

5. PRESENT STATE OF RURAL DEVELOPMENT IN NORTH-EAST THAILAND

5-1 General information on North-east Thailand

North-east Thailand is the largest region in the country. It consists of 16 provinces and covers an area of 170,226 square kilometers, about one third of the total area of the country. In terms of the population of the country, North-east Thailand is the most populous region comprising approximately 15 million or roughly one third of the total population. The majority of the North-eastern people are ethnic Thai. However, there are some minorities, Vietnamese, Laos, and Kampuchean, living along the border area. These minorities comprise only a small fraction of the total population of the region. In general, it can be said that the population of the North-east has a very high degree of homogeneity.

More than 80 per cent of the population of the North-east lives in rural areas. Agriculture is their main occupation. According to the official statistics, more than 80 per cent of the workforce in the North-east works on the rural farms. Only a small fraction of the workforce of the North-east works in the cities.

Due to the fact that most of the North-eastern people work on rural farmland, it is not surprising at all to observe that their level of education is relatively low. In terms of potential manpower development, it is felt that a lot of effort is still needed. This aspect of development should be discussed in detail later.

Table showing the prefecture names in North-east Thailand.

1. Kalasin
2. Khon Kean
3. Chaiyaphum
4. Nakhon Phanom
5. Nakhon Ratchasima
6. Buri Ram
7. Maha Sarakham
8. Yasothon
9. Roiet
10. Loei
11. Si Sa Ket
12. Sakon Nakorn
13. Surin
14. Nong Khai
15. Udon Thani
16. Ubon Ratchathani

Fig. 26

MAP OF KORAT (NAKHON RATCHASIMA)

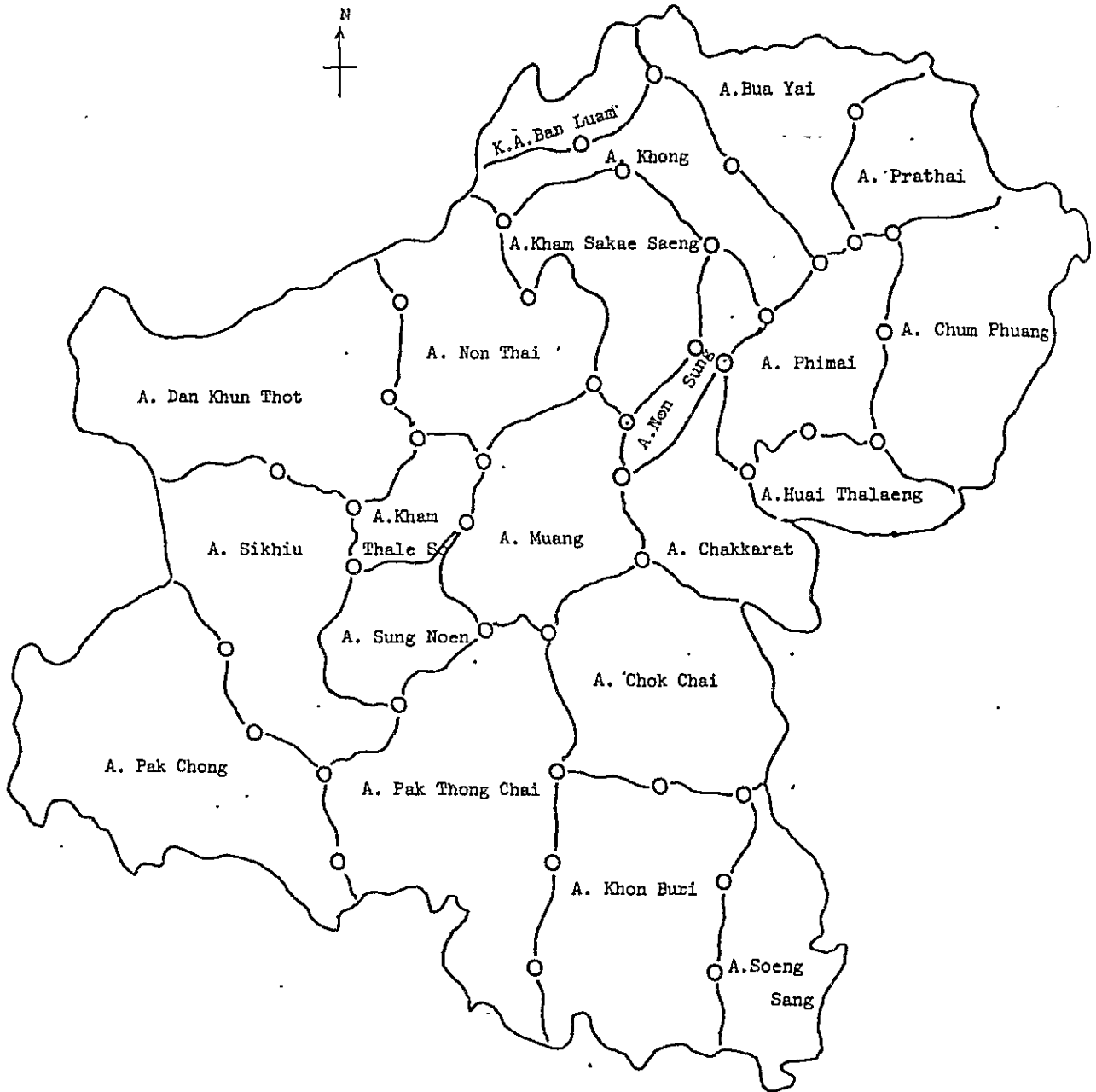
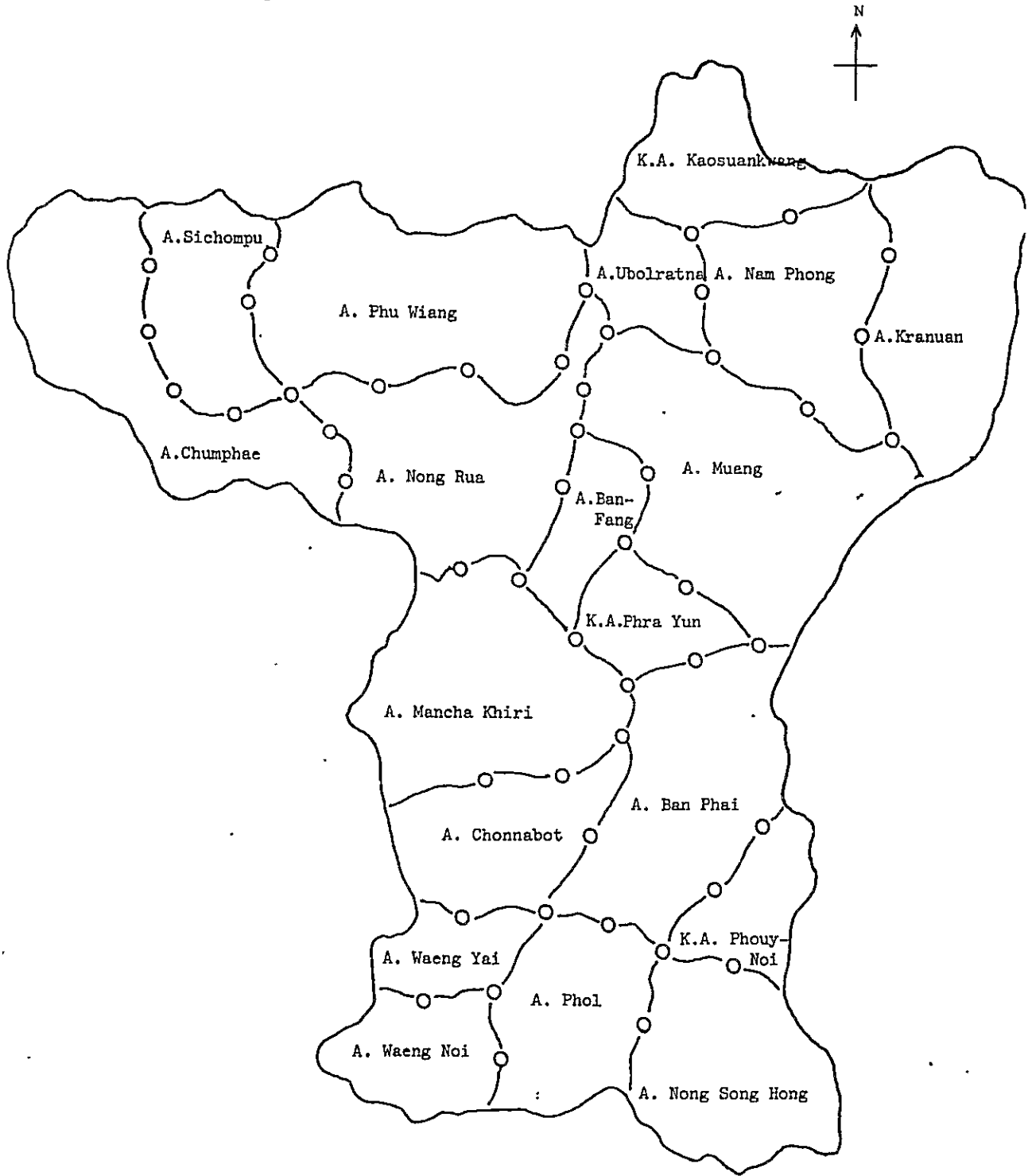


Fig. 27

MAP OF KHONKAEN



North-east Thailand has an area of 170,200 km² covering 16 provinces. The whole region is divided by the river system into three main areas. The first area is located in the upper part of the region, an area of approximately 45,000 km², comprising many tributaries of the Mekong and with runoff flowing directly into the Mekong River. The second area is located in the middle of the region, namely the Chi River Basin, occupying an area of approximately 54,100 km²; there are two main tributaries of the Chi River. One is the Nam Pong River and the other is the Lam Pao River. The Nam Pong River flows into the Chi River in Khonkaen Province, the Lam Pao River flows into the Chi River in Roi-et Province and the Chi River flows into the Mun River in Yasothon Province. The third area is located in the lower part of the region, and the Mun River is the main river of this area. This river has a catchment area of 70,000 km² and the discharge flows into the Mekong River in Ban Dan District about 80 km from the east side of the Ubonratchatani Province.

The water resources of the river system mentioned above is shown in the following table.

Table 26

River	at	Drainage area	Average Runoff	Period of Record Yrs
			million m ³	
Nam Pong	Khon Kaen	13,168	2,268	11
Lam Pao	Nong Song Hong Dist.	5,542	963	6
Chi	Yasothon	47,406	7,059	18
Mun	Ubonratchathani	106,673	18,918	18

Rainfall is one of the water resources in North-east Thailand. Fig. 1 shows the isohyetal map of mean annual rainfall in North-east Thailand for the period of record of 28 years (1952-1979) and details of the record are shown in table 27.

Table 27 Mean Annual Rainfall (at Key Stations in North-east Thailand)

No.	Station	Mean Annual Rainfall	Period of Record
		mm	Yrs
1	Loei Province	1,201.09	28
2	Nong Khai Province	1,649.0	28
3	Udon Thani Province	1,473.0	28
4	Nakhon Phanom Province	2,299.7	28
5	Sakon Nakhon Province	1,442.1	28
6	Khonkaen Province	1,160.0	28
7	Kalasin Province	1,362.2	28
8	Maha Sarakham Province	1,228.4	28
9	Roi-et Province	1,400.6	28
10	Chai Ya Phum Province	1,136.7	28
11	Ya so thon Province	1,360.4	28
12	Nakhon Ratchasima Province	1,102.0	28
13	Burirum Province	1,254.5	28
14	Surin Province	1,242.9	28
15	Sisaket Province	1,395.4	28
16	Ubon Ratchathani Province	1,579.1	28

Annual rainfall in North-east Thailand is around 1,000 to 1,500 mm. and falls during the monsoon season only. After November the land becomes drier and drier until the next rainy season. The brown colour of dead vegetation was generally seen along the roadside during the trip. Only in some parts of the land within the project areas were some green irrigated crops observed but they seemed to be very small areas in the vast undulating plain. It is obvious that, with increasing number of tanks or pumping from a reliable source of supply, more and better agriculture development can be carried out in the North-east Region.

5-2 Some aspects of the history and culture of North-east Thailand.

(1) THE ORIGIN OF THE PEOPLE OF NORTH-EAST THAILAND.

The ancestors of the people of North-east Thailand were a mixture of several ancient groups. They include: (1) The ancient "Nigrity", of which the major group migrated further southward. Nowadays many of them are found living in the deep jungle in the Malayan Peninsula. (2) The "Austronachian"

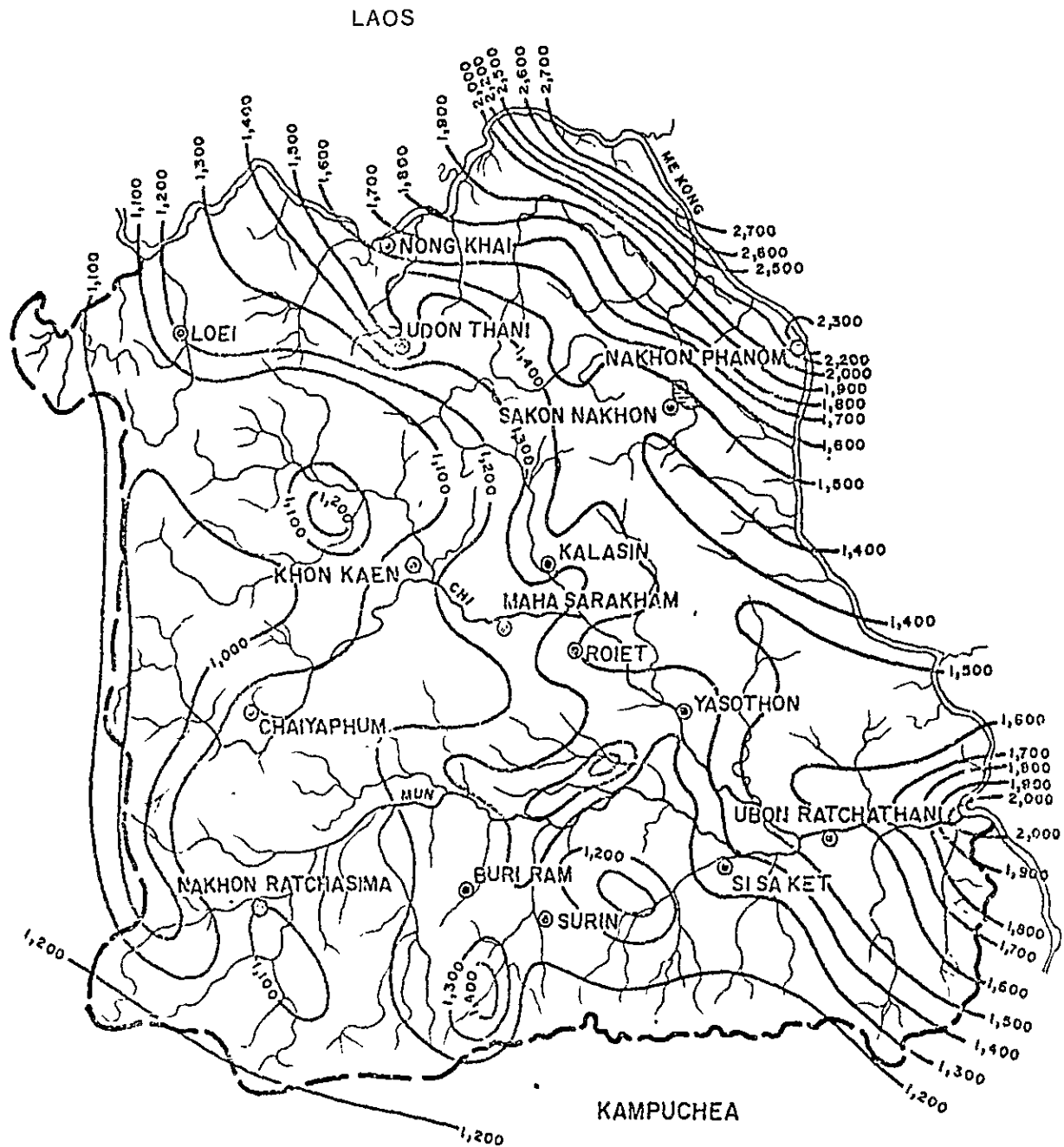


Fig.28

ISOHYETAL MAP OF MEAN ANNUAL RAINFALL
(1952-1979) NORTHEAST THAILAND

⊙ PROVINCE

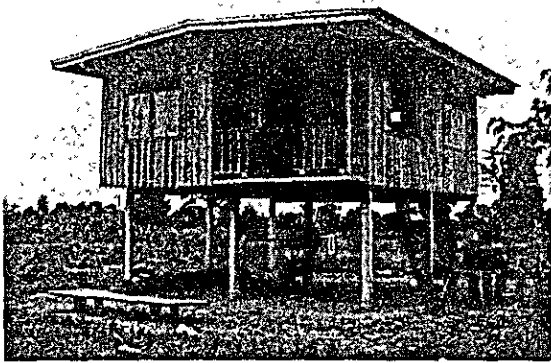


Photo 7 New farmer's house



Photo 8 Water buffalo

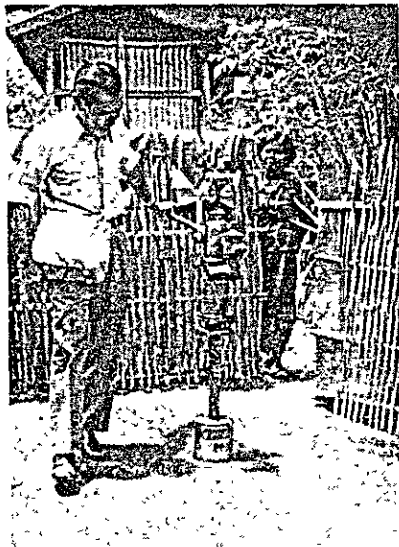


Photo 9 Family well



Photo 10 Transportation of rice

who were said to have migrated from the South-eastern region of China, passing through Thailand all the way to Malaya, Indonesia, The Philippines, and as far as New Zealand. (3) The family of "Ka" which can be divided into many sub-groups, namely: Kajarm, Kamorn, Kamu, Kaoam, Kamer, Karen, Kawa, and so on. (4) The "Yuan" and (5) the "Oai Laos".

The Oai Laos was the most populous of all groups. They can be traced back as far as seven thousand years ago when they lived in Mongolia. The Oai Laos were considered Mongolian. They started migrating southward along the Yellow River Valley and the Yang Si Kiang Basin some seven thousand years ago.

The long history of the people of Oai Laos was full of struggle, conflict and fighting against the native people while they were migrating from place to place and particularly with the native Chinese. The battles usually ended with unfavorable results to the Oai Laos.

The defeated Oai Laos kept on their migration southward. However, many of them stayed behind and formed several large communities in present day China. The migrating Oai Laos finally arrived in South Asia scattering into several countries including India, Vietnam, Laos, and Thailand.

The Oai Laos which migrated into Suwannaphoom formed three kingdoms:

- a) "Lanna" in northern Thailand with Chiangmai as the capital.
- b) "Lancharng" in north-eastern Thailand with Nakorn Risuchanakanahut as the capital.
- c) "Siam", a merger of Sukhothai and Ayuthaya.

These three kingdoms merged and became Prata Siam and finally become Thailand in 1941.

The present day people of North-east Thailand and those of Laos are close kinsmen. They are the same group of people by common ancestry. They share a common language, customs, and history and are considered to be brothers. It is also noted that the customs, culture, and language of North-east Thailand are similar to those of northern Thailand.

(2) CERTAIN CUSTOMS AND CULTURE IN NORTH-EAST THAILAND.

(i) Glutinous Rice Area.

The people in north-eastern and northern Thailand, the whole nation of Laos, and the neighbouring regions of Burma, Vietnam, Cambodia, and Yunnan of Southern China constitute a continuous culture area of around 200,000

square miles with glutinous rice as their staple food.

Throughout northern and north-eastern Thailand, rice eating is a sign of status. The indigenous villagers eat glutinous rice, a sign of inferiority. The central Thai eat white rice, a superior diet. Although people seldom speak of rice as a sign of status, all recognize it as such. An official local feast provides a good example, the high ranking officials and other officials of central origin are served with white rice, while the headman of the village and other villagers eat sticky rice.

(ii) Eat Together

A household is defined to include members who eat together. Eating together means to eat food from the same cooking. They may or may not eat at the same time, depending upon whichever way is more convenient at that time. The north-eastern style of eating glutinous rice makes it unnecessary for all members of the family to eat at the same time. A whole day's supply of rice is cooked early in the morning and then stored in a wooden keg. There the members of the family help themselves whenever they are ready to eat. There is no prohibition against the male and female members of the family eating together, However, when there are guests, the women usually eat after the men.

(iii) Matriarchy

According to the government, the father or husband of the family is the head of the household. However, in the social context of north-east Thailand there seems to be a tendency toward matriarchy. A typical multigenerational extended family is of matrilineal-stem type composed of parents, unmarried sons and daughters, and the married daughter and her husband and children. As sons grow up, they marry out of the family and go to live with the families of their wives. Daughters ideally marry in sequence of age. Each daughter and her husband lives in her parents' house for a period which varies from a few months to several years. Two married daughters are not supposed to live in their parents' house at the same time. The first married daughter and her family usually moved into a separate house in the courtyard of her parents when the second daughter marries and brings her husband to live in her parents' house. The youngest daughter together with her husband and children remain to live with her parents for the rest of their lives, and ultimately inherits the house. The separated households of the older daughters remain under the domination of the parental house as the latter controls the formers' labour until they gain independence.

Under certain circumstances the married couple may practice partilocal residence. When the couple consider that it is more appropriate to live with the groom's family, they may move there after a brief stay with the wife's family. For instance, where the man's family is much richer or his parents have no daughter to perform the woman's work of the household and to care for them in old age as well as to inherit the house and the matrilineal ancestors.

(iv) Inheritance

The ideal rule of inheritance is that all children, sons and daughters, inherit equally the property of their parents. The main exception to the rule is that the youngest married daughter, who brings her husband to live in the house of her parents, inherits the house and its grounds, in addition to her share of the rest of the property. The reality of inheritance is much more complicated than the ideal and reveals more detailed rules and options as it is considered appropriate under certain circumstances. A rich child may refuse to take any of the inheritance, so that the less fortunate ones will get more. In other cases, a deceased man may give all of his property to his newly married wife and nothing to his children.

5-3 Literature of the North-east

The development of North-eastern customs and culture can be found in many North-eastern literary works. This is not a universal phenomenon for all regions in Thailand. In the central part of Thailand, most literature was initiated or written by the people in the King's Palace; but in the North-east, the common people wrote their own literature.

As a consequence, the North-east people are more close to their local literature. Because of their own initiative, most of their philosophies, customs and culture were recorded with or without their acknowledgement in these literary works.

If their way of life and the ideologies they have are studied, it can be concluded that those literary works in turn have had a considerable influence upon the people in the following generations.

(1) Philosophies in North-east Thailand.

The North-eastern philosophies are a combination of Buddhism and Animism. The most outstanding and relevant literature: "12-month Customs for the People and 14 Principles to be observed by a Ruler" must be paid most attention as this work can be regarded as social rules and regulations for

the North-eastern people in former times.

The oldest literature, called "Khun Bor Hom", was written in the early 16th century (1500-1520). This work is, in a way, an ancient history, which is full of the philosophies of the North-east people. According to this work, the ruling class was born of heaven and destined to rule, while the common people were in a much poorer position and destined to be ruled at all times.

The North-eastern people's culture was under the sole influence of the Mekhong Basin until the fifth reign of King Chulalongkorn. Undoubtedly, the North-eastern people were able to identify themselves more easily with those people beyond the Mekhong River if they had liked to. Now, the culture from the Central Part of Thailand, so-called the Chaophaya Basin, has had a bigger role in the North-east way of life.

In most of the admired works, the writers often interpolated their own views concerning rules and regulations of the society in the old times. If these rules and regulations were not observed, then the violators would be condemned; they and their families would be faced with inauspicious things and disasters.

The literary works intended to establish a common concept of society; that is to say, in order to be reborn into a good life, one must try to be patient with everything and always do good. Their philosophers believed in the world of the next Bodhisattva, who will save mankind. In many words, in the form of fables, they repeated that if the people observed the "12-month Customs for the People and 14 Principles to be observed by a Ruler" and other teachings, they would be very happy in the next life. This is of course was an incentive for the people to keep observing those teachings seriously.

In other words, the system of ruling the people in the Central and the North-eastern parts are not similar. In the former system, which is called the "order system", it must be backed up by laws; in the latter system, which is called the "attitude system", an attempt will be made to establish the relevant attitudes that make the people accept authority.

(2) The role of the Buddhist temple.

A Buddhist temple is the centre of everything for the villagers. All the above-mentioned teachings have been especially disseminated by Buddhist monks. The literary works are in a sense the means of ruling, controlling or directing the people. As these fables or stories are claimed to be parts of the 500 odd stories of former incarnations of the Buddha (a Jataka),



Photo 11 Children in research village

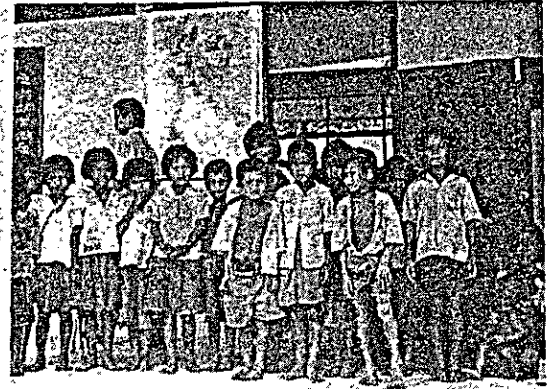


Photo 12 Students of primary school in poor village

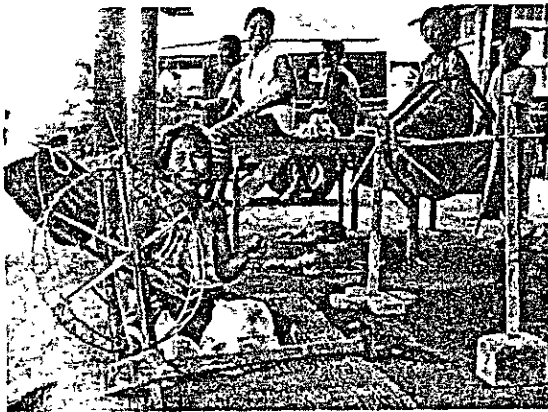


Photo 13 A spinning wheel



Photo 14 Handweaving

people were even more convinced to believe in the teachings inherent in those fables or stories.

These written works were sometimes aimed at protesting to the rules or against deceiving oneself that the nature can be overcome; for example, in one of the famous stories an ugly prince, called "Phya Kunkarg", fought with Phya Tan and forced him to provide rain for cultivation. Phya Tan was in fact considered supernatural by North-eastern people and who believed he would never be overcome by human beings. According to Sigmund Freud, dreaming and writing can both come to the same end; i.e. to stay away from the real and unhappy life.

It is recommended that an intensive survey on literary works is necessary in order that the North-eastern people can be understood and appropriate ways can be found to successfully help the people.

5-4 Irrigation Development in North-east Thailand.

The growing season in North-east Thailand falls within the same period of the South-west Monsoon season which lasts from May to October. The outbreak of the South-west Monsoon brings appreciable rain to the North-east region. Ploughing begins in June and July followed by nursery cultivation, and transplanting of rice crops will take place from July to August. Surplus rainfall in the form of storm runoff flowing into the Tank is stored. The release of supplemental irrigation supplies is made during the period of less rain. Rain water is utilized by the rice crops both inside and outside the project areas but those crops depending on rain alone usually yield less and are unreliable because the rice crops may die during the long dry spell.

The rice yield in the project areas is around 400-500 kilograms per rai (Thai unit area equals 1,600 m².) or equivalent to 25-31 tons per hectare.

The rice crop is normally grown in the project area during the wet season. Crops other than rice, such as beans, or cucumbers are usually grown during the dry season and only in part of the areas depending upon the water left in the reservoir.

North-east Thailand is bounded by the Mekhong river to the north and east while its southern boundary is adjacent to Cambodia. The west boundary leads to Central-North Thailand beyond a dividing ridge of 1,000 metres altitude. The river system of the region can be divided into 3 parts; the area along the Mekhong river, that along the Chi, and along the Mon. Topographically, the land slopes from the west downwards to the south-east to form a vast plain

of 100-200 metres above sea level. The following 4 regions may be considered with respect to the mode of water management.

(1) Area benefitted by large dam.

The Lam Pao dam, under construction on the upper reaches of the Phan river, a tributary of the Chi river, is situated 20 Km north of Kalasin city.

The Lam Pao dam supplies water to the Huai Si Thon tank, which, together with the water from its own catchment area, irrigates 1,760 ha of cropland in the wet season and 800 ha in the dry season.

In the benefit area of this dam, there exists an agricultural experimental station established in 1966 by the aid of the United Nations. Here, farm products such as paddy rice, peanuts, sweet corn, soy beans, and sweet potatoes are grown in an area of approximately 10 ha. Water management taking the groundwater table into consideration is carried out, as well as irrigation. By spreading irrigation and cultivation techniques developed in this experimental station throughout the benefit area, remarkable progress can be expected in the neighbouring villages.

The driving channel from Lam Pao dam to Bung Aram tank is under construction at the moment; water supply will be started as soon as the aquaduct is completed.

This tank will enable efficient operation of reservoirs providing irrigation during the dry season, and thus enlargement of the benefit area is expected.

Apart from the above-mentioned, the Nong Thewarat tank downstream of the Lam Pao dam was also investigated. These basins are listed in the following table.

Table 28

reservoir	storage capacity	irrigated area	aquaduct from Lam Pao dam
Nong Thewarat	$1.46 \times 10^6 \text{ (m}^3\text{)}$	96 ha	absent
Bung Aram	2.61×10^6	176	under construction
Huai Si Thon	5.89×10^6	1760	present

With respect to Huai Si Thon, an irrigation canal system has been constructed and crops being grown at the moment (dry season). As for Nong Thewarat and Bung Aram, water is delivered by plot-to-plot irrigation, a natural sloping method, to the lower benefit area, where nothing is grown in



Photo 15 Temple in full moon

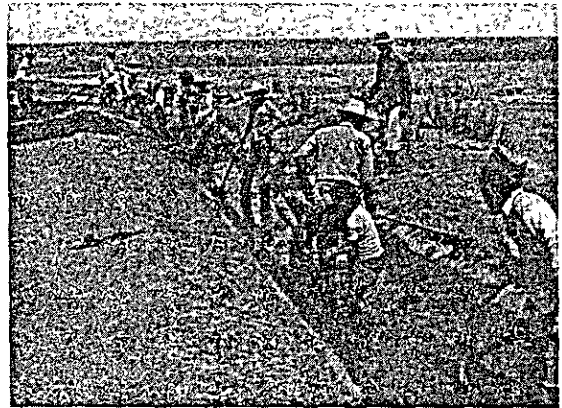


Photo 16 Cleaning of irrigation canal



Photo 17 Preparation for vegetables

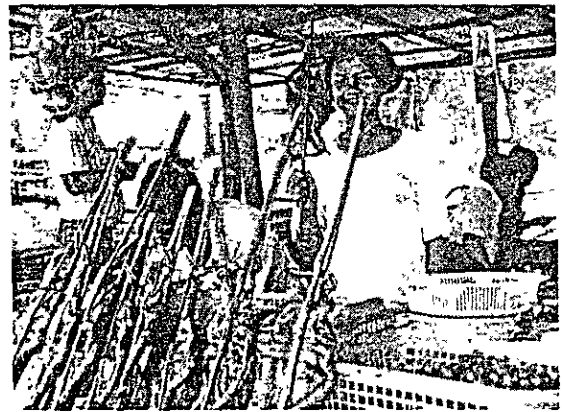


Photo 18 Small restaurant

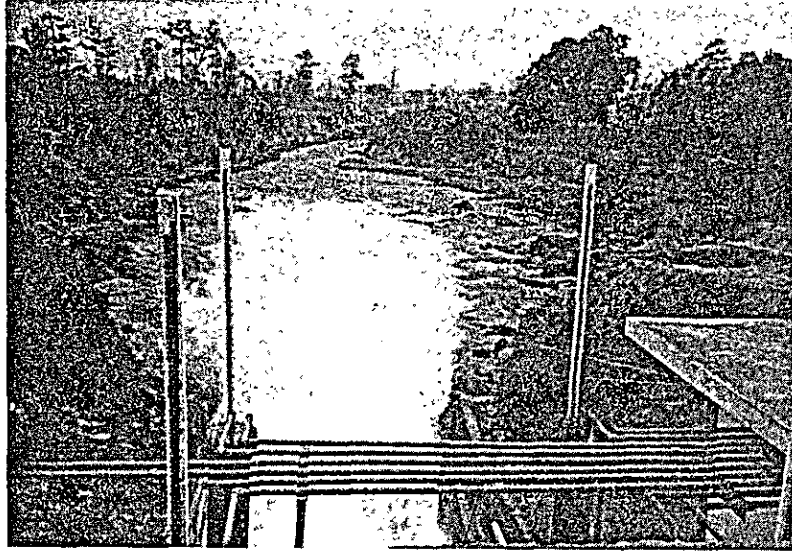


Photo 19 Main canal for the Nam Gum reservoir

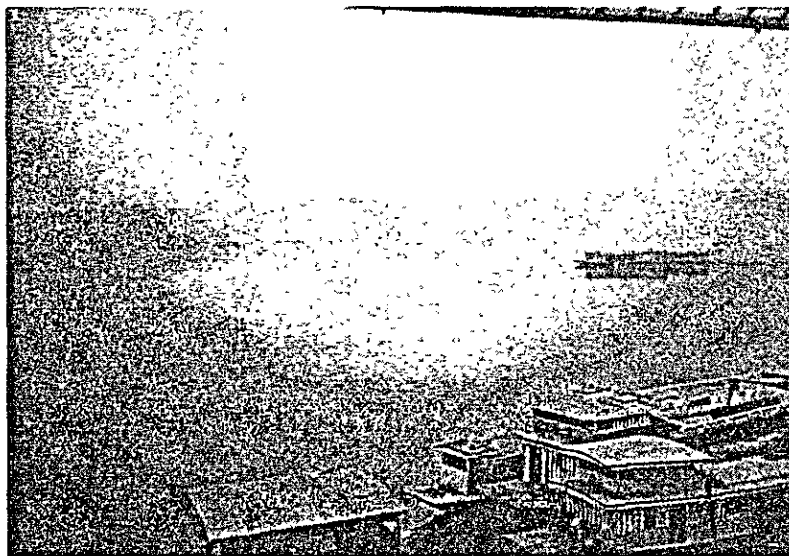


Photo 20 The Maekon river at Nom Kai

the paddy fields at present. Both tanks have a very shallow depth and it is impressive that neighbouring farmers are catching fish with casting nets in the residual water, which is delivered for domestic use in pipes.

Supply of water from Lam Pao to these dams will enable irrigation during the dry season, changing paddy fields to fertile areas and this will release the poor farmers from fishing.

(2) Area along the Mekhong river.

Pumping stations have been introduced along the Mekhong river. Farm products such as paddy rice, tobacco, tomatoes, and water melon are grown. The pump house is operated by the R.I.D. while the main and lateral canals are managed by the farmers. The water rent varies with planting area and crop varieties; e.g. 50 ฿ /season/rai in the case of rice. The average income of a farmer is 10,000 ฿ or more from a farming area of about 1.6 ha; the income consists of 7,000 ฿ from the first crop of rice and 3,000 ฿ or more from that of the second, melons, tomatoes and so on.

There are 17 pump houses along the Mekhong river, and these carry out irrigation for a width of 2-5 km. The possible discharge from the Mekhong river amounts to 25 % of the total discharge and, at the moment, only 20 m^3/sec are taken in at the maximum. It can be considered that a fair amount of discharge remains to be exploited in the future.

As the second step of development in this region, a project to enlarge the irrigation width on the right side of the river from 2-5 km to 15-20 km has been started.

(3) Region suffering damage from salt accumulation.

Between Korat and Khon Kaen, there are places where accumulation of salt in reclaimed land is causing damage to plant growth. Also, in some places, the ground water contains so much salt that it is unsuitable for drinking.

As mentioned above, in the region lying between Korat and Khon Kaen, strata containing considerable quantities of salt are present. Without infiltration pressure such as rain, a phenomenon can be seen in which salt rises by surface evaporation precipitating out on the ground. This also affects irrigation water and the drinking water reservoirs and an analysis of water quality has shown salinity above a standard value.

(4) Regions with irrigation tanks.

There are many tank irrigation systems in North-east Thailand. From Korat to Khon Kaen, several tanks in which water is collected solely from their

own basins, and where their benefit areas are provided with irrigation canals, were investigated.

Water management of the Huai Sai tank is arranged so that 8 zonemen selected from 85 families within the benefit area take charge of the main and lateral canals and 1 representative notifies the R.I.D. office of the daily discharge requirements.

Huai Yang also serves as the experimental site for runoff processes. The whole catchment area is flat with little undulation, possessing the characteristics of the North-east reservoirs. Thus, with heavy rainfall during the wet season, the direction of rain streams may become diverse, resulting in an indefinite runoff basin.

Of the tanks mentioned previously, Huai Sap Pradu has the largest capacity with a fairly established water managing system. In its benefit area consisting of 2 districts and 3 communes, 3,000 people making 600 families are living. Some people who had left the village during droughts have moved back.

(5) Recommendations.

- a. An understanding of the specific hydrology and an outline of North-east Thailand as a whole is required. For this purpose, a review of the existing data and their analytical examples is suggested so as to understand the general characteristics from past investigation results. At the same time, rainfall and runoff data over the whole of North-east Thailand should be researched, collected and classified. Also, it is advisable to try analysis personally and compare with past results.
- b. For the tanks such as Huai Yang constructed in a vast plain, with little undulations in the basin and for which boundaries of the basin become obscure during the wet season, it is useful to study rainfall-runoff relationships in detail for construction of small-scale reservoirs in the future.
- c. With respect to dams such as Huai Si Thon to which water is newly supplied from large dams, investigations on changes of the actual water management conditions caused by the enlargement of planting areas, alteration of crop varieties, and improved managing methods are desirable.
- d. Considerable assistance in predicting future water use and agricultural development in North-east Thailand may be obtained if a thorough analysis is carried out on rainfall-runoff and actual water management conditions at

dams, such as Huai Sap Pradu, possessing well-defined basins and large storage capacities, and for which water management techniques are advanced.

e. The topography of the North-east region is characterized by a rolling landscape and often steep slopes with sandy soil. Rivers are generally short and swift. This situation makes large scale irrigation very costly and is usually inefficient. This circumstance partially explains the widespread existence of small scale irrigation and reservoirs in the region.

f. North-east Thailand is a sensitive area subject to heavy insurgency and guerrilla activities. To win over popular support, the government has, among other endeavours, developed water resources for irrigating farmland as well as for domestic consumption. Fighting for popular support, the government has to move fast. Constructing large scale irrigation needs careful planning and imposes a heavy financial burden on the government which is not suitable in an emergency case like this. As a consequence, small water reservoirs have sprung up all over the region.

g. Reservoirs created as a result of the above-mentioned schemes have a significant and everlasting effect on the ensuing water management and maintenance of the irrigation systems. The government initiated the irrigation project, and was responsible for the construction, operation, and maintenance. Farmers had no role at all except enjoying the results free of charge. This situation can be analyzed as follows:

h. The lack of farmer participation in the irrigation projects in the North-east is a crucial phenomenon deserving serious attention. Farmer participation in constructing and maintaining on-farm facilities is generally considered desirable. Many small, successful irrigation schemes in South-east Asia including those of Northern Thailand are constructed and are equitably operated solely by farmers.

i. The lack of careful planning is predominant in most irrigation schemes in North-east Thailand. This is largely due to hastiness and concentration on security considerations. The design of irrigation systems for long-term stability must include not only political considerations of winning over the sentiments of the population, but also agricultural, economic, social, legal, and environmental considerations, and engineering aspects of water storage and conveyance. A multidisciplinary approach, in which each specialist understands the interaction between his discipline and that of his co-workers, is

required to integrate these various factors into a final design.

j. To use the irrigation water efficiently, a fee must be charged to the farmers in the irrigated areas. It is recommended that farmers should bear the cost of irrigation at least to the extent of paying for the annual operation and maintenance expenses. Water charges might be in the form of direct payments for water or indirect land taxes. If the irrigation is profitable, farmers must be able to pay for the cost of irrigation. In addition, when a water fee is charged, the government can use the proceedings to finance further irrigation schemes and thus accelerate the expansion of irrigation coverage.

In conclusion, despite various limiting factors, North-east Thailand has a great potential for water resource development.

A good irrigation system and an effective rural organization, among other factors, are likely to be a prerequisite for rural development in North-east Thailand.

k. There is a general consensus in the literature that the quality of local leadership, the nature of local values, the profit incentive, and the extent of economic and social disparity within a village are important determinants of successful irrigation and village organization. Given the hypothesis of this study, the aforementioned factors become the determining variables of rural development.

However, impressions derived from field observations suggest that the success of the irrigation systems in North-east Thailand depends heavily (aside from the natural factors that determine the quantity of water available) on the efficiency and effectiveness of government officials responsible for the irrigation project rather than on the factors mentioned in the above paragraph.

5-5 Limiting factors for integrated rural development in North-east Thailand.

In low income agriculture like that of North-east Thailand, factors belonging to the former group are usually abundant and those of the latter are scarce. Because of the complementary nature of the two groups of factors, existence of certain resources in relatively large quantity, compared with the others, normally results in low marginal productivities of the abundant resources and total output also remain at a low level. Under such circumstances significant increases in production can be obtained by increased factors of a particular set of scarce resources.

Therefore, the first requisite of an integrated development in traditional agriculture is specific identification of the various abundant and scarce resources. Determination must be made of the extent to which the abundant resources are being under-utilized and the specific nature of their relationship to the scarce resources. Following identification of the scarce resources, means must be discovered for enlarging their supply. Because of the high degree of physical, economic, and cultural variability in agriculture, regional decentralized measures must also be taken into account.

In North-east Thailand, land and labour as well as certain types of capital are relatively abundant. While irrigation, rural organization and marketing facilities are scarce resources and thus constitute the important limiting factors for rural development in the region.

(i) Irrigation

A good irrigation system is a prerequisite for efficient use of other forms of input. For instance, applying fertilizer and improved seed without sufficient water control usually brings about disappointing results. There is a general consent in the literature that the unreliability of water control is one of the most important obstacles for new technology adoption and thus a serious hindrance for rural development.

Only about 10% of the cultivated area in North-east Thailand is covered by irrigation projects in the wet season and less than 1% in the dry season. This situation is aggravated by the fact that many irrigation projects in the area have fallen short of expectation (including all of the study project, i.e., Huay Si Ton, La Lerng Wai, and Sub Pra Du), partly because they have been designed and managed almost exclusively from an engineering point of view.

(ii) Irrigation facilities at the farm level.

Irrigation systems in North-east Thailand deliver water to fields by supplying it via the highest plots to those on the next level and from these to the levels and fields below. Water moves from field to field in a descending sequence down and across the terraces formed by the slope of the land in the command area. Channels connecting the village canal inlet to individual fields were seldom built (except in some well designed irrigation projects). As a consequence, farmers, regardless of the location of their individual plots on the terraces, cannot draw water independently from each other as needs arise from the conditions of the crop and state of the soil moisture in their particular fields. Instead each farmer must wait until

water is released to cover all the fields across the slope by the slow flow from the uppermost to the lowest. The entire command area must be saturated whether the crops on some fields need water or not. This situation is aggravated by the rolling landscape. Crops suffer from over-irrigation or deficient moisture depending upon the frequency of water release for the entire irrigation block and on the level of the particular farm. Besides, in the absence of a proper drainage system, water accumulates in the valley lands. The existing field-to-field irrigation system stands in the way of the adoption of suitable cropping patterns on different types of land and in controlling the quantity of water and its timely use. Farmers cannot select crops that have widely varying water requirements for production on fields located at different points in the same command area.

The remedy for this situation has long been known. A network of water delivery channels running from the village irrigation inlet to each individual field, and a complementary network of drains connecting each field to the main drain at the bottom of the terraced slope provides each farmer with full control over the provision of water to his particular plot. But networks of such channels can virtually double the costs of small scale level work in building an irrigation system. These extra costs can turn a project from being a winner to being a loser. Because of cost, the added water savings and the added production benefits of individual field control over water use are usually ignored when systems are built.

(iii) A brief review of successful irrigation development.

The design of irrigation systems for long-term stability must include not only engineering considerations of water storage, conveyance, and delivery, but also agricultural, economic, social, and other relevant considerations. A multidisciplinary approach, in which each specialist understands the interaction between his discipline and that of his co-workers, is required to integrate these various factors into a final design. Specialists from various disciplines must collaborate from the outset in the design process of problem identification, data collection, field investigation, design analysis, pilot testing, selection of final design, and project implementation.

A brief review on the economic, production, social, and political factors follows.

(iv) Economic and Production Factors

Production incentives for farmers are important to the success of an irrigation scheme. One important incentive is the provision of on-farm

roads and facilities for applying and removing irrigation water. A high density of field channels is often associated with improved control and management of water. Better irrigation and drainage facilities generally save water. Rapid removal of excess water can lead to earlier harvests. Integrating access roads with the irrigation layout can result in a better managed and less expensive system. Improved access allows products to be rapidly transported to and from markets, thus reducing losses. Individual farmer control of water also allows management of fertilizer with minimum losses. All these attributes must be economically evaluated and incorporated into the on-farm system design.

(v) Social and Political Factors

The success of an irrigation project depends ultimately on its social acceptability and farmer involvement. Detailed knowledge of the social structure, cultural attributes, values, and leadership patterns is essential to appropriate planning and design.

The optimum size of the tertiary irrigation unit depends not only on physical criteria but also on the size of farmer groups that can effectively manage the water, and on the leadership required for efficient collective activities. Highly individualistic farmers may require more facilities or smaller tertiary units. Channel layout at the tertiary level must often compromise hydraulic efficiency for social acceptability, for example, field channels are made to follow property boundaries to avoid fragmenting farm holdings.

Farmer participation in constructing and maintaining on-farm facilities is generally considered desirable. Many small, successful irrigation schemes in Thailand are constructed and are equitably operated solely by farmers.

The political environment influences design decisions. Political involvement in Thailand occurs in decisions on the intensity of infrastructure, setting of irrigation fees, and commitment to their collection.

(vi) Rural Organization

Effective rural organization is a necessary condition for integrated rural development. Many developing countries have seriously engaged in exploring the potentiality of institutional innovation as a device for raising the productivity of small farmers to meet the challenge of the new development goals and to bring them into the main stream of development processes aimed at fulfilling basic human needs. The following reasonings are generally cited in the literature to demonstrate the important role

which rural organizations play in rural development.

First, the individual small holder, tenant, and agricultural labourer is powerless without organization to provide essential services, to express his needs, and to have his grievances attended to. Under conditions of individualism, the great majority of the rural population is deprived of the development process and thus the situation deteriorates which in turn jeopardises agricultural development policy.

Secondly, through organization the limited administrative capacities of the central government can be multiplied as local structures redirect through their channels the information, credit, fertilizer, and other inputs provided by the government. In performing these allocative functions, rural organization can activate the energies of rural people, afford them entry into the system or network of services and exchanges provided by the government, and gain for them a measure of allocative influence over their own destinies.

Finally, rural organization is a form of local self-government. It gives farmers the opportunity to tackle jointly many things needs for development, to decide on the use of the local resources to carry out and sponsor their own projects on a varieties of local problems as they see fit, and to become politically mature more readily.

Institutional advancement, especially that of economical significance such as agricultural co-operatives, does not happen easily. Whether the institutionalization is timely and satisfactory is not only dependent upon the concerted efforts of the villagers concerned, but also dependent in large measure upon the conscious efforts of the government agencies. It can not be taken for granted that just because farmers engage in a few cultivation practices together, or join together in building houses, it will be easy and natural for them to organize and operate co-operative societies. The skills and understanding required are quite different.

Economically significant rural organization is a scarce resource in North-east Thailand. It is limited in both quantity and quality and is likely to be a limiting factor, along with irrigation and marketing, in rural development.

The most prominent form of rural organization in the economic scene, the agricultural co-operative, is incapable of removing poverty which is widespread among farmers in North-east Thailand. The huge amount of finance and manpower assigned to the improvement of the co-operative movement falls short of contributing to building up a viable co-operative system in which farmers can pool their resources and efforts to achieve goals and objectives

that they can not achieve individually.

Since the time of its inception, co-operative life has been full of defects and in contradiction with genuine co-operative philosophy and principles. Co-operatives have not been able to keep up with their aspirations as an economic organization. This is largely due to the interference with, and direct control of, co-operatives by the government to an excessive degree. The government directly dominates the management, operation, and financing through its different administrative agents. The Government have treated co-operatives as political institutions which imposed a misconception on the co-operative movement and upset the popular participation principles. Co-operatives have been reduced to the position of being a channel of distribution of government goods and services. Farmers take co-operatives to be government agencies and will participate only at the government's order. The tight control of government over co-operatives has undermined the effectiveness of the co-operative movement in the North-east region in particular and in the country in general.

Marketing Effective marketing facilities are important factors in agricultural development. One important facility is farm roads and transportation. Without efficient marketing facilities, a significant increase in agricultural production reduces prices to the extent that most of the benefit derived from rising yields vanish as far as farmer is concerned. Otherwise the increased production is not able to find sufficient outlets and destroys the incentive for farmers to increase production. The lack of sufficient marketing facilities is often cited as one of the major disincentives for farmers to adopt improved technology in North-east Thailand.

However, because roads and similar facilities are very costly, their requirements should be carefully scaled to present and future expected traffic patterns, with attention to likely size of vehicles. The opportunity costs of scarce capital must also be balanced against economic returns expected from such investment.

5-6 Agricultural aspects of small scale rural development.

The main fruits, fruit vegetables and vegetables which were found in the markets of North-east Thailand were as follows;

papaya, banana, pineapple, mango, coconut, jackfruit, durian, sapodilla, litchi, water apple, guave, mangosteen, carambola, indian jujube, tamarind, manila tamarind, horse mango, star apple, star berry, orange, pomelo, apple, grapevine, pear, water melon, melon, cucumber, tomato, egg plant, pumpkin, onion, bean, garlic, sweet corn, lettuce, cabbage,

chilli, chinese parsley, etc.

Including the off-season fruits, there may be several times as many kinds of fruit as in Japan. However, the oranges, pomelos and grapevines were transported from other inland regions and the apples and pears were imported from abroad. In the future, because of the increased demand for oranges and grapevines, it will probably become necessary to grow oranges or other soft fruits in this part of Thailand. On the other hand, the number of kinds of fruit vegetables and vegetables was not as great as in Japan. Also during the survey, there was no opportunity to find the large-scale cultivation of vegetables in the same way as in Japan, except in and around Korat. In the future, the large-scale cultivation and introduction of new varieties of fruit vegetables and vegetables will become a very important problem in this region.

As a general rule, in the fine villages under survey, there were many kinds of plants to be found in home gardens as follows;

main fruit trees: coconut, papaya, banana, mango, jackfruit, sugar apple, pineapple.

other fruit trees: guava, lemon, sapodilla, pomegranate, tamarind, manila tamarind, water apple, etc.

fruit vegetables or vegetables: egg plant, garden bean, tomato, lemon grass, chilli, mint, etc.

Although there were a lot of fruit trees in the villages gardens, there were few fruit vegetables and vegetables, and there were no highly productive vegetable gardens such as Japanese ones where many kinds of fruit vegetables and vegetables are usually grown for their own daily food. It was interesting to note that the products of fruit trees and perennial trees, are more important than vegetables, annual plants or biennial plants, whereas in Japan it is the other way round. Furthermore, in addition to fruit and vegetables, over ten kinds of tree-vegetables are commonly eaten, for example, "Ga Tin" are eaten everyday. But in proportion to the increase in the standard of the tendency of eating food which can only be gathered in the forests is decreasing now. And also, it is very interesting that the main fruits, other than mango and sugar apples, are non-seasonal fruits, which can be obtained throughout the year. Therefore, taking the habit of eating the main fruits at all times of the year into consideration with the habit of eating tree-vegetables, it can be said that the products of perennial plants are most important and the concept of "fruit" may be different between Japanese and Thai. Judging from the stability of food supply, in Japan the order of stable food is crops, vegetables, fruit vegetables and fruit, and in



Photo 21 Rain-fed paddy field in the dry season

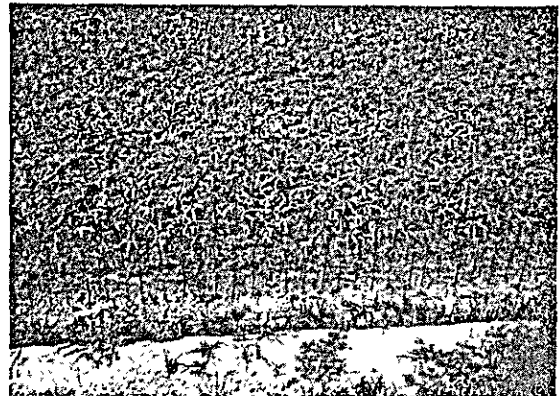


Photo 22 Casaba



Photo 23 Rain-fed paddy field in the dry season

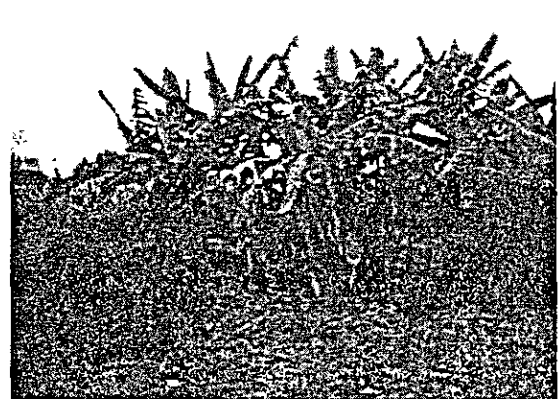


Photo 24 Banana

Thailand the order is crops, and others among which fruit is most important. Therefore, it is very reasonable non-seasonal fruit trees are commonly grown in their gardens. In carrying out a comparative study of agriculture between both nations, these points will be worthy of attention as very important factors.

It is felt that the above-mentioned main fruit trees are unlikely to be injured by irrigation, rather they would become vigorous; however deciduous fruit trees such as apples and pears would be injured by salt.

In the case of the introduction of new varieties of vegetables and fruit vegetables, judging from the present cultivation of beans, cucumbers and melons, this may be successful, if they are laid up in ridges and are well drained. Therefore, if the fields are successfully irrigated, many kinds of crops, fruit trees and vegetables could be grown, and it would be expected that the villagers' nutritive conditions would be improved, and food shortages avoided.

Considering the relationship between water supply and fruit productivity, especially during the dry season, flowering time is a very important problem, because fruiting is affected by water and nutrients supply at that time. The fruiting percentage of mango and sugar apple, seasonal fruit trees, depends on the supply of water and nutrients during the dry season, because they come into flower at that time. However, the non-seasonal fruit trees are not affected as much and consequently non-seasonal fruit trees are the most suitable plants in North-east Thailand.

Table 1 shows the propagation methods for many fruit trees. Among the main fruit trees, papaya, coconut and sugar apple are propagated from seedlings; therefore, the characteristics of these fruit are variable. On the other hand, the characteristics of banana, mango, pineapple and jackfruit are stable because of vegetative propagation.

The North-east Regional Office Agriculture in Khon Kaen and the Agricultural Experimental Station in Kalasin were visited. In both stations, research and experiments are conducted on the adaptability of rootstocks of mango, cashew and sugar apple. It is hoped that the results will be available in the future. On the other hand, very few experiments on land productivity have been conducted and actually the reviewed fruit yields were very low; coconut 832 kg/10a, mango 507 kg/10a, banana 792 kg/10a, jackfruit 753 kg/10a, in 1976. In the case of musk-melon cultivation in Korat, it is believed that the productivity of musk-melon can be doubled simply by improving the planting density or land use efficiency.

In conclusion, it is suggested that the land productivity of agricultural products could be increased two or three times in North-east Thailand, if sufficient water supply can be obtained at all times as and when required.

Names	Methods
papaya	seedling
banana	sucker
mango	grafting cutting
coconut	seedling
pineapple	crown, sucker, ratoon, adventitious bud
jackfruit	grafting, cutting, air-layering
durian	grafting
sugar apple	seedling, grafting
horse mango	seedling
litchi	grafting, air-layering
water apple	grafting, air-layering
guava	seedling, air-layering
mangosteen	seedling
carambola	air-layering
cashew	seedling
rambutan	seedling grafting, air-layering
indian jujube	grafting, cutting
pomegranate	seedling, air-layering
tamerind	grafting
sapodilla	grafting, air-layering

5-7 The effects of fertilizers in North-east Thailand.

Judging from a brief survey the properties of cultivated soil in the North-east are fairly uniform; the textures of the top soils are very coarse ranging from fine sandy loam to loamy fine sand with few gravels, and the soil organic matter contents are very low. These properties indicate that nutrient status in the top soil is very poor and the nutrient holding capacity and buffering actions are also low. So in the case of liming and application of water-soluble chemical fertilizers, special attention will be necessary.

(1) Amelioration of arable land in the North-east

The present agriculture in Thailand, especially in the North-east, is balanced on a "low input, low output" or "low cost, low income" relationship.

Introduction of an intensive agricultural system into such a situation will create various effects.

Average paddy yield in the North-east at the present is about 1.0 - 1.5 ton/ha, but it is said that if sufficient water supply is available, 3 ton/ha paddy yield is possible without application of fertilizers (heard at Huai Si Thon tank).

It is suggested that, when irrigation in the dry season spreads, fertilizer application will be continuously necessary because the soil fertility in the North-east is generally very low. Thus the present agricultural situation ("low input, low output") will be shifted to "high input, high output".

There are two choices of fertilizer application, one being "home-made manure", the other being "commercial fertilizer".

Home-made manures are organic in origin, so they have the merit of supplying organic matter which enables an increase in the buffering capacity of the low humic sandy soils of the North-east.

Sources of home-made manures are mainly crop residue (straw, leaves and others) and cattle faeces, but at the moment it is uncertain how much of these materials would be constantly available, because the crop residues are usually burnt on the field.

Therefore, it is necessary to investigate the possibility of utilizing straw as a source of farmyard manure, and the possibility of the cultivation of herbaceous leguminous plants for green manure.

Another promising green manure source is azolla.

Azolla is widely distributed in the rice-growing regions of the tropical and the temperate zones, and grows on the water in irrigated rice fields. It quickly covers the surface of the floodwater, but does not interfere with the normal cultivation practices of the rice crop. Azolla is extensively used as a green manure crop in Vietnam and southern China.

Azolla is a genus of water fern that assimilates atmospheric nitrogen in association with the nitrogen-fixing blue-green algae Anabaena azolla that lives in the cavities of Azolla's upper lobes. The nitrogen-fixing ability of the Azolla-Anabaena complex offers potential for increasing rice yield at comparatively low cost in the face of possible shortages and rising prices of nitrogen fertilizer. The azolla fern in particular offers a source of organic nitrogen fertilizers for rice farmers who cannot afford chemical nitrogen fertilizers.

Therefore, it would be worthwhile to attempt the propagation of azolla fern in the ponds or the small tanks in the North-east.

As for commercial fertilizers, their relative prices in Thailand are very high. For instance, the Ammonium sulphate/paddy price ratio in Thailand is nearly 10 times higher than that in Japan, so in order to increase the application of commercial fertilizer, improvements in the agro-economical side are needed in advance.

Finally, when fertilizer application has spread, special attention to prevent eutrophication will be necessary. As the top soil in the North-east is generally sandy and low in the nutrient holding capacity, nutrient fertilizer will be easily leached out into the neighbouring streams and ponds.

(2) Further Problems.

- i. A general survey of the nutritional characteristics of the top soil in the North-east.
- ii. An investigation on the circulation system of agricultural products and materials including commercial fertilizers and pesticides in the North-east.
- iii. An investigation on propagation of the azolla fern in the ponds of the North-east.
- iv. An evaluation of N, P, K circulation rates in some agro-ecosystem models in the North-east.

(3) Agricultural productivity with reference to fertilizers.

Agricultural production is a matter of productivity and efficiency. Increasing agricultural production can be achieved by either increasing productivities, or increasing the efficiency of resources used, or both.

(i) Identification of Limiting Factors.

It is interesting to note that within each service area of the irrigation reservoirs in the research sites, different individual farmers have access to a different degree to irrigation facilities and thus receive different amounts of water supplies. Access to sufficient water supplies is a prerequisite to introducing other forms of new technologies.

Increasing farm productivities consists of a package of practices. Due to the intimate way in which different farm practices interact in affecting yields, it is essential that (for an accelerated agricultural development program) a package of farm technologies should be introduced simultaneously. Irrigation facilities provide opportunities for farmers to apply other forms

of new technologies, such as fertilizers, high yielding varieties, pesticide, and herbicides. But will farmers use them? This is mainly a question of profitability and the accessibility of the relevant inputs. That is, the inputs must be effective and available in the local market at the time when they are needed, at a reasonable price.

If the results of the research indicate a high correlation between irrigation facilities and the adoption of other forms of new technologies, this would suggest that irrigation is the limiting factor for increasing agricultural productivities in the research areas. Once the irrigation facilities are available other forms of new technologies would also be adopted and irrigation facilities will be used to their full potential.

It is noted that the accessibility of each individual farm to water supplies is a problem of engineering techniques. Location, hydrology, and management factors have a bearing on the amount of water each individual farm can receive.

a. Efficiency in Utilizing Irrigation Water.

Since access to different amounts of irrigation water varies from area to area, together with the fact that different types of crops require different quantities of water, it is advisable to grow different kinds of crops on different pieces of land to the extent that variations in water supplies permit such differentiation in crop production. This is with a view to increasing the efficiency of water use.

b. Fertilizer Response Function.

The Farmers' response to the question "What is the most needed assistance you would like to request from the Government?" is usually a demand for fertilizer. But fertilizer prices are too high. Complaints about fertilizer prices are also more serious in the rain-fed agriculture of Ban Nong Ya Phraek than the other sample villages. Little fertilizer is being applied to the paddy fields of Ban Nong Ya Phraek but its use is quite common in the other villages.

The fertilizer response function will help to suggest the suitable price ratio of rice to fertilizer.

5-8 Agricultural Marketing in North-east Thailand.

The agricultural products of the North-eastern Region of Thailand are as follows: cassava, rice, maize, kenaf, jute, sugar cane, groundnuts,

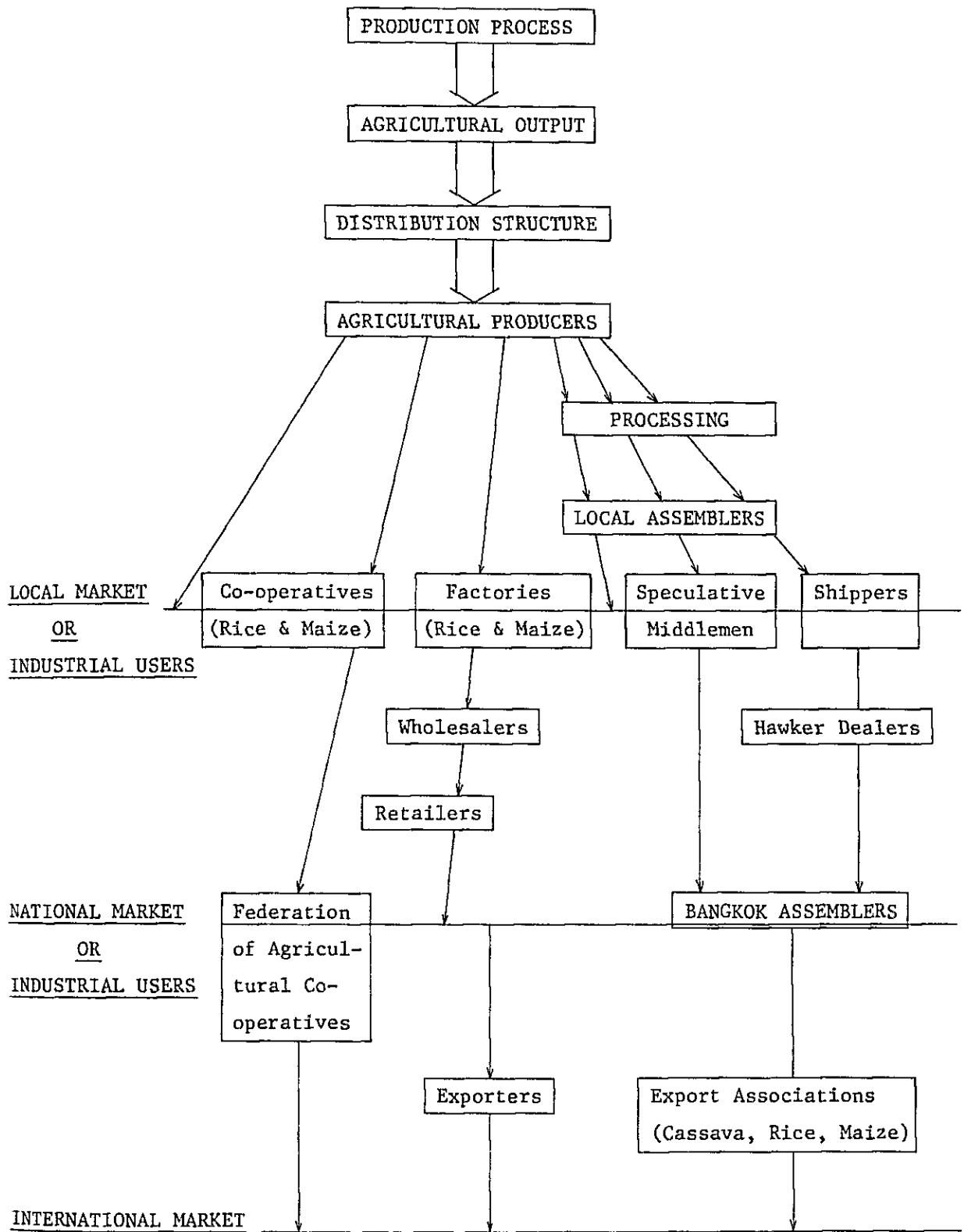
mungbeans, soybeans, castor seeds, cotton, kapok, silk, etc. After the production process is completed agricultural producers have to face the inevitable problem of marketing, especially when the objective of production is for commercial purposes. The research areas in Khon Kaen, Kalasin and Korat have different physical characteristics as well as different degrees of social organization development but they have one common "marketing problem." The living conditions of agricultural producers have not been improved because they have not been able to find a market for their output, or they have to sell their output at low prices due to seasonal production, excess supply and the market structure. In order to solve the marketing problem the following aspects must be carefully analysed:-

- (a) The market structure
- (b) The flow of agricultural products.
- (c) The behaviour of intermediaries involved in buying and selling.
- (d) Storage
- (e) Processing
- (f) Transportation
- (g) Pricing
- (h) Price fluctuations
- (i) Costs
- (j) Finance or Credit
- (k) Rate of return on investment or profit margins of middlemen.

As a result of the field survey, August 18-30, 1980, three main agricultural products were identified on the basis of volume as well as value; they are cassava, rice and maize. By tracing the flow of these agricultural products from producers to final consumers or users, it was found that their distribution structures were almost identical.

In the case of rice, about 10 % of the total output in Khon Kaen, Kalasin and Korat is for sale. Agricultural household consumption accounts for 85 % of the total rice production. In the case of cassava and maize approximately 75 % of the total output flows through various intermediaries. From the Flow Chart, it is quite clear that the distribution structures of cassava, rice and maize have multiple channels of distribution. The majority of the products flow through long channels of distribution. The longer the channel of distribution the higher the marketing cost will be because more middlemen are involved. Co-operatives in the North-eastern Region are involved in buying and selling only two agricultural products, rice and maize. Until 1979

Fig. 29



the government provided funds to co-operatives under the "Price Support Scheme". Funds were limited, so co-operatives purchased only a limited quantity of rice each year. The Federation of Agricultural Co-operatives provides loans to co-operatives in the North-eastern Region for buying maize for export. Most middlemen in the North-eastern Region and in Bangkok are Chinese; they perform all the functions of middlemen, buying and selling agricultural products, providing transportation, warehousing, financing, risk bearing in price changes and product deterioration.

Agricultural producers sell their output at prices determined by demand, supply and the number of middlemen in the channel of distribution. The longer the channel the lower the prices to agricultural producers will be, because export prices are determined by the world market, and the middlemen at each level must receive a certain amount of profit for the services they render. If agricultural producers use modern technology to increase their output, but they have to sell their output at very low prices for the reason mentioned above, under such circumstances their living conditions will never be improved.

The objective of integrated small scale rural development is to improve the living conditions of agricultural producers by means of raising their activities. In the development process there are many problems, one of the most important problems being "marketing". In order to achieve the objective there should be a thorough analysis on the co-operatives' and middlemen's functions and profit margins. Agricultural producers will receive better prices for their output if co-operatives fully perform their functions, and, at the same time, some of the middlemen in the channel of distribution should be by-passed in order to reduce the marketing cost. From the marketing point of view a complete elimination of middlemen is impossible and undesirable. At present, co-operatives are not in a position to perform all the functions of middlemen. On the other hand, agricultural producers will benefit from the competition among middlemen and between middlemen and co-operatives, if they function side by side. By using the world-market demand approach, it may be possible to propose feasible alternatives or identify potential commodities which will generate higher income in the long-run i.e. cashew nuts, livestock, etc. and at the same time short-run solutions may be recommended after empirical studies have been made.

The "Price Support Scheme" failed to improve the living conditions of people in the North-eastern Region. The reasons for the failure of the scheme are as follows:-

- (i) The Government provided very limited funds for buying paddy each year.
- (ii) Rice was the only agricultural product which came under the "Price Support Scheme.
- (iii) The Government had to rent cooperatives warehouses for the storage of paddy, but most of the local cooperatives' warehouses were small.
- (iv) District officers were authorized to buy paddy, and they followed government procedures which caused excessive bureaucracy and inconvenience to farmers.
- (v) No containers or transportation were provided.
- (vi) There was a complicated procurement process and the payment normally took 15-30 days.

Due to the problems mentioned above, farmers prefer to sell their output at slightly lower prices to merchant middlemen, but they receive much better services.

The government is aware of the marketing problem in the agricultural sector, so this year the government has adopted a "Price Guarantee Scheme" which will be effective for the 1980-1981 production season. This new scheme covers three types of agricultural products, rice, maize and cassava, which are coincidentally the same agricultural products to be analysed in the "TOBAN N.E. THAI PROJECT." So far as integrated small scale rural development is concerned the "Price Guarantee Scheme" seems to be more effective for the following reasons:-

- (i) The scheme covers more kinds of agricultural output, (rice, maize, cassava).
- (ii) Prices are higher than under the "Price support Scheme." Under the "Price Support Scheme" the price of paddy was fixed at ₪ 3,300 per ton; in the case of the "Price Guarantee Scheme" the price of paddy is fixed at ₪ 3,800 per ton.
- (iii) For the first time in the history of the country, the government is guaranteeing the prices of maize and cassava. The farm price of maize is fixed at ₪ 2,300 per ton and the price of fresh cassava roots at ₪ 710 per ton.

(iv) The Government is encouraging advance purchases of rice, maize and cassava.

(v) The Public Warehouse Organization (PWO) and the Agricultural Co-operatives Organization of Thailand (ACOT) will jointly set up rice and maize buffer stocks.

(vi) Special facilities for the export of rice, maize and cassava are being provided.

(vii) Special collaboration has been arranged between various government offices and private organizations, i.e. the Foreign Trade Department (FTD), the Bank for Agriculture and Agricultural Co-operatives (BAAC), the Agricultural Co-operative Federation of Thailand, Ltd. (ACFT), the Public Warehouse Organization (PW), the Thai Rice Mills Association (TRMA), the Rice Export Association, the Maize Export Association, the Cassava Export Association, etc.

It is high time to start a research project on the marketing system of rice, maize and cassava, to analyze variables which affect the marketing of all three agricultural products, and also identify the main determinants which will create higher incomes and improve the standard of living of agricultural producers. The effectiveness of the "Price Guarantee Scheme" may be evaluated by the end of 1982, and the result may be used to support the recommendations of the "TOBAN N.E. THAI PROJECT" which is to be completed in March 1983.

5-9 Farmers activities in Thailand and comparison with those of Japan.

(1) Agricultural co-operatives.

In Thailand the central government buys rice and sells fertilizer, i.e. it carries out de facto the functions of agricultural co-operatives. This situation reflects the weakness of the economic business of agricultural co-operatives and at the same time increases the weaknesses.

Concerning agricultural co-operatives, an officer resides at the agricultural co-operative office, so that agricultural co-operative is under government control and must pay half of its yearly profit to the Government. In this way agricultural co-operatives cannot be free of government control. As a result it takes on the character of a subcontract agency, supplementing the economic functions of the government.

(a) The situation of the water user associations is similar. The RID controls completely water use. The construction cost of irrigation facilities is borne by the RID. Farmers have no share. Water users' associations in Thailand do not have their own source of revenue for maintenance and independent management unlike the water user associations in Japan. The RID supplies to farmers all materials for maintenance of water facilities; the water user association supplies only labour. It is true that water user associations perform an important function, i.e. the water distribution, but it is said that the ratio of actual irrigation area to planned irrigation area is only 1:5 and the water cannot be supplied precisely to each piece (parcel) of paddy field. In this situation the water user associations function of water distribution is only the adjustment (coordination) for water shortages. Under these circumstances, the water user association is not an independent association, but only de facto one section of the RID.

(b) The situation of the village is similar to that of the agricultural co-operatives and water user associations. The headman of the village is elected by the villagers, but he receives his salary from the government and has the character of an administrative official rather than the character of

The village itself has no source of revenue of its own and no village (or community) property (for example common land). The budget of the village is covered by governmental subsidy, so the Thai village does not have the character of a self-governing body such as in Japan and Western European countries. This situation is a fundamental difference from the situation in Japan and Western European countries. In Japan and Western European countries, the village has common land for agricultural production and villagers' livelihood. Villagers mutually agree (i.e. by-law or village law) on a fee for villagers. This is the so-called village community. This village community is at the same time a fundamental unit of governing.

(c) Agricultural co-operative and water user association in Japan were organized originally on the basis of such village communities. Later on, the reorganization of village communities into functional units such as administration, marketing, and irrigation, was executed. This reorganization in Japan corresponded to the expansion of local markets for farmland, agricultural products (especially cocoon), and labour, in the Meiji era (1868-1911). Of course it would be wrong to over-emphasize the character of the village as a self-governing body. The government imposed the joint survey on village

communities from above and manipulated the village as the unit of administration, water use etc.

(d) In Thailand the village was not a village community, so that the water user association is based on a lateral unit from the technical point of view. The agricultural co-operative is based on the amphur unit from the point of view of management. In the villages of North-east Thailand natural economy is dominant and the important cash crop does not relate to the local market, but to the international market. In addition to this situation, the village community does not exist, so the government could not set up a functional unit based on the village community or the local market area and had to form the functional unit artificially from above.

(e) The difference mentioned above between Thailand and Japan is difference of type based on the difference in natural and historical conditions. It is not possible to provide a satisfactory explanation as to why this difference appeared; only a few points can be made.

It is mentioned that in the period of natural economy there were conditions in Thailand under which a small family could live easily by agriculture. At first there was a huge supply of land. Secondly, the water supply for rice production was provided by nature, though the gift of nature was very unstable. Thus, a small family could cultivate land by itself. It did not need the aid of a village community. When water facilities were built, his water right was not established by his water facilities, because the water supply which was provided by the facilities was very unsuitable.

In Japan these situations did not exist. Also in Japan, farmers had to extend the farm land, but at the same time from an early period had to intensify agriculture. In addition to this situation, the farmer had to supply water to his paddy land by water facilities, at the latest in the 13th century, and water rights were created by water facilities, because the water supply by water facilities was relatively much more stable than in Thailand. Thus a water-using community based on water facilities was formed. The unit of the water-use community was originally minor. In 16th-17th century the village community was formed and became the unit of the water-use community.

(f) However, now the situation in Thailand is changing. Land reserves are running short, and intensification of agriculture is inevitable. In order to intensify agriculture, it is important, at first to build the water facilities and upgrade agricultural productivity, for some time without the improvement

of agricultural techniques. Thus one of the pre-conditions in which farmers can continuously sell his agricultural products to the local market, and the other, in which agricultural co-operatives exist, appear. At the present time the area of rain-fed agriculture has not created this condition. A community development project has tried to create this condition at least, partially (Ban Kut Wiwaii). In this village 1 breed boar was given to the farmers' group consisting of four groups of 10 Household, by the government. The members of the farmers' group have 20 sows altogether. The other villagers have 40 sows. After introduction of the breed boar the number of breeding was 20 times. The number of sows was doubled and 100 6 month old pigs were sold in the local market. It is expected that the community development project will upgrade the general agricultural productivity by the improvement of irrigation at village level or farmers' group level, and develop the small scale agricultural commodity production and the local market. In this way the farmers are becoming more self-aware, and a leader of agricultural production and of the farmers' activities (village, agricultural co-operatives and water user associations) appears.

(g) Concerning the water user association, the farmer must take part in planning, management and maintenance of water facilities in order to supply water precisely to each parcel of paddy land. It is found that the operation of water supplies is not suitable for the crop schedule of farmers when the RID controls the water (Ban None Kum). When farmers control the irrigation water there is no problem (Ban Ba Jai).

(h) Concerning paddy marketing, it is found that the procurement process of paddy by the government is very complicated and payment takes a long time, and transportation is not provided, so farmers prefer to sell their surplus paddy at the lowest price to rice mills in the village (Ban None Kum). In order to increase the farmer's income, farmers must have their own storage, means of transportation, floating capital for paddy rice selling and for buying materials. It is important to organize the marketing and purchasing activities of farmers at village level. '

(2) The function of agriculture in the village.

(a) North-east Thailand is the most backward region in Thailand, but here the arrangement of the infrastructure (for example, principal roads, electricity etc.) is improving to a certain extent too. Especially in the outskirts around Khon Kaen and the areas along the principal roads the attraction of

factories is developing.

(b) In consequence, in the area of rain-fed agriculture in Khon Kaen, the price of paddy fields has risen to 5,000 Bahts per rai, which is nearly twice as high as that of general paddy fields (2,500 ~ 3,000 Bahts per rai). But the fluidity of land caused by this industrialization is low as yet, except in the neighborhood of the city.

(c) In the villages near Khon Kaen, the number of small holders, who work at the factories in and around the city, is now increasing. But their wage (30 Bahts a day) is on the same level as the traditional wage of unskilled labour in the villages. Their families cannot live on this low wage alone. They must have a self-supporting agriculture in addition to their wage income. The low wage level is the main cause of the two way migration between rural and urban areas among small land-holding families.

(d) The advancing cash economy in the farmers' households and industrialization are causing diversification of farmers into a) the upper class which sell their agricultural products b) the middle class who keep only self-supporting agriculture, and c) the lower class who works at factories, or become tenants. But because the traditional level of wages in the villages prescribes the level of wages in factories and cities, as above mentioned, this industrialization cannot cause a rise in the wage of farmers who work in non-agricultural labour and quit agriculture.

On the other hand, there are no conditions in the area of rain-fed agriculture that fully develop the landlord-tenant relationship. The land productivity in this area is too low. The rate of interest of land capital can be estimated. In Ban Cong Kham the price of paddy fields is 3,000 Bahts per rai, the rice yield per rai is 30 Tang, the rent rate of share cropping is 1/3, thus the rate of interest is only 10 %. This interest rate of land capital is below even the interest rate of bank loans (12 ~ 15 %). The profit rate of the merchant middlemans capital (pre-modern-capital), who buy the cash crops from farmers, is 50 % at least. So they never buy the many paddy field by their commercial gain.

(e) In the area of rain-fed agriculture the economy in kind is dominant. The rice is mostly grown for self consumption. The charge for clean rice which farmers pay to the rice-mill in the village is rice bran or broken rice. This is evidence of a self sufficient economy. The only farmer who have surplus rice for sale are those with over 20 rai.

The cultivation of cash crops does not bring a profit to the cash crop farmer, because the pre-modern commercial capital makes use of the contradiction of small scale cash crop production to the large scale demand, and governs the cash crop farmer by usury. The cash crop farmer has no chance to accumulate profit and to enlarge the size of cultivated land beyond the size which the farm family labour can cultivate itself.

So in the area of rain-fed agriculture, only farmers with over 20 rai take an active interest in commercialized agricultural production. Thus the purpose of the credit in this area is mainly the credit of livehood.

(3) The irrigation level and farmers' activities.

When the area of rain-fed paddy fields and the irrigated area is compared, the following points can be seen:

(a) In the area of irrigated agriculture, the land productivity increase considerable although the conventional agricultural technique is not improved. Here are two examples:

Table 29

	rice yield per rai	
	before irrigation	after irrigation
Ban Dong Kloi	20 Tang	30 ~ 50 Tang
Ban Phon Thong	5 ~ 10 Tang	50 Tang

Besides the increase in rice yield production becomes stable. In Ban Nong Ya Prak, the area of rain-fed agriculture, lean years occurred 8 times in 12 years (from 1968 to 1979), so the frequency of natural calamities is very high.

(b) In consequence of increasing land productivity and increasing stability of the agricultural production, the price of paddy land rises to 6,000 ~ 10,000 Baht per rai in the area of intensive irrigated agriculture.

(c) When the irrigation level is raised, then the ratio of the commercialized agricultural product to the grass agricultural product doubles. For example, in the area of rain-fed agriculture. Ban Nong Kham, the rice yield is very unstable, so even the headman in a fruitful year does not sell his surplus rice storing it instead, in order to provide for a lean year. So in the area of rain-fed agriculture the ratio of the commercialized product to the grass

agricultural product is low, even in the case of upper class farmers. When the irrigation level becomes intensive, the headman class intensifies their character as commodity producer. The upper class such as headman, at the same time, does side business, for example, operating a retail store (grocery store, miscellaneous goods), a rice mill (combined with middleman), so that he positively takes part in marketing. In the area of the Subpradu project, which is an area of intensive irrigation located near the marketing center of agricultural products (especially vegetables), Korat, such an upper class of farmers appears. Such a farmer has farmland over 50 rai and carries on a side business, for example motor car repair shop, middleman for cash crops and materials for agricultural production, and takes the position of chairman in an agricultural co-operative and water user association. He combines being a farmer with being a manufacturer, middleman, and chairman of farmers party. He is so to speak, the bourgeoisie of the villagers. The middle class farmer in an area of intensive agriculture becomes the commodity producer as a result of twice yearly rice production. He now needs credit for agricultural production.

(d) The farmer in an area of irrigated agriculture buys much more materials for agricultural production than the farmer in an area of rain-fed agriculture. For example, in Ban Nong Kham, an area of rain-fed agriculture, farmers use little chemical fertilizer, but in Ban Don Kloi, an area of irrigated agriculture, the farmers buy 12.5 kg chemical fertilizer per rai. It is obvious too that buying of materials for agricultural production requires and accelerates the selling of agricultural products.

The transaction of farmland in areas of rain-fed agriculture occurs generally within the limits of one village. The farmland is sold firstly to the brothers and sisters of the farmer (Vorkaufsrecht of relative, the basis of the family property community) and secondary to the villagers (Nong Ya Phrack). But in the area of irrigated agriculture the sphere of this transaction extends beyond the limits of one village. The amount of farmland in one village which is bought by members of another village, is increasing. The increase in land mobility is due to the increase of land productivity by irrigation (Ban None Curve).

(e) In the area of irrigated agriculture, now inheritance is put into practice not by custom but by civil law. This indicates the change of rights consciousness of the family members. Perhaps this change is due to the commercialized agriculture which is caused by upgrading of land productivity

in areas of irrigated agriculture. But the increase of land productivity is not enough to produce rental, so that the farmer must put his farmland under the charge of his brothers and sisters without rent, or he must sell the farmland to his brothers and sisters or villagers in his village, if he is a migrant. In order to use farm land the farmer must cultivate it by himself as before.

(f) The development of commercialized agriculture (commodity production agriculture) and of the buying of materials for agricultural production is stimulated by the improvement of irrigation and this causes and stimulates the activity of the agricultural co-operatives. However, it was not possible to consider this point in detail in this investigation year. In a) the area of intensive irrigated agriculture, i.e. the area of the Sabpradu Project near Korat, which has a marketing center for agricultural products and b) the area on the outskirts of Khon Kaen, agricultural co-operatives carry on their business to a certain extent. But in Ban Don Kloi which is in area of irrigated agriculture through a small scale reservoir at Huai Si Thon, there is no agricultural co-operative and no farmers' group. In this area the cash crop is rice grown in the dry and rainy seasons. The main commercial material for agricultural production is therefore fertilizer for rice. In this village, the government deals with rice and fertilizer so that the government has de facto the function of the agricultural co-operative. This is characteristic of Thailand.

5-10 The manpower aspect of North-east Thailand.

The whole of the North-east region has not received rainfall since October last year, 1979. It is, therefore, not surprising at all when it is heard that many people of the North-east have been migrating into big cities to look for work.

The chairman of a water user association in Korat Province confirms that during the dry season people living outside the irrigated area have to move elsewhere because there is no water for farming.

Due to the fact that the area under irrigation is relatively small compared with the total area of the region, therefore, most farmers have to depend totally on rain water for growing the main crop. During the dry season only a small irrigated area can be used for growing crops which consume very little water such as maize, groundnuts, soybeans, kenaf and tobacco. Therefore, in terms of manpower utilization, most of the North-eastern people spend only a part of the year working on farms and the rest of the year

working as cheap labour elsewhere, especially in cities, or otherwise stay underemployed on the farms. However, it is very interesting to observe that in the areas where irrigation systems are available it is found that people are eager to work on the farms rather than move away to work elsewhere, provided that their crops can be sold at a reasonable price in the market. One local official working on an experimental farm near Kalasin province informs us that farmers are willing to work on farms if their crops are able to be sold at a good price. The farmers' willingness to accept new technology in farming is not so evident because farmers are not certain about their crops in the market.

At this stage it can be concluded that irrigation and crop marketing are both very important factors in the process of manpower utilization in the North-east. Without these two factors, nothing can be done to stop North-eastern people from migrating into cities to work as cheap manual labour in manufacturing and service sectors. Furthermore, there are very few manufacturing industries in the North-east. They can not absorb the surplus manpower in the dry season. Then, if there is no water, the surplus workforce from the dry farmland has no choice other than moving into cities thus causing further problems.

Another conclusion that can be derived from the field survey trip is that in irrigated areas where there are effective water user associations and co-operatives, manpower development can be achieved more easily. Through co-operatives, farmers can get new farming technology and learn how to work together as a group. In addition, through co-operatives and water user associations, farmers can fully utilize the scarce resources i.e. water, more effectively. In summary, water user associations and co-operatives can be an effective solution to the problem of manpower development in the North-east.

North-east Thailand is unquestionably under-utilized in terms of natural resources and manpower. It is very interesting to be able to find some ways to develop a suitable method of resource and manpower utilization in the North-east.

Water user associations and co-operatives should be introduced as a suitable method for this area. However, empirical research has to be done in order to find out whether or not water user associations and co-operatives are in fact a suitable method for resource and manpower development in the North-east.

5-11 Policies of the Thai Government on rural development in North-east Thailand.

(1) Community development in North-east Thailand.

(i) Community development projects at the village level, Korat (Receiving loan from Japanese Government) 1980 ~ 81.

(a) Programs.

There are three plans:

- a) To provide Production and increase income.
- b) Improvement of facilities and village conditions.
- c) Promotion of Farmers' Groups.

(b) Area cover.

95 villages in 7 districts: see map attached.

(c) Number of projects.

508 projects including village water reservoir, village pond weir, bridge, fishery, rice farming, upland crop cultivation, animal husbandry, cottage industry, and handicraft.

(d) Budget.

Japanese loan ¥ 21.7 Million 3.5 % interest, 25 yrs repayment period and 10 yrs grace period. Thai Government Budget 38.1 Million

(e) Field visit, Friday March 20.

- a) Pig raising.
- b) Village pond construction.
- c) Wet season rice cultivation promotion.
- d) Road construction for transportation of agricultural products.

(ii) Community Development Project at the Village Level Khao Wong District, Karasin (Japanese Loan)

(a) Program There are three plans:

- a) Provision of Factors of Production and Increased Income.
- b) Improvement of basic structure and village conditions.
- c) Promotion of Farmers' Groups.

(b) Area Covers one district

khao Wong 7 Tumbol, 17 Villages.

(c) Number of Projects

84 projects including construction of Weirs, Village Ponds, underground water, roads, promotion of rice cultivation, and training programs

(d) Budget

Loan from Japan = 6.167 130 ฿

Thai counterpart fund = 6 487 715 ฿

(e) Suggested field visit Monday (March 16 1981)

- a) Weir construction.
- b) Road construction.
- c) Cattle raising.
- d) Rice cultivation.

(2) Community development at Ubonrajchatanance and Si Sa Ket.

There is a central office in Bangkok taking care of Japanese loan community development projects who co-ordinate the rural development projects of all provincial offices. There are 28 provinces all together.

(i) The duty of the central loan office in Bangkok:

To set up general plan for provincial rural development. All provincial plans must have the following features:

- (a) Provide factor of production and increasing income.
- (b) Construction of basic structure and improvement of village conditions:

Every provincial rural development project has to follow the above mentioned master plan.

The provincial office orders the commune board to set up projects for rural development under the outline of the master plan community development officer who is the consultant to the commune board in the capacity of drafting rural development projects.

The provincial office collects all the projects from the commune board and checks the feasibility of the projects in terms of management, with priority generally given to technical aspects and cost estimation. After the projects are approved, they are sent to the Bangkok office to be screened and adjusted according to the available budget.

Problems arise as the Japanese loan regulations specify the type of payments; for example, Japanese loans cannot be used for labour.

The Japanese loan can be used for only some kinds of material equipment and consultant service, since some kinds of material is paid for out of the counterpart fund, e.g. wood, sand; and other kinds are paid for by the Japanese loan, for example, cement, steel, etc. The materials must be ready at the same time to get the job done, but actually the materials provided by the Japanese fund are usually delayed because of technical problems. Work cannot be done without the complete set of materials so the whole project is delayed.

Concerning the meaning of the technical problem.

The Central office in Bangkok must compile all of the material submitted from 28 provinces (more than 10,000 projects), and each project does not arrive at the same time. It takes time to arrange all of the projects in order. And also it takes time to distribute the materials to each project.

Regarding community development projects supported by the Japanese Loan 1979 to 1980 in Ubon Province. This involved 13 districts, 62 tambols, 139 village and 747 projects.

The total budget was	68,276,111 Baht.	which was composed of
Japanese loan	24,617,164 Baht.	and
Thai Government counterpart fund	43,658,947 Baht.	

The 1980/81 project proposal has already been sent to the central office in Bangkok. But because the new rural development policy of the central government for the next decade is to concentrate on poor areas the 1980/81 rural development project has had to be changed from the PREVIOUS year which did not concentrate on only poor areas. The 1980/81 rural development project will include the same 13 districts but different village with only poor villages included.

(ii) Community development in the Ra Si Salai district.

The Moon river passy through the lower part of the district cutting the district into a northern part and southern one. The norther part is high land, and the southern part is low land, so the southern part is flooded every year by the Moon river. Aggravated by low fertility soil, it has become the poorer part of the district. This includes the villages of Hong Ka Nong Meak, Puer and Kam. The Northern part of the district has a better situation as there is no flooding. Most of the part belongs to the Tung Kularong Hai. This includes the following tumbol.

- a. Khee Kling
- b. Kung
- c. Jick Sung Tong
- d. Dan
- e. Nong Kae
- f. Du
- g. Muange Kan
- h. Pai
- i. Som Poi
- j. Muang Kong

Only the upper part of Tambol Nos. 4,5,10 belong to Tung Kularong Hai. The rest of the tambol belong entirely to the Tung Kularong Hai. However, they are not the poorest villages in the Tung Kularong Hai. Therefore we proceed to the associate district of Pone Sai of Roiet Province in Tung Kularong Hai. According to the report of the office of Land Revolution for Agriculture the average farm income per household of farmers in 1976-78 was 1,617.27 Baht/year. Farm per capital income in the same year was 231.04 Baht/year and total income per household was 3,928.42 Baht/year. Per capital income was 561.20 Baht/year.

(a) The villagers are very poor because of many parts of the district are flooded in the rainy season and the whole district suffers from drought in the dry season.

The soil is very sandy. Some parts are also salty. All of the farmers are doing rain-fed agriculture without supplementary water. Most of the land is under rice cultivation. The rice yields are very low unless fertilizers are applied.

(b) Population of the associated district is 19,910.

land area	204 Km ²
land holding for Agricultural cultivation	57,220 Rai
for rice cultivation	56,820 "
for trees	300 "
average land holding	10-15 "
the range of land holding is between	5-200 "

(3) Rural development for the poor.

The Thai Government's policy on economic development during the next decade, reflected in the 5th. National Economic and Social Development

Plan (to be applied in October 1981), put the emphasis on rural development of the poor areas.

The plan classified rural areas into three categories namely; advanced, middle, and poor. The development efforts in the next ten years will be concentrated on the poor rural areas. This is to correct the disparity in income distribution among regions and occupational groups. The effects of the past development strategy which emphasized an accelerated rate of economic growth have resulted in widening the gap between the rich and the poor. The rich get richer the poor get poorer.

The poor are predominantly farmers. The poorest farmers are mainly living in the north-east region. The poorest north-eastern farmers are concentrated in the adverse area characterised by the following conditions: (1) lack of supplementary water: rain-fed agriculture, (2) poor soil conditions: low fertility soil; sandy soil; and saline soil, and (3) unfavorable topography; flooding in the wet season and drought in the dry season.

It is noted that the concept of a poor village described above is associated with "the area" not with the level of income. This is for two reasons. First, the notion of "area" would help linking each area to the main causes of poverty. The determination of poverty without linking it to its cause is not an effective method of tackling the problems of poverty. Secondly, going directly into the problem area is a more effective method to solve the problems of poverty.

The poor farmers are deprived of economic and social opportunities. They suffer from malnutrition, poor health, and are relatively ignorant of the way to improve their own living conditions and thus form a corps of low quality human resources. Many of them migrate to Bangkok and other big cities creating slums, prostitution, crime, and unemployment. If these farmers have a choice, they would rather stay in the rural areas where they belong than go to the city to face all kinds of risks and uncertainty. They would feel more secure and happier in their hometowns.

Making a serious research investigation into the problems of the poorest villages to develop an effective method of development is not only consistent with the government's policy, but also interesting, challenging, and humane. The present government is determined to mobilize its limited resources to the development of the poor rural areas.

((i) Tactics to Tackle Village Poverty.

In development of a poor village, two considerations should be taken

into account. First, the capacity of the villagers to absorb development efforts is limited. Development projects should, thus, be selective. Secondly, village self-reliance is important. This is to help them so that they can help themselves in the future. In the context of the Toban Model, water resource development including building farm ponds for irrigation, fishery, and consumption is relevant.

Farm pond construction will raise agricultural productivities in the village. Villagers will thus be better fed as a consequence. Solving the problems of malnutrition and securing healthy people is the most effective method to improve the quality of human resources which will in turn contribute to the successfulness of the improvement in the agricultural productivity program.

In most poor villages drought is frequent and is usually serious. In each drought year a total of fifty percent or more of agricultural production can be damaged. Construction of farm ponds is likely to be an effective method of reducing the damage in most drought years.

(ii) Program Implementation.

An experimental village should be designated for farm pond construction. While doing the intensive study in the prospective village, an examination will also be made on both technical and economic opportunities of such a program. Coupled with this investigation, a promotion campaign will be initiated to mobilize farmers to participate in selecting and planning a village project. This is to develop a strong sense of ownership to secure proper operation and maintenance of the project by farmers. Each and every project will be carefully designed to make the village self-reliant in the future and capable of taking care of their own needs without future assistance.

(4) North-east Regional Office of Agriculture.

The Department of Agriculture of the Ministry of Agriculture and Agricultural Co-operatives is operating two cashew plantations. The first one is located in the Young Talard District of Kalasin and occupies an area of 70 rai. It was started in 1966. The second plantation is located in Si Saket Province, covering an area of about 50-60 rai.

(i) The office of public welfare in the Provincial Office of Khon Kaen.

The Unon Rat Kam Land Settlement Project faces a lot of problems.

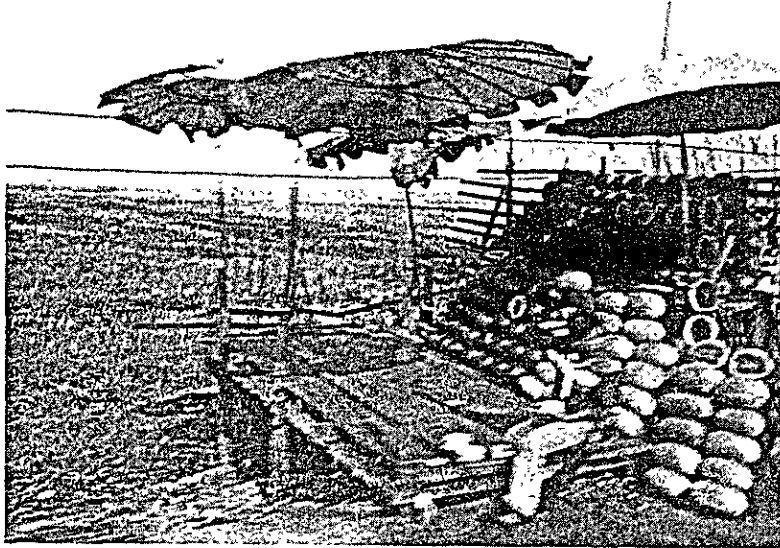


Photo 25 Temporary shop beside a highway



Photo 26 Tank for irrigation

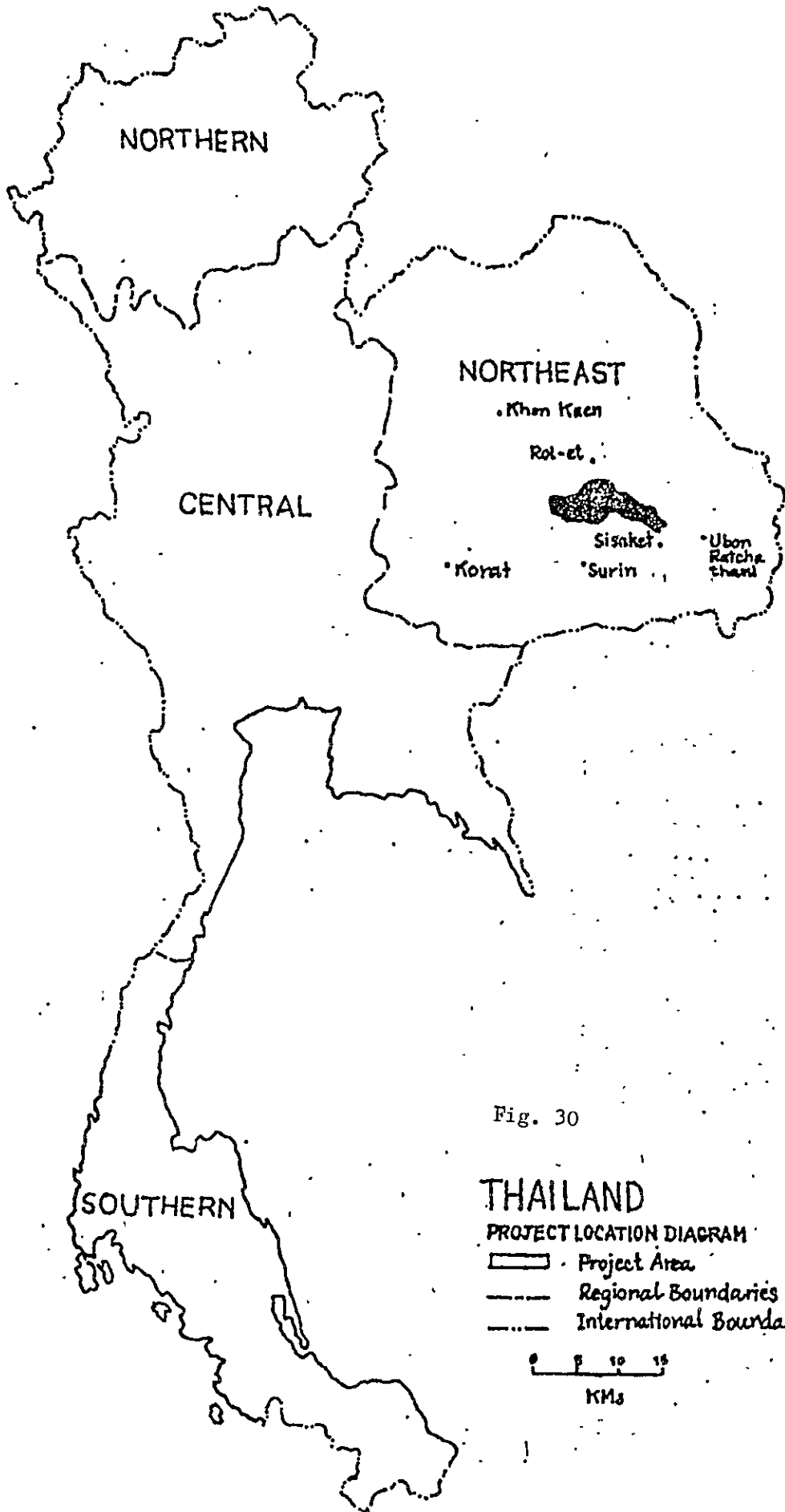
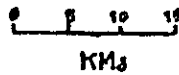


Fig. 30

THAILAND

PROJECT LOCATION DIAGRAM

- Project Area
- - - Regional Boundaries
- International Boundaries



Factors contributing to low agricultural productivity and village poverty.

- a. Lack of supplementary water (rain-fed agriculture)
- b. Poor soil (low fertility sandy and saline soil)
- c. Floods in the wet season, droughts in the dry season
- d. Isolation
- e. Social Political factors (human resources)

Tactics for tackling poverty.

- a. Identify crops that are tolerant to low fertility and sandy soil.
- b. Development of water resources including building village ponds for irrigation and fishery, pumping water from natural streams and digging wells for underground water.

- c. Improve soil conditions (Quality and salinity)

Use compost fertilizer manure, chemical fertilizer and clay to improve the fertility as well as soil structure.

Salinity problems are still under study. The available method to deal with saline soil is to select plants that are tolerant of salinity, such as rice, cashew nuts, trees and grass for animals.

- d. To develop the production method that is suitable for poor and saline soil
- e. To introduce animal husbandry.
- f. To develop the method to prevent the seepage of water from the tank.
- g. To create extension services, to bring new ideas, new technology to the village, radio communication must be used more frequently and a agricultural extension office must be close to the villagers.

The problems in the poorest village are malnutrition and poor health.

The problem is to make them able to produce enough to eat so they will be stronger and more resistant to disease.

· NEDSB has classify the rural areas into 3 categories namely advanced, medium, and poor. Government policy is to concentrate on developing the poor areas. Therefore it is very important for the projects to select poor villages and carry out intensive studies because this will be consistent with government policy to be applied in the next decade.

(5) Khon Kaen Provincial office.

(i) Provincial co-operative office.

Co-operatives may be divided into 6 types:

- a) Agricultural co-operatives.
- b) Consumer co-operatives.
- c) Service co-operatives (transport).
- d) Saving co-operatives.
- e) Fishery co-operatives.
- f) Land settlement co-operatives.

Provincial co-operative offices are attached to the co-operatives promotion department, Ministry of Agriculture and Co-operatives. At provincial level the provincial co-operative offices are under governor offices. The main functions of provincial co-operative offices are as follows; to promote agricultural activities, to guide and supervise the activities of co-operatives and also give recommendations to the government for the important of co-operatives.

In Khon Kaen Province there are only 5 types of co-operatives;

- 25 Agricultural co-operatives.
- 10 Saving co-operatives.
- 4 Service co-operatives.
- 5 Co-operative stores.
- 1 Land settlement co-operative

45

(a) Office of the Agricultural Co-operatives at Amphur Muang Level,

Khonkaen Province

This co-operative is one of the two co-operatives at Amphur Muang, Khonkaen province. It has the larger membership of around 3,500, while the other co-operative has only 2,000 members. At this office, the opportunity was taken to interview both the manager and the staff and the conclusions are as follows:

1 The manager has some experience in business affairs and co-operative works, but looks inactive sometimes. His academic background is as low as secondary school level.

2 The amount of credit available for the co-operative is not sufficient to expand the co-operative business activities, such as the construction of a rice silo which would enable the cooperative to purchase and store more rice from members, or the acquisition of trucks for delivery of consumption commodities, insecticide, fertilizer, and other agricultural materials to

farmers in villages.

3 The co-operatives are in general considered public enterprises under the Co-operatives Promotion Department because they are usually under close supervision and control. In other words, the co-operatives are not independent from the Government Authority.

4 According to the manager, the education of members is low; they are not able to understand the principles of co-operatives. If they had been educated better, the co-operative work would have been much better.

5 Merchants sell fertilizer at a lower price and they can do that because their fertilizer is usually 1-2 Kilogrammes under-weight. The farmers are not allowed to weigh the commodity before purchasing; and if they insist, the merchants will stop selling fertilizer to them. The co-operative is not yet in a position to counteract this misbehaviour.

(ii) Provincial office of public welfare.

There is only one land settlement project in Khon Kaen, the land settlement project at Ubonrat dam. This land settlement project has characteristics of both success and failure.

This project originated in 1962-3; when Ubonrat dam was built the surrounding area was flooded about 4,000 H/H were effected by the flood. The department of public welfare was ordered to set up a resettlement project. Three committees have been set up to plan the resettlement. These were at the provincial, department and ministry level. LAW was set up as a result in 1964. Two kinds of settlement were designed.

1 village type

as in the right hand figure

2 line type

village settled along the road

Each village consists of 60-80 households. Most of the villages are organized as village types. Each household is allocated 15 rai or land, 2 rai as residential area and 13 rai for cultivation.

The total land area of the project was 373,900 rai before the beginning of the project. Fertile land was already occupied by the original villagers, therefore newcomers under the resettlement project had to occupy the low fertility land.

These newcomers were used to paddy farms on fertile soil, and they have had to change from paddy to upland crops with which they are not familiar.

This has caused a lot of trouble and many of them have moved out. The land settled on is not given to the settler until he can prove that he is serious about working on the land, which may take 5 to 10 years.

In the first year of settlement in the area he is assigned a piece of land to work on, and after one or two years, if he is diligent he will be given a piece of paper to show that he is occupying that piece of land.

After five years, if he is still working successfully, he will be given certificate to show that he has become the owner of the land.

(6) Khon Kaen University activity on rural development.

Almost every faculty of the university is involved in research on rural development. There are two faculties, the faculty of agriculture and the Faculty of Humanity and Social Science.

An important research project entitled Social Laboratory is a interdisciplinary research project. It involves many departments including soil science, plant science, animal science, plant pathology and social science.

This institute has been accepted and included in the 4th national Economic and social development plan, but they have not received an actual budget. They expect to get a budget within the fifth plan. The lack of communication is the most important limiting factor in the poorest village in the North-east. Communication means to exchange information and knowledge about transferring the technology of cropping, cultivating, marketing etc.. Radio communication would be able to do this job because most of the farmers have a radio. But it appears that farmers do not use the water in the reservoir for irrigation; they use it only for consumption and feeding.

To improve the poor villages work should be concentrated on increasing crop productivity, and marketing is not involved in this case, because the farmers' problem is to produce enough for home consumption, not to produce for marketing. It is also said that high yielding rice is not suitable for conditions in the North-east because this kind of rice needs fertile soil and good water control. The Government should promote the cultivation of sticky rice in the North-east because sticky rice is the staple food of the people in the area.

It was pointed out that saline soil is a problem in North-east Thailand, Whereas the good condition of soil in the provinces of Loi, Lorat, and areas close to the Mekhong river make farmers in that area rich. Soil of poor quality can be found in the central area of the North-east region. Some of this area is irrigated. In the irrigated areas farmers have a relatively

high income, but in the rain-fed areas farmers are still poor, poor farmers are found areas of in rain-fed agriculture with low fertility soil conditions.

Fifteen villages have already been selected for the project. The details of project implementation are shown below.

(i) Project items.

1. credit union, 2. animal husbandry, 3. poultry, 4. pigs,
5. fishery, 6. horticulture, 7. rice, 8. vegetables,
9. fuel gas from animal waste, 10. silk, 11. mushrooms,
12. library, 13. upland crops.

The main objectives are to carry out community development projects, with emphasis on helping farmers to help themselves in the future.

The strategy is to set up a credit union, that is, to organize people so that they will participate as a group.

The differences between farmers' groups, credit unions and agricultural co-operatives are that agricultural co-operatives are formal and credit unions are informal. In the near future, credit unions will develop and become stronger, and they will be registered as agricultural co-operatives (agricultural credit unions). -Farmers' groups have general objectives, and are also informal groups, and can be registered as agricultural co-operative if they prove themselves successful.

(ii) Functions of some credit union groups

- a. rice bank, b. fertilizer bank. c. orientation course.

The orientation course lasts from a few hours to 2 days, and is provided by the education committee. After the candidate has passed the orientation course, his name will be submitted to the chairman of the credit union in order to get approval from the general meeting.

(iii) At Ban Kam hai

Committee members of the credit union include the chairman (also the headman of the village), 2 loan officers, and the education committee.

This credit union was set up 4 years ago (1977), and now because of their success, they have already registered as an agricultural co-operative.

There are 265 households in this village, 131 of these households are members of the union. There are 45 households receiving loans from the union. Those loans amount to 120,000.-\$ which is equivalent to the total accumulated saving of the union.

The loan procedure is that:

A farmer who wants to borrow money has to submit the request to the union between the 5th and the 7th of each month and the loan committee meets on the 7th of each month to make the decision on each request. In practice, almost every request is approved. If the requested loans exceed the available funds, the available money is shared proportionally to the requests.

The maximum loan is $\text{฿}3,000.-$, the Interest rate is 1 % per month, the period of loan is 10 months, and the borrower has to repay the capital of 10 % per month. For example, a farmer who receives a loan of 1,000 baht has to return 110 baht at the end of the first month (100 baht as capital repayment and 10 baht as interest). At the end of the second month he has to return 109 baht and so on.

Members are entitled to a 7 % interest rate on their deposits with the credit union.

The agriculture of Ban Kam Hai is under rain-fed conditions. There are no irrigation facilities. However there are two small village ponds and a large pond of 700 rai. This large pond covers the area of three villages. The ponds, especially the large one, are polluted, shallow, and full of water plants. These ponds are used mainly for fishery, animal bath, and irrigated vegetables grown along the edge of the ponds. The water is too dirty to consume.

There is no fishing right: every body is entitled to fish in the pond. The Fishery Department supplies fish eggs to this reservoir.

With regard to the rice bank, there is storage for rice with a capacity of 70 tons. The Rice bank buys rice from the farmers and stores it in the storage for sale and for loan to farmers who are in need. Usually rice loans are made in June which is the beginning of the cultivation season and the loan has to be returned after the harvesting season, and the interest rate is 10 % per season.

Farmers who deposit with the rice bank also get interest, but the rate of interest is not specified; it depends on the benefit over a 3 year period.

- Electricity was introduced to the village 10 years ago.
- Piped water was introduced to the village 4 years ago.

However, both are mainly for home consumption, not for production. price of a buffalo or ox is between $\text{฿}12,000.-$ and $\text{฿}4,000.-$, with an average price of $\text{฿}6,000.-/\text{head}$.

The price of glutinous rice (sticky rice) is $\text{฿}2.50/\text{kg}$, and non-glutinous rice is $\text{฿}3.10/\text{kg}$, which is lower than the guarantee price.

6. SURVEY OF FOUR RESEARCH PROJECTS ON INTEGRATED RURAL DEVELOPMENT



Photo 27 With young men group



Photo 28 Interview with the village head



Photo 29 Interview with a farmer

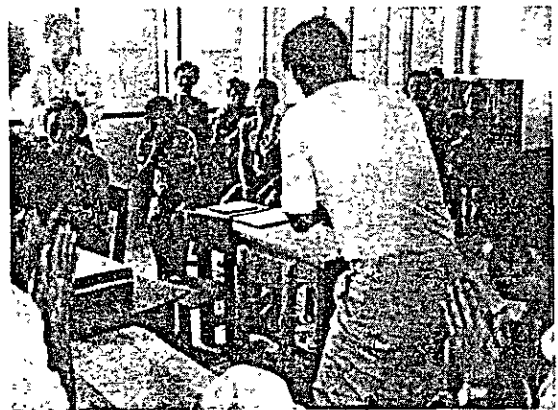


Photo 30 After the field research

(1) Research project findings.

The surveys were carried out by the research team. The first survey took 11 days, 15-25 January 1981. The second survey took 10 days, 11-20 February 1981. Most of the information on the socio-economic characteristics of these villages came from interviews with the village headmen.

The main objective of this trip was to select specific research projects which were both technically and socio-economically appropriate.

There were 5 general criteria for selection, as follows:

- a. Average land holding in a selected village must be at least 10 rai per household,
- b. 80 % of households in the selected village are engaged in agricultural activities,
- c. The selected village must have been established for at least 100 years,
- d. There are at least 100 households in the selected village,
- e. The cultivated area in the selected village is either irrigated or rain-fed, depending on the requirements of each project.

With regard to farmers' organizations, no specific criteria were required.

It was agreed that four projects with different water conditions were to be selected. One would be of purely rain-fed agriculture; one with plenty of water or a guarantee of no shortage of irrigation water; one would be of saline water which could represent the typical problems of the Region; and one with excellent water management and agricultural co-operatives. These four projects in North-east Thailand would be studied in every detail and would be compared to the Toban Project in Japan.

After laborious interviewing of the headmen of the villages, the farmers and the villagers, of the Government officials and employees who were taking care of project operation and maintenance, as well as of the officers of other agencies whose functions are related to agricultural development, several long discussions on all aspects were held among members of the Research Team. Finally 4 projects were selected based on the criteria adopted by the members.

Due to the fact that all four project areas are located very close to the highway, there is no problem of communication and transportation of output to the market.

Research project No. 1

Research Village

Ban Nong Ya Phreak

Research project No. 2	
Research village	Ban Don Kloi
Research project No. 3	
Research village	Ban Ya Kha
Research project No. 4	
Research villages	Ban Si Kew
	Ban Non Kum
	Ban Ma Klue Mai
	Ban Khok Sung
	Ban Rai

6-1 Research project No. 1.

- Project region (Khon Kaen province)
 - rain-fed agricultural area
- Research village
 - Ban Nong Ya Phraek

(1) General Situation of Research Project No. 1.

(i) Location.

The first project village selected, "Ban Nong Ya Phraek village", is located in the Don Hun Commune of the Tha Phra District, Khon Kaen Province, about 8 kilometers west of Tha Phra District Office on the highway from Tha Phra District to Maka Sarakham Province. This village has about 180 households, rice fields of over 4,500 rai, and an area for upland crops of over 3,000 rai.

(ii) No irrigation.

The cultivation in this project area is purely rain-fed. Runoff from an undulating area of land is collected in the low land where rice can be cultivated only in the rainy season, while upland crops such as cassava and kenaf are grown on the higher ground. During periods of drought this land needs a supplementary water supply for cultivation but without any development this cannot be provided. The crop yield is relatively low in dry years, i.e. about 100-150 kg/rai for rice and 2 tons/rai for cassava. This village is located about 6 kilometers east of the Northeast Regional Office of Agriculture which operates a meteorological observation station, and the rainfall data from this station can be used as rainfall data for the village area. The study will include the water used by crops under natural condi-

tions. The fluctuation of rain water collected in a farm plot which is useful for rice growing will be observed. It is proposed to install two water level recorders in the two adjacent farm plots for this purpose. The observation is planned to be carried out throughout the period of research study.

Project No. 1 is in a purely rain-fed agricultural area, located in the Don-Hun Commune about 20 km south from Khon Kaen City by road.

(iii) Water management.

The study should begin to install the equipment for engineering investigations. A network of Hydro-Meteorology instruments was adopted for installation in the area, as shown in Table 29.

Table 29

Site Selected	Existing Hydrological equipment	Additional Hydrological equipment to be installed
Project No. 1	Meteorological observation station at N.E. regional office of Agriculture, located about 6 kms. west of Project No. 1. The rainfall data at this station can be used as rainfall data over the area of Project No. 1.	It is proposed to install two water level recorders in the two adjacent farm plots.

Project No. 1 "Ban Nong Ya Phrack Village".

The hydro-meteorological records can be used at the Agricultural Center Tha Phra which is located some distance from Project No. 1, approximately 5 kms to the west, from a hydrological point of view; the data of this station will be represent the climatic conditions at Project No. 1. The data is provided in Table 30.

Fig 51 MAP OF AMPHUR PHOL, KHONKAEN

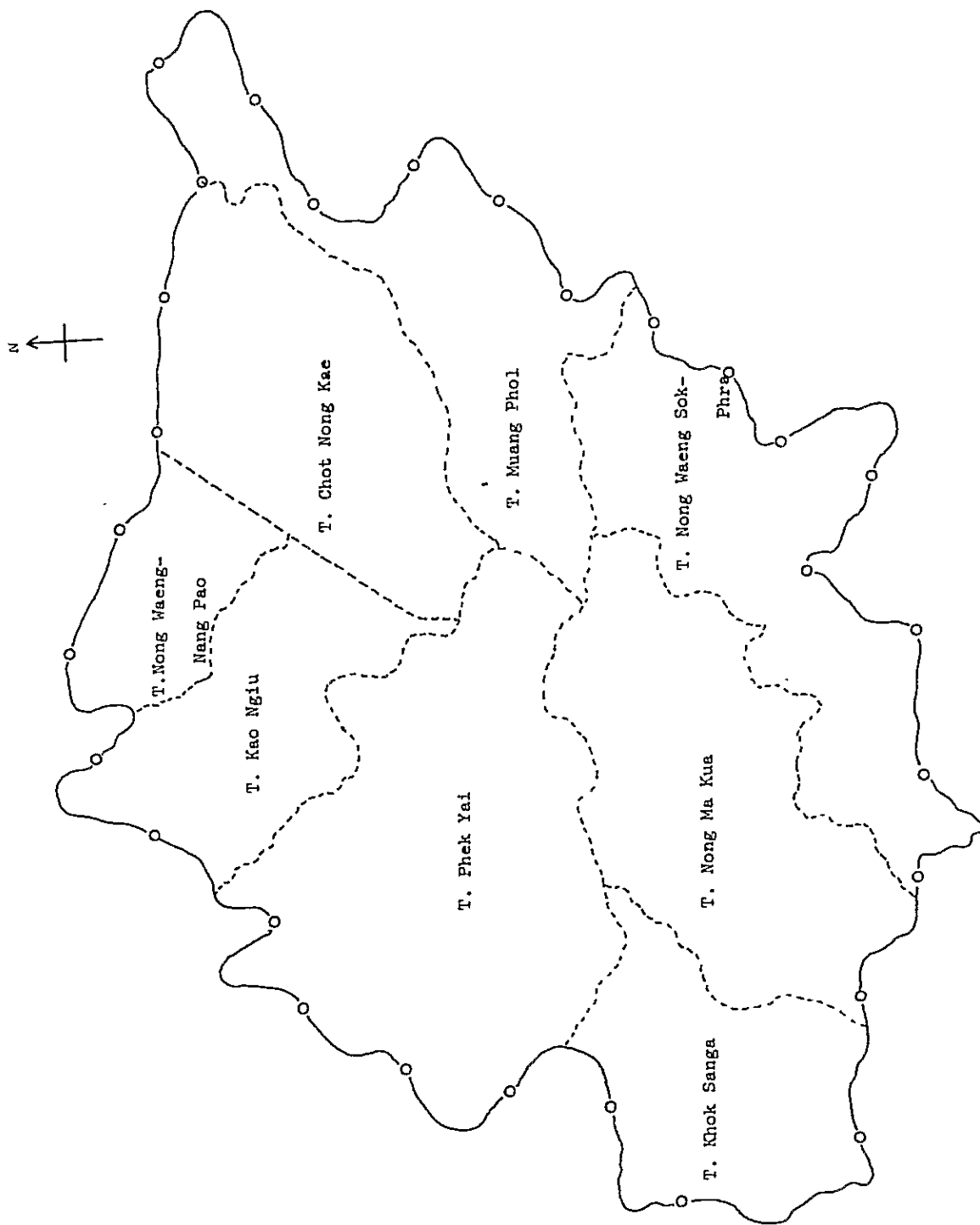


Fig 32 MAP OF AMPHUR MUANG, KHONKAEN

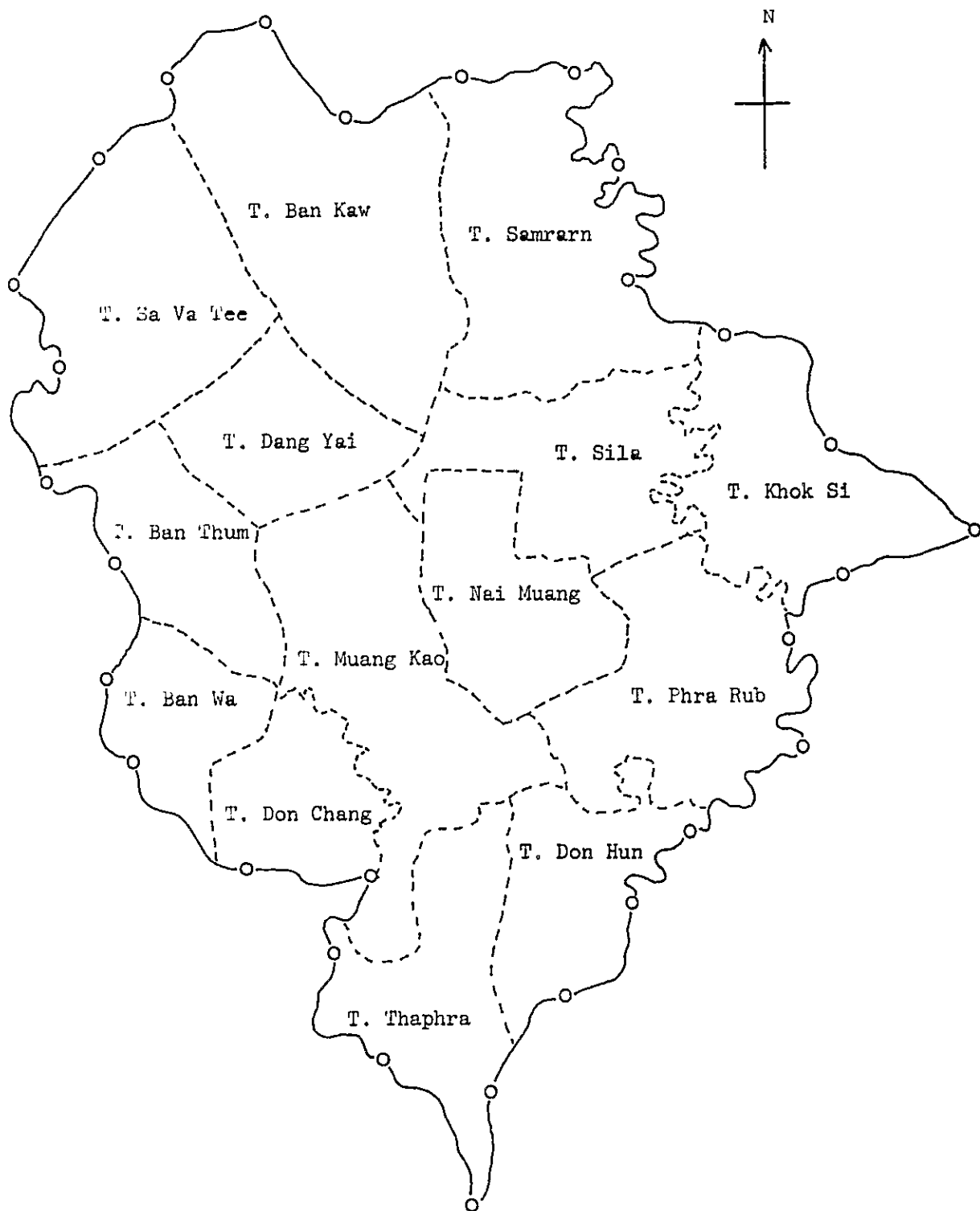


Table 30 Climatic data for Project No. 1

Month	Mean Monthly ¹⁾ Rainfall mm	Mean Monthly ²⁾ Temperature °c	Mean Monthly ³⁾ Evaporation mm	Mean Monthly ⁴⁾ Relative Humidity %
Jan.	18.9	22.7	148.2	63.2
Feb.	12.9	25.3	154.6	62.5
Mar.	94.9	28.4	196.5	60.8
Apr.	89.7	30.0	202.5	62.8
May	167.4	29.4	203.1	72.0
Jun.	147.6	29.0	175.2	74.8
Jul.	164.6	28.2	172.4	77.6
Aug.	195.3	27.7	145.1	79.6
Sept.	249.0	27.4	132.0	81.3
Oct.	91.8	26.8	148.8	76.5
Nov.	24.0	23.7	138.0	70.6
Dec.	49.6	20.6	212.3	66.3

Remarks

- 1) Data at Agricultural Center Tha Phra from 1971-1980.
- 2) Data at Agricultural Center Tha Phra from 1971-1980.
- 3) Data at Agricultural Center Tha Phra from 1971-1980.
- 4) Data in Khon Kaen Province from 1948-1965.

(iv) Village situation.

The village consists of 183 households out of which 181 are agricultural households and 2 are non-agricultural households. The total population is 1,158. There is only 1 primary school in the village; most students continue their education in town after finishing primary level. Most houses in the village are not in good condition. Judging from the materials of the houses as well as the structure of the houses, it can be said that the economic condition of the village people is not very good.

Nearly 100 percent of the workforce in this village engages in agriculture, mostly rice farming and tapioca. There are only two households not engaged in agriculture.

Since farming can only be done in the wet season, many people move to work outside their village during the dry season. According to the headman of the village, more than 100 people move out to look for jobs elsewhere in the dry season.

Having considered the economic and social conditions of the above five villages, it was decided that Ban Nong Ya Praek must be selected as research site No. 1.

Ban Nong Ya Phraek is the fifth largest village in the Tambol Don Hau Muang District in Khon Kaen. It is about 10 km from the city of Khon Kaen. The whole area of the village depends totally on rain water for cultivation.

(v) Some Demographic Information.

This village consists of 173 registered households. The total population is 1,068. A list of households names of the household head, and the household members was made. This list will be used as a framework in the planning of data collection in Phase II.

Other demographic information, i.e. fertility, mortality, and migration will also be collected through the interviews with household heads.

(vi) Some Socio-economic Information.

Like Project Area No. 1 at Ban Don Kloi, most households in this village grow glutinous rice mainly for domestic consumption. Only the surplus of rice is sold to the rice mill. The main sources of money income are tapioca, kenaf, and sugar cane. More than 50% of the agricultural land of this village is used for growing tapioca, kenaf, and up land crops. One interesting feature is that the area used for growing glutinous rice is used for growing upland crops. During the dry season the land used to grow rice is allowed to dry up and left for the next season.

Migration is quite high in their village. Many young men and women migrate into other areas looking for jobs. Some of them move to urban areas and work as manual labourers. This may be attributed to the lack of water supply for cultivation. Nearly half of the total agricultural land is left idle in the dry season for lack of water.

According to the headman, Mr. Seree Larsida, the most serious problems in this village are the lack of water supply for cultivation, and roads for the transporation of village products. There are many other problems, such as the drug problem.

In the dry season, apart from working on their own farmland, cultivating upland crops, most people whose lands are small and cannot grow upland crops go out to other areas looking for jobs in the factories nearby or working as hired labourers on farms; some of them go as far as Korat and Bangkok. Some of them migrate permanently to live elsewhere.

In this village, drinking water comes from shallow wells about 2 km

outside the village. It is amazing to learn that most households have no tank to keep rain-water for domestic consumption.

However, there is a health center in this village run by a public health officer. This health center provides facilities for pregnant women.

(vii) Agricultural co-operatives.

The people carry out lowland farming in the rainy season and upland farming during the dry season. There are 183 households, a number of which are registered as co-operative members. From the field survey, those who are co-operative members have a higher standard of living, while those who are not have a lower standard of living. The explanation is simple. According to the state law concerning co-operatives, only land-owners with a certain amount of land are accepted as members; those without farmland of their own must be guaranteed by at least two co-operative members, one of which must own some pieces of land. Personal credit is therefore important if farmers who have no land of their own would like to be registered as co-operative members. Unfortunately, most poor farmers do not possess these two requirements, i.e. a certain amount of land and personal credit; for that reason they turn to doing business with local financiers or middlemen. The interest rate charged on loans is enormously high: 50 percent for one cultivating season. After the harvesting period, the poor farmers are obliged to sell their products to the same financiers or middlemen. Undoubtedly, the farm price is very low indeed in the field. However, even the co-operative members sometimes have to contact the local middlemen since they cannot deliver their products to their co-operatives in town due to the very great distance.

Ban Nong Ya Phraek was established 74 years ago (1907), the original village having been situated about 1 km to the north-east of the old village. A serious disease attacked the village, so people moved away and established the present village. At that time there was no limitation to land area, so the farmers gained land titles just by clearing and cultivating the land.

More than ten years ago, all of the land had become occupied, and expansion of land became impossible. Increasing agricultural production had to rely solely upon land saving techniques.

There was serious drought during 1971-73 and 150 households out-of 170 households in the village suffer from malnutrition (there was not enough food to eat).

(viii) Credit Union in Ban Nong Ya Phraek.

This was set up on 13th May 1977 and there has 3 functions, namely:

1. saving money,
2. rice bank,
3. fertilizer bank.

The organization of this union is consists of

1. chairman,
2. vice-chairman,
3. treasurer,
4. 2 vice-treasurer,
5. secretary,
6. vice-secretary,
7. 4 loan committee members,
8. 3 education committee members,
9. 2 education committee members.

Now, there are about 40 members, most of them being young men, with a very few old men participating, so there is a generation gap.

A money saving project was started on 13 May 1977.

Mr. Khem Chart selected three people from the village to participate in a training course at Khon Kaen University.

There were thirty people in the class, including these three from Bank Kam Hai village who returned to the village and organized the credit union after finishing their training course.

The regulations of the credit union are:

- a. Each member has to save 10 ฿ a month,
- b. Any member who does not abide by the first regulation for a period of 3 months consecutively, will be disqualified.

At present the accumulated saving is B14,000.- and all of this money is loaned out to the members with an interest rate of 1 % per month, the maximum loan being ฿3,000.-. This is regular loan.

There is an emergency loan, the maximum of which is ฿400.-, for not more than one month without interest. There are twenty-five people with loans from the credit union.

Next, the rice bank. The idea of rice bank originated from the Catholic Missionary of the Center for Social Development at Udon Tani. This center provided 10,000.-฿ to the rice bank as the original fund, without interest. Rice Fund has to pay back ฿1,000.- every year.

The rice bank used this money to buy rice and sell rice to the market, and made a profit of ฿1,400.- last year. The service of committee members is free of charge. So there has been no requests for loans yet.

Lastly, the Fertilizer Bank. This bank was established by the same Catholic Mission. The management procedure of the Fertilizer Bank is as follows:

- (a) People from the Catholic Mission come to the village in February to collect the requests for fertilizer.

(b) This mission buy fertilizer from the government and brings it to the farmers.

(c) In the first year, 25 % of the cost of fertilizer was provided by farmers. The remaining 75 % was advanced by the Mission. The farmers' proportion is expected to increase as time goes on. Finally, when farmers are able to stand on their own feet the mission will withdraw.

(d) Farmers are expected to repay the cost of fertilizers advanced by the Mission after harvesting their rice.

(e) The Fertilizer Bank has made a 2-20 % profit from this fertilizer transaction.

(f) Last year the delivery of fertilizer was delayed, which caused problems in applying the fertilizer.

The help most needed from outside is:

(a) to clean the village pond,

(b) to improve the farm roads (farm roads in this village become useless in the rainy season).

(ix) Meeting with villagers on the function of a group scale tank. More than 100 villagers including the headman, the chairman of the credit union, the land owners of the installation land, etc. gathered in the hall of the temple.

The objective was to show this idea of a farm pond constructed on an individual's farmland at the lowest part of land so that the catchment area is large and easily gathers rain-fed water. The disadvantage is the difficulty of distributing water for irrigation. A water pump is required, a windmill to raise the water to the fields.

This idea was agreed on by all the villagers but the problems were:

(1) Every farmer wanted to have the pond.

(2) How to decide the order of constructing the pond because there are more than 160 h/h.

(3) There are many construction methods including using human labour, a bulldozer, or a small digging machine.

(4) How to decide the location, size, number, of ponds.

In order to estimate the effectiveness of the pond, some of villagers were interviewed about the last 10 years rice yield.

Table 31

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Headman	30	30	0	40	30	10	10	45	40	45
Lowland							10	0	10	0
Highland						15	0	20	20	25

unit: tang/rai tang = 20 ไร่

1973 and 1976 were drought years in this village, and 1978 and 1979 were flood years.

(x) Brief general information on Nong Ya Phraek.

The area is totally rain-fed. There is no other source of water supply for agriculture.

Table 32

① Household and Population

Project area No.	Name of village	Information			
		Village Headman	No. of households	Population	Agricultural households (%)
1	Ban Nong Ya Phraek	Mr. Seree Larsida	185 registered households	1,068	92 %

Table 33

②

1	Nong Ya Phraek	<p>1. Glutinous rice: 3,593 rais (for domestic consumption only): hardly any surplus.</p> <p>2. Upland crops: 3,826 rais for market, i.e. tapioca, kenaf, sugar cane, ground nuts, sweet corn, water melon.</p>
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1	Nong Ya Phraek	<p>3. Upland crops are the main sources of cash income.</p> <p>4. Tapioca and kenaf dominate the upland cultivation.</p>
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Table 34

(iii)

1	Nong Ya Phraek	<p>1. Only 13 households own no agricultural land. They work as wage labourers. Some of them work in the city of Khon Kaen.</p> <p>2. In the dry season many young men go to work as wage labourers in the city of Khon Kaen.</p> <p>3. However, there is still little non-agricultural work in this village.</p>
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Table 35

(iv)

1	Nong Ya Phraek	<p>1. In the dry season, population movement is high. People move from their households to work as wage labourers in the surrounding tapioca plantations and tapioca processing plants; some move as far as other provinces, but most of them move to nearby areas.</p> <p>2. Most people go to work on a day-to-day basis.</p> <p>3. Very few people go to Bangkok to work.</p> <p>4. Only 10 people migrated permanently to the city last year.</p> <p>5. Males and females move to work outside the village, but only males move to the faraway places.</p> <p>6. Most people return in the rainy season to cultivate their land.</p>
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Table 36

(v)

1	Nong Ya Phraek	<p>1. Most houses are built of wood.</p> <p>2. They are mainly traditional two-storey houses with the ground floor open for multipurpose uses.</p> <p>3. There are some houses built of bamboo mats.</p> <p>4. Each house has rice storage for the whole year's domestic consumption.</p>
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Table 37

(vi)

1	Nong Ya Phraek	<ol style="list-style-type: none"> 1. Many households in this village borrow money from Chinese money lenders. 2. The purpose of borrowing is for investment in upland crops. 3. The payment of debts can be done in kind or cash, whichever is possible. 4. Most money lenders demand that the products must be sold to them.
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Table 38

(vii)

11	Nong Ya Phraek	<ol style="list-style-type: none"> 1. There is a public health office in the village. 2. One health officer works at the office. 3. This office provides facilities and some basic medical treatment for villagers, especially for pregnant women. 4. Diarrhoea and influenza are the commonest diseases among the villagers.
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Table 39 Sanitary Conditions

(viii)

Project area No.	Name of the village	Information
1	Nong Ya Phraek	<ol style="list-style-type: none"> 1. Water supply for domestic use comes from well water outside the village (about 2 km.) 2. Some households have their own wells (46 wells). 3. No household keeps rain water in a big jug (traditional water container made of clay). The reason is that it costs a lot of money to buy water containers to keep rain water.

Project area No.	No. of the village	Information
1	Nong Ya Phraek	<p>4. Drinking water also comes from wells outside the village.</p> <p>5. Only some wells provide drinking water as many areas are salty.</p> <p>6. This village has only one big tank to store the rain water, but it is for the monk's use.</p> <p>7. There are 73 households with modern toilets.</p> <p>8. Most households still use old style toilets, consisting of a hole in the ground. Many people still use the fields.</p>

Table 40

(ix)

1	Nong Ya Phraek	<p>1. There is one primary school.</p> <p>2. There are 226 students and 7 teachers.</p> <p>3. Primary education takes 6 years.</p> <p>4. After finishing primary education, some parents send their children to secondary school (high school) at Tambol level. 70 households send their children to provincial school at Khon Kaen.</p> <p>5. Most parents intend to let their children continue their study as long as possible.</p> <p>6. The parents' intentions regarding their childrens' education and future occupation is not clear and needs more investigation.</p>
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6-2 Research Project No. 2.

• Project region (Kalasin Province).

Huai Si Thon irrigation project.

• Research village.

Ban Don Kloï.

(1) General situation of research site No. 2.

(i) Location.

The second project selected is the "Huai Si Thon Tank Irrigation Project" located near Kalasin Province. This project was started in 1957 and completed in 1959. The drainage area above the dam site is 81.5 square kilometers. The storage capacity of the reservoir is 5.89 million m³. The distribution system is designed to supply irrigation water to an area of 11,000 rai including that of 2,000 rai of the agriculture experimental area under the supervision of the North-east Regional Office of Agriculture. The Lam Pao Dam was built in 1963. Since the completion of the left main canal the water from the Lam Pao Project can be released directly into the Huai Si Then Tank when needed to supplement the irrigation shortage.

(ii) Irrigation level.

The Team had done interviews in several villages within the project area. Finally "Ban Don Kloi Village" was selected as a research village for carrying out a detailed survey. From the irrigation point of view only some parts of the project area supplied by the 1R-L lateral and 1L-1R-L sublateral up to Highway No. 213 will be used as the representative area for water use/control study. It is proposed to install water level recorders and to make measurements of the irrigation supply to this area of about 2,200 rai. The area covers more than one village. Research Project No. 2 Plenty of water has been developed at "Huai Si Thon Tank Irrigation Project" located near Kalasin Province, about 7 kms. north of Kalasin City by road. Since the completion of the left main canal of the Lam Pao Project in 1978, the water from the Lam Pao Reservoir can be released directly into the Huai Si Thon Tank when needed to supplement the irrigation shortage.

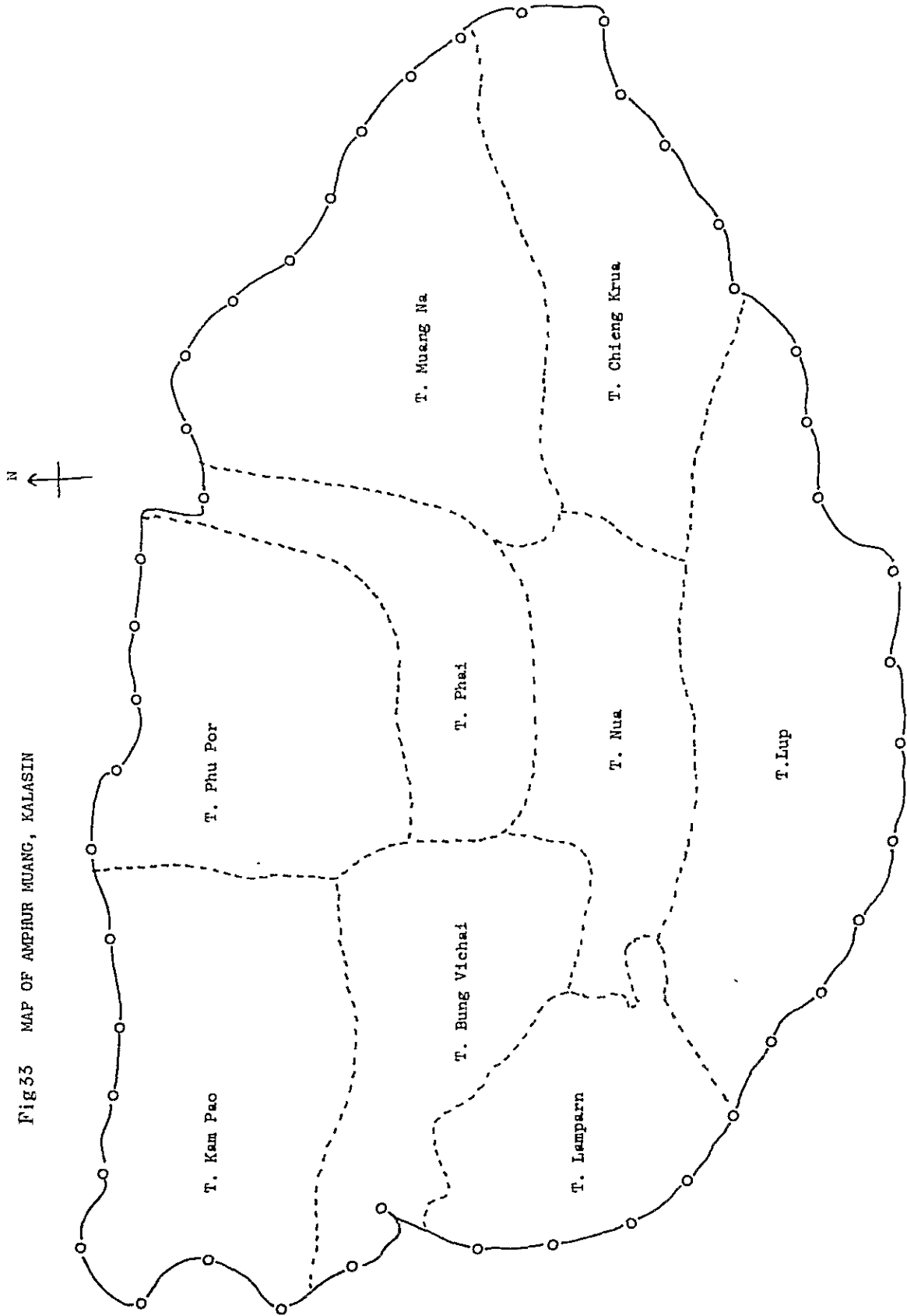
Don Kloi has an area of 1,500 rai, divided into 85 rai for housing and gardens, 1,300 rai for paddy land, and 1,000 rai for upland crop.

Of the 75 h/h, 60 h/h are fulltime farming, 10 h/h are in part-time farming and 5 h/h are engaged in operating businesses, including grossing rice mill and selling h/h appliances.

This village has one headman and one assistant (the other assistant is in charge of Nonejo).

There is no village council because this village is very small. The history of this village shows that Mr. Kheow Yuntawin and his family was the first household to establish this village in 1914 and many other families followed him later.

Fig 33 MAP OF AMPHUR MUANG, KALASIN



Most of the people in this village come from the city because of city overcoming. They went to the rural area to occupy land. Land in the past had no marketing value, so any person could occupy land without being limited in area. The land in Don Kloi assumed a market value only 70 years ago.

All of the farmland in Don Kloi is irrigated; only the 100 rai of upland are not irrigated.

They have enough water not only in the rainy season but also in the dry season.

(iii) Water management.

Concerning the field survey on water operation the following items have been installed.

Table 41

Project No.2	<p>1) Non-recording rainguage and water level staff guage in the reservoir at Huai Si Thon Dam site.</p> <p>2) Meteorological observation station at Huai Si Thon Agriculture Experimental Farm.</p>	<p>1) It is proposed to install one water level recorder in the feeder canal upstream of the control gate before it reaches the Huai Si Thon Reservoir</p> <p>2) It is proposed to install four water level recorders at four stations, the first recorder to be located at the head of the left main canal; the second recorder to be located at the head of the 1R-L lateral; the third and the fourth are to be located at the crossing points of the two sublaterals 1L-1R-L and 1R-1R-L with Highway No. 213.</p>
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Huai Si Thon Tank Irrigation Project has reservoir features as follows:

Catchment area above dam site = 81.5 km²

Retention elevation = +154.00 m (AD)

Elevation at the top of the embankment = +155.50 m (AD)

Outlet sill elevation = +150.00 m (AD)

Storage capacity at retention level = 5.890 mem

Dead storage volume = 0.300 mem

Surface area of lake of retention = 2.820 km²

The mean daily variation of water surface elevation in the Huai Si Thon Reservoir for various years is shown in graph Fig. 2.

The climatic data for the Huai Si Thon Irrigated area is shown in Table 42.

Table 42 Climatic data for Project No. 2

Month	Mean Monthly ¹⁾ Rainfall mm	Mean Monthly ²⁾ Rainfall mm	Mean Monthly ³⁾ Temperature °c	Mean Monthly ⁴⁾ Evaporation mm	Mean Monthly ⁵⁾ Relative Humidity %	
						Khon Kaen
Jan.	6.1	6.3	21.9	155.3	64.0	63.0
Feb.	9.2	13.9	24.2	191.1	63.0	62.0
Mar.	35.6	27.1	26.5	151.7	62.0	60.0
Apr.	75.5	74.6	28.0	162.6	64.0	63.0
May	209.8	221.2	28.2	148.4	72.0	72.0
Jun.	197.3	189.2	27.4	146.7	76.0	76.0
Jul.	231.2	193.4	26.6	155.0	78.0	76.0
Aug.	267.9	233.9	25.7	157.9	80.0	80.0
Sept.	304.7	292.1	26.7	158.8	82.0	82.0
Oct.	68.8	74.5	25.5	155.3	77.0	76.0
Nov.	8.0	8.6	23.5	144.4	71.0	70.0
Dec.	2.6	3.7	22.0	168.8	66.0	65.0

Remarks

- 1) Rainfall records at Huai Si Thon Dam site over a period of 18 years.
- 2) Rainfall records at city of Kalasin over a period of 32 years.
- 3) & 4) Records at the Huai Si Thon Agricultural Experimental Station
- 5) Records at Khon Kaen city and Roi-et city.

(iv) Present situation of Huai Si Thon irrigation area.

Huai Si Thon Reservoir supplies a total agricultural area of 7,700 rai and covers some areas of five villages; Ban Phon Thong, Ban Ham Hae, Ban Hat Lamduan, Ban Dong Por, and Ban Don Kloi.

In the selection of the research site No. 2, intensive surveys on the economic and social situations of the villages in the irrigation area were made.

This village receives its water supply from Huai Si Thon. Most people in the village are employed on their own farms. Because of the availability of the water supply throughout the village area, it is not surprising to see that the economic well-being of the people is rather good. There are many houses having television sets. Ban Dong Kloi is located very close to the city of Karasin. The communication with the village is very convenient. This village consists of 64 households out of which 50 are agricultural households and 14 are non-agricultural households.

With regard to labour movement, it is found that only a small number of people in the village move to work in the city.

Having considered both the irrigation system and the economic and social situations, this village was selected as research project No. 2.

Ban Don Kloi, officially known as Ban Nong Thum, is a 13th village in Tambol Nua. It is located very close to the municipal area of the city of Kalasin (about 2 km). There is also a small natural reservoir nearby called Kang Don Klang which can provide a water supply for growing vegetables and for domestic use, so the water supply is plentiful all year round.

The source of drinking water is pipe water from Huai Sithon. During the past 10 years there has been no damage from droughts because whenever there has been a drought farmers have been able to get water from Huai Sithon.

Over the past 10 years there have been 2 flood years. The first one was in 1978, when 85 % of paddy farms were damaged, and the second one was in 1980, when 30% of rice paddy fields were damaged.

There are less than 30 rai of paddy fields for which water supplies are reliable all year round. The remaining 1270 rai of paddy fields have reliable water supplies only in the rainy season.

The dry season supply is not totally reliable.

There is no tenant in Don Kloi. All of the farmers are land owners. The smallest farm occupies 6 rai, the largest farm 40 rai. The average is between 10-25 rai, a farm size which can support a farmer's family being 20-25 rai.

There is no dry season paddy farming; in the rainy season 30 % of paddy fields grow a high yielding rice variety. The remaining 70 % of paddy fields are under local varieties.

All of the farmland is fertilized by chemical fertilizer, one of the tapioca is fertilized.

All of the water melons are fertilized with manure.

The rice yield in irrigated areas with fertilizer is about 30 tang/rai. Those areas without fertilizer have a low yield of less than 20 tang/rai. This is because of the sandy soil.

The amount of fertilizer applied to paddy fields is kg/rai, and the tapioca yield 2,500 kg/rai.

Farmers prepares the land for rice cultivating in May, seed bedding at the end of May, transplanting in June, harvest in November, and marketing in December, and January.

The planting date for tapioca is not fixed but usually farmers plant tapioca after rice harvesting in December.

(v) Some Demographic Information

At present, the civil registration system at village level is under the Kamnan's responsibility. Each household must be registered at the Kamnan Office, and two copies of the registration cards are made; one copy is given to the household head and another is kept at the Kamnan Office. On the registration card, some demographic information is recorded, i.e. the head of household, household members, relationship to the head of household, dates of birth and death and changes of residence. Other vital events, such as births deaths, migration, and changes of marital status must also be reported to the Kamnan Office.

At this stage the main purposes of the survey were 1) to identify each household and its household head in the village; 2) to count the total number of people living in each household in order that the total population of this village could be estimated; 3) to prepare a list of households and household heads for the planning of data collection in Phase II.

Nearly the whole day was spent at the Kamnan Office looking at each registration card and trying to identify the household head and the household members. It was found that there are 124 registered households in this village, and 6 households out of this number are vacant. The total population has been recorded as 876. All households have been listed including names of the household heads and the total number of household members. This

list will be used as a framework for the planning of data collection in the next phase.

(vi) Socio-economic Information

Much interesting information on socio-economic aspects came from the conversations with the headman of the village. It was found that agriculture, especially glutinous rice growing, is the main occupation of most households. There is no problem of water supply for cultivation because the whole area is fully irrigated. One important point which should be mentioned here is that most households grow glutinous rice primarily for their own consumption. Only the surplus is sold to the rice mill for money income. The headman of the village told us that approximately 60 per cent of the rice yield was domestically consumed and 40 per cent was sold to the market last year. Nevertheless, this rough estimation is still questionable.

Up to this point it is apparent that the money income of most households in this village depends on the annual surplus of glutinous rice. A few households which occupy large areas of agricultural land are in better position to produce a large surplus of rice and earn enough income. But the majority of the households in this village own quite small amounts of agricultural land and, therefore, produce small amounts of surplus of rice to be sold for income. Most households in this village must then earn income from other sources.

Additional sources of income other than glutinous rice are water melons groundnuts, vegetables and other crops which are produced for the local market. These crops can be grown all year round.

Another interesting point is that this village has no problem of land tenure. Most households have their own land for cultivation. There are very few households possessing no land for cultivation; those who hold no land are the ones whose household heads work as government officials, school teachers, and skilled labours in the city of Karasin.

There appears to be a very small level of migration to urban areas other than the city of Karasin. This fact may be attributed to many factors which should be investigated in detail in the next phase.

There is, however, some movement of labour into the city of Karasin and the surrounding areas during the dry season. Mostly they are young men, but most of them work on a temporary basis. They return to their households to help on the farm in the wet season. Very few people migrate to urban places permanently.

The headman of the village was asked what problem he considered the most serious one. The answer was the low price of agricultural products. More detail study should be made on this problem.

Most houses in this village are in good condition showing that the economic situation is quite good. Some time was spent looking around the village and it was noticed that some houses have television aerials on the roof. Due to the fact that the village is very close to the city of Karasin, electricity and piped water are provided. In case of illness the villagers can go to the hospital in Karasin quite easily. Nevertheless some households still live in a traditional manner by using well water for domestic use. However this traditional way of life has been gradually diminishing.

The people in this village appear to be in good health and properly clothed reflecting their economic well-being. In depth studies on health, sanitation, and expectation of life of the population of the village will be done in the next phase.

(vii) Water users' associations and agricultural co-operatives.

It was surprising that in these areas there were no water users' associations despite the plentiful water supply for agricultural uses.

Officially, this is a 13th village. The village is under the Pilot Farm Project executed by the office of the Under-secretary of state, Ministry of Agriculture and Co-operatives. The question is "how successful is this Pilot Farm Project?". After a long debate and discussion among researchers and with responsible officials at the Pilot Farm Project, it was concluded that the technological transfers to farmers are insignificant because of four main reasons: (1) a shortage of revolving capital, (2) marketing problems, (3) the production process is not accepted by farmers and, (4) the productivity of the soil in North-east Thailand is very low. Aside from this, very few farmers from Ban Don Kloi came to the Pilot Farm Project for training. There was some concern that since the village is too close to the town of Kalasin (2 kilometers) and the urbanization process is slowly moving into the village, the land prices will go up quickly and the land-owners will sell the land and move out. This assumption was wrong.

Here in this village, farmers' organizations are perfect. They include one co-operative group of 32, a farmers' group of 20 and a water users' association group of 30. The impression was that in the area of abundant water supply, water management is poor and a water users' association rarely emerges, while in the area of water shortage, farmers are inclined to organize themselves and share the use of the water supply.

(viii) Agricultural situation.

Water is used for water melons, peanuts, long beans, yellow melonds and legumes. The water melon harvesting period is 65 days from planting to harvesting. Roughly the income from water melons is from $\text{P} 3,000$ to $\text{P} 4,000$ per rai. The cost of water melons is 300 P for fertilizer/rai, and 200 P for pesticide/rai. The rice yield is from 30 to 50 tang/rai, and the income from rice/rai is from 750 P to $1,250 \text{ P/rai}$. For tapioca, the yield is 2-3 ton/rai; 1 ton is $700-900 \text{ P}$ so income is about $1,400 \text{ P}-2,700 \text{ P}$ per rai.

Therefore the income from paddy farming is the lowest, but the reason why farmers grow rice in the wet season is because 1) paddy fields cannot be used to grow any other kind of crop 2) the farmer has to produce enough rice for household consumption.

This area also is salty and is not used to grow any dry season crops. There is a lot of water release from the left main canal of Haui Si Thon, but farmers in the upstream region block the water for their own use. No water was reaching the lower stream.

There are 6 groups of water users' associations and each association consists of farmers who are upstream. There is no association downstream, because the water doesn't reach there. Sometimes there is conflict between associations on the issue of water management.

The canal was constructed 17 years ago. Before the construction, there was no dry season crop in the area. Farmers grew upland crops as soon as the water was available. Haui Si Thon irrigation project has raised the income of villagers quite a lot.

With regard to the water reservoir named "Keng Don Kland" which is situated at villages of Ban Don Kloï, Ban None Nam Tang, Hua Non Ko, and the provincial prison, this water reservoir was built by the provincial government more than ten years ago.

This stream dried up in the dry season about 20 years ago. Since embankment of the dam water has been reserved in the tank all year around. There is a weir between this tank and the stream leading to the river Chi. During the flooding season water from the tank flows over the weir and goes to the Chi river (through the Lam pown canal). There are some fish in the tank such as catfish and other local fish but there are very few.

The most needed help that farmers would like to have is to release fish eggs in the tank.

Since this tank is at the lower level of Meconnhyside, farmers in the surrounding areas cannot use water from the tank to irrigate their fields.