

# **THEME 1 GOVERNANCE**

**THEME 1-1 LEGISLATION AND  
ORGANIZATION: ESTABLISHING  
MECHANISMS TO RESPOND TO  
CHANGING NEEDS**

## **ABSTRACT**

Water resources management is implemented across multiple organizations and requires coordination of conflicts of interest among water users, upstream and downstream areas, and flood protection areas, as well as environmental conservation. It is essential to develop a legal system and organizations to execute policies and master plans for water resources management.

Japan has traditionally practiced comprehensive water resources management in the use of river water for irrigation and the mitigation of damage from floods. The Japanese River Law, which regulates river water, river areas, and river management facilities, differs from water laws of other countries. Legal systems and organizations have been established to administer water use and flood protection in a consistent manner.

During the high economic growth period in the mid-1950s through the early 1970s, the demand for domestic and industrial water use rapidly increased. Water sources, especially in metropolitan areas, could not supply enough water to meet the demand. Therefore, new water resources were required to be developed based on a wide-area coordination involving a large number of water users. Legislation and organizations were established for this purposes. As the economy matured in the 1990s, water demand began to decline, values diversified, and the water needs of the people changed. The River Law was revised to focus on the natural environment of rivers and public involvement. Furthermore, the roles of the public corporation and development plans for water resources were also revised.

The Basic Act on the Water Cycle, enacted in 2014, contributes to sustainable development and the improvement of the lives of the residents by restoring a healthy water cycle. Urbanization and changes in the natural environment during periods of high economic growth have caused an increase in the outflow of rainwater, deterioration of water quality, and lowering of the groundwater level. Comprehensive water management, including that in relation to groundwater had to be established to respond to these changes.

## CHAPTER 1 INTRODUCTION

Water resources management covers coordination of conflicts among various stakeholders and between water sources and beneficiaries, trade-offs between development and environmental conservation, and demarcation of roles and cost allocation among stakeholders. Therefore, the legal system and organizations should be established with consideration of these factors. For the past nearly 2000 years in Japan, water resources have been managed based on the legal system and other organizations.

Water resources management has faced various difficulties, such as conflicts among water users, between water sources and beneficiary areas, and between development and environmental conservation. Japan has established and improved its legal system and organizational structures to coordinate a wide range of issues into this management. It has become necessary to clarify the roles and cost allocations of stakeholders. The cost of projects related to water resources management should be borne by various stakeholders such as the national government, local governments responsible for domestic water services, companies involved in hydropower and industrial water supply projects, and agricultural parties.

River water in Japan has been utilized since ancient times. Rain mainly occurs during the flood season, and rainwater rapidly flows into the sea due to the steep terrain, so the discharge of the river decreases significantly in the non-flood season. In the course of its modernization in the late 19<sup>th</sup> century, Japan frequently experienced large-scale floods. This triggered the government to enact flood protection acts. During the high economic growth, facilities were developed to store river water during the flood season to prevent flood damage and utilize the stored water during the non-flood season to meet the rapidly increasing demand for domestic and industrial water. The legal system was developed with a focus on integrated flood protection and water utilization in a consistent manner throughout a river basin. During the transition from high economic growth to socioeconomic maturity, the values of the public also changed. The legal system was changed to conserve and improve water environment, and new laws were enacted amid these changes in society.

Water resources management is closely related to the Sustainable Development Goals (SDGs), and the relationships between legislation and organizations and the SDGs are shown in the following box.

**Relationships between Legislation and Organization and the SDGs:**



- (1) An appropriate establishment of the legal system and organizations is the basis of equitable and sustainable water resource development for each sector:  
SDG6 “Clean Water and Sanitation”
- (2) The legal system enables coordination among water users and facilitates hydropower generation:  
SDG7 “Affordable and Clean Energy”
- (3) A legal system centered on the River Law enables the integrated water management of flood protection, and ensures that water utilization and the river environment are consistent throughout a river basin:  
SDG11 “Sustainable Cities and Communities”
- (4) The legal system stipulates the roles and responsibilities for mitigation and adaptation measures in relation to climate change:  
SDG13 “Climate Action” 13.1 “Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries”
- (5) Establishment of the legal system in response to current demands would realize sustainable development while fulfilling the needs of society:  
SDG17 “Partnerships for the Goals”

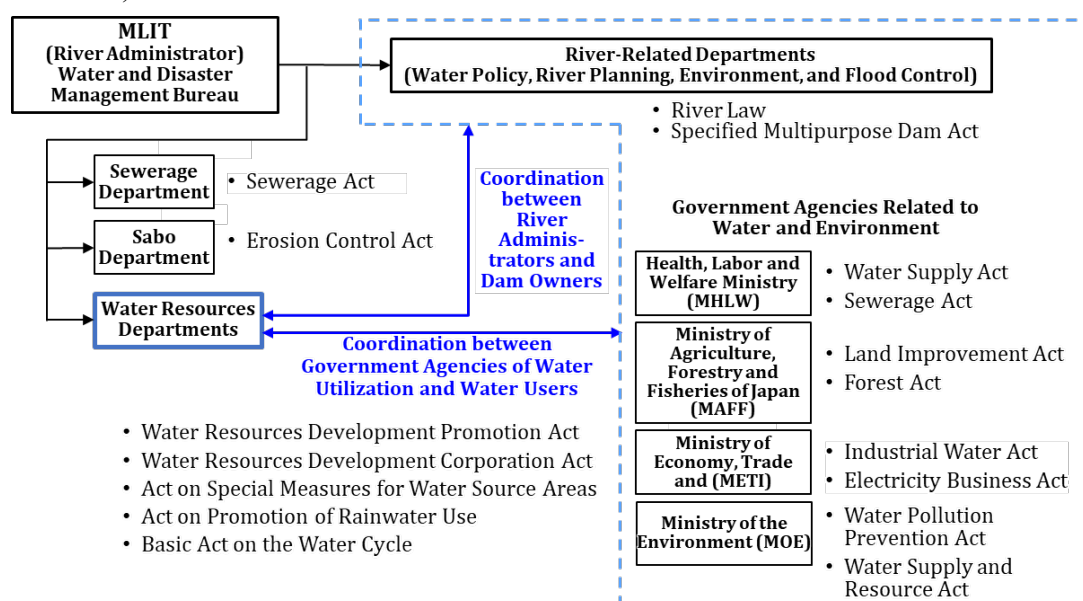
## CHAPTER 2 COORDINATION AMONG PARTIES FOR WATER RESOURCES MANAGEMENT

### 2.1 Organization for Coordination of Water Resources Management

To achieve proper water resources management, an organization must comprehensively coordinate with ministries and agencies, as well as formulate and promote fundamental plans. It is necessary to establish a legal system which stipulates the roles, authorities, and responsibilities of related ministries and departments.

#### (1) Government Organization for Water Resources Management

Flood protection and agricultural water utilization have traditionally been the main reasons for water resources management in Japan, which is located in the Asian monsoon region. During the period of modernization, as the demand for domestic and industrial water increased, the national government was required to manage water resources with a wider view of the entire basin. The Water Resources Department was established by the Economic Planning Agency of the national government in 1961. It was transferred to the National Land Agency in 1974 and to the Ministry of Land, Infrastructure, Transport, and Tourism (MLIT) in 2001. The Water Resources Department involves various entities and is responsible for coordinating relevant agencies and supervising organizations for water use and water users, including prefectural governments, as shown in Figure 2.1. The MLIT governs water resources management as the river administrator for Class A rivers, and the owner of multi-purpose dams. The MLIT centrally manages flood protection, river water utilization, and the river environment consistently throughout a river basin. It consists of regional development bureaus in each region of the country with a river management office in each basin. The river management office constantly communicates with communities to understand the local needs. (Note: Details of river administrators and the river management offices are described in Section 2.2 (3). The role of river administrators is explained in the present theme.)



Source: Prepared by Project Research Team with reference to the MLIT website.

**Figure 2.1 Entities Involved in Water Resources Development and Concerned Law and Acts**

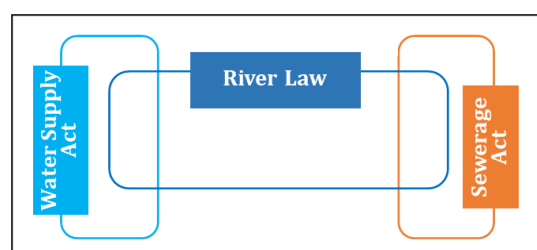
## (2) Conceptual Changes in the Legal System

In Japan, various laws have been enacted in the legal system related to water resources in response to the changing needs of society (Figure 2.2 and Tables 2.1 and 2.2). A modernized nation was established at the end of 19th century, and during this period, the rivers were improved for river navigation.

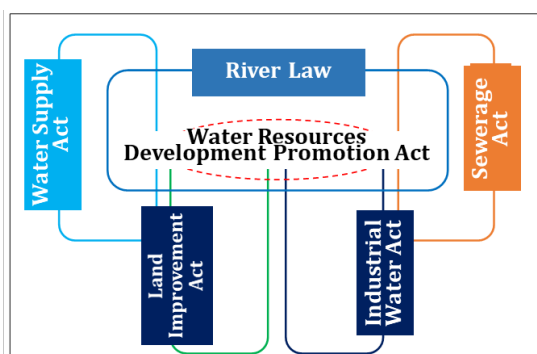
The surface water of rivers is regulated as “public water<sup>1</sup>” by River Law. As river water is the main source of water use, a legal system related to water was enacted, centered on the River Law in 1896. During modernization, flood impacts became more serious, which induced the creation of flood protection projects. The development of water supplies and sewage systems to prevent infectious diseases has shown to improve public health in urban areas. The first regulation related to water use was the Ordinance for Domestic Water Supply in 1890, which was replaced by the Water Supply Act in 1957. The Sewerage Act was enacted in 1900.

After World War II (WWII) ended in 1945, the development of irrigation and hydropower was mainly executed for the reconstruction of the country to increase food production and secure power sources. Natural disasters with greater than 1,000 dead and missing occurred almost every year, causing Japan to intensively implement flood protection and forest conservation projects, such as watershed management, erosion control, and slope conservation. The Land Improvement Act was enacted in 1949 based on the Agricultural Land Improvement Act of 1899 and the Irrigation Association Act of 1908 to restore the devastated economy after WWII and increase food production.

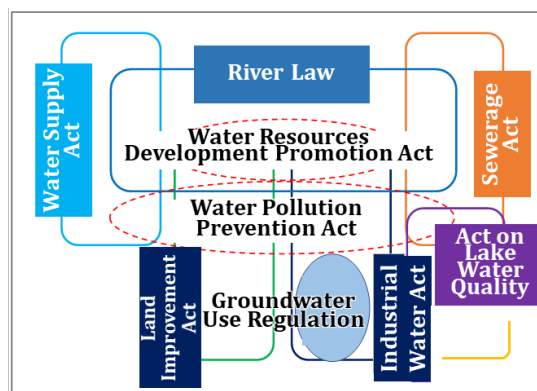
During the high economic growth, water resource development for supplying domestic and industrial water accelerated in parallel with flood protection. The Specific Multi-Purpose Dams Act, Water Resources Development Promotion Act, and Water Resources Development Corporation Act were implemented for this purpose.



**Modernization: End of 19<sup>th</sup> Century-Mid 20<sup>th</sup> Century, Flood Prevention and Public health**



**High Economic Growth: Mid 20<sup>th</sup> Century to 1970, Water Resources Development**



**Sustainable Growth :1970-Present, Environment**

Source: Modified figure of Team Water-Japan by Project Research Team

**Figure 2.2 History of the Legal System Related to Water in Japan**

<sup>1</sup> “Public water” means water for public use. The River Law mentions river water is not to be a subject of private rights.

Economic growth presented challenges in terms of pollution-related diseases, water pollution, land subsidence due to excessive extraction of groundwater, and floods in urban areas. The values of the public, such as interest in the environment, had changed and diversified. The Industrial Water Act was enacted in 1956 to conserve groundwater, prevent land subsidence, and ensure a proper supply of industrial water. (Theme 5: Urban Water Management) The majority of the sewerage system was developed after the enactment of the Sewerage Act of 1958. The Water Pollution Prevention Act was implemented in 1970, and the Act on Special Measures Concerning Conservation of Lake Water Quality was enacted in 1984 to secure the health of the public and preserve the living environment. The Basic Environment Act was enacted in 1993 as a comprehensive framework for the basic principles of environmental conservation, including pollution control and natural environment conservation, and related measures based on these principles (Theme 4: Water Pollution and Environmental Management). The Act on Special Measures for Water Source Areas was implemented to support the reestablishment of the daily lives of people affected by the construction of large-scale facilities.

**Table 2.1 Law and Acts that Contributed to Water Resources Management**

Law and Act	Contribution to Water Resources Management
<b>Old River Law (1986)</b>	The Old River Law focused on flood protection as the main issue for the role of the government.
<b>Specific Multi-Purpose Dams Act (1957)</b>	This Act stipulates the budget allocation, ownership, and responsibility of operation and maintenance of multi-purpose dam projects. It was one of the main measures for water resource development to meet the rapid increase of water demand during high economic growth.
<b>Water Resources Development Promotion Act (1961)</b>	This Act stipulates the formulation of a comprehensive water resources management plan throughout a basin, realize systematic and efficient water use in wide areas, and build large-scale water resources facilities together with water convey facilities to meet the rapid increase of water demand during high economic growth. The Act aims at identifying river basins where such a comprehensive water resource development plan is required, establishing the process to formulate the Water Resources Development Basic Plan, and stipulating the advisory role of the Water Resources Development Council.
<b>Water Resources Development Corporation Act (1961)</b>	This Act authorizes the Water Resources Development Corporation to construct and operate the water resource facilities planned in the Water Resources Development Basic Plan.
<b>River Law (renewed in 1964, (New River Law))</b>	The New River Law stipulated not only flood protection but also water rights, conciliation regarding water use, and dam construction and operation, to meet the increase in hydropower development prior to WWII and the increase in water demand after WWII.
<b>River Law (revised in 1997, (Revised River Law))</b>	The Revised River Law incorporates a mechanism to communicate the opinions of local governments and residents on the river basin to river management as well as provisions relating to the river environment.
<b>Basic Act on the Water Cycle (2014)</b>	This Act aims for the sustainable development of the economy and society as well as the stabilization and improvement of the lives of the public by maintaining and restoring a healthy water cycle.

Source: Project Research Team



**Table 2.2 Acts Regulating Water Resources Management with River Law**

Category	Related Laws
<b>Flood measures</b>	Flood Control Act, Basic Act on Disaster Management, Flood Prevention Association Act, Act on Erosion and Flood Control Emergency Measures, Flood Control Special Accounting Act
<b>Water resource utilization</b>	Water Supply Act, Industrial Water Act, Land Improvement Act, Electricity Business Act
<b>Water transportation</b>	Act on Port Regulation, Port and Harbor Act
<b>Regulations related to pollution, effluent, and environmental conservation</b>	Basic Environment Act, Water Pollution Prevention Act, Act on Special Measures Concerning Conservation of Lake Water Quality, Sewage Act, Nature Conservation Act, Natural Parks Act, Waste Management and Public Cleansing Act, Mine Safety Act
<b>Water cycle, underground water, and land subsidence</b>	Basic Act on the Water Cycle, Industrial Water Act, Act on Regulation of Groundwater Extraction for Buildings, Act on Promotion of Rainwater Use
<b>Land conservation regulations</b>	Act on Special Measures for Water Source Area, Water Supply Act, Erosion Control Act, Building Standard Act, Forest Act, Landslide Prevention Act, Act on Prevention of Disasters Caused by Steep Slope Failure
<b>Permissions for mining of riverbed material such as sand and gravel</b>	Mining Act, Quarrying Act, Gravel Gathering Act

Source: Main Report on Water Right System in People's Republic of China, 2006, JICA

## 2.2 History of the River Law and Role of River Administrators

Japan has historically focused on the utilization of surface water and flood protection in rivers as the main issues in water resources management. The River Law governs river water, river areas, and river management facilities, and differs from water laws of other countries. The law focuses on water use management, flood protection, and environmental conservation in a consistent manner throughout a river basin. River administrators play the leading roles for the planning, regulation, and coordination related to water resources management.

### (1) History of Water Use in Japan Before the Modern Age

Japan is located in the Asian monsoon region. Flood protection and irrigation have historically been the main issues in water resources management. As rice dominated major agricultural production, people simultaneously developed agricultural land and irrigation systems. The first levee recorded in history is the “Manda no Tsutsumi” on the Yodo River that was built in the 4th century. It was constructed in conjunction with the development of irrigation water and paddy fields along that river. Local governments under the centralized nation formed in the 7th century administrated the rivers, when river water was considered public property. In the 8th century, the government promoted agricultural land reclamation to increase food production for the expanded population and allowed private ownership of agricultural land and water. At the same time, Gyoki, a prominent monk, developed many large-scale water resource facilities, such as the renovated Sayama pond.

In the Warring States period (15th to early 17th century), feudal lords endeavored to increase rice production using water diverted from small and medium-sized rivers. During the Edo period (17th to 19th century), the Edo shogunate implemented new paddy field development along large rivers, such as the Tone River located in the Kanto Region. Alluvial plains were rapidly converted into paddy fields. The shogunate constructed water supply systems, such as the Kanda water supply system in 1629 that was 63 km long and the Tamagawa water supply system in 1654 that was 85 km long to supply water to Edo, where the population had rapidly increased. The shogunate operated the systems by collecting water tariffs from residents according to the width of their houses.

## (2) Implementation of River System Management

### 1) Old River Law

During the Edo period, feudal lords handled floods individually in their respective areas. At the end of this period, rivers and forests in the river basin were devastated by insufficient maintenance due to political and economic turmoil. Consequently, large-scale floods frequently occurred in the 1890s and 1990s during the Meiji period. The Old River Law was enacted in 1896 to deal with flood protection, together with the Forest Act and Erosion Control Act enacted in 1897. These are the three flood protection acts, which cover the river basins from the upstream mountainous areas to the downstream regions. Under the Old Law, while prefectural governors had the primary responsibility for flood protection based on the “section principle”, the national government implemented river works in large rivers and those that flowed through more than two prefectures, as well as river works in which the cost exceeded the financial capacity of the local government.

The Old River Law stipulated only that permission from the local government should be obtained for the occupancy of river water. The water rights of existing irrigation systems remained unchanged.

### 2) Enactment of the New River Law in 1964

From 1945 to 1960, flood disasters such as the Kathleen Typhoon and the Isewan Typhoon (Typhoon Vera) occurred. The national government promoted mid -to long-term flood protection projects by enacting the Act on Erosion and Flood Control Emergency Measures and the Flood Control Special Accounting Act in 1960.

The water resource development and supply system could not meet the rapid increase in water demand during high economic growth. Water users were dependent on groundwater utilization, and land subsidence caused by excessive extraction of groundwater became more intense. (Theme 7: Groundwater Management) Water resource development was required, but the Old River Law did not stipulate sufficient provisions regarding water development and distribution. Although the government had been interested in the development of multi-purpose dams since prior to WWII, this was hindered by the inadequate legal system, especially in terms of ownership and cost allocation. The Specific Multi-Purpose Dams Act was enacted in 1957 to promote the construction of multipurpose dams with the participation of multiple private sectors. The Water Resources Development Promotion Act promotes water resource development in designated river basins and systematic water use. The Water Resources Development Corporation Act was enacted in 1961 for the establishment of the corporation.

### (3) Roles of River Administrators

The New River Law was enacted in 1964 to: 1) abolish the “section principle” managed by the prefectural governor and to introduce the “river management for river system” by the national government, 2) add provisions for river water use, and 3) add provisions for flood protection by utilizing dam reservoirs. The New Law aims to: 1) prevent flood disasters and high tides, 2) ensure proper river water use, and 3) maintain the normal functions of the river. Normal functions include water supply maintenance, environmental conservation, and other public interests. River management includes maintaining the floodplain of rivers, operating the river management facilities, providing permission to use rivers, restricting activities that affect river function, supervising the use of rivers, imposing costs, and providing public obligations for river management.

Rivers are divided into two classes. Class A rivers are designated by the Minister of Land, Infrastructure, Transport, and Tourism and are particularly important for national land conservation and the national economy. Class B rivers include other rivers, which have an important relationship with the public interest and are designated by the prefectural governor. Rivers are required under this law to be managed by river administrators, namely the Minister of Land, Infrastructure, Transport, and Tourism and the prefectural governors for the Class A and B rivers, respectively.

The roles of river administrators are to formulate plans (Theme 2-2: River Basin Planning), river water usage permissions, land occupation, structure construction and operation rules (Theme 6: River Management), and water rights coordination (Theme 1-2: Water Rights). The river management offices (RMOs) established by the MLIT for Class A rivers and by the prefectural governors for Class B rivers perform the roles of the river administrators on the ground.

### (4) Characteristics of the River Law Compared to Water Laws of foreign Countries<sup>2</sup>

In many countries, water law forms the basis of a legal system for water management. The management of river water, river areas, and river management facilities is required for water resources management in Japan, and the related legal system consists of the River Law and various acts (Table 2.2). Throughout history, Japanese society has established a system for the utilization of river water and the prevention of water-related disasters to stabilize society. The River Law mainly covers flood protection, river water use, and the river environment. It has limited provisions regarding water quality, purification, wastewater, replenishment, groundwater, rainwater, and navigation, which are present in water laws of other countries. For example, the Italian Water Law stipulates that both surface and groundwater should be treated as public water. The Israeli Water Law covers not only surface water and groundwater but also natural water, artificial water, and wastewater as public water and a part of water resources. In Germany and France, wastewater is returned to rivers in principle; in other words, the wastewater is treated in the same way as water extracted from the river. European societies traditionally had riparian rights from the ancient Roman laws, whereby only those who own land along the river could use the river water. This

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<sup>2</sup> This section refers to “Management and Utilization of Country’s Land” (Kenji Sanbongi), “Philosophy and Status of Water Law Systems in Other Countries” (the River, November 1980), “Contribution on Modern Legal System of River of 100 years” (the River, February 1997), “Half Century of Domestic and Foreign Water related Legal System surrounding the River Law” (the River, December 2014), “Main Report on Water Right System in People’s Republic of China” (2006, JICA).

caused challenges for the government to develop an administrative system such as permissions for water use or the imposition of fees .

The riparian areas of rivers were floodplains, and river water was extracted for public use or transferred for irrigation in Japan. Therefore, Japan shifted private water rights to the public, and the government established an administrative system for water rights. River water was legally separated from the right related to the riparian land, and the water became public goods. Comprehensive basin-based water management was realized early in Japan. The Water Resources Development Promotion Act of 1961 establishes the water resources management for each river basin.

Strong opposition to administrative intervention for river management had remained in countries with traditions of riparian rights. France adopted the basin foundation system relatively early, in 1964. Italy and Spain revised the law in 1980. Germany has a traditional union system for tributaries, except for the mainstream of the Rhine. This system handles flood protection, river water use, and drainage in an integrated and autonomous manner.

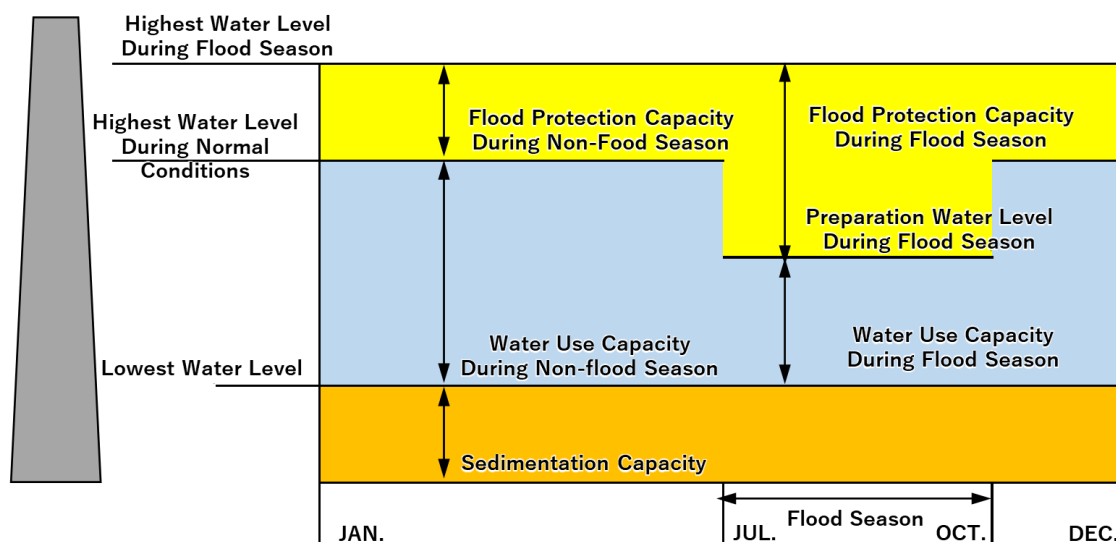
Japan has no international rivers. The national government manages large rivers that cross multiple prefectures and coordinates stakeholders for each basin. This coordination that transcends administrative boundaries can be used as a reference for international river management.

## **2.3 Water Resources Management using Multi-Purpose Dams**

A multi-purpose dam is an effective measure for water resources management. A legal system should be established to stipulate ownership of facilities, cost allocations for construction and maintenance, and demarcation for operation and maintenance of facilities.

### **(1) History of Multi-purpose Dams in Japan**

Most rainfall in Japan is concentrated during the rainy and typhoon seasons. Rainwater flows down steep rivers in a short time and frequently causes floods, while a decrease in river flow during non-flood seasons can cause droughts. The government has attempted to promote a comprehensive river development project since the 1930s to manage flood protection and river water use in an integrated manner. The project aimed to store river water during the flood season and utilize the stored water during the non-flood season (Figure 2.3). The multi-purpose dam has the multiple functions of flood protection, hydropower, irrigation, and water supply. Four multipurpose dam projects, including the Ikari Dam, were initiated in 1949 by the national government.



Source: Web site of Disaster Information for River, MLIT

**Figure 2.3 Operation of a Multipurpose Dam which Stores River Water in the Flood Season and Utilizes Stored Water in the Non-Flood Season**

## (2) The Specific Multi-Purpose Dams Act

Several multipurpose dams were constructed using a facility-sharing system in which water users jointly owned the dam. This system proved inconvenient and ineffective because: 1) the rights for stored water and facilities were not clear, 2) the responsibility and demarcation of facility operation and maintenance were not clear, and 3) the Minister of Land, Infrastructure, Transport and Tourism, as the river administrator, could not take the leading role in managing the facilities. Considerable time and effort had to be spent on obtaining consent from users for facility operation and cost allocation.

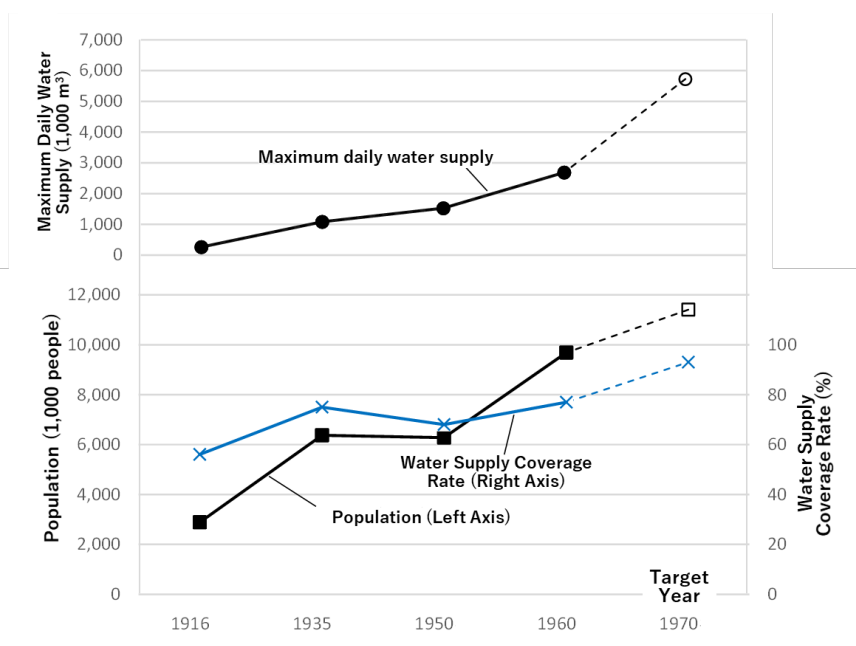
The Specific Multi-Purpose Dams Act was enacted in 1957 to facilitate the construction of multi-purpose dams by stipulating a method of cost allocation, responsibility for facility management, ownership of facilities, and rights to use the dam. The responsibilities of the construction project and the management of dams were allocated to the Minister of Land, Infrastructure, Transport, and Tourism. The Act stipulated the right to store water in the reservoir and distribute the stored water to the project participants, such as power generation companies and water supply companies, who shared in the construction costs. Ownership of the dam belonged to the Minister of Land, Infrastructure, Transport, and Tourism. The cost allocation method followed the substituting dam-justifiable cost method. (Theme 3: Finance)

## 2.4 Water Resource Development during High Economic Growth

For wide-area water resource development, inter-regional and inter-organizational coordination is essential. The establishment of a necessary legal system and implementation of counter measures for confrontation are required.

### (1) Coping with Water Shortages in Tokyo during a Period of High Economic Growth

With the high economic growth in Japan in the 1960s, the domestic water demand rapidly increased due to the population concentration and industry in urban areas, changes in the living environment such as the proliferation of flush toilets, washing machines, and sewage systems, and the development of heavy and chemical industries. The water resource development portion of the National Income Doubling Plan established by the Cabinet in 1960 intended to increase industrial water use by 3.3 times and raise the domestic water supply coverage rate from 49% to over 80% in Japan. The Tokyo Metropolitan Government planned to develop water supply facilities with a target coverage rate of 93% by 1970 (Figure 2.4).



Source: A Historical Study of Modern River Projects Leading to the Comprehensive Revision of the River Law, Saburo Yamamoto

**Figure 2.4 Amount of Water Supply in Tokyo**

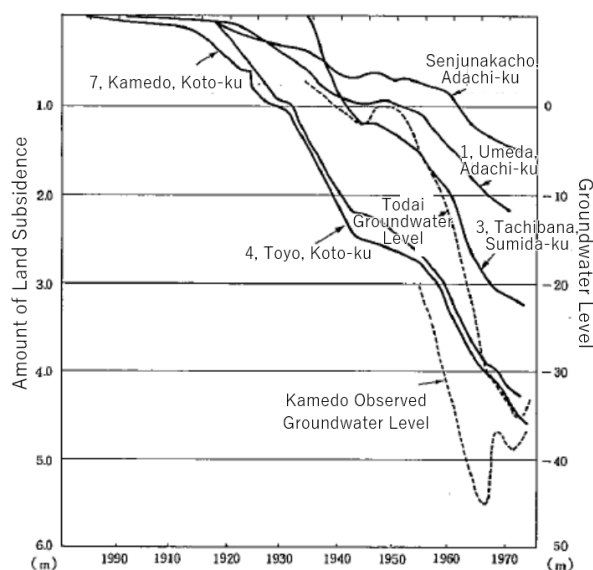
When Tokyo was preparing to host the Olympic Games in 1964, it suffered a serious water shortage known as the “Tokyo Desert”. In the 1950s, the Tokyo Metropolitan Government expanded its water supply systems from neighboring rivers, such as the Tama, Sagami, Edogawa, and Nakagawa, but it could not secure sufficient water sources. Water supply restrictions were imposed for approximately 42 months, from October 1961 to March 1965. The water storage rate of the Ogouchi Dam on the Tama River dropped to 2%, and the lives of the citizens were disrupted by the cutoff of the water supply (Figure 2.5). Land subsidence due to the excess extraction of groundwater became more serious, and regulations on extraction became tighter (Figure 2.6). (Theme 7: Groundwater Management)

One solution was the implementation of a wide-area water supply project from the Tone River, which has the largest drainage area in the country and flows through the northern part of the Tokyo metropolitan area (Figure 2.7). The Tokyo Metropolitan Government could not cover the considerable costs of the project, and coordination among users regarding cost-sharing was complicated. A large number of water resource stakeholders, such as related prefectures and water user groups, were involved in the project.



Source: Water Cycle Policy 2017, Cabinet Secretariat

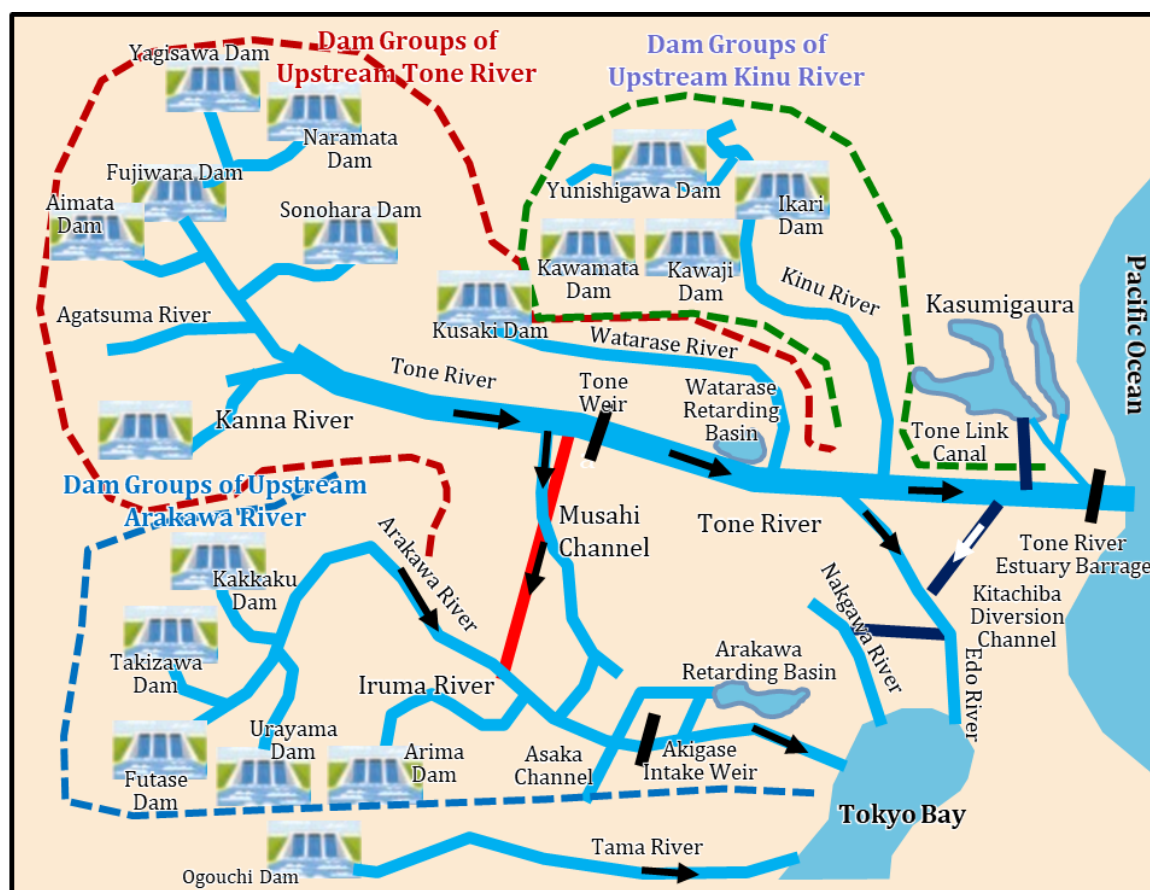
**Figure 2.5 Ogouchi Dam Reservoir During the Drought (upper) and Emergency Water Supply (lower) in 1964**



Source: A Historical Study of Modern River Projects Leading to the Comprehensive Revision of the River Law, Saburo Yamamoto

**Figure 2.6 Land Subsidence and Groundwater Levels in Tokyo**





Source: Project Research Team based on summary of the drought in 2009, MLIT

**Figure 2.7 Major Dams and Water Networks in the Tokyo Metropolitan Area Centering on the Tone and Arakawa Rivers**

## (2) The Water Resources Development Promotion Act

The Water Resources Development Promotion Act and Water Resources Development Corporation Act were implemented in 1961. These acts enabled the promotion of projects according to evidence-based plans by determining specific goals and necessary projects.

The Cabinet determines the Water Resources Development Plans, which are ranked higher than the plans of the Ministry. The plan is prepared after consulting with the heads of the relevant government agencies and receiving the opinions of the prefectural governors and the Water Resources Development Council (currently the National Land Council) (Figure 2.8). Through the fiscal investment and loan program of the government, financing for construction can be secured. (Theme 3: Finance)

The Economic Planning Agency was responsible for the two acts. The administration of water resources was transferred to the National Land Agency in 1974 and was further integrated into the MLIT in 2001. Currently, the Water Resources Department of the MLIT has jurisdiction over these two acts.

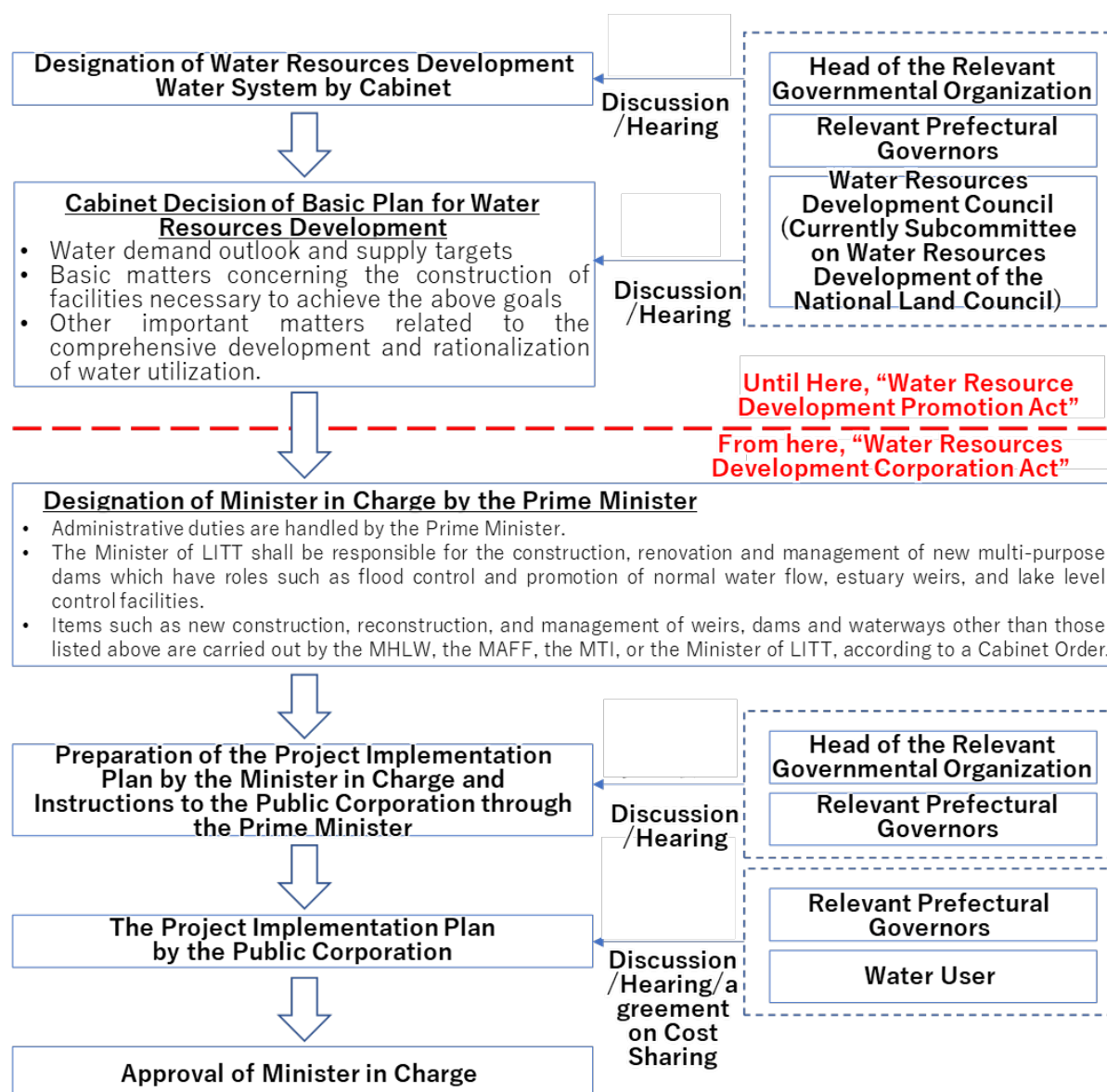
## (3) The Water Resources Development Corporation Act

The Water Resources Development Corporation was established in 1962. The Corporation has implemented projects for dams, river mouth barrages, lake water level control facilities, and water channels. It is involved with projects that cannot be handled by a single local government, such as wide-



area multipurpose main canals. To meet the rapid increase in water demand during high economic growth, it was necessary to make prior investments in water resource development. The Corporation introduced a system to execute prior investments with loans. (Theme 3: Finance, Chapter 3)

The Act stipulates the organization, operation, and government supervision of the Corporation. The procedures for the determination of the Basic Plan for Water Resources Development and implementation of projects in designated river systems, together with the Water Resources Development Corporation Act, are shown in Figure 2.8.



Source: Project Research Team based on the Water Resource Development Promotion Act and Water Resources Development Corporation Act

**Figure 2.8 Flow of Procedures for Determination of the Basic Plan for Water Resource Development and Implementation of Projects in Designated River Systems**

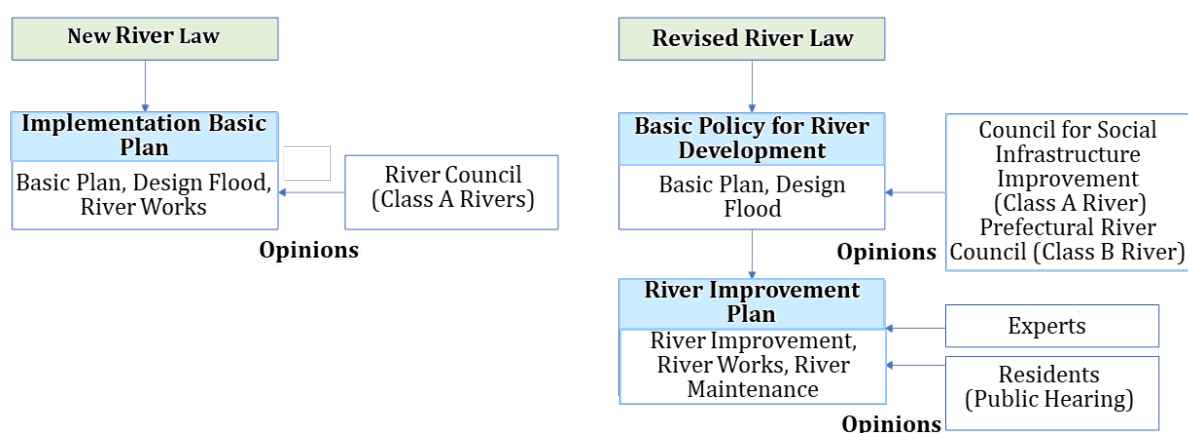
## 2.5 Response to Changing Needs

The legislation and institutional systems are required to meet changing needs as the economy matures.

### (1) Revision of the River Law for Conservation of the River Environment

After high economic growth, the required functions of the rivers change. Rivers are considered not only for flood protection and water use but also for providing waterside spaces and habitats for the growth of diverse organisms. (Theme 4: Water Pollution and Environmental Management, Chapter 5) Therefore, the Revised Law in 1997 introduced: 1) improvement and conservation of the river environment, and 2) a planning system and river improvement that reflected the opinions of local communities. The details are explained in the Theme 2-2: River Basin Planning.

Under the New River Law, a Basic Plan of Implementation of Construction Works was prepared for each river, incorporating the opinions of the River Council established by the Minister of Land, Infrastructure, Transport, and Tourism (Figure 2.9). The Revised River Law stipulates that a basic policy for river development and a river improvement plan should be formulated for each water system and should reflect the opinions of local residents and experts. This participatory approach requires accountability to the public, transparency of projects, and flexibility in the review of projects in response to changes in society. (Theme 1-3: Public Participation and Decision-Making Process)

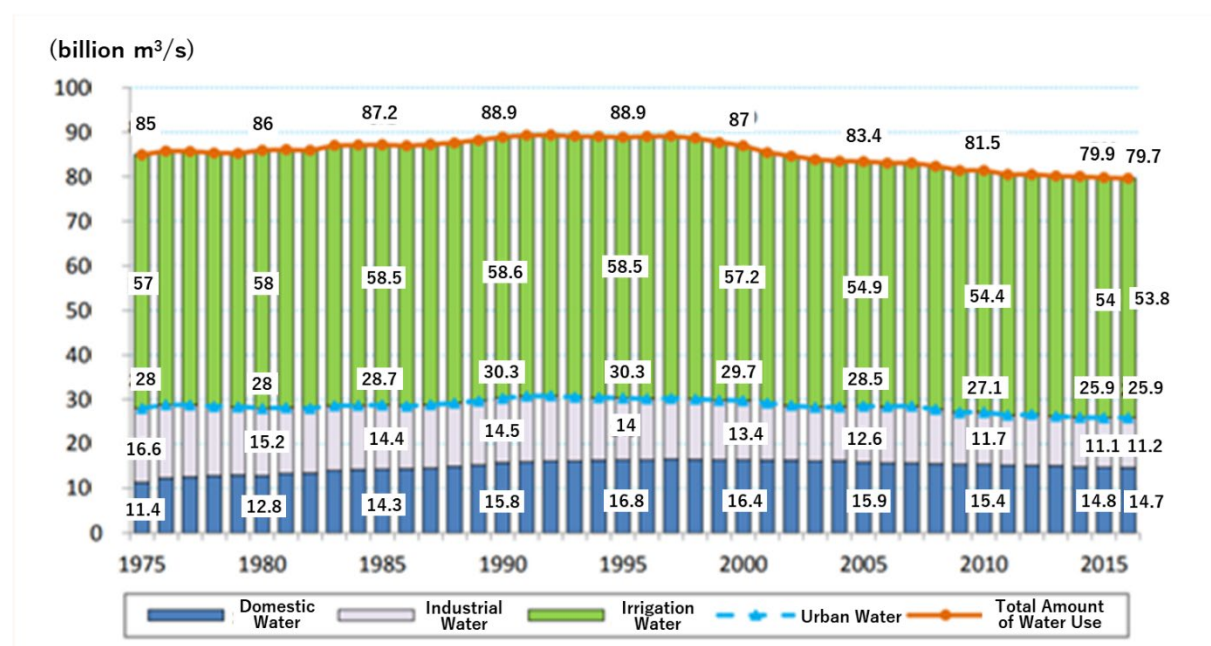


Source: Project Research Team

**Figure 2.9 Differences in River Planning Under the New River Law and Revised River Law**

### (2) Transition from the Water Resources Development Corporation to the Japan Water Agency

The increase in water demand slowed down, and domestic water demand flattened and slightly declined in the 1990s (Figure 2.10). The necessity for water resource development decreased, and the role of water resources management shifted from new development to the effective use of existing facilities. The Water Resources Development Organization Act was abolished; the Japan Water Agency Act was enacted in 2003, at which time the Japan Water Agency was established. The Agency does not implement new water resource development projects, but continues the ongoing projects of the Water Resources Development Corporation. The focus of the Agency is on securing a stable water supply and environmental preservation through the rehabilitation and management of existing facilities.



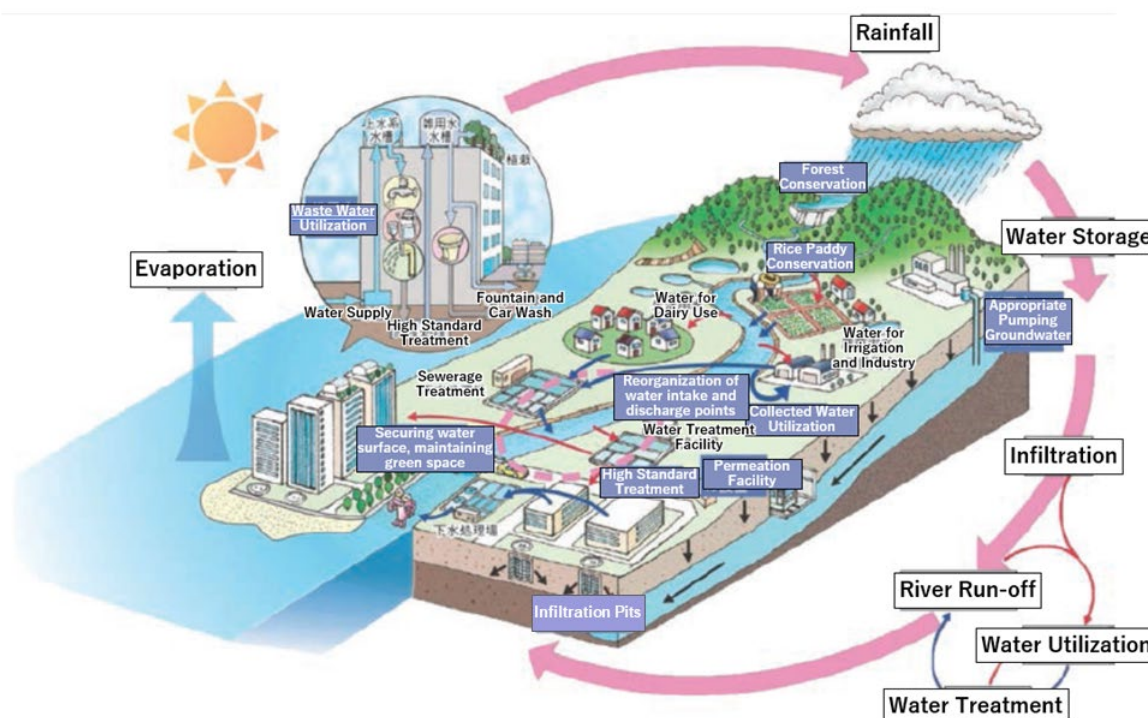
Source: Current Water Resource in Japan 2019, MLIT

**Figure 2.10 Water Use Trend in Japan**

## 2.6 Initiatives for a Healthy Water Cycle

The comprehensive management of river systems including groundwater is required to cope with the adverse effects of increasing rainwater runoff, deteriorating water quality, decreasing groundwater level and land subsidence caused by urbanization and alteration of nature. Cross-sectional efforts are required not only among the administrative divisions of forests, rivers, land use, and agriculture, but also across regions. The Basic Act on the Water Cycle was enacted in 2014 in Japan, and the Headquarters for Water Cycle Policy headed by the Prime Minister has been organized to work toward a healthy water cycle.

The “water cycle” is defined as the circulation of surface and ground water around a river basin in the course of its arrival at a sea area and its evaporation, falling, flow, or infiltration (Figure 2.11). It is necessary to maintain or restore a healthy water cycle by promoting measures in a comprehensive and integrated manner.



Source: Water Cycle White Paper 2018, Cabinet Secretariat

**Figure 2.11 Concept of the Water Cycle**

## (1) Necessity for the Comprehensive Management of River Systems

The rapid increase in population through high economic growth and industrialization, centered on the heavy and chemical industries, has caused rapid changes in land and nature. Accelerated urbanization and alteration of land use of forests, paddy fields, and reservoirs has increased the risk of floods and other disasters and worsened water quality due to the inflow of pollutants that exceeded the natural purification capacity of rivers. Many adverse effects became apparent, such as reduced groundwater recharge capacity due to the expansion of impermeable areas in the basin, reduced river flow due to short-circuiting of the water cycle system, decline of the diverse inland aquatic ecosystems and natural environment inherent in rivers, and land subsidence due to excessive extraction of groundwater.

The 3<sup>rd</sup> National Comprehensive Development Plan (NCDP), approved by the Cabinet in 1977, pointed out the necessity for comprehensive management of river systems. The 5<sup>th</sup> NCDP planned to investigate and clarify the water cycle mechanism in river basins and the comprehensive management of the water cycle system including river water and groundwater. It is necessary to organize councils for cross-sectional coordination and cooperation on multi-layered issues that are beyond the administrative divisions for water quality, erosion and flood control, sediment management, forests, farmlands, and land use. It is also necessary for the Minister of Land, Infrastructure, Transport, and Tourism and the prefectural governors to create a different framework from the existing management system in accordance with the revised River Law to overcome the issues caused by the vertically divided administration system. More details are provided in Theme 7: Groundwater Management.

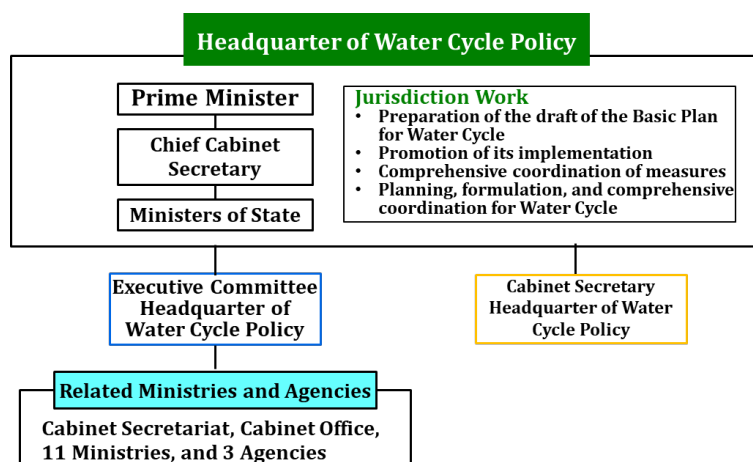
## (2) The Basic Act on the Water Cycle

The Basic Act on the Water Cycle, enacted in 2014, aims to maintain or restore a healthy water cycle and contribute to the beneficial development of the economy and society of Japan, as well as an

improvement of the lives of the users. The “Healthy Water Cycle” is defined as a state in which water functions for human activities and environmental conservation are properly maintained. The basic measures include the development of facilities for water storage, recharge of water sources and underground infiltration, and rationalization or regulation of water use.

The Headquarters for Water Cycle Policy is established in the Cabinet with the Prime Minister as the head, the Chief Cabinet Secretary and the Minister in charge of the Water Cycle Policy as deputy heads, and all other ministers as members. The government establishes the Basic Plan for the Water Cycle, including measures that are reviewed and approved by Cabinet every five years. This system has enabled related ministries and agencies to coordinate (Figure 2.12).

The Cabinet Secretariat prepared the Guide for Developing Basin Water Cycle Plans in 2015. As of 2020, 44 basin water-cycle plans have been prepared. To expand and improve the quality of the plans, various initiatives have been implemented, such as an advisory system based on good practices, the development of case studies and manuals, and the incorporation of initiatives to deal with disasters caused by climate change. These initiatives involve strengthening the national land with integrated hard and soft measures, risk management-type water supply, preparation of a drought response timeline consisting of scenarios and action plans, extending the life of water-related facilities, storing flood water using green infrastructure, and strengthening the recharge function. Examples of water cycle initiatives are described in Theme: 2-2 River Basin Planning.



Source: Project Research Team based on Headquarters for Water Cycle Policy, Cabinet Secretariat

**Figure 2.12 Relationship Between the Water Recycling Policy Headquarters and Ministries and Agencies**

### (3) Basic Plan for the Water Cycle

The government establishes the Basic Plan for the Water Cycle and reviews it approximately every five years. The first basic plan was formulated in 2015 and a new basic plan was prepared in 2020. The three main points of the new basic plan are as follows:

- 1) Aiming for Water Cycle Innovation by Basin Management<sup>3</sup>: Support the development of basin water cycle plans and visualize healthy water cycles and the effectiveness of basin management.
- 2) Realizing of Safe Society: Intensify the measures for disaster risks increased due to climate change. Promote measures to adapt to critical droughts caused by climate change. Strategically maintain and upgrade the water infrastructure. Maintain and improve the storage and recharge functions to ensure sustainable groundwater conservation and use.
- 3) Inheriting Prosperous Society Through a Healthy Water Cycle for Future Generations: Promote awareness of the water cycle through public awareness, public relations, and education. Contribute to solving global water problems and achieving the SDGs through leadership by Japan.

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<sup>3</sup> To maintain or improve human activities and water quantity and quality, and maintain the natural water environment in a basin in a proper condition, related public organizations such as national and local governments, business owners, groups, and residents work together through various initiatives.

## **CHAPTER 3 COUNTERMEASURES AGAINST CLIMATE CHANGE**

The countermeasures for climate change are implemented by stipulating the roles of national and local governments, and private sectors and citizens, and monitoring their activities through the development of a legal system in Japan.

Climate change affects various sectors and results in crop failures, weather disasters caused by heavy rains and storms, heat stroke, deterioration of water quality in lakes, and changes in fish habitats. Many sectors, including water resources, need to adapt to climate change. Mitigation efforts toward climate change by the public and private sectors and individuals are crucial.

The Act on the Promotion of Global Warming Countermeasures was enacted in 1998. It has established a framework for national and local governments, the private sector, and citizens to work together to fight global warming. National and local governments formulate action plans to curb greenhouse gas emissions and announce the status of implementation. The private sector is requested to prepare plans and publicize their implementation status for: 1) reducing greenhouse gas emissions and 2) improving products and international cooperation. The Act revised in 2013 requires that the government formulate a global warming countermeasure plan that includes targets for the control and absorption of greenhouse gas emissions, specific measures to be taken by the private sector and citizens, and measures to be taken by the national and local governments. “The realization of carbon neutrality by 2050” is positioned as the basic principle, with measures for decarbonization with local renewable energy, a mechanism for promoting digitization, and open data of private sector emissions information to achieve this goal.

The sixteenth Conference of the Parties to the United Nations Framework Convention on Climate Change (COP16) of 2010 established the “Cancun Adaptation Framework”, which includes the creation of an Adaptation Committee to strengthen adaptation measures by all ratifying countries. The Paris Agreement also includes the expansion of adaptive capacity and the strengthening of resilience as its objectives, including promoting action on adaptation and the preparation of appropriate plans. The Climate Change Adaptation Act was enacted in Japan in 2018 (Table 3.1).

The Ministry of the Environment (MOE) published the Climate Change Impact Assessment Report in 2020. The impacts of climate change are listed in Table 3.2. The specific concepts and measures to be adapted for water resources are described in Theme 2-1: Management Planning, Chapter 5, Theme 5: Urban Water Management, and Theme 8: Dam Management.



**Table 3.1 Outline of Climate Change Adaptation Act**

Items	Contents
<b>1) Promotion of Comprehensive Adaptation</b>	<ul style="list-style-type: none"> <li>Clarify the roles of the national and local governments, private sectors, and citizens for promoting adaptation to climate change.</li> <li>The national government formulates a climate change adaptation plan.</li> <li>The MOE assess the impact of climate change every five years, after hearing the opinions of the Central Environment Council.</li> </ul>
<b>2) Development of Information Platform</b>	<ul style="list-style-type: none"> <li>The National Institute for Environmental Studies collects and provides information on climate change impacts and adaptation, and provides technical assistance to local governments and regional climate change adaptation centers.</li> </ul>
<b>3) Intensifying Regional Adaptation</b>	<ul style="list-style-type: none"> <li>Prefectures and municipalities formulate regional climate change adaptation plans, taking into account climate change adaptation plans formulated by the national government.</li> <li>Prefectures and municipalities collect information on climate change impacts and adaptation and secure a center for providing information (the regional climate change adaptation center).</li> <li>Local environmental offices of the national government, prefectures, and municipalities may organize a Regional Council for Climate Change Adaptation through wide-area cooperation.</li> </ul>
<b>4) International expansion of adaptation</b>	<ul style="list-style-type: none"> <li>Promotion of international cooperation on climate change adaptation, and project activities by private sectors</li> </ul>

Source: Cabinet Decision on the Climate Change Adaptation Draft Bill, MOE



**Table 3.2 Impacts of Climate Change on the Water Resources and Disaster Departments in Japan**

Department	Evaluation	Impacts
Water Resources	Current Evaluation	<ul style="list-style-type: none"> <li>• Drought due to no rainfall or low rainfall</li> <li>• Shortage of irrigation water in early spring due to increased snowmelt during the winter, and increased demand for agricultural and domestic water</li> <li>• Saltwater intrusion into coastal aquifers and shrinking freshwater lenses in small islands</li> </ul>
	Future Prediction	<ul style="list-style-type: none"> <li>• Worsening of drought due to increase in days with no precipitation.</li> <li>• Snowfall decreases, while rainfall increases due to global warming. This results in an increase in river flow in winter and a decrease of snowmelt flow in spring. Consequently, this impacts the quantity and timing of river water utilization</li> <li>• Shortage of agricultural water due to declining groundwater levels</li> <li>• Saltwater intrusion to more upstream areas of the river due to rising sea levels and its impact on river water use</li> <li>• Increasing polarization of drought and flood risks</li> <li>• Increase in slope failure due to increased groundwater supply from rain and snowmelt</li> </ul>
Disaster	Current Evaluation	<ul style="list-style-type: none"> <li>• Upward trend in sea level and extreme high tide levels caused by expanded and strengthened typhoons</li> <li>• Large-scale complex disasters such as the occurrence of numerous deep-seated collapses, simultaneous surface collapses, and sediment and flood inundation</li> <li>• Changes in typhoon intensity and path</li> <li>• Increase in insurance payments to natural disasters</li> </ul>
	Future Prediction	<ul style="list-style-type: none"> <li>• Increase in extraordinary rainfall and flood, inundation, and damage</li> <li>• Increase in the number of people affected by inundation and damages due to inland floods</li> <li>• Rising sea level and its impact on river intake facilities, coastal disaster prevention facilities, and port and fishing port facilities</li> <li>• Increased storm surge anomalies and increased risk of storm surges due to changes in the size and path of typhoons, and loss of beaches due to rising sea levels</li> <li>• Impacts from an increase in the number of strong winds and strong typhoons and the frequency of strong tornadoes</li> </ul>

Source: Climate Change Impact Assessment Report 2020, MOE

## CHAPTER 4 LESSONS LEARNED

- (1) **Stakeholders should be coordinated by establishing a legal system.** Various stakeholders are involved in water resources management. These are the users of agricultural, domestic, and industrial water, as well as hydropower companies. It is necessary to resolve inter-sectoral conflicts regarding water use and environmental conservation, and between water sources and beneficiary areas. The River Law and related Acts aim to integrate river basin and water use management in Japan.
- (2) **Various acts should be implemented to cope with the increased water demand.** The establishment of a legal system facilitated coordination among stakeholders and enabled water resource development to cope with the rapidly increasing demand in Japan. The Specific Multi-Purpose Dams Act stipulates the roles and authorities of dam owners and users and promotes the construction of multi-purpose dams. The Water Resources Development Promotion Act and the Water Resources Corporation Act coordinate the relevant ministries, departments, and parties involved in water use, prepare of the basic plan for water resource development, and promote a comprehensive and systematic development of water resources over a wide area, including major cities.
- (3) **The legal system should be revised as needs change.** Various acts and regulations have been revised in accordance with changing needs and values in Japan. When the country stated modernization, related acts aimed at mainly flood protection and water supply. To reconstruct national lands devastated by WWII and supply urban water during the high growth, legislation was developed to generate hydroelectricity and to supply irrigation and urban water. When the economy matured, the growth in water demand ceased, and the demands for and values of rivers and water resources became more diverse. The River Law was revised in 1997 to address the needs of the river environment and include public participation. The Basic Act on the Water Cycle of 2014 promoted comprehensive measures to maintain and restore a healthy water cycle.
- (4) **The roles and measures should be clarified to respond to climate change.** The roles of national and local governments, the private sector, and citizens in climate change mitigation and adaptation measures were clarified through legislation. Japan is implementing countermeasures in collaboration with its stakeholders.