

# Multipurpose Tsurumi River Retarding Basin

-- Protect people from flood disaster and create a recreation area --



Keihin River Office,  
Kanto Regional Development Bureau,  
Ministry of Land,  
Infrastructure, Transport and Tourism



## Location map

**■ Characteristics of watershed**  
 Watershed area: 235km<sup>2</sup>  
 Length of main channel: 42.5km  
 Population in the watershed:  
 1,960,000  
 (January 2015)  
 Population density in the  
 watershed: 8,200people/km<sup>2</sup>  
 (highest in Japan)



## Flood control facilities other than the Multipurpose Tsurumi River Retarding Basin

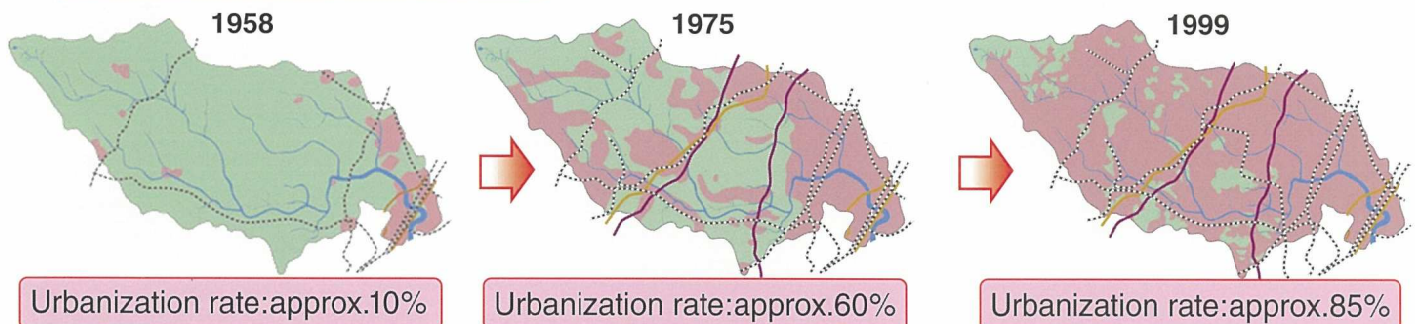
Facility name	Administrator	Storage capacity	Start of operation
① Onmawashi Park Retention Reservoir	Kanagawa Prefecture	Approx.110,000m <sup>3</sup>	2003
② Kawawa Retarding Basin	Kanagawa Prefecture	Approx.120,000m <sup>3</sup>	2008
③ Umeda River Retarding Basin	City of Yokohama	Approx.11,000m <sup>3</sup>	1990
④ Toriyama River Retarding Basin	City of Yokohama	Approx.44,000m <sup>3</sup>	2003
⑤ Yagami River Retarding Basin	Kanagawa Prefecture	Approx.194,000m <sup>3</sup>	Under construction

## Multipurpose Tsurumi River Retarding Basin

## Flood prevention measures for the entire watershed (comprehensive flood control measures)

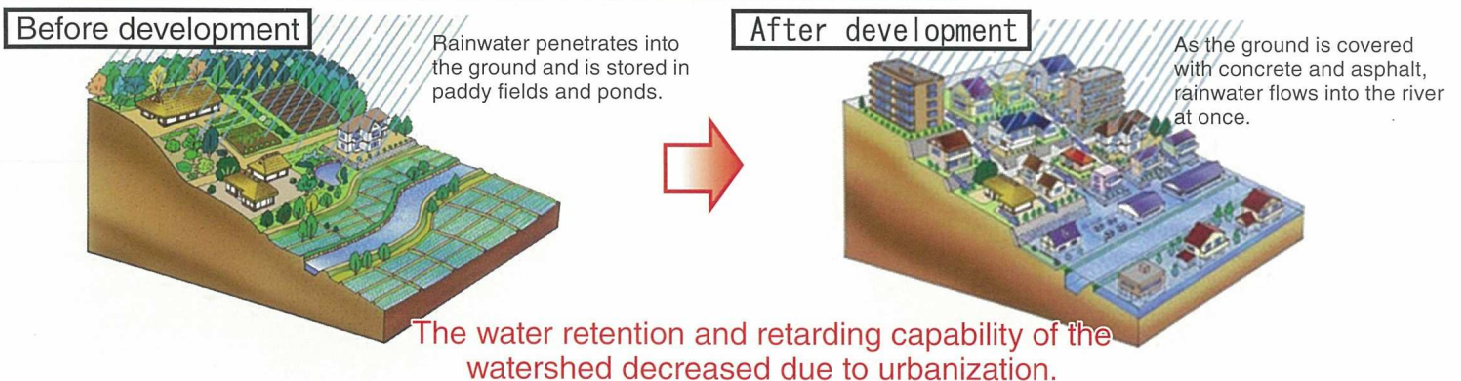
In the Tsurumi River basin, rapid urbanization has caused large amounts of rainwater to flow into the river at once, causing flood damage frequently. As it is difficult to prevent flood damage only through river improvements, flood control measures have been taken not only in the river area but also in the watershed area in a comprehensive way.

### Progress of urbanization



75 percentage point increase in urbanization rate in 40 years

### Change in outflow pattern due to urbanization





## Image of comprehensive flood control measures

### Preservation of natural capabilities to retain and retard water



Preservation of green spaces



Restraint on embankment in riverside agricultural land

### Outflow control facilities established at development sites in the watershed



Normal day



Rainy day

Reservoir for disaster prevention



Dry wells and trenches

### Watershed measures

## Flood control measures of the entire watershed (comprehensive flood control measures)

### Riverine measures

### Sewer measures



Multipurpose retarding basin



Before improvement



After improvement

River improvements (embankment and dredging)



Inland water drainage facility (pump station)



Rain water storage pipe

## Multipurpose Tsurumi River Retarding Basin

### To protect people from flood disaster

The area where the Tsurumi River and the Toriyama River join originally had a natural water-retarding capability. In the Multipurpose Tsurumi River Retarding Basin, the water-retarding capability was further improved by constructing reservoir with an overflow embankment and a surrounding embankment, as part of the comprehensive flood control measures.

By temporarily capturing flood water from the Tsurumi River, this retarding basin protects the surrounding and downstream areas from flood damage.

The total water storage capacity of the Basin is 3,900,000 m<sup>3</sup>, equivalent to about 3 times the volume of the Tokyo Dome.



Before development (1982)

### To provide a city with recreation area



The is located in an urban area called Shin-Yokohama, a very convenient place as it is close to a Shinkansen station and an expressway interchange.

The Tsurumi River Retarding Basin was developed jointly by the national government and the Yokohama City government for multiple purposes including flood control and municipal functions (medical and park facilities).

The Nissan Stadium, where the final match of the 2002 FIFA World Cup was held, is also in the Basin.

### To provide habitats for various organisms

Parks were developed and the natural environment was improved in the Basin.

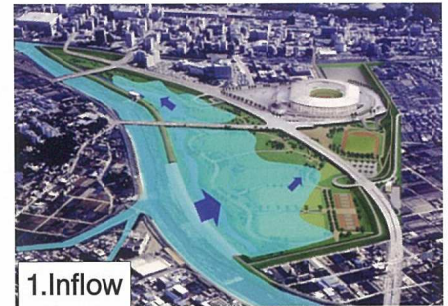
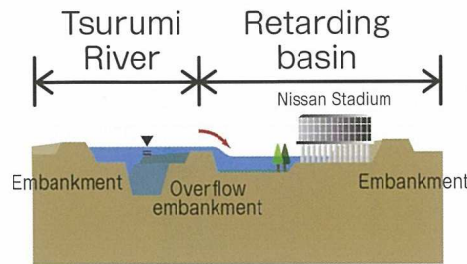
The Basin, which contains gentle flow areas, dead water areas such as ponds, waterfronts and grassland, provides habitats for various organisms.



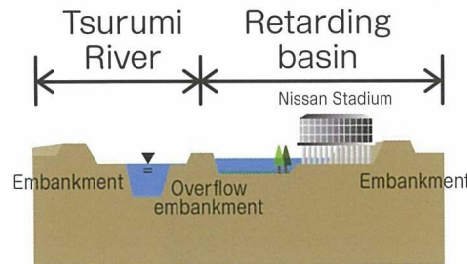


# Mechanism to store and retain water -- How the retarding basin works --

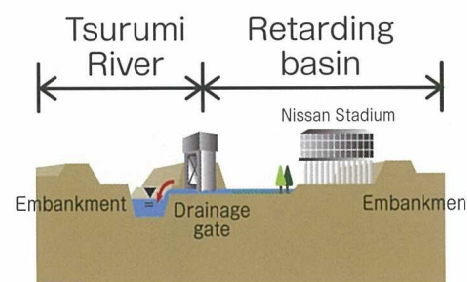
1. When the water level of the river rises due to a typhoon or the like, river water flows into the retarding basin through the overflow embankment which is lower than the neighboring one.



2. Water is temporarily stored in the retarding basin.



3. After the water level of the river has fallen, the stored water gradually returns to the river through the drainage gate.



## History to the Multipurpose Tsurumi River Retarding Basin Project

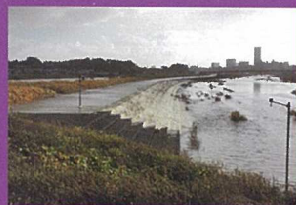
- April 1980: General approval of the retarding basin project by the minister of construction
- January 1985: Start of land acquisition by the Ministry of Construction
- February 1989: Signing of a letter of understanding between the ministry of construction and yokohama city
- January 1993: Determination of city plans
- January 1994: Groundbreaking ceremony and start of on-site excavation
- October 1997: Completion of the International Stadium Yokohama (construction started in January 1994)
- October 1998: National Sports Festival held in Kanagawa (International Stadium Yokohama)
- May 2002: Inauguration of World Cup Games (final match held at the International Stadium Yokohama on June 30)
- June 2003: Start of operation of the Multipurpose Tsurumi River Retarding Basin
- September 2003: Opening of the Tsurumi River Basin Information Center

## Specifications of the Multipurpose Tsurumi River Retarding Basin

- Area of retarding basin: 84 ha
- Flood control capacity: 260 m<sup>3</sup>/s for the retarding basin alone
- Total storage capacity: 3,900,000 m<sup>3</sup>
- Designed high-water level: 8.573 m above T.P.
- Ground elevation: 2.5 m above T.P. (north of the Shin-Yokohama Motoishikawa Line) 4.0 m above T.P. (south of the Shin-Yokohama Motoishikawa Line)
- Overflow embankment: wire mat work on the side slope wire mat plus asphalt on the crown  
Overflow embankment crown width: 15 m; embankment height: 6.6 m above T.P.; total length: 450 m
- Riverside embankment: 9.773 m above T.P. in altitude 1,830 m in total length
- Surrounding embankment: 9.773 m above T.P. in altitude 2,260 m in total length
- Drainage gate: 2.0 m above T.P. in site altitude Discharge during flood: 10.0 m (B) × 7.8 m (H)  
(Roller type steel gate) (Sluice type)



## Overflow embankment



The overflow embankment is a segment of the riverside embankment designed to have a height lower than the nearby segments to allow the inflow of river water when the water level rises. The wire mat construction method was adopted for the overflow embankment in consideration of the ease of maintenance, the surrounding landscape and the environment.

## Energy dissipator pool



This area reduces the momentum of inflow water, which comes from the river over the overflow embankment.

## Surrounding embankment



This embankment surrounds the retarding basin, separating it from the neighbouring land.

# Outline of the Retarding Basin



## Riverside embankment



This is an embankment situated between the retarding basin and the river.

## Drainage gate



This facility drains the stored water back to the river after floods.

## Elevated road



Highways in the retarding basin are in the elevated style or on the embankments so that they will remain functional even when water flows into the basin.

## Retarding Basin Operation Center

(Tsurumi River Basin Information Center on the first and second floors)



The retarding basin is operated at the Operation Center. As a platform for information and activities on the watershed and the river, the Center also performs versatile functions.

## Pilotis design

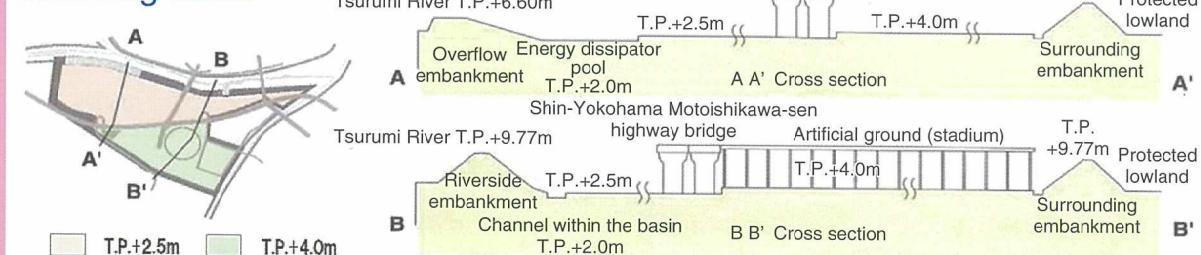


There are buildings within the retarding basin, such as the Nissan Stadium, Yokohama General Health Care Center, Yokohama Rehabilitation Center and the Sports and Cultural Center for the Disabled (Yokohama Rapport). These buildings are designed to have pilotis (high-floor style(supporting columns on the ground floor)) so that they are not inundated even if river water flows into the retarding basin.

## Ground Level of the retarding basin

While the original ground level of the retarding basin was about 6.0 m above T.P., the ground was further excavated to store a large amount of water. In consideration of the land use, the ground level was lowered to 2.5 m and 4.0 m above T.P. in areas north and south, respectively, of the Shin-Yokohama Motoishikawa Line. The total amount of earth excavated in the basin was 2,300,000 m<sup>3</sup>, which was recycled for constructing the surrounding embankment and the riverside embankment and was also effectively used for the Minamihonmoku landfill project of Yokohama City.

## Cross section of the retarding basin



\*T.P.: Tokyo Peil (Japanese vertical datum given by the mean sea level of Tokyo Bay)

Tsurumi River Basin Information Center



# Actual performance of the Multipurpose Tsurumi River Retarding Basin

The Multipurpose Tsurumi River Retarding Basin began operation in 2003. When this area was hit by Typhoon No. 18 in October 2014, the Basin contributed to reducing the downstream water levels by storing about 1,540,000m<sup>3</sup> of flood water, the largest performance since its start of operation.



[Normal day: aerial view]



[Day of flooding: state of inflow]



[Day of flooding: inside the Basin]



[Day of flooding: aerial view]



[Day of flooding: inside the Basin]



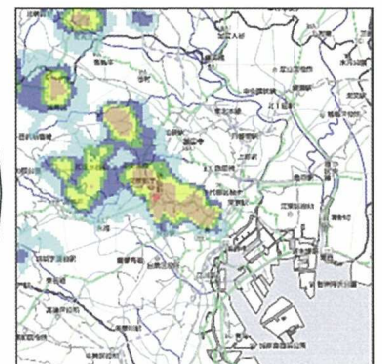
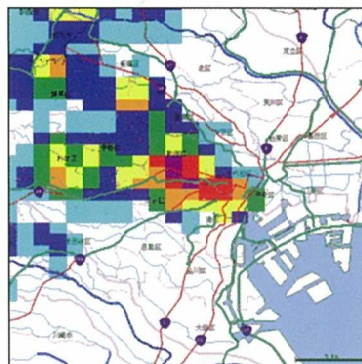
[Day of flooding: inside the Basin]

## An X-band MP radar system (radar rain gauge) is installed.

Localized torrential rains occur frequently in recent years. A radar rain gauge system is installed at the Tsurumi River Basin Information Center to quickly and precisely grasp rain clouds appearing over the urban area so as to make preparations against floods. This system observes rainfall intensity and rain clouds, at intervals of 1 minute and in units of 250m meshes.



### Comparison between conventional radar and X-band MP radar



Measurement data are publicized on the website of the Ministry of Land, Infrastructure, Transport and Tourism (disaster prevention information on rivers).

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

## Observation instruments are used to ensure efficient management.



Radio-wave level gauge



CCTV

In the Multipurpose Tsurumi River Retarding Basin, the state of overflow and the situation in the Basin are constantly monitored with CCTV cameras, water level sensors and flow volume sensors. All of the cameras and the sensors are networked with optical fibers and monitored in real time to constantly prepare for risk.

Main CCTV images are released on the website of the Keihin River Office (live camera information).

<http://www.ktr.mlit.go.jp/keihin/>





## Keihin River Office Kanto Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism

2-18-1 Tsurumi-Chuo,  
Tsurumi-ward, Yokohama city, kanagawa Pref.  
230-0051, Japan  
Phone: 045-503-4000 (main)  
Fax: 045-503-4001  
Website of the Keihin River Office:  
<http://www.ktr.mlit.go.jp/keihin/>

### [Directions]

Ten minutes on foot from Tsurumi Station  
on the JR Keihin Tohoku Line or  
Keikyu Tsurumi Station



## Tsurumi Branch Office

3-16-13 Tsurumi-Chuo,  
Tsurumi-ward, Yokohama city, kanagawa Pref.  
230-0051, Japan  
Phone: 045-501-3038  
Fax: 045-501-6744

### [Directions]

Fifteen minutes on foot from Tsurumi Station  
on the JR Keihin Tohoku Line or  
Keikyu Tsurumi Station

### [River segment in charge]

From the estuary to Sueyoshi-bridge



## Shin-Yokohama Branch Office

2081 Kozukue-cho, Kohoku-ward,  
Yokohama city, kanagawa Pref.  
222-0036, Japan  
Phone: 045-476-5003  
Fax: 045-476-5004

### [Directions]

Seven minutes on foot from  
Kozukue Station on the JR Yokohama Line

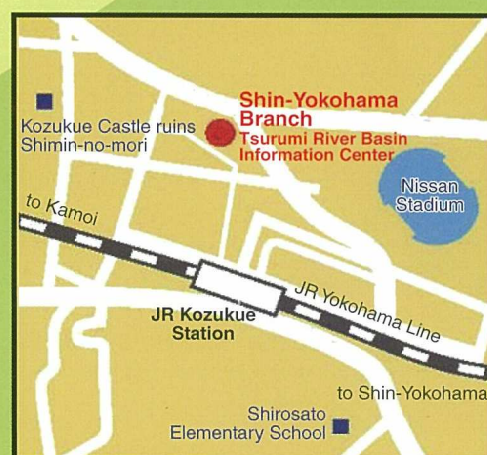
### [River segments in charge]

Tsurumi River: from Sueyoshi-bridge to  
Daisan Keihin Road

Yagami River: from its confluence with Tsurumi River to confluence with Shibu River

Hayabuchi River: from its confluence with Tsurumi River to Takada-bridge

Toriyama River: from its confluence with Tsurumi River to Kishine-bridge



## Tsurumi River Basin Information Center

Phone: 045-475-1998  
Open hours: 10:00 to 17:00  
Closed: every Tuesday, year-end and New Year holidays