Measures to make Horikawa River Limpid

Implementation by Nagoya City

Sep.28th 2019

Greenification & PublicWorks Bureau
River Plannning Div.

Waterworks and Sewerage Bureau
Sewerage Plannning Div.

Environment Bureau
Local environmental measures Div.

Implementation by Greenification & PublicWorks Bureau

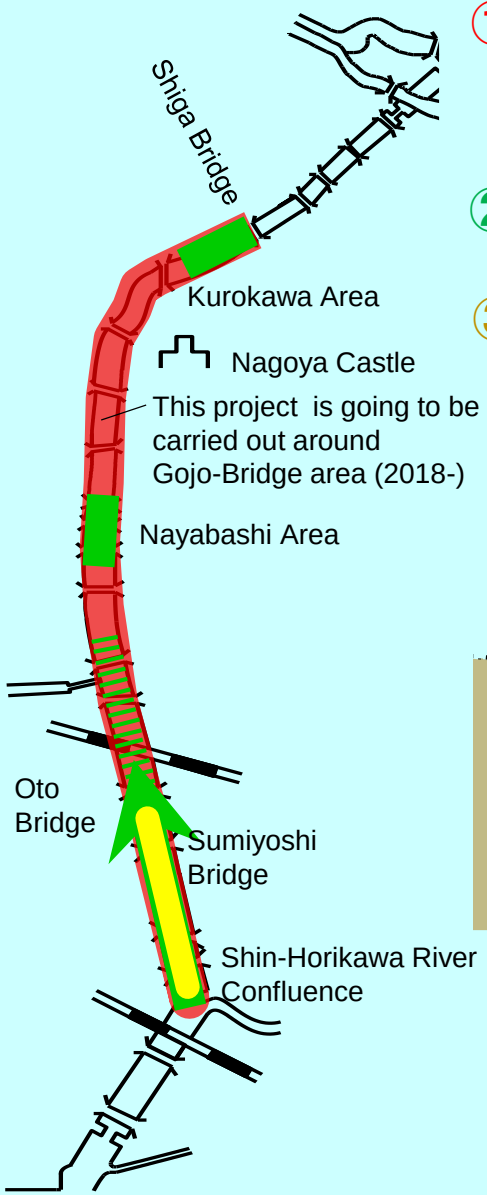
◆Removal of Sludge

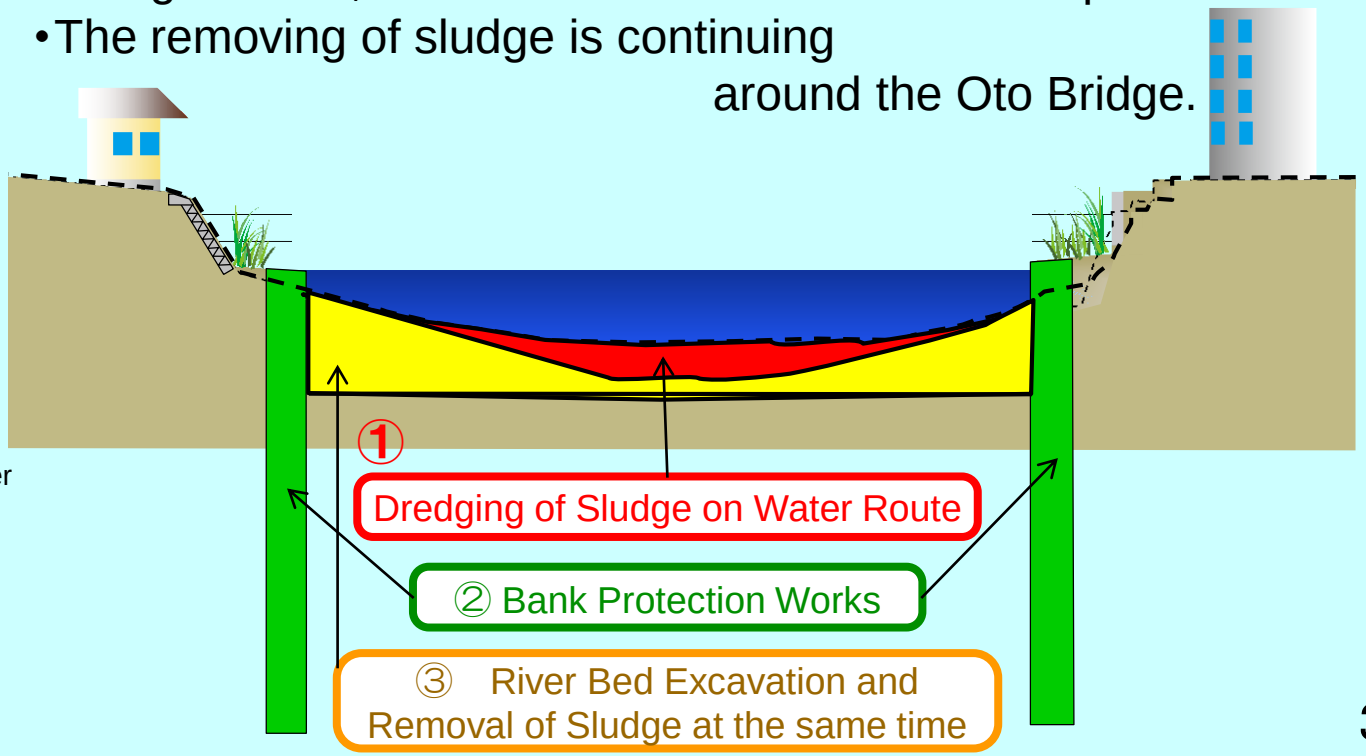
①Sludge have been dredged on water route between the Shiga Bridge and Shin-Horikawa River confluence (1994-2007)

②Construction of Bank Protection in River management project

③After Bank Protection Works, River bed Excavation and removal of sludge are implemented at the same time

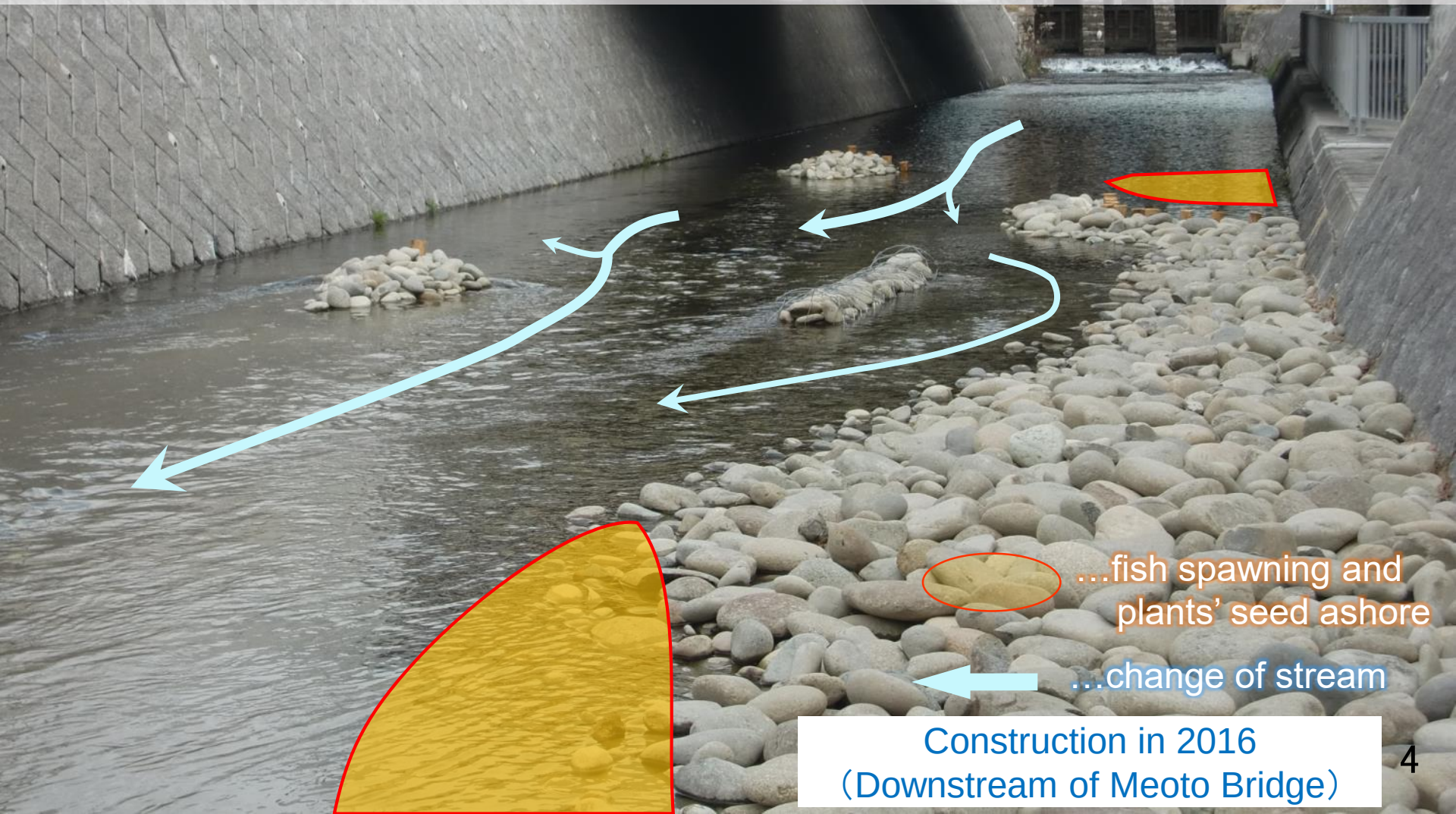
- Sludge of 155,000m^3 have been removed in the past
- The removing of sludge is continuing around the Oto Bridge.





◆Construction of Shallows and Depths

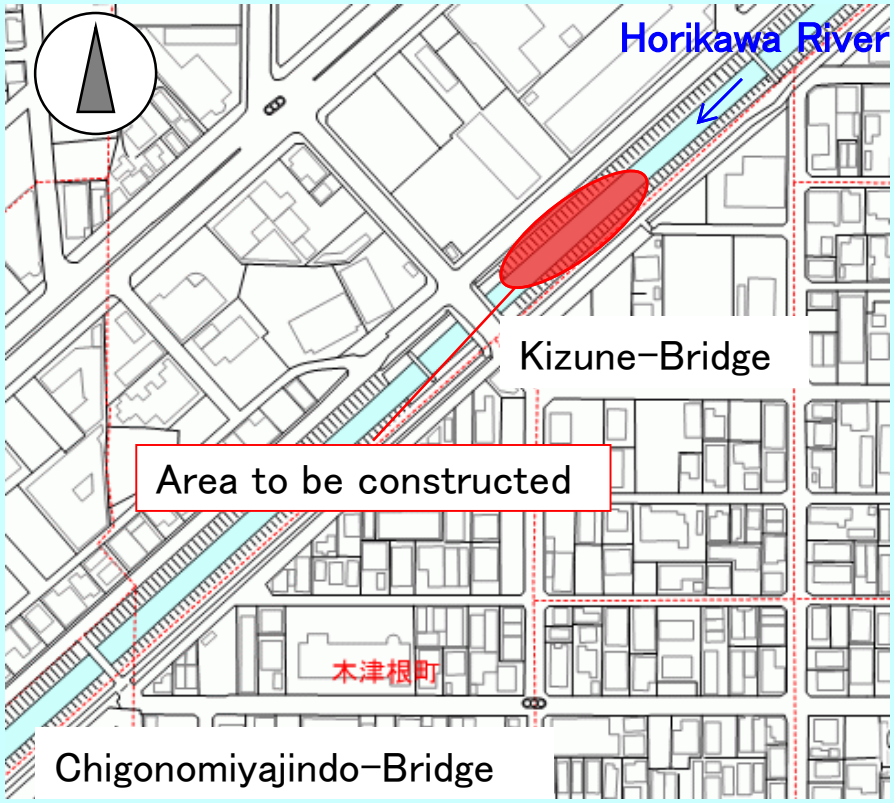
Setting wooden piles and ripraps generates variable stream on the river for enforcing river's self-purification function and creating habitats with growth of plants.



Construction in 2016
（Downstream of Meoto Bridge）

◆Construction of Shallows and Depths

City of Nagoya will constructed and installed shallows and Depths to upstream of Kizune-Bridge in Kita Ward in March 2019.



Current condition

◆Construction of Shallows and Depths

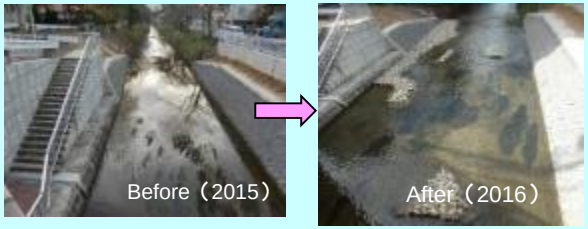
Installed in 2010

Installed in 2012

Installed in 2013

Installed in 2015
(Downstream of Ruriko Bridge)

Installed in 2016
(Downstream of Meoto Bridge)



Installed in 2018
（upstream of Kizune-Bridge）

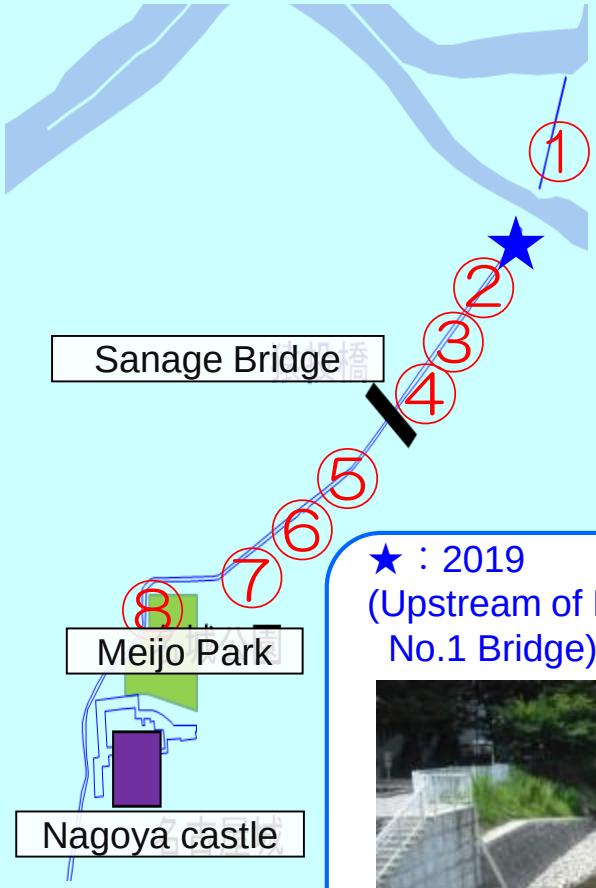
Some of the creatures seen in the upstream of Horikawa River

◆Improvement

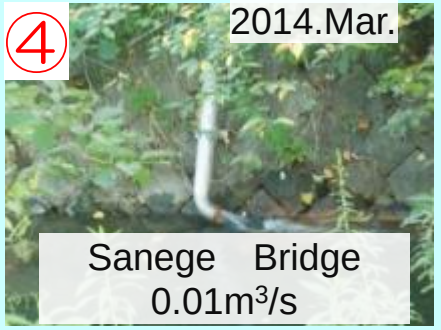
- Variety and amount of fish have increased.
  （example pale chub)
- Benthos have increased.
  （example shrimp)
- Plants have grow up more.

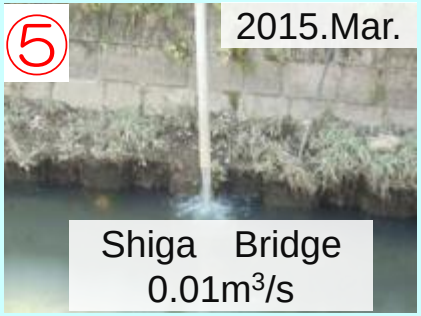
◆ Use of shallow groundwater

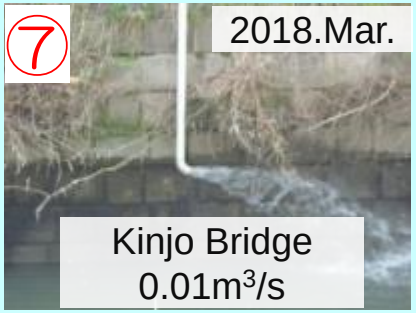
Use of shallow groundwater in the upstream area of Horikawa River



★：2019
(Upstream of Kurokawa No.1 Bridge)







◆Cooperation with Cleaning group of ports (*Sei-ko-kai,清港会*)

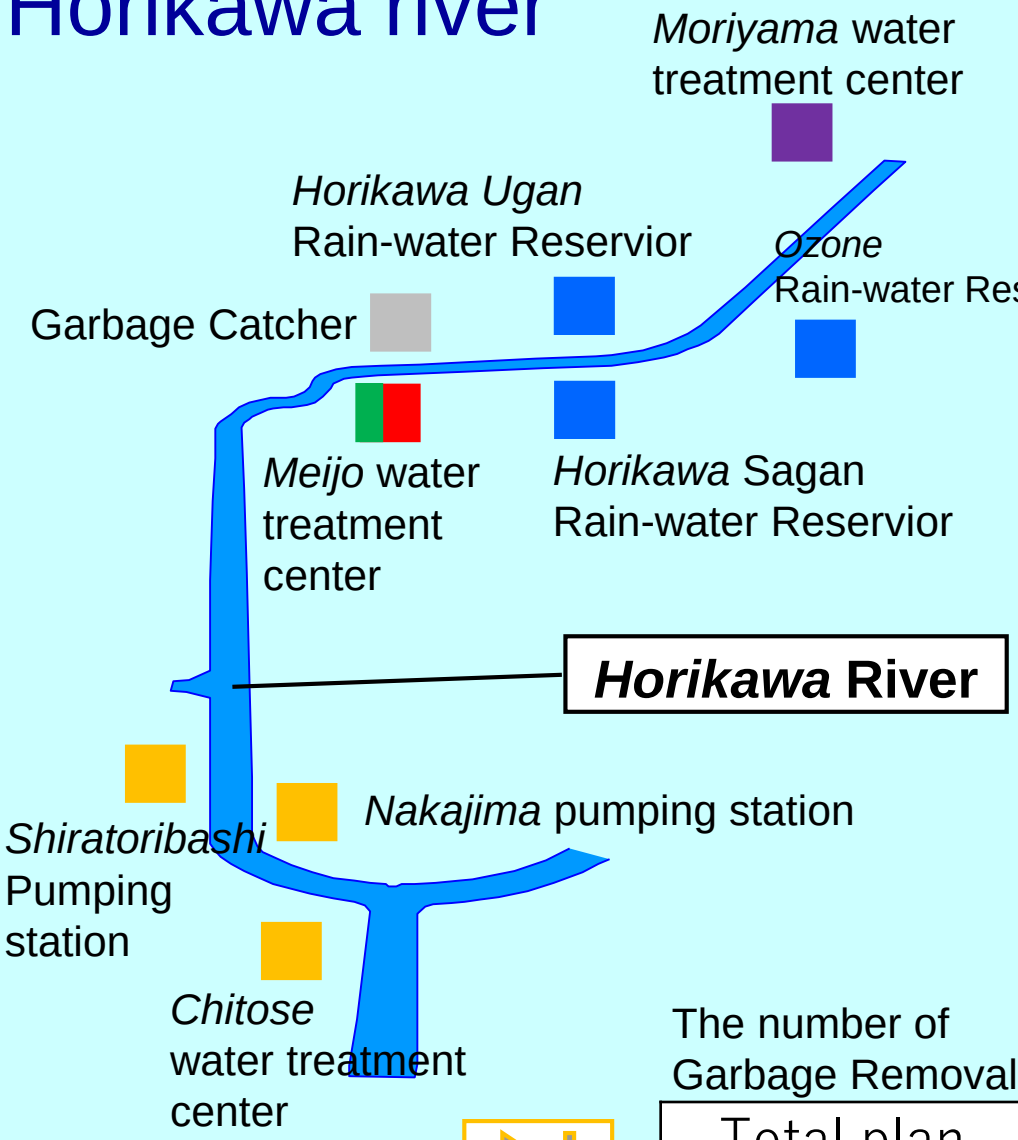
HSC shares the information about the tide level and the place which Dust is easy to collect with *Sei-ko-kai*, and they clean up suspended garbage efficiently.

Condition of cleaning at high tide level time

Implementation by Waterworks and Sewerage Bureau

Initiatives for clarification of Horikawa river

Initiatives for clarification of Horikawa river



Advanced water treatment
Meijo water treatment center
（disk filter）

Advanced Facilities of simple treatment
Meijo water treatment center
(under installing)

Rain-water Reservior for pollution controll
Ozone Rain-water Reservior
Horikawa Ugan Rain-water Reservior
Horikawa Sagan Rain-water Reservior
(under installing)

Shrinkage of Rainwater screen slit
Shiratoribashi Pumping station
Nakajima pumping station
Chitose water treatment center

reclaimed wastewater supply
Moriyama water treatment center

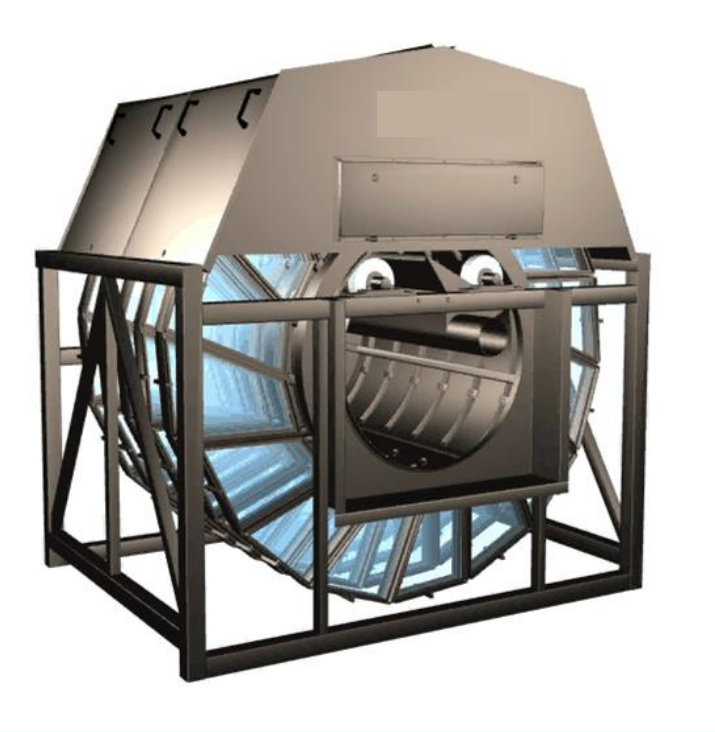
Garbage Catcher

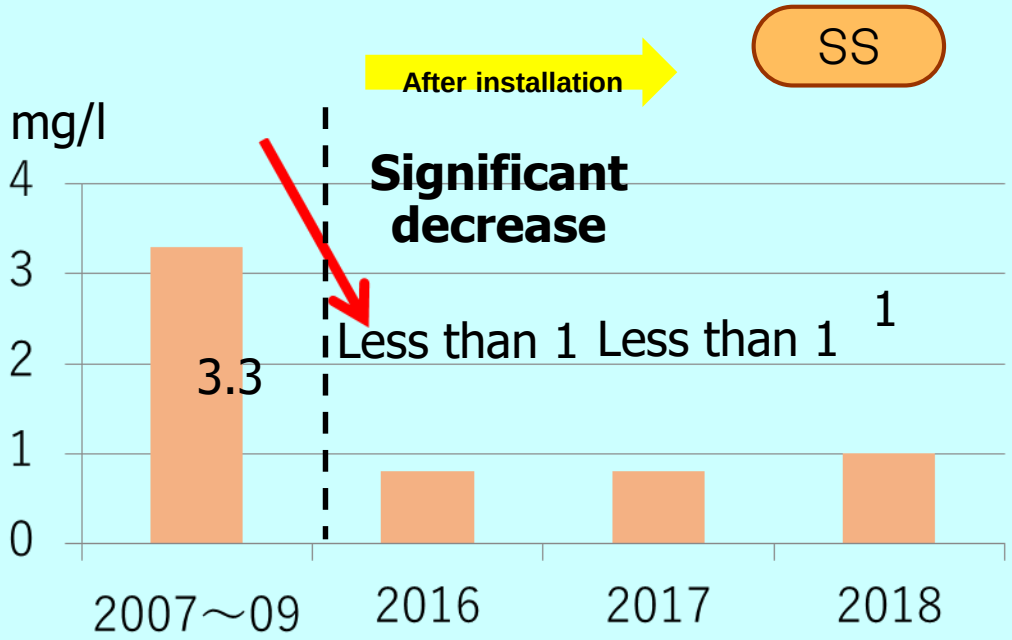
The number of Garbage Removal equipment

Total plan	Constructed	Future Plan
127	112	15

Advanced water treatment

◆Meijo Water Treatment Center
（treatment capacity：50,000m3/day）





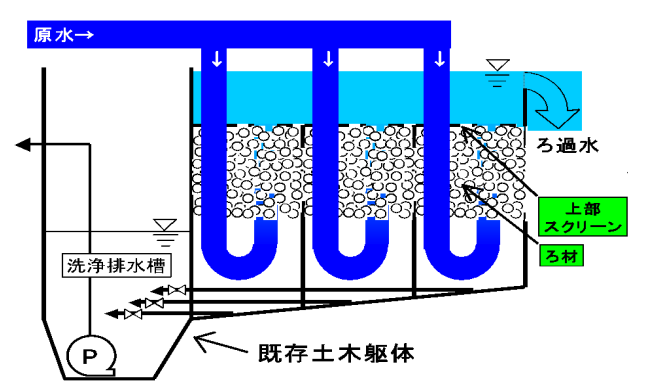
Minute Suspended Solids(SS) in treated water are removed more by the filtration devices

Advanced Facilities of simple treatment (Improvement of combined sewer system)

We changed the simple treatment of rain water from *Settling treatment* to *Filtration treatment*, remodeled the part of existing first settling basin and installed advanced facilities of simple treatment in the water treatment centers.

◆ *Meijo* Water Treatment Center（treatment capacity：99,400m3/day）

- Started operation in 2019



Treatment flow


Special filteration materilal

※Left figure is Tenma Water Treatment Center

◆**Removal Rate of BOD ： 20%−30%**

➡ **50%−60% Improvement!**

Rain-water Reservior for pollution controll (Improvement of combined sewer system)

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

Ozone
Rain-water Reservior

Started operation in **2006**

(12,000m³)

Horikawa Ugan
Rain-water Reservior

Started operation in **2010**

(13,000m³)

Horikawa Sagan
Rain-water Reservior

Started operation in **2019**

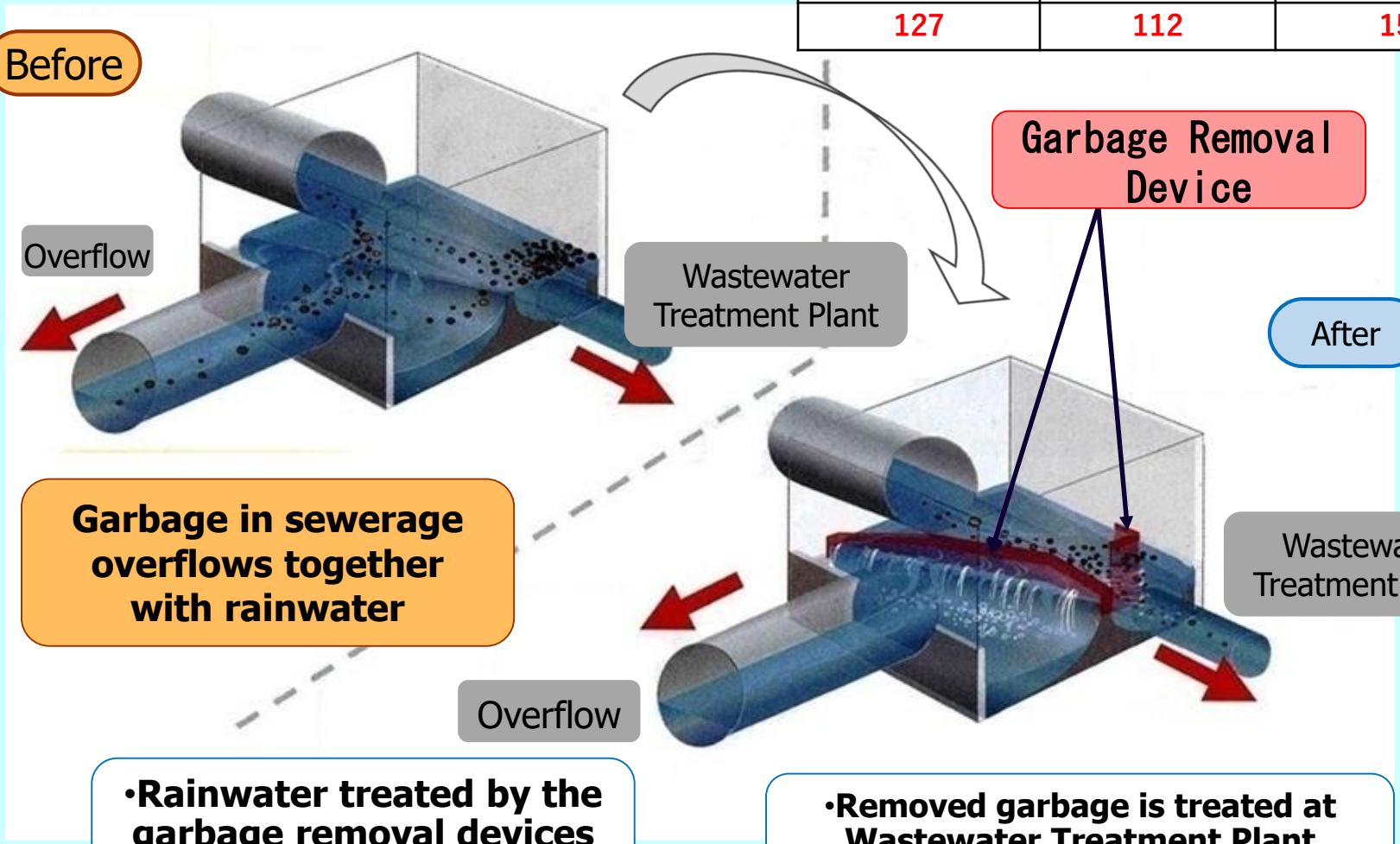
(14,000m³)

Removal and Reduction of inflow of pollutants

◆Improvement of combined sewer system (Installation of Garbage Removal Device)

The number of installation of Garbage Removal Device

Total plan	Installed by the end of 2018	Future plan to install
127	112	15



■Shrinkage of Rainwater screen slit (Improvement of combined sewer system)

Rainwater screens are the facilities to remove comparatively big garbage, and installed in water treatment centers and pumping stations.
Shrinkage of Rainwater screen slit remove more garbage.

- *Shiratoribashi* Pumping station
- *Nakajima* pumping station
- *Chitose* water treatment center

◆**Rainwater screen slit**

40mm → 25mm

◆**Reduction of inflow of pollutants**

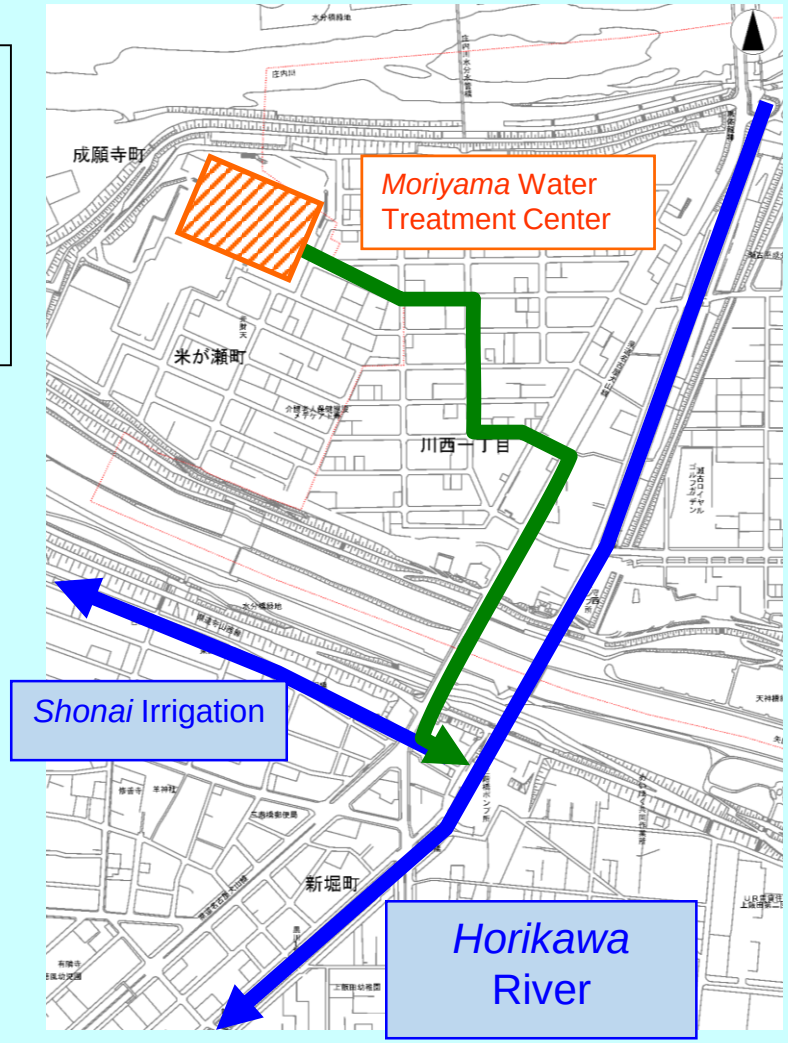
Additional Water Resource

Conducting reclaimed wastewater treated by membrane filtration
at the *Moriyama* Water Treatment Center

Water Supply: Up to 4,000m^3/day（0.046m^3/s）

Flat membrane unit aerobic tank

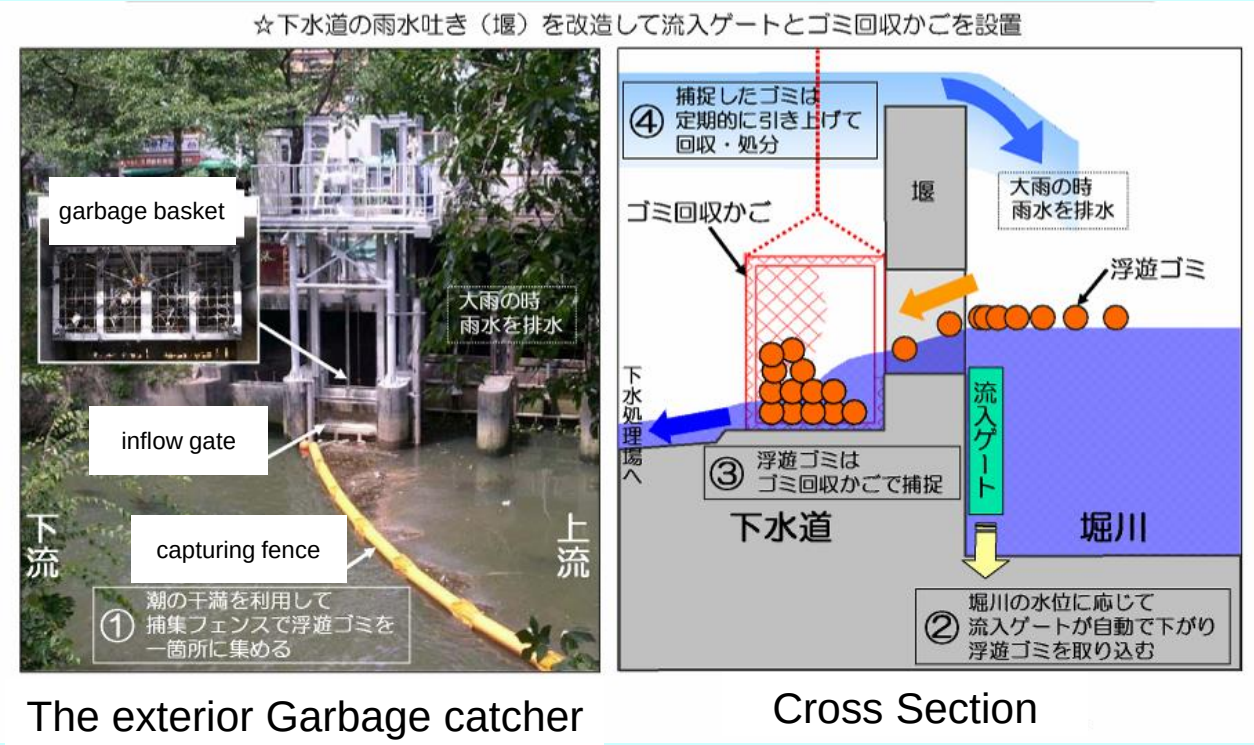
Flat membrane unit



※Watering period is almost irrigation period（April～October）
（Except the period for Shonai irrigation channel（November～March））

Removal and reduction of inflow of pollutants

◆Garbage catcher（Near *Johoku* Bridge) since 2006

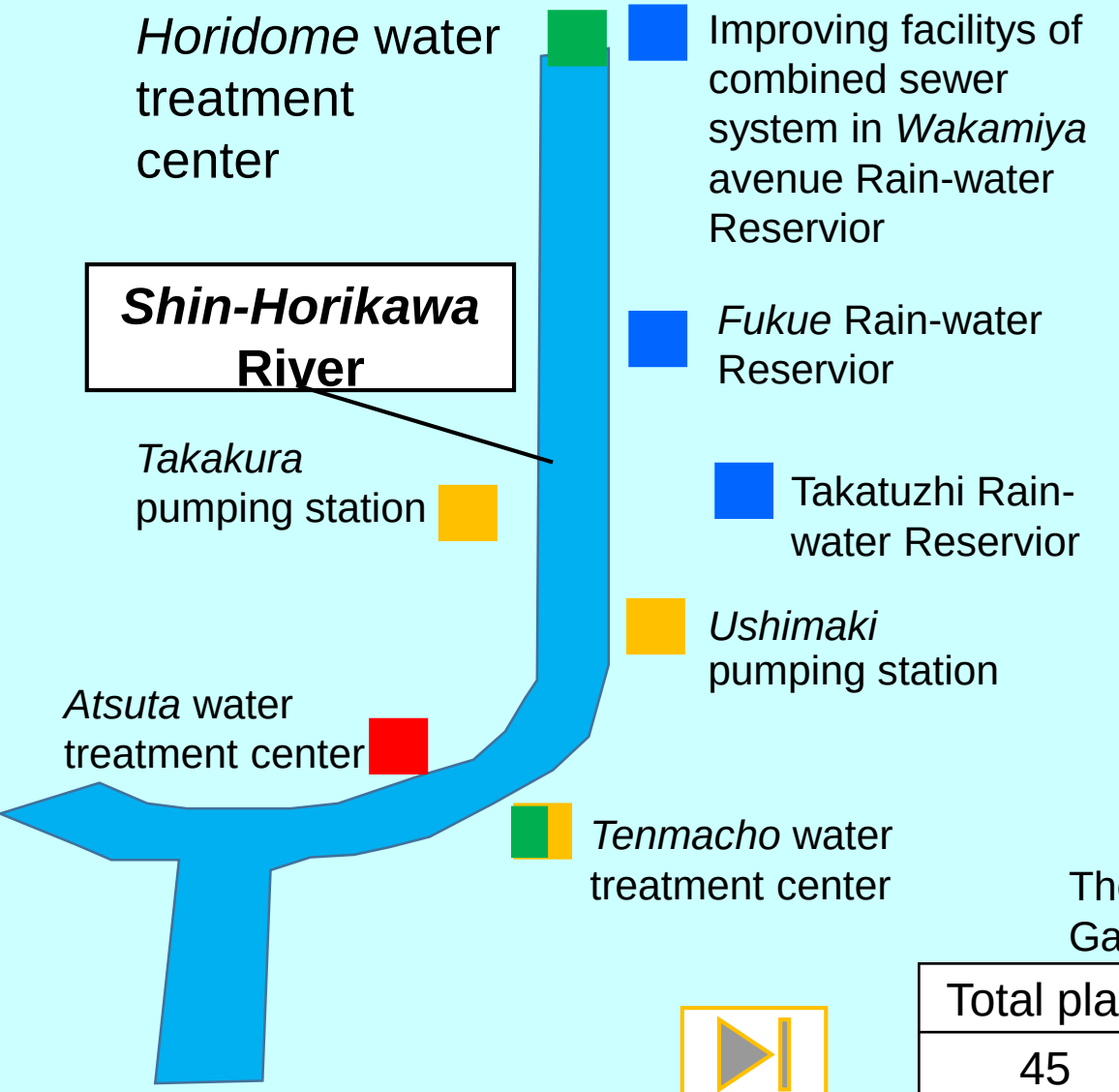


The exterior Garbage catcher　　Cross Section

Result of collection in 2015	1．4　t
Result of collection in 2016	1．3　t
Result of collection in 2017	0．7　t
Result of collection in 2018	1．1　t

initiatives for clarification of Shin-Horikawa river

initiatives for clarification of *Shin-Horikawa river*



Advanced water treatment (AO method)
Atsuta water treatment center

Advanced Facilities of simple treatment
Horidome water treatment center
Tenmacho water treatment center

Rain-water Reservior for pollution controll
Wakamiya avenue Rain-water Reservior
Fukue Rain-water Reservior
Takatuzhi Rain-water Reservior

Shrinkage of Rainwater screen slit
Takakura pumping station
Ushimaki pumping station
Tenmacho water treatment center (under installing)

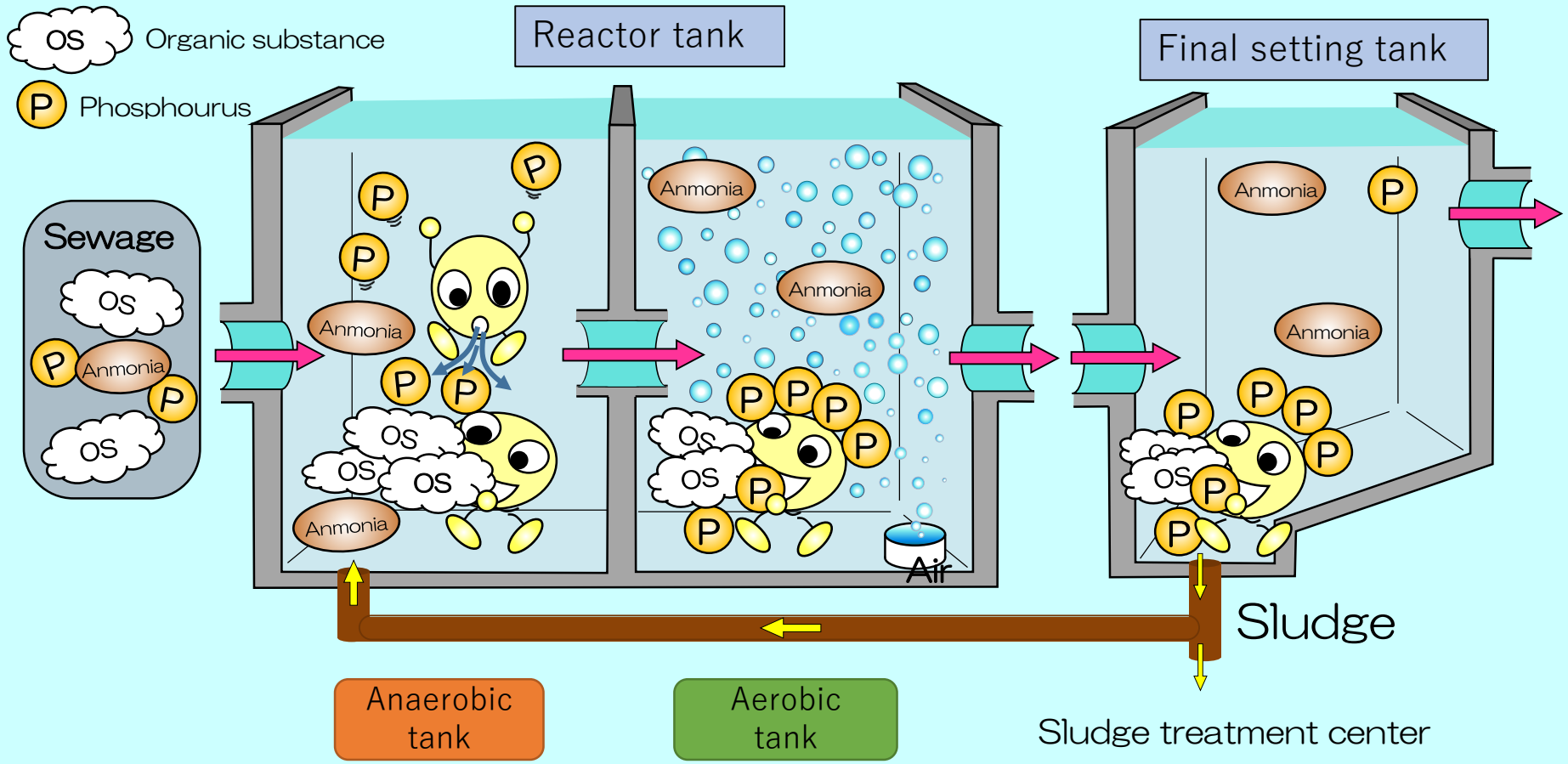
The number of Garbage Removal equipment

Total plan	Constructed	Future Plan
45	41	4

Advanced water treatment

◆Atsuta Water Treatment Center（Anaerobic-aerobic method）

Sewage treatment capacity：about 38,000m3/day



The process can remove nitrogen and phosphorus which causes eutrophication more than normal conventional activated sludge process.

Advanced Facilities of simple treatment (Improvement of combined sewer system)

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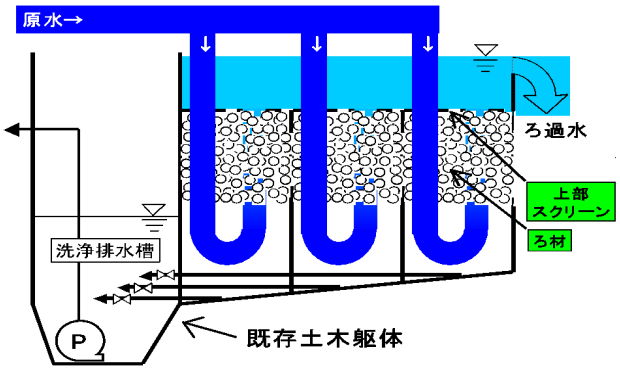
Tenmacho water treatment center（treatment capacity：168,000m3/day）
- Started operation in 2011

Horidome water treatment center（treatment capacity：277,200m3/day）
- Started operation in 2018



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Rain-water Reservior for pollution controll (Improvement of combined sewer system)

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

Takatuzhi Rain-water Reservior

Started operation in 1987
(30,000m³)

Fukue Rain-water Reservior

Started operation in 1999
(26,000m³)

Improving facilitys of combined sewer system in _Wakamiya_ avenue Rain-water Reservior

Started operation in 2002
(19,000m³)

Removal and Reduction of inflow of pollutants

◆Improvement of combined sewer system
(Installation of Garbage Removal Device)

The number of installation of Garbage Removal Device

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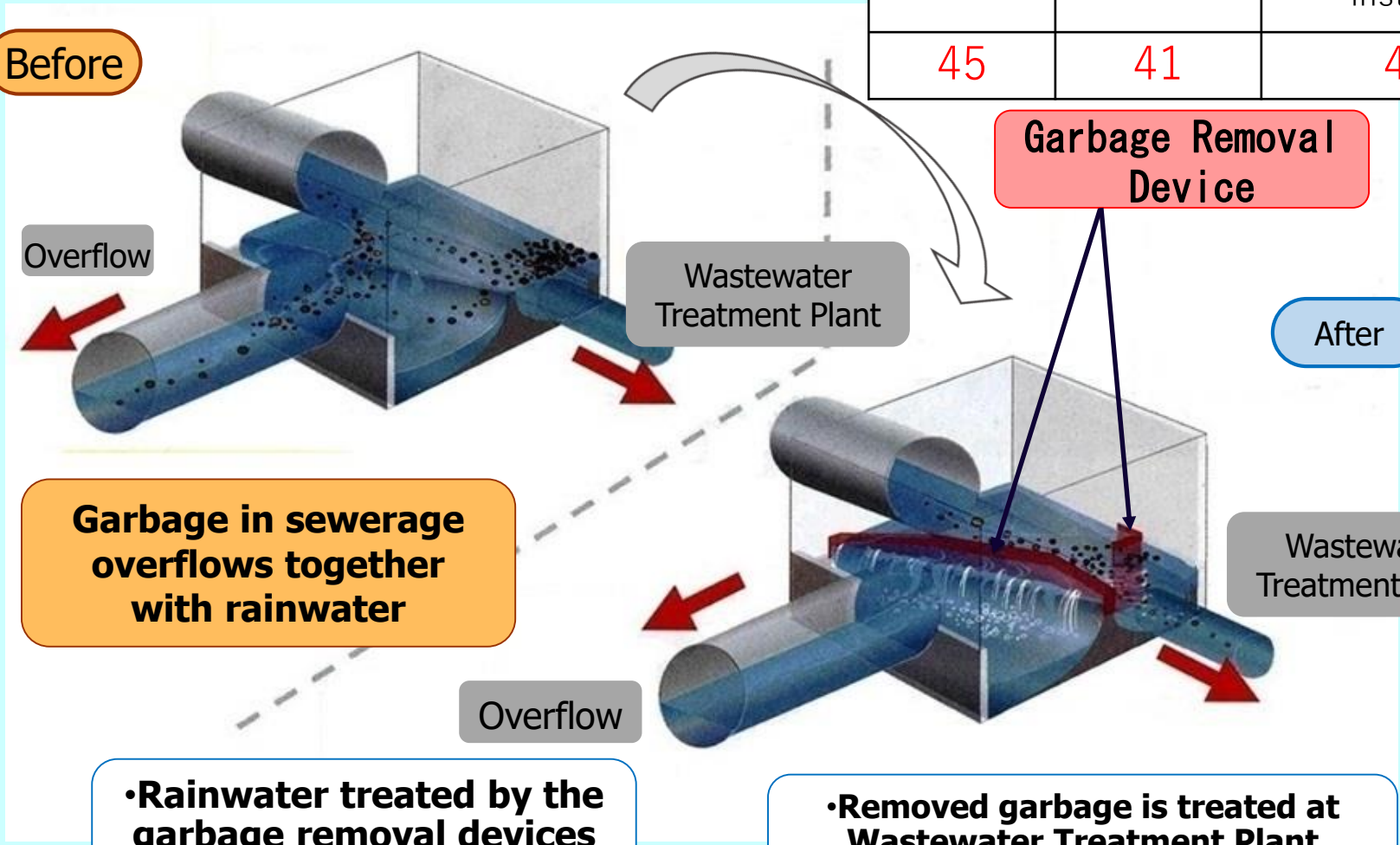

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◆**Rainwater screen slit**

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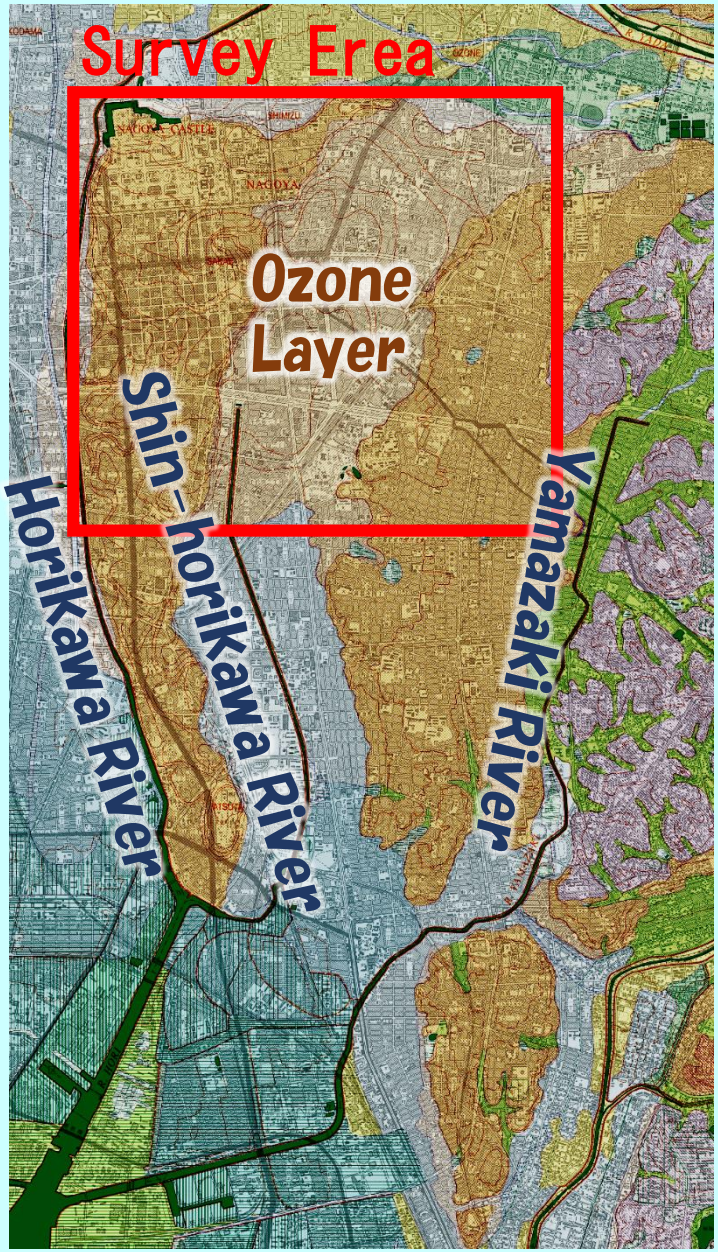
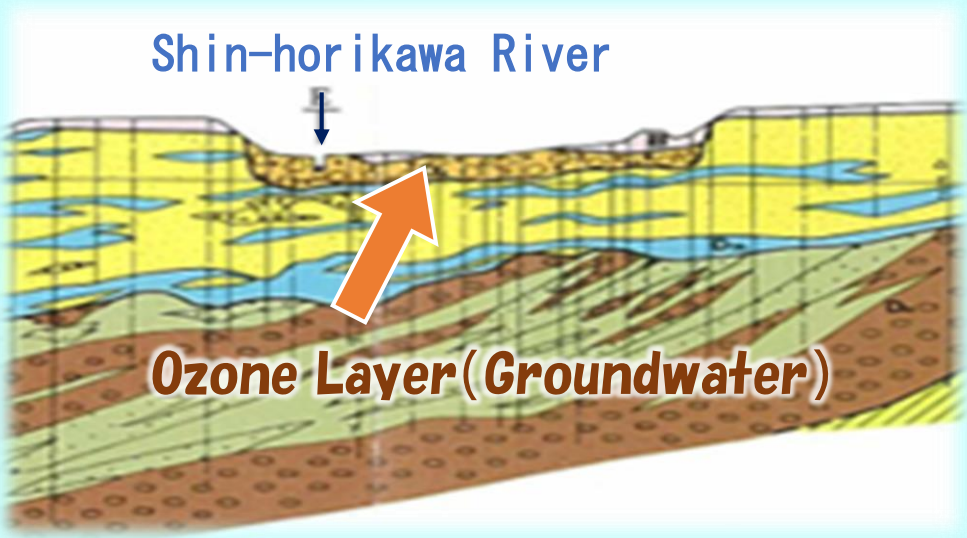
◆**Reduction of inflow of pollutants**

Implementation by Environment Bureau

Examination survey for river clarification(2019)





Basic survey to effectively use ground water as source of the river and water quality improvement

◆Application of ground water for clarification

◆Survey about measure to increase Spring water of Yamazaki river

Application of ground water for clarification

About Shin-Horikawa that has water quality problem,
We will conduct a basic survey to effectively use ground water as source of water quality improvement.

In order to secure water source

In order to improve water quality

□ Information gathering
- Boring data
- Water leak etc.

□Consideration of model case

2020～Survey will be concrete