Outline of Japan, Water Resources Development Public Corporation

Water for the Future

Water Resources Development Public Corporation (WARDEC) aims to hand down a comfortable life style endowed with rich water to future generations.

Japan has much rainfall and is sometimes called the Land of Abundant Rice. It is also described as the land of "purple mountains and crystal streams," which well represents the character of Japan who cherish mountains and rivers. Throughout the history, the water resources in Japan have been developed and used mainly for agriculture.

It is true that the average annual rainfall in Japan is 1,714 mm, about twice the world average of 973 mm. Converting this amount into that per capita, however, yields a volume of 5,150 m^3/year, which is only about one-fourth the world average of 22,881 m^3/year. Furthermore, rainfall fluctuates depending on the time of the year and region, and much of it is drained out into the sea within a couple of days because of steep terrain and short river length. This is a great disadvantage in using river water as a resource. Water resources development for a stable water supply, therefore, is an important national issue.

Rapid increase of population in urban areas and modern industrial advances since the years of high economic growth have brought about drastic increase in demands for domestic and industrial water supplies. Domestic water consumption continued to increase even after the years of stable growth. In parallel with the social and economic growth and the changes in life styles, the relationship between people and water is becoming very close.

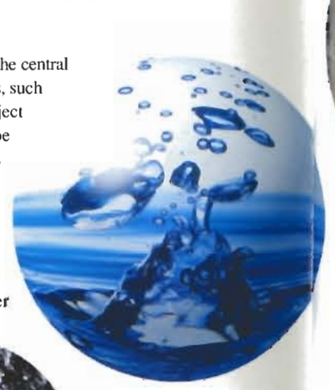
As pointed out by many experts, decreasing rainfall in recent years is destabilizing the availability of water resources. Droughts including serious ones such as the nationwide drought in 1994, occur somewhere in the country almost every year, affecting people's lives in many ways. The year 2001 was another droughty year in which drought countermeasures were taken in the Kanto, Chubu, Kansai and Shikoku regions. As the relationship between people's lives and water becomes ever more closer, the impact potential of drought on people's lives and economic activities is becoming greater than before. This is why something has to be done to ensure availability of water resources.

Water Resources Development Public Corporation (WARDEC), is the only special public corporation in Japan directly responsible for the construction and operation of facilities for water resources development. Since its inception in May 1962, WARDEC has been playing a major role in water resources development and activities to cope with water shortage, including the supplying of water to the "Tokyo Desert" from the Tone River during a serious water shortage popularly called the "Tokyo Olympic Game Drought" which occurred just after the establishment of the corporation. WARDEC has been supplying water in a dependable manner to major urban regions in Japan, including the Tokyo, Chubu and Kinki regions. The infrastructure WARDEC has built in the past 40 years has served as "lifelines" in these metropolitan areas.

In recent years, public demand has grown for safe and tasty water and scenic waterside spaces. WARDEC is also being called upon to plan carefully not only for securing the required quantity of water but also for maintaining water quality and improving waterside environments. Growing environmental concern is also making it necessary to minimize the environmental impact of water resources development projects through such measures as environmental impact assessment and monitoring.

Meanwhile, in view of the continuing economic depression and the increasingly tight financial conditions surrounding the central and local governments, the basic approaches to public works projects have been hotly debated. Strengthened measures, such as re-evaluation of projects and cost reduction, have also been taken to increase the efficiency of project implementation, and the organizational structure and functioning of special public corporations began to be subjected to strict scrutiny. Last year, reconsideration of all special public corporations including WARDEC was heatedly debated as part of the so-called structural reform.

As a result, in December last year the Japanese government adopted the Plan for Rationalization of Public Corporations, which called for redesignating WARDEC as an "independent administrative corporation." As an independent administrative corporation, WARDEC is now required to be even more autonomous, efficient and transparent than before in its operations. We would like to take this opportunity to be reborn into an organization better prepared for taking on the challenge of fulfilling our fundamental task of finding ways to supplying users with safe, high-quality water efficiently and in a dependable manner. WARDEC is working in order to cope with changing socio-economic conditions and meet changing public needs in and beyond the 21st century, often called "the century of water," and to ensure availability of water to future generations through the development and supply of precious water resources.



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Water Resources Development and WARDEC's Projects

The Role of WARDEC

Water resources development projects in Japan must be carried out comprehensively and cost-effectively based on long-term planning, since rainfall varies regionally and seasonally; areas suitable for water resources development in terms of geology and terrain are limited; and water resources development projects need to take into consideration both flood control and water utilization and require a long work period.

These features call for an organization which can implement projects (from water resources development to water conveyance) while taking into consideration the characteristics of the extensive catchment area, coordinate stakeholders, continuously procure necessary funds, and deploy competent engineers.

To meet these needs, the Water Resources Development Public Corporation (WARDEC) was established in 1962 under the Water Resources Development Promotion Law and the Water Resources Development Public Corporation Law. WARDEC has been implementing water resources development projects based on basic plans prepared for river systems in urgent need of extensive development, in order to enhance economic activities and improve the living standard of the people in Japan.

Water Use and Hydrological Cycle

The Activities of WARDEC

In accordance with the Water Resources Development Promotion Law and the Water Resources Development Public Corporation Law and based on the Water Resources Development Basic Plan ("Full Plan") designed for each of seven major river systems (Tone, Ara, Toyo, Kiso, Yodo, Yoshino, and Chugoku River Systems), WARDEC is constructing many large-scale dams, estuary barrages, water level controlling facilities for lakes and marshes, and water channels, to help promote water utilization and flood control for extensive areas. In addition, WARDEC is operating completed facilities, including the Aichi and Toyogawa Channels.

As the WARDEC's projects have diverse objectives such as the supply of domestic, industrial and agricultural water, flood control, and the maintenance and improvement of normal river functions (maintenance of the current water supply volume, river environment protection etc.), various government ministers are responsible for supervising the activities of this corporation: the assignment of management and financial accounting are under the control of Minister of Land, Infrastructure and Transport; and each project is managed by, depending on its purpose, Minister of Health, Labour and Welfare, Minister of Agriculture, Forestry and Fisheries, Minister of Economy, Trade and Industry, or Minister of Land, Infrastructure and Transport.

WARDEC's projects are carried out in accordance with the Water Resources Development Promotion Law and the Water Resources Development Public Corporation Law.

Water Resources Development Promotion Law

River systems in need of water resources development

Tone and Ara River Systems | Toyo River System | Kiso River System | Yodo River System | Yoshino River System | Chikugo River System

Water Resources Development Basic Plan ("Full Plan") for each river system

Water Resources Development Public Corporation Law

Water Resource Development Public Corporation (WARDEC)

WARDEC's activities

New construction and reconstruction of dams, estuary barrages, facilities for lakes and marshes and canals in accordance with the "Full Plan", and operation of completed structures.

Water utilization

Development and supply of domestic, industrial, and agricultural water

Flood control

- Alleviation of flood damage
- Maintenance of normal river functions of rivers (maintenance of the current water supply volume, protection of fauna and flora, maintenance of the cleanness of river water, vessel passage, prevention of chloride damage etc.)

Entrusted activities

- New construction, reconstruction, and operation of structures related to power generation
- Studies, surveys, design, tests and research for water resources development

Supervision

Ministers supervising WARDEC's activities

Minister of Land, Infrastructure and Transport
Minister of Health, Labour and Welfare
Minister of Agriculture, Forestry and Fisheries
Minister of Economy, Trade and Industry

Features of WARDEC's Projects

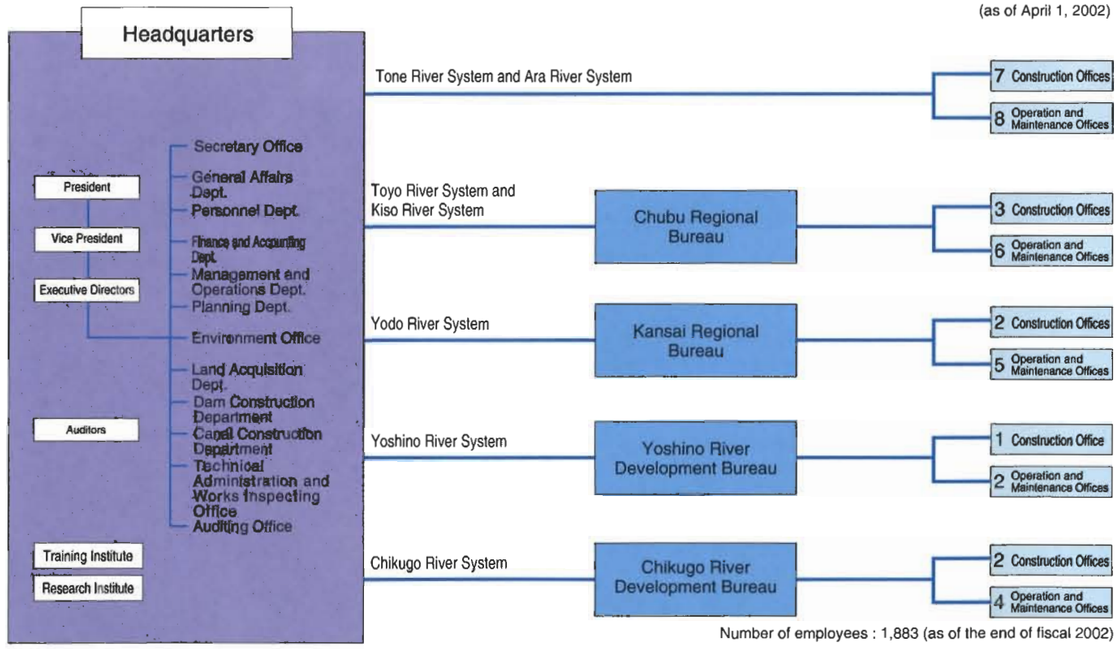
The water resources of river systems developed by WARDEC serve large areas, which cover several prefectures, and on which about half of the population and assets in Japan concentrates. These areas demand a large volume of water and have highly complicated patterns of the use of domestic, industrial, and agricultural water consumption. WARDEC has been involved in the construction and operation of a variety of facilities, from water resource structures to water conveyance structures, while coordinating with various parties including related ministries and agencies, prefectural governments, and water consumers.

WARDEC's projects, in general, are financed by loans such as the Government Investment and Loan Program, and the construction cost is repaid in stages by the beneficiaries after the completion of the projects. This scheme allows WARDEC to smoothly proceed water resources development projects which involve large capital expenditure and require long implementation periods.

WARDEC has so far developed about 90 percent of the total water resources in the seven designated river systems since its foundation. Recognizing the fact that water resources are essential for improving our life standard and socio-economic activities, WARDEC is promoting projects to develop new water resources, using its broad experiences and advanced technologies.

Organization of WARDEC

(as of April 1, 2002)



Number of employees : 1,883 (as of the end of fiscal 2002)

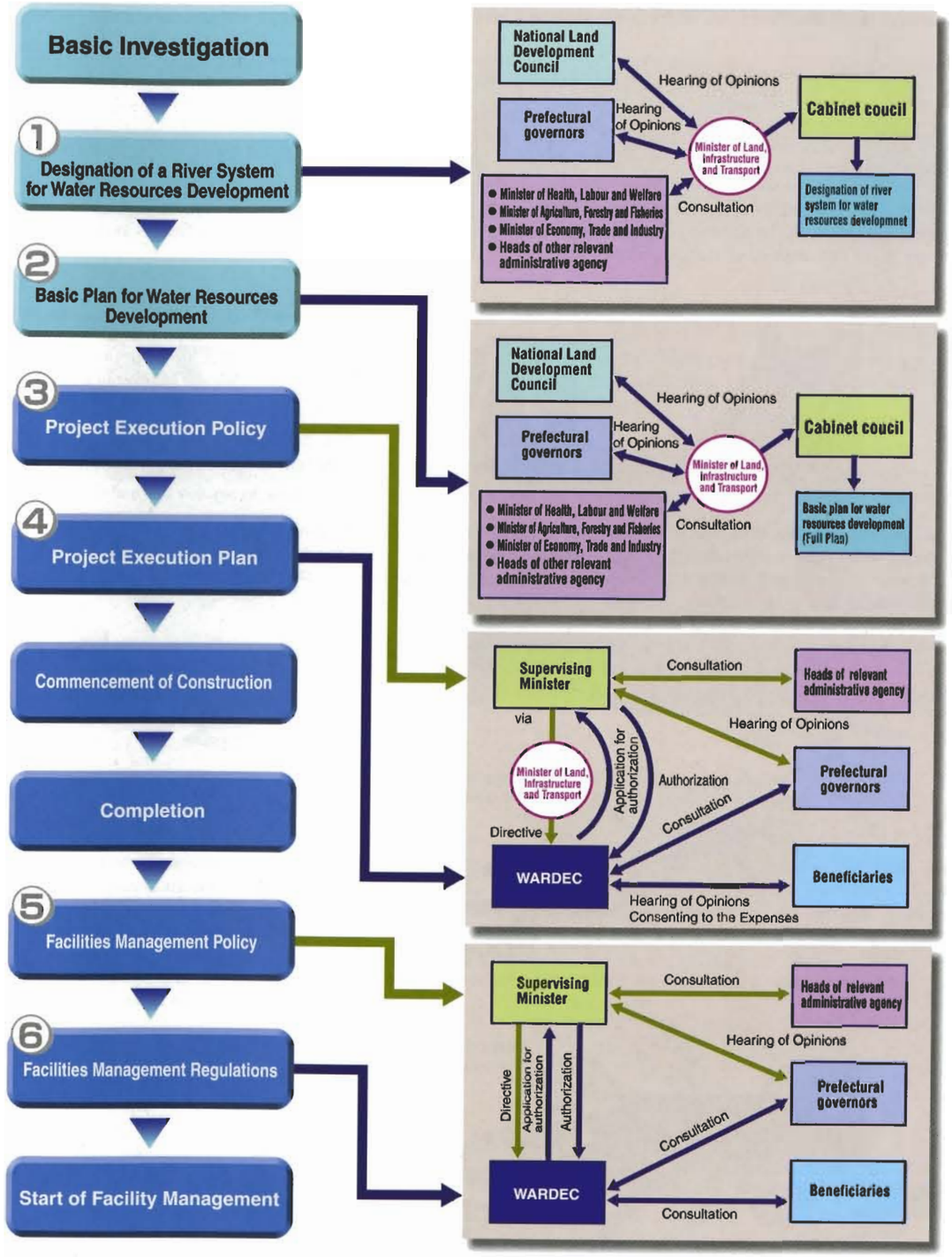
Note : Construction offices include General Project Departments, General Project Offices and Investigation Offices.

Capital Stock

¥2,621,200,000
(Entirely financed by the government)

Project Implementation Procedure

WARDEC's projects are implemented by following the legal procedures ① to ④ shown in the figure below. At each stage, WARDEC needs to reach agreement with the heads of relevant government organizations, prefectural governors and beneficiaries, on the project plan and cost sharing. The management of completed facilities starts after the legal procedures ⑤ and ⑥.



Construction and Operation of Water Resources Development Facilities

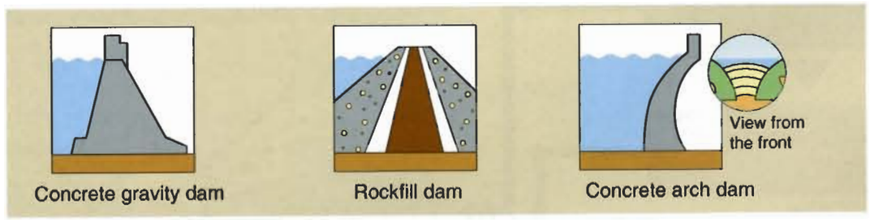
For water resources development, WARDEC has been constructing dams, estuary barrages, facilities for lakes and marshes development, canals and other various facilities.

Prior to and during the construction of these structures, surveys are conducted on various items such as natural and social environment and water quality in the areas surrounding the construction site.

After completion, these structures are centrally operated, and maintained and repaired on a regular basis, so that they can always fulfill their functions. Water quality and the status of fauna and flora around them are also regularly surveyed.

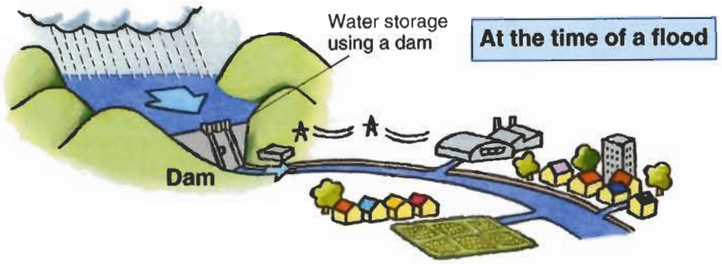
Dams

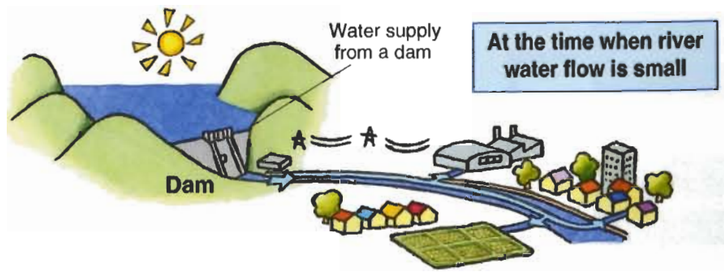
Dams are constructed to protect the downstream areas from floods, and store water consumed there for various purposes. The types of the dams to be constructed are determined taking into consideration such factors as the terrain and geology of the construction site, and cost-effectiveness.



At times of flooding, dam reservoirs store part of flood water to protect the downstream areas from damage. In order to predict water flow in rivers during floods, rainfall and river water level in the upstream areas are regularly monitored. When water is discharged from a dam, a warning notice is issued in advance, to alert people who are living, fishing, and camping in the downstream areas.

When water flow in rivers is large, part of it is stored in dam reservoirs, and when water flow in rivers is small, water is discharged from dams to meet water needs and preserve the environment along rivers. Some dams are used for hydraulic power generation by taking advantage of their large height.

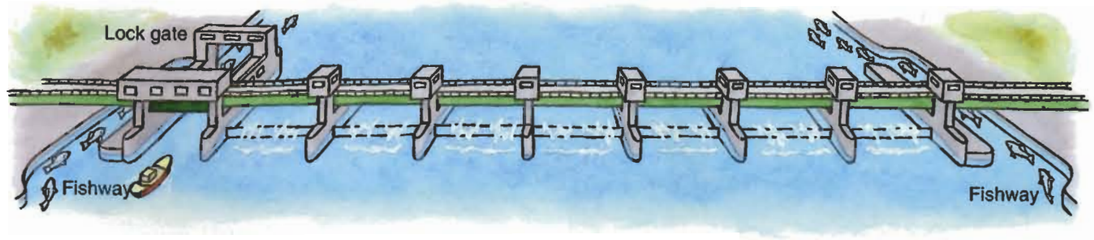




Estuary barrages

Estuary barrages are built across rivers near the estuary. By controlling their gate according to the changes of tidal level and river flow, estuary barrages prevent floods and chloride damage due to seawater run-up. They also maintain the upstream water level to allow water on the upstream side to be used effectively as a water resource, and to facilitate water intake.

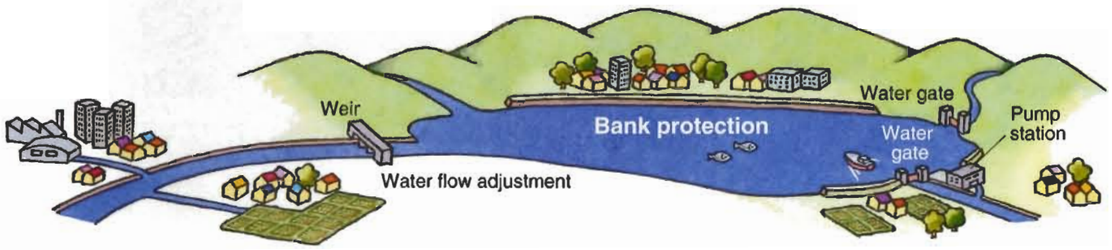
In addition, estuary barrages are fitted with lock gates for boat passage, and fishways for aquatic animal passage.



Development of lakes and marshes (facilities for lake and marsh development)

Levees, pump stations, water gates around lakes and marshes, and weirs for adjusting the river water level are constructed to prevent flood damage in areas around lakes and marshes, and downstream areas along the rivers in which water from the lakes and marshes flows, and to procure water for these areas.

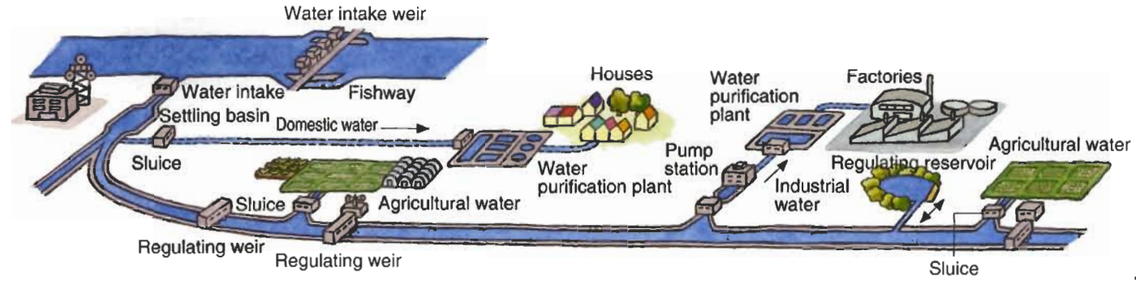
At times of flooding, pump stations, water gates and weirs are operated to alleviate damage in areas around lakes and marshes and downstream areas along the rivers in which water from the lakes and marshes flows. Lakes and marshes store water, when the volume of water entering the rivers is large, and discharge water when the waterflow in the rivers is small.



Canals

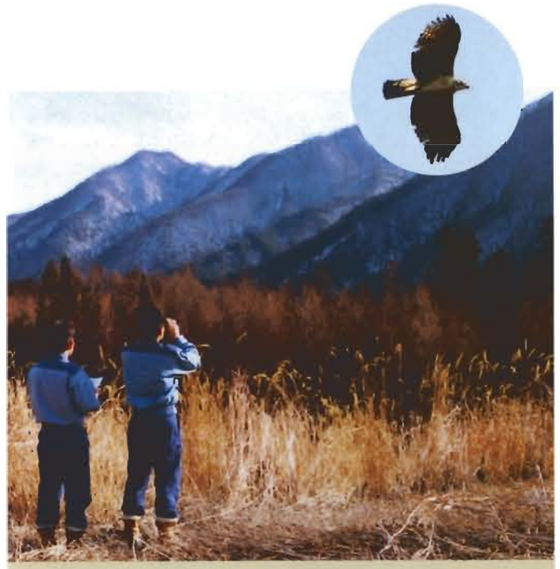
Canals and other various structures (including water intake weirs, intakes, settling basins, regulating reservoirs, pump stations and sluices) are constructed, to convey water taken from dams, rivers, lakes and marshes to water demand areas. Intake volume, water levels in canals, and water flow at sluices are regularly monitored, and the network connecting these facilities is carefully operated, in order to ensure stable supply.

Furthermore, existing facilities are modified and improved to maintain their functions and ensure safety, so that water is supplied in a stable and effective manner.



Balancing of Water Resources Development and Environment Preservation

WARDEC, through its various projects, has brought an abundance of water back to the society, and at the same time, has protected people from the threats posed by nature. In carrying out its projects, WARDEC has been conducting various activities (e.g. environmental surveys and environment protection measures) to create an environmental harmony between human and nature.



For conservation of rare birds of prey, WARDEC employees are also involved in surveys on hawk eagles and other species.

At the Tokuyama Dam, seminars by experts from academic and other sectors are held on a regularly basis, to educate and enlighten WARDEC's employees and engineers involved in the dam construction on environment preservation.

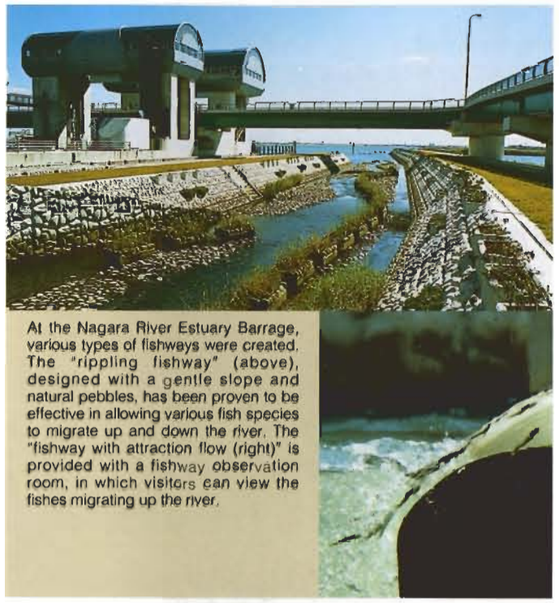
At the Kusaki Dam, planting of the former quarry's slopes was conducted. Blending with the surrounding natural environment, the Kusaki Reservoir is enjoyed by many visitors today, and has been listed in "the Best 100 Nature Preserve in Gunma Prefecture."

In the Lake Biwa Development, special care to protect reed fields was taken during the construction of lake bank levees and maintenance roads. Although part of the reed fields had to be ruined, compensation planting was carried out.

They include conservation of endangered species of raptors, provision of greenery around water facilities, restoration of reed fields to support wildlife, construction of fishways to suit various species, preservation of water quality by aeration. WARDEC also provides recreational facilities such as water parks and walkways, where people can commune with nature and rediscover their inner peace.

Other WARDEC's activities include monitoring surveys to evaluate the effects of environment preservation measures and assess the impacts of water facilities, not only during construction but also after completion.

WARDEC will continue to endeavor to promote the development and use of water resources and preserve natural environment.



At the Nagara River Estuary Barrage, various types of fishweys were created. The "rippling fishway" (above), designed with a gentle slope and natural pebbles, has been proven to be effective in allowing various fish species to migrate up and down the river. The "fishway with attraction flow (right)" is provided with a fishway observation room, in which visitors can view the fishes migrating up the river.

In the Tone Barrage Facilities Emergency Reconstruction, the ingenious shape of the barrage and the arrangement of streambeds protection allowed fish to travel upstream throughout the channels even when the water level changed during the work.

To conserve water quality, the Agigawa Dam incorporates a selective intake facility, check dams, shallow aeration facility (fountains), and many other devices.

During the reconstruction of the Minumadai Irrigation Canal (Saitama Goguchi Project - Stage II), part of it was covered to create open spaces where local municipalities created waterside parks.

Abundant water available with a twist of a tap
Water that irrigates farms and nourishes crops

That water is made available only with the understanding and cooperation of many people

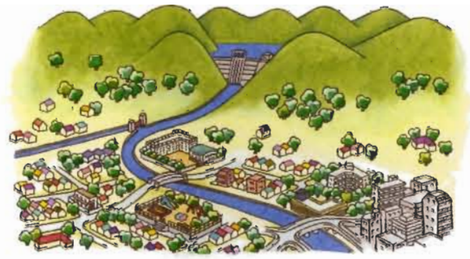
Water is always just a twist of a tap away. A bounty of water, rich grains and fresh vegetables is always available. We should not take them for granted, however. Water is available to us only because numerous people have toiled over many years to devise ways to store and supply water.

Construction of dams is one way to make effective use of water, a resource with a limited supply. It is only with the understanding and cooperation of many people, particularly of the people living in the areas where the reservoirs are located, that reservoirs can be filled and we can enjoy the abundance of water.

Construction of a dam may involve the resettlement of the people living in the area in which the reservoir is to be located. Moving to a new land and re-establishing one's life is no easy task because it may require, for example, finding a new job. In addition, dam construction not only affects the people who have to move but also may have serious consequences, both directly and indirectly, for the local community left behind, such as a reduction in the vitality of the local community left behind and a decline of the local economy.

Communication through activities related to water supply—Symposium for personal exchange between upstream and downstream areas of the Kiso River

A stone monument with the lyrics of a song "Kizuna (ties)" chiselled in it was erected at the Misogawa Dam (Nagano Prefecture) as a symbol of human exchange between people living in upstream and downstream areas.



In order to help the people who have to relocate re-establish their lives and help the reservoir community maintain vitality, all of us should know these circumstances under which water is made available to the communities downstream. All of us should know that water that enables us survive and makes life enjoyable is made available only with the cooperation of the people of reservoir communities.

Downstream communities that use water, however, are often so distant from reservoir communities that it is difficult for water users to understand the hardships that the reservoir communities are undergoing. Downstream communities should try to communicate with the reservoir communities and, in appreciation for the cooperation of the people living upstream, help them in various ways.

It is WARDEC's hope to help such interregional communication through water-related activities. WARDEC believes that closer communication and deeper mutual understanding between upstream and downstream communities will make people's lives more fulfilling and enjoyable.

Effort for Cost Reduction

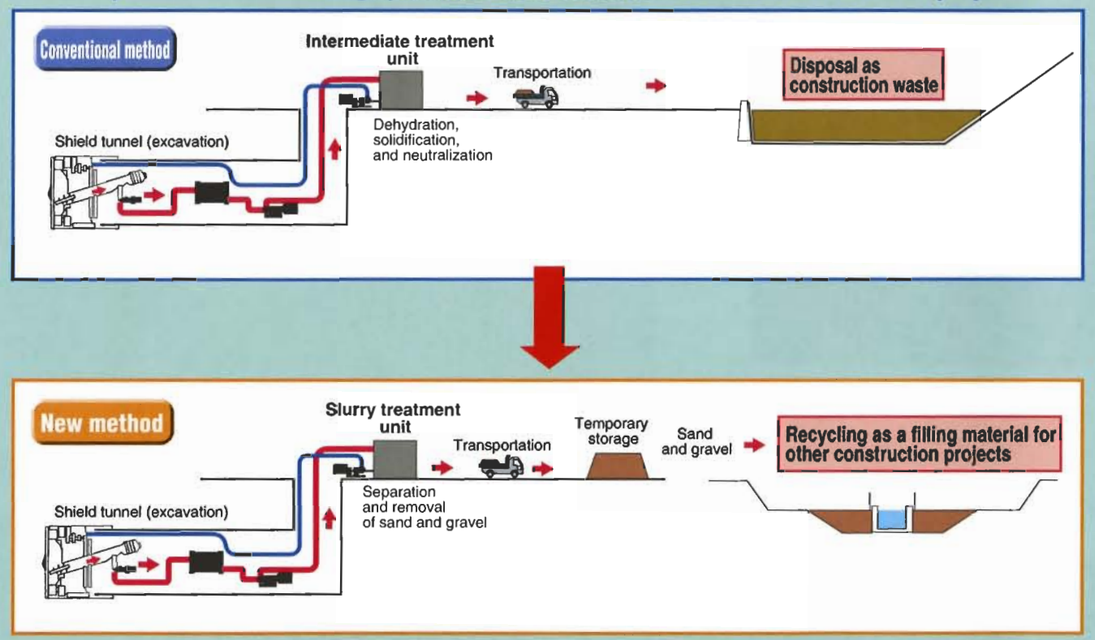
Water resource development facilities constructed and operated by WARDEC, such as dams and canals, serve as social infrastructures and play an indispensable role in maintaining and improving the standard of daily life and social activities. These structures therefore require rigorous quality control during construction and proper maintenance after completion.

On the other hand, since Japan is still under tough fiscal conditions, there have been demands for construction methods which enable structures to be constructed without compromising quality. WARDEC has been not only promoting the promulgation of existing cost reduction measures but also studying new measures.

Recycling of construction by-products

In order to reduce construction costs, WARDEC is promoting the recycling of construction by-products, such as sludge produced from construction sites, concrete wastes, and root of trees felled during dam reservoir construction.

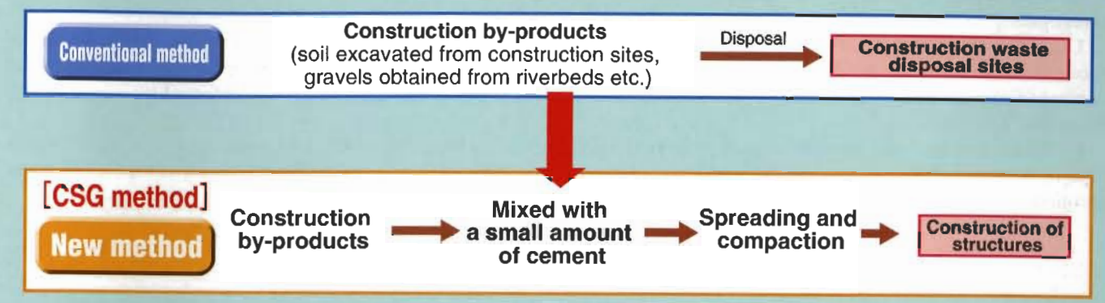
Examples of the use of sludge produced from construction sites in shield tunnel projects



- Recycling prevents excess production of construction wastes, reducing costs for their final disposal.
- Recycling allows other projects to reduce expenditures for purchasing filling material.

Effective use of resources by the CSG method

The CSG (Cemented Sand and Gravel) method constructs dam structures using a material which is produced by simply mixing construction by-products (e.g. soil excavated from dam sites and gravel obtained from riverbeds) with cement. This method has proven to be cost-effective in several projects: including the Tokuyama Dam construction, in which it was used for constructing the upstream cofferdam; and the Takizawa Dam project, in which it was used for constructing a temporary structure which served as bank protection and counter weight embankment.



- Recycling of soil excavated from construction sites helps reduce the costs for its disposal.
- The CSG method can construct structures with shorter periods and smaller coststhan conventional concrete structures.

Upstream cofferdam for the Tokuyama Dam

Counterweight embankment for the Takizawa Dam

Water Resources Development in the Seven River Systems

Status of WARDEC's Projects

Seven river systems (Tone, Ara, Toyo, Kiso, Yodo, Yoshino, and Chikugo) have been designated as river systems for water resources development, and the Basic Plan for Water Resources Development (Full Plan) is established for each to cover basic items including forecasting water demand, setting targets of water supply, and constructing the necessary facilities.

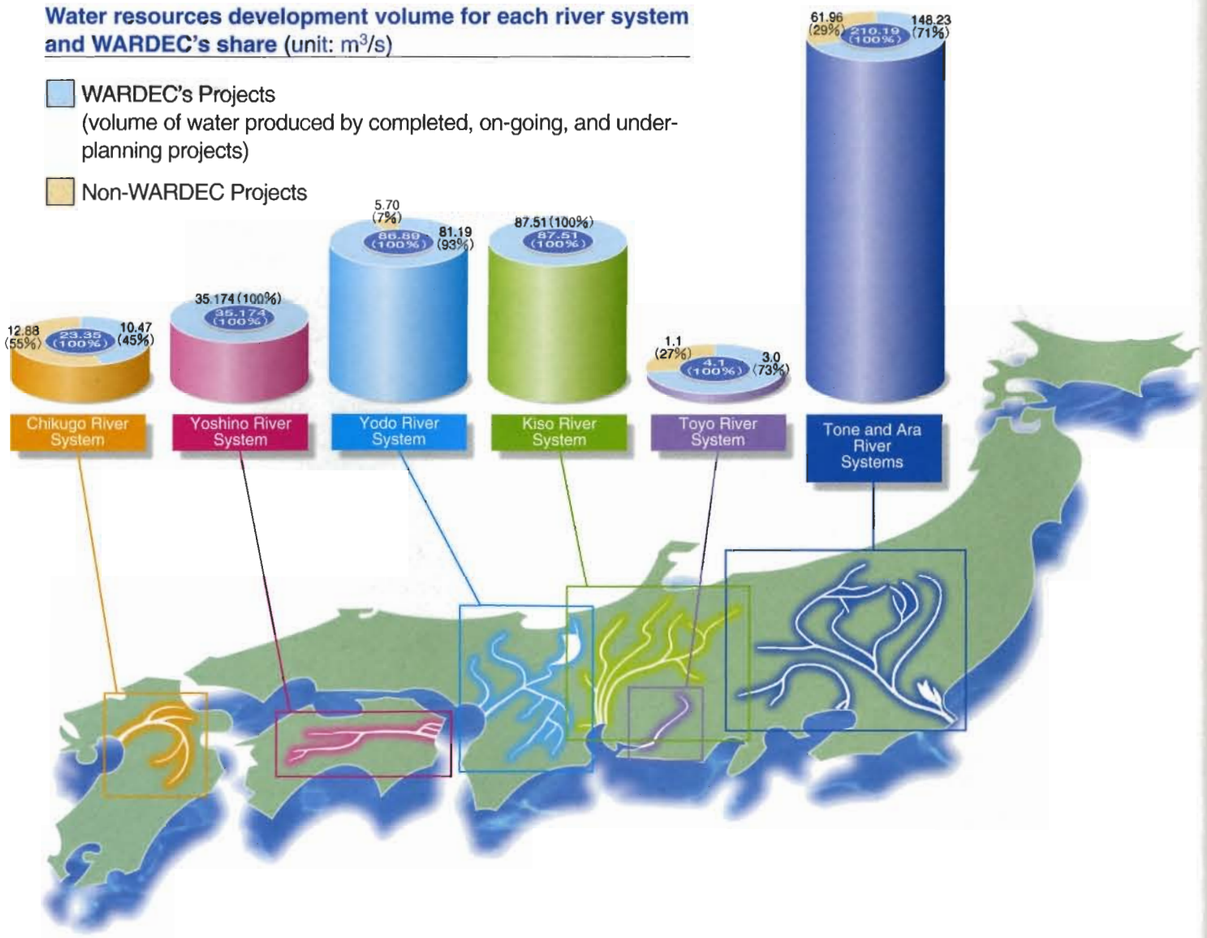
This plan covers areas of major economic and social activities. While accounting for only 16% of the national land, the areas covered by the plan are home to approximately 49% of the total population, and 47% of industrial shipments.

In these areas, WARDEC is managing 52 completed water resources development projects, and constructing or investigating 15 new projects.

Under the Basic Plan for Water Resources Development (Full Plan) for each river system, a water supply volume of about 335 m^3/s has been newly created by WARDEC's projects. This figure corresponds to about 89 percent of the total volume of about 376 m^3/s produced by all water resources developments, including those implemented by organizations other than WARDEC.

Of the total water resources development by WARDEC, municipal water accounts for a maximum of about 323 m^3/s (292 m^3/s completed), and agricultural water accounts for about 70 m^3/s, while conveyance volume of municipal water accounts for about 133 m^3/s (118 m^3/s completed) and that of agricultural water about 259 m^3/s.

Water resources development volume for each river system and WARDEC's share (unit: m^3/s)



Water Resources Development by WARDEC on Designated River Systems
(Figures as of April 2002)

(unit: m^3/s)

River System		Yield supply before the present Basic Plan	Present Basic Plan					
			Term	Target water supply	Yielded supply from authorized facilities			
					Under Construction/ Investigation	Completed	Total	Corporation's share
Tone and Ara River Systems	Developed by the Corporation	73.73	IV 1986~2000	170	12.4	62.1	74.5	61%
	Total	88.09			41.731	80.371	122.1	
Toyo River System	Developed by the Corporation	0	I ~2000	5.4	0	3.0	3.0	73%
	Total	0			1.1	3.0	4.1	
Kiso River System	Developed by the Corporation	41.71	III 1986~2000	34	12.0	33.8	45.8	100%
	Total	41.71			12.0	33.8	45.8	
Yodo River System	Developed by the Corporation	30.59	IV 1991~2000	60	4.3	46.3	50.6	91%
	Total	31.19			8.7	47.0	55.7	
Yoshino River System	Developed by the Corporation	35.174	III ~2010	—	0	0	0	100%
	Total	35.174			0	0	0	
Chikugo River System	Developed by the Corporation	7.841	III 1986~2000	17.7	2.01	0.62	2.63	17%
	Total	8.230			7.36	7.76	15.12	
Total	Developed by the Corporation	189.045			30.71	145.82	176.53	73%
	Total	204.394			70.891	171.931	242.82	

(Notes)(1) "Yielded supply before the present Basic Plan" is that obtained from the completed facilities of projects listed in the previous Basic Plans.
(2) The total is the sum of the maximum supply of domestic water, industrial water, and the average supply of agricultural water during the summer irrigation period (the average supply during the year for the Toyo river system).
(3) "Completed" includes the projects for which redemption of the Dam Construction Adjustment Loan has not been finished.
(4) Water Resources Development Basic Plan for Kiso and Yodo River Systems include the construction of structures necessary to cope with water demands arising after fiscal 2001.
(5) Water demand for municipal water in the Yoshino river system in the target year is estimated at 22 m^3/s. The goal, therefore, is to ensure that this demand will be met.
(6) Figure in the "Total" column are the simple addition of each river system.

Total Yielded and Conveyed Water of WARDEC Projects According to Use
(Figures as of April 2002)

(unit: m^3/s)

River System	Classification	Project	Yielded Water Supply			Conveyed Water		
			Municipal Water	Agricultural Water	Total	Municipal Water	Agricultural Water	Total
Tone and Ara River Systems	Completed	18	98.9	36.9	135.8	68.5	122.0	190.6
	Construction, Investigation	7	12.4	0	12.4	8.4	—	8.4
	Total	25	111.3	36.9	148.2	76.9	122.0	199.0
Toyo River System	Completed	2	1.5	1.5	3.0	1.5	1.5	3.0
	Construction, Investigation	1	—	—	—	—	—	—
	Total	3	1.5	1.5	3.0	1.5	1.5	3.0
Kiso River System	Completed	8	71.3	4.3	75.5	22.1	38.6	60.7
	Construction, Investigation	2	12.0	—	12.0	6.7	—	6.7
	Total	10	83.3	4.3	87.5	28.8	38.6	67.4
Yodo River System	Completed	10	76.4	0.5	76.9	1.6	—	1.6
	Construction, Investigation	2	4.3	—	4.3	—	—	—
	Total	12	80.7	0.5	81.2	1.6	—	1.6
Yoshino River System	Completed	7	23.6	11.6	35.2	5.7	11.3	17.0
	Construction, Investigation	1	—	—	—	—	—	—
	Total	8	23.6	11.6	35.2	5.7	11.3	17.0
Chikugo River System	Completed	5	5.3	3.1	8.5	4.1	36.1	40.2
	Construction, Investigation	2	2.0	—	2.0	—	—	—
	Total	7	7.3	3.1	10.5	4.1	36.1	40.2
Total	Completed	50	277.0	57.9	334.9	103.5	209.5	313.1
	Construction, Investigation	15	30.7	—	30.7	15.1	—	15.1
	Total	65	307.7	57.9	365.6	118.6	209.5	328.2
	Aichi and Toyogawa Canal Project (Completed)	2	15.4	12.2	27.6	14.1	49.3	63.4
	Completed	52	292.4	70.1	362.5	117.6	258.8	376.5
	Construction, Investigation	15	30.7	—	30.7	15.1	—	15.1
	Total	67	323.1	70.1	393.2	132.7	258.8	391.6

(Notes)(1) Construction, investigation = projects under construction, projects under investigation.
(2) Yielded water supply refers to maximum municipal water supply. Agricultural supply is the average water supply to agriculture during the summer irrigation period. Conveyed Water refers to the sum of the maximum municipal water supply and agricultural water supply. (Figures rounded to two decimal places in both cases.)
(3) The project number includes the Asaka Canal Reconstruction Project, Tone Barrage Facilities Emergency Reconstruction, Toyogawa Canal Facilities Emergency Reconstruction (all completed), Kisogawa Canal Facilities Emergency Reconstruction, and Kagawa Canal Facilities Emergency Reconstruction (each being under construction). Also, two projects from the Kisogawa Integrated Water Supply Project are included (Iwaya Dam and Kisogawa Canal). The table above only shows projects within the Water Resources Development Basic Plan.
(4) Purification water supply is included in the figure for municipal water supply from the Tone and Ara river systems.
(5) Since the figures are rounded to one decimal place, there are cases where the totals do not perfectly match the fractional figures.

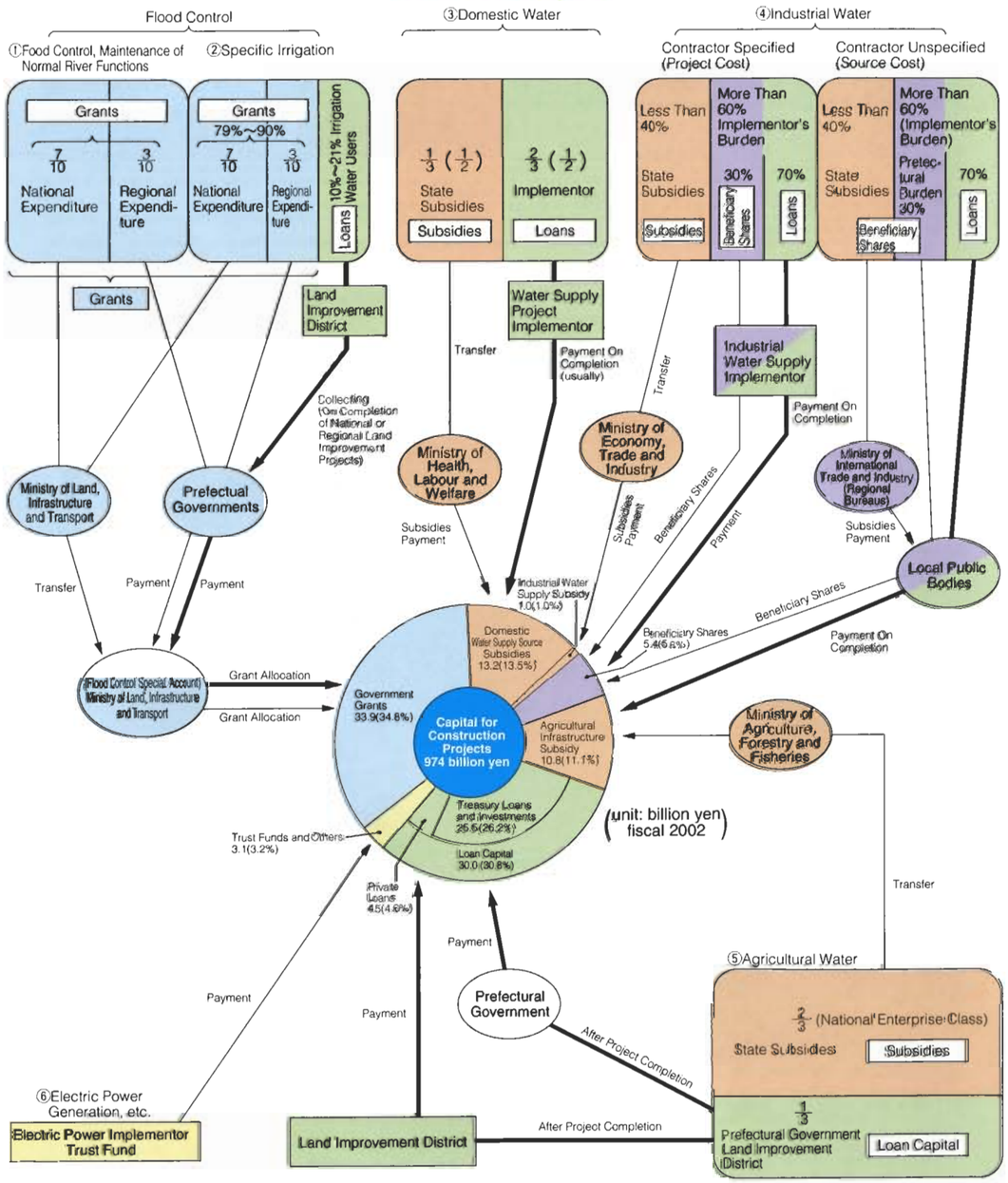
WARDEC's Budget

Funding Structure of Construction and Management Projects

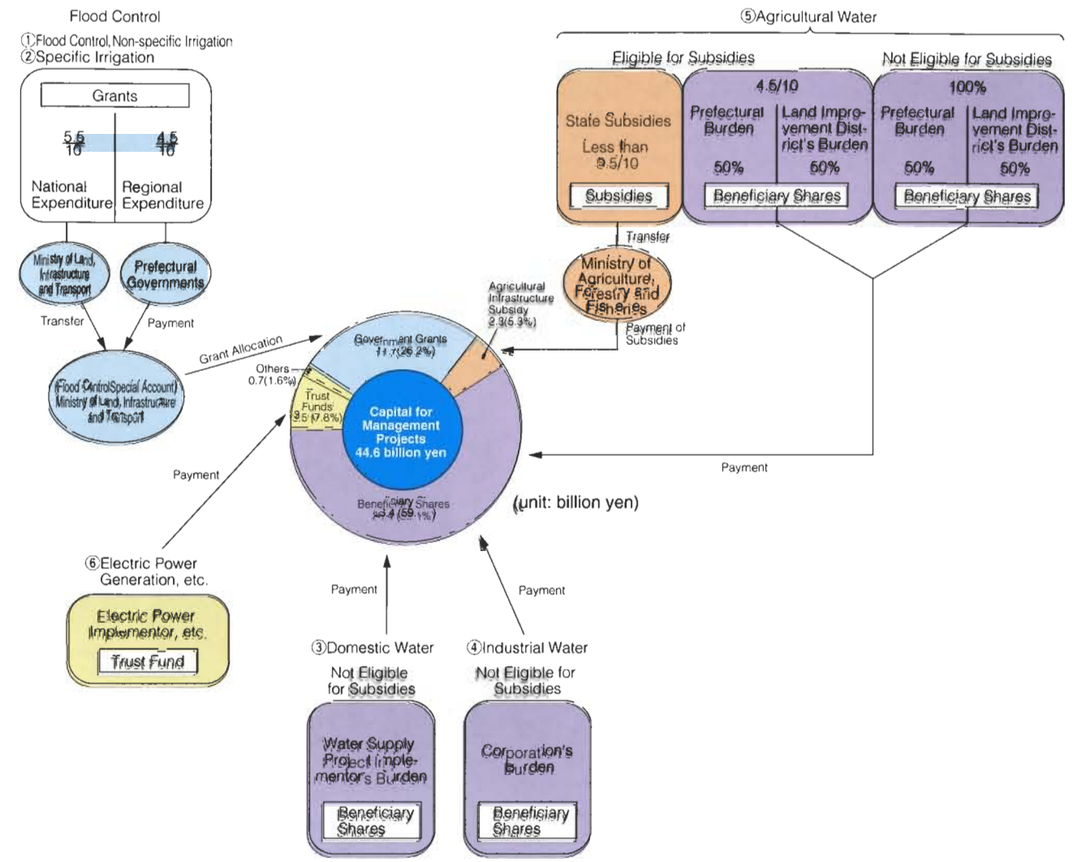
Project funding comes from government grants for flood control, from state subsidies for agricultural irrigation, domestic water supply and industrial water supply, and from revenues from water users as well as loan capital.

Flow of Project Costs

Construction Projects



Management Activities



○Government Grants

Expenses for flood control and storm surge protection works, and maintenance /improvement of normal river functions are provided by government grants (Ministry of Land, Infrastructure and Transport).

○Subsidies

National subsidies are provided by various ministries (Ministry of Agriculture, Forestry and Fisheries, Ministry of Health, Labour and Welfare and Ministry of Economy, Trade and Industry), in order to reduce the costs born by land improvement districts, and industrial and domestic water suppliers.

●Beneficiary Shares

These shares include the costs received during construction, installment expenses paid back after project completion, and the costs for management.

○Loan Capital

In order to enable beneficiaries to pay the installment expenses after completion, WARDEC receives government funds (Government Loan and Investment) in the form of a long-term loan, and issues Water Resources Development Bond (bond issued by organizations financed by the Government Load and Investment) as a continuation of the program started in fiscal 2001.

Also, from 1984, the Land Prepurchase Loan and from 1985, the Dam Construction Adjustment Loan were created to obtain the funding of private banks to help facilitate projects.

○Trust Funds and Trust Revenues

The Corporation obtains trust funding from respetive implementors for construction, survey, and other projects related to hydropower plants and roads.

History of WARDEC

Nov. 1961	・Water Resources Development Promotion Law was promulgated and put in force. ・Water Resources Development Public Corporation Law was promulgated (put in force in February 1962).
May 1962	・Water Resources Development Public Corporation (WARDEC) was founded (Tokyo headquarters and Osaka branch established).
Oct. 1968	Aichi Irrigation Public Corporation was integrated with WARDEC (Chubu branch established).
Dec. 2001	Plan for Rationalization of Public Corporations was approved by the Cabinet. WARDEC was designated as an independent administrative corporation.

Oct. 1962	Comprehensive National Development Plan was approved by the Cabinet.
May 1969	New Comprehensive National Development Plan was approved by the Cabinet.
Nov. 1977	The Third Comprehensive National Development Plan was approved by the Cabinet.
Jun. 1987	The Fourth Comprehensive National Development Plan was approved by the Cabinet.
Oct.	National Integrated Water Resources Development Plan (Water Plan 2000) was drawn up by the National Land Agency.
Mar. 1998	The Grand Design for National Development in the 21st Century (The Fifth Comprehensive National Development Plan) was approved by the Cabinet.
Jun. 1999	National Comprehensive Water Resources Plan (Water Plan 21) was drawn up by the National Land Agency.

The Tone River System and The Ara River System

The Tone River, dubbed "Bando-Taro (naughty guy in the Kanto Region)," is one of the largest rivers in Japan. Originating from Mt. Oo-Minakami located on the border between Gunma and Niigata Prefectures, this river flows through the Kanto Plain while gathering water from many tributaries such as the Katashina, Agatsuma, Karasu, Kanna, Watarase, and Kinu Rivers, separates at Sekiyado from the Edo River which empties into the Tokyo Bay, and then pours into the Pacific. With the largest catchment area in Japan of 16,840 km^2, the Tone River flows through the Tokyo Metropolitan Area and five prefectures: Ibaraki, Tochigi, Gunma, Saitama, and Chiba. The average annual rainfall in the area upstream of Kurihashi amounts to 1,360 mm.

Since a long time ago, this large river has provided abundant water and fertile soil, but at the same time has caused major disasters including floods. A series of serious water shortages called "Tokyo Olympic Game Drought," which occurred between 1961 and 1964, gave a great impact on water resources development policies in the following years in Japan.

The Ara River rises in Mt. Kobushigadake which is located near the borders of Saitama, Yamanashi, and Nagano Prefectures, runs through major cities in Saitama and Tokyo, both of which are located in the southern Kanto Plain, and terminates in the Tokyo Bay. It has a catchment area of 2,940 km^2, and the average annual rainfall in the area upstream of the Akigase Barrage is 1,358 mm.

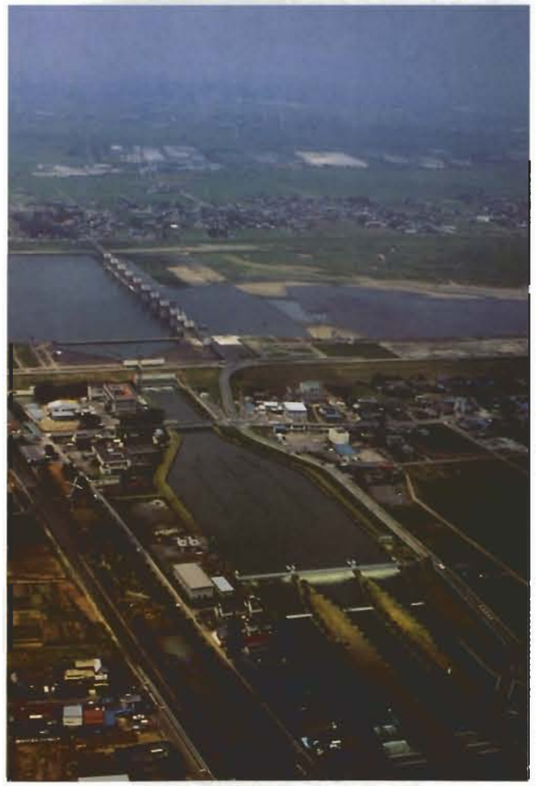
The combined catchment area of the Tone and Ara River Systems is 19,780 km^2, accounting for 66% of the total area of Tokyo and five prefectures in the Kanto Region. Since the catchment area covered by both river systems is the political, economic and cultural hub of Japan, the flood control and water supply in this area is significantly important.

In the Tokyo metropolitan area, rainfall has been decreasing in recent years, beginning to threaten the availability of water through frequent water shortages. Although the region is getting out of a water crisis situation in which water supply capacity is unable to catch up with increasing water demand, water demand is still on the increase. Under these circumstances, it is important to improve facilities for water resources development systematically in order to supply water in a more dependable manner.

Many projects for the construction and improvement of facilities for water resources development have already been completed with the understanding and cooperation of the people concerned. In order to keep these facilities fully functional, it is important to maintain and manage them properly. It is also important to modify and replace facilities systematically and in a timely manner, if necessary, to ensure availability of water.

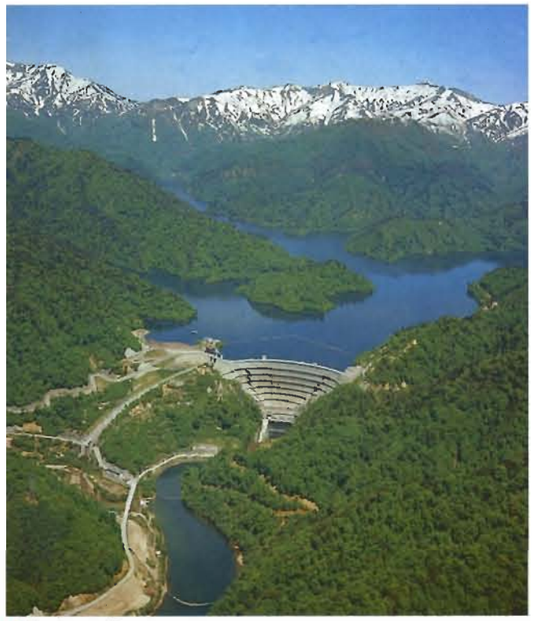
So far, WARDEC has completed 18 projects for the two river systems. In addition to the management of these projects, WARDEC is implementing six other projects including the Takizawa Dam and the Boso Canal.

● Completed ● Under construction/Investigation



● Tone Canal (Tone Barrage)

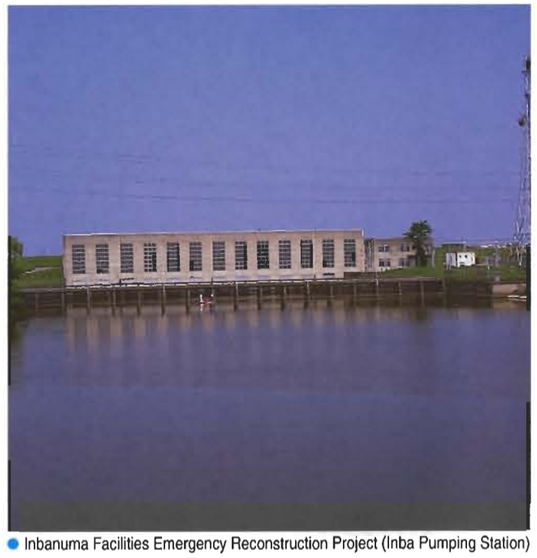
● Naramata Dam



● Yagisawa Dam

● Shimokubo Dam

● Hokusotobu Canal (Intake structure)



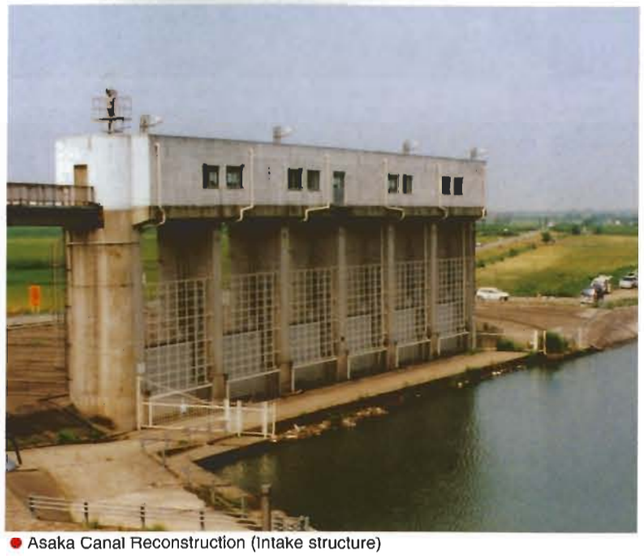
● Inbanuma Facilities Emergency Reconstruction Project (Inba Pumping Station)

● Gunma Canal (the Tone River Aqueduct Bridge)

● Tonegawa Estuary Barrage

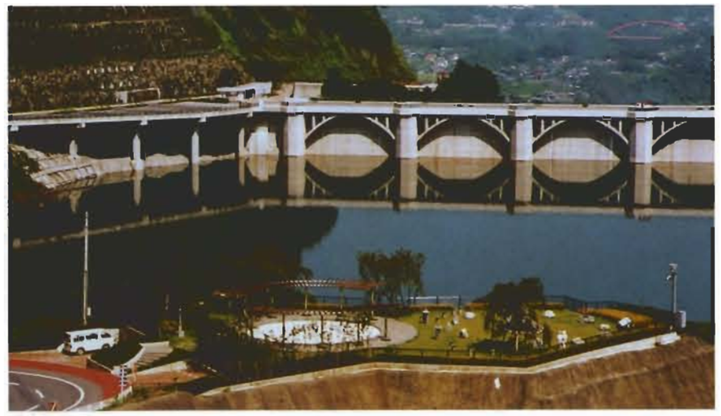
● Kusaki Dam

● Narita Canal (Intake structure)



● Asaka Canal Reconstruction (Intake structure)

● Toso canal (Iioka Surge Tank)



● Urayama Dam

● Kasumigaura Lake Development

● Kasumigaura Canal (Kokaigawa Aqueduct Bridge)

● Akigase Intake Weir

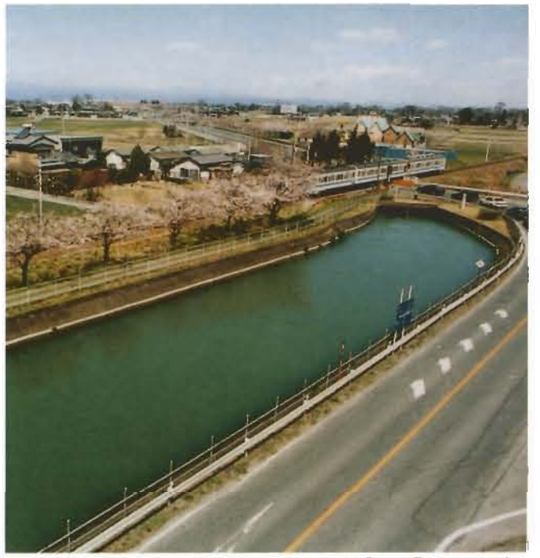
● Saitama Goguchi Stage II (Suedasuga Barrage)

● Tone Chuo Canal (Saitama Canal)

● Boso Canal (Togane Dam)

● Takizawa Dam (Dam Site)

● Tokura Dam (Dam Site)



● Musashi Canal Reconstruction

● Kuribaragawa Dam (Dam site)

● Omoigawa Development (Nanma Dam Site)

The Kiso River System and The Toyo River System

The Kiso, Nagara, and Ibi Rivers, originating at different locations distant from each other, reach the Nobi Plain where they join almost at the same location and flow into the Ise Bay. For this reason, they are called "Kiso-Sansen (three major rivers in the Kiso region)."

In the past, these rivers turbulently flowed through the Nobi Plain as one river and frequently caused serious damage. In the Meiji Period, river improvement projects were carried out to create the current three rivers. The total catchment area of these rivers is 9,100 km^2 which accounts for 26% of the four prefectures containing the basins. The average annual rainfall in the area covered by these three rivers varies from place to place: 2,132 mm at the Makio Dam located upstream of the Kiso River; 2,005 mm at Chusetsu in the catchment area of the Nagara River; and 3,049 mm at Fujihashi located upstream of the Ibi River.

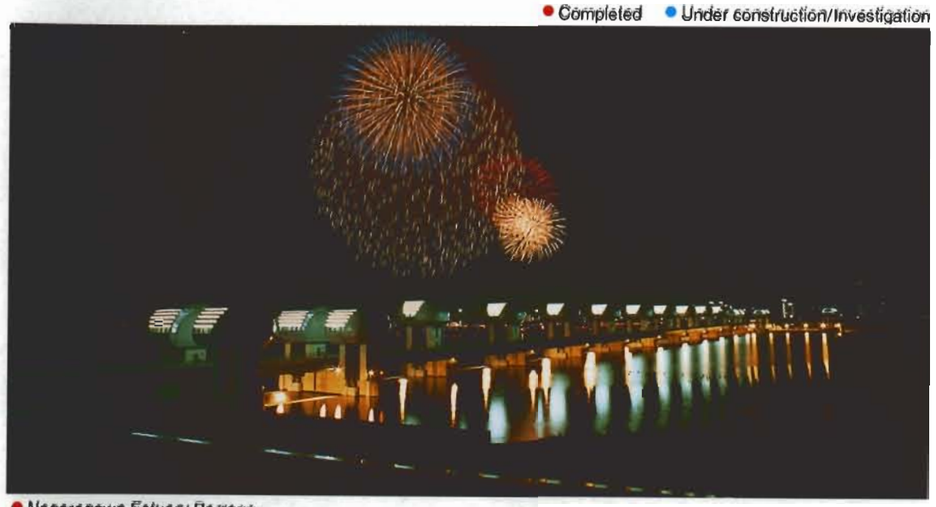
The Toyo River, which runs through the Eastern Mikawa Region before reaching the Mikawa Bay, has a catchment area of 724 km^2. The average annual rainfall at Kawai is 2,400 mm.

In the Chubu region, rainfall has been decreasing in recent years, beginning to threaten the availability of water through frequent water shortages. Although the region is getting out of a water crisis situation in which water supply capacity is unable to catch up with increasing water demand, water demand is still on the increase. Under these circumstances, it is important to improve facilities for water resources development systematically in order to supply water in a more dependable manner.

Many projects for the construction and improvement of facilities for water resources development have already been completed with the understanding and cooperation of the people concerned. In order to keep these facilities fully functional, it is important to maintain and manage them properly. It is also important to modify and replace facilities systematically and in a timely manner, if necessary, to ensure availability of water.

For the two river systems, WARDEC completed 10 projects and is currently managing 12 sites including the Aichi and Toyogawa Canals. Ongoing projects include the Tokuyama Dam Project and Aichi Canal Project Stage II in the Kiso River System, and Toyogawa Canal Project Stage II (replacement of the aging main canals) in the Toyo River System.

● Completed ● Under construction/Investigation



● Nagaragawa Estuary Barrage

● Nagara Canal (Intake structure)

● Misogawa Dam

● Agigawa Dam

● Mie Canal (Nakazato Dam)

● Iwaya Dam

● Tokuyama Dam (viewed from the upstream side)

● Aichi Canal Stage II (main canal)

● Aichi Canal Stage II (Makio Dam)

● Kisogawa Canal (Kisogawa Barrage)

● Toyogawa Comprehensive Canal (Onshima Dam) (Photographed by SS Nagoya)

● Toyogawa Canal Stage II

The Yodo River System

Originating from Lake Biwa, the largest lake in Japan, the Yodo River gathers water from many tributaries such as the Uji, Katsura, and Kizu Rivers and empties into the Osaka Bay. The 8,240 km^2 catchment area includes many large cities such as Kyoto and Osaka, and covers 29% of six prefectures: Mie, Shiga, Kyoto, Osaka, Hyogo, and Nara. The average annual rainfall of this catchment area is 1,806 mm.

In the Kinki region, rainfall has been decreasing in recent years, beginning to threaten the availability of water through frequent water shortages. Although the region is getting out of a water crisis situation in which water supply capacity is unable to catch up with increasing water demand, water demand is still on the increase. Under these circumstances, it is important to improve facilities for water resources development systematically in order to supply water in a more dependable manner.

Many projects for the construction and improvement of facilities for water resources development have already been completed with the understanding and cooperation of the people concerned. In order to keep these facilities fully functional, it is important to maintain and manage them properly. It is also important to modify and replace facilities systematically and in a timely manner, if necessary, to ensure availability of water.

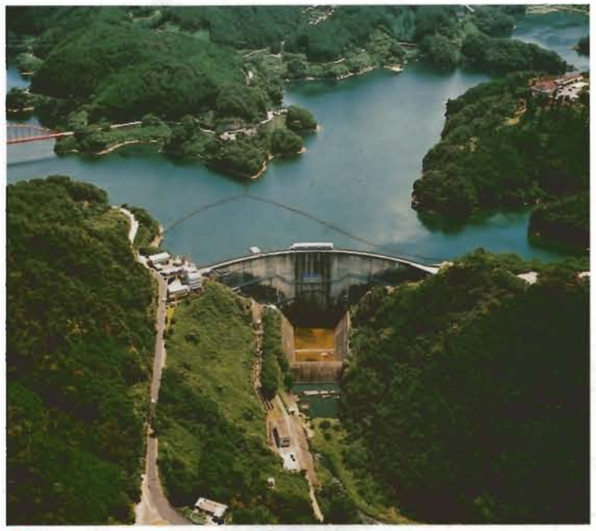
So far, WARDEC has completed and is managing 10 projects in the Yodo River System. Among these is the Lake Biwa Development Project, which is the largest lake and marsh development in Japan. This project was carried out as part of the Integrated Lake Biwa Development Plan which aimed to develop the water source region around the lake while conserving the natural environment. In addition, there are two ongoing projects including the construction of the Kawakami Dam.

● Completed ● Under construction/survey

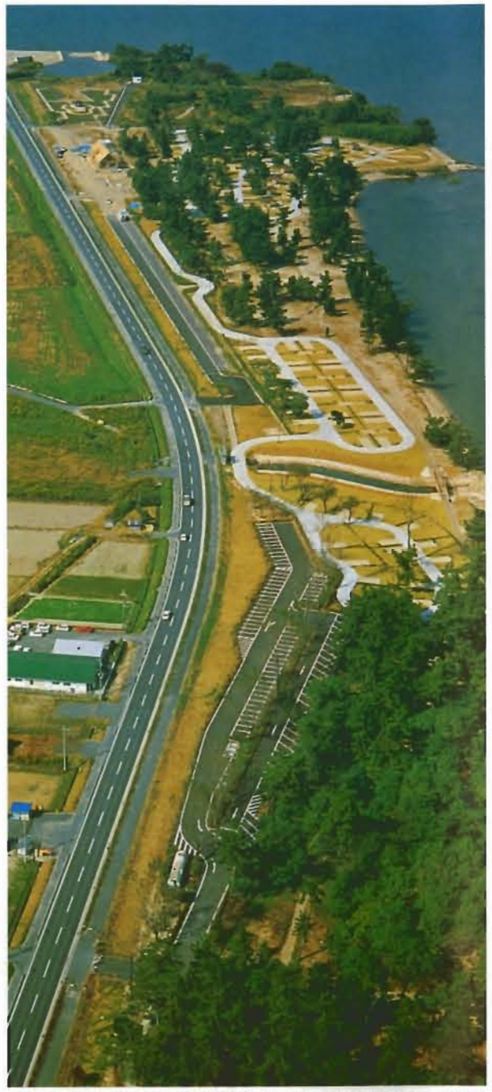
● Hinachi Dam

● Hiyoshi Dam

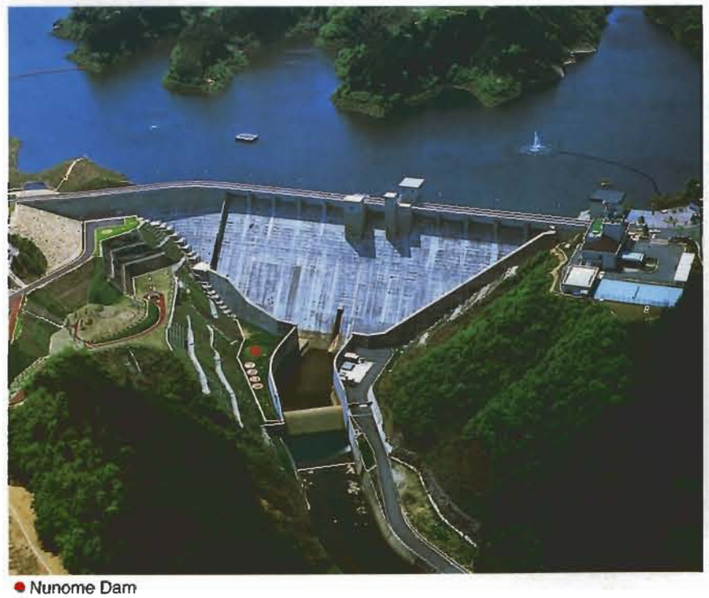
● Takayama Dam



● Shorenji Dam



● Lake Biwa Development (Bank of Lake and Maintenance Road)



● Nunome Dam

● Murou Dam

● Shorenjigawa Development (Takami Pumping Station)

● Yodogawa Barrage

● Hitokura Dam

● Kawakami Dam (Photomontage Picture)

● Niu Dam (Photomontage Picture)

The Yoshino River System

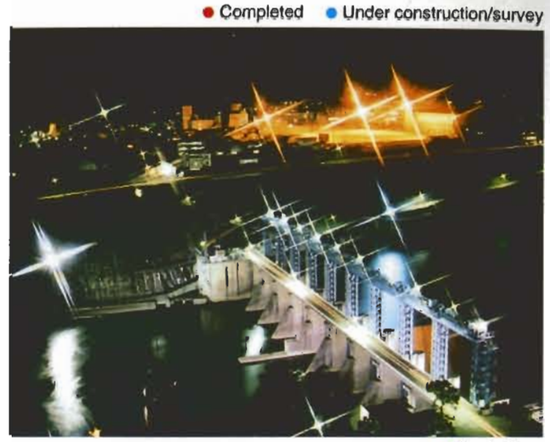
The Yoshino River, so-called "Shikoku-Saburo," is among the three biggest rivers of Japan; it is ranked along with Tone River in the Kanto region and Chikugo River in Kyushu region, so-called "Bando-Taro" and "Tsukushi-Jiro," respectively. It runs eastward in the central part of the Shikoku region and flows into Kii Channel. The catchment area is 3,750km^2, accounting for about 20% of the whole island. The average annual rainfall at Sameura Dam is 2,646mm.

The Shikoku Mountain Range divides the island into a dry zone in the north and a rainy zone in the south. Thus, the northern part has suffered from chronic water shortages while the southern part has experienced extensive floods. Under these situations, comprehensive development of the Yoshino River, a "lifeline of Shikoku Island," has been recognized as a top priority task for development of the whole island.

So far, WARDEC has completed seven projects in the Yoshino River System. WARDEC is currently managing various facilities including the Sameura Dam (a representative dam in the region) in an integrated and efficient manner. These facilities have been playing a crucial role in flood control, and irrigation and municipal water supply for the four prefectures (Tokushima, Kagawa, Ehime and Kochi) in the Shikoku region, and have been contributing to the improvement of industrial and social infrastructure. WARDEC has also been implementing the Kagawa Canal Facilities Emergency Reconstruction Project to replace the aging facilities.

● Completed ● Under construction/survey

● Sameura Dam



● Ikeda Dam

● Tomisato Dam

● Shingu Dam

● Kochi Canal (Jizojigawa Intake Weir)

● Kyuyoshinogawa Estuary Barrage

● Kagawa Canal (Intake Structure)

● Kagawa Canal Facilities Emergency Reconstruction (planned construction site for a reservoir)

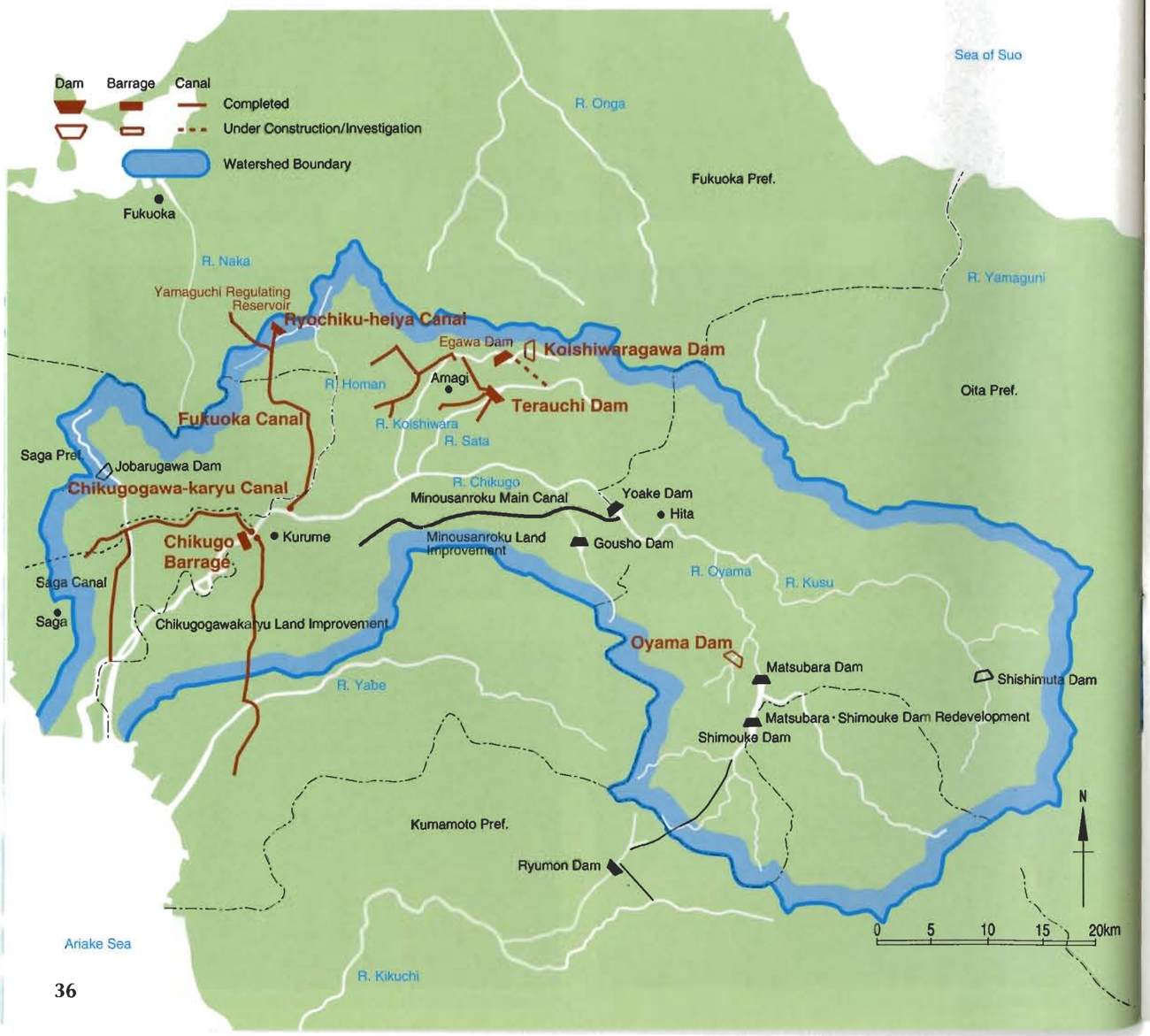
The Chikugo River System

The Chikugo River dubbed "Tsukushi-Jiro (naughty guy in the Tsukushi Plain)" is the largest river in the Kyushu Region and flows westward through the central part of the Northern Kyushu region and pours into the Ariake Bay. The catchment area is 2,860 km^2, accounting for 14% of the four prefectures through which the river flows. The average annual precipitation at the Hita gauging point located in the catchment of the Chikugo River System is 1,795 mm.

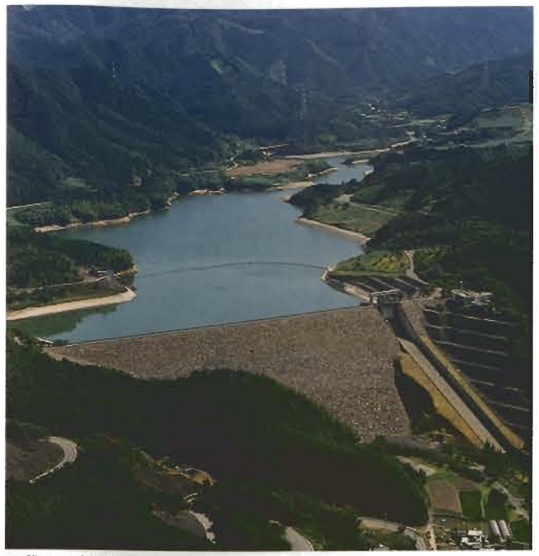
In the northern Kyushu region, rainfall has been decreasing in recent years, beginning to threaten the availability of water through frequent water shortages. Although the region is getting out of a water crisis situation in which water supply capacity is unable to catch up with increasing water demand, water demand is still on the increase. Under these circumstances, it is important to improve facilities for water resources development systematically in order to supply water in a more dependable manner.

Many projects for the construction and improvement of facilities for water resources development have already been completed with the understanding and cooperation of the people concerned. In order to keep these facilities fully functional, it is important to maintain and manage them properly. It is also important to modify and replace facilities systematically and in a timely manner, if necessary, to ensure availability of water.

WARDEC has so far completed and is managing five projects for this river system. The facilities constructed under these projects have been supplying water to users both inside and outside the region and contributing to the mitigation of drought damage. WARDEC is currently implementing two projects to stabilize water supply in the region.



● Completed ● Under construction/survey



● Terauchi Dam

● Ryochiku-heiya Canal (Egawa Dam)

● Ryochiku-heiya Canal (Meotoishi Head Works)

● Chikugo Barrage

● Fukuoka Canal (Yamaguchi Regulating Reservoir)

● Chikugogawa Karyu Canal (right-bank intake and Saga pumping station)

● Oyama Dam (Dam Site)

● Koishiwaragawa Dam (Dam Site)




Japan, Water Resources Development Public Corporation (WARDEC)

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