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An Analysis of Land Consolidation Projects in Thailand Compared with Japanese Experiences

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Abstract

To analyze the characteristics of land consolidation projects in Thailand, We surveyed extensive and intensive projects in the Chao Phraya Delta in Thailand, and one intensive project in Japan. These results are compared each other mainly from the viewpoint of land holdings and field layout and farmers' incentives. This study clarifies that (1) an extensive project is feasible in Thailand because the average plot size is relatively large, since most Thai farmers gather their land in a plot; (2) plot size is critical with regard to the advantageousness of the extensive type in comparison with the intensive type of consolidation; and (3) it is hard to provide incentive for upstream farmers to participate in a land consolidation project, since they have had the advantage in irrigation and drainage activity under the present plot-to-plot system. (4) We recommend using the direct buying system to obtain common land in an extensive project as a way of eliminating one of the difficulties in getting farmers' consensus for the project.

Key words: Land consolidation project, land holdings, field layout, farmers' incentives, Thailand

1. INTRODUCTION

The development of the industrial sector in Thailand since the 1970s has drastically decreased the agricultural population in the Central Plain of Thailand (Kasetsart University and ORSTOM, 1996), thus resulting in labor shortages in the agricultural sector. This situation creates a demand for the mechanization of farm work (Kasetsart University and ORSTOM, 1996), which requires that each plot has direct access to a farm road for more efficiency in the introduction of tractors. A land consolidation project can provide each plot with independent access to a road and an irrigation and drainage system. Only 3% of the total paddy areas in Thailand had undergone land consolidation projects by 1996 (Ministry of Agriculture & Co-operatives, 1998). More and more paddy lands are expected to be included in consolidation projects, although some areas in the southern part of the Central Plain are designated as conservation area, where paddy development with minimum impacts on the flood retention function is

recommended (JICA, 1990).

In contrast, land consolidation projects in Japan had covered more than some 70% of paddy land by 1998, most of which were implemented after World War II in response to the strong demand for field work mechanization (Shinzawa and Koide, 1963). The present type of land consolidation project, which started in 1963, had covered 56% of all the paddy land in Japan by 1998. Land consolidation project has contributed much to the decreased labor requirement for paddy cultivation, from 1,410 hours of labor per ha in 1965 to 361 in 1998 (MAFF, 2000).

In this paper, the authors aim to clarify the special characteristics of the land consolidation projects in Thailand in comparison with a Japanese case in the hope of contributing to better on-farm development in Thailand

2. THE OUTLINE OF LAND CONSOLIDATION PROJECTS IN THAILAND AND JAPAN

2.1 On-farm system development projects in Thailand

There are two types of on-farm system development in Thailand: a ditch and dike project and a land consolidation project. The Royal Irrigation Department launched a ditch and dike project in 1963, in which only ditches were constructed and no roads were constructed. In the early days of the project, rectilinear low-density ditches were adopted, and not all plots had access to a ditch for irrigation and drainage (Kasetsart University and ORSTOM, 1996). The irrigation was performed mostly in a plot-to-plot manner. Most of the ditches in recent projects are placed between paddy plots to give every plot direct access and to avoid dividing a plot into two. The coverage of the project was 17% of the total paddy land in Thailand in 1996.

In 1975 the Land Consolidation Office started the land consolidation project, based on the Land Consolidation Law of 1974, consisting of an intensive project and an extensive project. The intensive type projects have covered 1% of the Thai paddy land and the extensive projects have covered 2% of the paddy land. The extensive project is the most popular of the three project types executed in 1993 (Hovarongkura, 1995). The intensive project includes not only the construction of roads, ditches and drains, but also land leveling and replotting of paddy plots to make them rectangular. Therefore, the cost is higher than that of an extensive project, in which roads, ditches and drains are constructed for all the plots in a given area, but plots are not reshaped.

According to the Land Consolidation Law, one of the formal requirements to be met before a land consolidation project can be started is that more than 50% of related farmers must agree to the project. However, the land consolidation office has a criterion that in order to actually implement the project at least 70% of the farmers have to sign the agreement. This formal requisite regarding the percentage of the agreement has recently been reduced from 70% to 50%. The government subsidizes 50% of the cost of an intensive project and 80% of the cost of an extensive project. The farmers, of course, have to give up some portion of their land for common use in roads, ditches and drains.

In addition, the land consolidation office has four criteria in determining priority for project implementation; the highest priority goes to areas with good water conditions, a larger average plot size, fewer tenant farmers and better soil condition.

2.2 Land consolidation projects in Japan

In Japan, the start of a farmland consolidation project dates back to 1899, followed by a land readjustment project after World War II. The Ministry of Agriculture and Forestry

launched a land consolidation project in 1963. Its aim was to consolidate scattered small plots into larger rectangular plots (reduced in number) as well as to provide each plot with independent access to a road and a ditch and drain system. The layout of the facilities after the project is similar to that of an intensive project in Thailand. There are no projects in Japan that are similar to the extensive projects or ditch and dike projects in Thailand.

The land consolidation project is performed based on the Land Improvement Law enacted in 1949. According to the law, more than two-thirds of the total number of related farmers must agree to the project, and all members have to participate in it once the project has started. However, the central government has a guideline stating that more than 95% of the members should support the project. The central government and local governments subsidize about 3/4 of project costs in the case of prefecture government operating projects.

The standard plot size in the projects after 1963 is 0.3 ha with a 200-m interval for the road, ditch and drain, while a 1.0-ha or larger plot has been recommended in flat areas for higher labor productivity since 1985.

3. SURVEYED PROJECTS

We chose three land consolidation projects for case studies, one extensive type project and one intensive type project in the Central Plain of Thailand and one land consolidation project in Japan. The field layout and land holdings in these project areas were examined to make clear the special characteristics of each project.

The intensive project was conducted in Bangkud, Chainat Province, in 1980. The project site is 150 km north of Bangkok on the right bank side of the Chao Phraya River. The extensive project was conducted in Non Pla Mor, Ratchaburi Province, in 1985, which is located 75 km west of Bangkok on the right bank side of the Mae Klong River. The land consolidation project in Japan was carried out in 1973 in Kusunoki, Toyama City, Toyama Prefecture.

The project area, number of farms, average farm size and average plot number in each project are presented in **Table 1**. Since the average paddy area per farm in the Central Plain of Thailand is 2.1 ha (Ministry of Agriculture & Co-operatives, 1998), farm sizes in the studied projects are not much different from the average in this region. There is no big difference between Thailand and Japan in terms of the farm size.

However, the average number of plot-clusters which was defined by Shinzawa and Koide (1963) as to an isolated plot or

Table 1 Average farm size prior to land consolidation projects

	Bangkud	Non Pla Mor	Kusunoki
	Thailand		Japan
Project area (ha)	150	4,863	23
Number of farms	127	1,700	20
Average farm size (ha)	1.2	2.9	1.2
Average number of plot-clusters per farm	1.3	1.6	14.7

a group of connecting plots owned by a farmer, is much smaller in the Thai projects than in Kusunoki, Japan. Although we cannot get general statistics for the number of plot clusters in Thailand, one project case in Suphanburi has been reported in which the average number is 1.8 with an average farm size of 3.0 ha (Matsuda and Kanazawa, 1991).

Before the land consolidation project in Kusunoki, the number of plot-clusters ranged from 1 to 18 with an average of 14.7. It is distinct from the Thai cases. The dispersed plot-clusters, being large in number, were common in the rural areas in Japan (Shinzawa and Koide, 1963).

4. SURVEY RESULTS

4.1 Bangkud land consolidation project

The project area is located in Village No. 6 of the Bangkud

district, which is located within the Borromathad Irrigation Project, one of the 25 irrigation projects in the Central Plain. The water source is the Chao Phraya River. The project cost was Bahts 35,600 per ha, 50% of which was subsidized by the central government. The beneficiary farmers covered the rest.

In this intensive type project, the facilities were constructed so that each plot has independent access to a road, ditch and drain. Fig. 1 shows the field layout in the Bangkud area after the project. The interval of field ditches is 400 m, and in the midst of the interval a field drain is constructed. A road was constructed next to each ditch, and the interval between roads is, consequently, 400 m.

The distance between a ditch and a drain is 200 m, which becomes the longer side of a plot. Each field was divided by deciding the length of the shorter side of a plot so that a farmer would have a plot with an allocated area according to his land

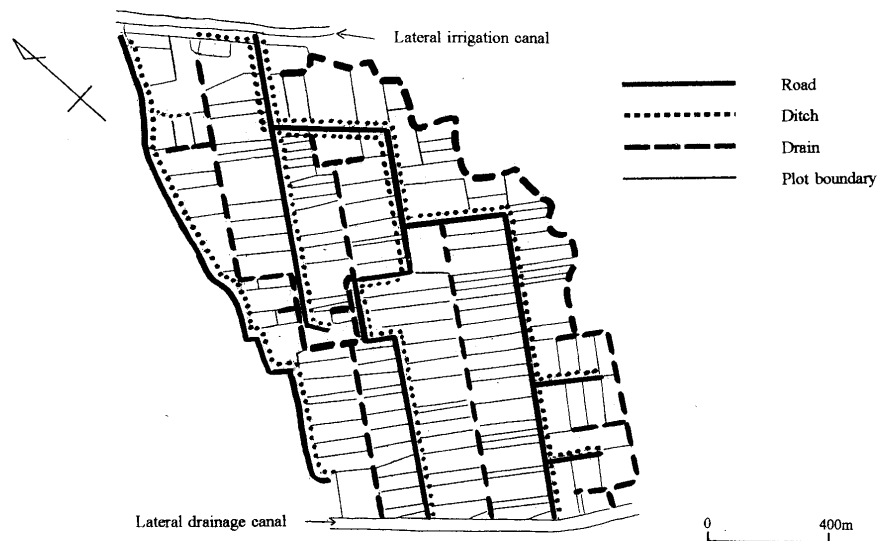


Fig. 1 Field layout after the land consolidation project in Bangkud

area before the project.

Under the project, all the plots were reshaped and the substitute lots were given to the farmers. The location of substitute lots was decided according to a common principle of the Thai land consolidation project; that is, more than 50% of the substitute lot area should be covered by the original lot of the same owner. Table 2 shows the distribution of households by the number of plot-clusters owned. As the table shows, there is little difference in the distribution following the project, although the number of households owning more than 3 clusters is reduced from 4 to 2. The total number of plot clusters in the project area was reduced by only three to 159.

The densities of roads, ditches and drains after the project are 41 m/ha, 50 m/ha and 40 m/ha, respectively. The land for these common facilities was produced by reducing the land area of each farmer by the same proportion, 7.4% of the registered area. The average plot size after the project is 0.85 ha, and 35

percent of the plots are larger than 1 ha.

4.2 Non Pla Mor land consolidation project

The project area is located around the villages of Non Pla Mor district, which is located within the Mae Klong Irrigation Project. The water source is the Mae Klong River. The project cost was 17,800 Bahts/ha, 80% of which was subsidized by the central government. The beneficiary farmers covered only the remaining 20%.

In this project, roads, ditches and drains were constructed on the boundary lines of the plots, and no plot was reshaped, since this was an extensive type project. Fig. 2 shows the layout of the facilities in a part of the project area. In contrast to an intensive type project, each plot cluster, but not each plot, has been supplied with an independent access to a road and a ditch and drain system.

In the area of Fig. 2, the densities of ditch, drain and road

Table 2 Number of farms by plot-cluster number before and after the Bangkok Project

Number of plot-clusters/ household	Before project	After project
	Number of households (%)	Number of households (%)
4	1 (1)	0 (0)
3	3 (2)	2 (2)
2	26 (20)	28 (22)
1	97 (76)	97 (76)
Total	127 (100)	127 (100)

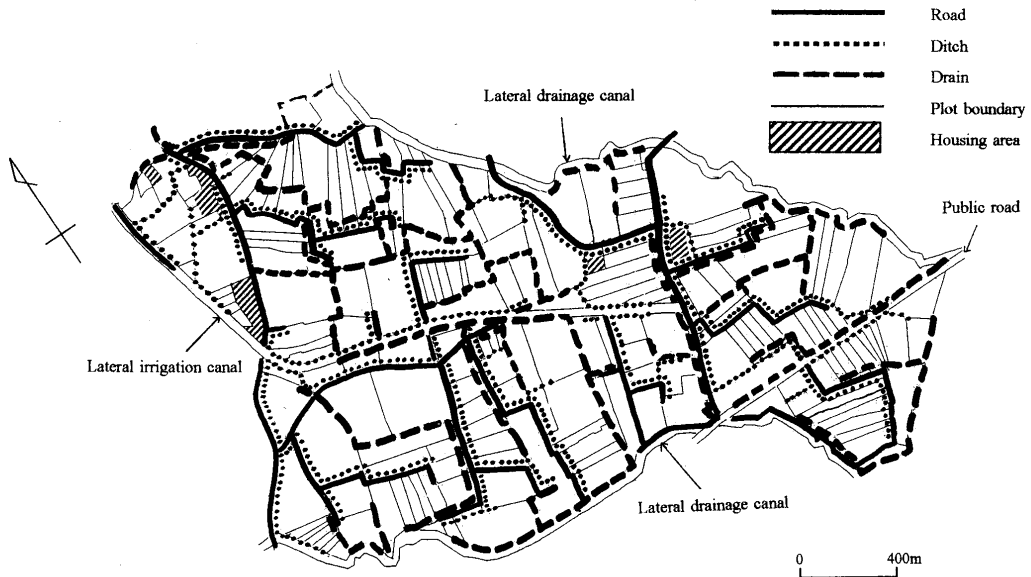


Fig. 2 Field layout after the land consolidation project in Non Pla Mor

after the project are 36 m/ha, 42 m/ha and 42 m/ha, respectively. They are less than or almost equal to the values of the Bangkud project. To produce the land for the ditches, drains and roads, farmers on both sides of the proposed facilities were requested to sacrifice a part of their adjacent farmland. The farmers in the upstream part lost their land more for ditches, and those in the downstream part lost more for drains. The average ratio of the sacrificed land in the whole project area was 6.5%, thus reducing the average plot size from 1.8 ha before the project to 1.7 ha after the project.

4.3 Kusunoki land consolidation project

The Kusunoki district is located in an alluvial plain of Toyama Prefecture. The average number of plots/plot clusters per farm before the project was as large as 14.7 for the average farm size of 1.2 ha. In this intensive type project, that number was reduced remarkably, down to 4.5. However, it was difficult to reduce the number further, because it was impossible from an equity point of view to allocate the most productive and convenient areas to only some of the farmers. The farm plots remained scattered, though the scattering was reduced.

Fig. 3 shows the field layout in the Kusunoki area after the project. Each farmer principally got an area of substitute lots proportional to the area he had owned before the project. The

standard proposed plot in the project was 0.3 ha; the longer side was 100 m, and the shorter one was 30 m. Nonetheless, the actual average plot size was 0.2 ha, since the shorter side of a plot was re-divided according to the area that a farmer was allocated. Table 3 shows the distribution of plot area realized in the project.

The densities of roads, ditches and drains are 85 m/ha, 112 m/ha and 86 m/ha, respectively. The reason the ditch density is greater than the others is that the ditches are constructed principally on both sides of an access road that is placed along the shorter side of a paddy plot.

Table 3 The distribution of plot area by number in Kusunoku Project

Plot size (ha)	Share (%)
0.35<	6
0.25< =<0.35	61
0.15< =<0.25	11
0.05< =<0.15	16
0.05>	4

5. DISCUSSION

5.1 Farm size and number of plot clusters per farm

The average paddy field area for paddy field owners in

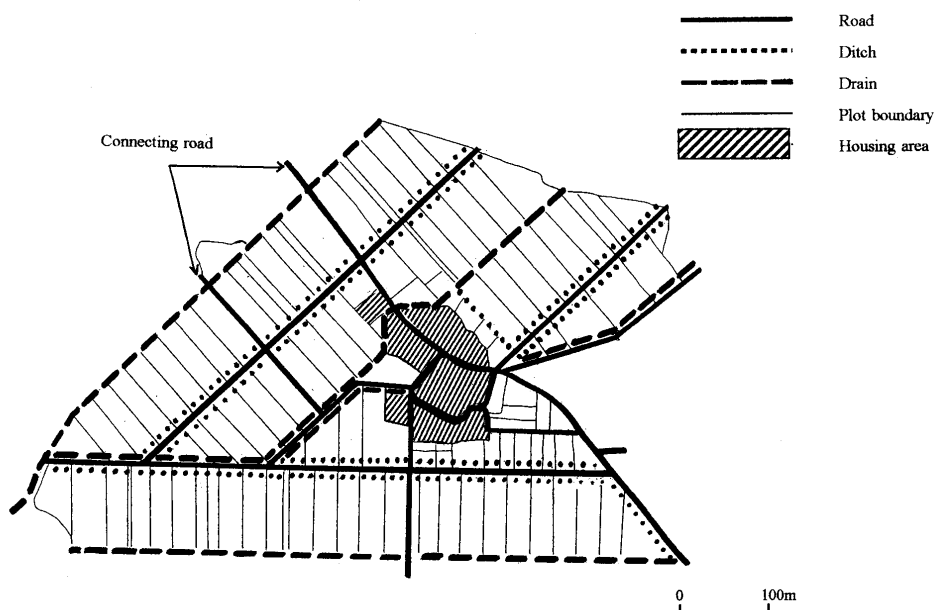


Fig.3 Field layout after the land consolidation project in Kusunoki

Japan is 0.8 ha (MAFF, 1998), while the Thai average is 2.1 ha, which is 2.6 times as large. Average paddy field areas per farm in the two Thai projects are 1.2 and 2.9 ha, both of which are larger than the average in the Kusunoki District. However, the average number of plot-clusters in Japan is much larger than that in Thailand, resulting in smaller cluster areas. These differences in land holdings influence both the purpose and the type of land consolidation project that is appropriate to implement. Gathering scattered small plots into a larger plot is often one of the main purposes of the land consolidation projects in Japan. At the same time, consolidation of plots is essential to the effectiveness of the projects. Without it, tractors could not enter some plots or achieve high efficiency in small plots. Also, farmers would have to travel long distances from plot to plot, consuming time. Clearly the extensive type of land consolidation project under the Japanese condition would require more land to be allocated to the higher density of roads, ditches and drains.

The implementation of an intensive type project unavoidably requires the reshaping and reallocating of plots; the farmers give their original plot(s) to the project office and get substitute lots. This is one of the difficult problems in the implementation of the Japanese projects, since each farmer's evaluation of his original plots and the substitute plots may not always coincide with the project office's evaluation of the same plots. On the contrary the extensive type of land consolidation project is a feasible alternative in the projects in Thailand, since it can avoid the high land loss rate and the problems on the substitute plots under Thai land holdings there.

5.2 Layout and densities of roads, ditches and drains in an intensive project

The standard intervals between farm roads in the Kusunoki project and the Bangkud project are 200 m and 400 m, respectively. The theoretical densities of farm roads under these conditions in the intensive project are 50 m/ha and 25 m/ha, respectively, if the object area is uniform and broad enough. Every 100 m of road commands 2 ha of paddy field on both sides of the road when the interval is 200 m, and 4 ha in case of a 400-m interval. This is also true for the layout of ditches and drains. However, the actual density of roads is much more than the theoretical value due to the limit in the broadness and the irregular shape of the area. This can be called as the "fringe effect." The construction of main roads and main canals can increase the densities, too. The ratio of the actual road density to the theoretical one is 1.7 in Kusunoki, which is larger than the value of 1.6 in Bangkud.

A major difference between the layout of farm roads in the

Japanese and Thai projects is the construction of connecting roads in the Japanese projects. Because they hold land in multiple plots, many Japanese farmers have to move from plot to plot in their farming. There are connecting roads planned in the Japanese projects to make it easy to move from one farm road to another (see Fig. 3). The Japanese design standard for land consolidation projects states that there should be a connecting road every 300 to 600 m along a farm road. This is one of the factors causing increased road density in Japanese projects, and the density is a result of the special characteristics of land holdings. There is no need for the connecting roads in the Thai projects.

There are two major considerations regarding ditch layout. One is whether ditches are constructed on one or both sides of the access road, and the other consideration is the limit put on the length of a farm ditch. Ditch construction on both sides of an access road is more costly than that on a single side. The Japanese project uses the double-side system because it provides equal accessibility to water for the farmers on either side of the road. A shorter farm ditch can contribute to the even water distribution along the ditch, too. Feeder ditches at appropriate interval are needed for that purpose. This feeder ditch is placed along every connecting road according to the design standard manual in Japan. Its construction, of course, increases the project cost.

The single side ditch was widely adopted in farmland consolidation projects before World War II in Japan (Shinzawa and Koide, 1963). However, this type of ditch layout is rarely adopted in Japanese land consolidation projects, since Japanese farmers prefer equity among themselves, even if there is an additional cost.

When Thai farmers place a higher priority on improved water management, the layout of field ditches in the Japanese manner may be requested in the future.

The ratio of land loss in the total project area was 7% in Bangkud and 11% in Kusunoki. The smaller land loss in Bangkud reflects the lower density of ditches, drains and farm roads.

5.3 Comparison of land loss in extensive and intensive projects

The Land Consolidation Law in Thailand declares that the total land loss in a project area should not exceed 7%, regardless of project type. Planners of land consolidation projects must pay attention to this regulation. There are factors for different land losses in extensive and intensive type projects, which we will discuss in this section.

The densities of roads, ditches and drains in the case of an extensive project are estimated in Bangkud, where an intensive project was implemented, and those of an intensive project are estimated in Non Pla Mor, where an extensive project was done. Fig. 4 is a projected layout of the facilities in the extensive project in Bangkud, in which the roads, ditches and drains are laid out to supply direct access to every plot in the area. Fig. 5 shows the same kind of facility layout for the hypothetical intensive project in Non Pla Mor, in which the 400-m interval of road, ditch and drain and its realistic layout are assumed. Table 4 shows the densities of assumed facilities being compared with those values in actual projects.

There are big differences in the values of Bangkud and Non Pla Mor in the case of both extensive and intensive projects. Bangkud has larger values than Non Pla Mor does, in general. For the intensive project, however, there is no reason for the

larger values except for the difference in the “fringe effects.” As for the extensive project, the far smaller average plot size in Bangkud, which is almost half of that in Non Pla Mor (see Table 1), accounts for the higher densities of facilities in Bangkud.

The densities in extensive projects are proved to be larger than those in intensive projects in general. This may be because the roads, ditches and drains in extensive projects are curved and do not systematically reach every plot. This can be a major shortcoming of the extensive project in Thailand, because it may violate the restrictions of the Land Consolidation Law with regard to the upper limit for the land loss rate. In the Bangkud project, for example, the rate of land loss would have far exceeded the limit if the extensive project had been applied. This would have made such a project infeasible, unless some of the small plots had failed to receive the direct benefits of the project.

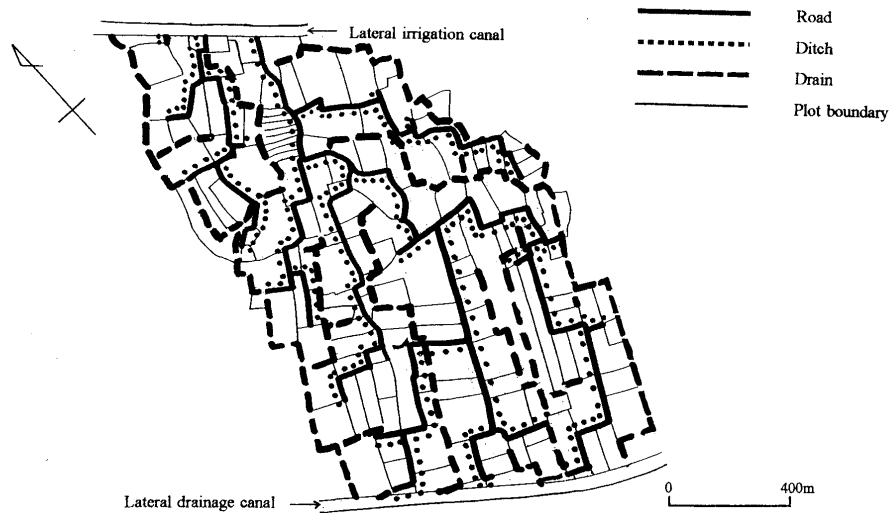


Fig. 4 A projected layout of the facilities in the extensive project in Bangkud

	Item	Extensive project	Intensive project
Bangkud	Roads	56	41
	Ditches	56	50
	Drains	69	40
Non Pla Mor	Roads	36	26
	Ditches	42	29
	Drains	42	32

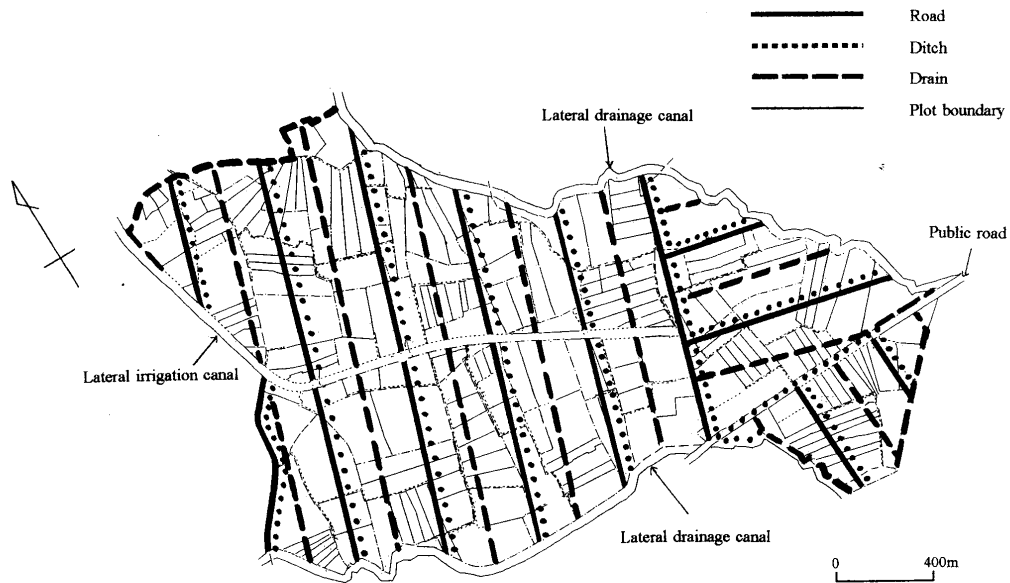


Fig. 5 A projected layout of the facilities in the intensive project in Non Pla Mer

There may be such cases, under the Thai system, in which the extensive project is not applicable, even though its cost is lower than that of the intensive project.

5.4 Farmers' incentive to participate in the land consolidation project

Shinzawa and Koide (1963) summarized the purposes of land consolidation projects in Japan as follows:

- 1) To introduce tractors and combined harvesters by improving road access and drainage conditions
- 2) To raise labor productivity through the consolidation of scattered plots followed by mechanization
- 3) To raise land productivity by improving irrigation and drainage conditions
- 4) To promote farmers' motivation in their farming by allowing them to do irrigation and drainage activities independently of each other

These purposes are, at the same time, the incentives for farmers to participate in the project.

In Thailand, the consolidation of scattered plots cannot be a purpose of the project, since the number of plots per household is minimal at present. With regard to the other purposes listed, they apply in Thailand as well as in Japan. Thai agriculture

especially needs mechanization and is attempting to implement it at high speed.

In addition, the Thai government gives a priority to consolidated farmlands with regard to getting irrigation water during the dry season for the second paddy crop (Nakajima, 1992). With the limited water resources in the Central Plain, farmers are eager to get enough water for the double cropping of wet rice. Therefore, the government policy can be one of the incentives for farmers to perform a land consolidation project. In Japan, of course, double cropping of rice cannot be used as one of the incentives, as the meteorological conditions allow only single cropping.

5.5 Formation of farmers' consensus in extensive projects

Extensive projects have the advantage of being less expensive than intensive projects, which explains their recent popularity. The total area consolidated in Thailand through 1999 was 282,265 ha, of which two-thirds was part of extensive type projects and one-third was part of intensive type projects. All of the projects implemented in the 1998/1999 fiscal year covering 411 ha were of the extensive type.

Extensive type projects require more land for common use for roads, ditches and drains in a project of smaller average plot

size because of the higher density of those improvements. The ratio of land needed for the common use may be more than 7%, which is the upper limit of the ratio set by the government, if the consolidation plan aims to provide every plot with independent access to these facilities in an area that has a small average plot size. The average plot size of an area determines whether an extensive type project is advantageous for that area.

The extensive project in Thailand requires related farmers to sacrifice their land to the common use without compensation. This method influences the formation of consensus for an extensive type project because this way of creating common land affects member farmers differently. The ratio of sacrificed land in a plot differs depending on whether the canal/road lies along the longer or shorter side of the plot. The wider ditch required in the upstream part of the project area creates an unwillingness on the part of farmers there to participate. In addition, the upstream farmers generally have an advantage when getting water because of their plots' closeness to the lateral canal. In this case, the upstream farmers may receive less benefit from the project. If a farmer owns several plots over the project area, he may accept the situation for the benefit of his plots downstream. The small number of plot clusters per household (see Table 1) will, however, exacerbate this problem. The upstream farmers exert a critical influence on the successful formation of a land consolidation project, since the downstream farmers cannot get land for ditches and drains if the upstream farmers do not participate in the project.

There is a case found in the area of Village No. 6 north-west of the Bangkud project area (see Fig. 1) in which a big upstream farmer didn't agree to the proposed project, thus resulting in project formation failure for that part of the project. In Village No. 2 of Nom Pla Mor, a group of farmers could not participate in the project because the two upstream farmers refused to join the project. The Thai government has ruled that all the related farmers must participate in a land consolidation project if more than half of the farmers have agreed to the proposed project. However, it is rather difficult to apply simply such a regulation in reality. Therefore, the introduction of a buying system for common land in an extensive project may be effective in promoting the successful project formation of land consolidation projects.

6. CONCLUSION

- 1) Most Thai rice farmers in the studied area own only one plot for their farming. Therefore, the gathering of dispersed plots was not one of the purposes of the land consolidation projects in Thailand. This is quite different from the

situation in Japanese projects in which farmers want to combine their scattered small pieces of land.

- 2) The average plot size affects whether an extensive or an intensive type of land consolidation project will be more advantageous, based on the ratio of area that has to be sacrificed to the common roads, ditches and drains. The extensive type of project is advantageous in the case of larger plot sizes, and the intensive type is superior when plot sizes are smaller.
- 3) In an extensive project, which does not include readjustment of land among the owners, there can be some farmers in the upstream part of the project area who do not incur any benefits from the project, since they presently have the advantageous position both in irrigation and in drainage, and at the same time they are being asked to donate some portion of their land for downstream farmers. These upstream farmers will likely be reluctant to participate in an extensive project, thus spoiling the project plan.
- 4) To promote extensive type projects in Thailand, the sacrifice system presently applied to prepare the land for common use should be replaced by a direct buying system.

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REFERENCES

- Center for Agricultural Economics Ministry of Agriculture & Co-operatives (1998): Agricultural Statistics of Thailand, Crop Year 1996/97.
- Hovarrongkura, M (1995): On-farm System Management in Thailand, The Tokyo Symposium on Sustainable Agriculture and Rural Development, pp.1-14.
- Japan International Cooperation Agency(1990): Upper Central Region Study, Sector report Vol. 4, Water Resource Management, Agricultural Development and Land Use Management, pp123-131
- Kasetsart University, ORSTOM (1996): Agricultural and Irrigation Patterns in the Central Plain of Thailand, DORAS Project, pp. 29-31,169-172.

- Matsuda T. and Kanazawa N.(1991): *Tai Inasaku no Keizakouzou* (in Japanese), pp.162-163.
- Ministry of Agriculture Forestry and Fisheries (2000): Outline of Budget for Land Consolidation Projects in 2001(in Japanese), *Totikairyokan*, No.105, pp. 4-5
- Ministry of Agriculture Forestry and Fisheries (1998): White paper on Agriculture (in Japanese), pp. 4-5
- Nakajima, M.(1992): Formation and Development of Irrigation Water Management System in the Thai Chao Phraya Delta (in Japanese), South East Asian Studies, Vol. 9, No.4, pp. 454-467.
- Shinzawa, K. and Koide S. (1963): Land Consolidation in Paddy Fields (in Japanese), pp.3-98. *Iwanamishoten*, Tokyo.

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{Questions and/or discussions on this paper for public debate will be accepted before Dec. 24, 2001}

日本と比較したタイの圃場整備の分析

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要 旨

タイにおけるイクステンシブとインテンシブ2種類の圃場整備の特徴を事例調査により分析した。分析は、日本の1事例と対比しながら土地所有状況と耕地形態および農民の参加動機に着目して行い、以下のことを明らかにした。(1) タイでは多くの農民が水田を1枚しか所有していないため平均1区画面積が大きく、イクステンシブの圃場整備が成立しうる。(2) インテンシブに対するイクステンシブの有利性は平均区画面積によって大きく左右される。(3) 上流部の農民は用排水に関してもともと有利な立場にあるため、圃場整備参加への動機が弱く、圃場整備事業への合意形成に困難が生じやすい。(4) イクステンシブにおける合意形成を促進するために道水路用地の無償提供方式に替え、直接買取方式の導入が望ましい。

キーワード：圃場整備、土地所有状況、耕地形態、農民の参加動機、タイ