

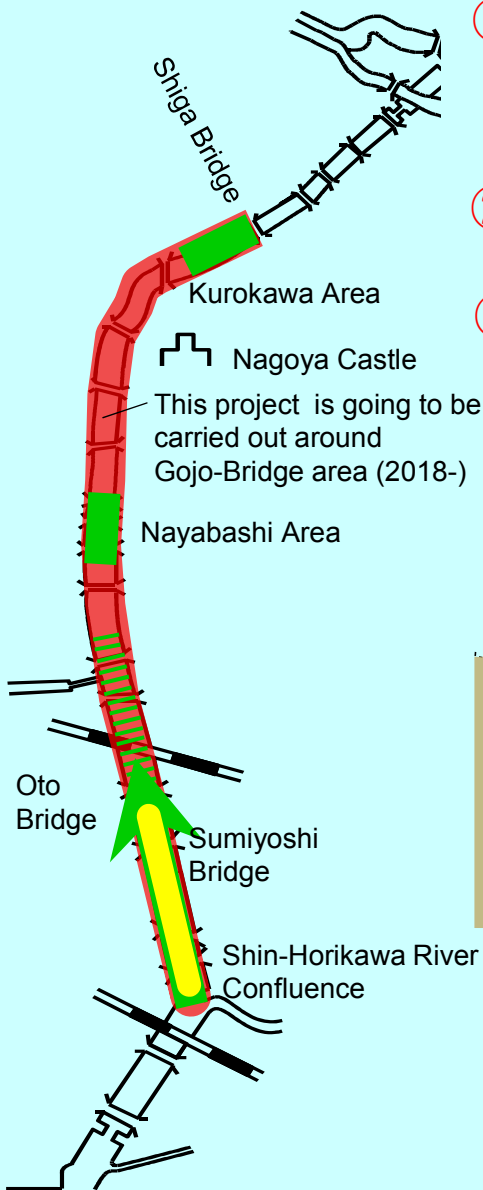
Measures to make Horikawa River Limpid

Implementation by Nagoya City

Sep. 29th 2018

Greenification & Public Works Bureau
River Planning Division
Waterworks and Sewerage Bureau
Sewerage Planning Division

◆ Removal of Sludge



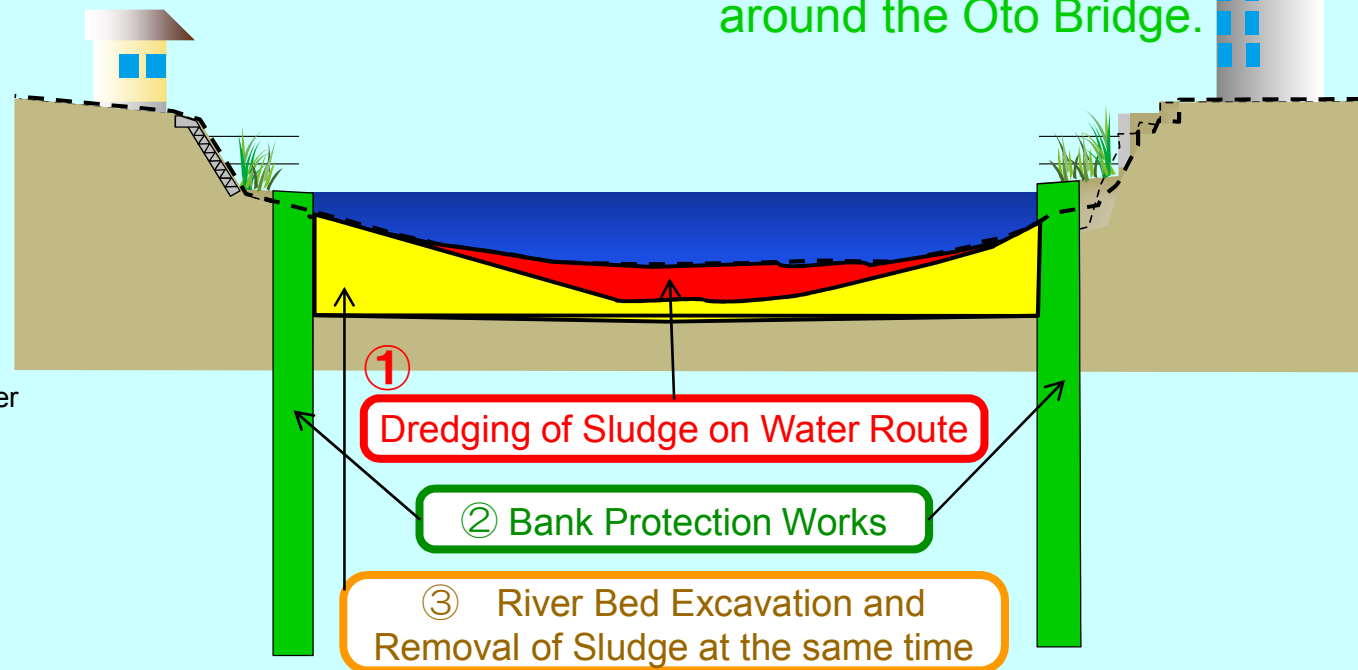
① Sludge have been dredged only on water route between the Shiga Bridge and Shin-Horikawa River confluence (1994-2007)



② Construction of Bank Protection in River management project

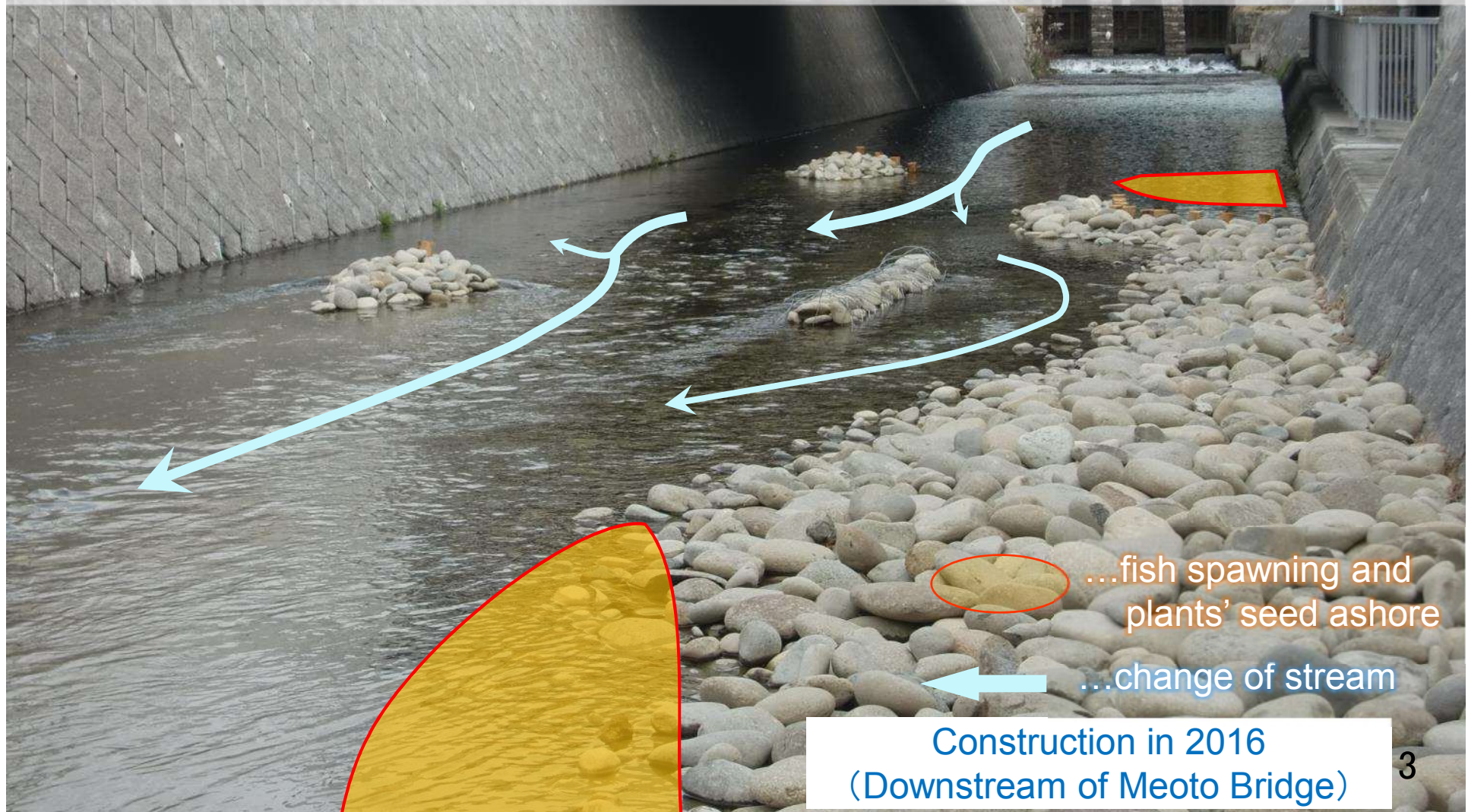
③ After Bank Protection Works, River bed Excavation and removal of sludge are implemented at the same time

- Sludge of 150,000m³ have been removed in the past
- The removing of sludge is continuing around the Oto Bridge.

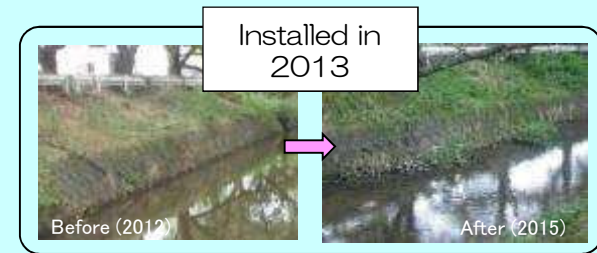
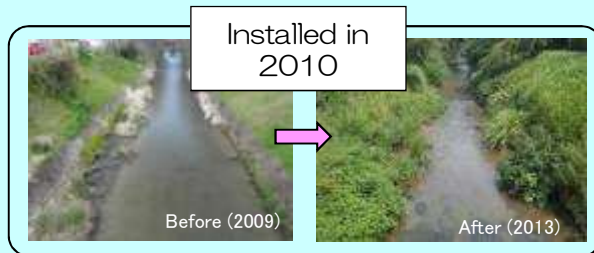


◆ Making shallows and deeps

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 of Shallows and Depths



Some of the creatures seen in the upstream of Horikawa River

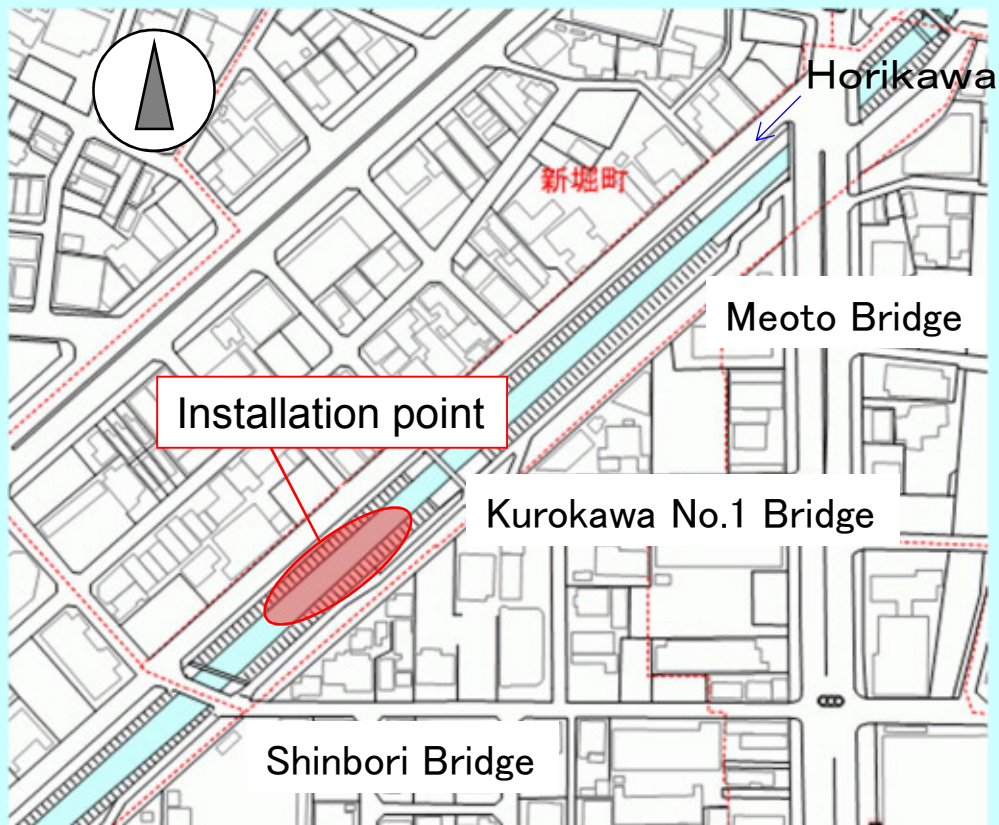


◆ Improvement

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

◆ Construction of Shallows and Depths

May in fiscal year 2018, Jyohoku Lions Club had contribute the shallows and Depths to a city at downstream of Kurokawa No.1 Bridge in the north ward.



The state of the site



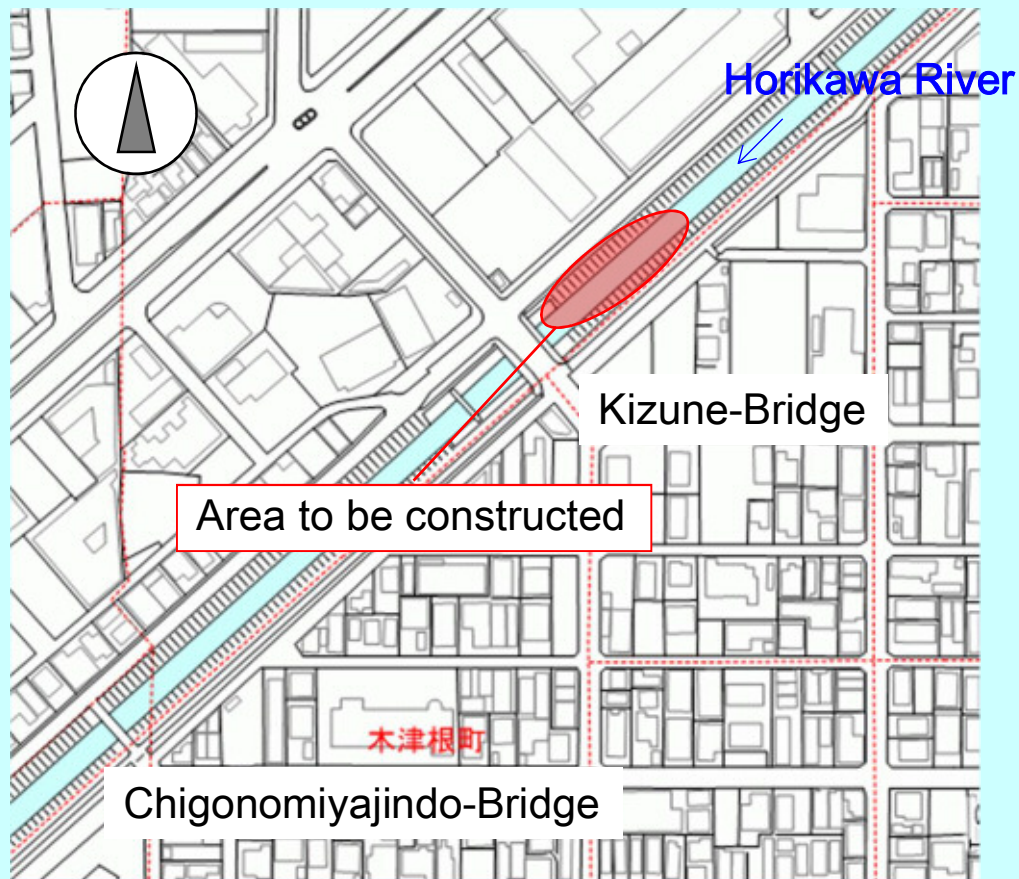
◆Construction of Shallows and Depths



Presentation ceremony of certificate of appreciation to Johoku Lions Club

◆Construction of Shallows and Depths (Plan)

City of Nagoya will construct and install shallows and abyss to upstream of Kizune-Bridge in Kita Ward before March 2019.

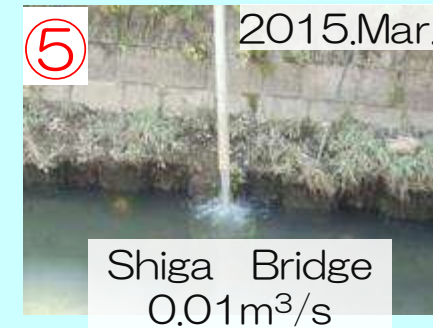
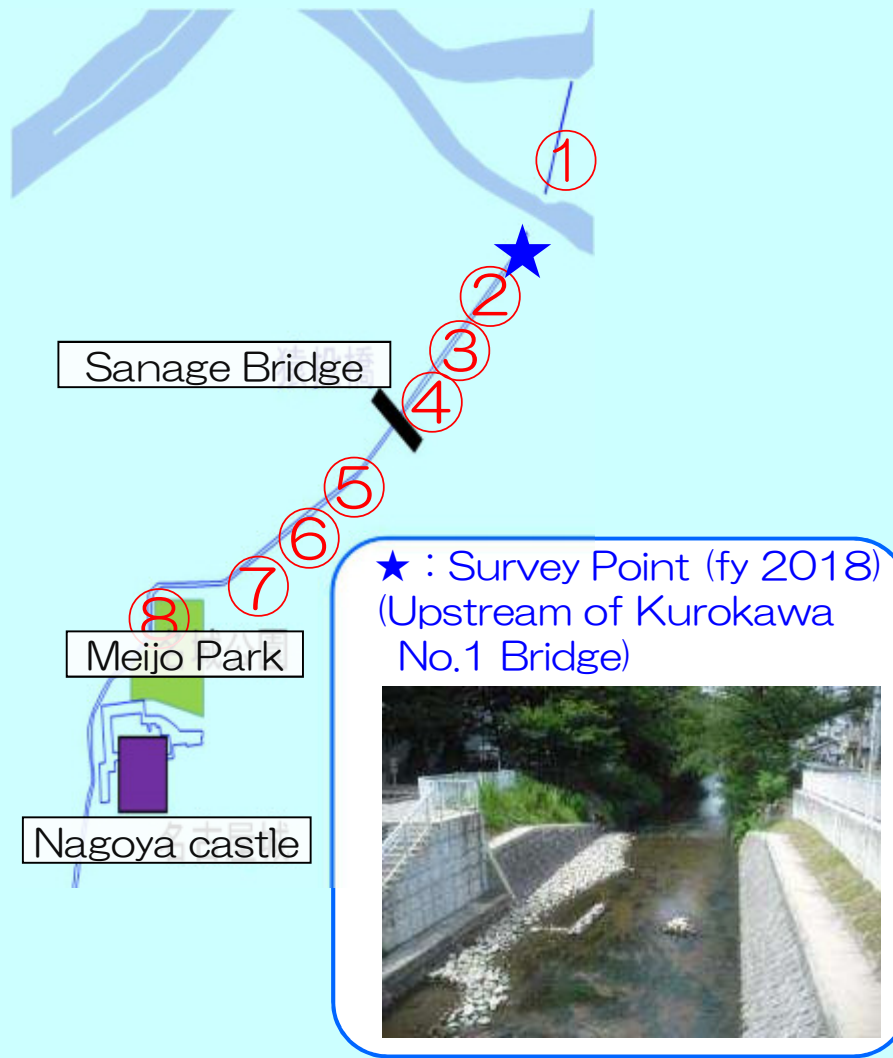


Current condition

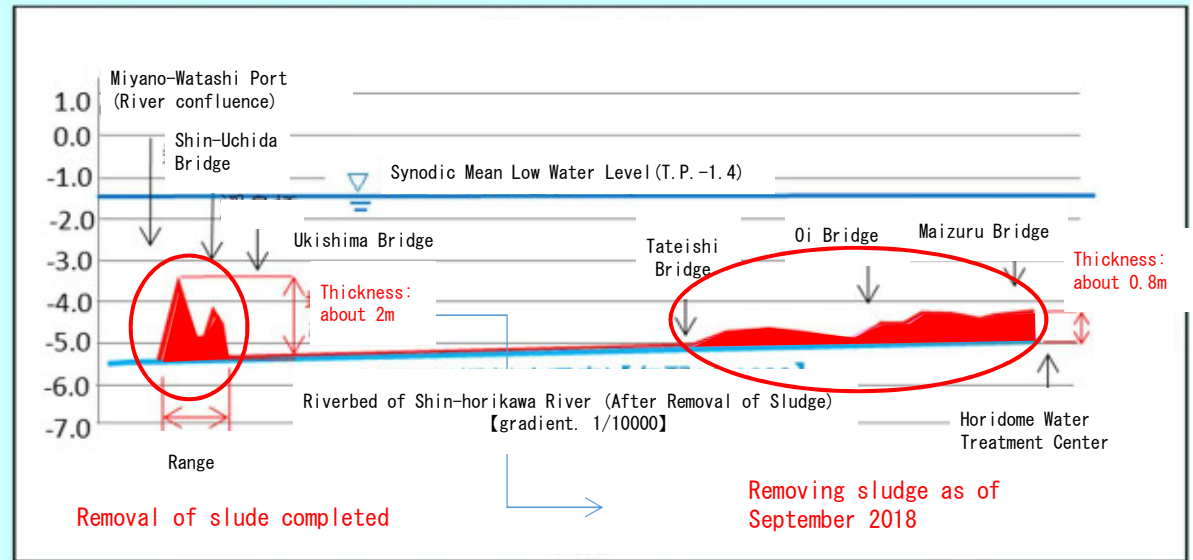


◆ Use of shallow groundwater

Use of shallow groundwater in the upstream area of Horikawa River



Measures of removing sludge in Shin-Horikawa River



Removal of Sludge in upstream zone was started in September 2018.



■ Removal of sludge in Shin-Horikawa River

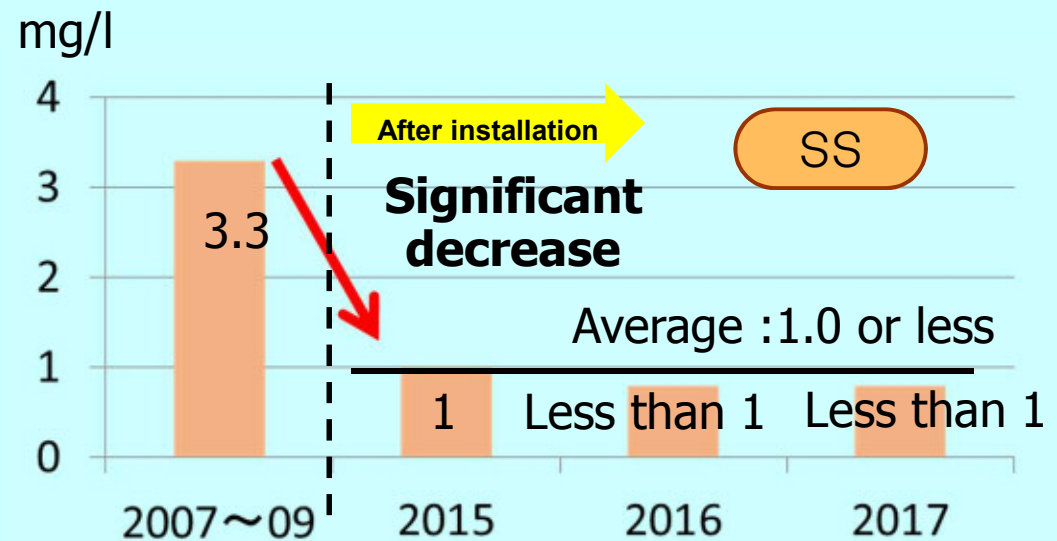


State of dredging

Measures and policies of Nagoya city Waterworks and Sewerage Bureau

Removal and reduction of inflow pollutants

- ◆ Advanced water treatment at the Meijo Water Treatment Center (since May 2010)



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

■ Removal and reduction of inflow of pollutants

◆ Control of combined sewer overflow

(Installation of advanced primary treatment facility)

Advanced primary treatment facilities at maintained area by combined sewer system will be installed in order to improve water quality of primary treatment in rainy weather.

◆ Meijo Water Treatment Center

- Started construction in 2017
- Scheduled to start operation in 2019

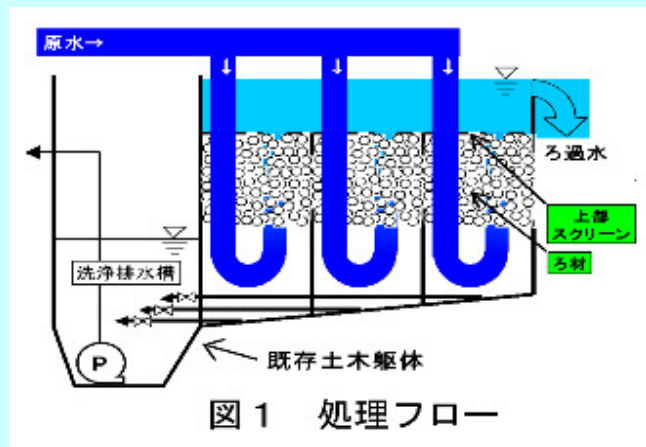


Fig.1 Process flow in Temma-cho Water Treatment Center



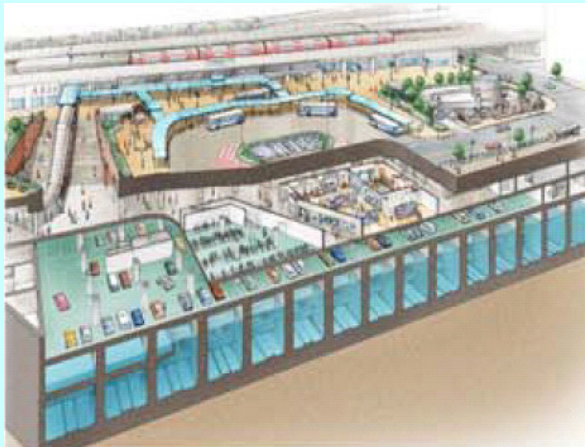
Pic.1 Special filter material

■ Removal and reduction of inflow of pollutants

◆ Control of combined sewer overflow (rainwater storage facility)

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

Ozone Storm water
Reservoir for
pollution control



Started operation in 2006
(12,000m³)

Horikawa Ugan
Rainwater
Reservoir for
pollution control



Started operation in 2010
(13,000m³)

Horikawa Sagan
Rainwater
Reservoir for
pollution control



Under construction
since 2008
(14,000m³)

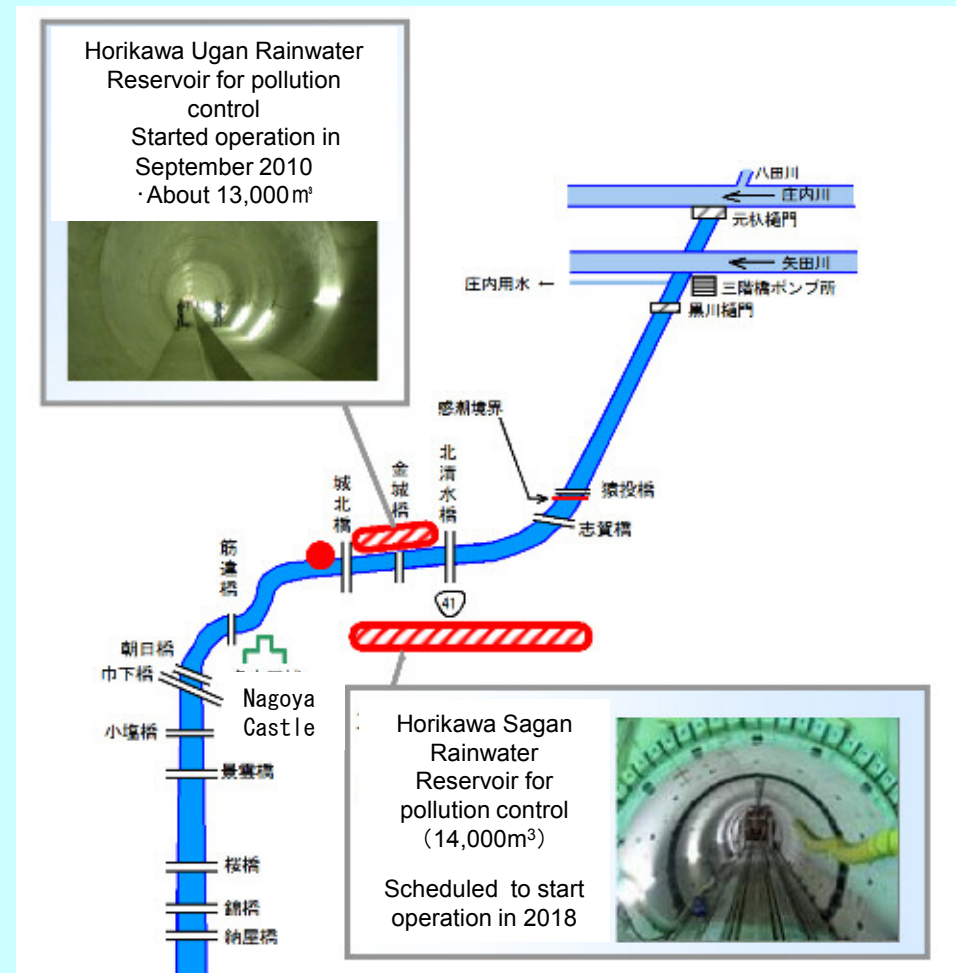
Removal and reduction of inflow of pollutants

◆ Horikawa Ugan Rain-water Reservoir for pollution control

- Started operation in September 2010
- About 13,000m³

Cumulative stored water volume in FY2017

About 710,000m³

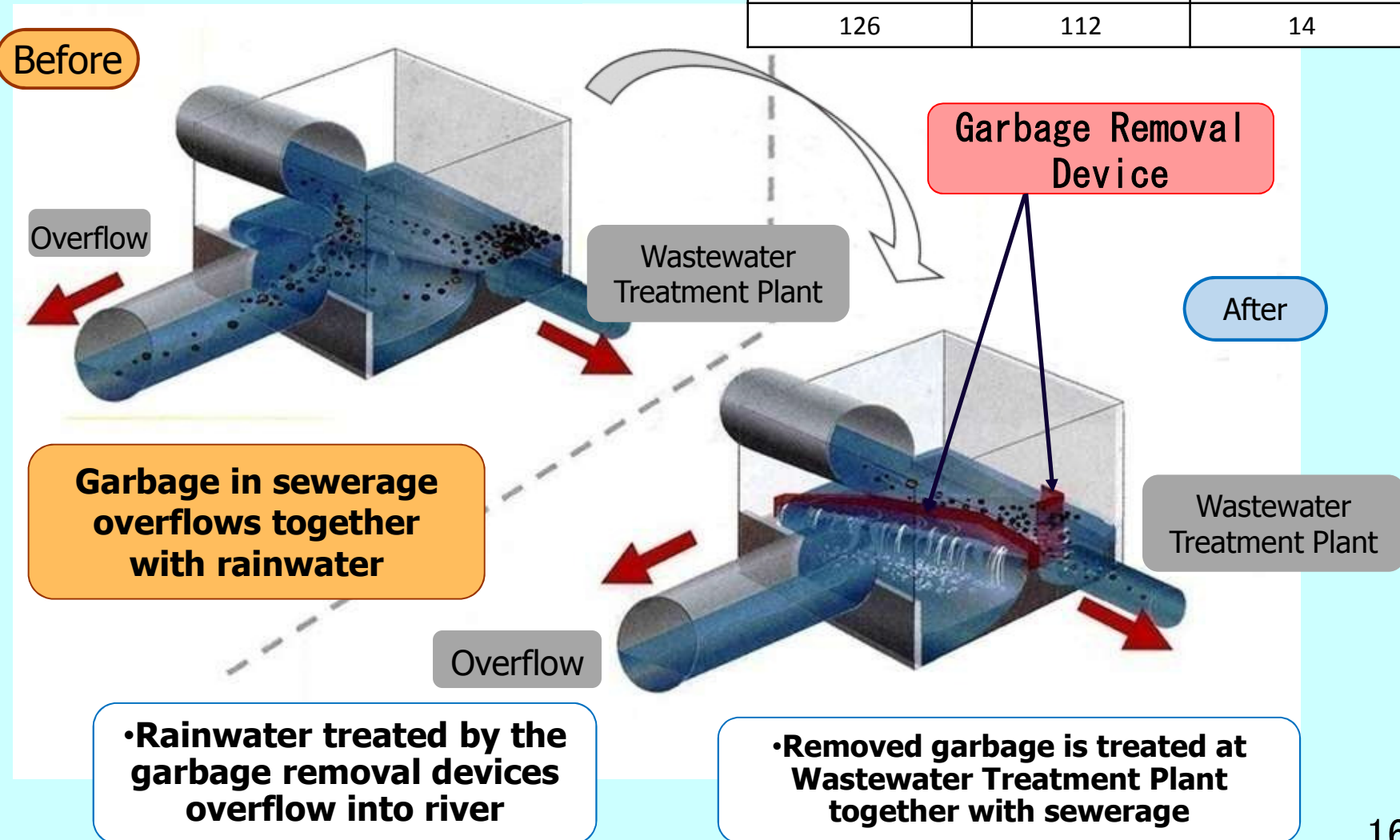


Removal and Reduction of inflow of pollutants

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

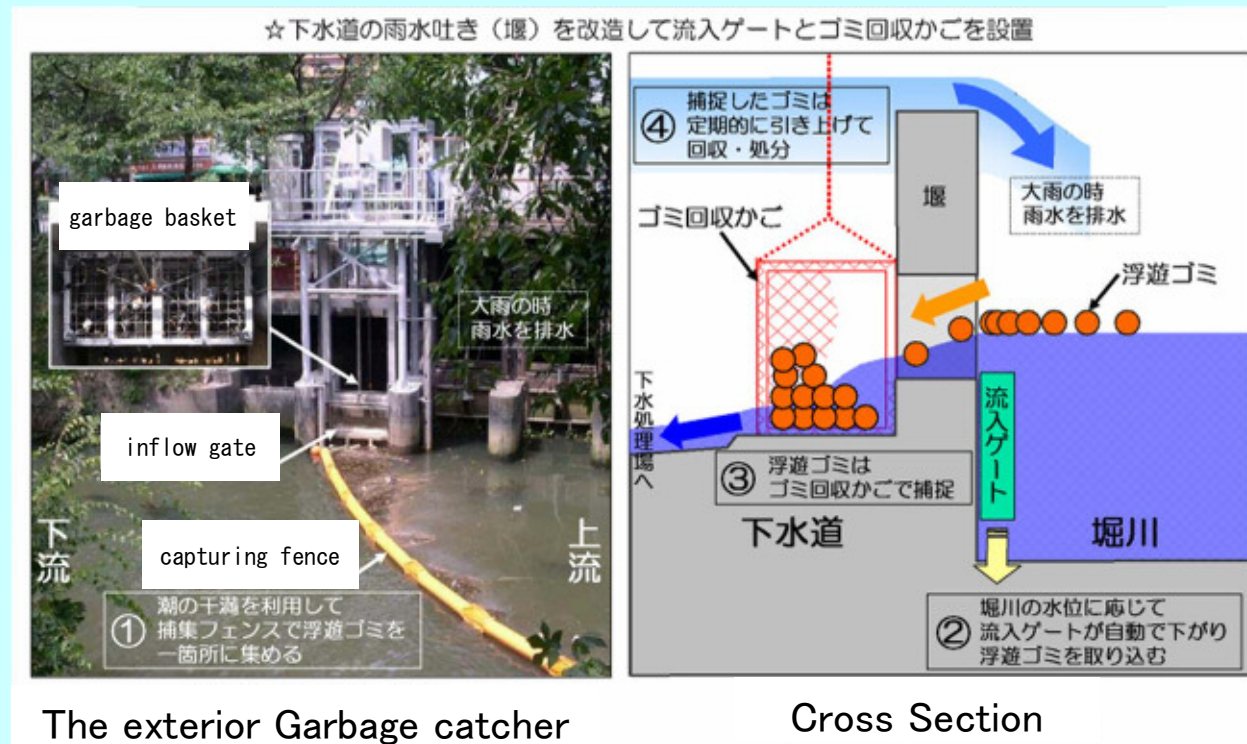
The number of installation of
Garbage Removal Device

Total plan	Installed by the end of 2017	Future plan to install
126	112	14



Removal and reduction of inflow of pollutants

◆ Garbage catcher (Near Johoku Bridge) since 2006



Result of collection in 2014	0. 7 t
Result of collection in 2015	1. 4 t
Result of collection in 2016	1. 3 t
Result of collection in 2017	0. 8 t

Additional Water Resource

◆ Utilization of Reclaimed Wastewater (Excluding Winter)

Conducting reclaimed wastewater treated by membrane filtration at the Moriyama Water Treatment Center
 Water Supply: Up to 4,000m³/day (0.046m³/s)



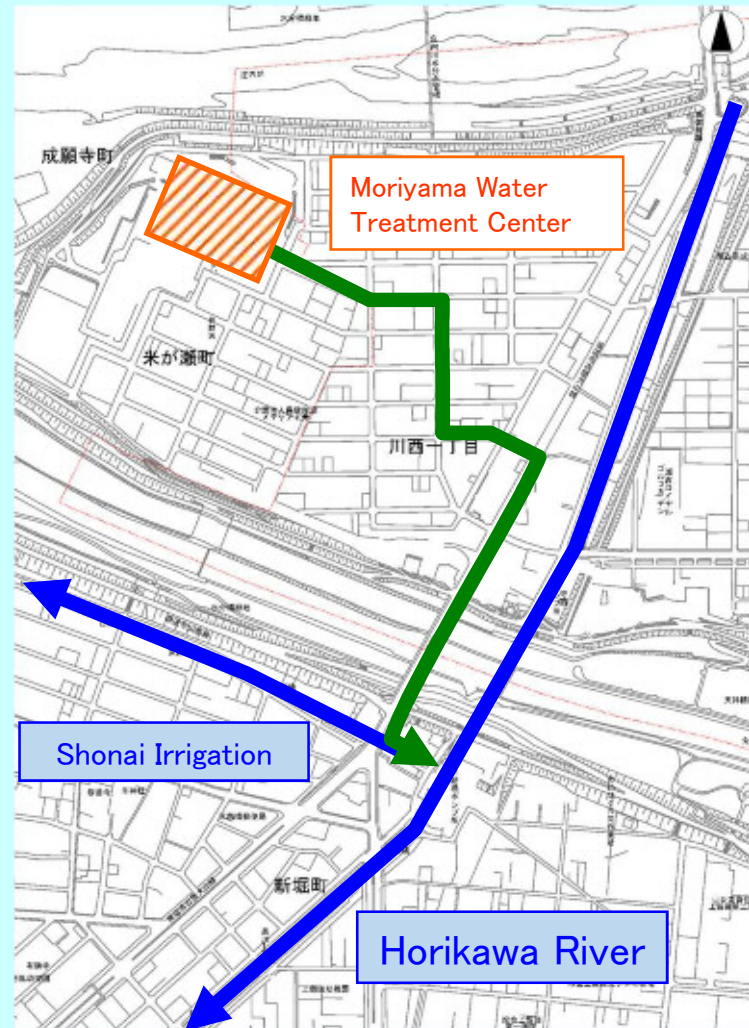
Flat membrane unit aerobic tank
 (400sheets × 12units)

Upper stage membrane case
 (200 cartridges inside)

Lower stage membrane case
 (200 cartridges inside)



Flat membrane unit



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