

The model of integrated small-scale rural development by Tameike in Northeast Thailand: action details in Khonkaen

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I. The concept of integrated small-scale rural development

To start a project on rural development in Northeast Thailand, availability of water is considered a top necessity. Without water supply for production, other related development activities can never be fulfilled. In the past and maybe down to the present, government agencies favoured water resources development in large and medium scales. Later evaluation proved that tremendous investment funds spent for these big projects could not raise the people's living conditions as expected. At present, there are already limited areas, which are technically suitable for big construction like a big dam or big reservoirs, not to mention the financial limitation of the government budget. From the Japanese experience, big projects for water resources development often occurred at the later stage when most farmlands had been able to store water in tameike (a Japanese-styled farm pond) in the paddy fields.

Large-scale water resources development had highlighted the rural development strategy in Northeast Thailand during 1960-1980. The following disadvantages were recognised.

1. The construction period was very long and costs were very high. "Lam Nam Oon Integrated Rural Development Project" in Sakon Nakhon province could be cited as one typical example. The amount of total cost for this Project was US\$43.8 million or equivalent to some 1,200 million baht at the time of construction. Ten percent of these amounts were the foreign loan from AID. Nam Oon Dam was constructed in 1967 and took 7 years to completion in 1973. Its irrigation system was finished in 1981. Of course, a long construction period and high cost of construction are not at all suitable for a poor country like Thailand.
2. Many big projects were mostly financed by foreign loans, and they must be justified in consideration of investment returns. Therefore, a large benefited development area would have to be planned. This was normally unpractical for rural Thailand, which is characterised by small farms. High-yielding crop varieties must be included in the plan and farmers were insisted on adoption of big-farm technology. This attempt could not be worked out effectively at the farm level.
3. In order to achieve this technical transfers at the farm level, the government must provide all necessary equipment and extension services to farmers over a fairly long period of time until farmers got used to this kind of guided development. They could not stay independently when the project moved out. The termination of extension services by the government often brought about a tendency to revert to inefficient traditional production again.

4. It was naturally much more difficult for farmers to gain a general understanding of public irrigation and maintenance works when the development scale was too large.

The idea for integrated small-scale rural development in Northeast Thailand was inspired by the successful experience in rural development in the Toban district of Hyogo Prefecture. The concept of "integration" is here defined to cover both technical and socio-economic aspects in order to achieve a complete cycle of rural development. However, as based on the experience of the Toban area, the development of water resources with efficient water management and of farmer organisations concerned will be especially emphasised to be the backbone of this development pattern. Other related aspects are treated as complementary development factors: for example, the improvement of soil productivity, the development of high-yielding varieties of crops or the introduction of new crops to farmers.

II. Rural development in Japan: the tameike approach

Each stage of rural development in the Toban district was a gradual progress for hundreds of years ago. The water resources development in the old times was performed by the cooperative effort of farmers in the form of "tameike group." Since the Japanese topography in most farmlands was impossible for rainfed agriculture, a number of tameike were thus constructed to store up rainwater to be used later for agricultural production. In the old times, the paddy farm was in the forestland, which means that private ownership did not occur yet. It was therefore very easy to decide a suitable pond site on mountainous forest areas and to introduce some management for water use, which turned out to be an exclusive water use right later under group ownership and under the management of the water users association. The organisation of the tameike group was later made uniform in all over Japan.

The set-up of the agricultural Cooperative took place much later originally to serve the rural poor farmers. The Cooperative's first function was to provide agricultural credit to poor farmers for their production. The multi-purpose functions of the agricultural Cooperative occurred later by the initiative and guidance of the Japanese Government. At present, the agricultural Cooperative becomes the main mechanism in all economic activities in rural Japan. All rice produced is, for example, channelled through the agricultural Cooperative for marketing in all over the country. The tameike group and the Cooperative group are legally separate; but they are practically the same group of farmers in the same area.

How to adopt this model and to realise it in Northeast Thailand for integrated small-scale rural development are very sophisticated indeed. At present, all farmlands in Thailand are administered under private ownership. Most farmers are currently urged to produce their products for export, not for household consumption as in the former time. Thailand is well known as one of the top rice exporters. Even worse, Thai farmers gradually adopt stronger individualistic attitude day by day; so they do not wish to cooperate with their

neighbours because they do not trust them. Therefore, the introduction of this Toban model to Northeast Thailand could be very difficult indeed when compared to Japan.

III. The model of integrated small-scale rural development in Northeast Thailand

The rural development approach from the experience of the Toban area of Harima District in Hyogo Prefecture can be labelled as a kind of "integrated small-scale rural development." Since the rural development at a large scale in Northeast Thailand was not effective enough during the past several decades, we propose that the Toban development model be realised in Northeast Thailand. In other words, an integrated small-scale rural development in Japanese style is proposed for an alternative approach. In fact, small-scale rural development has already existed in many areas in Northeast Thailand. There are at least three small-scale rural development patterns adopted by the Government:

- 1) a reservoir leads development;
- 2) a head work leads development;
- 3) a water pump leads development.

These are three small-scale development patterns in Northeast Thailand.

The rural development in which a reservoir is constructed would seem logical considering from the natural conditions of the Northeast topography. Up to the present time, several hundreds of reservoirs have been constructed in Northeast Thailand for irrigation, domestic use and fishery. Some of them show fairly stable irrigation, but others have many problems, especially the lack of water supply in drought years. Small-scale rural development that is based on head works can only be adopted in regions where river discharge is stable which means that a big reservoir exists upstream. About lifting-water-pumps, it needs a strong and fair water use/control system; currently this system is in operation noticeably along the Mekong River and imperfect so far.

a. The definition of integrated small-scale rural development

The concept of "integration" has been variously defined by different Government agencies. Lam Nam Oon integrated rural development project in Sakon Nakhon province defined "integration" as coordination among involving development agencies. By this understanding, Government agencies would have a common plan of development and its implementation would be by coordinated effort. In Udon Thani province, Thai-Netherlands integrated development project defined "integration" simply as various aspects of development; they had, as a consequence, as many as 14 sub-projects implemented independently in the same area. In other words, it is actually a system of combination of various development activities in one area.

As for our definition, the actual crux of the integration for this new development approach is the integration of technical and socio-economic activities to achieve a complete cycle of rural development. Our emphasis will be on the development of water resources and of farmer organisation.

b. The features of village as the rural development unit

The villages in Northeast Thailand are scattered both in mountainous areas with relatively more rainfall and in flat plateau areas with relatively less rainfall. Usually, upland or cash crops occupy the mountainous areas and rainfed paddy fields occupy the flat plateau. This flat plateau comprises about 80 per cent of all agricultural areas of Northeast Thailand. Poor villages are mostly concentrated in the big flat area surrounded by Mue and Chi rivers. This big flat area has saline soil and there are no dam sites for water storage. Most of the flat plateaus are rainfed paddy fields with rainy-season monocrop system.

In order to make the model practical; the pre-conditions of a target village should be as follows:

- 1) the individual feature of all paddy fields is not so much different;
- 2) the main purpose of rainfed rice production is to supply glutinous rice for family consumption and not for marketing;
- 3) the supplementary agricultural activities are mainly for family consumption and for little cash income;
- 4) the village lacks water supply for agriculture causing instability to rainfed paddy fields;
- 5) the farmers have no experience of joint works for irrigation development and for common businesses;
- 6) the chance for farmers in the area to earn extra income is very limited.

As a consequence, the growing of vegetables or fruit trees should be limited in the house garden. The poultry's raising, if any, is mainly for family consumption and the raising of pigs and buffaloes for emergent income. As there is a small rainfall per year, water resources development would bear a comparatively high cost for poor farmers. So without the active support of the Government, the farmers cannot start their rural development by themselves.

c. Natural disasters in Northeast Thailand

There are natural disasters in Northeast Thailand as follows:

- 1) drought or continuous period of dry weather in rainy season;
- 2) flooding or inundation disaster;
- 3) salinity disaster.

The elimination or reduction of these disasters will bring about effective rural development in Northeast Thailand. The introduction of the tameike system in rainfed areas and its optimum size of the system can be planned through the comparison with the experience of Toban area in Japan. The tameike system is the Japanese pond system, which has multi-purpose functions.

d. The characteristics of the tameike

Tameike is a kind of the tank system collecting water from its own flat area for the utilization of local water resources. The areas in the world where annual rainfall is only from 900 to 1,300 mm. usually have many tameikes; such as Japan, Sri Lanka and India. The tameike is different from other small reservoirs, which store the upstream run-off and release for downstream benefited area in that it has been designed for multi-functions as follows:

- 1) it stores rainwater and ground water;
- 2) it stores the returned flow of surface water from surrounding paddy field;
- 3) fresh water in the tameike can dilute dense saline water of original ground water to the extent of useful irrigation water;
- 4) it has the desalinization effect for neighbouring ground water zone.

If we connect the movable weir intake with tameike through feeder canal in the development area, water utilization efficiency becomes greatly improved. In Thailand, water use right is open to all. But as a key solution for effective water management based on Toban experience, the exclusive water use right for tameike members should be applied to our study areas as well.

e. The establishment of farmer organisation

In Japan, two farmer organisations play significant roles in rural development; namely, the water users association and the agricultural Cooperative. To adopt these two organisations to villages in Northeast Thailand, it is suggested that the two organisations be combined into one due to a smaller responsible area in Northeast Thailand. We will call it "*the agricultural village Cooperative.*" This agricultural village Cooperative not only executes the usual multi-purpose works of the ordinary agricultural Cooperative at district level, but also does the additional work on water-use management and cooperation in development area. This Cooperative will become the sole representative farmer organisation for all village members and be independent. In other words, this agricultural village Cooperative will have the combination of basic functions of the present agricultural Cooperatives and the water users association.

The organisation of this agricultural village Cooperative has important implication for the whole Cooperative structure of Thailand. That is to say, the agricultural Cooperative at district level (Amphur Cooperative) will become the federated Cooperative, instead of local agricultural Cooperative. It will be again emphasised here that the proposed village Cooperative has its own legal status and its own management. This Cooperative will not be involved in the credit business especially at the beginning in order to avoid financial complication at village level. There are two reasons for this complication: (1) village leaders have no experience in credit management; and (2) the village Cooperative needs time to develop its own credibility to get a public support both in sources of funds and also a sincere faith from their own members to save money with the Cooperative.

IV. The introduction of tameikes in Northeast Thailand

The first tameike was introduced in a very poor village in Khonkaen province in 1982. The experimental village was Ban Non Khwao in Ban Fang district, some 30 km in the southwest direction of Khonkaen City. This poor village was characterised by salinity concentration in soil and water. According to our laboratory experiment, salinity could be reduced by the introduction of effective tameike system in rainfed area.

In fact, the original tameike design in Japan lacks two important qualities. First, the Japanese tameike is too shallow to store a lot of water because farmers in the old times did not receive support from their government, especially the use of big construction equipment. Second, the tameike site on some mountain slopes in Japan is often not a suitable site for storage capacity. Our field trip in the Toban area of Hyogo Prefecture during November-December 1984 showed that several tameike ponds had no water left at all. However, the Japanese government solved the problem of water scarcity by construction of big dams to refill these tameike ponds.

As Northeast Thailand has no big dams to refill future tameike ponds, the standard design of tameike in Northeast Thailand must be modified from the original tameike in Japan in order to maximise the water storage capacity. From engineering experiment, the tameike in Northeast Thailand should be deep enough to arrive at the bedrock. Since the depth of the bedrock is naturally different from place to place, the depth of the pond should vary accordingly. At our experimental village, it was decided that the tameike had an average depth of around 4.5 metres having the concrete pipe constructed through pond embankment at the level of ground surface so as to introduce surface water into the tameike. Other supplementary facilities that were constructed were outlet well, lifting device of water and distribution pipe.

Figure 1: Concrete pipe through embankment



Our design of tameike is quite different from the original tameike in Japan. The storage capacity of the first tameike at Ban Non Khwao was only 3,000 cubic metre (m^3). At the depth of 4 metres, the pond could not be constructed by farmers' manual labour. In fact, the pond depth of more than 2 metres is already difficult for manual hauling. A bulldozer should be used in the construction and only the construction of inlet pipe and distribution system was suitably done by manual labour. Our staff will advise the design and location of the pond.

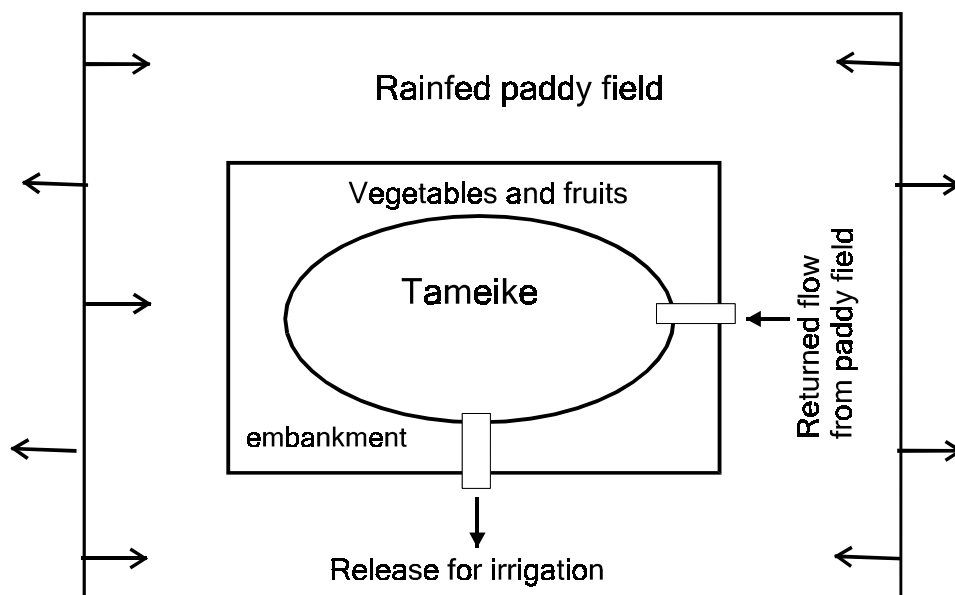
According to NESDB poverty index of the Government's Fifth Plan (1982), Ban Non Khwao was regarded as one of the poorest villages in Northeast Thailand. The living standard of the population was at subsistence level. This was a very small village of only 30 households. The rice cultivation in village could be performed only in wet season with a very low yield of only 15-20 tang/rai. Drought occurred almost yearly causing disaster to both men and all kinds of animals. There was one public reservoir for domestic use; but it dried up quickly during dry season.

V. The Experimental Operations

We started our negotiation some time in late 1981 with villagers concerned. It was indeed very difficult to get good cooperation from these villagers, which was quite understandable since they were mostly small farmers. The sacrifice of their land for the pond construction would decrease their cultivating areas. The reason we used in convincing them was, "Lose one rai for year-round activities OR keep all rais for a half-year activities."

There was at last a volunteer. He was the assistant village headman of Ban Non Khwao. Out of the total 11 rais under his ownership, only one rai was offered for the experimental construction of the first tameike in Northeast Thailand.

Figure 2: Bird's-eye view of the pond



Bird's-eye view of the pond was shown in Figure 2. We can see that one tameike has several functions.

- 1) It irrigates paddy field as the supplement to rainfall during dry spell.
- 2) It grows vegetables and fruit trees on the embankment of the tameike.
- 3) It raises fish in the tameike primarily for family consumption and etc.

This first experimental tameike could store rainwater enough for supplementing the rice cultivation in the early drought period of about 20 days usually in late August for an area of 20 rais. The catchment area for this tameike is 10 rais and the pond size is 20 m. wide and 28 m. long at bottom with an average depth of 4.0 m. from the ground surface. The dug soil was used to fill the embankment around the tameike. The pond area enclosed by embankments is 4,080 square metres (m²) or 2.55 rais. The total cost of pond construction was exactly 275,990 baht comprising excavating of rock and soil (about 80 per cent of the total cost), materials and labour wage. The construction of this first tameike was finished in February 1982. The total cost of construction was rather high because the location of the experimental village (Ban Non Khwao) is far remote from the highway and there was only one pond to be dug up. If there were many ponds for construction in one area, the average construction cost of a pond would be much lower. The cost of construction per one tameike of double storage capacity at our Pilot Village no.3 in Maha Sarakham Province in 1986 was only 85,000 baht.

VI. The Experimental Observations

After one year of construction, the following events were observed.

1. The farmer could effectively use water in this experimental tameike for paddy field during drought in wet season. In crop year 1982, serious drought attacked Khonkaen province and all of Northeast Thailand. Even nursery fields of rice became almost dead. However, in the benefited area of the experimental pond, nursery survived and transplanting could be started as usual.

2. The farmer could use the water in the tameike to grow vegetables and fruit plants that are helpful for household consumption.

3. It was possible to raise fish in this tameike pond for eating and selling. We had released some 300 tilapia fish into the pond and after 90 days, these fish could be caught for consumption.

4. In this particular year, there was no water for consumption during drought period. The farmer must use the water from the tameike for consumption. During drought in 1982, this experimental pond became the only source of water left in the village and all buffaloes must rely on water from our newly constructed tameike pond.

5. The experimental tameike proved to be able to dilute dense saline water of original ground water to the extent of useful irrigation water. This was because the ground water coming out into the pond was mixed up with the surface water thus reducing salinity.

The landowner of this experimental pond was the farm operator himself. He had declared some parts of the embankment area available for his neighbours to grow vegetables. However, the distance from residential area was a barrier for regular care taking plus a respect for private ownership of the landowner making his neighbours reluctant to utilise the embankment

area for free cultivation. After pond construction, the pond owner must stay at the pond site for almost 24 hours a day for fear that his neighbours or visitors from other villages might steal his vegetables grown on embankments or catch his fish from the pond any time if he was not around.

Within a year after the complete construction of this tameike, all villagers from Ban Non Khwao and nearby villages expressed their eagerness to have ponds also for their cultivation. One landowner even proposed to contribute large sum of money to the Project if a pond was to be dug up in his land.

Figure 3: The example tameike in Northeast Thailand



It is clear that a pond constructed in public land by the Government produces much less benefit to farmers if compared to our tameike in private land. It is due to the fact that no one is responsible for the maintenance of the public pond and that the use of water in public pond has many limitations. Fish raising is, for example, impossible in public reservoirs unless the whole community does it.

VII. The realisation of the model of integrated small-scale rural development

Ban Non Khwao was re-selected as our first pilot village for a comprehensive realisation of the model of integrated small-scale rural development. Many farmers from three nearby villages owned the selected paddy fields to be experimentally developed; namely, Ban Non Khwao, Ban Bung Sawang and Ban Nong Bua. This is one typical characteristic of rural Thailand where all farmlands can be owned by anybody. Therefore, our definition of pilot village no.1 includes these three neighbouring villages.

Table 1: Household statistics at pilot village no.1, April 1984

<i>Villages</i>	<i>Population</i>	<i>Households</i>
Non Khwao	190	30
Bung Sawang	782	107
Nong Bua	375	70
Total	1,347	207

Source: Own surveys during April 1984

Ban Bung Sawang was the largest village in terms of population and households; Ban Nong Bua the second and Ban Non Khwao the smallest. The number of seasonal emigrants from our first pilot village was about 30 per cent of working labour force. As compared to Nam Phong Irrigation district in

the same province, out-migration was less than 10 per cent because their farmers could do the double cropping in irrigated areas.

It was decided that 10 more tameike ponds would be excavated in the first pilot village. Field arrangements for the realisation of the model are elaborated below.

a. Technical preparation before the construction

The following technical works were carried out in order to obtain the best possible pond sites in terms of water storage capacity within the proposed paddy fields.

1) Water resources data

There were three components of water resources data to be collected. The first component was "direct rainfall," which is the major source of water flowing into the pond. The second component was run off from Huai Yang Creek flowing close to the pilot village tameikes and the water from this creek could be obtained during August and September, which is the flooding season of Thailand. The third component was ground water flowing into the pond at an approximate level of 2 to 3 metres below the ground surface.

2) Topographic survey

Topographic survey was done in the paddy fields of about 700 rais. The purpose of the survey was to provide ground levelling in various points of selected area for pond construction. Ground levelling survey could provide the suitable locations of tameike in the rice field.

3) Ground water survey

The purpose of ground water survey was first to study the level and movement of ground water table. The second purpose was to evaluate existing content of saline ground water.

4) Survey of farm size and name list of land owners

To identify the ownership of land to be used as pond sites, it required the map showing the farm plots, their sizes and names of landholders, having the same scale as the topographic map. When we superimposed the map of landholders on the topographic map, the owners whose lands were to be the pond sites and the benefited areas of the tameikes are clearly identified.

5) The design of the pond site

This is an engineering design. It required consideration of the following issues:

- ◆ The criteria of water use from the pond;
- ◆ Rainfall data at the pond location;
- ◆ Boundary of watershed area above each pond site.

At pilot village no.1, the design capacity for each pond size was adopted at 8,000 m³. This design capacity could decrease or increase for each tameike due to the demand by farmers/land owners concerned before the start of the pond construction.

b. The grouping of farmers to support the water use/control model

In the Toban area, there were two kinds of farmer organisations; the tameike group and the agricultural Cooperative group. The tameike groups were later combined into a new organisation called "water users association." These two Japanese organisations have played significant roles in the successful development of Toban area in Japan. To effectively apply this experience to Northeast Thailand, we had combined these two organisations into one because one farmer organisation with multi-functions should be more appropriate to an integrated small-scale rural development at village level. This newly established organisation was called, "agricultural village Cooperative." The village Cooperative not only executed the usual multi-purpose works of ordinary agricultural Cooperative at district level, but also did the coordination works on water-use management in the village area.

VIII. The coordination activities with farmers

To arrive at an effective organisation, the following works have been executed in sequence.

1) The village meeting

The request for the whole village meeting was made through the village headman of Ban Non Khwao on March 28, 1984. There were two main purposes: one was to stimulate farmers in the project area to work harder for their own development and another one was to explain our development details in their own villages. The farmers in the development area must commit themselves to the following agreements.

- To sacrifice a piece of farmland for pond construction. The size of the committed land dependent on the extent of the pond shared by his neighbouring farmers.
- To share in the labour during the construction of pond, which would last from the middle of December 1984 to March 1985.

Most farmers accepted the above agreements.

2) The set-up of the "village development board"

The village development board would act as the coordinating body between the Project staff and all farmers concerned during tameike construction. The board was organised on June 25, 1984. There were altogether 9 members comprising one chairman, two vice-chairmen, one secretary, and other members. The board could give advice to the Project staff for re-consideration in all matters.

This village development board was temporary because it would be dissolved when the agricultural village Cooperative was established later after the complete of pond construction.

3) Farmer group meeting for written approval

On October 21, 1984, we had an important farmer group meeting in order to get their written approval. The decisions of farmers/land owners were very unpredictable. Many decisions were unreasonable considering from economic viewpoint. We could also blame social and personal conflicts for the failure of the talks. We could list some serious problems concerning farmer grouping as follows:

- ◆ Farmers/landowners were unwilling to sacrifice their farmland for pond construction. Some small farmers, who had less than 6 rais, were willing to sacrifice at most 1 rai; while those having many more complained that their cultivation area would be smaller if pond construction was allowed.
- ◆ Some minority groups insisted on private use of tameike and objected to any share on the same tameike by their neighbours. The Project could not make any compromise and many landowners had to be excluded from the benefited areas of the tameike.
- ◆ Some farmers/landowners had already divided their land to give to their sons and daughters. Due to smaller size of land after land division, nobody would want to sacrifice one's piece of land for pond construction.

By November 1984 or around 7 months since the first meeting, only six tameike ponds could be constructed by the approval of all group members concerned. Four potential tameike groups were still under negotiation. However, more farmers turned to be "positive" as soon as the bulldozers moved into the village. More farmers had come and asked us to include them into our benefited areas. The change of mind could occur in any time and any minute especially for Thai farmers who have been often promised by government and private agencies but those promises were often forgotten. Our project was new to them and it was very hard for them to get acquainted so quickly. The wait-and-see attitude for some farmers was adopted only for their safety; and they would never make any commitment until they saw what was actually happening in their neighbourhood.

IX. The contribution of farmers during tameike construction

There were four agencies involved in the construction operations:

- 1) Survey and design unit, from Hydrology division of the Royal Irrigation Department;
- 2) Tractor fleet unit, from Tractor Operation Centre for Northeast Thailand, Division of Earth-Moving Equipment, Royal Irrigation Department;

- 3) Village development board, from farmers/landowners concerned; and
- 4) Project Administration composed of experts from Chulalongkorn University and Kyoto University.

Our project intentionally introduced the idea of an intensive participation of farmers right from the beginning. The village development board organised the labour group of farmers to support the pond construction. Each construction unit had at least one field representative for informal discussion in case any problem arose in the field. Also one project staff member was available at the field site for central coordination. The tractor fleet unit moved into the pilot village no.1 by the end of December 1984 to camp out in the rice field. The survey and design unit was in the village much earlier for many surveys and designs.

The following tasks needed the decisions of farmers concerned:

- 1) The exact location of each pond for each tameike group could not be decided until the last minute before the pond construction. A landowner had a tendency to have a smaller farm pond from the original average design of 8,000 m³. The volumes of ponds therefore varied from about 3,000 to 12,000 m³.
- 2) The farmers/landowner tried his best to negotiate for a new pond location that was always to be on upland area. The farmer would like to save his lowland area for paddy field. But this request from farmers was often against the engineering criterion on the maximum inflow of rainfall into the pond.
- 3) The farmers/landowners would also want to change the original design of a pond shape in actual construction.

The project would not pay for unskilled labour since the pond construction was in the private land. Almost all farmers concerned had no objection to this idea. Two labourers were agreed each day from each participating household to form the labour pool during construction. The works to be done by labour were as follows:

- 1) The construction of two "check boxes" for each pond; and
- 2) The construction of "distribution system" to irrigate the benefited area of each pond if there is drought.

However, during the construction period, there occurred a "power play" among village leaders from different villages. This power play could damage the village unity and so it needed to be eliminated as soon as possible.

X. The summary

For Thai farmers, "sense of belonging" to their mother village was very strong indeed. If our development village covered only one village, it would be

much easier to get that feeling from farmers concerned. But here in pilot village no.1, we had three villages in the development area. This caused much trouble to us in an effort to form a cohesive farmer organisation.

Initially, we organised "village development board" being composed of village headmen and their assistants of altogether 9 members. The headman from Bung Sawang village (Ban Bung Sawang) was elected the chairman of the board and the one from Ban Non Khwao was the vice-chairman. Before the start of tameike construction, the "village development board" was very active and so efficient in negotiation with landowners concerned. The success of the negotiation was earlier up to individual capability of each member of the board. The chairman from Ban Bung Sawang showed that he was most capable in making many successful negotiations in his own village. The vice-chairman from Ban Non Khwao and representatives from Ban Nong Bua showed little effort and that was why we have almost all tameike groups from Ban Bung Sawang.

On the whole, field management improved quite a lot but not to the extent that the original plan could have been achieved. This situation existed even after the Tractor Fleet Unit had moved into the pilot village. The villagers' hesitation prolonged our original working schedule for tractor operations and it created an additional cost for the Project.

With such a hesitation, we needed to extend the benefited area beyond the original boundary. The two-tameike ponds had to be located outside the pre-determined area due to this problem. There was no engineering survey due to time constraint that occurred when the Tractor Fleet Unit must move out for other assignments. Only one tameike owned by the chairman and his relatives could be successfully constructed according to the design. Another tameike owned by his assistant was dug up unsuccessfully due to muddy soil.

However, these two additional tameike groups became most useful for field demonstration during rainy season when visitors could hardly walk through the rice field to inspect the Project's whole systems of water resources development by tameike and of water distribution by concrete pipe. When the construction was completed, all farmers in the benefited area clearly realised several advantages of the model of integrated small-scale rural development. Those farmers/landowners who failed to join the project in time were very much disappointed for their wrong decision and had hoped that they could join this kind of project in the future.

That hope has never been realised in the first pilot village so far. We have later extended this experimental model in other villages of other provinces. We have three experimental projects in Roi-et province with one in the area of Thung Kula Ronghai; one in Maha Sarakham; and two more experimental villages in Buriram province. The model has become the blueprint of the integrated small-scale rural development in Northeast Thailand until today.