Report 1

Institutional Framework of Water Allocation in Japan

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Abstracts

Japan had experienced large growth in population, urbanization and industrialization since the end of WWII. Due to that, water demand for municipal use had increased significantly, and it has been one of the most important issues how to allocate water resources appropriately. In order to the appropriate distribution, we have promoted water resources development constructing dams or weirs, and son. Also, we established the necessary institutional frameworks. Especially, there are three most important frameworks. they are: water right system, institutional framework of multi-purpose dam construction and institutional framework of preparation plans for broad-based water allocation.

Contents

1. Introduction

Japan started its modernization since Meiji Period (1868-1912). After that, through World War I & II and the period of high economic (from the middle of 1950's to the beginning of 1970's), Japan has achieved the significant economic development. In the meantime, Japan had experienced the increase in population (especially in urban areas), urbanization and industrialization. In addition, especially from the end of WWII to the high economic growth period, water demand for municipal and industrial use had been increased considerably. Therefore, water allocation became one of the most important issues at that time. In order to deal with the increase in water demand, Japan has developed institutional frameworks for ensuring the water use, and also has implemented water resources development including construction of water infrastructures. As a result, the tight conditions of water demand-supply have been improved to some extent until now.

As some Southeast and South Asian countries have been experiencing population growth, urbanization and industrialization, water demand for municipal and industrial use is now increasing. In line with this increase in water demand, water shortage has often happened in these countries, especially in dry season. That is to say, these countries are now facing the water-related problems that Japan had experienced. In order to improve such a situation of water-related issues, it is necessary to develop institutional frameworks for water allocation. For that purpose, it is beneficial to share the information and knowledge of Japanese institutional framework for water utilization.

At first, this paper refers to the status of water utilization before WWII, and describes the process for establishment of institutional framework for water allocation after WWII. Finally, the recent issue on unstable water supply is introduced.

2. The status before WWII

2.1 The status of JAPAN before the enactment of the River Law (1896)

In Japan, modern river administration system has been carried out since the birth of the River Law. It was enacted in 1896, which is in the mid-Meiji Period. **At that time, flood control was the biggest concern with river administration**. That is to say, in the mid-Meiji Period, flood disasters occurred one after another along major rivers such as the Yodo, the Tone and the Kiso Rivers. The necessity of fundamental flood control measures was felt strongly as a result of these disasters, and this was discussed at the Diet. These years coincided with the period during which Japan was building its legal system required for a modern state. As for the Japanese Government trying to establish national institutional systems as soon as possible, the establishment of a legal system under flood control projects was a priority goal.

On the other hand, utilization was limited to irrigation use at that time; except for hydroelectric power generation which had the just begun on a modest scale. Therefore, water conflict between irrigation use and other uses had hardly ever occurred. Accordingly, at that time, **the importance of flood control was emphasized compared to that of river water use**.

2.2 Enactment of the River Law

Under such a status mentioned above, the River Law was enacted in 1896. Also, in the next year, 1897, the Sabo Law and the Forest Law were also formulated which laid the foundations for modern flood and erosion control in Japan. In other words, the River Law was established intended for the proactive development of flood control.

On the other hand, the River Law provisions regarding the use of river were simple because the importance of water use administration was not recognized seriously. Also, local governments possessed the authority to administer water utilization including the use of river water.

Water right system was established under this law introducing the permission system for river water use. Before the enactment of the River Law, there had been no concept of water right. Also, almost all of irrigation water had been utilized continuously far before Meiji Period, and such irrigation uses were regarded as permitted water use. That is to say, the concept of customary water rights was approved. The establishment of water right system was significant from the viewpoint that water use itself obtained a legal background. The establishment of that system made water allocation immobilized. As a result, frictions between new users and existing users had happened.

2.3 Increase in utilization of river water and water conflict

After the enactment of the River Law, iron and steel, machinery and other industries had developed, and especially after World War I (1914-1918), hydropower generation increased rapidly because of the significant economic growth. As for agriculture, on the contrary, the arable land readjustment program initiated in the late Meiji Period began to progress steadily, contributing greatly to land improvement projects, particularly irrigation and drainage projects. As a result, friction associated with water rights among water users such as agriculture, power generation and municipal water supply became increasingly serious.

On the other hand, in order to meet the growing water demand, the River Water Control Scheme concerning food control and water utilization focused on dams and weirs, was initiated. This scheme was stimulated by a number of factors including the TVA projects, then underwent in the United States as part of the New Deal Policy, with increasing agricultural production to meet the growing demand for food, and changing water demand, namely,

growing drinking water consumption due to contamination in urban areas. Projects under this scheme were implemented by the national and local government on the basis of the Study on River Water Control begun in 1937. The scheme, however, was discontinued shortly after World War II broke out without achieving significant results.

3. Establishment of institutional framework of water resources development after the WWII

3.1 Background

After the end of WWII, Japanese economy had recovered from the damages of WWII since 1950's. After that, heavy and chemical industry had been developed, and urban areas also had been expanded. As a result, the demand for municipal water had increased drastically, and lack of municipal water had been a bottleneck of socio-economic development. Furthermore, around 1960, severe droughts had happened in metropolitan area including Tokyo, the capital of Japan. Therefore, the urgent need for water resources development had been recognized widely in order to achieve appropriate water allocation.

In general, there are 2 types of water resources; surface water and ground water. With regard to groundwater, as the quality was generally good and not expensive to extract, groundwater had been extracted to fulfill the demand for water supply and industrial use before WWII, but ground settlement had occurred on a nationwide scale. Therefore, extraction of groundwater was restricted by legislation around 1960 from the viewpoint of prevention of ground settlement or saline contamination. Because of this restriction of ground water extraction, river water development had become public concern.

In addition, in order to develop water resources, there are 2 ways in general; one is water reallocation (with water transfer), and the other is water resources development constructing water infrastructures. Japan chose the latter measure; so water resources development with construction had played the main role in water allocation policy rather than water reallocation. Therefore, many water infrastructures including dams have been constructed, and as a result, the tight water supply conditions have been inclined to improve. Of course, reallocation has sometimes implemented through rationalization of agricultural water use, but it has played a supplementary role in allocating water resouces.

Then, what institutional tools had Japan needed in order to allocate water with water resource development? Three kinds of tools were established for that purpose around 1960. These are water right system, institutional framework to facilitate construction of dams and institutional framework of comprehensive preparation plan for water demand and supply. In the followings, these 3 types of institutional tools are introduced. In addition, the River Law was overhauled in 1964, so this overhaul is referred to.

3.2 Water right system

The River Law regulates water right system. In Japan, water right is granted by government (river administrator) through permission for river water use (Art 23, the River Law). Concretely speaking, the Ministry of Construction had had the responsibility for granting the permission in Class A rivers, and prefectural government had had the responsibility for it in Class B Rivers (This is regulated under the River Law in 1964. Please see the chapter 3.5). Therefore, government can allocate river water for water deficit sectors in granting permission for river water use. That is to say, water right system is one of the key tools to allocate water resources appropriately.

By the way, as one of the most important criteria for permission, the following conditions can be listed.

The conditions [The amount of planned water use] ≦ [Standard drought water discharge (355-day discharge)] – [Normal discharge (Discharge for vested water rights)+(Discharge for maintenance (Environmental Flow))]

"Drought Water Discharge" is **the 11th smallest amount of discharge** in a certain year. In other words, this is the amount of discharge which is sure to flow for **355 days** in a year. Also, "Standard Drought Water Discharge" is **the least "Drought Discharge" during the recent 10 years**. This condition has been required from the viewpoint that each water user can intake and use river water peacefully. In other words, this condition was come upon through the coordination between the stability of water uses and the beneficial use of water resources.

In many rivers in Japan, however, there has been little room for granting new water rights within the standard drought water discharge because the existing water uses including irrigation use were so large. In that case, it is necessary to construct dams or barrages to increase the standard drought water discharge in granting new water rights. Accordingly, water users often had to participate in construction of dams or barrages with beneficiary-payment if they want to obtain the new water right. This has contributed to the rapid water resources development with construction of water infrastructures. Also, the multi-purpose dams, which mentioned in the next chapter, have played the main role in water resources development.

3.3 Institutional framework of planning, construction and management of multi-purpose dams

From the end of WWII to 1960's, flood control was still an important issue due to frequent floods Therefore, it was necessary to construct water infrastructures satisfying both of the

necessity of flood control and water utilization. In order to coordinate the necessity of flood control and river water use, construction of multi-purpose dam started to promote.

Multi-purpose dam has the purposes of flood control and river water use including irrigation, water supply and industry. Also, the number of concerned water users is more than one. They belong to discrete sectors, and often belong to discrete prefectures. Furthermore, the site of the dams and benefited areas are often located in discrete prefecture. Therefore, there are some issues in constructing multiple-purpose dams as follows.

(1) Implementing body of construction and management

If water users themselves implement construction and management of multiple-dams, multiple users are to compose the implementing body. However users are belong to discrete sectors, and often belong to discrete prefectures, so they often have contradictory. Therefore, the coordination between the water users within the implementing body will often have run into difficulties. As a result, they cannot push ahead with the dam project. Accordingly, national government should be an implementing body of construction and management. In addition, it is necessary to establish the institutional framework to authorize national government to implement construction and management of multiple-dams. Furthermore, it is necessary to establish institutional framework to consult with multiple stakeholders.

(2) Distribution of authority among national government

A sole and definite organization should be engaged in planning, construction and management of a multi-purpose dam from the viewpoint of integrated river administration. However, the responsibilities related to each purpose usually belong to discrete government organizations. The example of Japan was as follows.

- Flood Control: Ministry of Construction (MOC)
- Development of irrigation water: Ministry of Agriculture, Forestry and Fisheries (MAFF)
- Development of industrial water: Ministry of International Trade and Industry (MITI)
- Development of water for power generation: MITI
- Development of water for water supply: Ministry of Health and Welfare (MHW)

Therefore, it is necessary to establish the institutional framework to decide the organization responsible for construction and management of dams. Furthermore, it is necessary to establish institutional framework to consult with multiple water-related agencies.

(At present, the names of some organizations were changed by the recent administrative reform in 2000. MOC was changed to the Ministry of Land, Infrastructure and Transport, MITI to the Ministry of Economic, Trade and Industry, MHW to the Ministry of Labor, Health and Welfare.)

(3) How to allocate the cost of construction

Multiple stakeholders are involved in construction of the multiple-dam, so it is one of the big issues how to allocate the cost of construction among beneficiaries including water users.

In 1952, the Electric Power Development Promotion Law was enacted to meet the growing demand for electricity. The Electric Power Development Promotion Law provides:

- A river administrator has an authority to construct water infrastructure including dams whose purpose is hydropower generation through closing contracts with electric power corporation, and
- **How to allocate the cost of construction of multi-purpose dams.** The way to allocate the cost of construction is also applied to the construction of multi-purpose dams.

Then, in 1957, the Specified Multipurpose Dam Law was enacted. The Specified Multipurpose Dam Law provided that:

- MOC was authorized to plan, construct and manage multi-purpose dams in integrated manner,
- In the preparation for basic plan of multi-purpose dams, MOC had the authority for allocating the storage capacity of a dam for water users according to their application,
- In order to finish the procedure of preparation for basic plan of dams, MOC must consult with concerned administrative authorities, concerned prefectural governors and water users, and
- Water users obtain the property right to use the multi-purpose dam.

The significance of this law is that

- The construction of multi-purpose dams have been facilitated with centralizing the authorities related to dams into MOC, which have had advanced technical capacity for construction, and
- On the other hand, stakeholders have the chance to manifest their opinions to MOC, and water users are ensured to obtain the property right for using dams.

It is one of the most important points that the authority for granting water right and the responsibility related to multi-purpose dams belong to the same government organization, MOC, with regard to Class A rivers. Accordingly, water allocation has implemented smoothly. The characteristics of water allocation in Japan are; firstly water infrastructures including multi-purpose dams are constructed to develop additional water resources, secondly government (river administrator) allocates developed water resouces through granting new water rights.

3.4 Basic Plan for Water Resources Development (Full Plan) ~ Broad-based water allocation plan in the river basin text

The legal framework of multi-purpose dam had established, but it had been inadequate in some river basins which covers water deficit metro areas including Kanto or Kansai District. In metro areas in Japan, increase in water demand had been considerable due to the explosive urbanization and industrialization. In addition, in such an area, more and more increase of population and industrialization had been predicted. Under the condition, it had been required to prepare the plans for water allocation based on mid-and-long term prediction of water demand and supply within the broad areas across multiple Prefectures and also required to develop water infrastructures in line with such broad-based plans. Also, it had been recognized that government should play a leading role in preparing plans for broad-based water resources development. The reasons why national government should play a leading role are as follows.

- Water allocation plan in water deficit metro areas is one of the most important issues from the viewpoint of national strategy.
- Water allocation plan has close relation to the ones for construction of dams, weirs and canals; so advanced technical capacity was required for the preparation plan. For that purpse, national government was the most appropriate agency.
- In a broad area, there are usually a lot of water-related stakeholders and are usually a lot of interest oppositions. Therefore, national government was the most appropriate agency which should coordinate interests of a lot of stakeholders.

On the other hand, the Specified Multi-Purpose Dam Law had defects in preparing such broad-based plans for water resources development. It is because;

- It was necessary to include the comprehensive construction plan for not only dams but also irrigation canals or pipes for municipal water within the broad-based water allocation plan, but this law was basically designed for only constructing dams, and
- If water users want to participate in a dam project within the scheme of this law, first they have to make application for MOC; therefore, national government cannot play a leading role in planning.

Accordingly, it had been recognized that it was necessary to establish a new legal framework in some river basins. In order to achieve these objectives, the Water Resources Development Promotion Law was enacted in 1962. This law provides that

- Prime Minister shall designate the specific river systems which need to take broad measures for water shortage (Article 3, the Water Resources Development Promotion Law),
- Prime Minister shall decide the Basic Plan for Water Resources Development (it is called “**Full Plan**” in Japan) in the specific river basins (Article 4, the Water Resources Development Promotion Law), and
- In order to finish the designation of the specific river systems or the preparation of this basic plan, Prime Minister must consult with the administrative authorities concerned, prefectural governors concerned and the Water Resources Development Council, and also must obtain a cabinet approval.

(At present, these prime minister's authorities were transferred to Minister of Land, Infrastructure and Transport since the administrative reform in 1999. Also, the Water Resources Development Council was reorganized into the National Land Development Council.)

The significance of the law enforcement was that;

- **Prime minister**, who occupies an apex position over other water-related ministers, had the responsibility to decide designated river systems and to prepare the Basic Plan for Water Resources Development **through the Cabinet approval**. Multiple water-related organizations usually have an interest in the broad-based water allocation plan; therefore, it was provided that prime minister had the authority for preparing this plan to facilitate the preparation of the plan.
- On the other hand, stakeholders government organizations concerned and prefectural governors) have the chance to manifest their opinions within the procedure of consultation with prime minister. Due to that, it is possible to make a good coordination between national government and stakeholders.

Under this law, 7 river systems, Tone River, Ara River, Toyogawa River, Kiso River, Yodo River, Yoshino River and Chikugo River, have been designated as "the specific river system" by now. In addition, the Water Resources Development Public Corporation (WARDEC) was established as an implementing body of the Basic Plan for Water Resources Development in 1962, in parallel with the enactment of the Water Resources Development Promotion Law. This corporation is the predecessor of Japan Water Agency (JWA).

In the 7 river systems, a lot of water infrastructures have been constructed in line with the Basic Plan for Water Resources Development and water resources development has been progressed significantly in these river systems. As a result, water scarcity has been mitigated in metro city areas.

Regarding the procedural flow, please see the attachment.

3.5 the River Law Overhauled

In 1964, the River Law was overhauled to meet the changing river administration needs shown below, which resulted from the socioeconomic progress and administrative system reforms implemented since the mid-1950s.

(a) The drastic administrative system reforms made in line with the newly established Constitution necessitated reconsideration of divided management of rivers by prefectural governors based on administrative jurisdiction.

(b) There was a growing need for a switchover from conventional section-by-section river administration to integrated administration consistent throughout river

basins in respond to the progress of river basin development accompanying socioeconomic developments and to meet the growing demand for water for various purposes.

(c) The progress of water utilization projects has necessitated the establishment of legal provisions concerning water utilization, such as adjustment between new and existing water uses.

(d) As number of large dams increased in keeping pace with the advancement of construction technology, legal provisions for the prevention of disasters associated with dam operations, etc., became necessary.

With regard to the water right system, the followings are important.

- "**One Basin, One Permitter**" principle was provided. That is to say, the permission system for water use changed from the conventional section-by-section principle to integration principle throughout river systems.

Institutional framework of water uses conciliation during droughts was provided.

4. Issues

A lot of water infrastructures including multi-purpose dams have been constructed and this development has contributed to the improvement of water allocation in Japan. However, now we are facing the issue of unstable water supply owing to the recent trend that rainfall has been on the decline by low precipitation in some years.

As long-term trend, temperature has been fluctuating in Japan, the annual average temperature has been raised by approximately 1 degree over the last 100 years. Concerning precipitation, numerous low rainfall years have been recorded since 1970 and precipitation was below average in those years 1973,1978,1984,1994 and 1996, when water shortage has been serious and brought damages. Recently a trend of fluctuation between extremely low rainfall and extremely high rainfall has been observed, and especially the trend of small precipitation in low rainfall year has been remarkable.

In Japan, dams are designed on the storage level of relatively low rainfall year (base year for water use) to meet the water requirement in most cases. When river flow falls below level of the base year for water use and dam capacity remains unchanged, the amount of water that can be obtained throughout the year, even with dam replenishment included, will fall below the level of base year for water use. Due to decline in rainfall in recent years, securing stable water supply throughout the country has been focused. On the other hand, it has been difficult to develop additional water resources with constructing new water infrastructures in Japan. As reasons of that, decrease of suitable dam sites, rise of oppositions to dam constructions from the viewpoint of environmental conservation and tight financial conditions in public sectors can

be listed. Therefore, we have to consider how to manage water resources efficiently under such a condition in the future.

5. Conclusion ~ Summary of water allocation in Japan

In main rivers in Japan, irrigation use had been so large that there had been little room for granting new water right though water demand for domestic and industrial use had increased. Therefore, it had been necessary to develop water resources urgently. For that purpose, water resource development including dams has played a main role. Furthermore, developed water resources have been allocated to granting new water rights. This two have been the key tools for water allocation. In addition, the same organization, MOC, has had the authorities both for granting water right and for planning, construction and management of dams; therefore this scheme has been well functioned.

However, it has been inadequate to implement an appropriate water allocation in some areas including water deficit metro cities. In such areas, it was necessary to prepare the broad-based water allocation plan based on mid-and-long term prediction of water demand and supply with initiative of national government. Therefore, the legal framework of the Basic Plan for Water Resources Development was established. In the sense that national government has an initiative, the way of the Basic Plan for Water Resources Development may be like a planned economy.

National government's initiative in preparing the Basic Plan for Water Resources Development was a very effective framework in order to catch up with increasing water demand. Due to that, coordination among a lot of stakeholders in broad areas has been facilitated and water resources development has been progressed significantly.

On the other hand, we are facing the issue of unstable water supply owing to the trend of smaller precipitation in low rainfall years, and in addition, it is difficult to construct new water infrastructures. Under this condition, it is the important challenges in the future how to manage limited water resources efficiently.

6. Remarks

The views expressed in this paper don't reflect the official views of any government organization including the Ministry of Land, Infrastructure and Transport (MLIT), or Japan Water Agency (JWA).

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