

Land Improvement and Water Rights in Japan

I. Upland Field Improvement, the Control of Water Rights and the Problems in Case of Toyokawa Improvement Project

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Outline of the upland field irrigation in Japan

In Japan, paddy field is plentiful but upland field is not so plentiful. In contrast to the fact that a lot of land improvement projects including paddy field developments have been implemented, there remains a fact that quite few projects including upland field are implemented, now.

Consolidation of the upland field in Japan, which amounted to 2,365,000 *ha* in 1974, constituting 42% of the total cultivated land area, was noted to be lagged for behind in comparison with paddy field consolidation.

Paddy field improvements have long been carried out under the controlling of the land-improving national projects. They aimed at improvement and consolidation of paddy field, and modernization of water facilities, raising the level of agricultural techniques for the purpose of increasing production per 10 ares.

So, it is generally agreed that even after the restriction-policy of rice production and paddy field area which has been executed since 1970, production of rice per 10 ares has not decreased on account of the support of land improvement, though a lot of farmers of rice production have been discouraged at the intensive agriculture (Table 1).

Accordingly, the importance of an integrated approach to improvement projects including mainly upland field has stressed. But the reclamation of land involves heavy expenditures for a longer period before the reclaimed land can be cultivated by farmers with the repaying of the expenditures.

Manifestly, it is not possible, in most cases, to shift the amount of such initial cost to the farm households on upland field, while to the farm households on paddy field, to a certain degree, it is possible on account of the rice price insured at normal costs under Government management. Thus, the aggregate area of improved lands till 1970 has been 1,680,000 *ha* of paddy field and 290,000 *ha* of upland field, excepting the improved lands themselves. The aggregate improvement-area of upland field is constituting 17% of the aggregate improvement-area of paddy field. Table 2 shows the ratio of such aggregate improvement-area by a sort of each land improvement. Main part of the improvement of exploited upland field is only re-adjustment, without irrigation and drainage.

But after the execution of restriction-policy of rice production and paddy field area, selective expansion of agricultural products, except rice, has been promoted by Ministry of Agriculture and Forestry. So, recently, the projects including upland field has in-

Table 1. Paddy field rice production; plant area, yield per 10 ares and production.

Year	Plant area (1,000 <i>ha</i>)	Yield per 10 ares (brown rice: <i>kg</i>)	Production (brown rice: 1,000 tons)
1960	3,124	401	12,539
1963	3,133	400	12,529
1964*	3,126	396	12,362
1965*	3,123	390	12,181
1966	3,129	400	12,526
1967	3,149	453	14,257
1968	3,171	449	14,223
1969	3,173	435	13,797
1970	2,836	442	12,528
1971*	2,626	411	10,782
1972	2,584	456	11,744
1973	2,570	470	12,073
1974	2,675	455	12,182

Source is *Crop Statistics*, Statistics and Information Department, Ministry of Agriculture and Forestry.

*Year of damage by cool weather.

Table 2. The ratio of the rural community in a sort of land-improvement to the total improved rural communities implemented till 1970 year.

The sort of land improvement	Paddy field	Upland field
Re-adjustment	46%	31%
Land exchange	5	11
Exploitation	3	47
Irrigation and drainage	27	9
Drainage under the ground	10	—
Soil dressing	6	—
The others	3	3
Total	100	100

Source is *Rural Community Survey of the 1970 Agriculture Census*.

creased gradually. By Table 3, after 1971, only regarding to the prefecture-operated projects excepting state-operated projects, the share of upland-field-area of improvement of the area of total projects is now increased.

But, there always remains a question whether it will pay to irrigate on the upland field in such a humid zone as Japan with the average annual precipitation of 1,600 *mm*. It is justifiable to assume that the irrigation of upland field which has been considered as the only means of supplementary irrigation may not always be necessary for crops. But their irrigation makes it possible for a greater diversification of crops to adapt the agricultural production to the trends of demand without taking care of drouth. Even in the humid zone, we are subject to a great irregularity in rainfall. So, in the season of drouth, some farmers cultivate crops with heavy expenses for fertilizers and labour using irriga-

Table 3. Area of the improvement-land by paddy field and upland field (Unit: *ha*)

	The amount of area of the state-operated, prefecture-operated and organizations-operated projects					The area of prefecture-operated projects	
	1965	1966	1967	1968	1969	1971	1972
Paddy field area	259,300	451,100	422,600	557,100	527,000	(103,500)	(85,300)
Upland field area	79,700	103,300	99,000	144,300	119,600	(42,700)	(73,300)

tion. Such crops as many farmers can not cultivate in the season of drouth are to be welcomed by consumers, so that the price of that crops will be high. Accordingly, irrigation may be considered as a means of more intensive cultivation. Recently, some farmers make an upland field ponding by irrigation for the purpose of maintaining soil fertility.

Many using systems of irrigation on upland field are now designated for multi-purpose development.

Since then the Ministry of Agriculture and Forestry has been laying stresses on the upland field irrigation, as one of the most important land improvements, the area of irrigated upland field has been enlarged to about 100,000 *ha*. But that extent is only 10% of the area of upland field necessary for irrigation which has been surveyed by the Ministry of Agriculture and Forestry.

It should be asserted that the upland field irrigation, the base of land improvement, is to be executed with more earnestness and promptitude.

Control of water rights

Irrespective of the scale the plans for a reclamation project should be more subsidized, especially with a view to enlarge the area of upland field improvement. Regarding to the state-operated project, 60% of the expenses are to be subsidized by the National Government, and the remaining expenses will be shared in obligation for 15 years installments with 5% annual interest financed by the Agriculture, Forestry and Fisheries Finance Corporation.

But, the initial cost of upland field is generally higher than that of paddy field, for the upland field has been less implemented than the paddy field. So it is hoped that the upland field improvement should be more subsidized in comparison with the paddy field.

By the way, the consideration of initial cost of upland field brings forth the necessity of considering general agricultural, industrial and various other conditions in connection with their shared contribution. Because, a lot of recent plans of the upland field improvement have the multi-purpose of water use, for example, for industry or for drinking. The fact that there are great common benefits to be obtained from using water has led to regarding it as of public functions, which are entitled to some public aid.

Therefore, it is subject to some degree of public control how to use water.

The Ministry of Construction, which administers the use of main rivers, fixes the land improvement project and industrial water development project with a maximum quantity of water per second of the time when the crop needs most quantity of water for growing in a year. And, the section of trunk cannal is limited with a maximum quantity

per second. But, recently, even in the period when the necessary quantity of water for the rice production is very little, the need for the quantity of water is increasing. Because the part-time farm households, whose the ratio of number to the total of farm households is increasing, are now not willing to cultivate, continuing taking water in order to check weeds and to reduce their work, with no regard to the lessening of rice production per 10 ares. And they are working on only Saturday afternoon and Sunday, with no regard to the rainfall, using the irrigation improved.

But in Japan, the bases on which charges for using irrigation are made a flat charge to be levied per 10 ares. Generally, a flat charge per 10 ares, regardless of the quantity of water used, gives no incentive to the use of water. So the total quantity of water used for irrigation in a year is now increasing, while the maximum quantity per second is observed. Thus the Ministry of Construction are willing to subject to more severe control of maximum quantity per second per each period according with quantity needed for crops and, moreover control of total quantity of water in a year.

But these controls of water rights have no effect on increasing the agricultural productivity, for both the sort of crops and cultivation schedule shall be always changing. I prefer the control by the charge to the severe control by the water rights. It is hoped that a charge based on the quantity of water delivered should present an effective argument for economy.

Toyokawa Improvement Project

Since the water of Toyokawa Improvement Project from 1968 was used, as shown in Table 4, vegetables-production has rapidly increased in typical 3 villages under Toyokawa Improvement Project area.

As shown in Table 5, after 1970, the quantity of cabbages which was produced in Aichi Prefecture, mainly under Project area, has increased in November. These cabbages harvested in November, with their short growing period, have been liable to be destined to complete or partial failure in short periods of drouth. But in Toyokawa Improvement Project, the planting-schedule is to be freely determined in accordance with the trends of the other area's supply. So, cabbages harvested in November, have been transplanted in August, period of drouth, using irrigation under Toyokawa Improvement Project area.

Table 4. The ratio of aggregate of planted area by crops in Atsumi, Akabane and Tawara Villages.

Main crops	1961	1965	1967	1969	1971	1972	1973
Rice	21	24	24	23	18	19	18
Wheat	20	11	5	1	0	0	0
Sweet potatoes	13	12	5	2	1	0	0
Pulses	11	10	7	3	3	3	2
Vegetables	21	27	42	56	61	66	68
Total (area)	100 (12,561 ha)	100 (10,800)	100 (10,400)	100 (11,100)	100 (9,040)	100 (9,480)	100 (9,440)
Utilization rate of cultivated land	165	136	136	144	133	125	125

Source is *Aichi Prefecture Annual Statistics* of agriculture, forestry and fishery.

Table 5. The share of the shipments quantity of cabbages produced in Aichi Prefecture to the quantity of arrivals in Tokyo Wholesale Market by month.

	Jan.	Feb.	Mar.	Apr.	Nov.	Dec.	Total of year
1961	59%	62	61	22	—	17	16
1965	56	58	51	21	—	22	13
1970	45	61	60	25	28	40	19
1973	36	52	42	19	25	52	20
1974	61	59	46	36	13	47	18

Source is *Annual Statistics of Tokyo Wholesale Market*.

Table 6. The quantity of water from the Ohno Intake Gate of Toyokawa Improvement Project.

Plan	Use for agriculture	Use for life and industry	Total
	97 million tons	85 million tons	182 million tons
1968	122	11	133
1969	149	20	169
1970	161	24	186
1971	171	30	201
1972	164	33	197
1973	166	39	205
1974	164	39	203

Source is *Annual Statistics of the Water Resources Development Corporation*.

Thus it is generally agreed that the upland field irrigation of Toyokawa Improvement Project is the most successful improvement to promote the level of agriculture techniques and the incomes of the farm households.

According to Table 6, the quantity of water for agriculture from Ohno Intake Gate, the main gate of Toyokawa Improvement Project, managed by the Water Resources Development Corporation has been always exceeded the planned one. The plan operated by the Ministry of Agriculture and Forestry, which amounts to 97 million tons quantity of water for agriculture in a year, assumed the peak of quantity to be at July and August, and at the other months to be in a very low level of quantity. So the total quantity of water at the end of two months, July and August, contains 50% of the total quantity of a year. But Fig. 1 shows that the months in which excessive quantity of water used lie outside the period of July and August. The seasons in which excessive quantity of water used are spring and autumn in which a lot of quantity of water is used for upland field irrigation.

So there exists a very common assumption that the quantity of water used on upland field should be very great. But this is nothing but a mistake. Table 7, in which the quantity of water used on paddy field and upland field, was supposed with no regard to the quantity of water taken in the Ohno Intake Gate, shows that the quantity of water used on upland field is only 10% of the total quantity.

Now, where did the difference of the quantity of water between the field and the Intake Gate go? The difference of the quantity of water was always overflowing from the many farm ponds located per in 32 ha area.

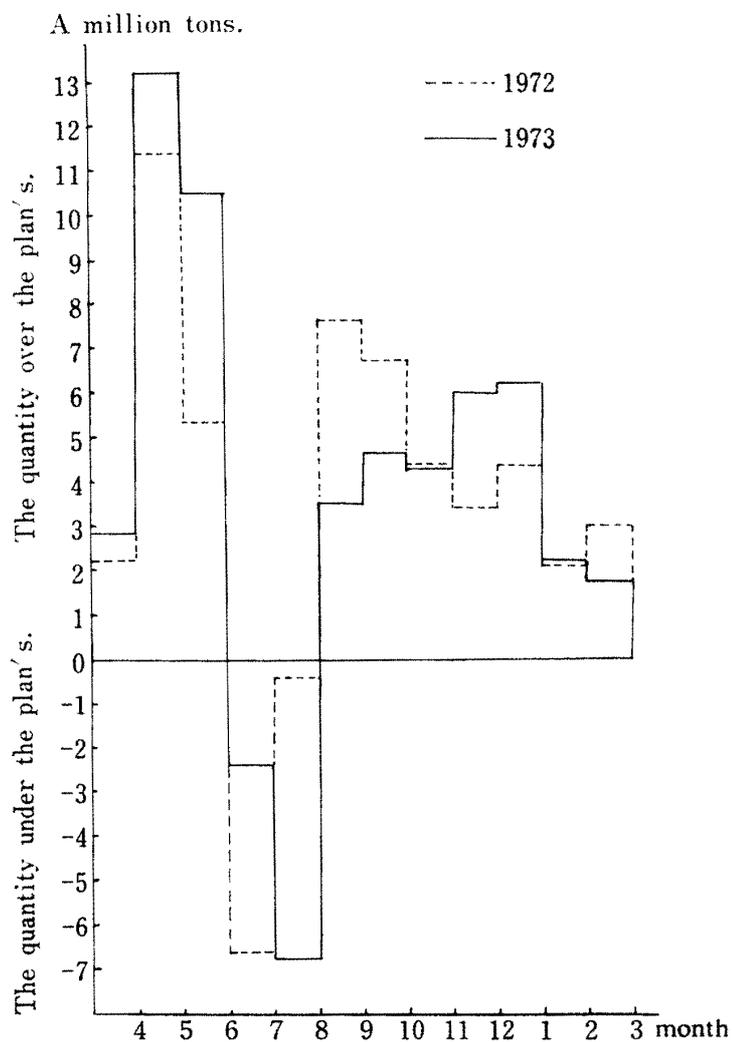


Fig. 1. The difference between the quantity of plan and the quantity taken from the Ohno Intake Gate by month.

The farmers stress that they should be able to use water freely and constantly by continuously taking full of water into the farm pond from the trunk canals and supplying to the land. So only when the total quantity of water should be increased, the agriculture structure may be modernized, and overflowing quantity may be increased.

We have to stress that the controlling of the water rights should be kept at present and charging of mixed rate—a flat charge per 10 ares and the payment to a quantity of water should be executed to rationalize water using with modernizing the agriculture structure.

Table 7. Supposition of quantity of the used water in 1973 on paddy field and upland field of Toyokawa Improvement Project.

	Area of planted area (<i>ha</i>)	Irrigated water depth in planted time (<i>mm</i>)	Total quantity of water (a million ton)
Green house	187	Musk melon (two times) 207 × 2	76
		Chrysanthemum 270 ~ 469	51~88
Vinyl sheet house	1,420	Prince melon 159	226
		Chrysanthemum 270~469	383~666
Sub total	1,607		736~1,056
Pulses	402	166~210	
Melon, except green house melons	1,513	8	
Japanese radishes	2,883	23~159	
Cabbage	3,309	14~259	
Water melons	2,008	1~7	
Sub total	10,115		193~1,540
Paddy field	6,477	767~1,529	4,968~9,903
Use for life, i.e. cleaning, livestock drinking	Full-time farm households	2,000 per household	1,450
	Part-time farm households	1,000 per household	2,175
Sub total			3,625
Total			9,522~16,124