

**Water Resources Development  
Public Corporation, Kansai Branch**

The Yodo River System covers 6 prefectures, namely Mie, Shiga, Kyoto, Osaka, Hyogo and Nara. The Yodo River System is one of the largest river systems in Japan with the basin area of 8,240km<sup>2</sup> and the total length of 75.1km. The Yodo River System consists of three different river systems. The Uji River, which is the main river in the Uji River System, flows from the Lake Biwa which is the biggest lake in Japan. The Kizu River, which is the main river in the Kizu River System, has its source in Mie and Nara prefectures. The Katsura River, which is the main river in the Katsura River System, has its source mainly in Kyoto prefecture. After these three rivers meet at the southwest of the Kyoto, the river is called "The Yodo River". The Yodo River runs through Settsu and Kawachi area in Osaka Prefecture. After this and before it flows into the Osaka Bay, The Kanzaki River and the Oookawa (The old Yodo River) are diverged from the Yodo River. The Ina River, which has its source in Hyogo prefecture, is also included in the Yodo River System. Comparing with other rivers, the river flow conditions are relatively constant in the Yodo River. This attributes to the distinctive weather characteristics at the Uji, Kizu and Katsura River System.

Osaka, Kyoto and other many cities are developed, in the Yodo River System, so the Yodo River System is the very important area in Kinki Region for many senses. At the same time, from ancient days, a lot of flood control and water utilization projects have been carried out in the Yodo River System, so they have played important roles in this area.

(mm)

— Lake Biwa  
(at Torigawa gauging station)

— Kizu River  
(at Kamo gauging station)

— Katsura River  
(at Nouso gauging station)

Thawing Season

Rainy Season

Typhoon Season

12 3 6 9 12

(Month)

Catchment area	8,240 km <sup>2</sup>	The 7th largest in Japan. The largest one is the Tone River system with 16,840km <sup>2</sup>
Urbanized area	Approx. 1,000 km <sup>2</sup>	The urbanized areas exceeds 1,000km <sup>2</sup> only in the Yodo River and the Tone River System.
Length of trunk river	75.1 km	From Lake Biwa to Osaka Bay (Seta River-Uji River-Yodo River).
Average annual precipitation	Approx. 1,750 mm	The national average is about 1,590mm.
Annual outflow amount	Approx. 8.6 billion m <sup>3</sup>	Approximately 1/3 of the storage in Lake Biwa, about 7300 times the size of the Tokyo Dome.
Total population within the water usage area	Approx. 16.6 million	Approximately 78% of the total population (approx. 21,200,000) in the Kinki Region as of 1997.

[illegible]



# Water Quality in the Reservoir

## Total water quality management needed for lakes

Water quality of the Yodo River has deteriorated due to environmental changes brought about by high economic growth since the 1950's. The expansion of cities has caused various problems, like the effluence of toxic substances into rivers, although sewage treatment facilities and drainage systems have improved water quality. Water resources management is necessary in order to alleviate negative impacts on the ecosystem in the Yodo River.

### The Annual change of COD [annual average]

( ) indicates 75% value

Lake Biwa		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Regulatory Standard for Plan for Conservation of Lake Water Quality
South lake		3.0	2.7	2.9	2.6	2.8	3.0	2.9	3.2	3.1	3.1	South lake $\leq 2.5\text{mg/l}$
North lake		2.0	2.1	2.1	1.9	2.1	2.3	2.4	2.4	2.4	2.4	North lake $\leq 2.0\text{mg/l}$
(mg/l)												
(South lake 75% value)		(3.0)	(2.7)	(3.2)	(2.6)	(2.8)	(3.0)	(3.2)	(3.4)	(3.3)	(3.2)	(North lake $\leq 3.3\text{mg/l}$ )
(North lake 75% value)		(2.1)	(2.2)	(2.3)	(2.0)	(2.3)	(2.4)	(2.6)	(2.6)	(2.4)	(2.5)	(North lake $\leq 2.2\text{mg/l}$ )
Reservoir name		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Environmental Water Quality Standard value
Takayama Dam		3.3	5.6	4.2	4.3	4.3	4.7	4.0	3.8	3.6	4.1	
Shorenji Dam		3.8	2.6	3.2	3.8	5.0	3.4	2.3	3.4	3.2	2.6	
Muro Dam		3.8	3.5	5.0	7.2	7.4	7.0	3.5	5.0	4.7	5.1	Environmental Quality Standards Related to the Preservation of Living Environment ( $\leq 3.0\text{mg/l}$ )
Nunome Dam		—	—	—	—	—	—	—	3.6	3.8	4.0	
Hitokura Dam		2.6	2.4	2.0	2.2	2.7	3.2	3.3	2.4	2.4	2.8	

\*COD...

**Chemical Oxygen Demand**  
The volume of oxygen needed when a toxic substance in water is chemically oxidized. (Bigger numbers indicate more polluted water)

\*COD for Environmental Quality Standard value

Type	Marshes
AA	$\leq 1\text{ mg/l}$
A	$\leq 3\text{ mg/l}$
B	$\leq 5\text{ mg/l}$
C	$\leq 8\text{ mg/l}$

### The annual change of T-N(total nitrogen)[annual average]

Reservoir name	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Environmental Water Quality Standard value
South Lake Biwa	0.43	0.37	0.35	0.38	0.39	0.42	0.38	0.41	0.40	0.37	Regulatory Standard for Plan for Conservation of Lake Water Quality
North	0.26	0.27	0.24	0.28	0.29	0.28	0.31	0.30	0.32	0.28	South lake $\leq 0.35\text{mg/l}$ North lake $\leq 0.26\text{mg/l}$
Takayama Dam	1.389	1.809	1.268	2.378	1.79	1.73	1.58	1.53	1.63	1.56	
Shorenji Dam	0.614	0.475	0.542	0.713	1.309	0.634	0.484	0.700	0.577	0.585	
Muro Dam	1.0	1.1	1.4	1.0	3.90	3.45	1.26	1.97	1.84	2.15	
Nunome Dam	—	—	—	—	—	—	—	1.45	1.53	1.62	
Hitokura Dam	0.660	0.533	0.725	0.438	0.508	0.630	0.648	0.551	0.461	0.641	

### The annual change of T-P(total phosphorus)[annual average]

Reservoir name	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Environmental Water Quality Standard value
South Lake Biwa	0.027	0.023	0.023	0.022	0.023	0.026	0.023	0.023	0.022	0.021	Regulatory Standard for Plan for Conservation of Lake Water Quality
North	0.008	0.011	0.008	0.009	0.010	0.009	0.010	0.009	0.009	0.008	South lake $\leq 0.015\text{mg/l}$ North lake $\leq 0.010\text{mg/l}$
Takayama Dam	0.036	0.078	0.031	0.092	0.055	0.040	0.044	0.038	0.035	0.036	
Shorenji Dam	0.006	0.020	0.015	0.041	0.019	0.019	0.012	0.016	0.015	0.019	
Muro Dam	0.012	0.020	0.042	0.027	0.097	0.069	0.027	0.043	0.031	0.041	
Nunome Dam	—	—	—	—	—	—	—	0.033	0.042	0.030	
Hitokura Dam	0.037	0.034	0.036	0.031	0.035	0.027	0.035	0.037	0.038	0.022	

## Facilities for Comfortable Environment and Environmental Preservation

## Creation of beautiful and rich environment

Water amenity facilities such as parks, sidewalks and picnic shelters have been made in dam construction projects or river improvement works. Every effort is made to create nature rich open space by paying careful attention to surrounding scenery and environment. Various events are being held at these multipurpose open spaces now.

Fountain in th



Nunome Dam/Water quality conservation facility

Open space



Hitokura Dam

Lakefront banks and roads for maintenance works



Lake Biwa

Monument



Hinachi Dam

Lakefront man-made beach ('maehama')



Lake Biwa

### The lakefront bank and roads for maintenance works in the Lake Biwa Development

Lakefront banks were built to defend people in the area from inundation damage. Roads for maintenance works were also built to conduct flood fighting activities and maintenance works smoothly. They play a big role as the roads for daily life for residents. In the Lake Biwa Development, a part of reed areas, which were demolished by construction of lakefront banks and roads for maintenance works, were restored. On top of restoration of reed areas, lakefront manmade beaches( "Maehama" )were also made. Restroration of reed areas and creation of Maehama not only provide rich nature and scenic space but conserve the ecosystem and the environment.



Free from natural disasters  
Town planning to live safe and  
sound...

Flood damage reduction by flood control and  
river improvement works.



1983.Sep.The conditions of inudation in Tada area by typhoon #10



1982.Aug.The conditions of inundation in Kameoka city by typhoon #10

The Yodo River  
Flood Control  
Master Plan

The Yodo River has experienced disaster by bank destruction in 1885, 1917 and 1953. These experiences gave the opportunity for making flood control master plan in the Yodo River System. The Flood Control Master Plan set up in 1954, in which 8,650m<sup>3</sup>/sec for the design flood discharge and 6,950m<sup>3</sup>/sec for the estimated high-water discharge were adopted at Hirakata, introduced flood control at Amagase Dam and Takayama Dam. Taking into consideration of the occurrence of the deluges four times after introduction of this master plan and the concentration of assets and population in the Yodo River System in recent years, large improvement of the safety for the flood damage was required.

On the other hand, in the Ina River, after the Hanashin Deluge in July 1938,the flood control plan of building the dam upper stream at Mushio was introduced. Later, this plan was modified to build Hitokura dam. But this plan was needed to modified one more time by taking into account of the concentration of assets, population and recent flood conditions etc.,

In 1971, both the Yodo River and the Ina River Flood Control Master Plan were modified. In these master plans,1/200 was adopted at Hirakata in the Yodo River and at Odo in the Ina River for the annual probability of excess.

The design flood discharge is 12,000m<sup>3</sup>/s after controlling the dams by 5,000m<sup>3</sup>/s in the Yodo River and 2,300m<sup>3</sup>/s after controlling the dams by 1,200m<sup>3</sup>/s in the Ina River.

Recent deluges in the Yodo River

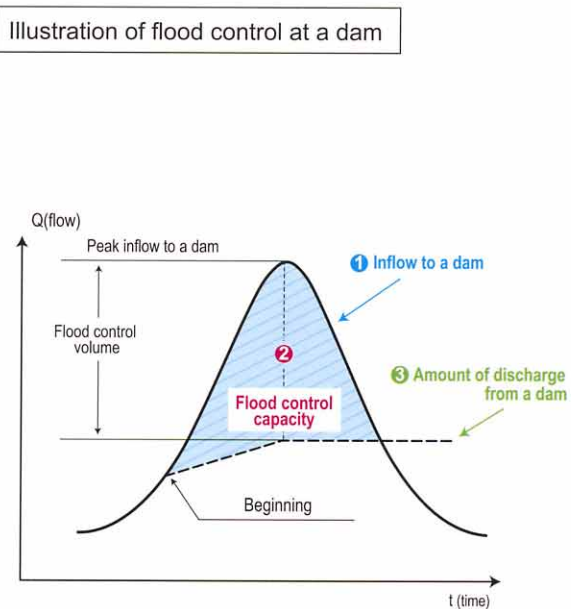
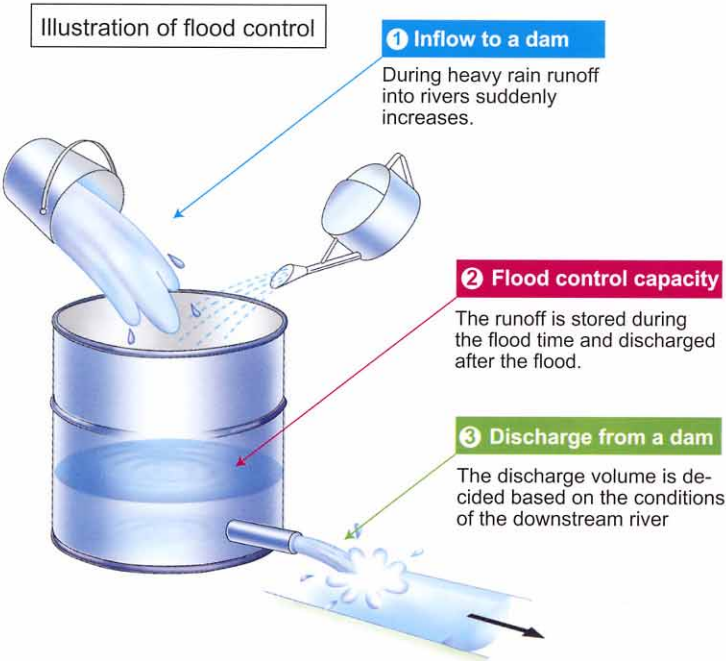
Occurrence Date	Weather Factors	Maximum flow rate (m <sup>3</sup> /sec)			
		Kizu River (Kamo)	Katsura River (Hazukashi)	Uji River (Uji)	Yodo River (Hirakata)
1953. 9. 25	Typhoon #13	*5,800	2,700	*1,780	*7,800
1956. 9. 27	Typhoon #15	3,850	810	670	4,610
1958. 8. 27	Typhoon #17	3,650	790	525	4,030
1959. 8. 14	The front/typhoon #7	3,900	2,500	*1,270	6,800
1959. 9. 27	Typhoon #15 (The Ise Bay Typhoon)	*6,200	1,700	885	*7,200
1960. 8. 30	Typhoon #16	770	2,600	310	3,840
1961.10.28	Low pressure/ the front/typhoon #28	*5,220	2,100	*1,000	*7,800
1965. 9. 17	Typhoon #24	*5,170	2,500	900	6,870
1972. 9. 17	Typhoon #20	3,260	2,320	810	5,230
1982. 8. 2	Typhoon #10	3,980	(Nuso) 1,950	(Mukoujima) 990	6,260

Recent deluges in the Ina River

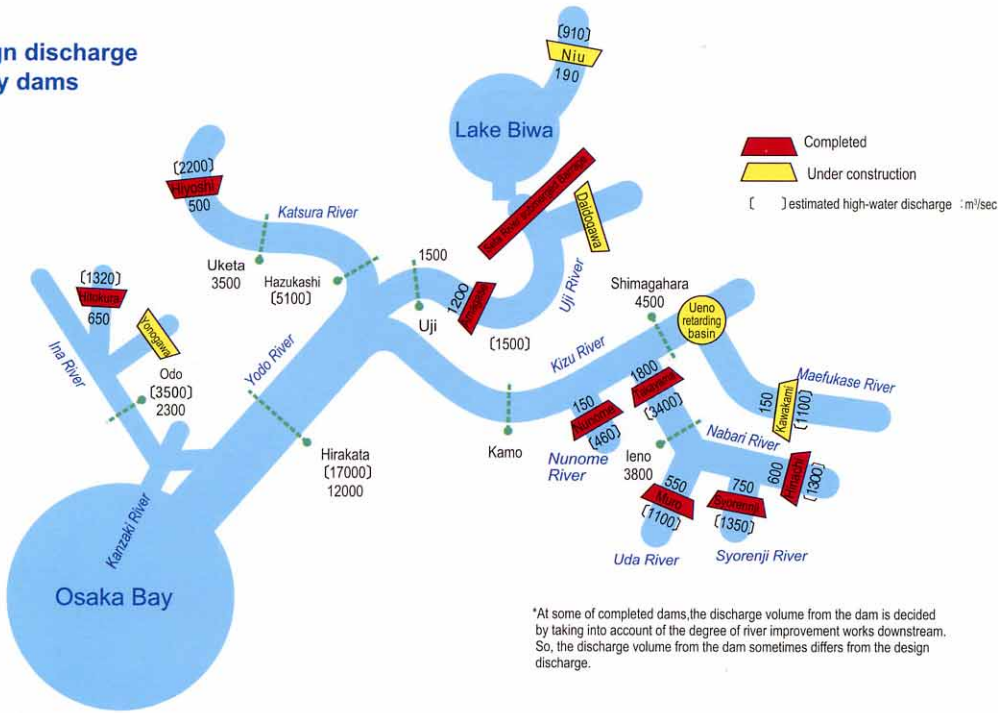
Occurrence Date	Weather Factors	Maximum flow rate (m <sup>3</sup> /sec)	
		Odo	Gunkoubashi
1938. 7. 5	Heavy rain front	1,870	
1953. 9. 25	Typhoon #13	1,645	
1960. 8. 30	Typhoon #16	1,360	1,390
1967. 7. 9	The front and typhoon #7	1,363	1,370
1968. 8. 29	Typhoon #10	1,091	1,056
1972. 7. 12	Heavy rain front	1,190	1,046
1972. 9. 16	Typhoon #20	1,317	1,337
1983. 9. 28	Typhoon #10	1,362	1,569

Deluges in the lists are the floods that exceeded the design flood discharge described in the old Yodo River Flood Control Master Plan (revamped 1971, March)

( ) estimated figure without destruction of banks



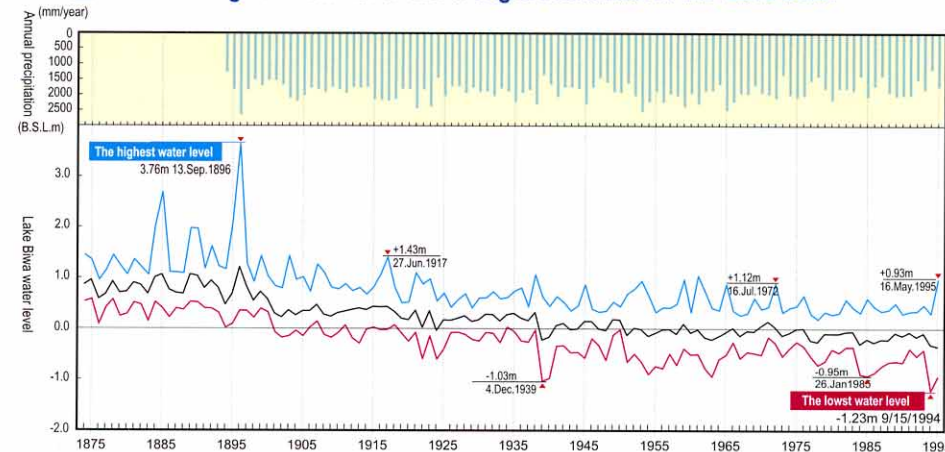
Distribution of design discharge  
after flood control by dams



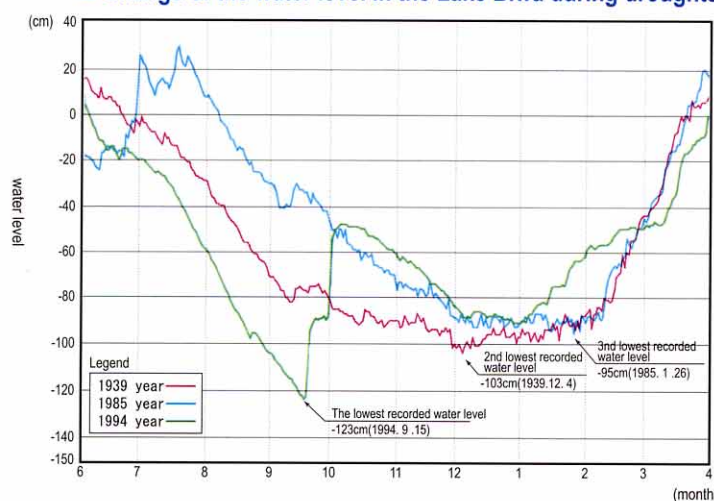


- 1874 Staff gauge was set at Toriigawa
- 1885 Biwako-sosui No.1 project started
- 1890 Biwako-sosui No.1 project completed
- 1905 The completion of the Nango Barrage
- 1912 Biwako-sosui No.2 project completed
- 1923 The completion of the Uji power plant
- 1954 Improved Basic Plan for the Yodo River System approved
- 1961 The completion of the Seta River Barrage
- 1967 Improved Basic Plan project for the Yodo River System completed
- 1971 Basic Plan of Work Execution for the Yodo River System approved
- 1972 Act on Special Measures for the Lake Biwa Development promulgated
- 1982 Act on Special Measures for the Lake Biwa Development improved
- 1991 The completion of the Lake Biwa Development Project

## Annual change of water level and drought conditions in the Lake Biwa



## Change of the water level in the Lake Biwa during droughts



## Change of the water level in the three worst drought years.

Due to the unusual dry and hot weather in 1994, the water level in Lake Biwa was going down by 1.4 cm in a day from the beginning of July. The lowest water level (After beginning of the observation of the water level in the Lake Biwa) B.S.L.-1.23m was recorded September 15<sup>th</sup> in that year.

## The main droughts in Lake Biwa

Dates	Water level (m)
1939.12.4	-1.03
1954.2.26	-0.90
1967.10.25	-0.60
1973.9.3	-0.56
1977.11.2	-0.58
1978.11.29	-0.73
1985.1.26	-0.95
1986.12.11	-0.88
1992.9.29	-0.55
1994.9.15	-1.23

Note: B.S.L (Lake Biwa Standard Water Level)  
This sign indicates the water level of the Lake Biwa. This water level is decided according to the water level at Toriigawa gauging station (T.P64.371m). If the water level is higher than this, (+) is put in front of the water level and vice versa.

# Yodo River Water Utilization Plan

## Water resources development in the Yodo River System for supporting urban lives

Increasing water demand and the goal for water supply

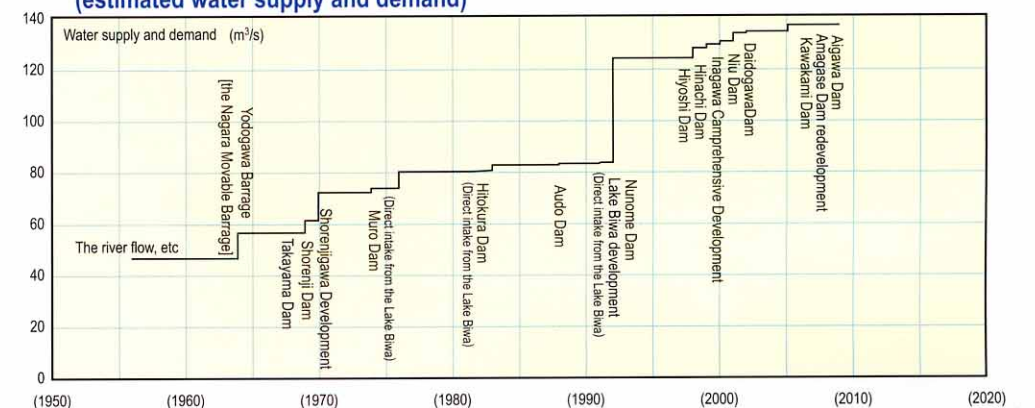
Securing water for urban areas became the urgent issue because of the increasing water demand in the Keihanshin region brought about by the industrial development and the increase of population. April in 1962, the Yodo River System was designated as the water resources development river system based on "The Water Resources Development Promotion Law". Projects by WARDEC (Water Resources Development Public Corporation) were started after "Water Resources Development Basic Plan" was adopted in the Yodo River System, August in the same year.

This plan, which was promulgated in 1962, has totally improved three times in 1972, 1982 and 1992.

The current plan(The 4<sup>th</sup> Basic Plan) is supposed to be completed from 1991 to the year of 2000. In this plan, to meet the water demand, another 60m<sup>3</sup>/s (42m<sup>3</sup>/s for domestic water, 10m<sup>3</sup>/s for industrial water and 9m<sup>3</sup>/s for agricultural water) is necessary to be developed. But the fulfillment of the current plan is delayed, so securing 49m<sup>3</sup>/s water is tentatively targeted by the end of the year 2000.

Right now, both Kawakami and Niu Dam are Under construction by WARDEC. The current plan (The 4<sup>th</sup> Basic Plan) was partially modified September in 2001.

## Water resources development plan in the Yodo River System (estimated water supply and demand)



The water supplies of as many as 66 cities, 87 towns, and 12 villages in 6 prefectures(Mie, Shiga, Kyoto, Osaka, Hyogo, Nara) are dependent upon the Yodo River System.



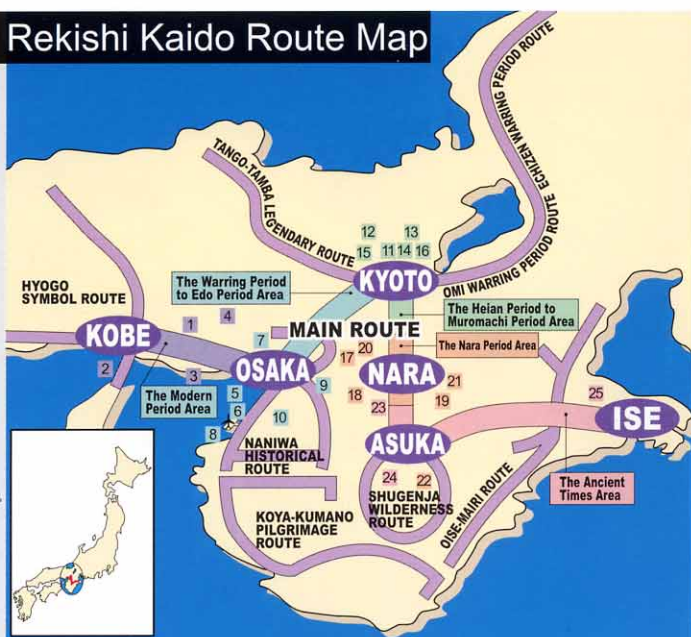
# Enjoy a Time Trip To historic periods along the Rekishi Kaido



## Rekishi Kaido Route Map

The Rekishi Kaido ("Historical Highway") passes through scenes of eternal relevance in the history of Japan. It is also a new route which enables people to experience at first hand the charms of Japan's history and culture.

所谓历史街道，指通过探访拥有悠久历史的名胜古迹，愉快地感受日本文化魅力的新的路线。レキシカイド(역사가도)란 유구한 역사의 무대를 찾아 일본문화의 매력을 즐겁게 체험할 수 있는 새로운 루트를 말합니다.



Please send your questions and opinions to:  
Rekishi Kaido Promotional Council  
TEL:81-6-6448-8716 FAX:81-6-6448-8698  
<http://www.kiis.or.jp/rekishi/kaido-e.html>

## Main route With Japanese chronology

### The Modern Period Area

1868



1 Kitano Injikan (Foreigner's Houses) Area



2 Akashi Kaikyo Bridge



3 Port Tower



4 Arima Hot Spring

Japan was forced to reopen itself to foreign contact by Western powers, followed by the restoration of political power to the emperor. Japan commenced various reforms towards modernization of the state by positively introducing Western culture with Kobe and other ports as major doorways to the world.

## KOBE

1868  
The Meiji Restoration, Rebuilding Japan into a modern state begins.



5 Kaiyukan Aquarium



6 Universal Studio Japan



7 Expo Memorial Park



8 Kansai International Airport



9 Osaka Castle



10 Nintokuryo tomb

1641  
Completion of national seclusion.

1853  
Leading an expedition from the U.S. to Japan, Commodore Perry arrives in Port Uruga (now in Kanagawa Prefecture) and reopens Japan to foreign contact.

## OSAKA

1543  
Introduction of guns.  
1549  
Introduction of Christianity.

1603  
Establishment of the Tokugawa shogunate government at Edo.

1336  
Establishment of the Muromachi shogunate.  
The shogun's control over vassals is relatively weak, resulting in division of ruling authority throughout the country.

## NARA



20 Yakushiji Temple, Nishinokyo



21 Suzakumon Gate, Heijo Palace Site



22 Cherry Blossoms at Yoshinoyama

Political and administrative systems gradually took form as exemplified by Wado Kaichin, the first coinage minted in Japan, while transmission of foreign cultures from the Asian continent through the Silk Road led to thriving of a fresh, international culture in the country.

710



17 Todaiji Temple, Nara Park

710  
Heijokyo is built as a new capital on the model of the Chinese Tang dynasty's capital, Chang'an.

752



18 Kasuga Taisha Shrine

752  
A ceremony to consecrate the newly built Great Buddha statue is carried out.



19 Daibutsu

The land was unified after power struggles by rival warlords. The Tokugawa shogunate was established in Edo and in the late 17th century, popular culture such as Bunraku (puppet theater) came into bloom.

645

538

### The Ancient Times Area

350 A.D.

300 B.C.

The art of rice cultivation was introduced into Japan around the 3rd or 2nd century B.C. Development of an agricultural society led to the emergence of social classes. Unification of the land under a single authority gradually progressed around the 4th century.

## ASUKA

645

Taika Reform-this reform leads the country to follow the path to a centralized state.



23 Horyuji Temple



24 Ishibutai Tomb



25 Ise Grand Shrines

350 A.D.

A state (Yamato court) is established sometime before the mid-4th century.

538  
Buddhism was officially introduced from the Asian continent.

300 B.C.

Rice cultivation and the use of metal implements begin.

## ISE

794

## KYOTO

After the transfer of the capital from Nara to Kyoto, foreign cultures from the continent were assimilated to the extent that the aristocratic society matured and Japan's original culture, including the hiragana alphabet, Buddhist Zen culture, tea ceremony and flower arrangement, was developed.



11 Nijo Castle



13 Kinkakuji Temple



15 Arashiyama



12 Ginkakuji Temple



14 Kyoto Goshou



16 Toji Temple

794

Capital is moved to Heian-kyo.

1192

Establishment of the Kamakura shogunate, Japan's first warrior government

### The Warring Period to Edo Period Area

1853 1641

1603 1549 1543

1336

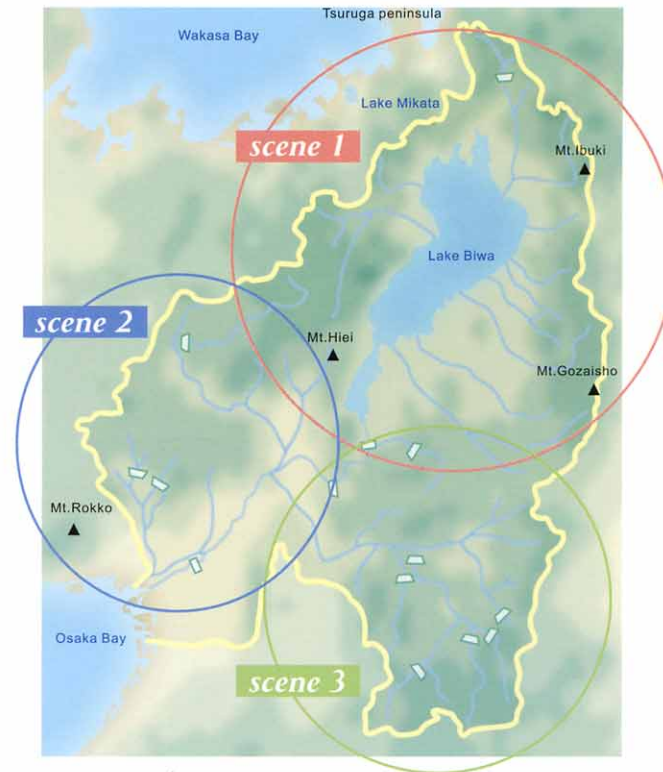
1192



# Commune with rich nature surrounding by abundant water and greenery in the Yodo River System

The Yodo River System is one of the biggest river systems in Japan. Its catchment area is 8,240 km<sup>2</sup> and its length is 75.1 km.

The Yodo River System is full of nature, beautiful scenery and lots of traditional customs. The Yodo River gives not only water, which is the most important thing to our lives, but also peaceful feelings and relief to our daily lives.



## scene 2 The outskirts of the Yodo River and the Ina River



The Yodo River Wando



Going down the Hozu River by boat



Otaue Festival (Hiyoshi Town)



Fish catching event at Hitokura Dam (Kunisaki Area)



Springs Hiyoshi (Hiyoshi Town)

## scene 1 The outskirts of the Lake Biwa



Planting 'Yoshi' (Kusatsu area)



Ayu (Sweetfish) fishery in the Lake Biwa



Ayu fishing in the Takatoki River



Hikone Castle



The Hikiyama (children's kabuki) festival at Nagahama



Chawan Festival (Niu Shrine)

## scene 3 The outskirts of the Kizu River



Azaleas in the Prefectural naturepark (Nunome River)



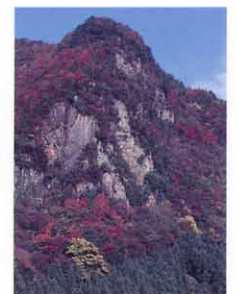
Autumn Festival (Nabari City)



Ume (Plum) Festival



Akame shijuhachi-taki



Kouchidani



# Outline of the projects in the Yodo System



Water Resources Development Public Corporation (WARDEC) is constructing, operating and maintaining of facilities for water resources development. WARDEC has completed 10 projects so far and now is carrying out 2 projects in the Yodo River System.

## Projects by WARDEC

### Flood control

- Alleviation of flood damage
- Maintenance of normal river function

### Water utilization

- Supply of domestic water
- Supply of industrial water
- Supply of agricultural water

## Construction, Operation and Maintenance

- Dams
- Development of lakes and marshes
- Estuary barrages
- Canals



## Project and River

### Lake Biwa Development

Shiga Pref  
Lake Biwa

## Project Objectives

1. Flood control
2. New Water Utilization

Domestic Water	Osaka Pref.	24.312m <sup>3</sup> /s
	Hyogo Pref.	5.857m <sup>3</sup> /s
Industrial Water	Osaka Pref.	7.200m <sup>3</sup> /s
	Hyogo Pref.	2.631m <sup>3</sup> /s
Total		40.000m <sup>3</sup> /s

## 2. Facilities

- Facilities developed by Seta River Barrage Improvement
- Lakeshore Levee and Maintenance Way Length 50km

## Project Description

### 1. Lake (Lake Biwa)

Catchment Area	3,848km <sup>2</sup>
Lake Area	680km <sup>2</sup>
Design High Water Level	*BSL+1.40m
Normal Water Level Elevation	BSL+0.30m
Water Level for Summer Season	BSL+0.20~+0.30m
Low Water Level for Utilization	BSL+1.50m
Compensational Level	BSL+2.00m
*BSL: Lake Biwa Standard Water Level (T.P.+84.371m)	

- Water Gates : 137
- Pumping Station : 14
- Roof Weir : 7
- Water Supply Station : 4

### 【Minister in Charge】

Minister of Land, Infrastructure and Transport

### 【Total Project Cost】

¥353.18 billion

### 【Approval Dates】

- Basic Plan Approved  
1972. 9. 19
- 1982. 8. 3 (modified)
- Execution Policy Directive Issued  
1972. 12. 16
- 1982. 8. 25 (modified) 1991. 12. 27 (modified)
- Execution Plan Approved  
1973. 2. 27
- 1982. 12. 24 (modified) 1992. 2. 26 (modified)

### 【Construction Period】

1968-1996 (1991 completed)  
Received by WARDEC 1973. 3. 1  
Operated by WARDEC 1992. 4. 1

- Management Policy Directive Issued  
1992. 2. 20
- Management Regulations Approved  
1992. 3. 30



## Project and River

### Nunome Dam

Nara-shi, Nara Pref  
Nunome River

## Project Objectives

1. Flood control 100m<sup>3</sup>/s ~ 150m<sup>3</sup>/s Constant rate discharge
2. Maintenance of normal river functions
3. New Water Utilization

Domestic Water	1.136m <sup>3</sup> /s	(Nara Pref)
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## Project Description

### 1. Reservoir (Lake Nunome)

Catchment Area	75km <sup>2</sup>
Reservoir Capacity	17,300,000m <sup>3</sup>
Active Storage Capacity	15,400,000m <sup>3</sup>
Flood Control Storage	6,400,000m <sup>3</sup>

### 2. Dam

Type	Gravity Concrete
Height	72m
Crest length	322m
Volume	331,000m <sup>3</sup>

### 【Minister in Charge】

Minister of Land, Infrastructure and Transport

### 【Total Project Cost】

¥60 billion

### 【Approval Dates】

- Basic Plan Approved  
1976. 1. 13
- 1982. 8. 3 (modified)
- Execution Policy Directive Issued  
1979. 11. 30
- 1991. 12. 2 (modified)
- Execution Plan Approved  
1980. 1. 25
- 1992. 2. 26 (modified)

### 【Construction Period】

1975-1999 (1991 completed)  
Operated by WARDEC 1992. 4. 1

- Management Policy Directive Issued  
1992. 3. 26
- Management Regulations Approved  
1992. 3. 30
- Designated as the dam for "Act on Special Measures for the Reservoir Area Development"  
1980. 4. 11



## Project and River

### Yodogawa Barrage

Higashi-Yodogawa-ku,  
Osaka-shi (right bank)  
Miyakojima-ku,  
Osaka-shi (left bank)  
Yodo River

## Project Objectives

### 1. New Water Utilization\*

Domestic Water	Osaka Pref.	3.09m <sup>3</sup> /s
	Hyogo Pref.	1.06m <sup>3</sup> /s
Industrial Water	Osaka Pref.	4.24m <sup>3</sup> /s
	Hyogo Pref.	1.61m <sup>3</sup> /s
Total		10.00m <sup>3</sup> /s

\*This new water utilization was developed by the Nagara Movable Barrage and finally replaced by the Yodogawa Barrage. The maintenance of the Yodogawa Barrage is entrusted to the Ministry of Land, Infrastructure and Transport.

### 【Minister in Charge】

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

### 【Total Project Cost】

¥800 million Nagara Movable Barrage

### 【Approval Dates】

- Basic Plan Approved  
1962. 8. 17
- Execution Policy Directive Issued  
1962. 12. 25
- 1964. 4. 21 (modified)

## Project Description

### 1. Yodo River Barrage

Type	Movable
Length	Movable Section 300.0m
	Fixed Section 338.4m
Gate	Type Roller Gate
	No. of Gates 6

### 【Construction Period】

1962-1963 (1991 completed)  
Operated by WARDEC 1964. 9. 1  
Yodo River Barrage  
Operated by WARDEC 1983. 4. 1

- Execution Plan Approved  
1962. 12. 26
- 1964. 9. 25 (modified)
- Management Policy Directive Issued  
1964. 8. 17
- 1983. 3. 18 (modified)
- Management Regulations Approved  
1964. 11. 10
- 1983. 3. 31 (modified)



## Project and River

### Hinachi Dam

Nabari-shi, Mie Pref  
Nabari River

## Project Objectives

1. Flood control 300m<sup>3</sup>/s Constant discharge
2. Maintenance of normal river functions
3. New Water Utilization

Domestic Water	Mie Pref.	0.3m <sup>3</sup> /s
	Kyoto Pref.	0.6m <sup>3</sup> /s
	Nara Pref.	0.6m <sup>3</sup> /s
Total		1.5m <sup>3</sup> /s

### 4. Power Generation

1,800kw (Mie Pref)

## Project Description

### 1. Reservoir (Lake Hinachi)

Catchment Area	76km <sup>2</sup>
Reservoir Capacity	20,800,000m <sup>3</sup>
Active Storage Capacity	18,400,000m <sup>3</sup>
Flood Control Storage	9,000,000m <sup>3</sup>

### 2. Dam

Type	Gravity Concrete
Height	70.5m
Crest length	355m
Volume	426,000m <sup>3</sup>

### 【Minister in Charge】

Minister of Land, Infrastructure and Transport

### 【Total Project Cost】

¥97.3 billion

### 【Approval Dates】

- Basic Plan Approved  
1972. 9. 19
- 1982. 8. 3 (modified)
- Execution Policy Directive Issued  
1982. 3. 16
- 1994. 3. 29 (modified) 1999. 2. 10 (modified)
- Execution Plan Approved  
1982. 3. 25
- 1994. 5. 18 (modified) 1999. 3. 29 (modified)

### 【Construction Period】

1972-1998  
Operated by WARDEC 1999. 4. 1

- Management Policy Directive Issued  
1999. 3. 19
- Management Regulations Approved  
1999. 3. 31



## Project and River

### Takayama Dam

Minami-Yamashiro-mura  
Souraku-gun, Kyoto Pref  
Nabari River

## Project Objectives

1. Flood control 1,300m<sup>3</sup>/s ~ 1,800m<sup>3</sup>/s Constant rate discharge
2. Maintenance of normal river functions
3. New Water Utilization

Domestic Water	Osaka Pref.	4.226m <sup>3</sup> /s
	Hyogo Pref.	0.774m <sup>3</sup> /s
Total		5.000m <sup>3</sup> /s

### 4. Power Generation

6,000kw (Kansai Electric power Co., Inc.)

## Project Description

### 1. Reservoir (Lake Tsukigase)

Catchment Area	615km <sup>2</sup>
Reservoir Capacity	56,800,000m <sup>3</sup>
Active Storage Capacity	49,200,000m <sup>3</sup>
Flood Control Storage	35,400,000m <sup>3</sup>

### 2. Dam

Type	Arch Gravity Concrete
Height	67m
Crest length	209m
Volume	214,000m <sup>3</sup>

### 【Minister in Charge】

Minister of Land, Infrastructure and Transport

### 【Total Project Cost】

¥11.56 billion

### 【Approval Dates】

- Basic Plan Approved  
1962. 8. 17
- 1966. 7. 19 (modified) 1968. 6. 18 (modified)
- Execution Policy Directive Issued  
1962. 9. 25
- 1967. 9. 4 (modified) 1969. 7. 7 (modified)
- Execution Plan Approved  
1962. 9. 29
- 1968. 3. 15 (modified) 1969. 7. 16 (modified)

### 【Construction Period】

1960-1969  
Received by WARDEC 1962. 10. 1  
Operated by WARDEC 1969. 8. 1

- Management Policy Directive Issued  
1969. 7. 16
- 1970. 6. 27 (modified) 1974. 3. 20 (modified)
- 1974. 11. 21 (modified) 1992. 7. 13 (modified)
- Management Regulations Approved  
1969. 7. 30
- 1970. 6. 30 (modified) 1970. 4. 10 (modified)
- 1975. 3. 20 (modified) 1992. 11. 30 (modified)



## Project and River

### Hiyoshi Dam

Hiyoshi-cho, Funai-gun,  
Kyoto Pref  
Katsura River

## Project Objectives

1. Flood control 150m<sup>3</sup>/s Constant discharge
2. Maintenance of normal river functions
3. New Water Utilization

Domestic Water	Kyoto Pref.	1.160m <sup>3</sup> /s
	Osaka Pref.	1.576m <sup>3</sup> /s
	Hyogo Pref.	0.964m <sup>3</sup> /s
Total		3.7m <sup>3</sup> /s

## Project Description

### 1. Reservoir (Lake Amawaka)

Catchment Area	290km <sup>2</sup>
Reservoir Capacity	66,000,000m <sup>3</sup>
Active Storage Capacity	58,000,000m <sup>3</sup>
Flood Control Storage	42,000,000m <sup>3</sup>

### 2. Dam

Type	Gravity Concrete
Height	67.4m
Crest length	438m
Volume	674,000m <sup>3</sup>

### 【Minister in Charge】

Minister of Land, Infrastructure and Transport

### 【Total Project Cost】

¥183.6 billion

### 【Approval Dates】

- Basic Plan Approved  
1972. 9. 19
- 1982. 8. 3 (modified) 1992. 8. 4 (modified)
- Execution Policy Directive Issued  
1982. 7. 31
- 1993. 1. 18 (modified) 1998. 3. 4 (modified)
- Execution Plan Approved  
1982. 9. 17
- 1993. 2. 9 (modified) 1998. 3. 16 (modified)

### 【Construction Period】

1971-2006 (1997 completed)  
Operated by WARDEC 1998. 4. 1

- Management Policy Directive Issued  
1998. 3. 20
- Management Regulations Approved  
1998. 3. 20
- Designated as the dam for "Act on Special Measures for the Reservoir Area Development"  
1981. 6. 2





#### Project and River

### Shorenji Dam

Nabari-shi, Mie Pref  
Shorenji River

#### Project Objectives

- 1. Flood control** 450m<sup>3</sup>/s Constant discharge
- 2. Maintenance of normal river functions**
- 3. New Water Utilization**

Irrigation Water	Mie Pref.	1.86m <sup>3</sup> /s
Domestic Water	Mie Pref.	0.19m <sup>3</sup> /s
	Osaka Pref.	1.944m <sup>3</sup> /s
	Hyogo Pref.	0.356m <sup>3</sup> /s
Total		4.35m <sup>3</sup> /s
- 4. Power Generation** 2,000kw (Mie Pref)

#### Project Description

- 1. Reservoir (Lake Shorenji)**

Catchment Area	100km <sup>2</sup>
Reservoir Capacity	27,200,000m <sup>3</sup>
Active Storage Capacity	23,800,000m <sup>3</sup>
Flood Control Storage	8,400,000m <sup>3</sup>
- 2. Dam**

Type	Concrete Arch
Height	82m
Crest length	275m
Volume	175,000m <sup>3</sup>

**【Minister in Charge】**  
Minister of Land, Infrastructure and Transport  
**【Total Project Cost】**  
¥7.37 billion

**【Construction Period】**  
1964-1970  
Operated by WARDEC 1970. 7. 1

**【Approval Dates】**  
Basic Plan Approved  
1964.10.16  
Execution Policy Directive Issued  
1965. 1.30  
1970. 6.26 (modified)  
Execution Plan Approved  
1966. 3.19  
1970. 6.30 (modified)

Management Policy Directive Issued  
1970. 6.27  
1974. 3.20 (modified) 1974.11.21 (modified)  
1992. 7.13 (modified)  
Management Regulations Approved  
1970. 6.30  
1974. 4.10 (modified) 1975. 3.20 (modified)  
1992.11.30 (modified) 1999. 3.31 (modified)



#### Project and River

### Shorenjigawa Development

Osaka-shi, Osaka Pref  
Shorenji River

#### Project Objectives

- 1. New Water Utilization\***

Domestic Water	Osaka Pref.	4.109m <sup>3</sup> /s
	Hyogo Pref.	0.753m <sup>3</sup> /s
Industrial Water	Osaka Pref.	2.483m <sup>3</sup> /s
	Hyogo Pref.	1.155m <sup>3</sup> /s
Total		8.5m <sup>3</sup> /s

#### Project Description

- 1. Pumping Facility**

Water Intake Gate	1
Pumping station	1
Canal	Length 0.9km
- 2. Industrial Water Conveyance Facility**

Water Intake Gate	1
Canal	Length 6km

#### 2. River Clean Up Project

#### 3. Tidal Flood Control Project

#### 4. Sewerage Project

\*This new water utilization was secured by canalizing the Shorenji River, which is one of the tributaries in the Yodo River.

**【Minister in Charge】**  
Minister of Health, Labour and Welfare  
Minister of Economy, Trade and Industry  
Minister of Land, Infrastructure and Transport  
**【Total Project Cost】**  
¥5.16 billion

**【Construction Period】**  
1965-1971  
Operated by WARDEC 1970. 7. 1

**【Approval Dates】**  
Basic Plan Approved  
1966. 7.19  
1968. 6.18 (modified)  
Execution Policy Directive Issued  
1967. 3.25  
1970. 6.12 (modified)

Execution Plan Approved  
1967. 7.31  
1970. 6.27 (modified)  
Management Policy Directive Issued  
1970. 6.27  
Management Regulations Approved  
1970. 6.30



#### Project and River

### Murou Dam

Murou-mura, Uda-gun,  
Nara Pref  
Uda River

#### Project Objectives

- 1. Flood control** 300m<sup>3</sup>/s Constant discharge
- 2. Maintenance of normal river functions**
- 3. New Water Utilization and Conveyance**

Domestic Water	Nara Pref.	1.6m <sup>3</sup> /s
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- 2. Dam**

Type	Gravity Concrete
Height	63.5m
Crest Length	175m
Volume	153,000m <sup>3</sup>

#### Project Description

- 1. Reservoir (Lake Murou)**

Catchment Area	Direct	136km <sup>2</sup>
	Indirect	33km <sup>2</sup>
Reservoir Capacity		16,900,000m <sup>3</sup>
Active Storage Capacity		14,300,000m <sup>3</sup>
Flood Control Storage		7,750,000m <sup>3</sup>
- 3. Hase Canal**

Length	5km
Max. conveyance volume	1.6m <sup>3</sup> /s

**【Minister in Charge】**  
Minister of Land, Infrastructure and Transport  
Minister of Health, Labour and Welfare  
**【Total Project Cost】**  
¥9.75 billion

**【Construction Period】**  
1965-1973  
Operated by WARDEC 1974. 4. 11

**【Approval Dates】**  
Basic Plan Approved  
1966. 7.19  
1972. 9.19 (modified)  
Execution Policy Directive Issued  
1969. 5. 2  
1974. 1.28 (modified) 1974. 1.31 (modified)  
Execution Plan Approved  
1969. 9.17  
1974. 3.23 (modified)

Management Policy Directive Issued  
1974. 3.20  
1974.11.21 (modified)  
1992. 7.13 (modified)  
Management Regulations Approved  
1974. 4.10  
1975. 3.20 (modified)  
1992. 7.13 (modified)  
1999. 3.31 (modified)



#### Project and River

### Hitokura Dam

Kawanishi-shi, Hyogo Pref  
Ina River

#### Project Objectives

- 1. Flood control** 150m<sup>3</sup>/s Constant discharge
- 2. Maintenance of normal river functions**
- 3. New Water Utilization**

Domestic Water	Hyogo Pref.	2.038m <sup>3</sup> /s
	Osaka Pref.	0.462m <sup>3</sup> /s
Total		2.5m <sup>3</sup> /s

#### Project Description

- 1. Reservoir (Lake Chimyo)**

Catchment Area	115km <sup>2</sup>
Reservoir Capacity	33,300,000m <sup>3</sup>
Active Storage Capacity	30,800,000m <sup>3</sup>
Flood Control Storage	17,500,000m <sup>3</sup>
- 2. Dam**

Type	Gravity Concrete
Height	75m
Crest length	285m
Volume	440,000m <sup>3</sup>

**【Minister in Charge】**  
Minister of Land, Infrastructure and Transport  
**【Total Project Cost】**  
¥63.24 billion

**【Construction Period】**  
1968-1983  
Operated by WARDEC 1983. 4. 1

**【Approval Dates】**  
Basic Plan Approved  
1968. 6.18  
1972. 9.19 (modified) 1982. 8. 3 (modified)  
Execution Policy Directive Issued  
1968.10.14  
1978. 4. 3 (modified)  
Execution Plan Approved  
1968.12.25  
1978. 7.27 (modified)

Management Policy Directive Issued  
1983. 3.28  
2000. 4.25 (modified)  
Management Regulations Approved  
1983. 3.31  
2000. 6.16 (modified)  
Designated as the dam for "Act on Special Measures for the Reservoir Area Development"  
1974. 7. 2



#### Project and River

### Kawakami Dam

Aoyama-cho, Naga-gun,  
Mie Pref  
Maefukase River

#### Project Objectives

- 1. Flood control** 1,100m<sup>3</sup>/s → 150m<sup>3</sup>/s
- 2. Maintenance of normal river functions**
- 3. New Water Utilization**

Domestic Water	Mie Pref.	0.600m <sup>3</sup> /s
	Nara Pref.	0.300m <sup>3</sup> /s
	Hyogo Pref.	0.211m <sup>3</sup> /s
Total		1.111m <sup>3</sup> /s
- 4. Power Generation** 1,200kw (Mie Pref)

#### Project Description

- 1. Reservoir**

Catchment Area	55km <sup>2</sup>
Reservoir Capacity	33,000,000m <sup>3</sup>
Active Storage Capacity	31,200,000m <sup>3</sup>
Flood Control Storage	14,500,000m <sup>3</sup>
- 2. Dam**

Type	Gravity Concrete
Height	91m
Crest length	375m
Volume	606,000m <sup>3</sup>

**【Minister in Charge】**  
Minister of Land, Infrastructure and Transport  
**【Total Project Cost】**  
¥85.0 billion

**【Construction Period】** (estimated)  
1981-2004

**【Approval Dates】**  
Basic Plan Approved  
1982. 8. 3  
1994. 1.28 (modified)  
Execution Policy Directive Issued  
1992. 9.16  
1999. 6.28 (modified)  
Execution Plan Approved  
1993. 1.26  
1999.10.26 (modified)

Designated as the dam for "Act on Special Measures for the Reservoir Area Development"  
1993. 1. 22



#### Project and River

### Niu Dam

Yogo-cho, Ika-gun,  
Shiga Pref  
Takatoki River

#### Project Objectives

- 1. Flood control** 910m<sup>3</sup>/s → 190m<sup>3</sup>/s
- 2. Maintenance of normal river functions** (including emergency water supply during severe droughts)
- 3. New Water Utilization**

Domestic Water	Kyoto Pref.	0.200m <sup>3</sup> /s
	Osaka Pref.	2.474m <sup>3</sup> /s
	Hyogo Pref.	0.556m <sup>3</sup> /s
Total		3.23m <sup>3</sup> /s

#### Project Description

- 1. Reservoir**

Catchment Area	93km <sup>2</sup>
Reservoir Capacity	150,000,000m <sup>3</sup>
Active Storage Capacity	143,000,000m <sup>3</sup>
Flood Control Storage	33,000,000m <sup>3</sup>
- 2. Dam**

Type	Rockfill
Height	145m
Crest length	474m
Volume	13,900,000m <sup>3</sup>

**【Minister in Charge】**  
Minister of Land, Infrastructure and Transport  
**【Total Project Cost】**  
¥110.0 billion

**【Construction Period】** (estimated)  
1980-2010  
Received by WARDEC 1994. 4. 1

**【Approval Dates】**  
Basic Plan Approved  
1982. 8. 3  
1992. 4.16 (modified) 1994. 1.28 (modified)  
2001. 9.21 (modified)  
Execution Policy Directive Issued  
1994. 3.17  
Execution Plan Approved  
1994. 3.25

Designated as the dam for "Act on Special Measures for the Reservoir Area Development"  
1990. 3.26

Dams under construction, operated and maintained by the Ministry of Land, Infrastructure and Transport, In the Yodo River System.



### Amagase Dam

Uji-shi, Kyoto Pref.  
Yodo River (Uji River)



### Daidogawa Dam

Otsu-shi, Shiga Pref.  
Daio River



### Yonogawa Dam

Mino-shi, Osaka Pref.  
Ina River



### Amagase Dam Redevelopment

Uji-shi, Kyoto Pref.  
Yodo River (Uji River)