

Outline of Our Activities

Real-time information

Information on discharge and storage in Amagase Dam, which is managed by our office, is provided on a real-time basis.

What's New

You can check out our updated information.



Emergency Information

Information on discharge and emergency situations such as disasters is displayed.

Kids' Corner

The roles of the Yodo River Integrated Dams Control Office are explained in a manner that children can understand.

<http://www.kkr.mlit.go.jp/yodoto/>

淀川ダム

検索

To prevent accidents, we provide alarms and warnings before discharge from the dams.

We adjust the discharge volume from the dams according to the river level, flow rate and weather conditions. Before releasing a large volume of water from a dam, we will announce the release on the river information boards and by siren and loudspeaker because the downstream water level may suddenly rise to a dangerous level. To avoid an accident caused by discharge from a dam, pay attention to the warnings of water release when you are in an area downstream of a dam.

【River information board】



【Announcement by siren/loudspeaker】



When you hear a warning of discharge, you must evacuate the river promptly.

Kinki Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism

Yodo River Integrated Dams Control Office

10-1 Yamadaikemachi, Hirakata City, Osaka 573-0166 Tel: 072-856-3131

Amagase Dam Branch Office

15 Uji Kanaido, Uji City, Kyoto 611-0021 Tel: 0774-22-2188

We provide information on rainfall and water level across Japan on a real-time basis.

Real-time river disaster information provided by the Ministry of Land, Infrastructure, Transport and Tourism

<http://www.river.go.jp/>

【Cellphone website】

By taking a picture of the code on the right with your cellular phone, you can get access to the website easily. →

<http://i.river.go.jp/>



Kinki Regional Development Bureau,

Ministry of Land, Infrastructure, Transport and Tourism

Yodo River Integrated Dams Control Office

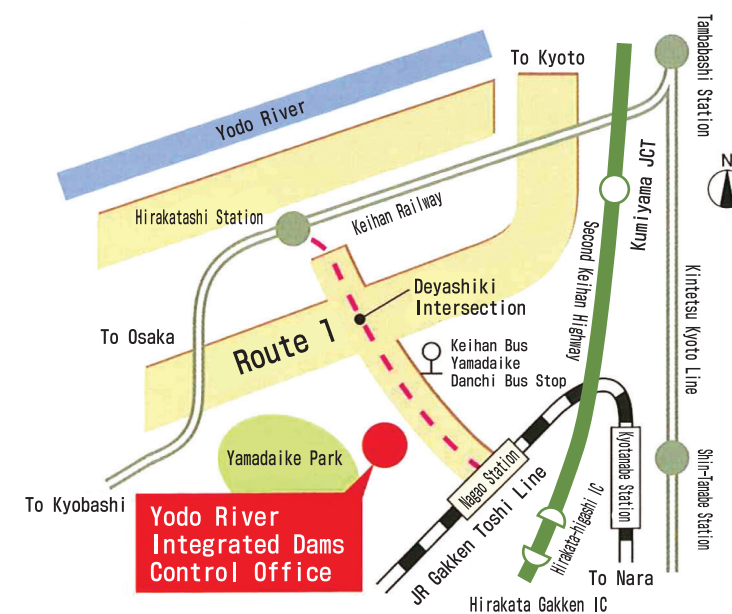
Watching the Rich Flow of Yodo River and Using it for Our Life

~Yodo River Integrated
Dams Control Offices~

We, the Yodo River Integrated Dams Control Office, are in charge of monitoring and controlling the flow of Yodo River.



【Access to the office】



Kinki Regional Development Bureau, Ministry of Land,
Infrastructure, Transport and Tourism

Yodo River Integrated Dams Control Office

10-1 Yamadaiketa-machi, Hirakata City, Osaka 573-0166
Tel.: 072-856-3131

【 By car 】

■ Access from Osaka

Take Route 1 towards Kyoto, turn right at the Deyashiki Intersection, and drive for approx. 3 minutes. Alternatively, take the Second Keihan Highway, exit at Hirakata Gakken IC, and drive towards Nagao Station/Yamadaike for approx. 10 minutes.

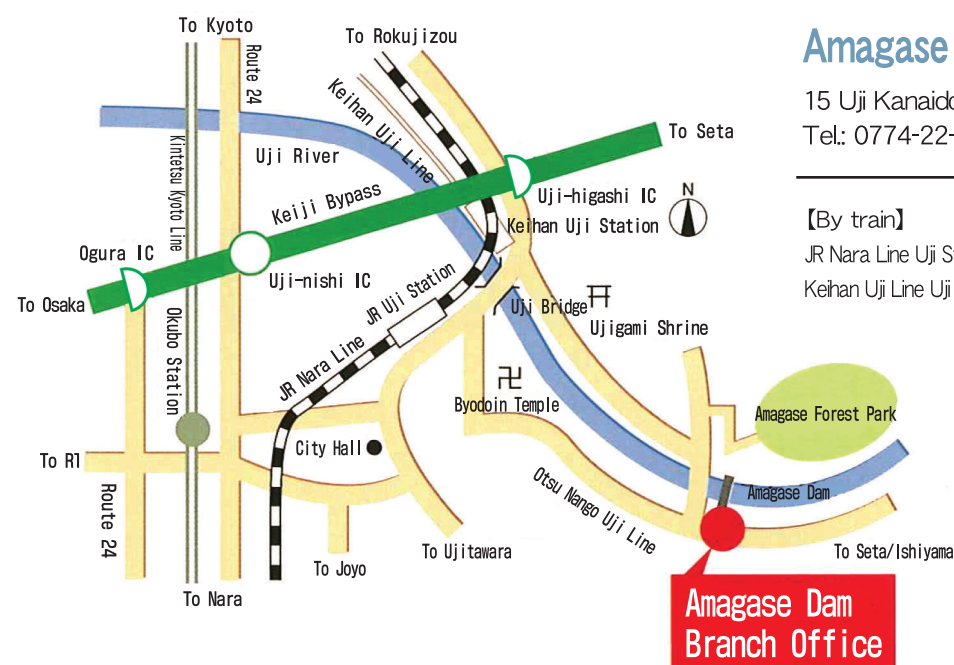
■ Access from Kyoto

Take Route 1 towards Osaka, turn left at the Deyashiki Intersection, and drive for approx. 3 minutes. Alternatively, take the Second Keihan Highway, exit at Hirakata-higashi IC, and drive towards Nagao Station/Yamadaike for approx. 10 minutes.

【By train】

JR Gakken Toshi Line Nagao Station → Take Keihan Bus to Yamadaike Danchi → About 5-minute walk

Keihan Line Hirakatashi Station → Take Keihan Bus to Yamadaike Danchi → About 5-minute walk



Amagase Dam Branch Office

15 Uji Kanaido, Uji City, Kyoto 611-0021
Tel.: 0774-22-2188

【By train】

JR Nara Line Uji Station → Take a taxi for about 10 minutes

Keihan Uji Line Uji Station → Take a taxi for about 10 minutes

Facilities of the office

Yodo River Integrated Dams Control Office



Amagase Dam Branch Office



The office has the following facilities.



Electronic computer system

Based on the collected information on the basin, electronic computers perform various calculations and processing for forecasting. The processed information is provided for the agencies involved in disaster prevention to be used for a wide range of purposes.



Operation room

In this room, which is used for integrated management, the status of the seven dams and two weirs in the Yodo River System are monitored and the information processed with the electronic computers is checked.



Exhibitions in the lobby

The works of the office and the Yodo River System are presented with panels and models. Video materials (VHS and DVD) are also available for rent.

History of the office

The office has operated since 1969 with the aim of managing the dams in the Yodo River System in an integrated manner.

1953	The dikes of Uji River were broken by Typhoon No. 13.	
1954		A basic plan for improving the Yodo River System and a plan for flood control with dams were made.
1959	Typhoon No. 15 (Ise Bay Typhoon)	
1961		The construction of Amagase Dam was launched.
1963		Seta River Weir (new) was completed.
1964		Amagase Dam was completed.
1969		The Yodo River Integrated Dams Control Office was established for the integrated management of Seta River Weir, Amagase Dam, Takayama Dam, Shorenji Dam, and Murou Dam.
1970		Shorenji Dam was completed.
1974		Murou Dam was completed
1982		Miyama radar rain gauge was completed and started the operation.
1988		Amagase Forest Park was opened with Amagase Dam Lake nicknamed "Hououko" (phoenix lake).
1992		Nunome Dam was completed, and the bypass channel of Seta River Weir was completed.
1994	Drought in Yodo River; the water level in Lake Biwa declined to the lowest level of -123 cm.	
1998		Hiyoshi Dam was completed.
1999		Integrated management of Hinachi Dam was started.

Features of the area

The sources of the three upper streams of Yodo River are remote from each other, and each of them is therefore influenced by different conditions such as climate and topography.

The source of Uji River is Lake Biwa, which is adjacent to Ibuki Mountains, Suzuka Mountains, and Hira Mountains and receives a large amount of water from melting snow on those mountains.

The upstream of Kizu River is in Takami Mountains, where the river flow often increases during the typhoon season, while the flow volume tends to be larger in the rainy season in Tamba Mountains, from which Katsura River flows.

Thus, since the three rivers possessing different characteristics converge to form the main stream of Yodo River, the flow rate is relatively stable throughout the year.

Outline of Yodo River

Yodo River is located in the center of the Kinki Region, and its source is Lake Biwa, the largest lake in Japan. The water of Lake Biwa flows through Seta River and Uji River, and then converges with the water of Kizu and Katsura rivers near the border of Kyoto and Osaka Prefectures to form the main stream of Yodo River and flow across the Osaka Plain. Yodo River is large with a total length of 75 km from Lake Biwa to Osaka Bay and a basin area of 8,240 km² including the rivers flowing into Lake Biwa and the upper streams of Kizu and Katsura Rivers.

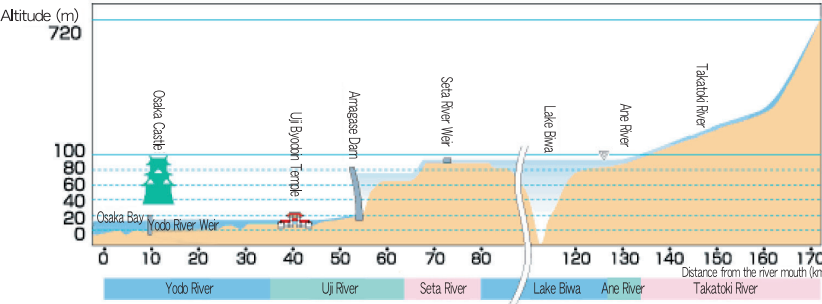
①Basin area	8,240km ²	7th largest in Japan (1st is Tone River with an area of 16,840 km ²) Lake Biwa basin : 3,802 km ² Uji River basin : 506 km ² Kizu River basin : 1,647 km ² Katsura River basin : 1,152 km ² Basin of the lower stream of Yodo River : 521 km ² Kanzaki River basin : 612 km ² (including Iha River basin with an area of 383 km ²)
②No. of rivers in the basin	963 rivers	1st in Japan (2nd is Shinano River with 881 rivers)
③Annual average rainfall in the basin	1,446mm	Highest (Nakakawachi in 1965): 4,052 mm Lowest (Kameoka in 1994): 773 mm
④Population in the basin	Approx. 12 million	About 10% of the total population of Japan, and more than half of the total population of the Kinki Region
⑤No. of municipalities in the basin	82	54 cities, 24 towns, and 4 villages

Source: ①"Current River State Survey 1991" ②"River Handbook 2007" ③"River Manual 2006" ④"Population Census of Japan 2005" ⑤"Basic Policy of River Development in the Yodo River System 2009"

Gradient of Yodo River

(Osaka Bay ~ Amagase Dam ~ Lake Biwa ~ Takatoki River (headwaters))

The surface of Lake Biwa is at an altitude of about 84 m, which is equivalent to the height of the tower of Osaka Castle. The upstream and downstream, which are bordered by Amagase Dam located in the upper stream of Uji River, have an altitude difference of around 50 m. After Amagase Dam, the river water flows on a gentle slope until reaching the river mouth.



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【Ruins of Naniwa Palace on the Uemachi Plateau (Chuo Ward, Osaka)】



Restored Daikoku-den (Main Hall)

Yodo River has supported people's life since the early times

People have lived around Yodo River and Lake Biwa since ancient times and obtained food by fishing from the river and lake.

After rice cultivation was introduced, they started to settle down in flatlands to find the production sites. The fertile soil created by Yodo River fed the people, and the population began to grow.

Then, the rich production capacity led to the birth of a nation, and the mouth of Yodo River played a major part in politics with Naniwa Palace during the Asuka and Nara Periods. The Yodo River basin, in which Nagaoka and Heian capitals were established, continued to flourish as the political, economic, and cultural center of Japan.

Yodo River supplies water to approximately 17 million people

The Lake Biwa and Yodo River Basin stretches over the six prefectures of Osaka, Hyogo, Kyoto, Shiga, Nara and Mie, and constitutes the social, economic and cultural foundation of the Kinki Region.

The basin embraces a population of some 12 million (as of 2006), which is larger than any other water systems in Japan. The population in the area receiving the water supply is approximately 17 million.

Around 8.7 billion m³ of water annually flows through Yodo River, and is also used for agricultural and industrial purposes. Thus, the water in the Yodo River System is a crucial infrastructure that supports our life and industry.

【Active water transport in Yodo River in the past】



A narrow boat and a food vendor boat cruising the river (Yodobagawa (Yodo River) from the series Kyoto meisho no uchi (famous places of Kyoto) by Utagawa Hiroshige)

Yodo River was the main transport artery to deliver goods and culture

Supporting the growth of the capitals, river water transport in Yodo River was fully developed during the reign of Toyotomi Hideyoshi. Then, in the Edo Period, the water transport network of rivers and canals was improved, which further activated the river water transport.

Narrow boats (called "sanjukkoku bune") connected Hachikenya-hama in Osaka and Fushimi in Kyoto in a short time and transported a large number of goods and travelers in Yodo River. Boats selling food to passengers on the sanjukkoku bune (called "kurawanka bune") also appeared in the river.

Osaka prospered as a cargo transport hub to receive goods from other parts of Japan and grew to be a major commercial city nicknamed "the kitchen of the nation." The areas along Yodo River that functioned as transit points for river water transport also developed into major posting stations and marketplaces.

Yodo River played a pivotal role in the delivery of culture and information as well as people and goods as the main transport artery connecting the capitals with the estuarine area, which was a front door for diplomacy and transportation.

【Area receiving water supply from Lake Biwa and Yodo River】



Boundary of the basin
Area receiving water supply from the Yodo River System

Source: Kinki Regional Development Bureau, Ministry of Land, Infrastructure, Basic Policy of River Development in the Yodo River System 2009

Efforts to revitalize the dam reservoir areas

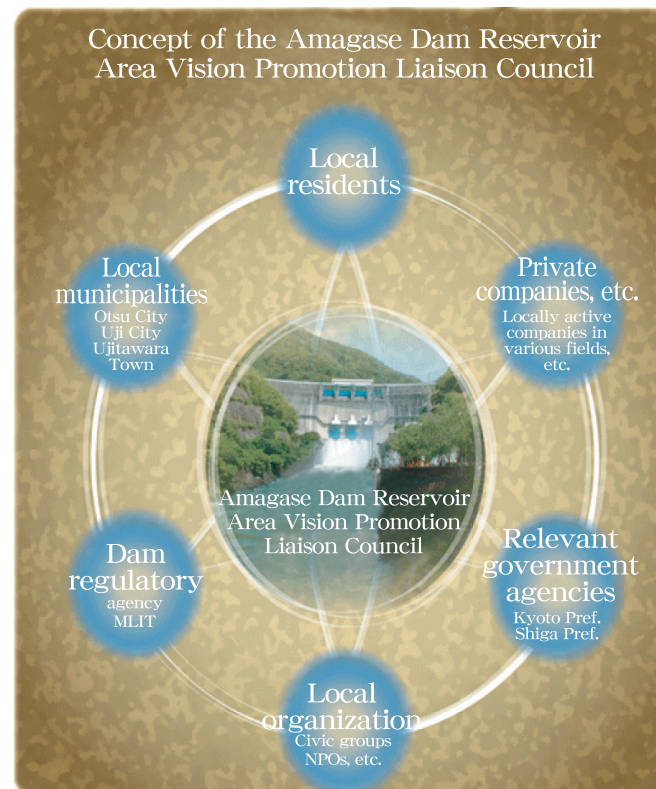
The reservoir areas will be revitalized by utilizing of the dam

Amagase Dam Reservoir Area Vision

The Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has formulated the "reservoir area vision" to promote the self-reliant and sustainable revitalization of each reservoir area of the dams controlled by the ministry or the Japan Water Agency by utilizing of the dams in cooperation with the local governments and residents.

Areas subject to the Amagase Dam Reservoir Area Vision:

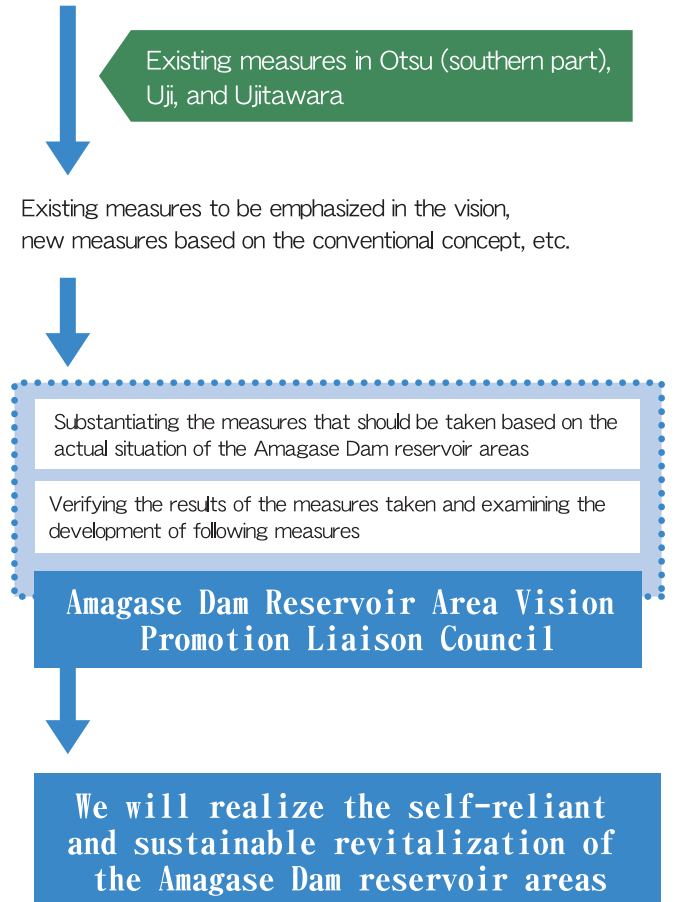
2 cities and 1 town : Otsu (southern part), Uji, and Ujitawara



Theme 1	Theme 2	Theme 3
Sustainable growth and conservation of the natural environment in the areas including forests and watersides	Revitalization of the two cities and one town utilizing their respective cultural, historical, and industrial features	Consideration for the establishment of a river-based network for mutual exchange and cooperation in the basin

Basic themes of the Amagase Dam Reservoir Area Vision

- Sustainable growth and conservation of the natural environment including forests and watersides
- Revitalization of the areas utilizing cultural, historical, and industrial features
- Establishment of a river-based network for mutual exchange and cooperation in the basin



Applications for the Amagase Dam guided tour and open lectures/delivery lectures are being accepted any time!

【How to apply】

Please give us a call first at the following number:

- ◆For application for the tour of Amagase Dam, call the Amagase Dam Branch Office at 0774-22-2188.
- ◆For application for open lectures/delivery lectures, call the Yodo River Integrated Dams Control Office at 072-856-3131.

For details, please see our website:

<http://www.kkr.mlit.go.jp/yodoto/>

Efforts to provide information

Office facilities are used as open classrooms

Open lectures

Easily understandable lectures are given at the Yodo River Integrated Dams Control Office to explain the mechanism of the water management of the Yodo River System.



【Subjects of the lectures】
◆Basic knowledge on meteorology
◆Flooding and drought in the Yodo River System
◆Dams in the Yodo River System and the mechanism of water management, etc.

Lecturers are sent to schools to provide comprehensible explanations

Delivery lectures

Our staff visit civic groups, incorporated schools, local public organizations, public interest corporations, etc. and present the functions and effects of dams in an easy-to-understand format.



【Subjects of the lectures】
◆Basic knowledge on meteorology
◆Functions and effects of Amagase Dam
◆Roles and functions of the Yodo River Integrated Dams Control Office, etc.

The roles and functions of the dam are introduced

Amagase Dam guided tour

Applicants can join a guided tour at Amagase Dam and learn the roles and functions of the dam in an easy-to-understand manner.



Work experience is provided for junior high school students

Learning through work experience

For the work experience program at municipal junior high schools in Uji City, we offer opportunities to experience dam control operations at Amagase Dam so that the students can understand the roles and significance of social infrastructure.

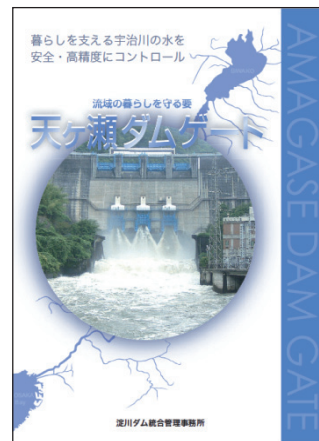
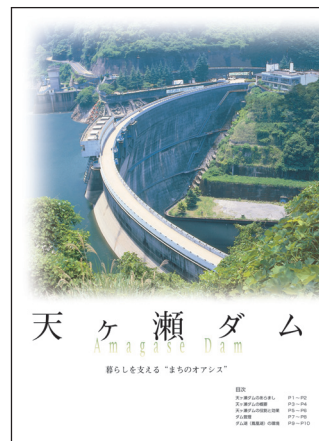


Preparation of pamphlets

We prepare various pamphlets to clearly explain the services of our office, the functions of the dams, etc.

>The pamphlets can be downloaded in a PDF format from our website:
<http://www.kkr.mlit.go.jp/yodoto/panflet.html>

>If you require maps, brochures, etc., please call the Yodo River Integrated Dams Control Office:
Tel: 072-856-3131



Dam card→



A "Violent" Aspect of the Generous Big River



A plain is always fraught with a flooding risk

The Osaka Plain, which includes the economic center of the Kinki region, is an alluvial plain formed by the deposition of Yodo River sediments.

When a river is swollen, the water overflowing the banks flows on an alluvial plain while changing the course freely. This is a mechanism intrinsic to rivers and has a function to create new land.

People have settled down in plains, which are suitable for agriculture because of easy access to water, and developed towns since early times. However, the ground is low by its nature and always has a risk of flooding.

Floods can also occur frequently in the upstream part of the Yodo River System

The main cause of flooding in the upstream part of a river is the narrowing of the river width.

In such narrowed sections, a large volume of water cannot flow at a time. At the time of heavy rain, therefore, the river channels at the sections have insufficient capacity for water flowing from upstream, which causes flooding.

The Yodo River System also has three narrowed sections: Hozu Gorge of Katsura River, Shishitobi Gorge of Seta River, and Iwakura Valley of Kizu River. These upstream areas have suffered from flooding for many times.

The battle against water has a long history

Yodo River has the longest history of flood control in Japan with its first dike, Manda-no-Tsutsumi (Manda Levee), built in the reign of Emperor Nintoku (around A.D. 320).

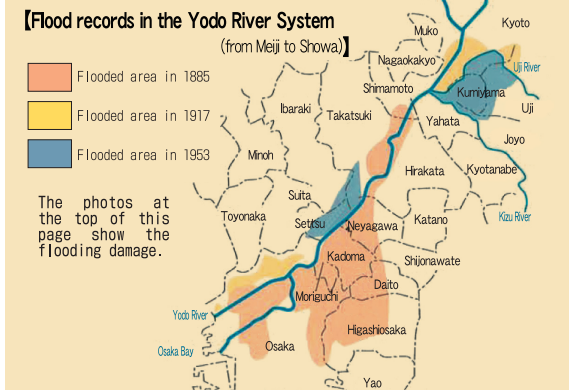
Since the modern times, a great number of large-scale flood control works have been performed in the river system, including the separation of Ogura Pond from Yodo River by Toyotomi Hideyoshi, construction of Bunroku Dike, excavation of Aji River, and re-routing of Yamato River.

A Dutch engineer Johannis de Rijke, among others, introduced western civil engineering technology to Japan in the Meiji Period, which was used to turn Yodo River into a modern form.

In the Showa Period, dams started to be fully used for flood control in addition to traditional measures.

Column Major floods in the Meiji, Taisho, and Showa Periods

The typhoons/rainstorms that hit the Yodo River System inundated the basin in 1885(the 18th year of the Meiji Period), 1917 (the 6th year of the Taisho Period), and 1953(the 28th period of the Showa Period) and caused flooding damage to the areas along the river.



Source: Kinki Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism, "Lake Biwa/Yodo River"

Nine Dams and Weirs Pro

Water management in response to topographical and other conditions

The need of flood control by dams was first considered when Typhoon No. 13 of 1953 caused severe floods along the Yodo River System.

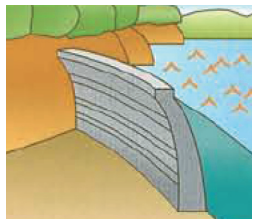
Since the construction of Amagase Dam in 1964, seven dams have been built in the Yodo River System. The current reservoir capacity is approximately 230 million m³ in total (which is equivalent to 2.6% of the annual water supply from Yodo River).

In addition, the water flow from Lake Biwa, the largest lake in Japan, is carefully adjusted with the operation of the Seta River Weir. The dams and weirs make use of the respective topographical and rainfall conditions, and control the water volume of Yodo River in a coordinated manner.

Types of dams in the Yodo River System

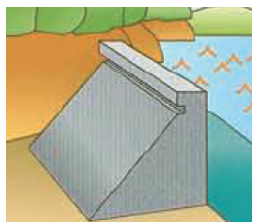
Arch dam

This type of dam is built in an arch shape so that the rock foundation on both banks withstands the pressure of the water stored in the dam. An arch dam is suitable for construction in a narrow V-shaped valley. In comparison with a gravity dam, this type requires sound rock foundations, but the dam can be thinner, which reduces the amount of construction material.



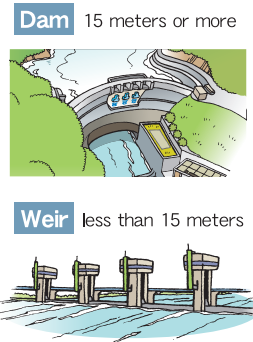
Gravity dam

A gravity dam withstands the pressure of the water stored in the dam by its own weight. This is the most common type in Japan. The simple shape allows the dam to be constructed to fit in various landforms.



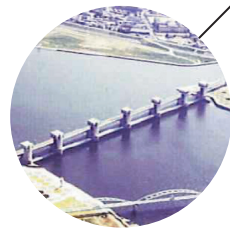
Difference between dams and weirs

Dams and weirs both hold back the water flow of a river and store and discharge to control the river volume. Their functions are similar. When the purpose of the structure is water utilization and the height (from the foundation ground to the crest) is 15 meters or more, it is called a dam, while it is called a weir when the height is less than 15 meters.



Hiyoshi Dam

Location: Hiyoshi-cho, Nantan City, Kyoto
Basin area: 290 km²
Type: Concrete gravity dam
Height: 67.4 m Crest length: 438.0 m
Date of completion: March 1998



Yodo River Large Weir

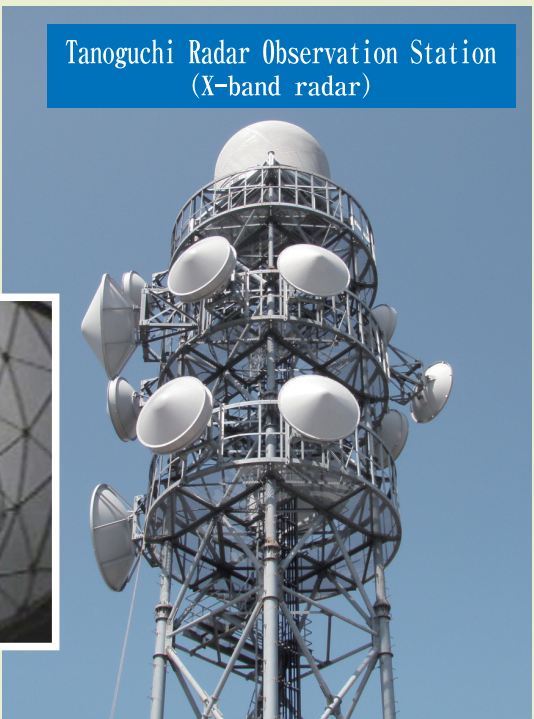
Location: Osaka City, Osaka
Type: Shell type roller gate
Date of completion: March 1984



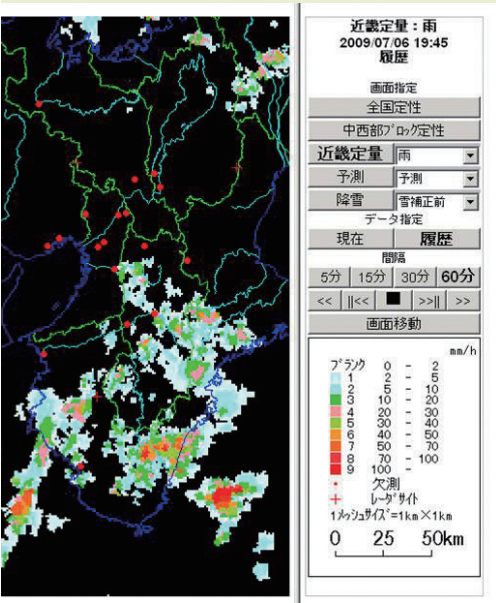
Miyama Radar Observation Station (C-band radar)



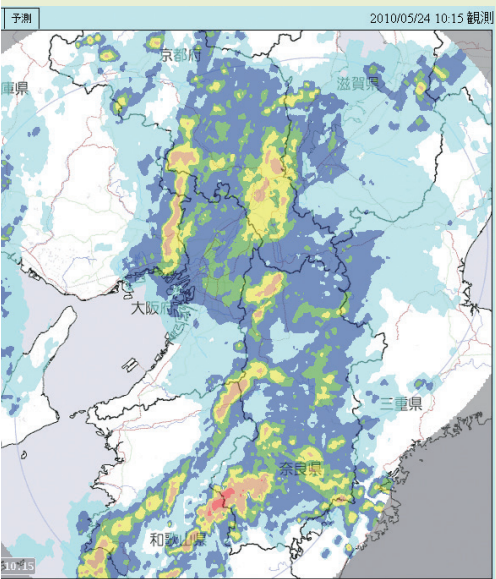
Antenna in the dome of Miyama Radar Station



Tanoguchi Radar Observation Station (X-band radar)



Example of display on C-band radar screen



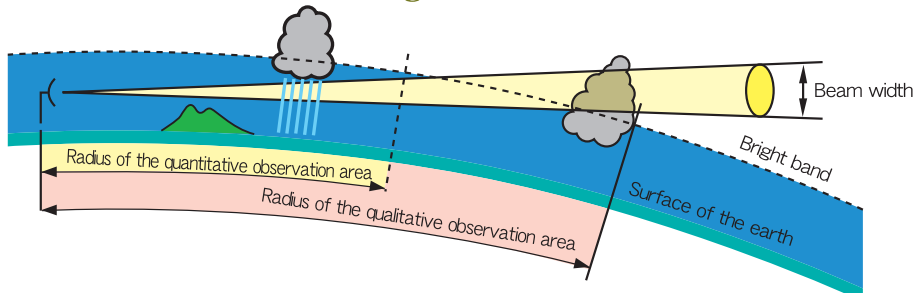
Example of display on X-band radar screen

Comparison between C-band radar and X-band radar

C-band radar and X-band radar have respective advantages and disadvantages. C-band radar is installed at the points where it can measure a wide area while X-band radar is placed to cover major cities such as Osaka, Kyoto, and Kobe in the observation range to minimize the damage caused by concentrated torrential rain, which frequently occurs these days.

Comparison item	C-band radar	X-band radar	Characteristics of X-band radar
Observation frequency	Every 5 minutes	Every minute	Local heavy rain and concentrated downpour can be observed quickly.
Mesh data	1km	250 to 500m	Local rainfall intensity can be identified in more detail.
Observation method	Single polarization [Miyama] Multi-parameter radar (double polarization) [Jogamori-yama]	Multi-parameter radar (double polarization)	The accuracy in the observation of rainfall can be improved by identifying the shape of raindrops with vertical and horizontal (double) polarization.
Quantitative observation range	Approx. 120km	Approx. 60km	The observation range is smaller due to attenuation by rainfall, etc.

Radar observation range



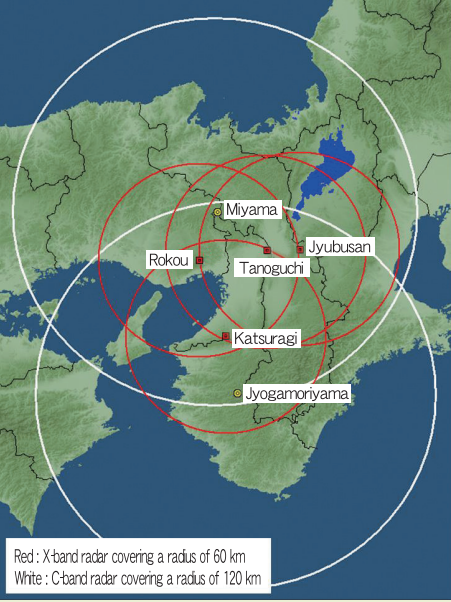
Although the radio wave emitted from radar travels in a straight line, it moves away from the land surface with increasing distance from the observatory because the earth is round. Since raindrops are in the form of ice in the cold sky, it is preferred to perform observation below the border where the ice turns into rain (called bright band). Accordingly, the range where rainfall intensity, rain distribution, and movement of the raining area can be roughly measured is set as the radius of the qualitative observation area, and the range where rainfall intensity can be measured with high reliability as the radius of the quantitative observation area.

4 Observation of precipitation with radar

We watch the formation and development of rain.

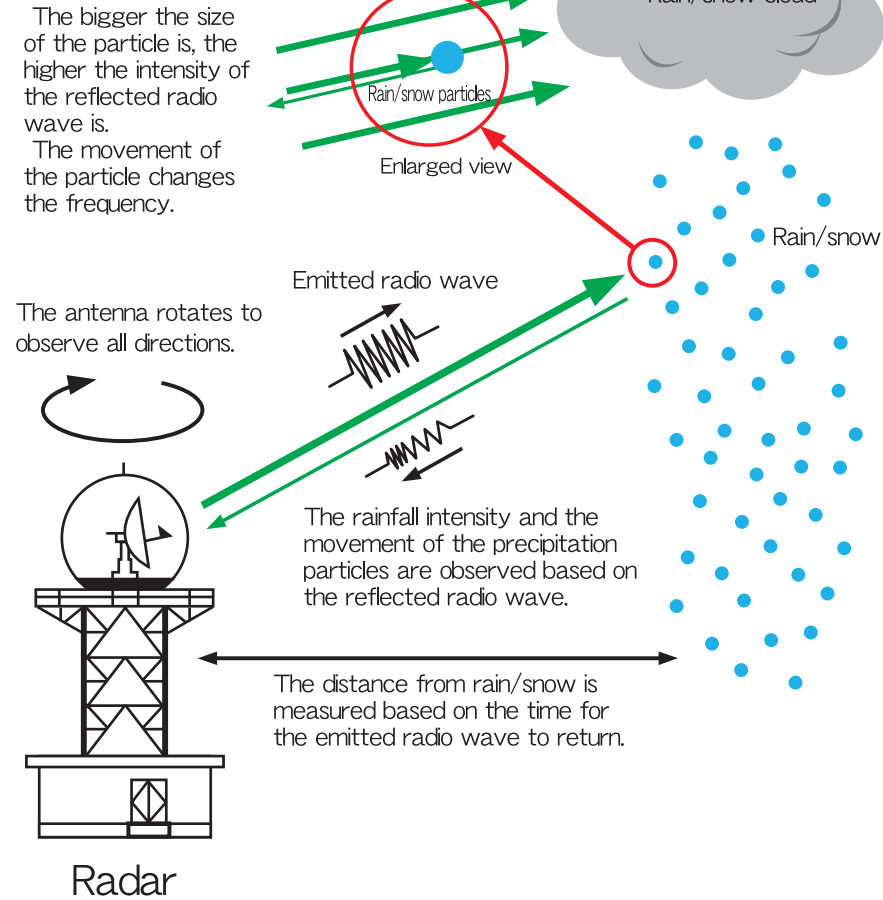
To perform high-level water management and improve the accuracy of the disaster prevention system, we operate a radar rain gauge system that can identify rain horizontally.

Based on the observation data, detailed information on the status and range of rainfall and direction and velocity of the movement is provided and used for safety measures in the whole Kinki Region.



The radar rain gauge system for the Kinki Region observes rainfall intensity based on the measurement data from two C-band radar observation stations and four X-band radar observation stations.

How rain is observed with radar



The radar observes precipitation by rotating the antenna in a horizontal direction and emitting pulsed radio wave hundreds of times per second. The emitted radio wave returns as reflected wave (echo) after it hits a raindrop, etc.

The intensity of the reflected wave is used to measure the rainfall intensity because they have a proportional relation.

Supply of observation data

The rainfall data observed with the radar rain gauge system are visually transformed and published on the Internet.

The administrators of roads and rivers (national, prefectural, and municipal governments, etc.) use the published information for traffic regulation and the confirmation of safety in river basins.

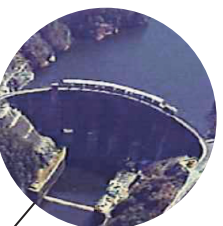
> The radar information is provided in the website of the Ministry of Land, Infrastructure, Transport and Tourism on the real-time river disaster information:
<http://www.river.go.jp/>

Protect People's Lives



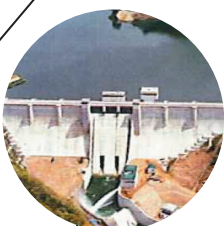
Seta River Weir

Location: Otsu City, Shiga
Baisn area: 3,848 km² Lake area: 680 km²
Total reservoir storage: 27.5 billion m³
Type: [Main weir] Double roller gate
[Bypass channel] Triple roller gate
Date of completion: March 1961
(the bypass channel was completed in March 1992)



Takayama Dam

Location: Minamiyamashiro-mura, Soraku-gun, Kyoto
Baisn area: 615 km²
Type: Concrete gravity arch dam
Height: 67.0 m Crest length: 208.7 m
Date of completion: August 1969



Hinachi Dam

Location: Nabari City, Mie
Baisn area: 75.5 km²
Type: Concrete gravity dam
Height: 70.5 m Crest length: 355.0 m
Date of completion: March 1999



Shorenji Dam

Location: Nabari City, Mie
Baisn area: 100 km²
Type: Concrete arch dam
Height: 82.0 m Crest length: 275.0 m
Date of completion: December 1970



Murou Dam

Location: Uda City, Nara
Baisn area: 169 km²
Type: Concrete gravity dam
Height: 63.5 m
Crest length: 175.0 m
Date of completion: March 1974



Nunome Dam

Location: Nara City, Nara
Baisn area: 75 km²
Type: Concrete gravity dam
Height: 72.0 m Crest length: 322.0 m
Date of completion: March 1992



Amagase Dam

Location: Uji City, Kyoto
Baisn area: 4,200 km²
(Lake Biwa: 3,848 km², Direct: 352 km²)
Type: Concrete arch dam
Height: 73.0 m Crest length: 254.0 m
Date of completion: November 1964

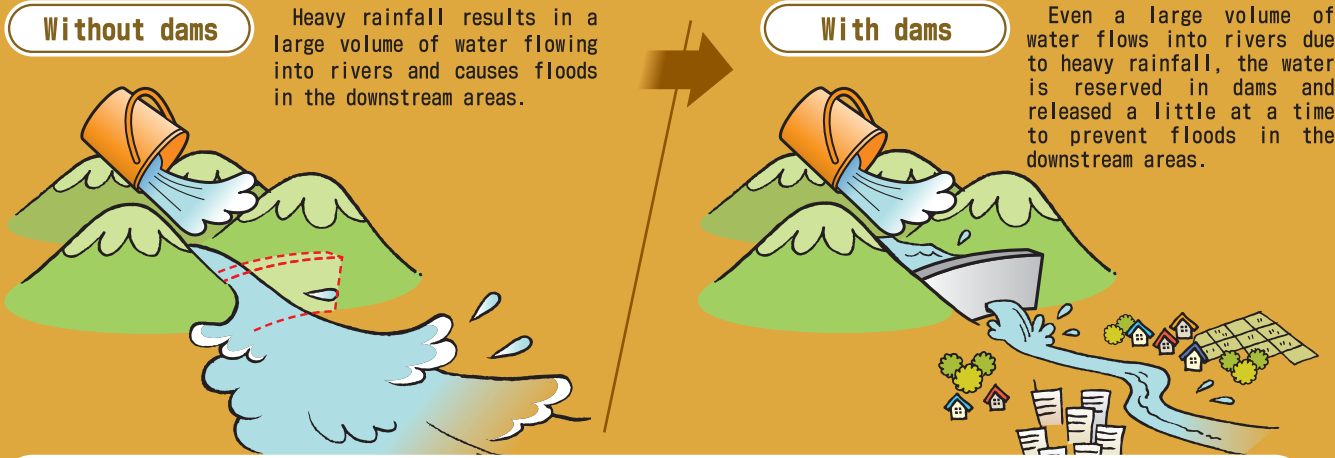


1 Flood Control

Dams adjust the river flow at the time of heavy rain and reduce the impact on the downstream areas.

◎ To protect the public from the threat of floods Rivers and dams prepare for heavy rain

When the volume of the water flowing into a dam exceeds a certain level due to heavy rain and other causes, part of the water is reserved in the dam and released a little at a time to prevent floods in the downstream areas. This is called flood control, an important function of dams.



Since dams always release a smaller volume of water than the inflow, the downstream areas will not be flooded.

Column Rivers share the water with dams.

In the Yodo River System, the rivers share the water with dams to adjust the flow rate.

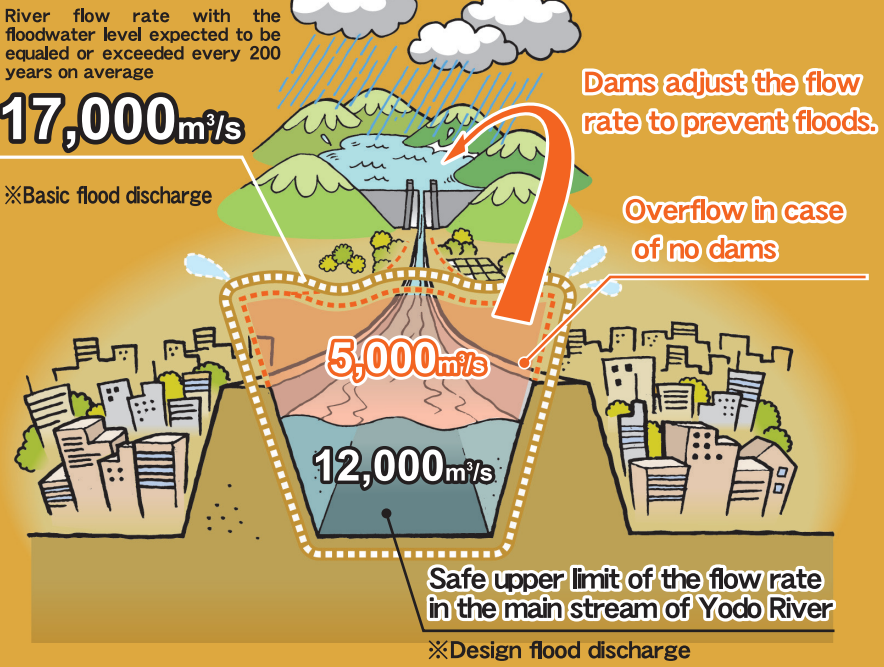
As a result of various previous river improvement works (embankment, river widening, dredging, etc.), the safe upper limit of the flow rate in the main stream of Yodo River is currently set to be 12,000 m³/s.

Dams have been constructed upstream to share the water with the rivers and prevent water more than 12,000 m³/s from flowing into the main stream even in heavy rain.

17,000m³/s

||

Water volume equivalent to approximately 50 standard 25m swimming pools per second

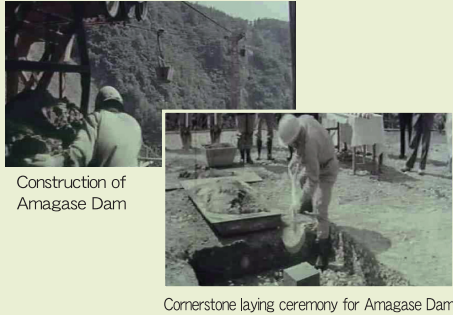


In Hirakata (the reference point for the measurement of water level of the main stream of Yodo River), the basic flood discharge, which is used as a basis for the flood control plan, is set to be 17,000 m³/s based on the highest possible flow rate with the floodwater level expected to be equal or exceeded every 200 years on average. As 5,000 m³/s is temporarily reserved in upstream dams and others for adjustment, the design flood discharge, which is used as a reference for river construction works, is set to be 12,000 m³/s.

※Basic flood discharge: the quantity of with no flow control facilities, such as dams, etc. ※Design flood discharge: the quantity of when flow control facilities, such as dams, etc., function as planned.

construction

Uji River, a component of the Yodo the river is called Seta River, which Lake Biwa. Amagase Dam was initiated as a caused by Typhoon No. 13 in than 40 years since its completion the safety of the downstream the river.



Cornerstone laying ceremony for Amagase Dam

1953	Typhoon No. 13 of the season caused unprecedented flood damage.
1954	The basic plan for improving the Yodo River System, which included flood control by dams, was decided.
1957	The construction of the dam was launched.
1959	The acquisition of the site was completed. The basic plan on constructing Amagase Dam was noticed.
1964	Amagase Dam was completed.

Main Services of Amagase Dam

Management of the dam facilities

Inspection, maintenance, and repair activities are conducted to secure the safety of the area around the dam body and reservoir and ensure that the gates and other facilities can be operated properly at any time. The pieces of driftwood and other trash flowing into the reservoir are also removed and disposed of to prevent them from disrupting the gate operation.

Gate operation, patrol, etc.

Water management operations such as the observation and control of water flow are performed to ensure that the dam can work effectively for its functions such as flood control and water supply.

Other services include communication of water discharge to relevant agencies, issuance of water discharge warnings for the downstream areas, and the patrol of the areas.

Measurement of the volume of sediment

(earth and sand deposited in the reservoir)

The volume of the sediment is measured in the dam. The total volume of the sand deposited by fiscal 2009 was 4.2 million m³, which was equivalent to 70% of the sediment capacity (6.0 million m³).

Water quality survey

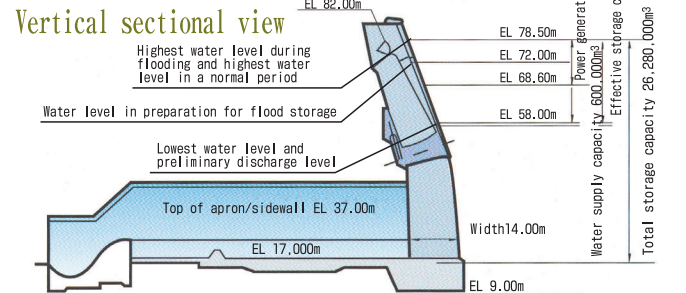
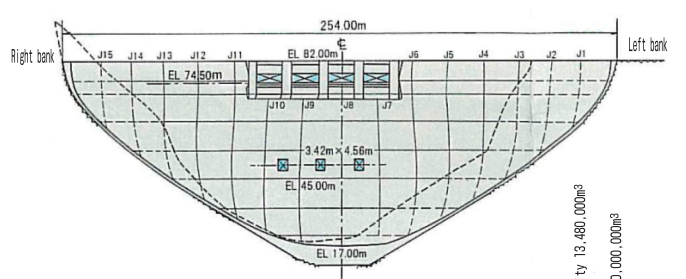
The water quality is surveyed regularly at seven points in the upstream of the dam (dam site, Omine Bridge, Shishitobi Bridge, Tawara River, Sotsuka River, Oishi River, and Shigaraki River) and one point in the downstream (Hakko Bridge).



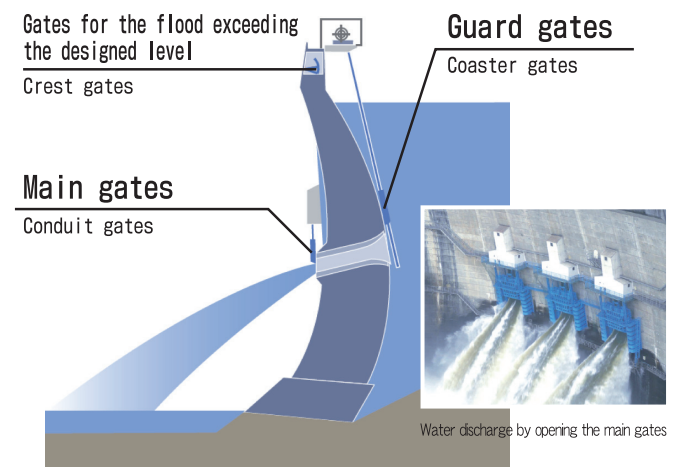
Type	Dome-shaped arch concrete dam	Use	Flood control, water supply, and power generation
Height	73m	Total storage capacity	2,628(ten thousand m³)
Crest length	254m	Effective storage capacity	2,000(ten thousand m³)
Volume	Main dam body:121,500m³ Apron of secondary dam: 42,500m³	Flood control capacity	2,000(ten thousand m³)
Catchment area	4,200km²	Water use capacity	1,408(ten thousand m³)
Reservoir area	1.88km²		Power generation capacity:1,348(ten thousand m³) Water supply capacity: 60(ten thousand m³)
Flood control	Inflow rate Adjusted rate		1,360m³/s 520m³/s
Power generation	Maximum output		92,000kW(Amagase Power Station) 466,000kW(Kiseniyama Power Station)
Water supply	Water intake		0.3m³/s(Provisional water utilization: 0.9m³/s)
Water discharge facilities	Gates for the flood exceeding the designed level (Crest gates)		10.0m(width)×4.357m(height)×4gates
	Main gates (Conduit gates)		3.42m(width)×4.56m(height)×3gates
	Guard gates (Coaster gates)		5.13m(width)×7.395m(height)×3gates

Main facilities of Amagase Dam

Front view from the downstream side



Dam gates

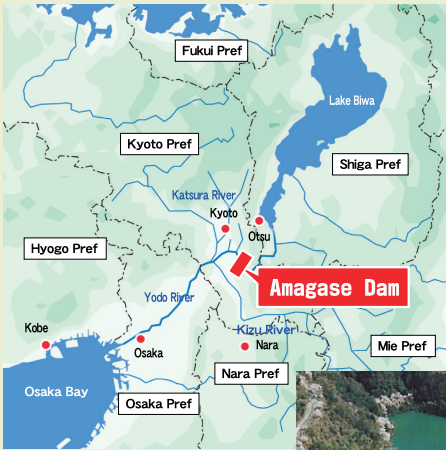


③ Management of Amagase Dam

The office adjusts the river water volume with the dam located downstream of Lake Biwa.

Among the dams in the Yodo River System, Amagase Dam is under the direct control of the Yodo River Integrated Dams Control Office.

Amagase Dam is located downstream of Lake Biwa. Only 2.3 km downstream of the dam lies Uji City, which has abundant tourist resources, and Kyoto, Osaka, and other major cities are further downstream. As the closest dam to these big cities, Amagase Dam works effectively to prevent flood damage to them.



Amagase Dam

River name: Yodo River (Uji River)
Location: Uji City, Kyoto
Date of completion: November 1964

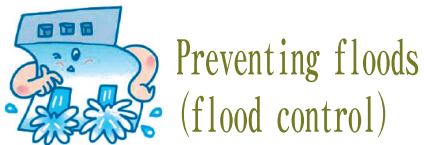


Background of the of Amagase Dam

Amagase Dam is located on River System. The upstream of is the only river flowing from

The plan to construct result of the flood damage September 1953. For more in 1964, the dam has ensured areas and stable water flow in

Functions of Amagase Dam



Preventing floods (flood control)

At the time of heavy rain caused by a typhoon or other weather conditions, the large volume of water flowing into Uji River is stored in Amagase Dam, and discharged to the downstream a little at a time to prevent flood damage of Uji and Yodo Rivers.



Supplying drinking water (water supply)

Part of the water flowing into Amagase Dam is stored for domestic use. The water is supplied to Uji, Joyo, Yawata, and Kumiya in Kyoto Prefecture, and about 360,000 people use the water.



Generating electricity (hydro power generation)

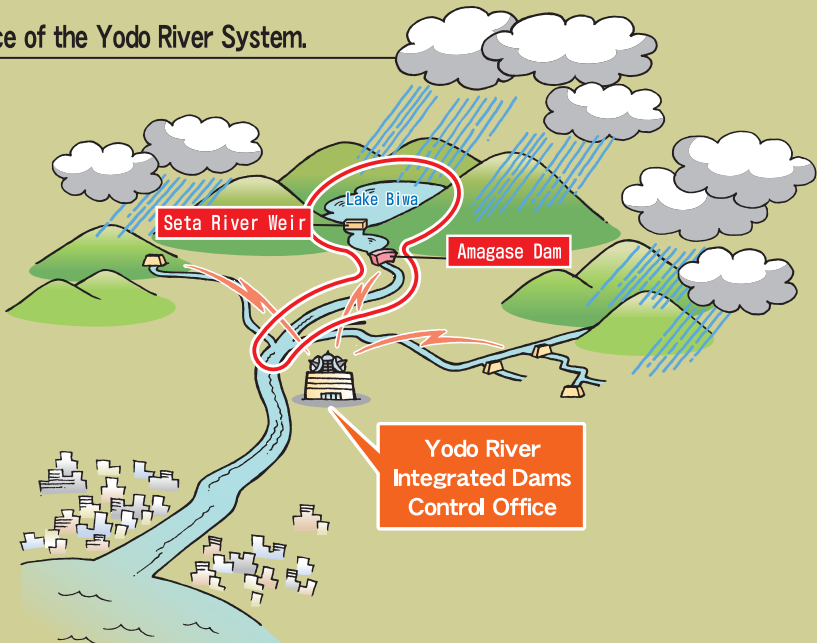
The water in Amagase Dam is also used for power generation. The Amagase Power Station just below the dam generates electricity that can be used by up to 100,000 people. In addition, the Kisenyama Power Station upstream of the dam generates electricity that can be used by up to 500,000 people.

Amagase Dam works to maintain the overall balance of the Yodo River System.

The gates of Amagase Dam are operated not independently by the dam office but under the direction of the Yodo River Integrated Dams Control Office.

Since Amagase Dam is located midway between Lake Biwa (upstream) and Yodo River (downstream), the discharge volume is always determined in consideration of the balance between the upstream and downstream flow.

Especially when the dam works for flood control, the gate operation is coordinated with the operation of Seta River Weir, which controls the outflow from Lake Biwa, so as to efficiently lower the water level of downstream Yodo River while making maximum use of the water storage capacity of Lake Biwa.



How to control floods

What if a typhoon or rainstorm comes?

The flood control procedures are as follows.

1 Forecast of rainfall and floods

Using the information collection systems presented below, we estimate the water volume flowing into dams, river level, and flow rate among others.

River information system

This system receives data such as:
- Rainfall in different points in the Yodo River System
- River water levels
- Reservoir water levels in the dams



Radar rain gauge system

This system receives precipitation information in the Kinki Region.



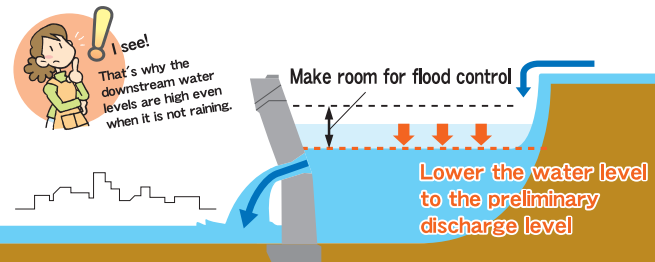
Meteorological Information system

This system receives data from the Japan Meteorological Agency.



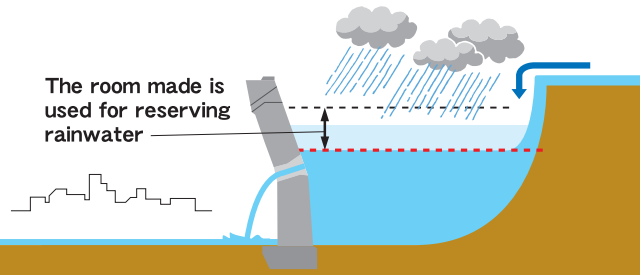
2 Preliminary discharge

When a dam lake is filled with water, it cannot be used for flood control. Therefore, we release water from the dam in advance to lower the water level and make room for flood control. As a result of this preliminary discharge, the downstream water levels may rise even without rainfall.



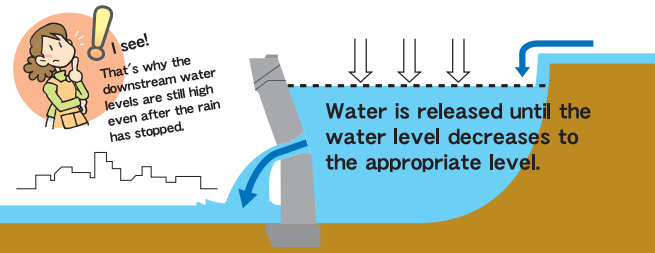
3 Flood control

When a typhoon or heavy rain comes, the volume of water flowing into dams starts to increase. The room made by the preliminary discharge is used for reserving part of the inflow water until the downstream water levels begin to lower.



4 Subsequent discharge

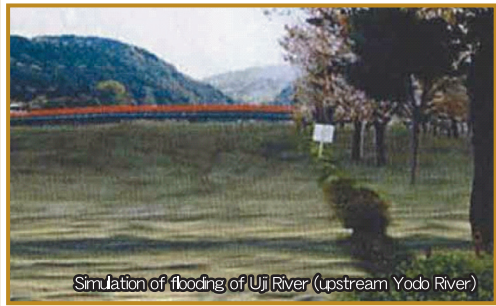
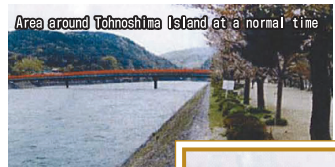
Even after the typhoon or heavy rain has passed, the dam still holds a large volume of water. Therefore, the water is then released until the water level decreases to the appropriate level to prepare for following rainfall. As a result of this subsequent discharge, the downstream water levels may remain high for a while.



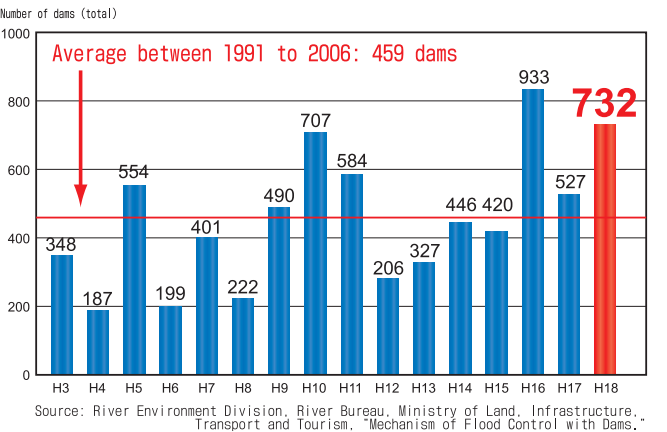
Effect of flood control

Flooding of the downstream areas is minimized with flood control operations.

The picture below shows a simulation of Uji River flooding on a scale equivalent to the floodwater that could have been caused by the 10th typhoon of 1982. Such flooding was prevented by flood control with the upstream Amagase Dam.



Flood control operations were performed 732 times in the dams all over Japan during the year of 2006.



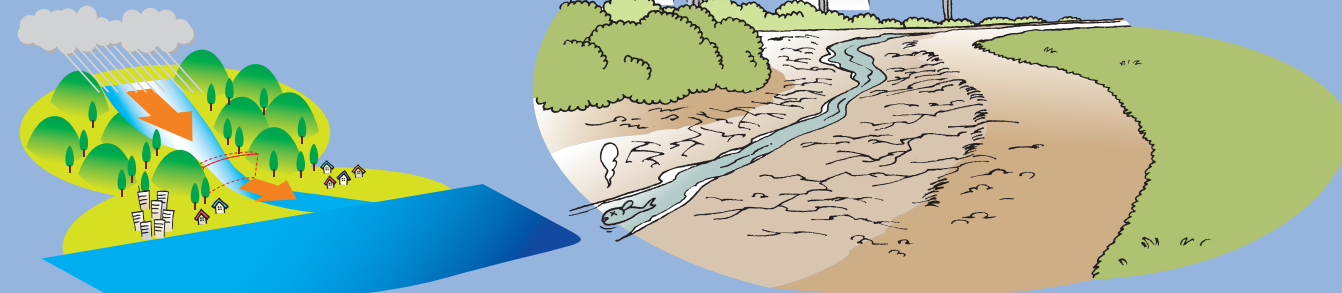
② Water Use

Dams ensure a stable volume of water throughout the year.

For the steady use of water resources Dams play a major role in ensuring a stable volume of stream

Japan is rich in rainfall, but most of the rainfall would flow into the sea without being used if the rivers were in a natural state because the topography is precipitous and the rivers are relatively short in the country. In addition, the significant seasonal fluctuations in the water volume of rivers make it difficult to secure steady water resources. Therefore, water is reserved in dams to ensure a stable volume of stream.

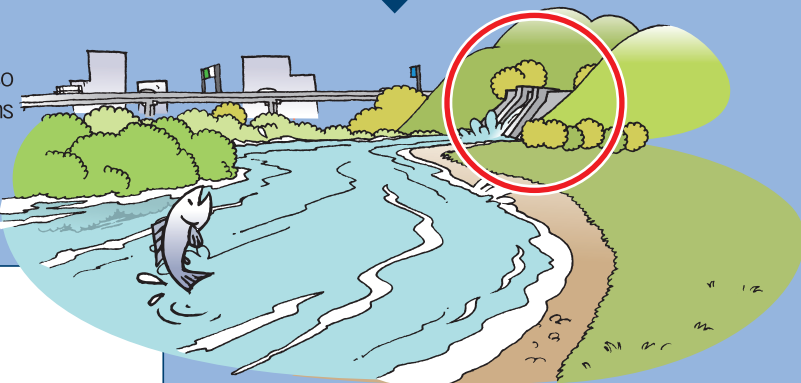
Without dams



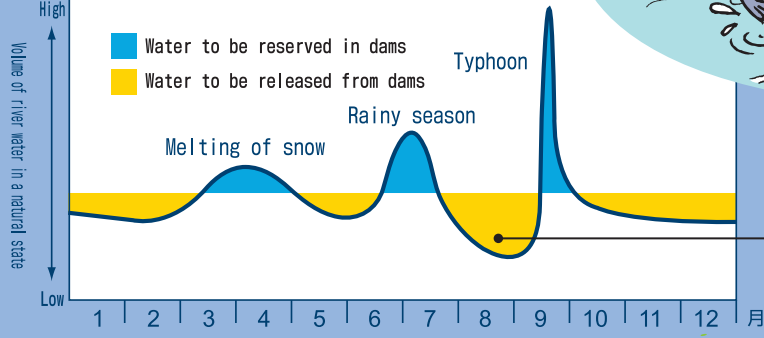
As the topography is precipitous, water flows into the sea without being used. When rainfall is low, there is concern about the shortage of water resources necessary for life.

With dams

Dams replenish rivers with stream water so that the rivers can maintain their normal functions even during a drought.



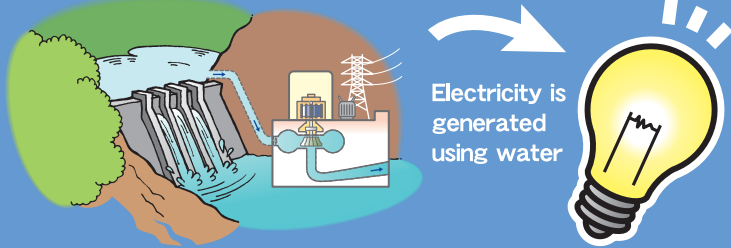
Annual fluctuations in the volume of river water and the indication of how dams supply water



During a drought, dams release water to increase the river water.

Some dams generate electricity.

Electricity is essential for our everyday life. One of the sources is hydro power generation, which uses the energy generated when a large volume of water falls. With the construction of dams and weirs, and the water reserved in them, electricity can be produced in a stable manner.



damage can occur, we announce flood forecasts depending the residents via mass media, municipal governments and properly according to the level.
six sections of the Yodo River Basin, and a reference point designated in each of the sections (indicated with ▲).

Flooding information is announced

Flood danger information is announced

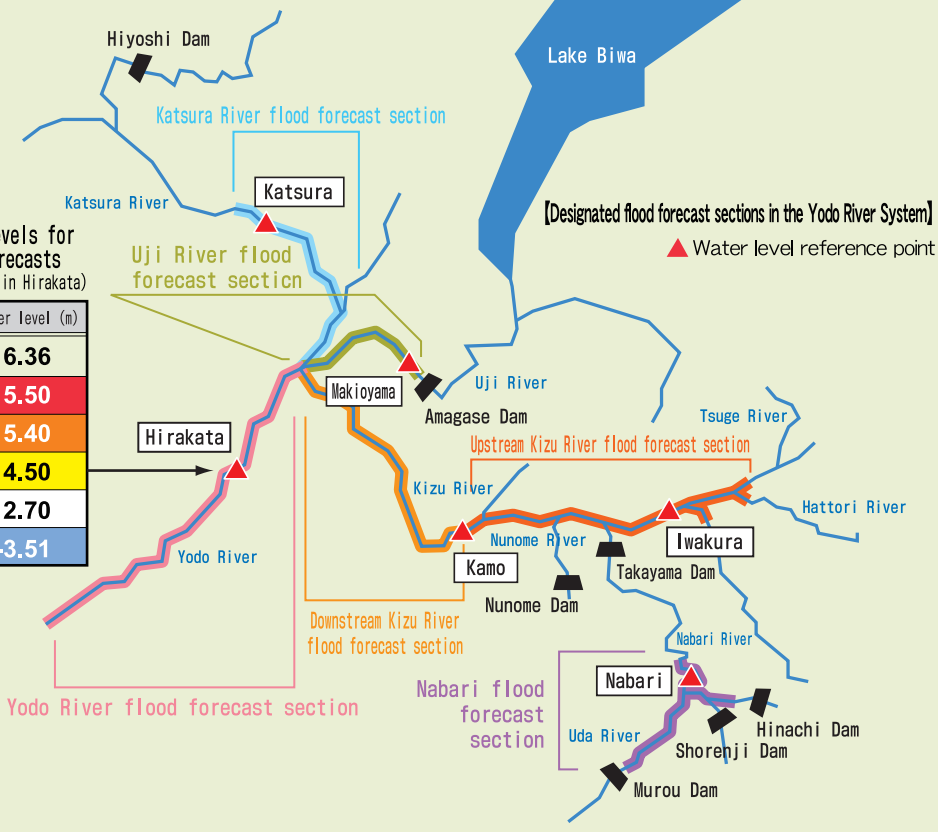
Flood warning information is announced

Flood watch information is announced

Normal water level

Reference water levels for issuing flood forecasts (The levels at the point in Hirakata)

Name	Water level (m)
High water level	6.36
Flood danger water level	5.50
Evacuation water level	5.40
Flood watch level	4.50
Flood control team standby water level	2.70
Normal water level	-3.51



【Via the Internet】

We announce the degree of danger due to rise in the river water level

【Via TV and other mass media】

When flood forecasts are announced, act properly according to the level! Since Level 1 is the flood prevention team standby water level, the flood forecasts are not announced to the public at this level.

Level 2 Flood watch information

Level 3 Flood warning information

Level 4 Flood danger information

Level 5 Flood information

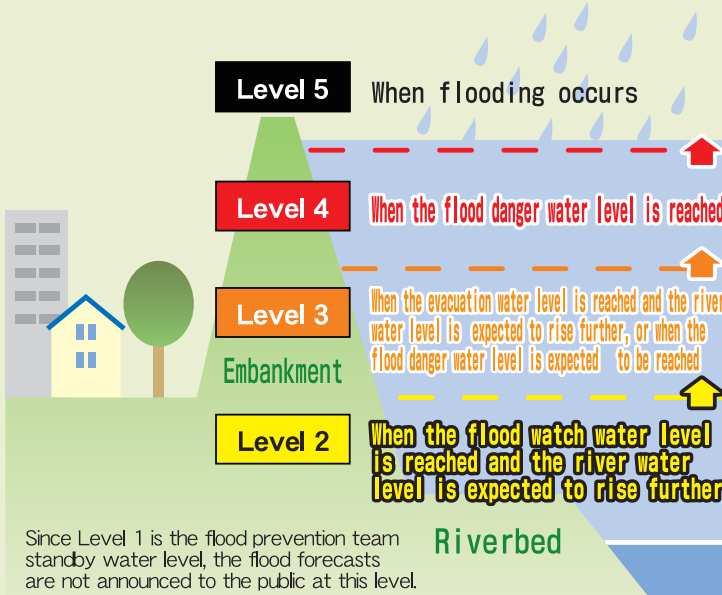
② Flood forecasting

We announce flood forecasts jointly with the Japan Meteorological Agency.

Flood forecasts are provided based on river information and weather forecast in order to inform the residents of the water level at the time of heavy rain as well as the flood risk. In the Yodo River System, the Yodo River Integrated Dams Control Office and the Osaka District Meteorological Observatory jointly announce the flood forecasts to minimize the damage.

We provide flood forecasts depending on the river water level.

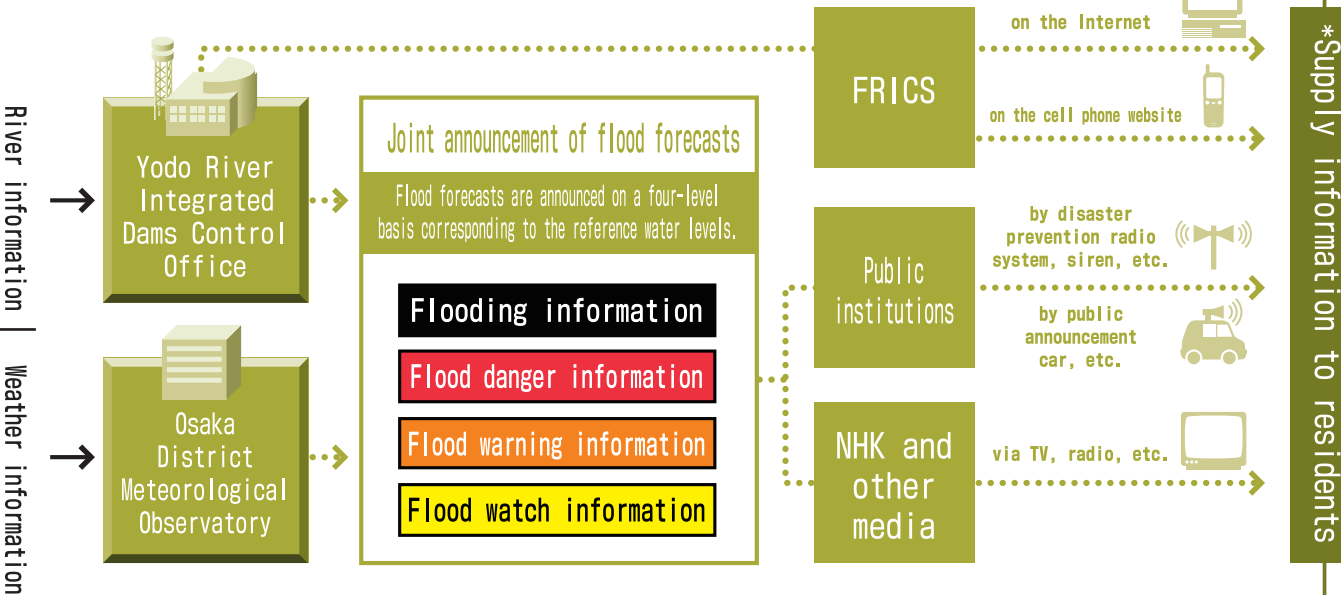
When it is expected that flooding on the flood risk level and inform the Internet so that they can act. Flood forecasts are made on the for measuring the water level is



Supply of information on flood forecasts

Flood forecasts are announced through various channels.

The forecasts announced jointly with the Japan Meteorological Agency are provided for residents through public institutions, municipal governments, and mass media. They are also published on the Internet via the Foundation of River & Basin Integrated Communications (FRICS).



※【Internet】 <http://www.river.go.jp/> 【Cell phone website】 <http://i.river.go.jp/>

【Hazard Map】

Be familiar with the anticipated flood areas and evacuation centers in advance.

The hazard maps that show the anticipated flood areas and evacuation shelters are prepared and distributed by the municipal governments whose jurisdictions include such areas. Preparedness in daily life is important so as to act quickly in an emergency.

MLIT Hazard Map Portal Site

<http://disapotal.gsi.go.jp>



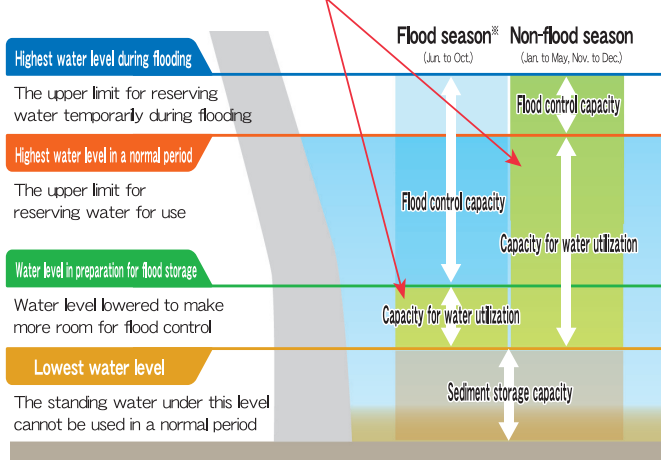
How to secure water for stream flow

How much water do dams reserve?

Dams reserve water when rivers are rich in water, while supplying the water when rivers are short of necessary water. Since dams have to reserve water for use and also perform flood control operations during flooding, standard values for the reservoir water level are set on a seasonal basis (flood and non-flood seasons), and the discharge volume is determined based on the standard values.

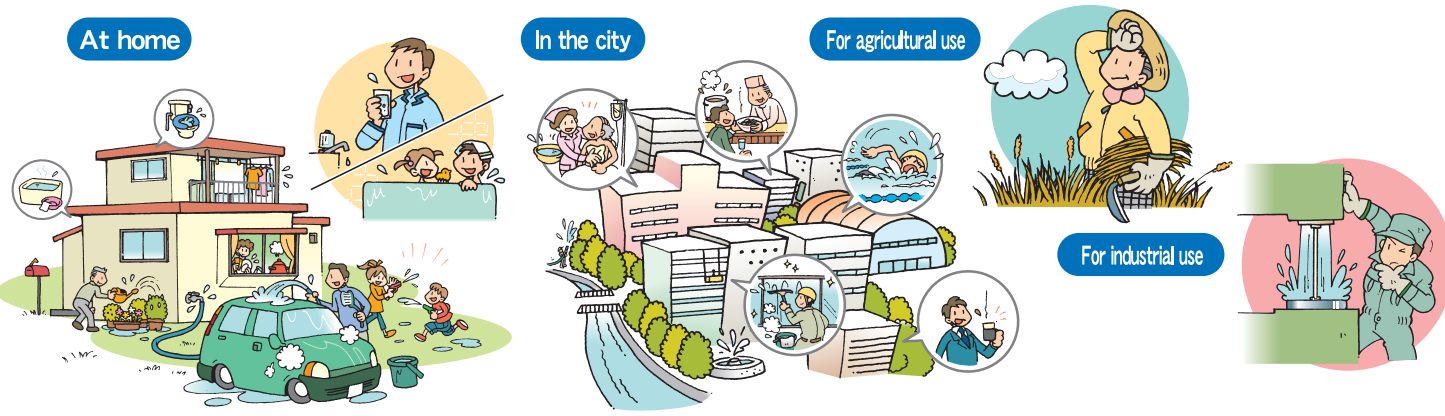
※Flood season: roughly June to October including the rainy season, typhoon season, and other flood-prone seasons with a high precipitation due to heavy rainfall, among others. The period is determined based on historical data. For the Yodo River System, the period is set to be from June 16 to October 15.

The reserved water is discharged downstream to supply supplemental water for use.



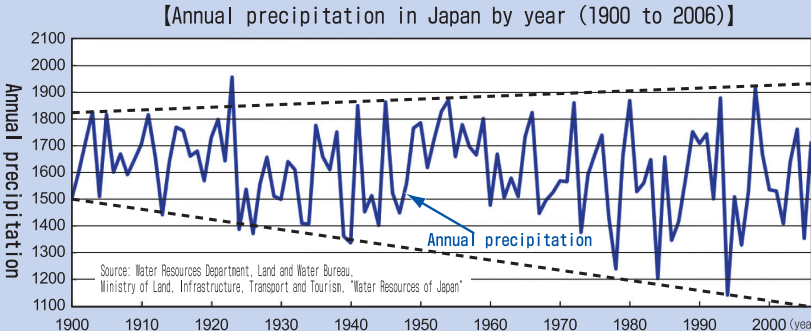
Effect of securing water for stream flow

Water can be used in a stable manner in a variety of situations.



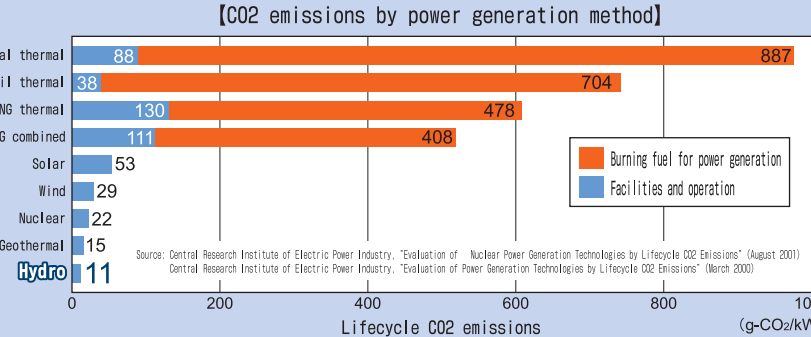
Column Annual precipitation has gradually declined and become unstable.

The climate change in recent years has gradually widen the gap in precipitation between rainy and drought years. In a drought year, the steady use of water is difficult, and the drought safety is reduced. It is therefore more necessary to secure water resources with dams.



Column Hydro power is clean energy generating little carbon dioxide.

Hydro power accounts for approximately 9.6% of the total power generated in Japan. Hydro power plants emit much less CO₂ than thermal power stations, which consume fossil fuels such as petroleum. Thus, hydro power generation contributes to the prevention of global warming as a clean and environmentally friendly power generation method.



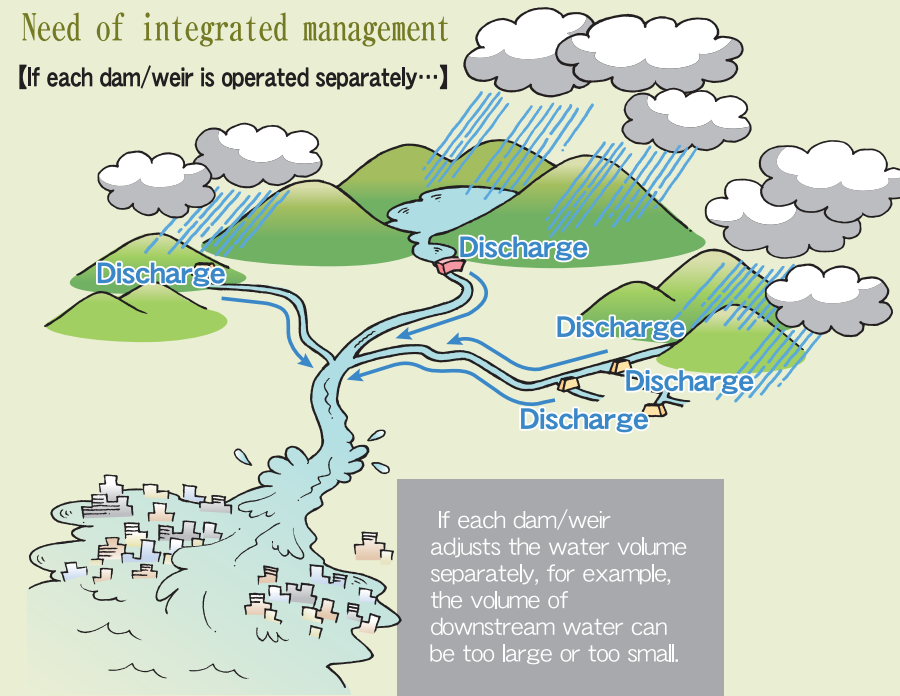
① Water Management

The integrated management of the dams in the Yodo River System enables efficient water management.

The Yodo River Integrated Dams Control Office manages the whole river system through the coordination of the dams in the system. The integrated management of multiple dams and weirs improves the efficiency and effectiveness of the regulation of the water flow in comparison with the separate operations of individual dams.

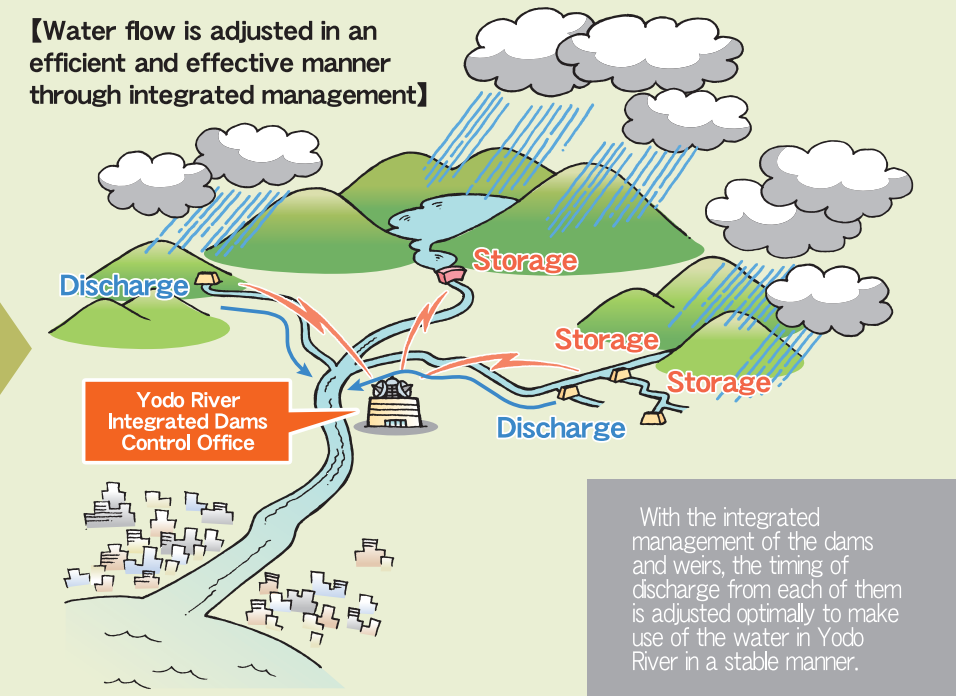
Need of integrated management

[If each dam/weir is operated separately...]



Necessary to have a director that checks the overall balance of the river system

[Water flow is adjusted in an efficient and effective manner through integrated management]



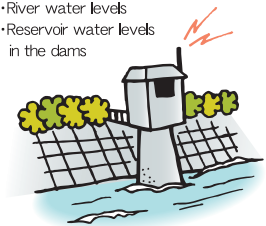
Procedures of the integrated management

① Collection of information

The information collection systems presented below are used to keep track of water conditions at different points of the Yodo River System

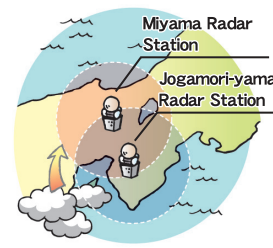
River information system

- This system receives data such as:
 - Rainfall at different points in the Yodo River System
 - River water levels
 - Reservoir water levels in the dams



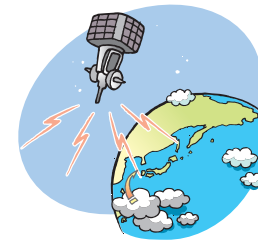
Radar rain gauge system

- This system receives precipitation information in the Kinki Region.

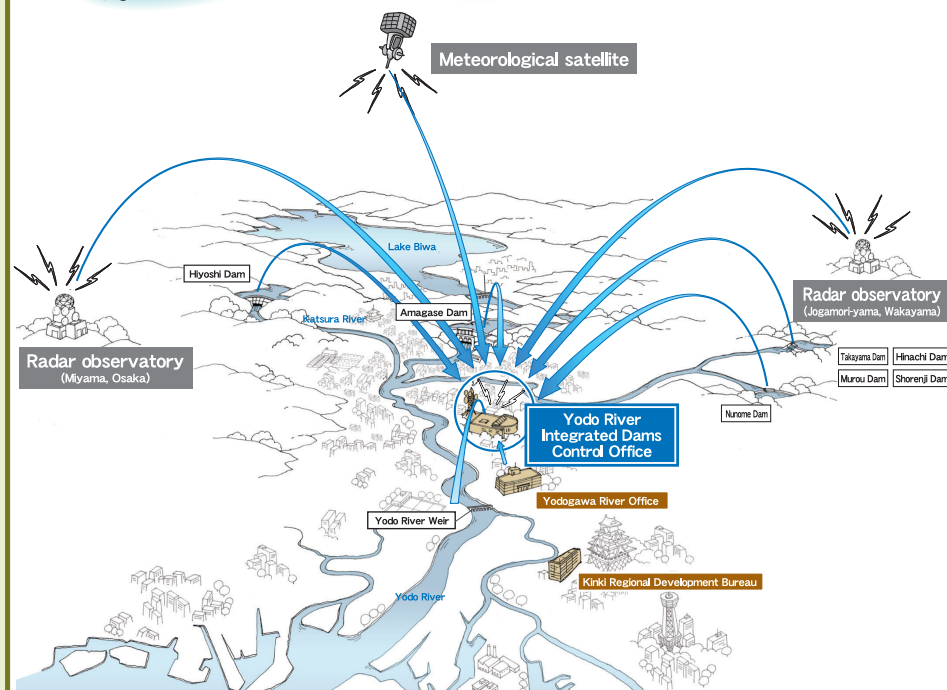


Meteorological Information system

- This system receives data from the Japan Meteorological Agency.



Meteorological satellite



② Forecast and examination

For determining the operation of each of the dams and weirs, the information collected is analyzed to forecast future rainfall, a rise in the river water level and water inflow to the dams.

Forecast calculation

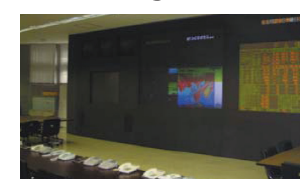
- Future rainfall
- Water flow during flooding
- Water level in dams during drought



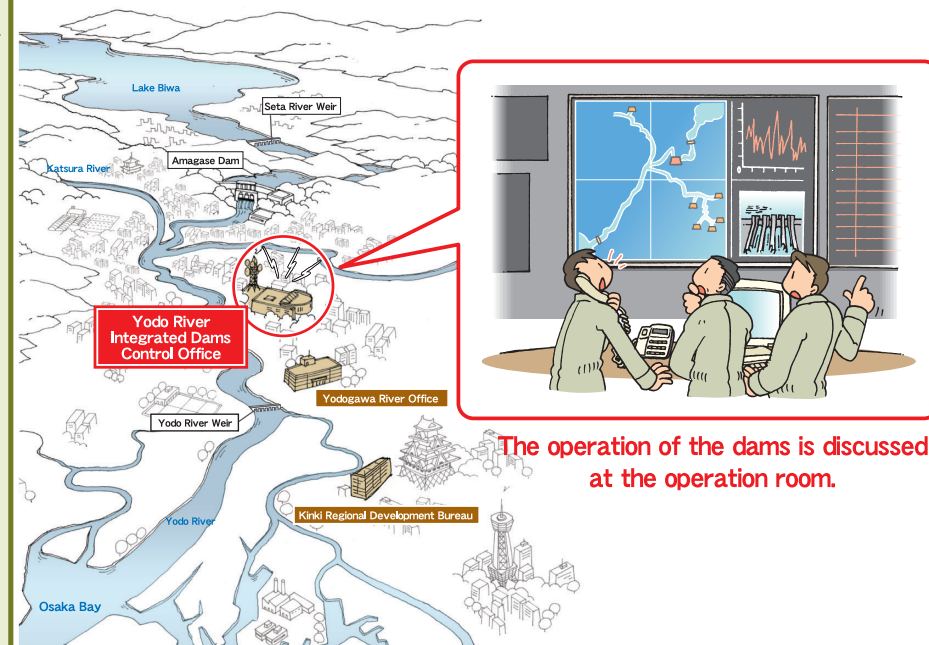
Forecast processing with the disaster prevention information system

Examination of the operation

- Operation to prevent flooding damage
- Operation to realize optimal water discharges at the time of drought



Operation room (Yodo River Integrated Dams Control Office)



③ Supply of information to relevant agencies

The dam management offices and other relevant agencies are informed of the results of the examination. Information on the prevention of river-related disasters is also published on the Internet

Provision of instructions on the operation of the dams for the respective control offices

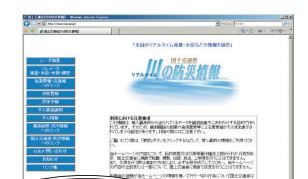
Each of the dams is operated based on the instructions. (The information is also supplied to other relevant agencies.)



Amagase Dam control room

Supply of information on the Internet

Real-time information for river disaster prevention is published on the Internet and the cell-phone website.



<http://www.river.go.jp/>

