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UNIVERSITÉ DES NATIONS UNIES

*Project on Technology Transfer,
Transformation, and Development:
The Japanese Experience*

*Projet sur l'expérience japonaise
en matière de transfert, transformation
et développement de la technologie*

Distribution: Limited

HSDP-JE Series

This working paper was prepared within the framework and as part of the Project on Technology Transfer, Transformation, and Development: The Japanese Experience (JE) of the United Nations University's Human and Social Development Programme. The views expressed in the paper are those of the author and not necessarily those of the United Nations University.

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Printed in Japan

ISBN 92-808-0336-0
ISSN 0379-5780

HSDRJE-44/UNUP-336

**THE ESTABLISHING PROCESS OF THE
ŌGO AND YAMADA CANALS**

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This paper is being circulated in a pre-publication form to elicit comments from readers and generate dialogue on the subject at this stage of the research.

1. Natural and Technical Features

(1) Periods of Water Resources Development

The diluvial heights of Kako, limited by their natural conditions including climate, topography and geology, are highly permeable due to thick layers of gravel. This zone is water-short, poor in precipitation (the average annual rainfall being only about 1,000 millimeters) and in water-catchment. Therefore, this district always lagged behind others in water resources development and remained a marginal zone of farm land expansion.

The history of water resources development in this district, surpassing those natural limitations, can be divided into the following five periods. During the first period, which dates back to the ancient and middle ages, relatively affluent rivers and springs were utilized by building weirs, waterways and/or reservoirs to expand irrigated rice fields (the achievements in this period include the Gokai Yōsui built in 593, Okaōike in 675, and Irigaike in 714). In the second period, civil engineering techniques developed from the 16th through the earliest phase of the 17th centuries were used for branching natural streams to channel water to highlands. The products of these techniques include the Arai Yōsui, Hayashizaki Yōsui, Terada Yōsui and Ōmizo Yōsui built in or after the mid-17th century. In this epoch was already established the system of combining rivers with irrigation ponds, in which water was deposited in the non-irrigation season to make up for the shortage of available water in the irrigation period. The method characterizing the third period, typically embodied in the Ogō and Yamada Canals, was to draw water from distant sources and deposit it in groups of reservoirs by way of long canals. The Ogo and Yamada Canals were characterized by large-scale application of the river-reservoir combination formula, technically already established early in the 17th century, to long-distance artificial channelling of water. In the fourth period, power pumps, which became common from around 1907 on, were used to enable rice fields to be developed even on highlands previously beyond the reach of irrigation. Good example can be found in the Tōgō Pond and the Gandoi Yōsui. The fifth period, starting late in the Taisho period (1912-1925), is charac-

TABLE 1. Chronology of Major Irrigation Facilities in Inamino

Name of facility	Completed in	Water source	Irrigated district	Intake period	Irrigated area (year of survey)	Major references
1 Gokai Yōsui	593	Kako River	Kako delta	Whole year	2,100 ^{ha} (1913)	Gokai enkaku-shi, etc.
2 Irigaïke	714	-	Temma highland	-	-	Kako-gun-shi
3 Teradaïke	890	-	Southern slope	-	-	Kako-gun-shi
4 Arai Yōsui	1657	Kako River	Southern slope of Noguchi hld.	Irregular	620 (1913)	Kako shinsui sosui-ki
5 Hayashizaki Yōsui	1658	Akashi River	Ōkubo highland	Oct. - May	627 (1918)	Banshū Akashi Hayashi-zaki kyōki, etc.
6 Terada Yōsui	1658	Kumori River	Southern slope of Noguchi hld.	Irregular	-	Shinzaïke-mura meisai-chō
a Takahata Bunsui	1672	Kumori River	Southern slope of Noguchi hld.	Irregular	200 (1879)	Takahata-mura meisai-chō
b Kitano Bunsui	1676	Kumori River	Southern slope of Noguchi hld.	Irregular	-	Kitano-mura meisai-chō
7 Big Six Ponds in Kako	1669	-	Kako highland	-	-	Kako-Shin-mura meisai-chō
8 Ōmizo Yōsui	1680	Kusadani River	Kako highland	July - April (lunar)	220 (1900)	Kako-Shin-mura meisai-chō
9 Temma Ōike	1705	-	Temma highland	-	-	Kako-gun-shi
10 Ōkubo Yōsui	1707	Akashi River	Okubo highland	Oct. - May	-	Akashi-han-nai muramura ontaka utsushi, etc.
11 Shōnai Yōsui and Kansei Ike	1800	Seto River	Okubo highland	Whole year	-	Kansei'ike monument, etc.
12 Kamenoi Yōsui	1814	Minō River	Flood plain of Kako River	Whole year	89 (1916)	Kako-gun-shi
13 Kawarada Dam	1876	Kusadani River	Kako highland	Aug. - Mar. (lunar)	-	Antique documents of New Kako Village
14 Ōgo Canal (with 79 reservoirs)	1891	Ōgo River	Whole central part of Inamino	Oct. - May	1,100 (1937)	Ōgo-gawa Yamada-gawa sosui gojū-nen-shi
15 Togōike and 2 other ponds	1907	Kumori River	Northern slope of Noguchi hld.	Oct. - May	120 (1913)	Kako-gun-shi
16 Kanno Bunsui (Shin Arai)	1908	Kako River	Flood plain of Kako River	Whole year	50 (1913)	Kako-gun-shi
17 Gandoi Yōsui	1911	Kusadani River	Northwestern edge of Kako highland	Sept. - May	150 (1950)	Gandoi enkaku-shi
18 Yamada Canal (with 62 reservoirs)	1915	Yamada River	Peripheries of Inamino	Sept. - May	850 (1937)	Ōgo-gawa Yamada-gawa sosui gojū-nen-shi
19 Bored wells	Taishō and Showa years	-	Peripheries of Inamino	-	-	References on bored wells kept at prefectural office

Note: Taken from Reference 18, p. 457, which in turn is based on Inami Etsuji, "Daichi no kaihatsu to suiri shisetsu no keisei katei" (Reference 2).

terized by the drilling of deep wells to tap additional water resources by the use of powerful pumps, which came into particularly extensive use after World War II (Reference 2, pp. 63-74; Reference 6, pp. 32-39 with partial correction).

(2) Introduction of Modern Technology

The construction of the Ōgo and Yamada Canals was subject to major limitations in civil engineering techniques, as their long channels, involving many tunnels, had to be dug through regions of considerable topographical and geological complexity. The promoters of the projects were obliged to ride on the waves of "civilization and enlightenment" prevalent after the Meiji Restoration (1868) and rely on new techniques imported from Europe. In spite of their stockpile of traditional techniques accumulated since the Edo Period, they had no other alternative than to follow the leadership of the technocrat engineers of the Ministry of the Interior or the Hyōgo prefectural government, who had learned European techniques.

In the case of the Ōgo Canal in particular, the water drawn from the river had to go over the Yamada River before it reached the Kako district. Inverted trestled flume and suspended gutter techniques were already known, but they had never been used on so large a scale in Japan. A huge siphon was then built according to a plan by Colonel (later Major General) Palmer of the British army engineering corps. Born in 1838 in India (his father also was a colonel of the British army, then stationed in India), Palmer had participated in expeditions to Canada and Egypt after graduating from the military academy in Britain. When he was lieutenant colonel, he built a modern waterworks system in Canton (present-day Guangzhou) at the request of the Hong Kong government. In 1883, on his way home from China, Palmer stopped over in Japan, where he was charged with the task of designing waterworks for Yokohama at the recommendation of Hirobumi Itō. The construction of the Yokohama water service system was started in April 1885, and completed in or around October 1887. While he was engaged in this project, the designing of the Ōgo Canal made progress and, presumably at the request of the Ministry of the

Interior, Palmer visited the site of the canal work, designed the siphon at Misaka and made arrangements for the import of iron pipes from England. After that, he made important contributions to the construction of the Port of Yokohama and Osaka prefectural waterworks as an engineering consultant to the Ministry of the Interior, and died of illness in 1893 in Tokyo at the age of 54 (References 15 and 16). The Ōgo and Yamada Canals could not have been brought to full completion without relying on modern techniques such as Palmer's siphon.

2. Proposal to Build Yamada Canal

In September 1878, Kanji Uozumi, general representative of Nodera Village, Susaburō Iwamoto of New Takokusa Village, Kōshichi Fukuda of New Kunioka Village, Moheiji Maruo of New Innami Village, and the general representatives of New Nodani and New Kako villages submitted a joint application for permission to survey the intended Yamada Canal route to Masazumi Morioka, governor of Hyōgo Prefecture. This was the first step toward the materialization of the Ōgo and Yamada Canals.

The canal building plan seems to have been facilitated or encouraged by a number of factors. First, the area to benefit from the intended canal was merged into Hyōgo Prefecture in August 1876, and its prior subdivisions, previously governed by plural fiefs, were integrated, resulting in an even greater concentration of ruling authority than in the Edo period. In consequence, the planned Yamada Canal, whose route had stretched over different feudal clans, came under unified administration by Hyōgo Prefecture.

Second, triggered by the opening of the Port of Kobe in 1867, there was a sharp increase in imports of cheaper and better foreign cotton, with an adverse impact on local cotton growing and weaving, both important sources of income for Kako farmers. The downward trend of cotton farming in the area was made irreversible by heavy damage inflicted by a storm in 1880 (Reference 1, pp. 97-98). Thus the construction of the canal was desired to enable new rice fields to be developed and thereby to give an

alternative income source to cotton growers and weavers.

Third, the land tax reform started in 1875 resulted in such enormously heavier taxes on this locality that its inhabitants wanted new rice fields to provide themselves with additional earnings. As shown in Table 2, the new tax was 4.7 times the old in New Takokusa Village, the heaviest taxed, and increased two or three times in other villages.

TABLE 2. Revised Land Taxes on Mori Area

Village	Pre-reform land tax (A)	New tax after reform in 1876 (B)	B/A (times)
New Innami	¥708.426	¥2,130.989	3.008
New Takokusa	253.820	1,207.161	4.726
Nodera	377.473	1,038.594	2.751
New Nodani	220,064	763.608	3.470
Kusadani	679.716	997.631	1.467
Shimokusadani	205.508	390.016	1.898
Total	¥2,545.007	¥6,527.999	2.562

Source: Reference 10, p. 3.

One of the reasons for the increased taxes was that, as cotton growing, though already declining, still accounted for a large proportion of the overall farm output in this area, high land values were calculated on the basis of cotton growers' incomes in other localities with more plentiful water supply. In addition, the Hyōgo prefectural authority was then under strong influence of the Meiji "clan government" in Tokyo and wanted to have the place of their duty ranked among "superior prefectures" under the reformed land taxation system. They therefore tended to set the land taxes there higher than elsewhere. The land tax reform in Hyōgo was completed in July 1878. However, the farmers in the prefecture were ordered to pay the revised taxes for 1876 and 1877 (3 per cent each of the land price) and the further revised tax for 1878 (reduced to 2.5 per cent of the land price as a result of a riot invited by the tax increase) in a single payment. The heavily taxed farmers launched a campaign demanding a tax cut or at least the authorization of deferred

payment. At the same time they pinned much hope on the proposed development of new rice fields as the tax increase was lighter on irrigated rice fields and the market price of rice was then moving upward.

On top of all these circumstances, the district suffered severe droughts in 1876 and 1877, and dry field farming there, especially cotton growing, was seriously affected. The poor crops inevitably invited a steep drop in income, and an increased number of farmers found it difficult to pay land taxes and were even unable, because of a drop in land value, to find anyone who would lend them money. This circumstance, too, contributed to their desire for a stable water supply and newly developed rice fields.

Finally, the policy proposed by Interior Minister Toshimichi Ōkubo "to create jobs for noblemen and former samurai, increase production and promote industries" was implemented from 1878 on, and the proponents of the Yamada Canal may well have intended to avail themselves of this trend of the times. In line with the policy of the national government for all-out encouragement of production boost and industrial development, the fully state-sponsored construction of the Asaka Canal in Fukushima Prefecture had been planned, and in Tochigi Prefecture too the Nasu Canal project was under way with subsidies from the prefectural and national governments. In Japan, no project like that of the Yamada Canal to draw water from a remote source for irrigation of a vast area, which naturally would require highly sophisticated technology, had been practicable to undertake on private initiative. Adjusting the conflict of interests among different communities or building key facilities for large-scale irrigation was a task that could only be successfully managed by the government at that time. The tremendous cost of any such project had to be borne in part or at least temporarily defrayed by the government. In view of these circumstances, the designation of the Yamada Canal as a public works project seems to have been done to take advantage of the government's policy to increase production and promote industries.

3. Impact of Land Tax Reform

Approval for the Yamada Canal project was applied for in September 1878. The project faced rough going thereafter.

One of its problems was that the inter-community conflict of interests was too intricate to be quickly settled and the fluctuations of economic activity prevented an agreement from being readily reached on the sharing of the construction cost. For instance, out of the six villages initially proposing the project, New Kunioka and New Kako villages "abandoned it without (plausible) reason," and instead Kusadani and Shimokusadani villages newly joined as its cosponsors. Probably, the villages of New Kunioka and New Kako, located farther downstream than the other would-be beneficiaries of the canal, were more favored as to water supply and irrigated rice farming, and consequently needed the canal less urgently than the rest of the first six villages. In 1876, the Kawarada Dam had been built to tap the Kusadani River, whose surplus water was thereafter drawn in the non-irrigation season from August through March (lunar calendar) to benefit New Kako Village among others. Moreover, the villagers of New Kunioka and New Kako, unlike those of the six villages of the Mori area, were not fully organized in the campaign to demand the reduction, or at least permission for deferred payment, of the land taxes, and there seems to have been a difference of views on this and other matters among the village people.

The difficulty the canal project encountered was in part a consequence of a dispute over tax payment which had arisen between the Mori community and Hyōgo Prefecture. The prefectural government, which was asked to undertake the Yamada Canal project and defray its cost, seems to have thought that the farmers should first pay their land taxes even if they were unduly heavy. The local community, on the other hand, maintained that the unfair taxes should first be reduced, and irrigation facilities improved to better allow farmers to afford their tax payments. At that time movements for greater democratic rights were in their upward phase. The Mori community, its cotton crop hard hit by droughts, least blessed with water supply, and inspired by able leaders, waged a struggle with the Hyōgo

prefectural government over the questions of land tax reduction and deferred payment and of the Yamada Canal construction.

It was Naomasa Hōjō, headman of Kako County, who tried to mediate between the two disputing parties. The local autonomy system was reformed in January 1879 to replace the previous major and minor districts with countries, towns and villages. This area was integrated into Kako County (the county office was located in Jike Town, now a part of Kakogawa City), and Hōjō, who had headed the adjoining Minor No.2 District, was appointed its headman. Hōjō was a counsellor of the Hayashida Fief (having an annual revenue equivalent to 10,000 koku of rice, plus 5,000 koku from newly developed rice fields) at the time of the replacement of fields with prefectures in 1871; he had participated in the development of new rice fields toward the end of the Edo period (then 44 years old: Reference 7, p. 68).

Kanji Uozumi and other proponents of the Yamada Canal tried to convince the newly appointed county headman of its necessity. With his own experience in the development of new rice fields and his faith that the basis of people's livelihood consisted in civil engineering and their resources, Hōjō made up his mind to encourage the Yamada Canal project. To begin with, he appointed Itsuji Uozumi (Kanji's nephew), who was familiar with the circumstances in the county, to the office of county secretary, and had another secretary specialize in canal affairs.

Itsuji Uozumi was born in May 1857 in Nodera Village as the eldest son of Ippei, elder brother of Kanji. A man of brilliant talent well versed in Chinese classics, Itsuji helped his uncle Kanji, after the death of his father, in the campaigns for land tax reduction and Yamada Canal construction. Still only around 20 years old at that time, he was soon recognized as the leader of the local community (Reference 1, pp. 484-485).

In February 1879, a month after the integration of Kako County, an application was filed with the Governor of Hyōgo Prefecture by the representatives of the six prospective beneficiary villages for an actual survey

of the proposed route for the Yamada Canal. The survey was formally conducted for the first time in March by the personnel of the prefecture's civil engineering section. Thus there finally emerged realistic prospects for the completion of the canal, but the next problem was how to finance the project. In the feudal period a project of such great dimensions would have been directly undertaken or at least subsidized by the fief government, but after the Meiji Restoration any such undertaking had to be financed by its prospective beneficiaries. As calculated in the following year, 1880, the construction of the canal would cost a total of ¥14,600, too large a sum for the local farmers, hard hit by poor cotton crops, droughts and heavy taxes to pay. The village representatives met again and again for consultation, but failed to reach any definite conclusion.

Meanwhile, the prefectural authorities urged the farmers to pay their outstanding land taxes in exchange for the materialization of the canal project. In 1879, there was an even heavier drought than in 1876 and 1877, and dry field crops were seriously affected. For farmers to pay their new taxes, even taking into account the rate reduction granted after 1877, would have required a payment equivalent to seven or eight years' taxes under the old system--not only had the tax rate trebled, but the government was demanding payment in a single lump sum. The farmers were at a loss. Especially in New Innami Village, which had the remotest access to water resources and consequently a greater proportion of dry farms than elsewhere, there continued a persistent campaign for tax reduction and deferred payment, led by headman Moheiji Maruo.

However, once established the tax rate was difficult to revise again, especially for the tax officers of Hyōgo Prefecture, who had a strong desire to make theirs an "excellent prefecture" in the collection of revised land taxes and therefore insisted on their payment. County headman Hojo, finding himself in a mediating position, sought for a compromise, but neither party would concede. In response to this deadlock the Yamada Canal project failed to make any further progress.

4. Banshū Vineyard and Yamada Canal

The Agriculture Promotion Bureau of the Ministry of the Interior, in line with the policy to boost production and encourage industries, sought a vineyard site in this county.

In January 1879, the bureau had already leased a site of over one chō (nearly 1 hectare) for rearing olive seedlings at Sannomiya, Kobe. In 1883, it purchased a site of slightly over one chō and seven se (1 se = about 1 acre) along Yamate Street in Kobe, and in the following year leased three chō of a nearby nationally owned forest, both for the same purpose. At first, these sites together were known as the Kobe Branch of the bureau's Nursery, but in May 1884 they were renamed the Kobe Olive Orchard. The government wanted to grow Western fruits in the warm areas on the coast of Seto Inland Sea. The orchard was transferred to the control of the Banshū Vineyard in June 1885 (Reference 12, pp. 243-248, Reference 13, pp. 396-406).

At the end of 1879, the government had also planned to found another vineyard at Shinodakyō, about 12 kilometers south of Sakai City, Osaka Prefecture, but its negotiations with the proprietor of the site, Tomoatsu Godai (from Satsuma, then an influential business leader in Osaka), for its purchase were unsuccessful, and this plan therefore proved abortive.

Learning from press reports that the government was looking for a new vineyard site in his area, county headman Hōjō suggest the planned vineyard be located in New Innami Village, whose inhabitants could not afford to pay their land taxes, and enabling them to pay the taxes with the proceeds of the site. Having won the consent of the villagers, Hōjō met the official in charge, Hayato Fukuba (later transferred to the Department of the Imperial Household; the promoter of such new varieties of farm products as Fukuba Strawberry and Danshaku Potato, the latter being grown in Hokkaido), explained to him the circumstances of the village and began negotiations. However, negotiations proved difficult because the Agriculture Promotion Bureau thought the reasonable purchase price was some-

where between ¥2 and ¥3 per tan (1 tan = about 991.7 square meters) while the sellers insisted on a per-tan price of ¥6.50 (the average price then prevailing was ¥23). Finally on the New Year's Day of 1880, a settlement was reached at ¥6 per tan as Hōjō offered to pay the difference of ¥0.50 (totalling ¥150 for 30 cho) out of his own pocket.

In February the same year, 30 chō 2 tan 8 se 19 bu (1 bu = about 3.3 square meters) of dry fields in New Innami Village were sold for a price of ¥1,875.50 (according to Reference 13, 30 chō 1 tan 9 se 21 bu were sold for ¥1,870.14), and the whole proceeds were appropriated for the payment of the land taxes in arrears as jointly calculated by the villagers. Incidentally, they seem to have eventually refrained from accepting the ¥150 which Hōjō had promised to pay.

The establishment of the national Banshū Vineyard in New Innami Village not only enabled the villagers to pay part of their land taxes with the proceeds of their estates; the construction and the eventual operation of the vineyard created full-time and part-time jobs for the villagers and a market for their commodities. Furthermore, high-ranking officials of the central government, above all of the Ministry of the Interior and the Ministry of Agriculture and Commerce, who visited the village to inspect the vineyard, obtained first-hand knowledge of the local circumstances which greatly facilitated the materialization of the Yamada Canal project.

The visit in 1880 by Yoshio Tanaka (deputy senior secretary of the Interior Ministry) and director-general Ishii of the Civil Engineering Bureau on behalf of Interior Minister Masayoshi Matsukata led to the direct governmental undertaking of the Yamada Canal project, temporary defrayment of its cost by the national treasury, and dispatching of engineer Ichirobē Minami by the Ministry of Agriculture and Commerce. In 1882 Agriculture and Commerce Vice Minister Yajirō Shinagawa, and in 1883 Finance Minister Masayoshi Matsukata and Agriculture and Commerce Minister Tsugumichi Saigō (younger brother of Takamori), also visited the vineyard and inspected the surrounding area. Especially Matsukata, direct disciple of Toshimichi Ōkubo, became the leading advocate of the

policy to increase production and promote industries after the assassination of Ōkubo in 1879, and made particular contributions to the construction of the Asaka and Nasu Canals. He spared no support to the Yamada Canal project either.

The Banshū Vineyard had been transferred to the jurisdiction of the Ministry of Agriculture and Commerce newly established in 1881, which also took over the control of the Kobe Olive Orchard in June 1885. However, as part of a drive to cut public spending, the management of both orchards was entrusted to Masana Maeda (from Satsuma, previously Vice Minister of Agriculture and Commerce and president of the Great Japan Agricultural Association), in April 1886, and further in March 1888 both were sold to Maeda, thereby ending their existence as national enterprises (Reference 12, pp. 227-241; Reference 13, pp. 256-393; Reference 7, pp. 23-28).

Director Hayato Fukuba of the Banshū Vineyard, who had made important contributions to its founding, commented on the inhabitants of the area in his report in August 1880: "... to analyze the folkways of the whole village, the villagers are very timid, try to enjoy ease and are only preoccupied with seeking small immediate profits. Therefore, the extreme poverty of many people in this village in recent years, though certainly in part attributable to the frequent droughts, seems in part owing to their failure to make due efforts" (Reference 13, p. 286). Probably he had not been long enough in the village to grasp the situation accurately. In fact, it is probable that the villagers were profit-seekers as the area, close to the Seto Inland Sea coast, was one of the first developed commodity crop zones in Japan. Nor can the meagre water supply, droughts, the slump in cotton farming, and the heavy taxes be overlooked. The farmers, having no hope for the future, could choose only between riot and despair.

5. Reapplication for Canal Project Approval and Coercive Collection of Land Taxes in Arrears

The founding of the Banshū Vineyard enabled the farmers of New Innami Village to pay part of their land taxes in arrears with the proceeds of the land sale, and thereby paved the way for them to urge the prefectural government to undertake the Yamada Canal project.

Soon afterwards, in March 1880, leaders of the six villages involved in the canal project - Nodera, Takokusa, Innami, Nodani, Kusadani and Shimokusadani - held their first meeting and discussed policy and construction cost problems (in July, they organized themselves into the association of village headmen, and the six were integrated into Mori Village in April 1889). The meeting was chaired by Itsuji Uozumi, then 23 years old (with Yōzō Matsuo as vice chairman), who assembled the requests of the 42 participants in the meeting into a resolution that the project should be wholly supervised by the prefectural government and that the participating villages should share the estimated ¥14,600 cost after the completion of the canal. An application for approval of this project was again submitted to the governor of the prefecture.

In December 1880, the villages jointly requested the prefectural government of Hyōgo to take direct charge of the canal construction and temporarily to defray its cost, on the ground that it was a tremendously big project and the consecutive droughts had deprived the villages of resources to finance it. They offered to submit title deeds equivalent to the estimated construction cost as security for the fulfilment of their liabilities. At that time were in progress the projects of the national Asaka Canal, the state-subsidized Nasu Canal and Meiji Canal whose cost was temporarily paid by Aichi Prefecture. The proponents of the Yamada Canal project must have referred to these precedents.

In response to this request, the Hyōgo prefectural government finally resumed its activities, perhaps with an ambition to make Hyōgo a "model prefecture" in western Japan in terms of canal construction as well in line with the policy of the central government in those days to boost

production and encourage industries. As early as March 1880, the prefectural government resumed its survey of the proposed canal route and its civil engineering official was permanently stationed at the Kako County office (Reference 7, p. 31, though the year is stated to be 1881 in References 8, 9, 10, and 11). Presumably thanks to the efforts of county headman Hōjō, the civil engineering section of the prefecture began to show a very positive attitude toward the Yamada Canal project.

Meanwhile, the farmers of the Mori area remained unable to pay the remainder of their land taxes. The prefectural administration, one of whose functions was to collect taxes, was not in a position to encourage the canal project wholeheartedly before the land taxes were paid in full. Within the prefectural government itself, there arose a discord between county headman Hōjō, who tried to have land prices reassessed and promote the canal project, and the civil engineering section in favor of the project on the one hand, and the tax section, insisting on tax collection first, on the other.

Fortunately for the farmers, a proclamation by the Cabinet in May 1880 provided for special adjustment of land prices. The six villages of the Mori area, burdened with heavy taxes, in August that year submitted an application for land price reassessment (drafted by Itsuji Uozumi), and in September Takashige Ario (author of Hompō Chiso no Enkaku [A history of land taxes in Japan]) of the Ministry of Finance visited the villages on a fact-finding mission. The situation was thus beginning to change.

However, the tax section and Governor Morioka, who upheld its position, adamantly insisted on tax collection first. The villagers repeated their request for land price reassessment and deferred payment, and their conflict with the prefecture reached its peak when the prefectural government in February 1881 finally turned down all the applications concerning the proposed Yamada Canal. In April of that year, the farmers of the Mori area presented to the prefectural governor a "re-petition concerning the proposed opening of a new waterway from the Yamada River in Yatabe County, Settsu Province," again drafted by Itsuji Uozumi. The controversy between the two parties was to continue for some time.

In June 1881, the villagers succeeded in having their land values reassessed. For five villages of the Mori area, with Takokusa excluded, the previous total of taxes on dry fields, amounting to ¥3,647 plus a small fraction, was reduced to a little over ¥2,437 (the difference being ¥1,209, or ¥1,109 if ¥100 for the vineyard site is not counted, each plus a small fraction). As the previous total is based on the 3-per cent tax rate effective in 1876 and the rate was reduced to 2.5 per cent of the land value from the following year on, the difference for 1877 and subsequent years was a little over ¥1,008 per annum. Moreover, as this reassessment was not effective before 1881, the five-year total (¥6,049) of the differences, for 1876 through 1880, was not withdrawn and had to be paid by the villagers.

At the same time, the six villages of the Mori area were allowed, as they had repeatedly requested, to defer the payment of the tax increments for 1876 and 1877. The period of deferment was as long as 30 years for New Takokusa, 25 years for New Innami, New Nodani and Nodera, 20 years for Shimokusadani and 15 years for Kusadani village. (Reference 7, pp. 41-48)

As soon as the reassessment of the land values was announced, the prefectural government urged the farmers to pay their land taxes in arrears. Unfortunately for the farmers, Finance Minister Masayoshi Matsukata in 1881 enforced his tight money policy, which invited a severe depression and a sharp fall in commodity prices. So many estates were sold under foreclosure or otherwise that about a quarter of the total tilled area in the country underwent changes in ownership. It is no wonder that the farmers of the Mori district found it difficult to pay their taxes. County headman Hōjō took pains to mediate between the prefecture and villagers, but the prefecture took coercive actions against those who had not fully paid their land taxes. In New Innami Village where the proportion of dry fields was greater than elsewhere and the farmers therefore had particular difficulties in tax payment, more than 242 chō of dry fields belonging to 221 tax delinquents were put to public auction late in 1881. About 200 farmers, enraged by this disposition, travelled 12 kilometers on foot and stormed the Kako County office in a near-riot

situation.

Appeasing the angry farmers, county headman Hōjō seems to have taken steps so that nobody would respond to the public auction. Particularly as a result of a sharp drop in land value, nobody offered to buy any of the estates on sale, which therefore were confiscated by the government for the time being. Remembering the precedent in which land taxes were paid with the proceeds of land sale to the Banshū Vineyard, Hōjō looked for someone to buy some of the dry fields in New Innami Village.

Denzaburō Fujita, a wealthy Osaka merchant, seems to have wanted to purchase approximately 100 chō, but eventually another Osaka businessman, Sadayo Yano by name, bought a little over 34 chō at a price of 2,000 odd yen (¥6 per tan) for mulberry growing. The farmers of New Innami Village, also recalling the vineyard case, made adjustments among themselves to facilitate the land sale, whose proceeds were wholly appropriated for paying their land taxes in arrears. Meanwhile, thanks to Hōjō's endeavors, all the 242 odd chō of dry fields confiscated by the government were returned to their former owners (except the 34 chō sold to the Osaka businessman; this loss was shared among the villagers) (Reference 7, pp. 35, 48-57, 114).

Thus through the good offices of county headman Hōjō and by the cooperation of landowners in New Innami Village, dry fields totalling more than 64 chō were disposed of in two sales and the proceeds applied to the payment of land taxes in arrears. This seemed to have put an end to the Mori farmers' complaint about taxation, which had remained unsettled since 1878. However, the prefectural authorities, at the initiative of the tax section, in April 1882, dismissed county headman Hōjō, who was sympathetic to the farmers, on the grounds that he had always disobeyed the government policy regarding the land tax dispute.

After the petition to keep him in his office proved unfruitful, Hōjō, attracting much sympathy, was elected to the prefectural assembly to fill a seat "chivalrously" vacated by Kōichirō Iwami who had represented Kako County therein. Itsuji Uozumi, another proponent of the Yamada Canal project, had been elected to the assembly in February 1882 at the

age of only 25 (he held the seat until 1890, when he was elected to the House of Representatives). Joining in January 1883 the Constitutional Progressive Party led by Shigenobu Ōkuma, Uozumi enjoyed public confidence as a moderate democrat, and devoted his efforts to the materialization of the canal project. In February 1882, for instance, Uozumi in his capacity as chairman of the joint council for the promotion of the canal project submitted to the Governor of Hyōgo Prefecture a petition to inspect in person the proposed route of the Yamada Canal (Reference 1, p. 486; Reference 7, p. 58).

Meanwhile, the new headman of Kako County who succeeded Hōjō, in compliance with the policy of the prefectural government, demanded full payment of the land taxes prior to the undertaking of the canal project, and put to public auction the estates of the delinquents as required by law. The villages again requested permission of deferred payment, but finally in November 1884 coercive actions were taken against farmers who had failed to pay land taxes since 1878 and local taxes for fiscal 1884, and in the six villages of Mori 140 odd chō of dry fields belonging to 440 tax delinquents were supposed to be put to public auction. However, it was only a little over 70 chō belonging to 219 farmers that were actually sold, and the other 70 odd chō owned by the remaining 221 farmers were too barren to find any buyer and therefore confiscated by the government (they were resold in 1887 to their previous owners at an average price of ¥1.20 per tan - against the taxable value of ¥23). As there were a total of 730 households in the six villages of Mori in those days, more than 60 per cent of them lost their estates.

According to "a survey on the liabilities of people" in September 1885, the debts of the villagers with mortgages amounted to ¥62,692 odd and those without, ¥32,200, altogether totalling ¥94,896 odd, which means an average of more than ¥130 per household (Reference 7, pp. 62-65).

Droughts, a decline in cotton farming, increased taxes and the resultant sale or confiscation of farm land inevitably invited a decrease in the number of households in the Mori area. As Table 3 shows, it decreased from 830 in an early Meiji year to 808 by 1880, followed by a sharp fall

TABLE 3. Number of Households and Population of Mori Area

Year	Early in Meiji	1880	1885	1889	1892	Late in Meiji
No. of households	830	808	730	653	633	692
Population		3,767				4,348

Sources: Reference 7, pp. 2-3; Reference 10, p. 58.

to the bottom of 633 reached in 1892, as a consequence of the increased land taxes. In other words, a quarter of the earlier population or some 200 households deserted the village in two decades. After that, partly under the favorable effect of the development of new rice fields made possible by the Ōgo Canal, the number of households in the area again increased to 692 by a late Meiji year (each household having six members on an average, against 4.7 in 1880).

6. Revival of Yamada Canal Project

The villagers who tried to resist the collection of increased taxes at the same time endeavored to revive the Yamada Canal project. They even attempted to apply pressures on the Hyōgo prefectural authorities through the high-ranking officers of the central government who visited the national vineyard, such as Agriculture and Commerce Vice Minister Yajirō Shinagawa who came in December 1882, Finance Minister Masayoshi Matsukata in July 1883, and Agriculture and Commerce Minister Tsugumichi Saigō shortly afterwards. The local proponents of canal construction availed themselves of those opportunities to make their circumstances known to the influential officials and petitioned for the realization of the project.

Against this background, the prefectural government in January 1883 resumed its survey of the proposed canal route (in 1881, according to References 8, 10 and 11). As the surveyors found the local soil difficult and therefore costly to work on, the prefecture asked the central

government to make an on-the-spot survey for itself. In March of the same year, the Ministry of Agriculture and Commerce sent Ichirobē Minami (who had taken charge of developmental surveys for the Asaka and Nasu canals) and other officials, who examined the proposed route in great detail (Reference 7, p. 61; this took place in February 1881 according to References 8, 10 and 11, however). Thus in April 1883, Governor Morioka inspected the scene of the intended project, which finally made a definite step forward.

However, as the result of the survey pointed to a difficult project and, moreover, commodity prices had soared, the estimated cost of the enterprise seems to have jumped from ¥14,600 in 1880 to approximately ¥90,000. There must have been a controversy among the villagers over the sharing of this cost, and some of them may have proposed to invite other villages to join the project and thereby to reduce the per-head cost, but no agreement appears to have been reached.

Finally in March 1884, the villagers submitted a formal application for the construction of the Yamada Canal. Although this document itself is missing, New Kako and 20 other villages took part in the application according to an accompanying recommendation by the headman of Kako County (Reference 10, p. 26). However, it was not until January 1886 that the association of participating villages was actually organized, and only the five villages of Nodera, New Innami, Kusadani, Shimokusadani and New Nodani were represented in the list of canal committee members in a relevant document then filed, with the name of New Takokusa Village missing (Reference 7, pp. 61-65). This presumably reflected the circumstance that though there had emerged reasonable prospects for the materialization of the project and negotiations were under way to expand the membership of the association to reduce the per-head cost, no definite progress had as yet been achieved.

Furthermore, Governor Morioka, who had been reluctant to approve the canal project because of the delay in tax payment, reversed his position and began to encourage it, perhaps satisfied with the coercive collection of the taxes and complying with the moves of the high-ranking

officials of the central government to support the canal project. In 1884, referring to the application by the villagers, he explained to the national government in detail that "although the canal has to be built to activate this locality, its inhabitants could by no means afford to bear the cost of the project," and even recommended a loan from the state treasury be granted (Reference 10, p. 27). The participation of more villages in the project would have been an advantage in obtaining this state loan. For this reason, the prefectural government and the Kako County office may have tried to invite other communities to participate, and the local proponents may also have packed up their moves.

Meanwhile, the effects of the tight money policy of Finance Minister Matsukata implemented since 1881 began to be felt, and capitalism in Japan set itself on the right track. In 1886 many private enterprises started to be undertaken. In this area, too, the opening of the Port of Kobe in 1867 had stimulated the development of modern industries and, in anticipation of the scheduled openings of the Tōkaidō Railway's Kobe-Osaka section in 1874 and of the San'yō Railway's Kobe-Akashi section in 1888, there arose a new fever for business ventures.

In agriculture, not only were new Western techniques introduced, best represented by the Banshū Vineyard and the Kobe Olive Orchard, but also there was an expanding demand for new techniques and marketable crops in response to the then emerging call for greater-scale farm management. For instance in the Shijimi reclamation project extending from Shijimi Village, Minō County to Kanda Village, Akashi County, both adjoining the Mori area, Takateru Kuki (former lord of the Sanda Fief in Settsu Province) tried to develop a large western-style farm from 1886 on. The ground had been developed, with the approval of the Akashi Fief, by Bunzō Kondō of Ichiba Village, Katō County, since 1865. After the reclamation project comprising both irrigated and dry fields and housing sites reached 28 chō in 1886 (with 33 farm households in residence, consisting of 100 members altogether), it fell into the hands of the Kuki family. The Kukis imported three Western-style ploughs from the United States, each to be drawn by one to six oxen or horses, and tried to operate a large modernized farm with a total investment of more than ¥20,000. However,

as its earnings failed to pay its costs, the farm was converted into a tea plantation in 1890, and eventually leased out to tenants instead of being directly managed by its owners. When the Ōgo Canal was built, the Kuki family offered part of its land to be used as the beds of its channels and ponds free of charge, and in return a 10-chō segment of the farm was irrigated by the new canal (Reference 14, pp. 144-145).

In response to this private activity and the promotion of more productive farming in and out of Kako County, the participation in the Yamada Canal project expanded and the canal made a further step toward realization. In January 1886, at the urging of the prefectural and county authorities, the six villages of the Mori area, first to promote the canal project, were joined by 10 in the Temma area, New Kako Village, and two each of the Hiraoka and Futami areas (they were respectively integrated into Mori, Temma, Hiraoka and Futami Villages in 1889). Altogether, new participants now numbered 15, and this expanded group of villages called itself the Irrigation Association of New Innami and 20 Other Villages. After Governor Morioka had left office in October 1885 to become president of Nippon Yusen Kaisha, offspring of the marriage between Mitsubishi Company and the Mail Steamship Company, his successor Tadakatsu Utsumi devoted increased efforts to the materialization of the Yamada Canal project. Governor Utsumi again asked the national government for a loan from the state treasury, and a ¥45,000 loan corresponding to half the estimated construction cost was eventually promised. The way was thus finally paved for the realization of the Yamada Canal project.

In response to this favorable decision on the requested financing, the 21 villages participating in the project organized the Irrigation Engineering Association in March 1886, and thereby marked the first definite step toward the start of the construction work, nine years after the filing of the first application in September 1878.

7. From Yamada Canal to Ōgo Canal

As New Innami and the 20 other villages organized the Irrigation Engi-

neering Association in March 1886 and petitioned for the construction of the canal, the project was finally again set on its track. Anticipating a difficult work, Governor Utsumi requested the Minister of the Interior (under the new Cabinet system resulting from a reform in October 1885) to send an expert from his ministry. Interior Ministry Engineer Gisaburō Tanabe was stationed in the county from April 1886 on and together with the officials of the prefecture's civil engineering section started surveying the proposed canal route.

The result of the survey by Tanabe and his associates indicated that, as had been feared, the intended channel bed presented serious difficulties and therefore tapping the Yamada River was not advisable. Seeking another source of water nearby, they instead proposed to build a canal which would tap the Ōgo River and, at Misaka, stride over the Mino River with a siphon. Tanabe was a young technocrat who had learned Western civil engineering, and siphoning had already been used since April 1885 in the modern waterworks of Yokohama City, designed by Colonel Palmer, a British Army engineer. Encouraged by the findings of Palmer who also inspected the scene, Tanabe and his colleagues advocated a switch in water source from the Yamada to the Ōgo River for the proposed canal which, they maintained, should utilize new techniques. This meant that a new survey and a new design had to be made, and as a result the designing and budgeting were not completed until May 1887 (Reference 7, pp. 70-71; Reference 15 and 16).

The prefectural government of Hyōgo, which was directly responsible for the canal project and had successfully endeavoured to obtain a state loan partially to finance it, understandably consented to the Ōgo Canal proposal by Tanabe and his associates and tried to enforce the plan in a "government-dominated" way. It was no less understandable, however, that some of the villagers involved entertained doubts about the new proposal, especially about the first siphon system to be used for agricultural irrigation in Japan. Those of the Mori area, who had long suffered from the short supply of water and first proposed the canal project, were obliged to agree to the Ōgo Canal scheme, but those of the later participating villages were generally more skeptical. The meetings

of the Irrigation Engineering Association were only poorly attended, and failed to decide on the construction cost of the new canal at an early opportunity. The headman of Kako County, who had supervisory authority over the Irrigation Engineering Association, seems to have endeavored to persuade the skeptics at the instruction of the prefectural governor. Thus the positions of the villagers and the prefectural government were reversed as to the future of the project.

Meanwhile, the farmers in the water source area, whose land would be bought up to be used as the canal bed and whose irrigation practices would be affected by the new canal, must have had objections, too. When the headman of Mino County, well aware of popular views in his area, showed signs of "reluctance," the prefectural governor urged him to tender "resignation if he has any complaint," and it seems that, only by doing so, the governor was able to persuade the reluctant local inhabitants (Reference 7, pp. 70-71).

Meanwhile, Itsuji Uozumi and other influential persons of the Mori area made all-out efforts to win approval for the new canal plan. At last they succeeded in convening a meeting of the Irrigation Engineering Association in June 1887 to resolve on the budget for the construction of the Ōgo Canal. However, on June 5, only eight out of the 21 delegates (one each from the 21 villages) attended, obliging the meeting to be called off, and again on June 6 only 11 showed up. The headman of Kako County, concurrently chairman of the meeting, sent county officials for the absent delegates, and finally on June 7 the meeting had 16 in attendance. However, these sixteen were equally divided on the proposed switch to the Ōgo Canal plan and its construction budget. It was only by the vote of the county headman who chaired the meeting that the bills were approved as proposed. The delegates who voted for the proposals were those of the six villages initially advocating the project and two others, representing Kunioka and Kako Villages, whose positions had been reversed by the enthusiastic persuasion of Uozumi and his colleagues (Reference 7, pp. 73-74).

In 1887, the values of dry fields were reassessed as had been strongly

urged by the local farmers, following the first such reappraisal in 1881. Again in 1889, both irrigated and dry fields were revalued and in 1893, after the completion of the Ōgo Canal, the land values were allowed to remain unchanged in spite of the development of new irrigated rice fields (Reference 7, pp. 72, 81 and 96). The farmers of this area, having long suffered from heavy taxes, at last began to find themselves somewhat better off than before.

Meanwhile, the development of industries and the progress of urbanization, stimulated by the burgeoning private enterprises, invited a trend of rising rice prices, which, coupled with the opening of the new canal, induced local farmers to expand their irrigated rice fields.

Under the combined effects of all these circumstances, even those land-owners who had been skeptical about the Ōgo Canal seem to have gradually changed their position in favor of the new plan. On top of the initial proponents' endeavors, both the prefectural and county authorities worked hard to persuade the reluctant farmers, eventually achieving a consensus among the communities involved. In December 1887, water rights were defined in relation to the upstream area, and in January 1888 the construction of the canal was finally started.

8. Start of Ōgo Canal Construction

The construction of the Ōgo Canal, finally started in January 1888, encountered a succession of difficult technical and financial problems.

First, there were technical problems posed by troublesome soil-conditions, as anticipated, and tunnels necessitated by the topographical features of the canal route. Out of the 26,309-meter length of the channel, 20 per cent or 5,200 meters consisted of 28 tunnels, most of which took more than two years to complete. Especially difficult was the construction of the Karashiyama tunnel (682 meters long), where soil was soft, much water welled out and little air flowed in, so that sometimes no more than two feet's progress could be made in 24 hours. Eventually, the contractor

was dismissed, and the prefectural government took direct charge of the construction work, which was not completed until three years and four months afterwards (Reference 11, pp. 8-9).

Second, the project met enormous financial difficulties. The construction cost inflated on account of the difficulty of the work itself and the rise in wages and material prices in connection with the extension of the San'yō Railway (its Akashi-Himeji section was completed in December 1888, and two stations were established in Kako County, at Tsuchiyama and Kakogawa). However, the local farmers, already heavily suffering from droughts, a cotton farming slump, and increased land taxes, could afford no additional expenditure. As it was already difficult to collect fully the initially determined shares of the construction cost, the additional expenses inevitably created heated controversies among the members of the Irrigation Engineering Association. Though the additional expenses were curtailed, the total expenditure increased from the initially budgeted ¥69,255 to ¥84,473.

Out of this total cost, ¥45,000 was defrayed with a state loan, which was repayable by the local farmers in ¥15,000 instalments, without interest, every June from 1889 on. When the first repayment date came, they were unable to pay the instalment. In the same year a typhoon attacked the area. Mori Village (into which the six initially participating villages had merged in April 1889) was hardest hit as usual, and many farmers there had to mortgage their estates to pay their shares of the canal construction cost or their land taxes. At the beginning of the year, the combined debts of all the Mori villagers are said to have stood at more than ¥27,140, averaging over ¥41 per household. Because of these circumstances, farmers of the 21 villages involved requested permission to write off their debts to the state treasury in October 1889, and the request was repeated in August 1890. After the prefectural authorities permitted deferred payment, the national government in March 1892 ordered exemption of the farmers from their liabilities to its treasury (Reference 10, pp. 58-67; Reference 11, pp. 7-9).

However, besides this state loan, the liabilities of the local farmers in connection with the Ōgo Canal project totalled more than ¥24,255 at the beginning, or over ¥39,473 after the revision of the budget. Furthermore, as the construction of branch channels and reservoirs was supposed to cost about ¥58,586 and the development of new rice fields, about ¥53,491, both in addition to the cost of the main canal itself, the total expenditure would run up to more than ¥150,000. Few farmers could afford to pay their shares of this enormous overall cost, and loans available to them, secured with their estates, had their obvious limits. Even the headman of Kako County and the governor of Hyōgo, besides urging collection from landowners, endeavored to find money-lenders to help the local farmers pay their dues. In this course of events, not a few landowners must have lost their estates (Reference 10, pp. 58-61; Reference 11, p. 12).

In spite of all these difficulties, the Karashiyama tunnel which constituted the hardest part of the work was finally driven through in April 1891, and immediately underwent a water flow test. With the Ōgo Canal proper completed, the villagers set about building its branches and reservoirs. In New Takokusa Village, shortly before or after the completion of the trunk channel, Susaburō Iwamoto and other influential farmers launched the project to expand Hirotani Pond (completed in 1897). Following it, Kanji Uozumi of Nodera Village in 1892 took the joint initiative with Seibē Sawada of Hyōgo to start construction of Anazawa Pond (completed in March 1893), and Uozumi, in consultation with other influential villagers, also made important contributions to the construction or expansion of such ponds as Nobataike, Koideike, Nakaike, Kitaike, Kyōnoike and Anazawaike in or after 1894 (Reference 7, pp. 100-103).

After the first flow of water ran through Ōgo Canal from September 1891 through May 1892, the long-awaited irrigation of rice fields finally began. In the meantime, in accordance with the Ordinance on Irrigation Associations enacted in June 1890, the Irrigation Engineering Association had been reorganized into the Ordinary Irrigation Association of Mori and Four Other Villages of Kako County, in November that year.

9. Disaster to Ōgo Canal and Its Completion

In July 1892, not quite a year after water had begun to flow down the Ōgo Canal, a torrential rain hit the area. Because of the imperfect execution of the project due to stringent cost-cutting and the delicate soil conditions, the just completed embankments of the waterway collapsed, and many of its tunnels caved in, thereby immediately disabling the new canal.

The damaged canal had to be restored, but the beneficiary villagers had paid all they could for the initial construction work. They could no longer afford even a stopgap repair, and were obliged to rely on subsidies from the state and/or the prefecture.

Fortunately for the villages, the leader of their irrigation association, Itsuji Uozumi, was then staying in Tokyo as a member of the House of Representatives. In addition to working for the realization of the canal project, Uozumi had represented Kako County in the prefectural assembly from 1883 until 1890, and had also been a newspaper and magazine publisher. When the National Diet (parliament) was established in 1890, 34-year-old Uozumi was elected (affiliated with the Progressive Party) to the Lower House from his constituency comprising Kako and Innami Counties, and belonged to the budget committee during the first session and to the petition committee during the third session of the Diet (he was elected to the House for four consecutive terms until the sixth session in 1894) (Reference 1, pp. 487-488).

Informed of the damages to the canal and knowing that the villagers could ill afford its restoration, Uozumi made desperate efforts to obtain a government subsidy to finance its reconstruction. He must have sounded the Ministry of the Interior among others. Finally he thought of having the prefecture undertake the restoration on its own responsibility and the national treasury subsidizing the work in connection with the authority of the state to control rivers. Uozumi immediately cabled Susaburō Iwamoto (the first headman of Mori Village, in office until 1894) and Yōzō Matsuo, both leaders of the irrigation

association. Iwamoto and Matsuo in no time told what they had learned from Uozumi to the headman of Kako County, who concurrently was chairman of the irrigation association. After consulting with other officers of the association, the county headman requested the prefectural governor to take the action suggested by Uozumi (Reference 7, pp. 93-94).

Kōhei Sufu, then Governor of Hyogo, agreed to this proposal, and ordered a civil engineer to design the reconstruction work. Eventually, he decided on a plan to execute a "perfect and flawless" work with an enormous budget of over ¥180,000, and the most difficult part of the project was to be directly undertaken by the prefecture (at a cost of ¥150,019, of which 80 per cent was to be paid out of public funds) while the irrigation association was responsible for the rest (costing slightly over ¥28,750) (Reference 10, pp. 68-77). The association accepted this plan and, to enable it to pay its due of a little over ¥58,762, with the government subsidy of ¥120,015 being subtracted from the total cost, an arrangement was made for an ¥89,815 loan from the Japan Hypothec Bank (Reference 11, p. 62; the loan was also to cover the outstanding balance of the association's earlier debt).

However, public financing of the restoration project had to face two obstacles. The prefectural subsidy required the approval of the prefectural assembly, and its resubsidization by the central government needed that of the National Diet. Uozumi and other leaders of the association made all-out efforts to have this proposal pass the two legislatures. First, at an extraordinary session of the prefectural assembly, many of its members understandably objected to spending more than ¥180,000 on the restoration of the canal whose initial construction cost was about ¥80,000. After "the greatest confusion since the founding of the prefectural assembly," the plan was approved in December 1892 by a narrow margin of only two votes. Then at the National Diet, although some of its members suspected that the case was somewhat different from the usual objects of river conservation subsidies, the proposal was "unanimously approved by both Houses" or by a margin of two votes (according to Reference 1, p. 488; Reference 10, p. 143 and Reference 11, p. 66) in June 1893, largely as a result of energetic endeavors by Governor

Kohēi Sofu, who concurrently was a member of the House of Peers, and Representative Itsuji Uozumi.

As it was decided to subsidize the project with public funds, the restoration work was started in July 1893. There were some problems, including one arising from the governor's decision to lay iron pipes in some troublesome parts, such as the Karashiyama tunnel (Reference 10, p. 74), but, against doubts raised by some officers of the association, the work was finished in May 1894, finally bringing the Ōgo Canal to full completion.

Whereas the restoration of the trunk channel and the Aino branch (splitting from the main at Hirano Shinkai and reaching Kusadani in Mori Village via Bessho Village) was completed within the framework of the restoration project, the works on the other branches and reservoirs were undertaken by the respective beneficiary villages as earlier stated. By 1893 or 1894, all these supplementary projects were completed and, along with them, new rice fields were developed in succession. The construction of the branches and reservoirs altogether cost ¥146,886 and the development of new rice fields, ¥79,052. With the initial construction cost of ¥84,473 (including a ¥45,000 grant from the state treasury) and the ¥178,778 cost (including a governmental subsidy of slightly over ¥120,015) of restoration from the typhoon-inflicted damages being added to these sums, the aggregate expenditure from the start of the work to build the Yamada Canal until the development of new rice fields irrigated by the completed canal reached an enormous amount of ¥489,189 (of which a little over ¥165,015 was paid out of public funds).

Five villages - Mori, New Kako, Temma, Hiraoka and Futami - having a total area of a little over 1,875 chō benefited from the new canal. Out of this overall area, irrigated fields (on whose square measure were based the association dues) totalled more than 1,181 chō (including 709 chō of newly developed fields) (Reference 11, pp. 12-14).

After the sixth session of the National Diet in 1894, the year in which the Ōgo Canal was fully completed, Itsuji Uozumi retired as member of the

House of Representatives, and devoted the rest of his life to his family business and local politics. In 1896 he was elected to the newly established Kako County assembly, but he became ill in 1898 from overwork, and died in December 1899 at the age of only 43 (Reference 1, p. 489; Reference 4, p. 30).

In March 1894, Susaburō Iwamoto, who had also contributed to the construction of the Ōgo Canal, resigned his post as the headman of Mori Village. Many members of the village council wanted the vacated position to be filled by Naomasa Hōjō who, as the first headman of Kako County from 1879 on, had sided with the farmers with regard to the canal project and land tax problem. As he opposed the policy of the prefectural governor and tax section, Hōjō was forced to tender resignation in April 1882 and, after filling a vacant seat in the prefectural assembly for some time, fell into relative obscurity. Though he was then living in Osaka, persuasion by Itsuji Uozumi and other representatives of the village proved effective enough, and he became the second headman of Mori Village in April 1894. After serving three consecutive terms in that office, Hōjō resigned in March 1906 (Reference 7, p. 97 and elsewhere).

These are but a few examples of the important contributions made by the leading personalities who played central roles in materializing the Ōgo Canal project.

10. Increasing Development of New Rice Fields and Progress of Pumping Techniques

After the completion of the Ōgo Canal, newly developed rice fields quickly increased and farm management was gradually stabilized in this district, which had been only marginally provided with agricultural irrigation. Witnessing its development, the farmers of nearby villages must have been increasingly encouraged to open up additional rice fields of their own. Especially, some of the villages in the upstream area seem to have cooperated in the settlement of water rights and the supply of land for the canal bed in return for their promised shares in the water the canal would

provide.

To expand the water source of the Ōgo Canal and thereby to meet the increasing demand for irrigation, the revival of the Yamada Canal project, abandoned in 1887, began to be planned. The Ordinary Irrigation Association tapping the Ōgo River resumed a survey of the proposed route of the Yamada Canal in 1896, after the Sino-Japanese War (1894-95). However, this was shortly after the restoration of the typhoon-torn Ōgo Canal, and nearly ¥90,000 of the money which had financed the construction and repair of the trunk channel remained as an outstanding debt. For this reason, the attempt to revive the Yamada Canal project did not go beyond surveying the proposed route (Reference 10, p. 81; Reference 11, p. 16).

As there were strong requests for shares in the water from outside the association, surplus water was conceded to the United Irrigation Association of Kande and Iwaoka Villages (covering an area of 100 chō), Akashi County, and new rice fields at Kobayashi (10 chō) and Okiharu (14 chō) both in Bessho Village, Minō County, in March 1898. In 1900 surplus water was also given to the Ordinary Irrigation Association of Miki Town and Kurumi Village, Minō County, to irrigate a little over 16 chō 6 tan, and water supply to these non-participants in the project thus came to cover a combined area of more than 140 chō 6 tan (Reference 11, pp. 14-15).

At about the same time, the upsurge of capitalism began to involve Kako County and its vicinities. In the financial sector, Kakogawa and Takasago Banks were established in 1896, followed in 1897 by Ban'yō Bank (in Befu Town, managed by the Taki family, wealthy fertilizer merchants). Japan Woolen Textile Co. (in Kakogawa Town, 1886) and Mitsubishi Paper Mill (in 1888, Takasago Town) were also inaugurated at this time, followed after the Russo-Japanese War (1904-5) by Masumoto Sake Breweries (1905), Horikawa Paper Mill (1906), the Takasago Works of Kanegafuchi Spinning Co. (1907) and Befu Paper Mill (1908). This progress of industrialization and urbanization brought about an increased demand for farm products and thereby stimulated the desire of Kako farmers for greater access to water resources (Reference 1, pp. 11-13).

It was also in those years that irrigation projects utilizing power pumps began to be undertaken everywhere in the country, enabling highlands and other areas previously having little access to water resources to be readily irrigated with pumped water. In the Kako area for instance, the Kumori River was tapped from 1907 on with electric pumps to deposit water in Tōgō and two other ponds in the non-irrigation season from October through May, so that the north side of the Noguchi Highland could be newly irrigated (covering 120 chō in 1913).

Further in 1908, the Shin Arai channel was completed, this channel poured the water pumped from the Kako River into the Kanno branch channel and enabled 50 chō of previously inundated land to be developed into rice fields. Besides that, the Gandoi Ordinary Irrigation Association organized in 1906 by Yawata Village and others formulated a plan to draw water from the Kusadani River in the non-irrigation season from September through May, and irrigated an area of more than 170 chō at the north-western edge of the Kako heights. The construction of its three reservoirs (occupying a total area of slightly over 24 chō 6 tan) was started in April 1911, and the completed ponds benefited an overall area of 150 chō in 1950 (Reference 2; Reference 1, pp. 13, 203 and 219; Reference 4, p. 28).

11. Revival of Yamada Canal Project

Along with the development of industries in and out of Kako County described above the proliferation of irrigation with power pumps, farmers both upstream and downstream from the Ōgo Canal-irrigated area became increasingly interested in developing new rice fields, and began to plan exploitation of new water resources.

However, the villagers benefiting from the Ōgo Canal, whose area had already been well developed, were understandably less interested in building any new canal. Viewed the other way around, it was under the pressures of those villages looking for new water resources that the revival of the Yamada Canal project became a realistic possibility. By

1905, incidentally, the association of the Ōgo Canal beneficiaries had managed to fully repay its debts incurred through the construction and restoration of the canal.

Taking this opportunity, the headman of Kako County who had controlling authority over the Ōgo Canal association seems to have planned a project for expanding the available water resources. Then already under way was the construction, undertaken by Kanno and other villages, of the Tōgō and two other reservoirs in which to deposit water electrically pumped from the Kumori River (completed in June 1907). Having studied this technique, the headman of Kako County planned to install a power pump at Misaka where the Ōgo River joins the Yamada River and thereby to add the surplus water of the latter into the trunk line of the Ōgo Canal. This, he thought, would give the association members a supplementary source of water and enable the farmers of Minō, Akashi and Kako counties, who had strongly desired increased allocations of water, to develop new rice fields (Reference 10, p. 81, and elsewhere).

As he obtained approval from the headmen of Minō and Akashi counties, the Kako County chief consulted the standing officers of the Ōgo Canal association about his plan in June 1906. Though it took time to determine the new beneficiary areas and to adjust the shares of the construction cost and water right clashes with the downstream area, a field survey was started in October that year. The results of the survey, however, indicated that it was more advisable to build a new canal directly from the Yamada River, having a greater water flow than the Ōgo, than to install a power pump at Misaka.

Like in the earlier case of the Ōgo Canal, the initial plan was thus revised, and it was decided to revive the Yamada Canal project, a long-cherished dream since the Edo period. In April 1907 the irrigation association convened its meeting, which resolved that the communities newly participating in the Yamada Canal project should contribute two-thirds of the endowment, shared in proportion to the beneficiary area, and bear the total construction cost of the new project (the earlier cost of the Ōgo Canal had been equally shared) and that all other

expenses should be equally shared. After it was confirmed that 13 towns and villages, having a combined beneficiary area of over 948 chō, in Kako, Minō and Akashi Counties would participate in the new project, the Ordinary Irrigation Association of Mori and Four Other Villages was re-organized into the Ōgo River-Yamada River Ordinary Irrigation Association of Hyōgo Prefecture.

However, difficulties encountered in determining the sharing of the construction cost and buying up the land required for the channel bed and other uses delayed the start of construction work. The construction cost in particular, which could no longer be covered by a governmental subsidy even in part, would be wholly financed with a ¥280,000 loan from the Japan Hypothec Bank. It was not until February 1911, five years after the project had been mapped out, that the ground breaking ceremony for the new canal was finally held.

The construction of the Yamada Canal, again suffering from troublesome geological features, involved many difficulties. Nearly a half of the 10,752-meter length of its trunk line consisted of 19 tunnels (totalling 5,150 meters in length). Tunnel No. 15 presented the most difficulty; its contractor was replaced midway through the construction process which was only completed in December 1914.

Thus in April 1915, the trunk line of the canal tapping the Yamada River was completed at a total cost of slightly over ¥265,887 (Reference 10, pp. 93-95; Reference 11, pp. 16-18).

Meanwhile, along with the construction of the trunk channel of the Yamada Canal, work on branches to irrigate new beneficiary areas and reservoirs in which to deposit water in the non-irrigation season were also launched. Five new branches were to be built (totalling more than 50 kilometers in length) covering the Iwaoka, Kande, Hirono, Bessho and Moriyasu areas, and 62 reservoirs and electrical pumping facilities to feed water to the highlands of Hirono and Iwaoka. These works altogether cost slightly more than ¥856,485, out of which ¥800,700 was borrowed from the Japan Hypothec Bank (Reference 10, pp. 95-106; Reference 11, pp. 19-24).

Eventually in 1919, the branch channels and reservoirs were all completed, resulting in the completion of the Ōgo River-Yamada River-based irrigation canal system.

Loans totalling ¥1,040,200 remained a heavy burden on the financial position of the irrigation association for many ensuing years. The villagers finally paid up all their liabilities in 1951, after receiving a reduction of interest rates and recovering from the effects of the Showa depression (Reference 11, p. 24).

All subsequent irrigation-related projects, including the construction of Yamada Pond in 1928, were either directly undertaken or subsidized by the prefecture, as it became usual, from the late Taishō years on, for large-scale land improvements to be subsidized by public authorities.

12. Works to Secure Supplementary Water Supply and Off-Season Tapping

The "Tanzan" (= Ōgo and Yamada, a variant reading of the combination of the first characters "Ō" and "Yama") canal system thereby founded was designed to draw a maximum of about one ton/second of water from each river in the non-irrigation season, deposit the water in a large number of reservoirs by way of the trunk and branch channels, and therewith benefit a total area of 2,019 odd chō in the irrigation season. Drawing only two tons/second of water and irrigating more than 2,000 chō would be impossible by directly tapping rivers. The double structure of the Tanzan canal system, which tapped the rivers and deposited the water in reservoirs, served to enlarge the irrigated area per unit quantity of water drawn per second and, it has to be underlined, the stringent rules of water utilization in reservoir-dependent irrigation, together with the equality among the members of the irrigation association, made possible water-saving irrigation practices.

Nevertheless, the service area of the Tanzan canal system which was a water-short zone, suffered heavily from droughts. Moreover, as the area

to be irrigated tended to expand both in and out of the member-villages of the association, coping with the water shortage posed a serious problem.

Thus, stimulated by a heavy drought in 1924, the construction of the Yamada Pond was planned as a subsidized project. The work started in March 1929 as a prefectural undertaking covered by a state subsidy for trunk channels of water service and drainage, and was completed in March 1933 with a total cost of slightly more than ¥249,291. As it was a small reservoir with a capacity of only 60,000 cubic tsubo (1 cubic tsubo = about 6 cubic meters) and a catchment area of 57 chō, the Yamada Pond was further supplemented with a catchment channel (with a catchment area of 58 chō), built from 1935 to 1937 under subsidization by the prefectural government.

In the basin of the Ōgo Canal as well, a project was undertaken from 1934 to 1935 to build a channel to tap the Sō'o River in its upper reaches. In addition, the Nishihata River was rechanneled in 1939 and 1940. Both these projects were subsidized by the prefecture (Reference 10, pp. 108-119; Reference 11, pp. 25-27).

However, since all these water channelling works were strictly limited in scale and merely tapped relatively scarce sources, they provided no fundamental solutions to the water shortage. Accordingly, the need was felt for drawing water beyond the previously approved season.

Since the Yamada River had a greater catchment area than the Ōgo, it could be tapped even during the regular irrigation season. However, the volume of water available from the Ōgo River was much more limited. The irrigation association in April 1934 started negotiating with villages in the riverhead area, including Ōgo Village, for an extension of the tapping season — then ending on May 21 — until the end of the month and for off-season drawing of high water. The negotiations met difficulties over the sum of compensation and a disagreement among the riverhead villages themselves, but the association's request was eventually fully complied with in the settlement reached in June 1936 in the presence of the chiefs of the Miki and Kako Police Stations (Reference 10, pp. 114-117; Reference 11, pp. 35-37).

Afterwards, as the structures of the Tanzan canal system deteriorated with use, a major repair project was undertaken by the prefecture from 1949 on. Further projects, including a national one, of Tōban canal construction for agricultural irrigation were launched in 1970 with a view to development and greater utilization of additional water resources. These more recent undertakings, however, will be referred to in no further detail in this paper.

13. Water Intake Period and Cylinder Branching

Since the two water sources of the Tanzan canal system, the Ōgo and Yamada rivers, were narrowly limited in catchment area and in flow rate, the earlier established rights to the water therefrom were strongly defended. It was for this reason that only one ton/second of water from each river, or a total of two tons/second, was taken in during the non-irrigation season, guided through long channels and their branches, and deposited in reservoirs. Even during the irrigation season, the drawing of high water in or after heavy rainfalls was permitted, from the outset for the Yamada and from 1936 on for the Ōgo, but only under severe restrictions on quantity and in other respects. The supplementary facilities including Yamada Pond also were limited in dimensions. Accordingly, any expansion of the water intake would be subject to rigid restrictions.

Thus, stringent rules had to be prescribed and enforced with regard to canal branching and water distribution. In time of drought or water shortage for any other reason, such strong steps as compulsory water saving, alternate irrigation, and restricted rice planting were taken.

Therefore, the branching of the water flow, which was the source of water to be deposited in reservoirs, was accomplished in a fairly scientific manner. New facilities including branching cylinders for distribution of water according to the water-requiring area, which was the basis of sharing the irrigation cost, were devised. The water-requiring area, which was not necessarily identical with the irrigated area, meant the area to receive the distribution of water from a new reservoir built in connection

with the canal project. Some of the localities suffering especially from water shortages declared greater water-requiring areas than their actual areas to be irrigated to secure a larger supply of water, and paid greater shares of the cost than they would otherwise have had to bear.

Because of this circumstance, the distribution of water according to the water-requiring area had to be very precise. As a means of precise distribution, the cylinder branching method used at Neribeya at the trunk line end of the Tanzan canal system is particularly well-known. This method was also employed elsewhere, for instance at the Kande branching station, and precise distribution was attempted at every branching point by the use of a rectangular or otherwise-shaped dividing dam or a valve (Reference 17).

These branching methods seem to be adaptations of modern European techniques, perhaps of those used in urban waterworks recommended by Palmer or some other foreign advisor. They were most suitable for water distribution in such a water-short district as the area served by the Tanzan canal system, where rivers and reservoirs were utilized in combination. Many reservoirs had to be built to stock the water drawn from the rivers in the non-irrigation season. Since in this district locations suitable for reservoirs were already occupied by old ponds, most of the newly built ones had to be dish-shaped ponds surrounded by embankments built on flatland. The surface areas of reservoirs, therefore, were inevitably large relative to their capacities. In Mori Village for instance, reservoirs for irrigating 811 chō of rice fields occupied an area of 166.1 chō (resulting in a reservoir density of 20.4 per cent), and in Temma Village, New Kako Village, Ōkubo Village, and Hiraoka Town, the density reached the vicinity of 30 per cent (Reference 5, p. 664; Reference 3).

The reservoirs contributed much to the solution of the water shortage problem by enabling surplus water, mainly in the non-irrigation season, to be stored and facilitating water saving and equitable distribution in the beneficiary district. However, the presence of many dish-shaped ponds, whose capacities were small relative to their surface areas, resulted in a large proportion of reservoirs to the total area of land. As the

property value of land soared along with the rapid growth of the national economy from around 1955 on, there arose a call for elimination of irrigation ponds.

The Tanzan canal project, benefiting an aggregate area of some 2,000 chō, was a vast undertaking to draw water from outside the beneficiary district by changing the basins of existing rivers. The planning and execution of such a huge project presupposed, first of all, the settlement of conflicts of interests between residents of the upstream and downstream areas, inside and outside of the beneficiary area, and the unification of the wills of a large number of farmers. Secondly it required the local farmers to raise the enormous funds necessary to finance the huge project and particularly to win the most generous governmental subsidies possible. The prime movers of these endeavors were the leaders who succeeded in developing a consensus among the local villagers.

(1) Integrating the Would-be Beneficiary Communities

The Tanzan canal district had in the past only marginal access to water resources, and included many villages newly developed in or after the mid-17th century. Since the villages had been well integrated sociologically, catalyzed by the irrigation ponds, it was relatively easy for the influential personalities of the older villages to develop a consensus among their fellow villagers with respect to the planning and execution of the Tanzan canal project.

However, as the project transcended the boundaries of the old villages and had to draw water from far-away sources, there arose fierce conflicts of interests between the upstream and downstream areas, among the new villages themselves and also between different localities. The project required the participation of as many communities as possible to reduce its cost per head. Adjustment of these conflicting local interests was beyond the influence of personalities whose prestige was limited merely to the town or village level or even to the county level.

Here emerged an important coordinative role to be played by the adminis-

trative authorities of Kako County and Hyōgo Prefecture. Especially Naomasa Hōjō, the first headman of Kako County, was a civil administrator who, well known for his integrity since the days of feudal rule, devoted himself to the realization of the canal project for the welfare and in accordance with the will of the people, even against the intent of the prefectural government or his superiors.

The prefectural government of Hyōgo, on the other hand, at first was in dispute with the local villages over the land tax increase, and at one time was critical of the canal project. However, on the occasion of the establishment of the Banshū Vineyard in 1880, many high-ranking officials of the central government visited the locality. The villagers seem to have applied a dual approach of trying to persuade these influential personalities of national prominence to exert pressures from above for the materialization of the project while continuing their negotiations with the prefectural authorities. Eventually from 1883 on, the prefectural government changed its policy and began to support the canal project actively. A loan of ¥45,000 to cover part of the construction cost was granted from the national treasury, and the villagers were afterwards exempted from the obligation to refund this loan. Learning from the precedents of the Asaka, Nasu and Meiji Canals, they managed to have the cost partly borne by the national government and temporarily defrayed by the prefectural authorities.

Above all, the authorities of Kako County and Hyōgo Prefecture made earnest efforts to adjust the conflict of interests among the communities involved, even resorting occasionally to coercion. The construction of the trunk lines and other important sections was directly undertaken by the prefecture. Since the Edo Period, it had been customary for the ruler to take charge of the design, supervision and even execution in some cases of large-scale civil engineering projects like that of the Tanzan canal system.

(2) Sharing the Cost

The construction cost of the Ogo Canal, which had been planned as a private

undertaking from the outset, had inevitably to be borne by the prospective beneficiary communities.

In this district of those days, however, droughts, a slump in cotton growing and above all increased land taxes had exhausted the financial resources of the villagers, who were therefore obliged to reinforce their financial position by having the land taxes reduced and improving the irrigation facilities. A popular view holds that demanding tax cuts was the farmers' means of restoring financial security, while building a canal was the land owners' means to the same end; and that the latter was realized in exchange for the acceptance of the heavy taxation. Actually, the circumstances were not so simple (Reference 5, p. 665; Reference 6, p. 173).

The villagers were shrewd enough to pursue two goals, the tax cut and the canal, without missing either. In fact, the tax burden was gradually reduced by the revisions in 1881 and 1887, permission for deferred payment was granted and suspension of land value reassessment for newly opened rice fields was agreed upon. Even in New Kako Village, where greater emphasis was placed on the tax cut, the farmers had also been enthusiastic about the canal plan with an eye to improving the management of their farms and increasing their incomes. Of course, many succumbed to the heavy taxes, market fluctuations, droughts and the cotton farming slump, judging from the steep drop in the number of households in the area. As Naomasa Hōjō, second headman of Mori Village, aptly pointed out, "The benefits of the canal failed to reach the victims" (Reference 7, p. 115).

Meanwhile, the construction cost of the canal weighed heavily on the farmers who remained there, as their estates had to be mortgaged, often forfeited eventually, put to public auction or confiscated by public authorities in coercive collection of the taxes they had failed to pay. The villagers further sought state subsidization of the canal project to make up for the heavy burden of taxes. Their active lobbying with the central and prefectural governments finally bore fruit in a loan from the national treasury. This, however, had to be repaid, and moreover the newly developed rice fields would not contribute to increasing their

incomes until the canal was completed. Under the additional impact of droughts, it became virtually impossible for them to refund the state loan, which, as a result of energetic petitioning, was eventually written off. Perhaps they were aware of similar precedents, including the case of the Nasu Canal, or shrewdly calculated their inability to refund the state loan from the start.

In 1892, the year immediately following the completion of the Ōgo Canal, its channels and tunnels were heavily damaged by a torrential rain. So soon after the initial construction work, the beneficiary villagers could not afford to pay for its reconstruction. Due to the devoted efforts of Itsuji Uozumi, then a Lower House member, an ingenious plan to finance the reconstruction with prefectural expenditure and further to reimburse the prefecture for the expenditure with a state subsidy was worked out. After active lobbying with the administrations and legislatures both at the national and prefectural levels, the reconstruction project (out of its total cost, 80 per cent, or more than ¥120,000, was covered by public subsidies) was finally completed as a direct prefectural undertaking. Without this generous public subsidization and direct underwriting by the prefectural government, the Ōgo Canal project probably would have been abandoned.

The Yamada Canal project, launched in 1911, was wholly financed with private funds, as the private sector had built up its financial strength since the establishment of a capitalist economy in Japan in mid-Meiji years. In agricultural irrigation projects as well, lendings by the Japan Hypothec Bank or agricultural-industrial banks at the prefectural level replaced public subsidies as the main sources of fixed investments. The Yamada Canal project, too, depended on loans from the Japan Hypothec Bank for ¥280,000 of its trunk line cost and more than ¥800,000 of its branch and reservoir costs.

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