

# Measures to make Horikawa River Limpid

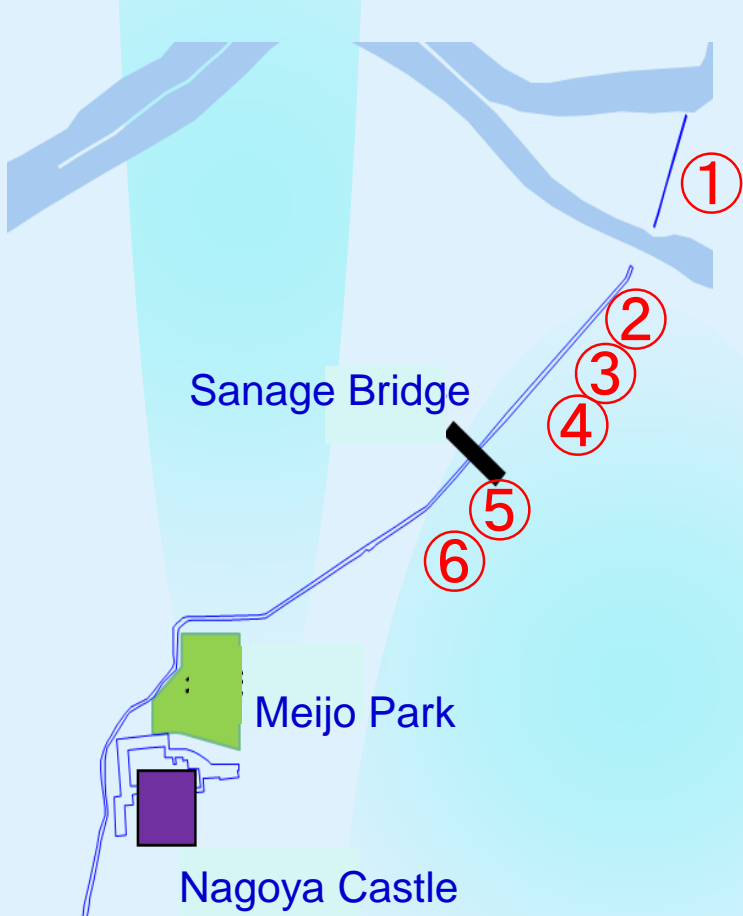
## Implementation by Nagoya City

**Feb.6<sup>th</sup> 2016**

**Greenification & PublicWorks Bureau  
River Dep. River Planning Div.**

# Making additional water sources

## ◆ Use of Shallow Ground Water (in the upper stream)

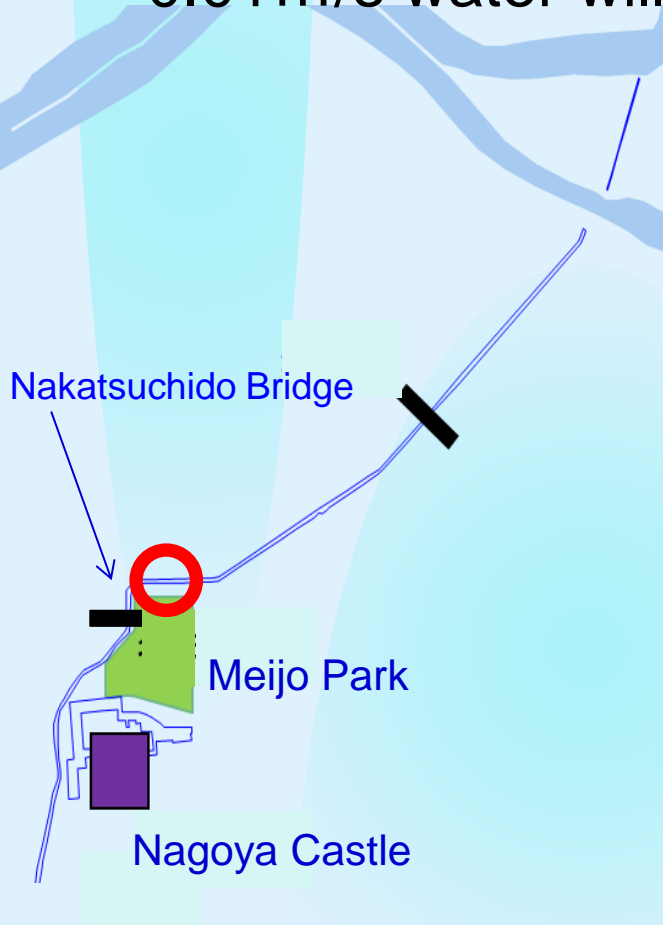


# ■ Making additional water sources

(New project in FY2015)

- ◆ Upstream of Nakatsuchido Bridge  
0.01 m<sup>3</sup>/s water will be lead into from Mar. 2016.

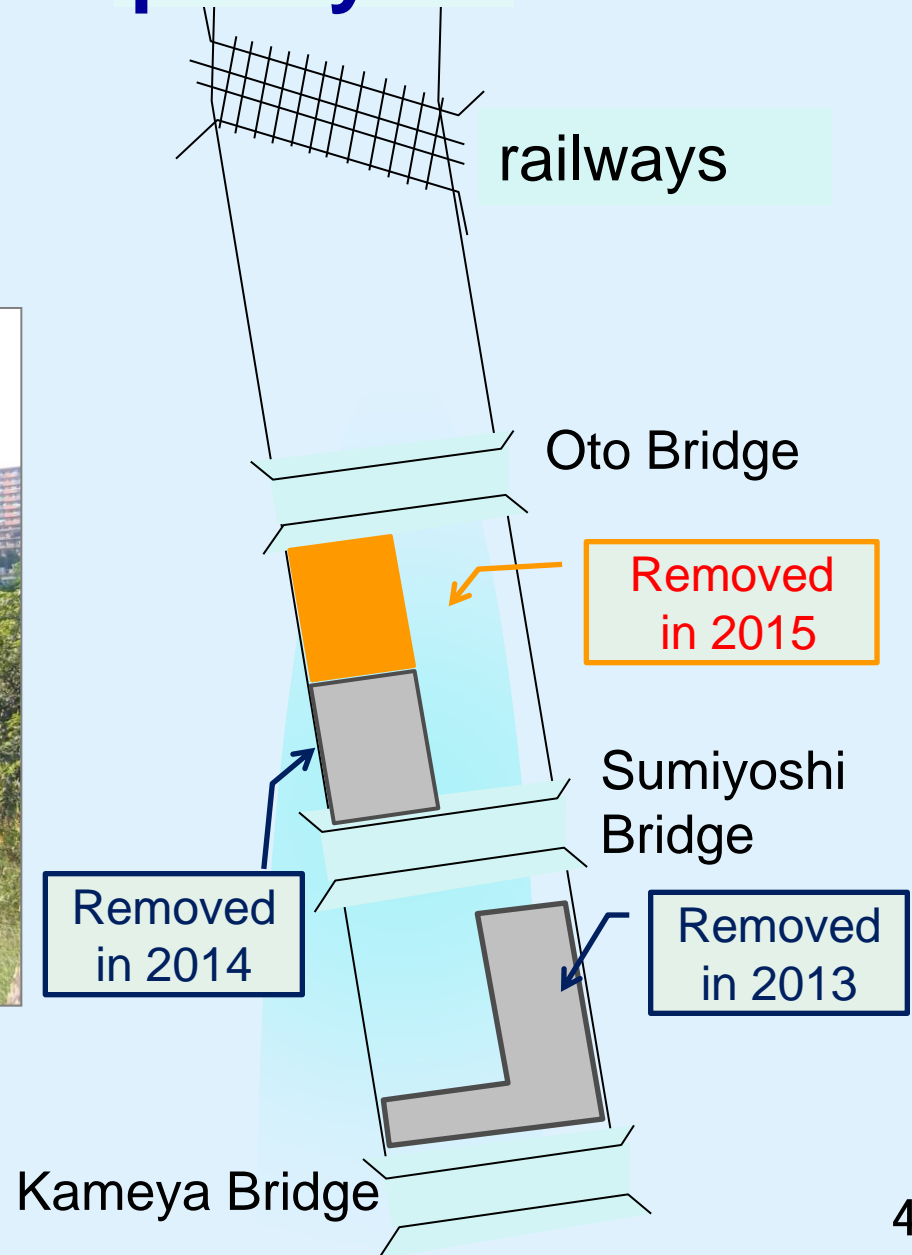
Being built now





# Improvement of water quality

## ◆ Removal of sludge



# Improvement of water quality

## ◆ Making slack and rapid current

Setting wooden piles and ripraps bends stream and makes current slack and rapid, which helps self-purification of Horikawa River.

since 2014



fish spawning and  
plants' seed ashore

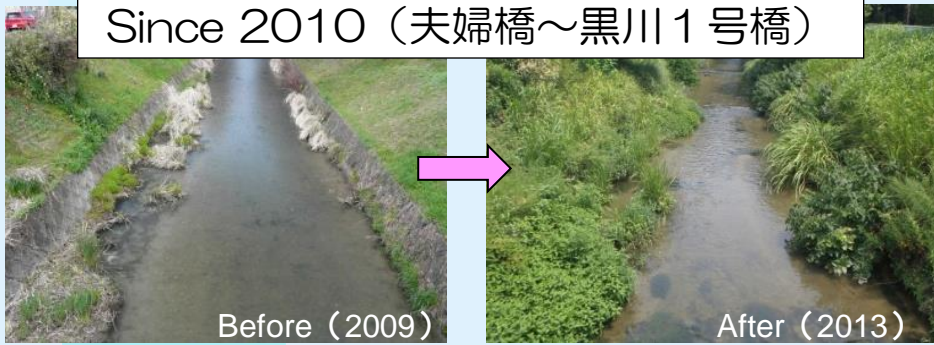


bent stream



# Improvement of water quality

Since 2010 (夫婦橋～黒川1号橋)



Since 2012 (黒川2号橋下流)



Since 2013 (黒川2号橋上流)



## ◆ Improvement

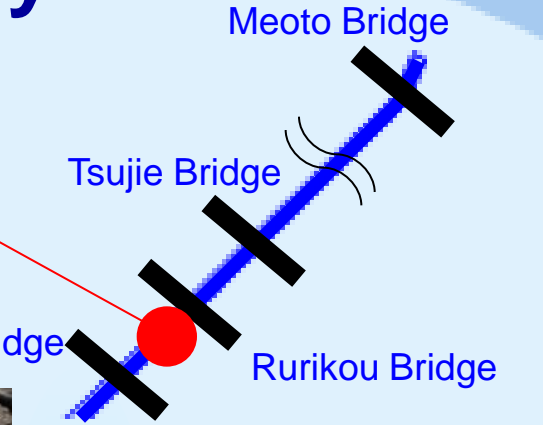
- Variety and amount of fish increased.
- Benthos increased.
- Plants grow up more.

Some of the creatures seen in the upstream of Horikawa River





# Improvement of water quality

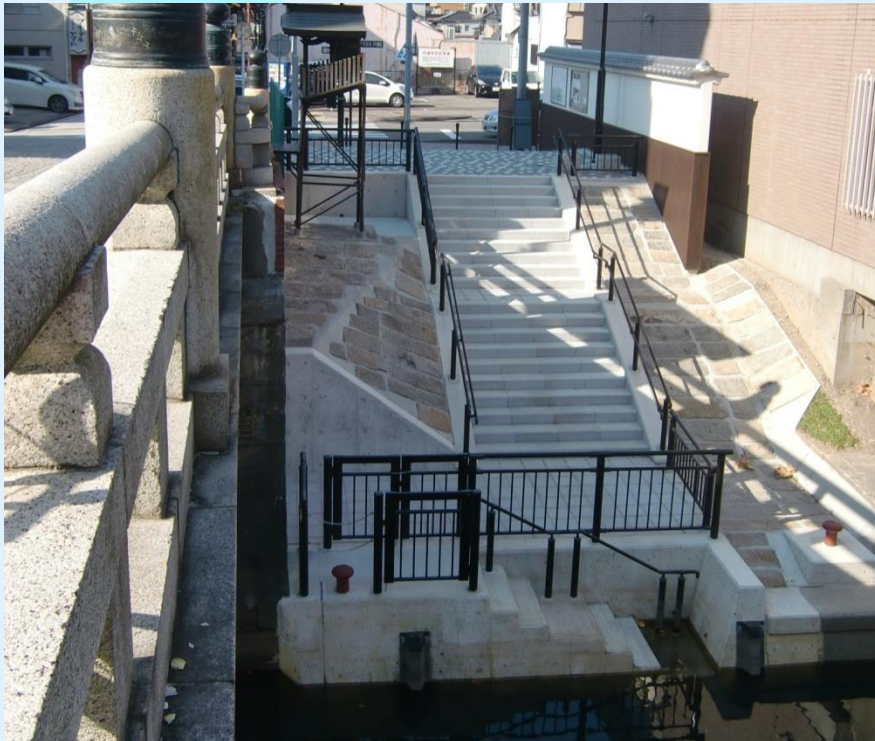




# Gojo Bridge River Square

Construction of River Square by Gojo Bridge  
was completed in Nov. 2015 !

The square is equipped with a guideboard about history,  
Tuiji-Bei(Japanese traditional wall) and shore for  
getting on/off the boats.



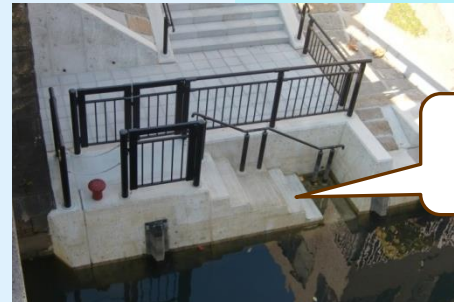
Guideboard

Tuiji-Bei Wall

Reuse of the stone pavement

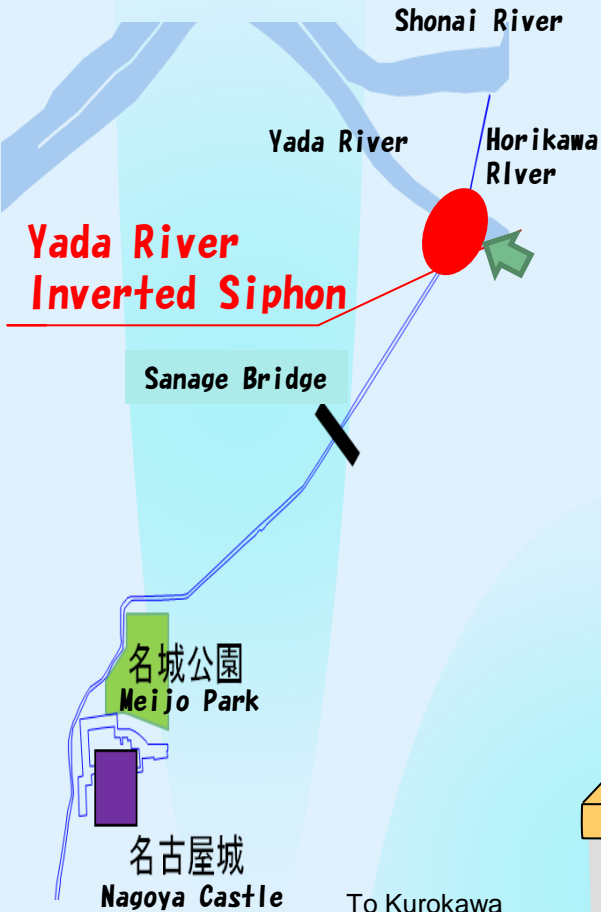


Shore for getting on/off the boats





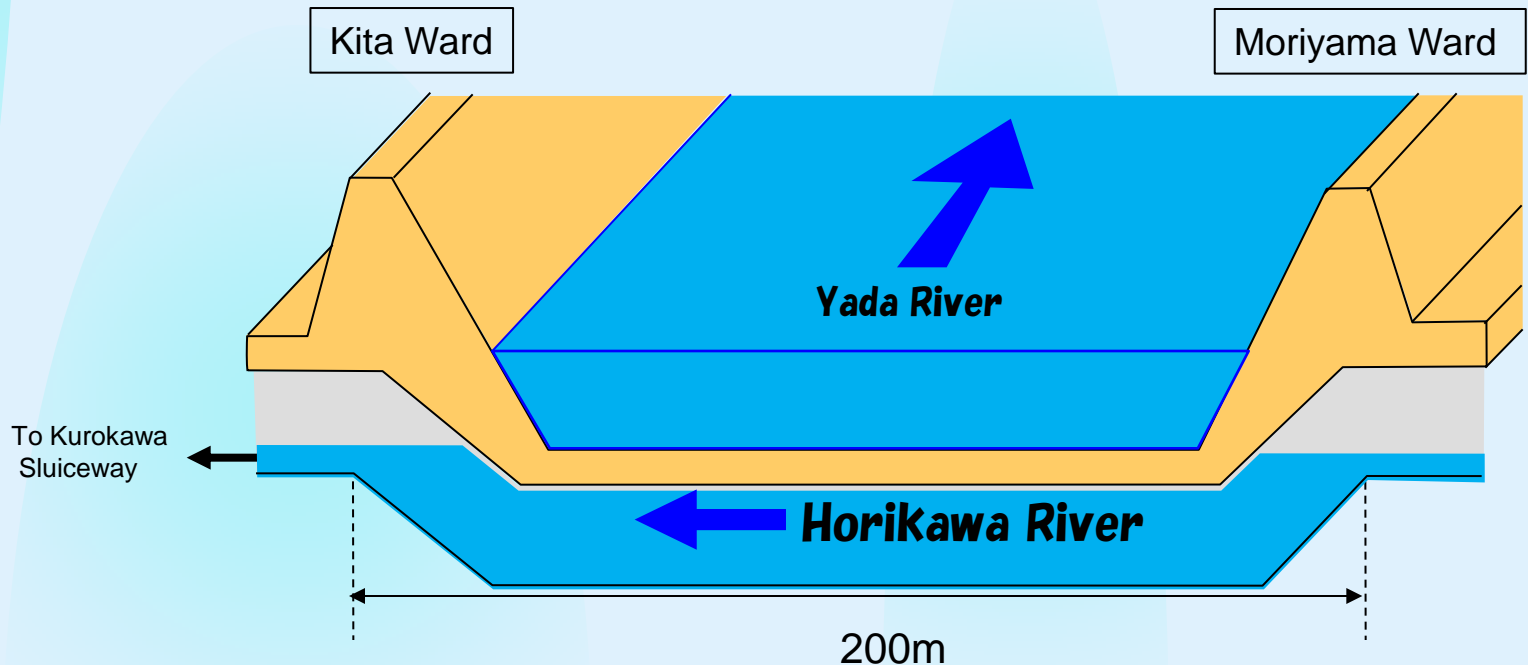
# Dredging works in Yada River Inverted Siphon



## ● What is Inverted Siphon?

When a culvert needs to intersect a river, the culvert crosses under the bottom of the river.

## ● Cross section of the inverted siphon



# Dredging works in Yada River Inverted Siphon

## ●History

• 1676

It was built to flow water from Shonai River to Nagoya Castle moat.  
(built in wood)

• 1877

The Kurokawa excavation works was completed. The Inverted Siphon reconstructed for water transport.

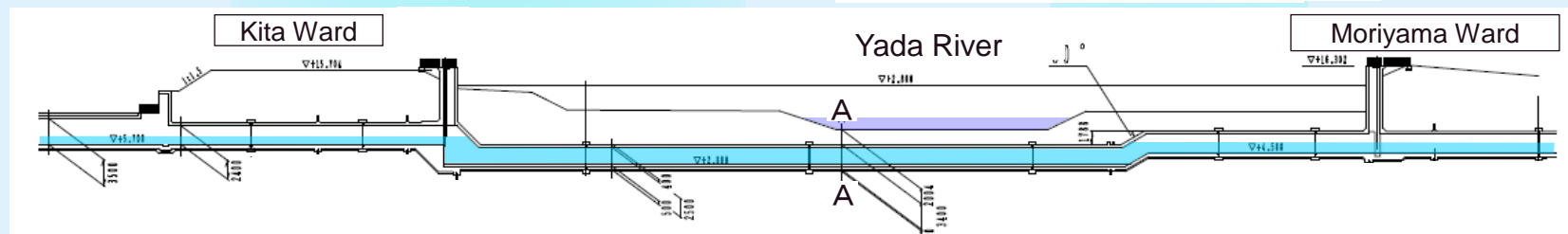
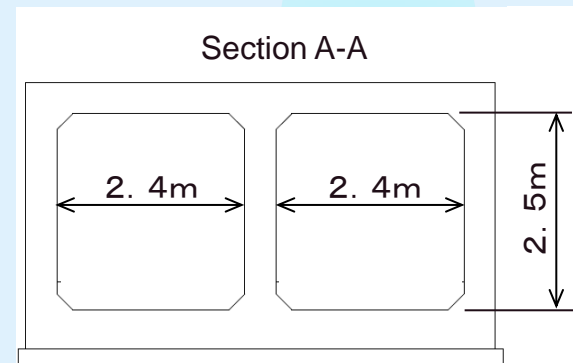
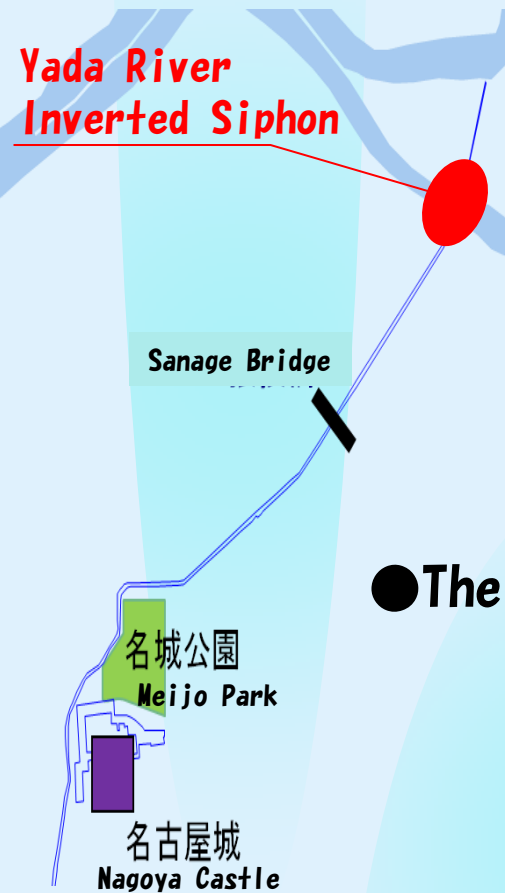
• 1911

Rebuilt with artificial stone

• 1955

Rebuilt with reinforced concrete  
(water transport was closed down)

## ●The current structure



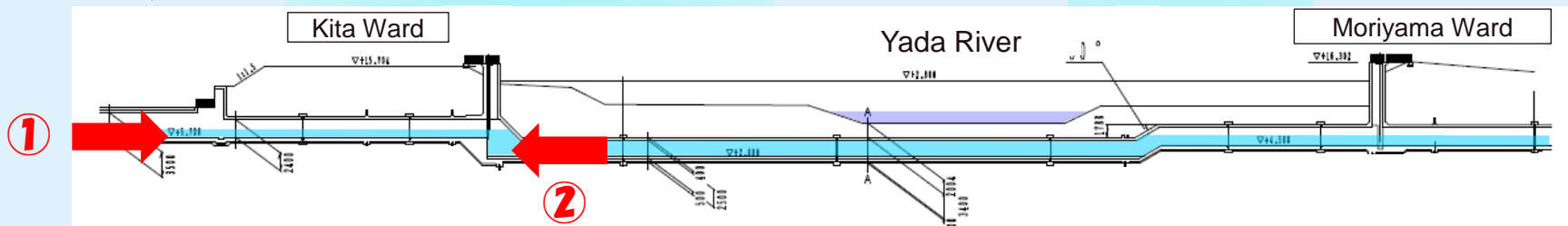


# Dredging works in Yada River Inverted Siphon

## ● State in the culvert




➔ : Photographing direction

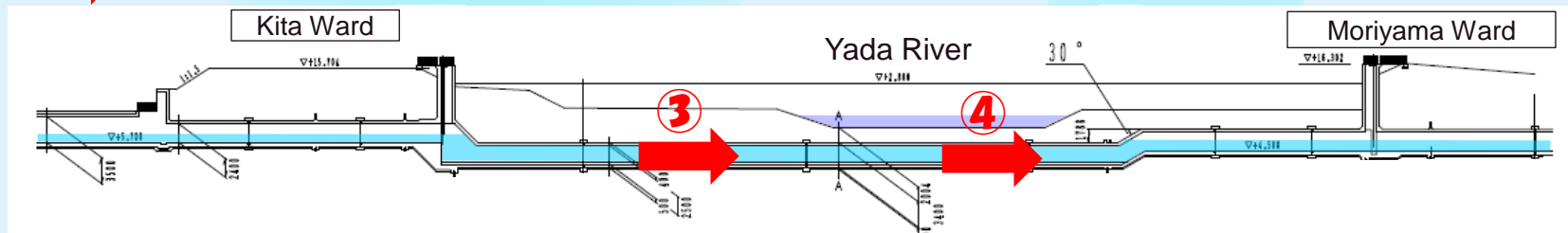


# Dredging works in Yada River Inverted Siphon

## ● State in the culvert



 : Photographing direction





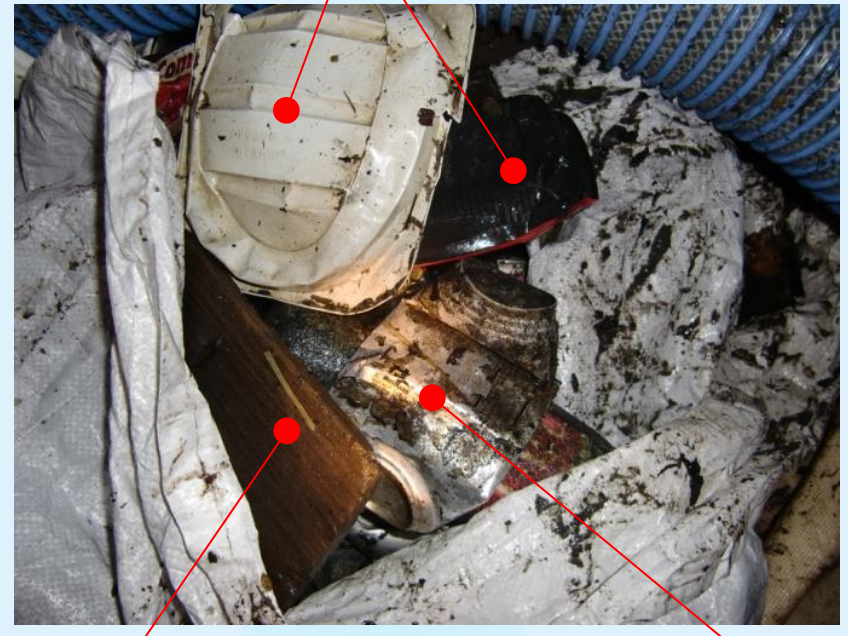
# ■ Dredging works in Yada River Inverted Siphon

Strong vacuum suction vehicle  
used for dredging



The trash which can't be  
collected by vacuum car

Plastic garbage (Lunch boxes)

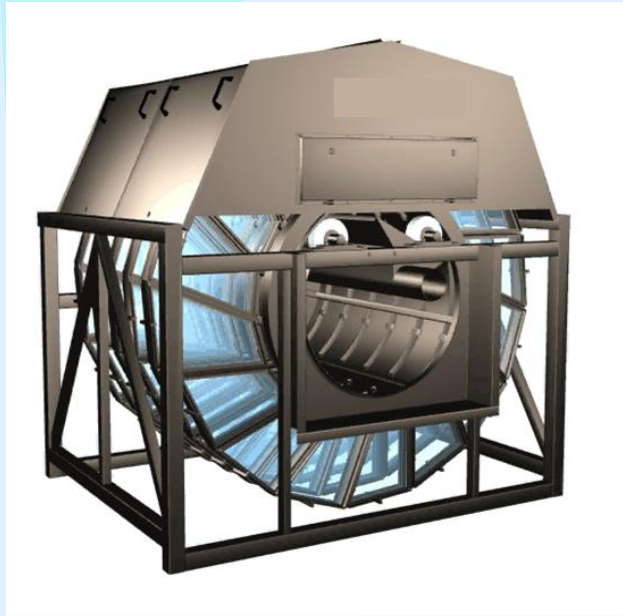


Woodchip

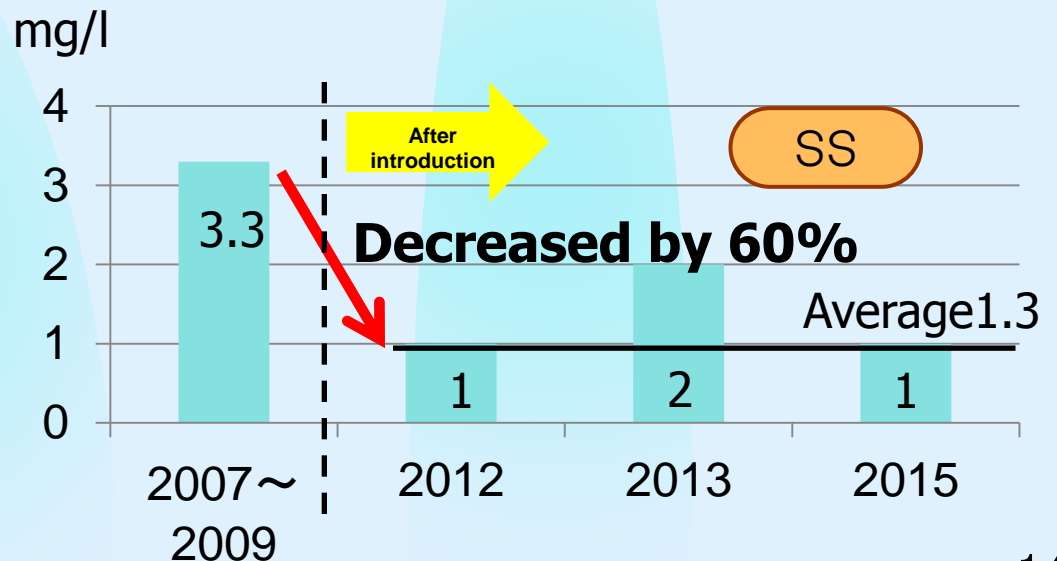
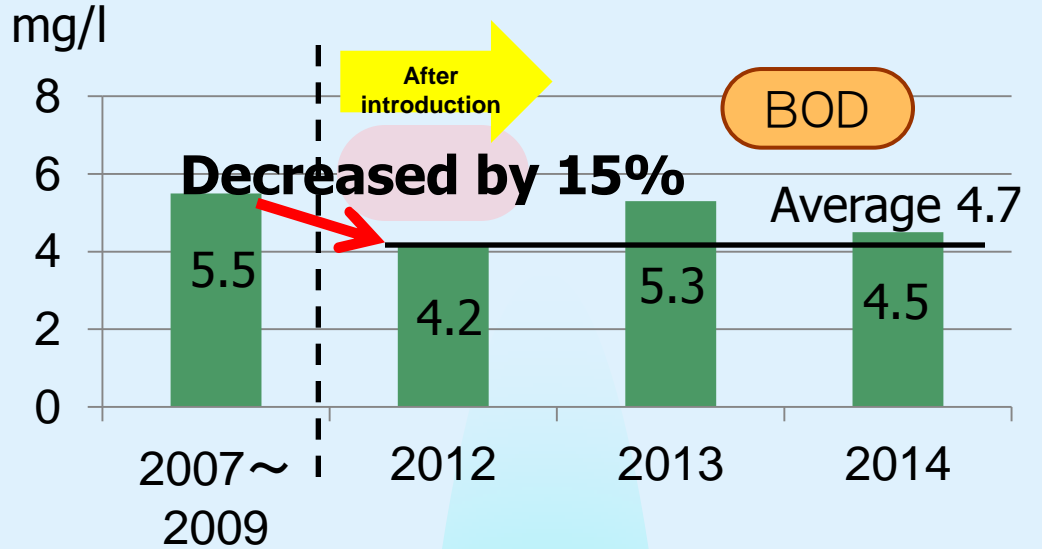
Aluminum can

# ■ Pollutants removal·inflow reduction

- ◆ Advanced water treatment at Meijo Water Treatment Center  
(Started operation in May, 2010)



Filter out more minute  
Suspended Solids(SS) in  
treated water by filtration  
devices





# ■ Pollutants removal / inflow reduction

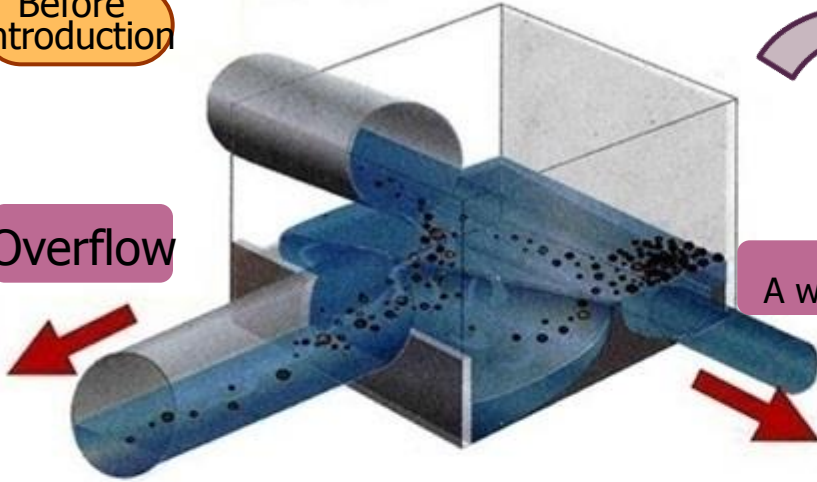
- ◆ Improvement of the combined sewer system (Installation of the garbage removal device)

Number of garbage removal devices

Planned value	Installed	2015 (Estimate)
126	101	10

Before introduction

Overflow



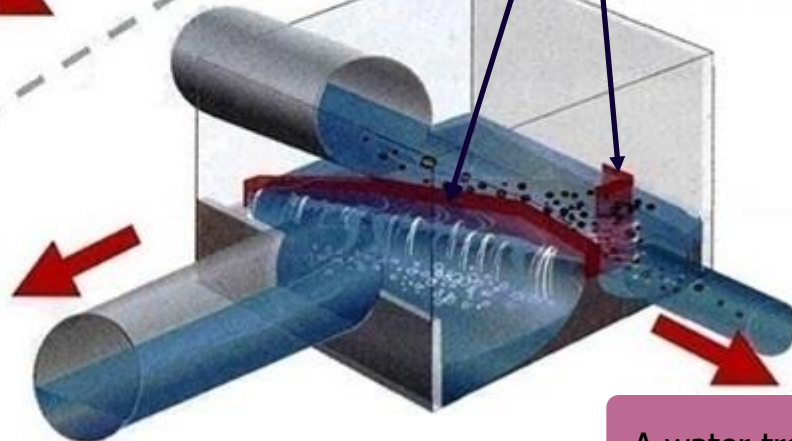
Garbage in treated water overflow with rainwater

Overflow

Rainwater treated by the garbage removal devices overflow

**Garbage removal devices**

After introduction

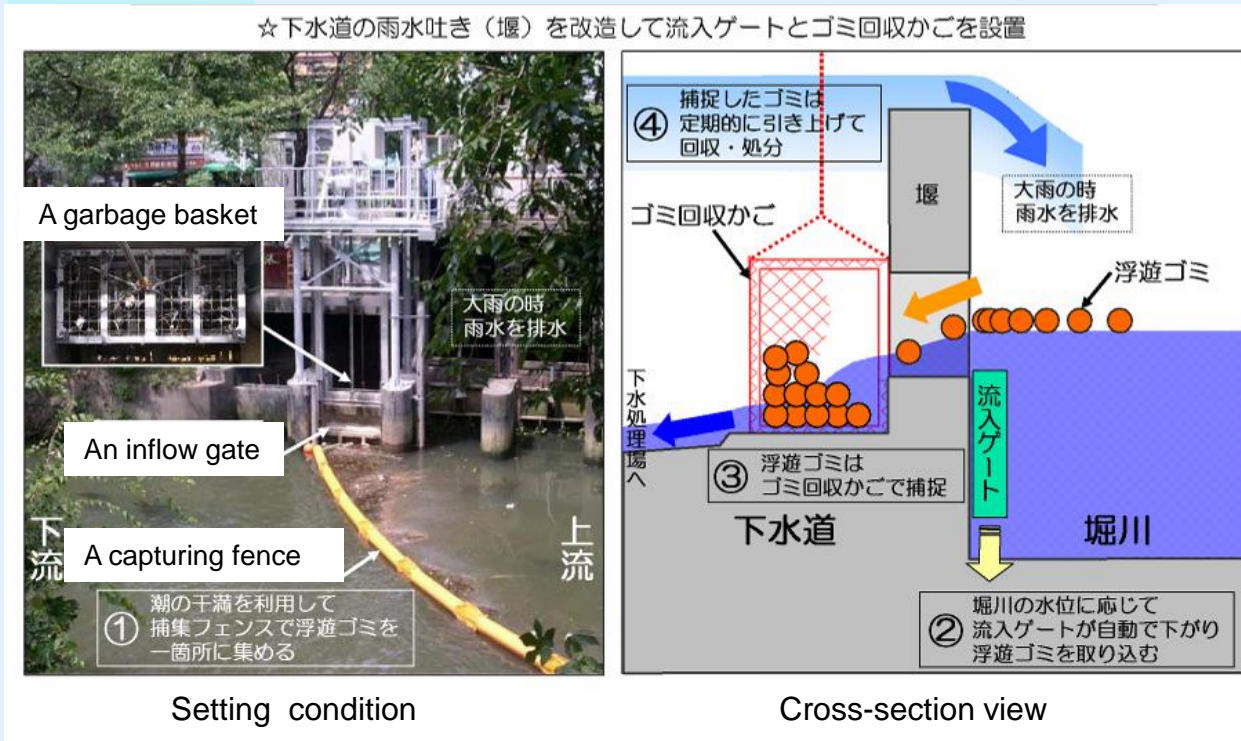


To A water treatment center

Removed garbage is treated with sewage at water treatment centers

# Pollutants removal / inflow reduction

## ◆ A Garbage Catcher (Near Johoku Bridge) Introduced in 2006



The accumulation result in 2012	1.1tons
// in 2013	0.8tons
// in 2014	0.7tons
// in 2015	1.2tons

← As of December 2015



# ■ Pollutants removal / inflow reduction

## ◆ Control of combined sewer overflow (Rainwater storage facilities)

Construct rainwater storage facilities to reduce pollution load for Horikawa River in rainy weather by storing high polluted first flush rainwater temporarily.

Ozone stormwater  
reservoir



Started operation in 2006  
(12,000m<sup>3</sup>)

Horikawa Ugan Rain-  
water Reservoir for  
pollution control



Started operation in 2010  
(13,000m<sup>3</sup>)

Horikawa Sagan Rain-  
water Reservoir for  
pollution control



Under construction  
(14,000m<sup>3</sup>)

# Secure the river source

## ◆ Reclaimed wastewater supply (Except winter)

Use of reclaimed wastewater treated by the membrane filtration process at Moriyama Water Treatment Center  
(maximum water supply :  $4,000\text{m}^3/\text{day}$  ( $0.046\text{m}^3/\text{s}$ ))



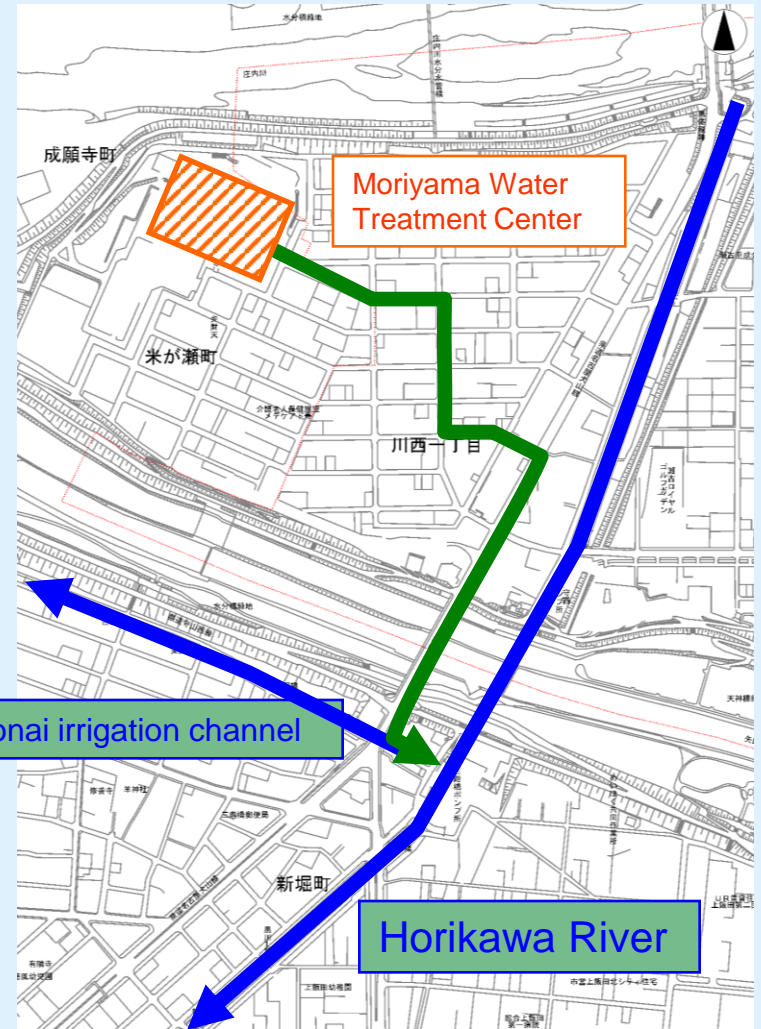
Flat membrane units in aerobic tanks  
(400 sheets × 12 units)

The membrane case of an upper stage  
(200 cartridges inside)

The membrane case of a lower stage  
(200 cartridges inside)



Flat membrane units



※ Water conveyance period is generally irrigation seasons (from April to October)  
(except the period for Shonai irrigation channel (from November to March))



***Thank you for  
your kind attention.***

