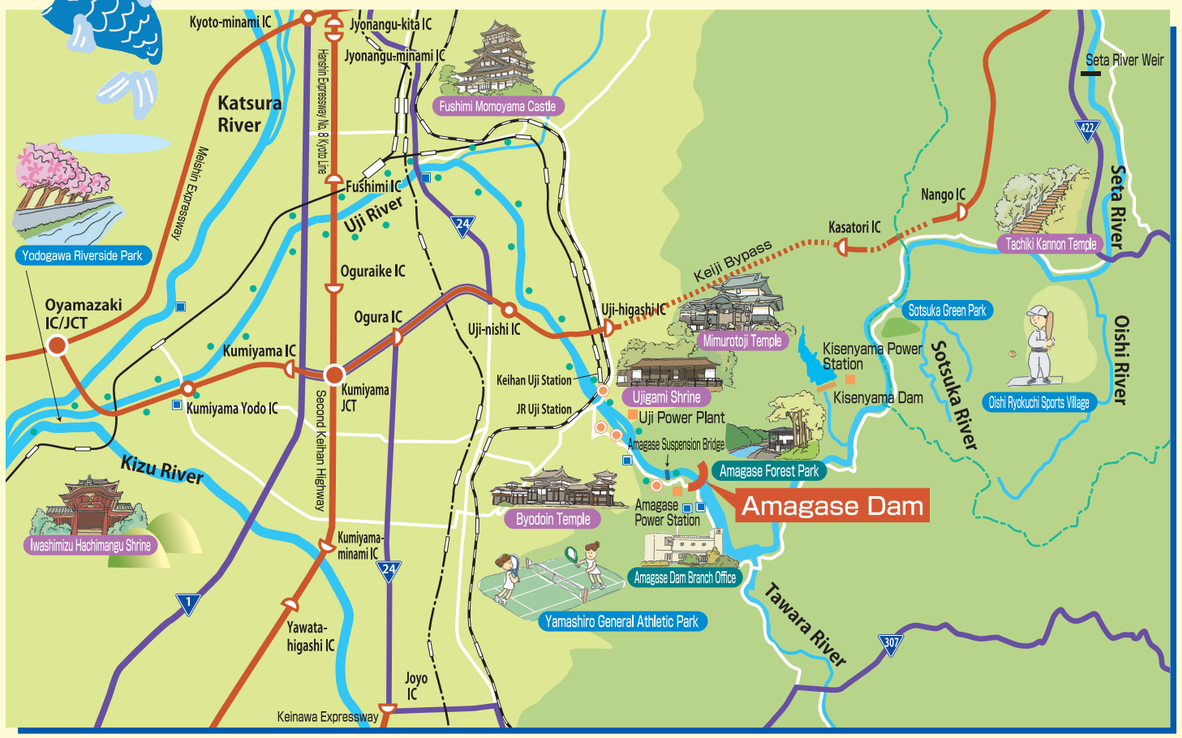
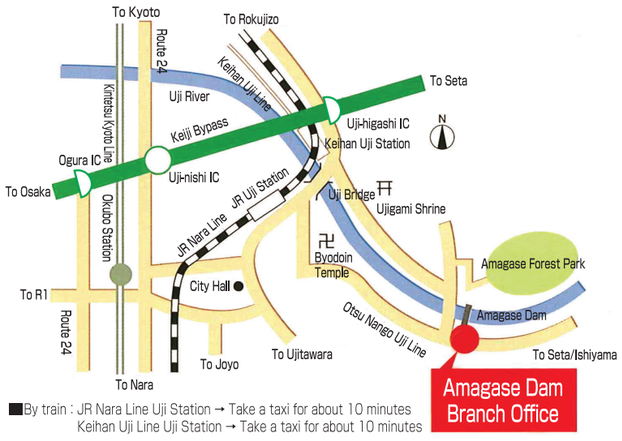
Map of the Area around Amagase Dam





■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

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/
【Cell-phone 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
Amagase Dam Branch Office
15 Uji Kanaido, Uji City, Kyoto 611-0021
TEL(0774)22-2188 FAX(0774)24-1705
http://www.kkr.mlit.go.jp/yodoto/

Amagase Dam

Supporting our life as an “Oasis in a City”

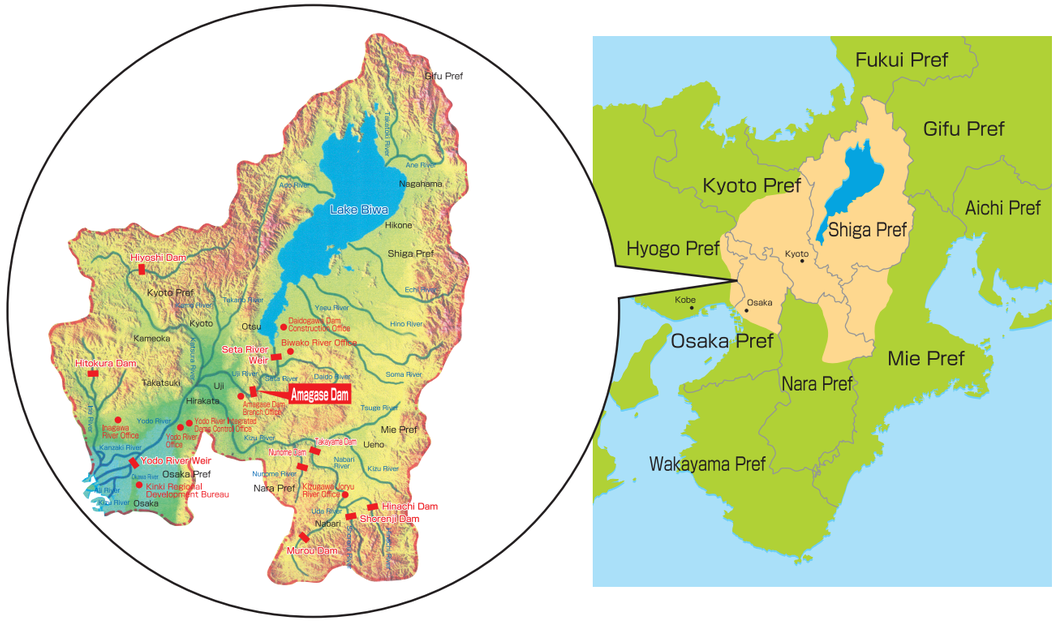
Contents

Background of Amagase Dam

Yodo River System and Amagase Dam

The Yodo River System is located in the center of the Kinki Region. Its water flows from Lake Biwa through Seta River and Uji River, and then meets the water of Kizu River flowing from south and Katsura river flowing from north to form the main stream of Yodo River. Then, the river flows across the Osaka Plain towards the southwest and reaches Osaka Bay. This vast river system covers a basin area of 8,240 k㎡.

Amagase Dam is located in Uji River, a component of the Yodo River System. The upstream of Uji River, called Seta River, is the only river flowing from the largest lake in Japan, Lake Biwa. In the river basin, Kyoto and other ancient capitals have flourished as the social, economic, and cultural bases of the Kinki Region, and served as the setting for many historic events.



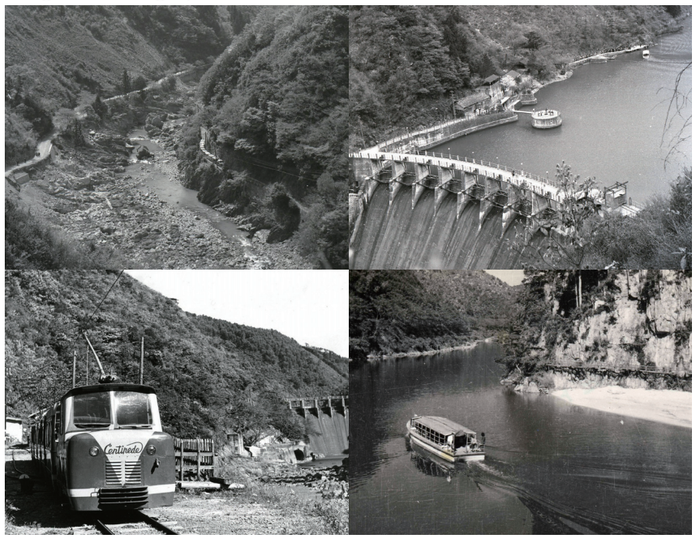
Description of Uji River before the construction of Amagase Dam

Until Amagase Dam was constructed, Ohmine Dam had stood at 3 km upstream of the current location of Amagase Dam. Kansai Electric Power used to use the water transmitted from Ohmine Dam for power generation at Shizugawa Power Plant located on the right bank immediately downstream of Amagase Dam and at Ohmine Power Plant just beneath Ohmine Dam.

In those days, propeller vessels cruised up Uji River from Shizugawa Power Plant to Tohnoshima Island, which was connected with Ohmine Dam by truck train (called "otogi (fairytale)" train). Pleasure boats were operated from the dam to Sotohata in Otsu, and bus service was provided from there to Ishiyama in Otsu. Round-trip tickets to travel these routes were also available at that time.

After the completion of Amagase Dam, pleasure boats cruised on the reservoir and buses were operated between Keihan Uji Station and Ishiyama Station in Otsu. However, the boats were abolished after the completion of Kisenyama Power Station because of the water level fluctuation. The bus service was also terminated as the decline in bus passengers before very long.

Otogi Train along Uji River Line　　Ohmine Dam



Otogi Train waiting for the departure time with Ohmine Dam on the back　　Uji River Line pleasure boat

Water quality of the reservoir (Lake Hoo)

External factors related to the water quality of Amagase Dam

①Existence of Lake Biwa in the basin

Amagase Dam has Lake Biwa, the largest freshwater lake in Japan, in the basin, and the lake basin (with an area of 3,848 ㎢) represents approximately 92% of the dam basin (with an area of 4,200 ㎢) As a result Lake Biwa accounts for the vast majority of the total inflow info Amagase Dam.

②High water turnover rate

While the total water storage capacity of Amagase Dam is 26,280,000 ㎥, the annual inflow is approximately 3.1 billion ㎥ per year (average between 1965 and 2009), which means that the water turnover rate is about 175 times per year. Such a high turnover rate indicates the facilitation of water replacement in the dam and has a favorable effect on the water quality.

③Operation of pumped storage power generation in Kisenyama

Having completed in 1970 on the right bank 5.5 km upstream of Amagase Dam, Kisenyama Dam is used for pumped storage power generation. With a total water storage capacity of 7,230,000 ㎥ and an effective storage capacity of 5,330,000 ㎥, the dam generates power by pumping water at night and falling it during the daytime when there is demand for electricity, which causes water level fluctuations of around 2.5 m within a day. This encourages the circulation and mixture of the water in the reservoir.

Designation of the type of the Amagase Dam reservoir

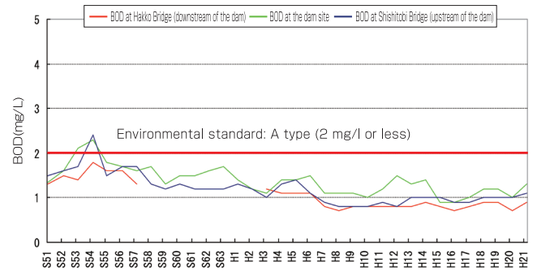
Dam name	Year of designation of the environmental standard	Environmental standard	Environmental standard value				
			BOD	pH	SS	DO	Coliform bacteria count
Amagase Dam	September 1970 (Uji River) April 1972 (Seta River)	River A type	2 mg/l or less	6.5 to 8.5	25 mg/l or less	7.5 mg/l or more	1,000 MPN/100 ml or less

The environmental standard for Amagase Dam reservoir is designated to be River A type.

※The designated environmental standards are not as to a lake but as to a river.

BOD (biochemical oxygen demand)

This value indicates the water pollution level, and refers to the oxygen concentration demanded by water microorganisms to degrade organic matter. Except a temporary increase during summer, BOD in the dam site (surface layer) is around 1 to 2 mg/l throughout the year and satisfies the environmental standard. The value decreased until around 1998, and has remained unchanged in recent years.



SS (suspended solids)

SS refers to floating or suspended particle matters with a diameter of 2 mm or less in water. The value in the dam site (surface layer) is around 5 to 10 mg/l and satisfies the environmental standard.

pH (hydrogen ion concentration)

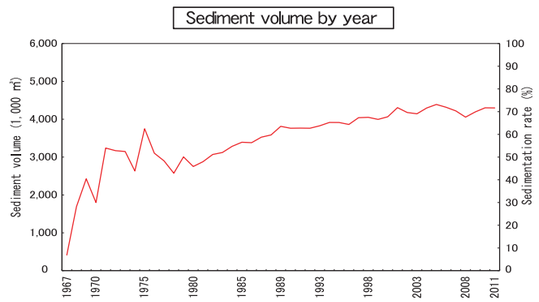
This value indicates the acidity/alkalinity of water. While pH in the dam site (surface layer) tends to be higher in summer and sometimes exceeds 8.5, the water is usually mildly alkali with a pH of around 7 to 8.5. The annual average satisfies the environmental standard.

DO (dissolved oxygen)

This value refers to the amount of oxygen dissolved in water. While DO in the dam site (surface layer) tends to increase in summer and decrease in winter, the variation range is between around 7 and 13 mg/l and satisfies the environmental standard.

Sediment in the reservoir (Lake Hoo)

We measure the volume of the sediment deposited in the reservoir. The total volume of the sediment deposited by fiscal 2011 was about 4.3 million ㎥, which was equivalent to 70% of the sediment capacity (6.0 million ㎥). This is within the scope assumed in the design, and the volume has been stable without a rapid increase in recent years.



Environment of the Reservoir (Lake Hoo)

We survey the fauna and flora (fish, benthos, plants, birds, amphibians, reptiles, mammals, terrestrial insects, zooplankton and phytoplankton, etc.) living in the Amagase Dam reservoir (Lake Hoo) and its peripheral areas.

Creatures in the reservoir (Lake Hoo)

Fish

8 orders, 16 families, and 52 species identified

【Representative species】 Carp, common minnow, dark chub, gudgeon, etc.

【Valuable species】 Far eastern brook lamprey, Kanehira, delicate loach, Lake Biwa catfish, etc. (37 species)

【Alien species】 Largemouth bass, bluegill, numachichibu, etc. (8 species)


Kanehira


Lake Biwa catfish


Largemouth bass

Benthos

27 orders and 285 species identified

The species in Ephemeroptera, Trichoptera, and Diptera (Insecta) have been increasingly identified.

【Valuable species】 Nakaseko-kawanina, marudobugai, setashijimi, Leptelmis gracilis Sharp (a species of riffle beetles), etc. (30 species)

【Alien species】 Dugesia tigrina (a triclad species), bladder snail, golden mussel, and Clark's crayfish (4 species)


Golden mussel


Setashijimi


Nakaseko-kawanina

Plants

157 families and 1,170 species of plants identified.

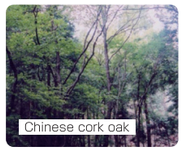
Dominant species include Chinese cork oak, oak community, Japanese red pines, and Rhododendron macrosepalum community (an ericaceous species) as well as planted Japanese cedar and cypress trees.

【Valuable species】 Deinostema adenocaulum (Maxim.) Yamazaki (a figwort species), Siphonostegi a laeta S. Moore (a figwort species), hardy terrestrial orchid, etc. (101 species)

【Alien species】 Bur cucumber, lanceleaf tickseed, parrot feather, water speedwell, etc. (178 species)


Bur cucumber


Lanceleaf tickseed


Chinese cork oak

Birds

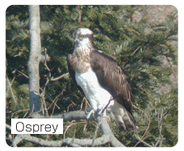
18 orders, 41 families, and 113 species identified

【Representative species】 Great cormorant, mandarin duck, white-eye, bunting, etc.

【Valuable species】 Mandarin duck, osprey, crested kingfisher, kingfisher, ashy minivet, etc. (61 species)

【Alien species】 Goose, muscovy duck, duck (5 species)


Mandarin duck


Osprey


Kingfisher

Amphibians, reptiles, and mammals

2 orders, 5 families, and 13 species of amphibians, 2 orders, 8 families, and 15 species of reptiles, and 7 orders, 15 families, and 24 species of mammals identified

【Representative species】 Lacertid, Japanese striped snake, lizard, Japanese pond turtle, Japanese sika deer, raccoon dog, etc.

【Valuable species】 Hida salamander, Tago's brown frog, forest green tree frog, giant flying squirrel, harvest mouse etc. (10 species of amphibians, 11 species of reptiles, and 3 species of mammals)

【Alien species】 Bullfrog, red-eared slider, nutria, korean yellow weasel, Common raccoon, and Masked Palm Civet (6 species)


Tago's brown frog


Yellow weasel


Japanese pond turtle

Terrestrial insects

25 orders, 433 families, and 4,091 species identified

【Representative species】 Common bluebottle, grayling, Japanese genji-botaru firefly, beetle, white-spotted longicorn beetle, etc.

【Valuable species】 Nakahara-leaf hopper, Hesperocorixa mandshurica (a species of water boatman), marginalis treebrown, etc. (83 species)

【Alien species】 Tree cricket, green tree cricket, cabbage butterfly, bluegrass webworm, Protaetia orientalis submarumorea (a species of flower chafer), Paraglenea fortunei (a species of longicorn), etc. (50 species)


Genji-botaru firefly

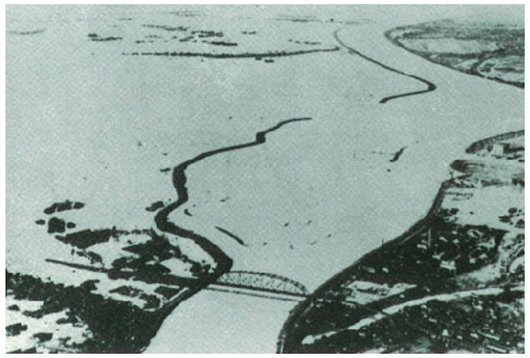

Nakaharanus nakaharae


Green tree cricket

※【Valuable species】 the species considered to be important from an academic perspective or based on the scarcity (listed in the Red Data Book, etc.)

Construction of Amagase Dam

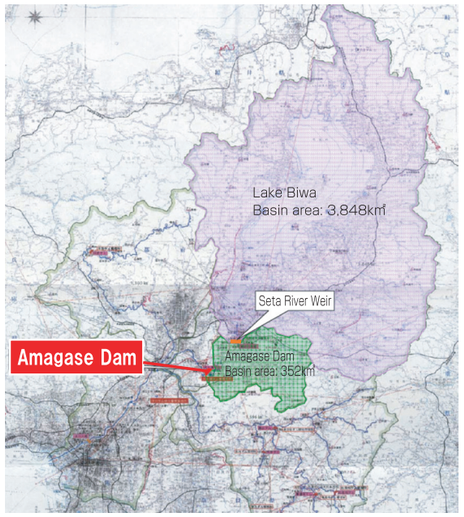
In 1953, Typhoon No. 13 of the season caused unprecedented flood damage along Yodo River. The water flow at the reference point of Yodo River (Hirakata) reached 8,650 m3/s, which was far higher than the design high water discharge of 6,950 m3/s. The dike of Uji River at Mukaijima was broken to generate massive damage to the areas along the river. This led to the drastic revision of the flood control plan of the Yodo River System. Then, in 1954, a basic plan for improving the Yodo River System was formulated, which included the construction of Amagase Dam in Uji River. The construction of the dam was launched in 1959 with the three purposes of "flood control," "power generation," and "water supply," and completed in 1964.


Dike of Uji River at Mukaijima broken as a result of Typhoon No. 13 of 1953

Date	History of Amagase Dam	Major events in Japan
1947	A plan to construct Amagase Dam was initiated for flood control of Yodo River and power supply to the Kinki Region.	The Constitution of Japan was enforced.
1953	Typhoon No. 13 of the season caused unprecedented flood damage to the Yodo River basin.	NHK began TV broadcasting.
1954	The basic plan for improving the Yodo River System was decided.	
1955	The geological survey was started on the dam site.	
1957	The construction project was launched; the Amagase Dam Construction Office was opened.	The Specific Multipurpose Dam Law was promulgated.
1959	The basic plan on constructing Amagase Dam with the purposes of flood control and power generation was noticed.	Typhoon No. 15 (Ise Bay Typhoon) caused flooding.
1961	The excavating work for the dam body was launched.	Typhoon No. 18 (2nd Muroto Typhoon) struck the Kinki Region.
1962	Shizugawa Power Station was abandoned to increase the power supply by Amagase Power Station; a revised basic plan on the construction of Amagase Dam was noticed.	The population of the Tokyo metropolitan area hit 10 million for the first time in the world.
1964	Amagase Dam and Power Plant were completed.	The Tokyo Olympics was held; Tokaido Shinkansen (bullet train) started its operation.
1965	Amagase Dam Branch Office was established to take over the dam management.	Typhoon No. 24 caused damage to the Yodo, Kuzuryu, Yura, and Maruyama River.

Outline of Amagase Dam

[Location and catchment area of Amagase Dam]



The basin of Amagase Dam covers the area along Uji River between Amagase Dam and Seta River Weir, which includes Uji and Ujitawara in Kyoto Prefecture and Otsu (southern part) and Koga in Shiga Prefecture.
The basin area of Amagase Dam is 352 ㎢ , and that of Lake Biwa is 3,848 ㎢ . The sum, 4,200 ㎢ , is the catchment area of Amagase Dam.

Specifications of the Amagase Dam body and reservoir

River name	Yodo River (Uji River) of the Yodo River System
Location	【Left shore】Rokkoku, Makishima-cho, Uji City, Kyoto 【Right shore】Makioyama, Makishima-cho, Uji City, Kyoto
Basin area	Lake Biwa basin 3,848㎢(including the area of Lake Biwa of 680㎢) Amagase Dam basin 352㎢ Total basin 4,200㎢
Type	Dome-shaped concrete arch dam
Crest length and height	Crest length:254m、Height:73m
Volume	Dam body:121,500㎥, apron of secondary dam:42,500㎥ total:164,000㎥
Geological features	Sandstone, clay slate
Conduit gates	3 gates, discharge rate: 1,100 ㎥/s (capacity), 840 ㎥/s (design maximum discharge)
Crest gates	4 gates, discharge rate: 680 ㎥/s (capacity)
Reservoir area	1.88㎢
Highest water level in a normal period	O.P.78.5m
Highest water level during flooding	O.P.78.5m
Water level in preparation for flood storage	O.P.72.0m(June 16 to October 15)
Lowest water level	O.P.58.0m
Preliminary discharge level	O.P.58.0m
Available depth	20.5m
Total storage capacity	26,280,000㎥ (equivalent to 70 times of the volume of Koshien Stadium)
Effective storage capacity	20,000,000㎥

[Downstream side]

Crest gates

Used in combination with the conduit gates when a flood exceeds the discharge rate of the conduit gates.

Gate type : Radial gate
Gate dimension : 10.0 m (clear span) x 4.357 m (height)
No. of gates : 4
Gating speed : 0.3m/min
Gating device : Hydraulic cylinder wire rope

Conduit gates

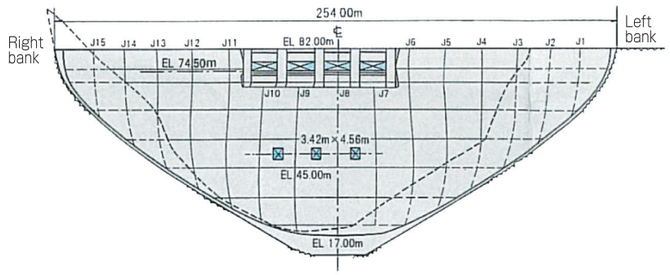
Used for discharge control on a regular basis.

Gate type: High pressure roller gate
Gate dimension: 3.42 m (clear span) x 4.56 m (height)
No. of gates: 3
Gating speed: 0.3m/min
Bonding type: Electric eccentric lever
Gating device: Hydraulic cylinder

[Upstream side]

Discharge from Amagase Dam

[Front view from the downstream side]



Facilities around Amagase Dam

Amagase Dam is located in the Lake Biwa Quasi-National Park, which is richly endowed with nature, and also neighbors many historical sites related to ancient literary works such as the Tale of Genji's Last Ten Chapters (Uji-jujo). In particular, Amagase Dam reservoir (Lake Hoo) is positioned along the tourist route connecting Uji City, which has Byodoin Temple and Ujigami Shrine (a World Cultural Heritage site), with Otsu City, the gateway to Lake Biwa. Many people therefore visit the dam and its adjacent area for sightseeing and recreation every year.
Amagase Dam is also used as a site for integrated study by elementary school students and work experience by junior high school students to learn the importance of water and the significance of dam management.

Facilities

Amagase Dam

Amagase Forest Park (on the right bank of the dam)

Oishi Ryokuchi Sports Village

Events

Periodical event to enjoy contact with the forest and lake (guided tour in the dam)

Uji Jujo stamp rally (Amagase Dam point)

Learning

Work experience by junior high school students

Integrated study by elementary school students

Amagase Dam redevelopment project

In the Amagase Dam redevelopment project, the discharge capacity is planned to increase by constructing discharge tunnel facilities on the left bank of the dam with the aim of improving the functions of the dam for the flood control of Uji and Yodo Rivers, the prevention of flooding in the areas around Lake Biwa, the maintenance of water supply for Kyoto Prefecture, and the power generation capacity. This will ensure the discharge rate of up to 1,140 ㎥/s to lower the water level to the lowest for flood control and the rate of up to 1,500 ㎥/s to lower the water level to the lowest during power generation for subsequent discharge from Lake Biwa.

Dam Management

To avoid adverse impact on flood control and water supply, we implement flow management, check of security in the area around the dam body and reservoir, and the inspection and maintenance of the facilities on a routine basis.

Dam management in a normal period

- Monitoring and recording of data on the dam (rainfall, flow, power output, etc.)
- Adjustment of the flow (gate operation, adjustment of the power output)
- Patrol of the dam body and reservoir
- Disposal of trash flowing into the dam (removal of driftwood, etc.)
  We dispose of approximately 150 tons per year (average between 1999 and 2009) of the driftwood and other trash flowing from the upstream into the reservoir.

Patrol of the dam site

Trash accumulated in the reservoir

Inspection and maintenance of dam facilities

- Inspection and maintenance of discharge facilities (gates and communication equipment)
- Inspection and maintenance of telemeter facilities (rain gauge, water gauge, weather observation equipment)
- Inspection and maintenance of discharge warning facilities (bulletin boards, sign boards)
- Inspection and maintenance of facilities in the dam site (control center, railings, lighting equipment)

Repair of railings

Inspection of the gates

Makioyama Water Level observation station

Check of the safety of the dam

- Monitoring and recording of data from observation devices (seismometer, deflectometer, leakage volume, etc.)

Check of the deflectometer

Monitoring of leakage volume data

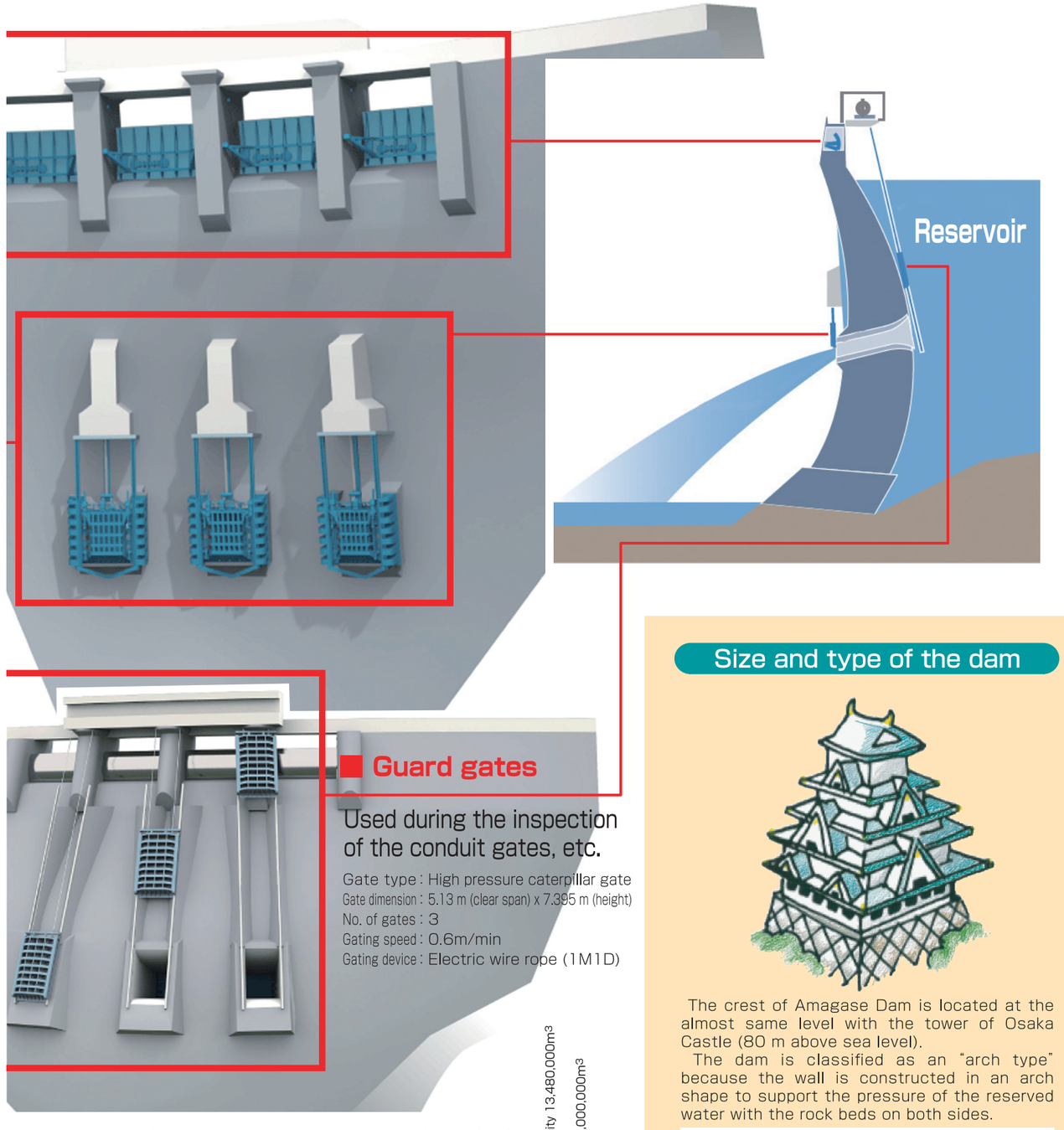
Check of observation facilities

Dam management during flooding

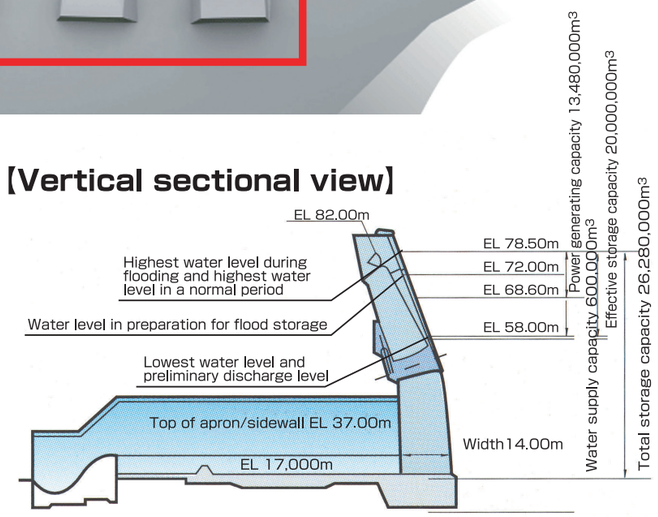
- Inflow forecast based on rainfall forecast
- Inspection of discharge facilities prior to the use
- Warning and patrol of the area between Amagase Dam and the point where the three rivers meet
- Notice of discharge to relevant agencies and opening of the gates

Speakers to announce discharge

Amagase Dam control room



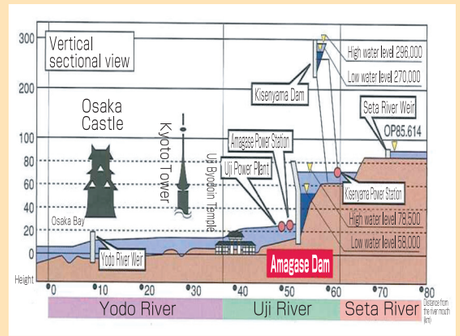
[Vertical sectional view]



Size and type of the dam

The crest of Amagase Dam is located at the almost same level with the tower of Osaka Castle (80 m above sea level).

The dam is classified as an "arch type" because the wall is constructed in an arch shape to support the pressure of the reserved water with the rock beds on both sides.

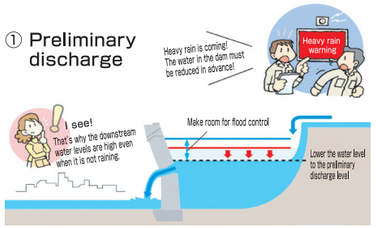


Functions and Effects of Amagase Dam

Prevention of floods

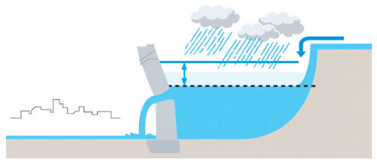
When a typhoon, or other weather condition, has brought heavy rain and led to significant flood risk, the design high water flow of 1,360 ㎥/s is adjusted to be 840 ㎥/s to prevent the flooding of Uji River. In addition, when the flow of the main stream of Yodo River, which is located downstream of the dam, is at a peak, the discharge rate is adjusted to be 160 ㎥/s to prevent flooding of the downstream areas.

① Preliminary discharge



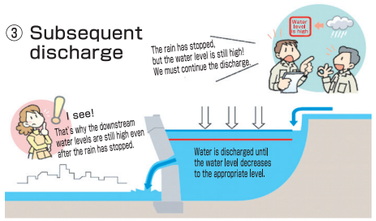
If the reservoir is filled with water, it cannot be used for flood control. Therefore, when a typhoon/heavy rain is expected, we discharge water from the dam in advance to lower the water level and make room for flood control.

② Water storage



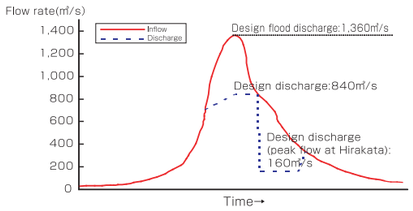
When a typhoon/heavy rain comes, the volume of water flowing into dams starts to increase. The room made by the preliminary discharge is used for reserving part of the inflow water until the downstream water levels begin to lower.

③ Subsequent discharge



Even after the typhoon or rainstorm has passed, the dam still holds a large volume of water. Therefore, the water is discharged until the water level decreases to the appropriate level to prepare for following rain fall.

【Amagase Dam flood control plan chart】



Generation of electricity

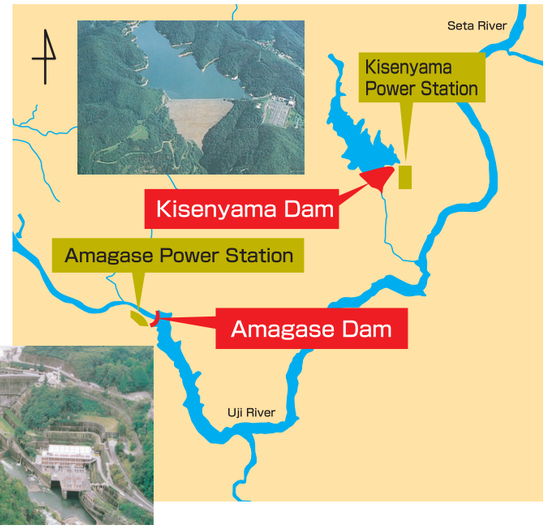
Amagase Power Station located downstream of the dam has a power generation capacity of 92,000 kW (equivalent to the power consumed by about 100,000 people) with the maximum water use of 186.14 ㎥/s. Kisenyama Power Station located upstream uses the Amagase Dam reservoir (Lake Hoo) as the lower balancing reservoir, and generates up to 466,000 kW (equivalent to the power consumed by about 500,000 people) by pumped storage with the maximum water use of 248 ㎥/s.

【Amagase Power Station】

Power generation type	Dam type
Location of the power plant	Uji Kanaido, Uji City, Kyoto
Location of the intake	Rokkoku, Makishima-cho, Uji City, Kyoto
Allowed output	Up to 92,000 kW
Effective head	Up to 57.1 m
Water use	Up to 186.14 ㎥/s
Starting year of power generation	1964

【Kisenyama Power Station】

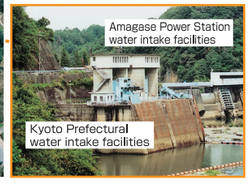
Power generation type	Pumped storage type
Upper balancing reservoir	Samutani River, a tributary of Uji River
Lower balancing reservoir	Uji River
Effective water storage of Kisenyama Dam	5,330,000㎥
Water use	Up to 248㎥/s(for power generation)
Effective head	227.4m
Power generation capacity	466,000kW
Starting year of power generation	1970



Supply of drinking water

Water is supplied from the reservoir to Uji, Joyo, Yawata, and Kumiyama at up to 0.3 ㎥/s (provisional water utilization:0.9 ㎥/s) equivalent to the use by about 360,000 persons.

【Water intake facilities in the dam】



Water is supplied from the dam to the water purification plant

【Uji Purification Plant】

Past records of flood control

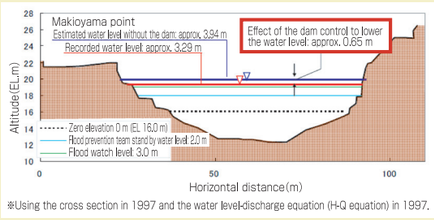
On September 17, 1965, the year after the completion of Amagase Dam, Typhoon No. 24 of the season hit the basin, and the water inflow into Amagase Dam reached 1,528 ㎥/s. In consideration of capacity of Uji River at that time, the discharge from the dam was limited to 715 ㎥/s to avoid flood damage to the areas along Uji River. Flood control has been implemented 17 times until now.

Date of flood control operation	Cause	Amagase Dam			Flow rate at Makioyama	Flow rate at Hirakata
		Max. inflow	Max. discharge	Adjusted rate		
September 17, 1965	Typhoon No. 24	1,528	715	813	715	6,868
July 8, 1969	Depression, rain front	948	766	182	766	2,211
July 11, 1972	Rain front	930	840	90	840	4,252
September 16, 1972	Typhoon No. 20	1,281	800	481	800	5,228
September 8, 1976	Typhoon No. 17	842	783	59	783	3,391
August 1, 1982	Typhoon No. 10	1,370	840	530	840	6,271
June 25, 1985	Depression, front	844	833	11	833	2,459
July 1, 1985	Typhoon No. 6	892	837	55	837	2,203
July 21, 1986	Front	950	834	116	834	3,137
July 22, 1986	Front	1,047	838	209	838	3,760
June 30, 1993	Rain front	864	838	26	838	2,443
July 3, 1993	Front	880	837	43	837	2,743
July 5, 1993	Front	1,051	838	213	838	4,104
May 12, 1995	Depression	928	834	94	834	4,760
July 6, 1995	Rain front	912	835	77	835	2,866

■ Effect of the flood control to address the attack of Typhoon No. 10 in August 1982

When flooding occurred on August 1, 1982 with a cumulative rainfall of 342 mm, the maximum inflow was 1,370 ㎥/s (design high water flow of Amagase Dam: 1,360 ㎥/s). Against this inflow, the maximum discharge was adjusted to be 840 ㎥/s by reducing 530 ㎥/s. The water storage at that time was approximately 8.2 million ㎥.
Prior to the flood control, the water storage level was lowered by preliminary discharge to around 65 m above sea level.

【Effect of water level decline at the Makioyama point】



※Using the cross section in 1997 and the water level-discharge equation (H-Q equation) in 1997.

If a typhoon equivalent to Typhoon No. 10 of 1982 hit without Amagase Dam, the area around Tohnoshima Island would be as shown in the picture on the right.

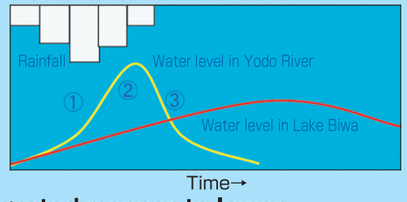
【Area around Tohnoshima Island at normal time】

【Image of the area around Tohnoshima Island in case of inundation】

Coordinated operation with Seta River Weir

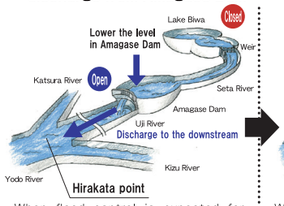
The Lake Biwa basin represents about half of the entire basin area of the Yodo River System. The water in the lake rises more slowly than in the rivers due to its large area.
In the Yodo River System, the flow in Kizu and Katsura Rivers increases first, and then the water level in the main stream of Yodo River rises. Subsequently, the water level in Lake Biwa reaches a peak.
This time lag is used when there is a flooding risk to the downstream areas of the main stream of Yodo River. The areas are protected from flooding by limiting or stopping discharge from Seta River Weir and thereby storing water in Lake Biwa.
After the water level in the downstream has declined, Seta River Weir is opened to discharge water and lower the level in Lake Biwa.

The water level in Lake Biwa rises behind Yodo River



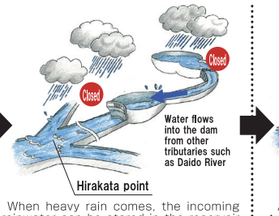
Amagase Dam and Seta River Weir are operated in an integrated manner to lower the water level at the downstream point where the three rivers meet.

1 Discharge from Seta River Weir is reduced for preliminary discharge from Amagase Dam



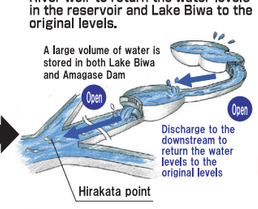
When flood control is expected for heavy rain, Amagase Dam conducts preliminary discharge to make room for the dam's water storage capacity. During the discharge, Seta River Weir is closed to reduce water inflow into Amagase Dam and use Lake Biwa, which is located upstream of the weir, as a water jar that can hold a large volume of water for a long time.

2 During flood control by Amagase Dam, discharge from Seta River Weir is also reduced.



When heavy rain comes, the incoming rainwater can be stored in the reservoir because room for additional water in the dam has been made in advance by preliminary discharge. The water is kept in the reservoir until the water level at Hirakata point in the downstream has declined sufficiently. Discharge from Seta River Weir is also reduced during this procedure so that Amagase Dam can hold as much water as possible.

3 Water is discharged a little at a time from Amagase Dam and Seta River Weir to return the water levels in the reservoir and Lake Biwa to the original levels.



After the heavy rain has passed, Amagase Dam and Lake Biwa still hold a large volume of water due to the flood control. Both the dam and Seta River Weir then begin to discharge water to the downstream a little at a time. This returns the water levels in the reservoir and lake to the original levels.