Implementation by Nagoya City

Measures to make Horikawa River Limpid

Oct. 10th 2020

Greenification & PublicWorks Bureau
River Plannning Div.

Waterworks and Sewerage Bureau
Sewerage Plannning Div.

Environment Bureau
Local environmental measures Div.

Implementation by Greenification & PublicWorks Bureau

Initiatives for clarification of *Horikawa* River

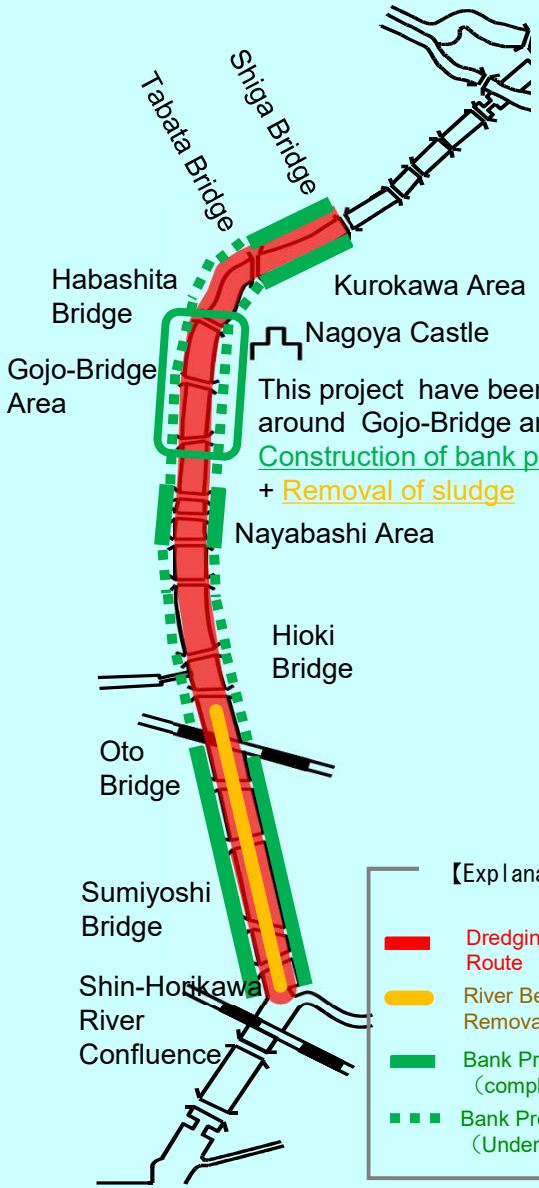
-①Removal of Sludge-

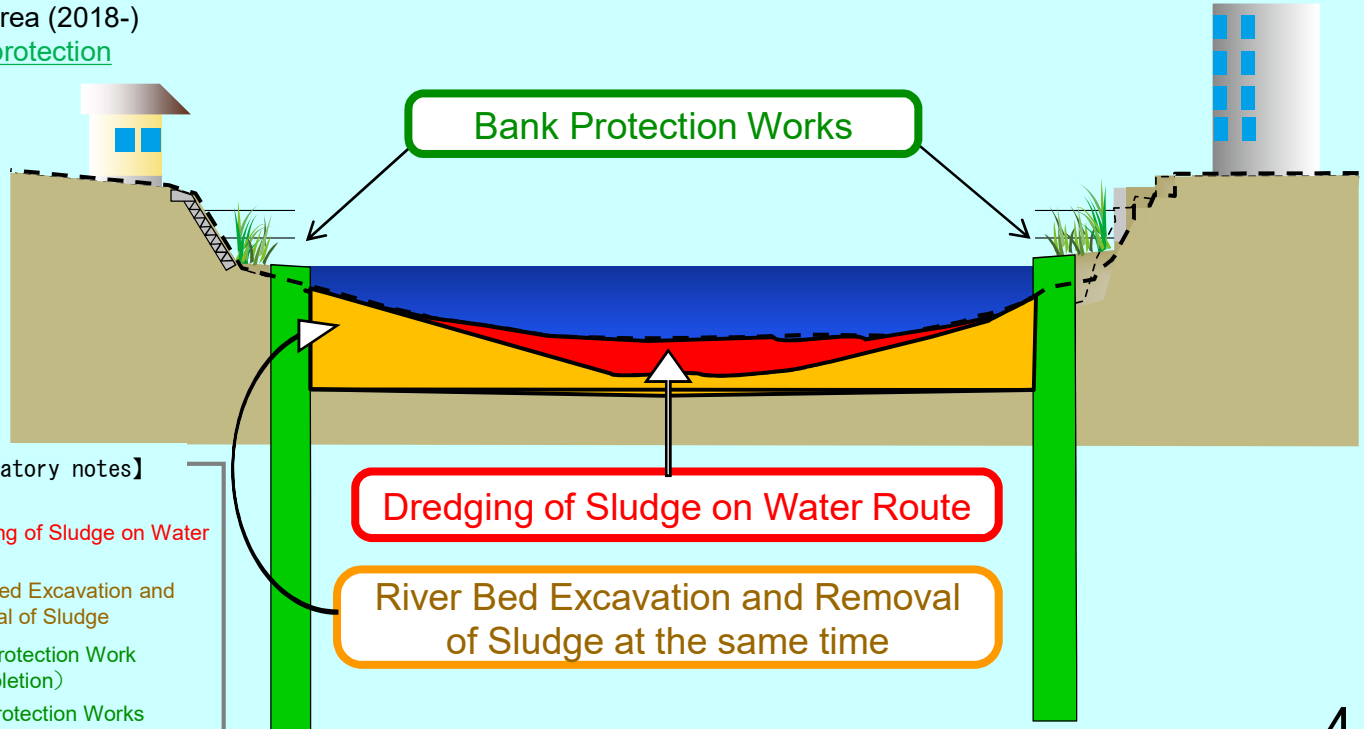
◆Removal of Sludge in Horikawa River


河床掘削の様子

- Construction of Bank Protection in River management project
- Sludge have been dredged on water route between the Shiga Bridge and Shin-Horikawa River confluence (1994-2007)
- After Bank Protection Works, River bed Excavation and removal of sludge are implemented at the same time

←**Speed Up of Construction of Bank Protection**



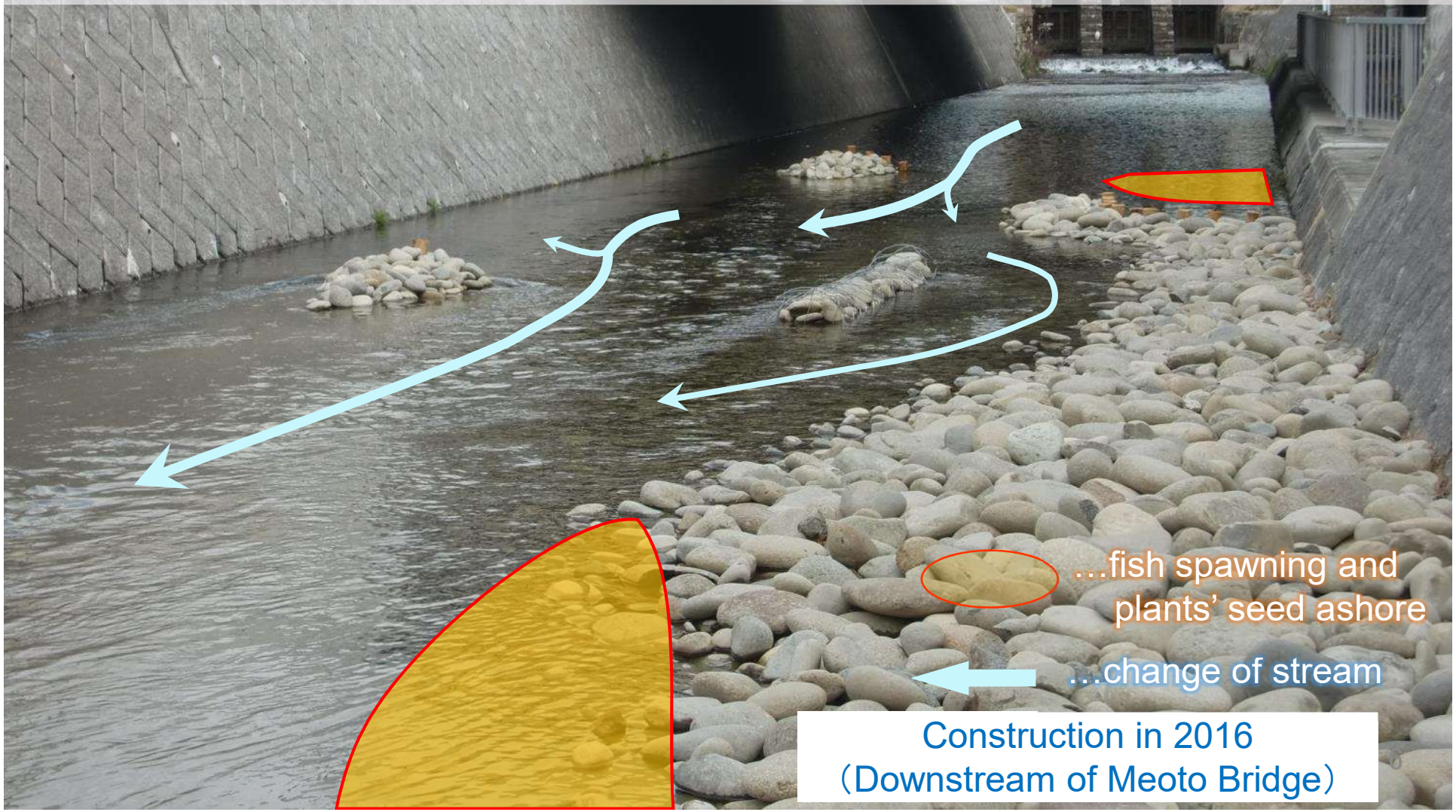


Initiatives for clarification of *Horikawa* River

-②Construction of Shallows and Depths-

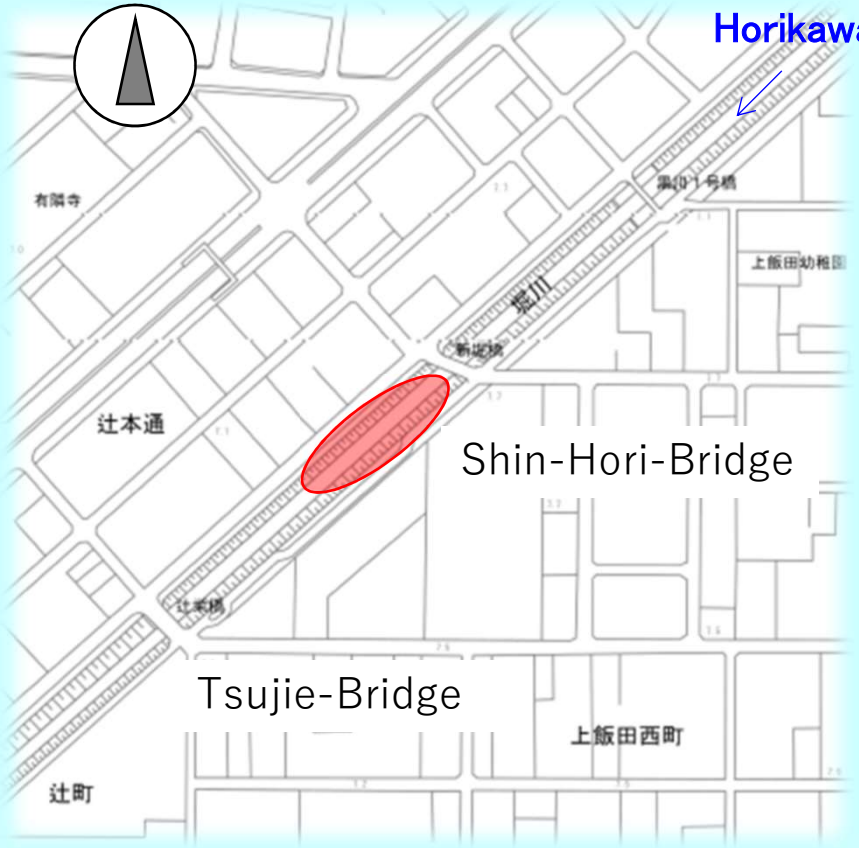
◆Construction of Shallows and Depths

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 of Shallows and Depths

Construction Plan in Downstream of Shin-Hori-Bridge in Kita Ward, 2020



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.

Initiatives for clarification of *Horikawa* River

-③ Use of shallow groundwater -

◆ Use of shallow groundwater

✔ New pumping groundwater facility is installed in upstream of Kurokawa No.1 Bridge in March 2020.
（⑨ in the following map）

✔We are investigating for extention of this facility in Moriyama ward in FY2020.
（★ in the following map）

① 2013.Mar.

Uprsteam of Seko Bridge
0.01m³/s

② 2004.Oct.

Tsujei Bridge
0.01m³/s

③ 2005.Nov.

Kizune Bridge
0.01m³/s

④ 2014.Mar.

Sanege Bridge
0.01m³/s

⑤ 2015.Mar.

Shiga Bridge
0.01m³/s

⑥ 2008.Mar.

Shimizu spring water
0.0005m³/s

⑦ 2018.Mar.

Kinjo Bridge
0.01m³/s

⑧ 2016.Mar.

Nakatsuchido Bridge
0.01m³/s

⑨

New!

★Completion in March 2020 (Upstream of Kurokawa No.1 Bridge)

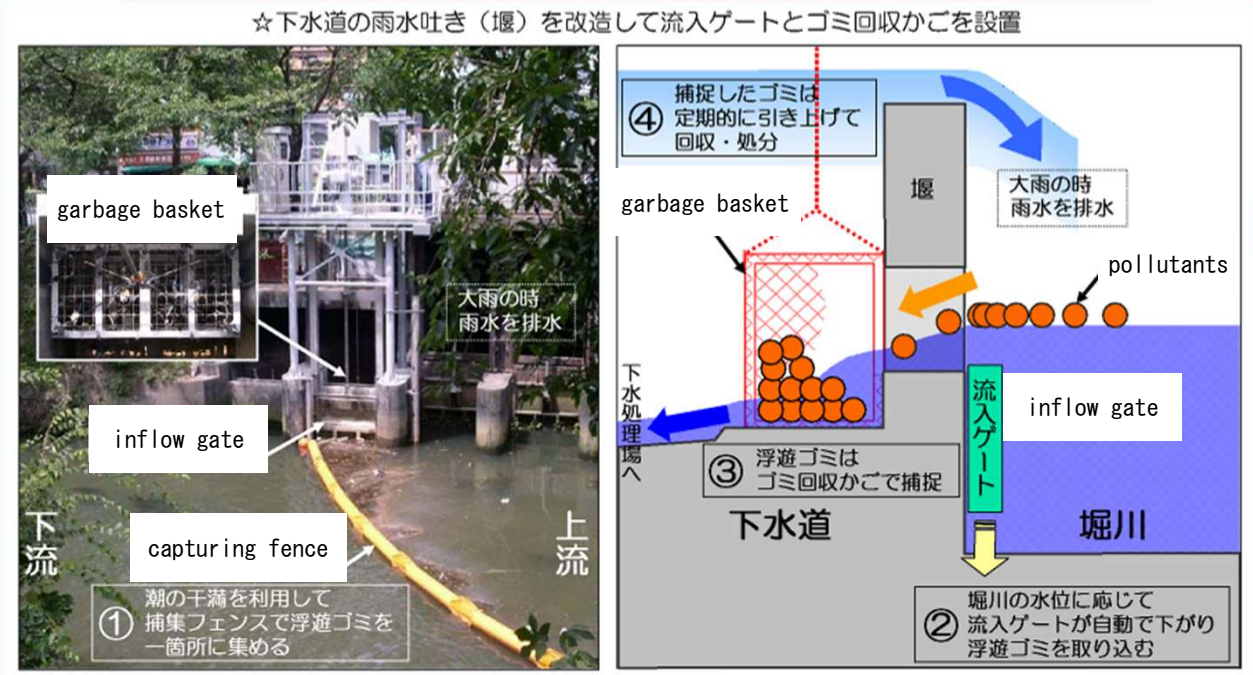
0.01m³/s

Initiatives for clarification of *Horikawa* River

-④Change of collected pollutants -

Removal of inflow of pollutants

◆Garbage catcher （Near Johoku Bridge） since 2006

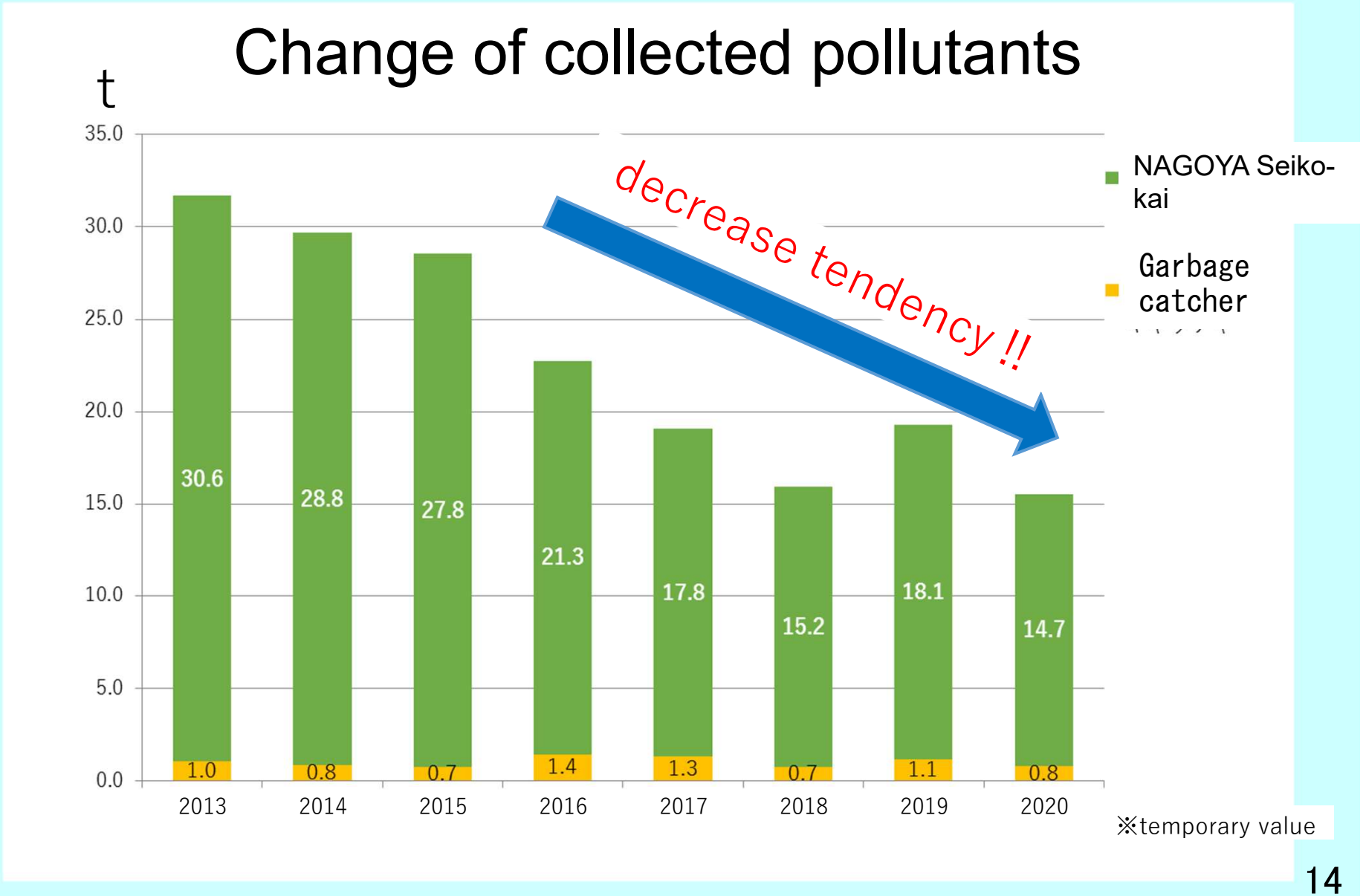


The exterior Garbage catcher　　Cross Section

Removal of pollutants

Cooperation with NAGOYA *Seiko-kai* (Public interest incorporated association for cleaning Nagoya Ports)

Collection of pollutants



Initiatives for clarification of *Shin-Horikawa* River

■Examination for water environment improving (2020)

○Basic Examination for water environment improving

Verify the effects of various water cleaning measures

<Examples>

Securing water source (underground water)

Environment Affairs Bureau

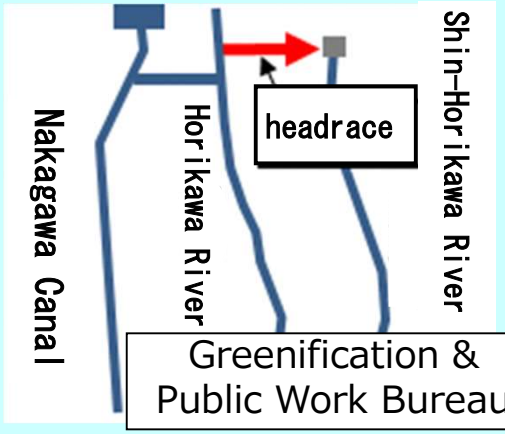
(Ex.) Spring water in Tsuruma central Library

Separating sewer systems、"Hybrid sewerage"

Waterworks and Sewerage Bureau

(Ex.) Horikawa-Ugan rainwater reservoir for pollution controll

○Securing water source (convey Horikawa River water)



Greenification & Public Work Bureau

(Ex.) Image of convey water from Horikawa River

○Hearing with Experts etc.

We examine the effective water cleaning measures and future utilization of waterfront area

Experts : Experts in river, water quality, city planning, etc.
Contents : ・effective water cleaning measure and scale
・future role of waterfront

■Cooperation with Nagoya Chamber of Commerce and Industry (***2020 plan***)

○***To make prosperity of Shin-Horikawa River together with companies on the river***

・Experience event of boarding (know the present)

is scheduled in 2020 for companies along the river

・Exchanging opinions about the future (talk about the future)

Industry-Government-Academia-Private started discussion about the future. (First meeting was held in August)

Implementation by Waterworks and Sewerage Bureau

Initiatives for clarification of *Horikawa* River

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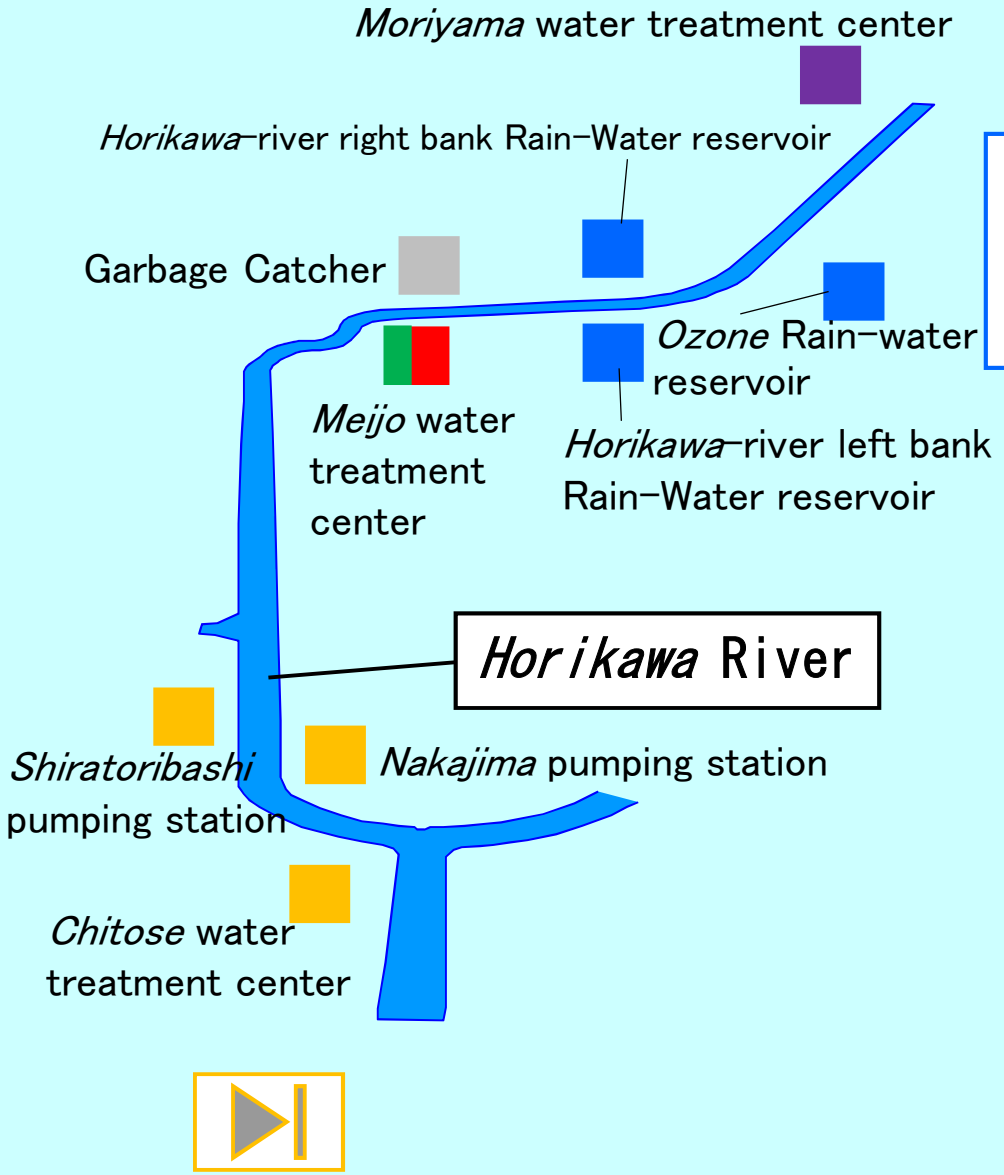


Advanced water treatment
Meijo water treatment center (disk filter)

Advanced facilities of simple treatment
Meijo water treatment center

Rain Water reservoir for pollution control
Ozone Rain-water reservoir
Horikawa-river right bank Rain-Water reservoir
Horikawa-river left bank Rain-Water reservoir

Set of Garbage removel facilities

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

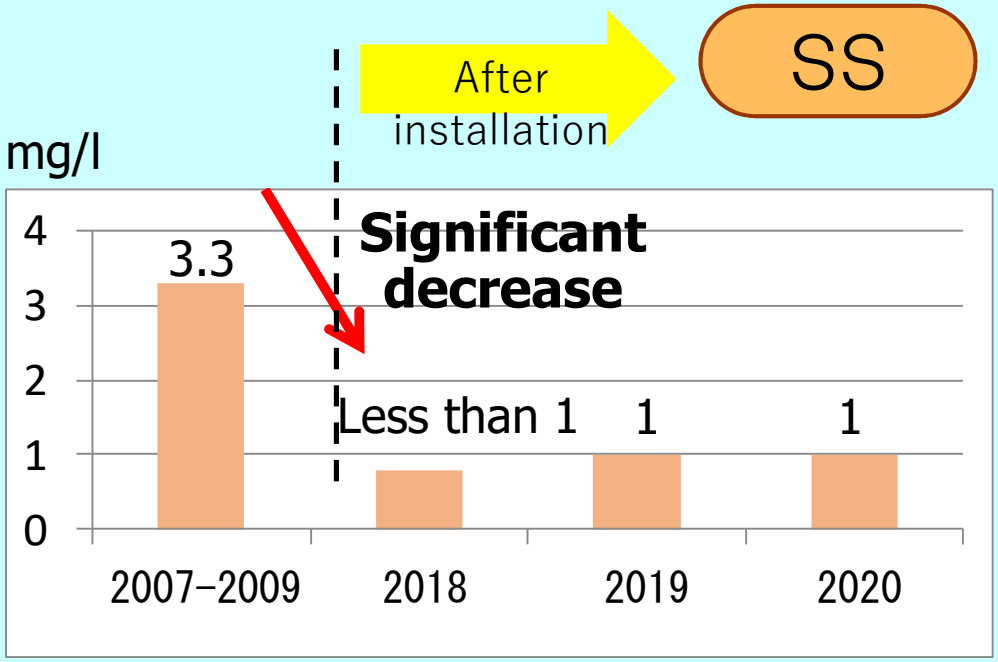
Reclaimed wastewater supply
Moriyama water treatment center

Garbage Catcher(Corporation with Greenification & PublicWorks Bureau)

Advence water treatment

◆*Meijo* water treatment center

(treatment capacity：50,000m3/day)



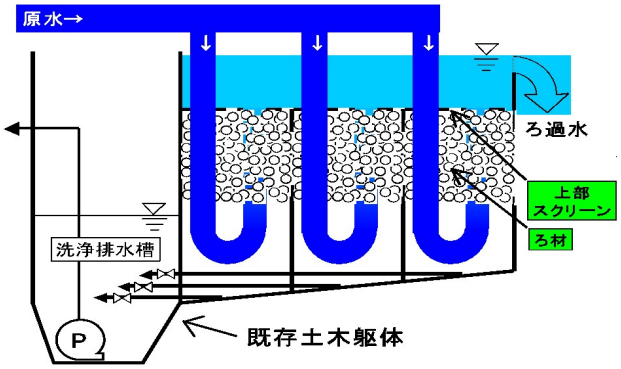
Minute Suspended Solids(SS) in treated water are removed more by the filtration devices (disk filter)

■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 (simple 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)

We 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 Reservoir for pollution control

Started operation in 2006

(12,000m^3)

Horikawa-river right bank Rainwater Reservoir for pollution control

Started operation in 2010

(13,000m^3)

Horikawa-river left bank Rainwater Reservoir for pollution control

Started operation in 2019

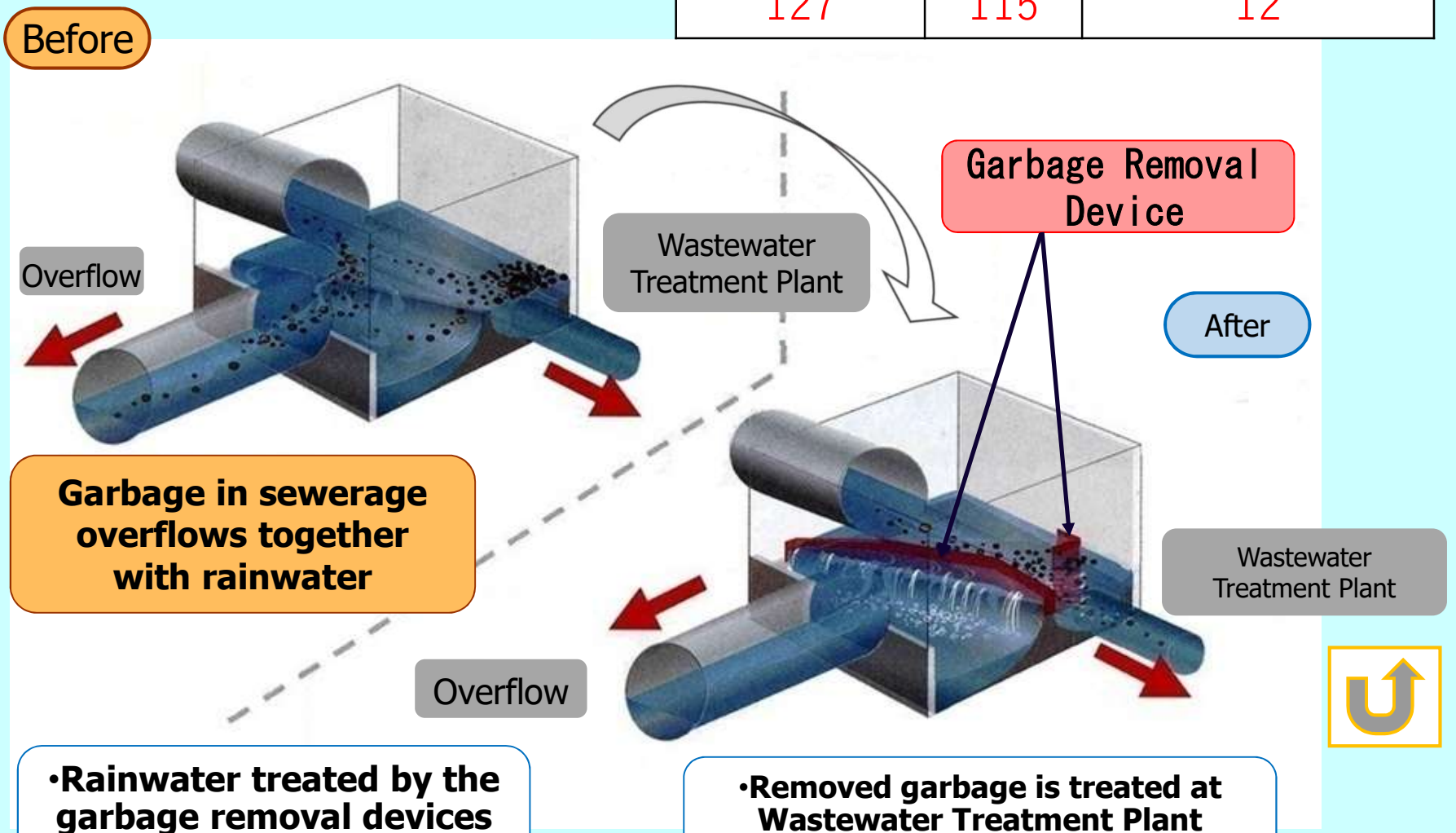
(14,000m^3)

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 (end of FY2019)

Total Plan	Installed	Future plan to install
127	115	12



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

Rainwater screens are the facility to remove comparatively big garbage, and installed in water treatment centers and pumping station.
More garbage is removed by shrinkage of rainwater screen.

◆ *Shiratoribashi* pumping station
Nakajima pumping station
Chitose water treatment center

◆Rainwater screen slit

40mm → 25mm

◆Prevention of inflow of pollutants

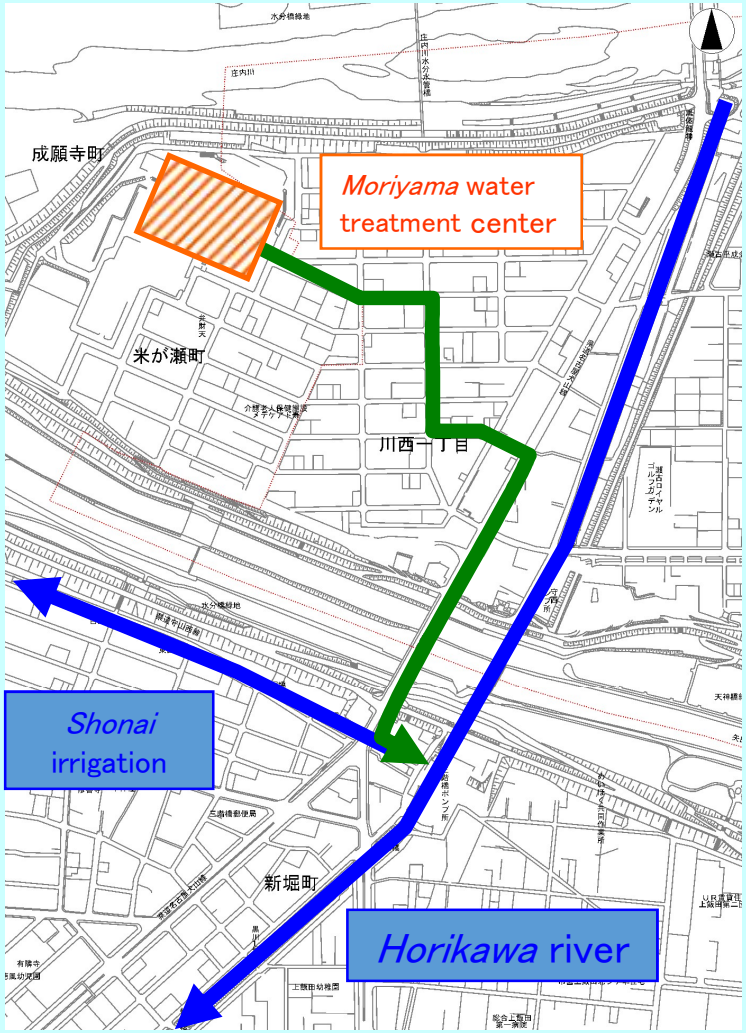
Supply of reclaimed wastewater

Moriyama water treatment center supply reclaimed water treated by membrane filtration to *Horikawa* river.

Water supply :Up to 4,000m3/day(0.046m3/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))

Initiatives for clarification of *Shin-Horikawa* River

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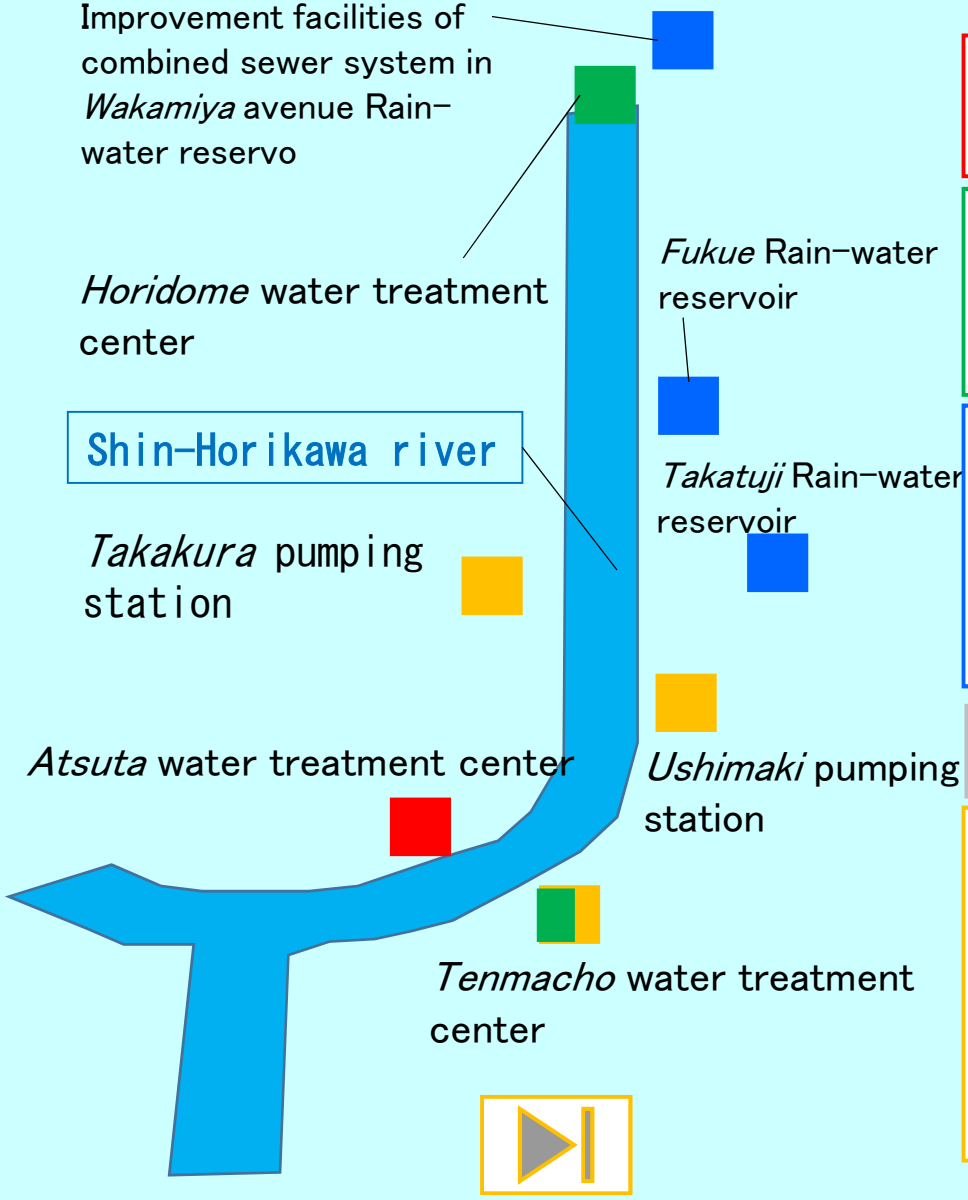


Advanced water treatment
Atsuta water treatment center (AO method)

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

Rain-water reservoir for pollution control
Wakamiya avenue Rain-water reservoir
Fukue Rain-water reservoir
Takatuji Rain-water reservoir

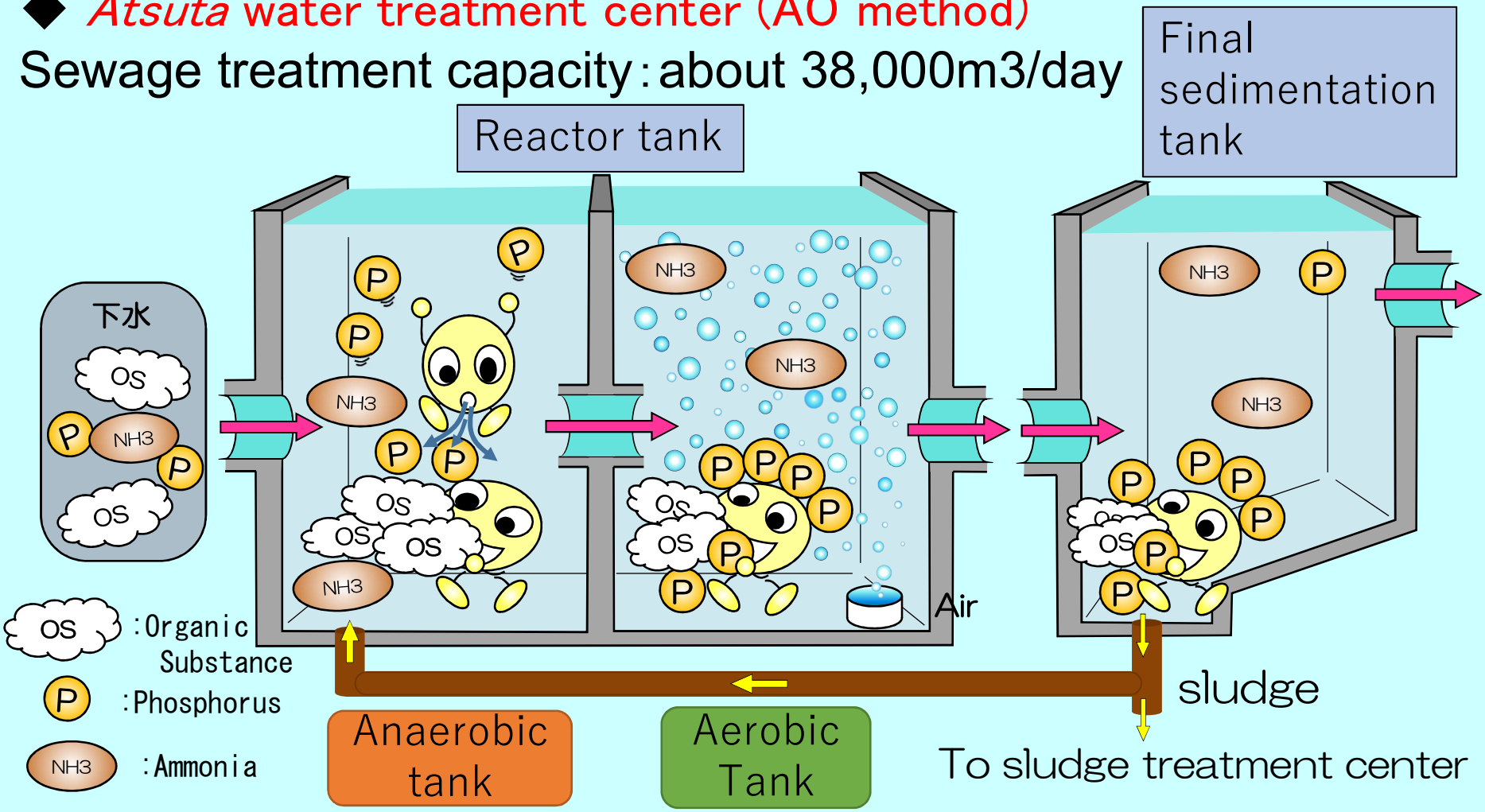
Set of Garbage removel facilities

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

Advenced water treatment

◆ *Atsuta* water treatment center (AO 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)

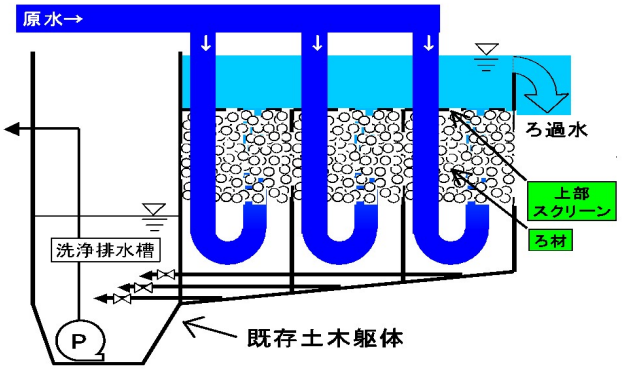
We changed the simple treatment of rain water from Settling treatment to Filtration treatment , remodeled the part of existing first settling basin and installed advanced facilities of simple treatment in the water treatment centers.

◆ *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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◆Removal Rate of BOD 20%–30%

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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 *Shin-Horikawa* River in rainy weather by storing high polluted first flush rainwater temporarily.

Takatuji Rain-water reservoir

Started operation in 1987

(30, 000m^3)

Fukue Rain-water reservoir

Started operation in 1999

(26, 000m^3)

Improvement facilities of combined sewer system
in *Wakamiya* avenue Rain-water reservoir

Started operation in 2002

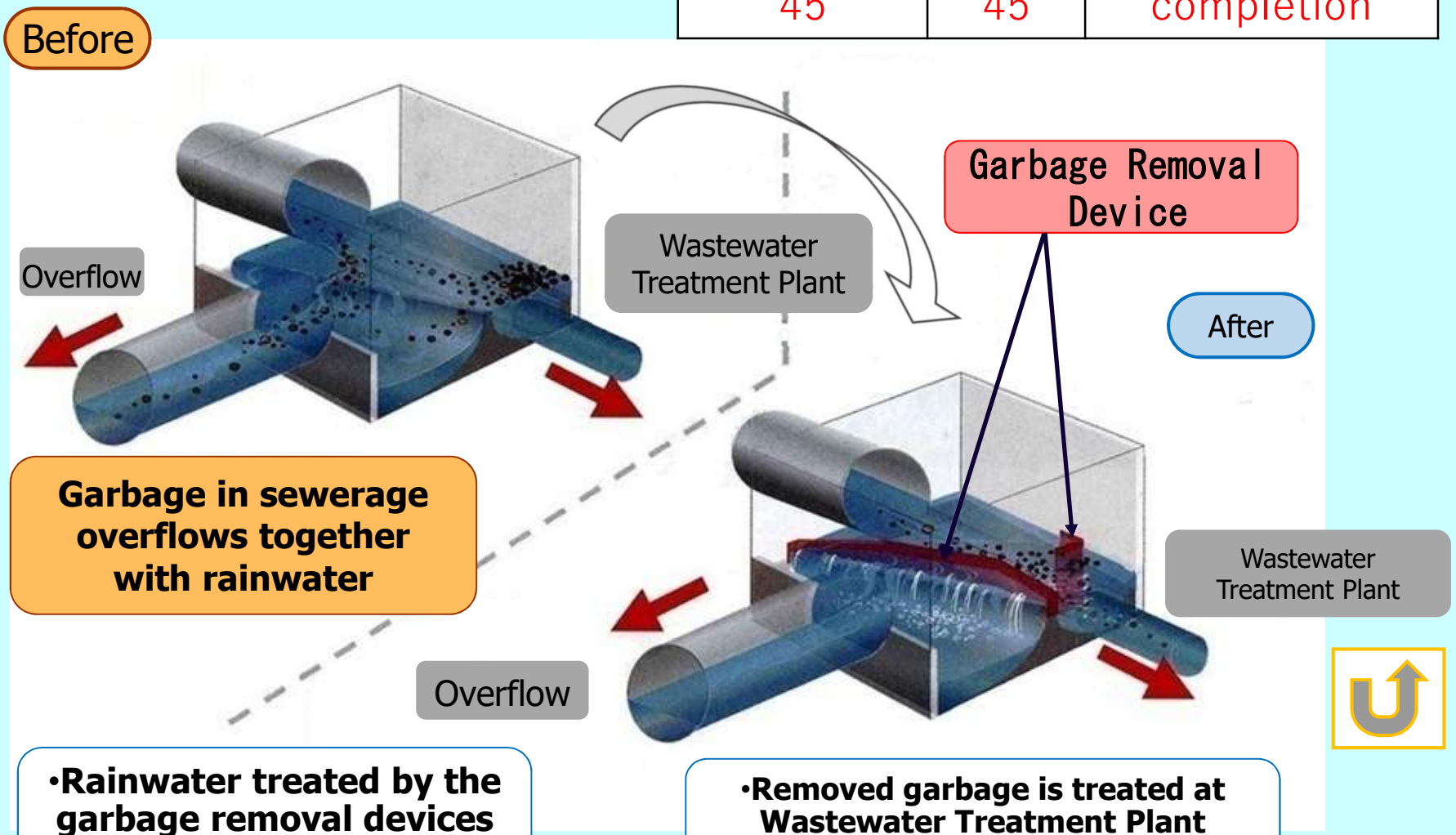
(19, 000m^3)

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 (end of FY2019)

Total Plan	Installed	Future plan to install
45	45	completion



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Ushimaki pumping station
Tenmacho water treatment center
(under installing)

◆Rainwater screen slit

40mm → 25mm

◆Prevention of inflow of pollutants

Additional initiatives for clarification

Further water clarification In the upper and middle area of Horikawa and upstream area of Shin-Horikawa

Subject

Further water clarification in the upper and middle area of Horikawa and upstream area of Shinhorikawa is needed in terms of contribution to town development in the city center.

Concept of countermeasures

We will promote effective measures as soon as possible, such as the construction of rainwater trunk sewer.

In parallel with this, we are also working on the examination and implementation of the early realization of separate sewerage system, by limiting the area and so on.

Urban development using the waterfront(Horikawa)

■ Examination of utilizing upper apace, etc. of the Horidome water treatment center

◆ Summary

Relevant bureaus in City of Nagoya study for attractive urban space in upper space, etc. of the Horidome water treatment center in internal project teams, making consistent with that town planning of the Sakae area, and incorporating know-hows owned by private companies.

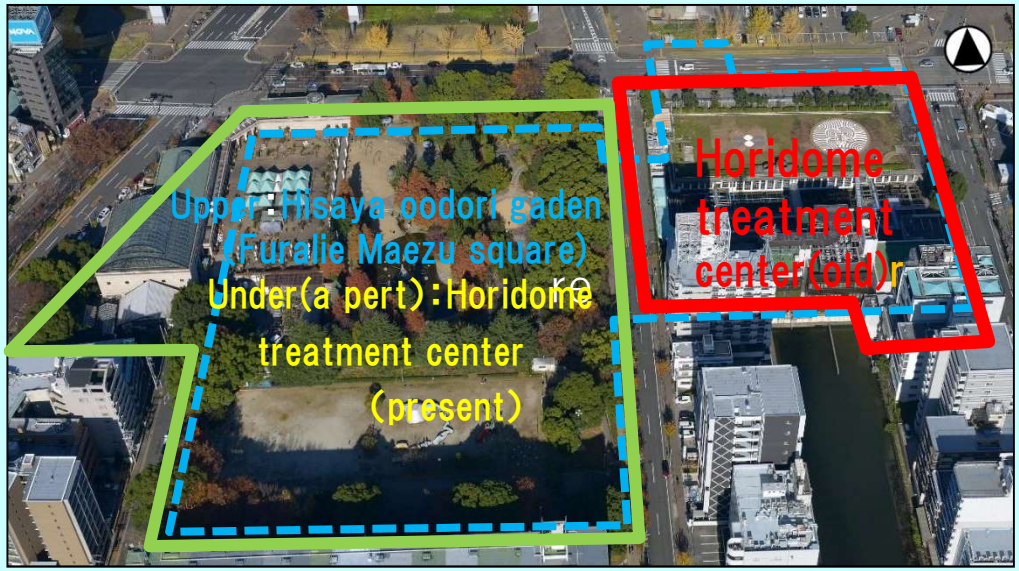
◆ Relevant bureaus

- Waterworks & Sewerage Bureau
- Housing & City Planning Bureau
- Greenfication &Public Works Bureau
- Bureau of Tourism, Culture & Exchange

◆ Future Plan

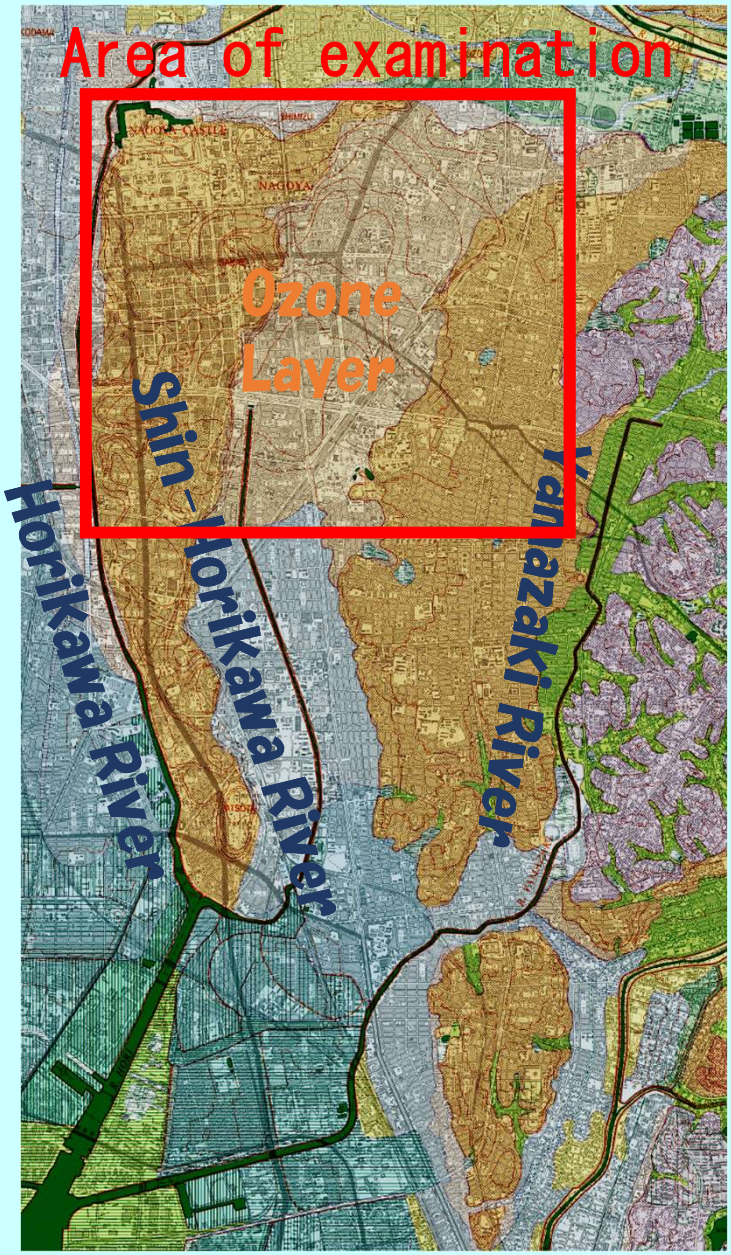
We will proceed promotions to start utilzing the upper space of Horidome water treatment center by 2027,
when the Linea Chuo Shinkansen Line will start its operation.

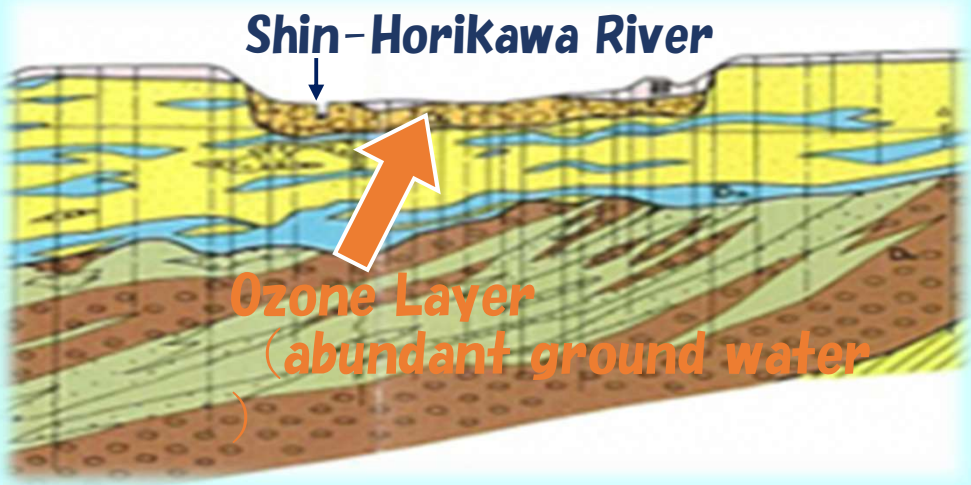
◆ Surround figure



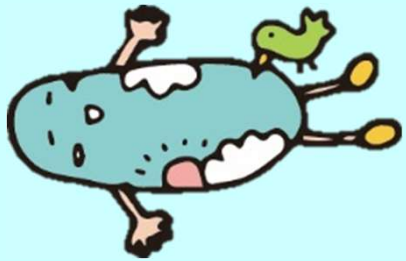
Implementation by Environment Bureau

Examination of ground water use for river clarification (2020)





We are conducting to promote river clarification and make attractive waterside space by effective use of ground water.



◆Examination of using ground water in Shin-Horikawa River

2019

☐ Examining a model case of using ground water from the surrounding ground water information of the upstream area of Horikawa River

Case1 Using the spring water from Tsuruma Central Library

There are seasonal fluctuations, distance to the River, and height differences.

⇒ We continue careful examination in consideration of cost effectiveness and efficiency.

Case2 Using the ground water from installing a new well

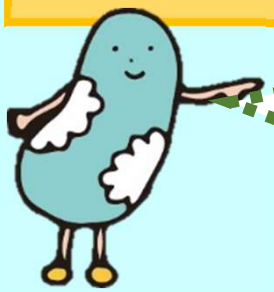
It has a stratum with abundant ground water and can secure a stable amount of water.

⇒ One of the effective measures

Case3 Using the ground water leaks from surrounding building

There are few ground water leaks from surrounding building.

⇒ Difficult to use



In 2020, we will consider multiple plans of using ground water and utilization in waterside space such as constructing an artificial shallow.

Thank you