

Measures to make

Horikawa River Limpid

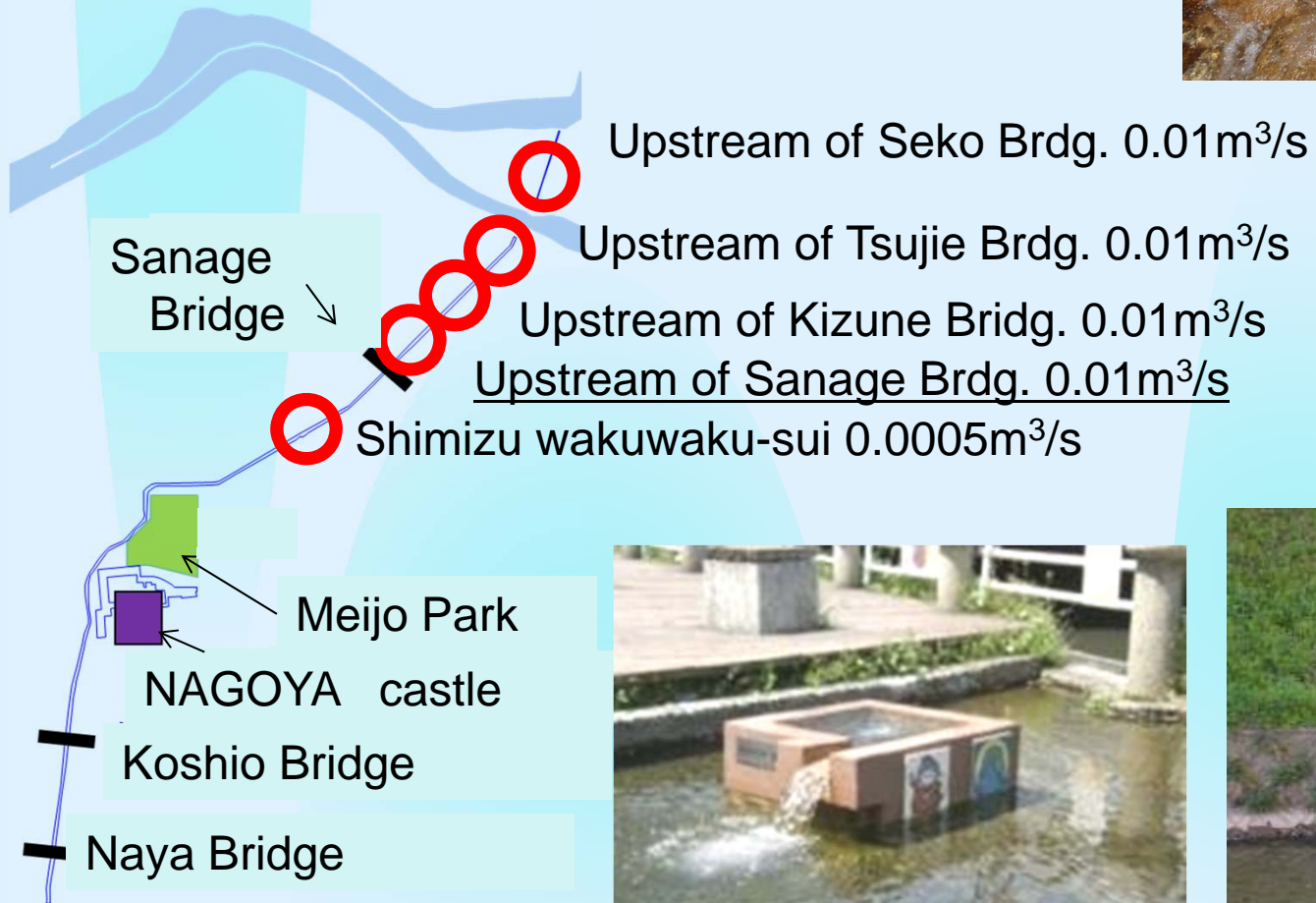
Implementation by Nagoya City

Feb.15 2015

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

Reservation of Water Source

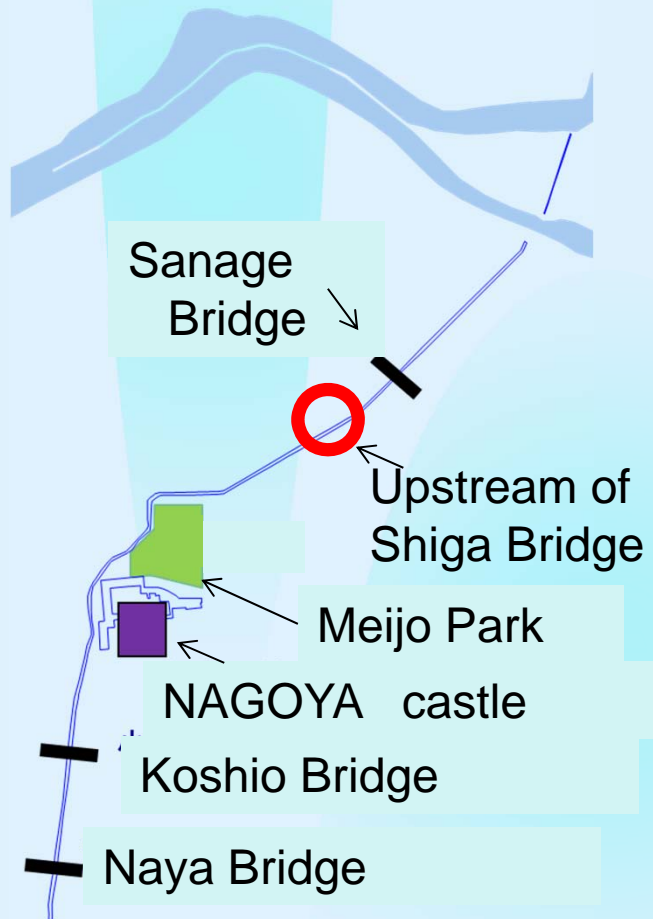
◆ Use of Shallow Ground Water
Upstream area of Horikawa River



Reservation of Additional Water Source(FY2014)

◆Upstream of Shiga Bridge

0.01 m³/s of water will be added (March 2015)

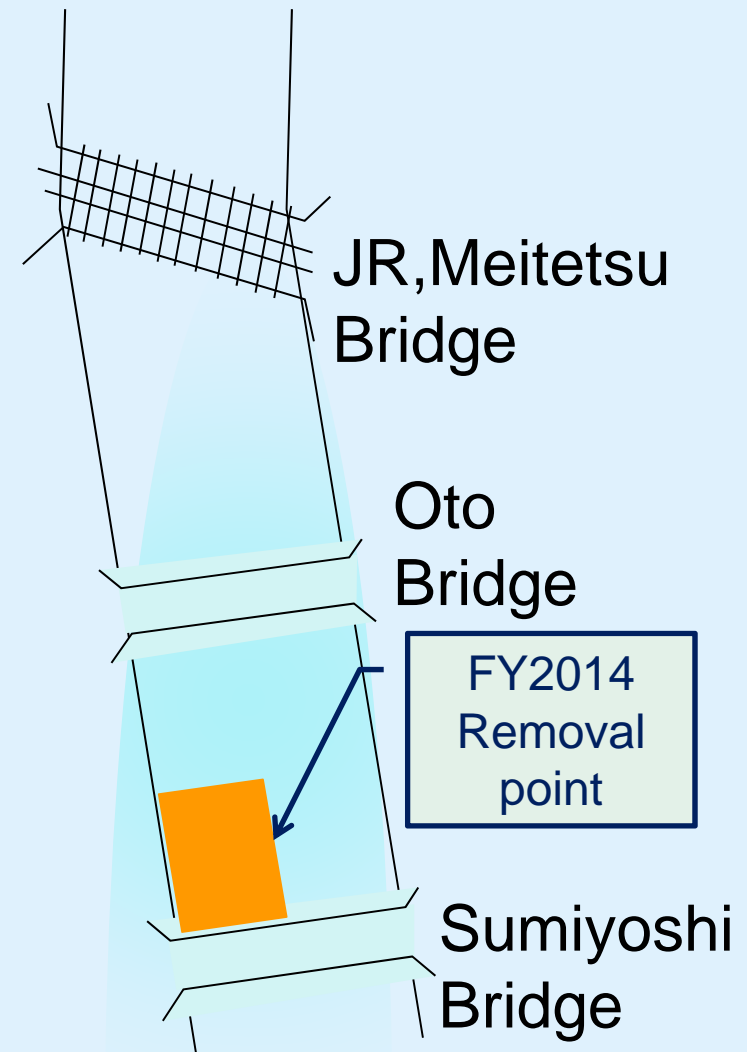


Improvement of Water Quality

◆ Removal of Sludge

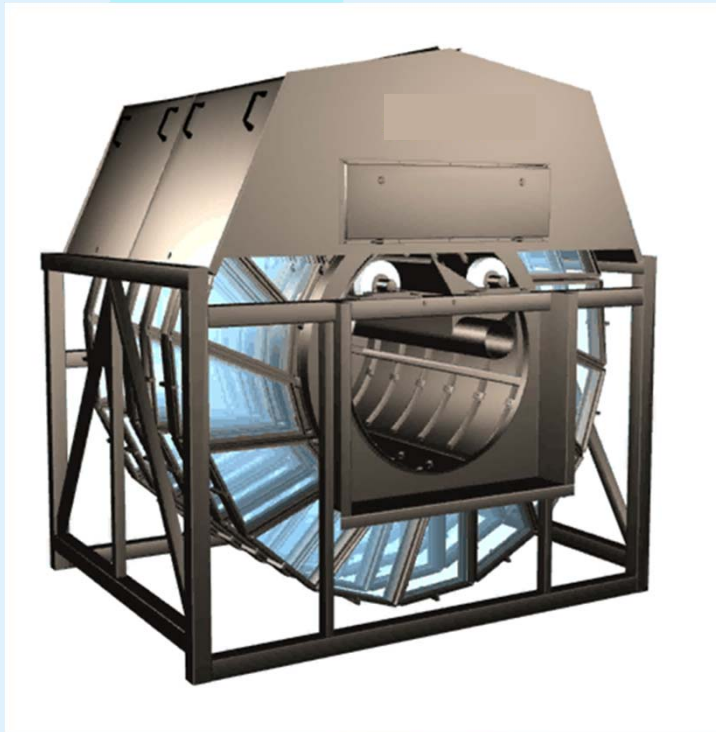


FY 1994~2013
146,000 m³ of sludge had been removed



Removal and Inflow reduction of Pollutants

◆ Advanced water treatment in Meijo Water Treatment Center



Filtering equipment (disc filters) removes fine particles remaining in treated water.

	Average before introduction (2007~2009)	Average after introduction (2011~2013)
BOD	5.5	4.3
SS	3.3	1

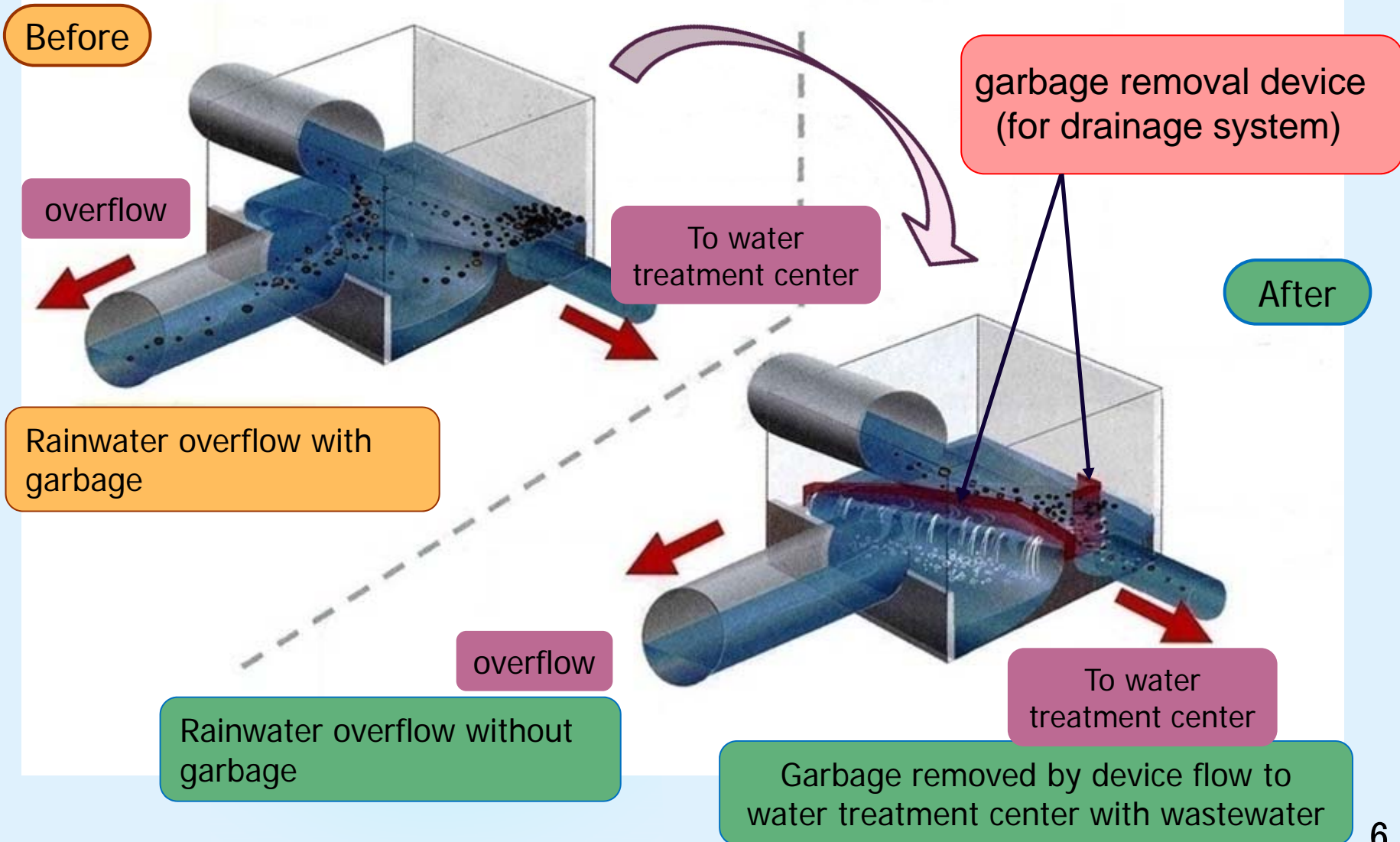
22% Down

Over 70% Down

Removal and Inflow reduction of Pollutants

◆ Control of combined sewer overflow

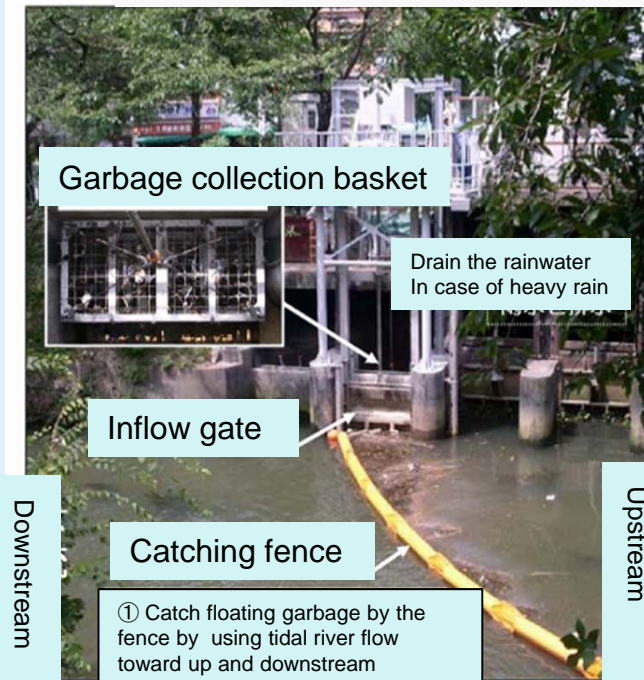
(set up garbage removal devices for drainage system)



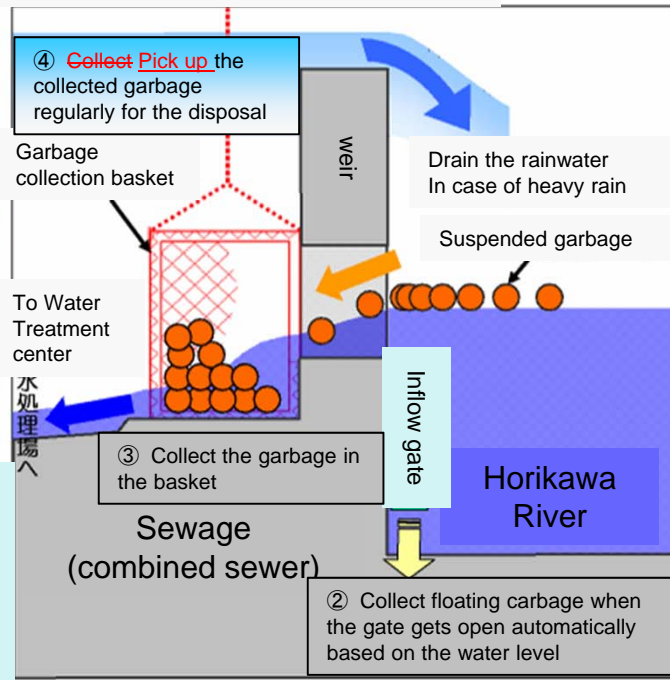
Removal and Inflow reduction of Pollutants

◆ Garbage Catcher (below Johoku Bridge) since FY 2006

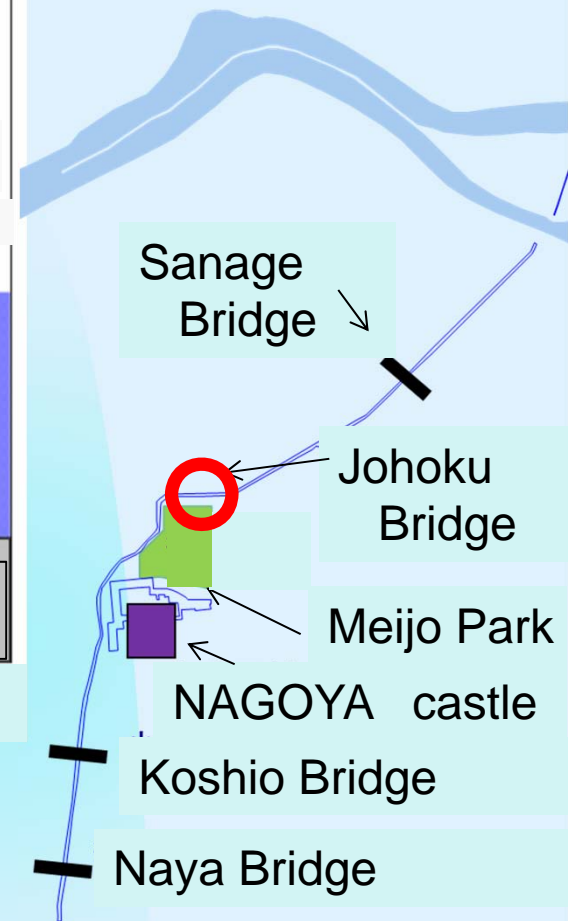
Set up the inflow gate and Garbage collection basket converted the weir of sewage



Situation of the facility



Cross section (Image)



collection result in FY2011	2.3 t
collection result in FY2012	1.1 t
collection result in FY2013	0.8 t

Reservation of Water Source

◆ Use of Reclaimed Wastewater

Reclaimed wastewater from Moriyama Water Treatment Center



flat membrane unit
in aerobic reactor
tank
(400 sheets × 12 units)

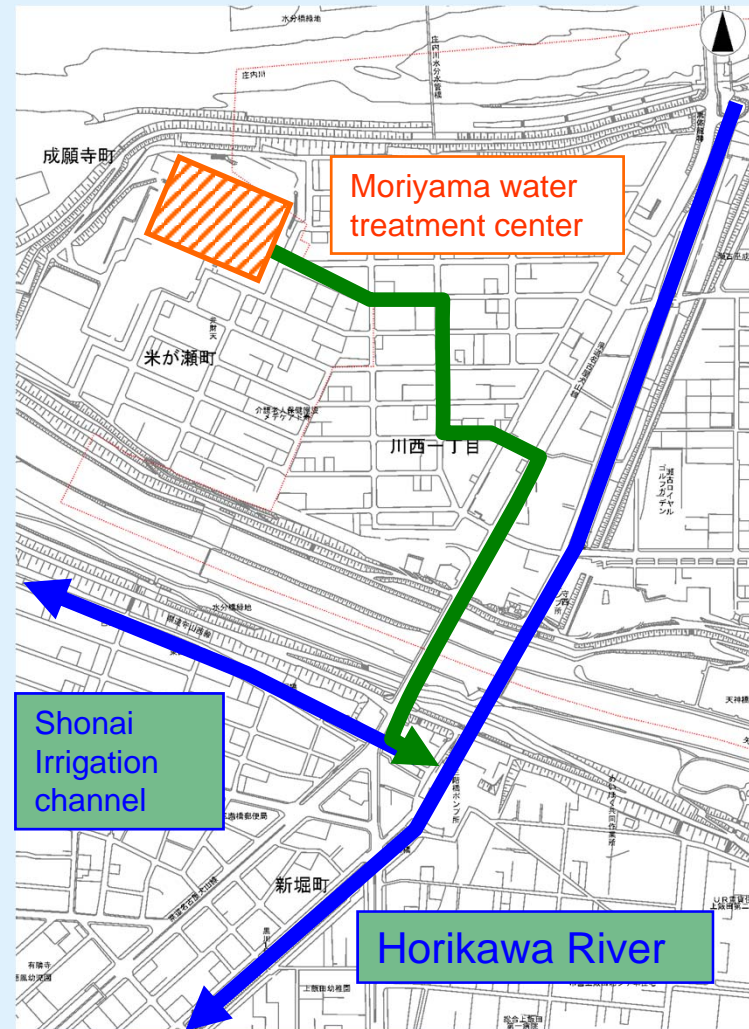
Upper case

Lower case



Each cartridge stores 200 sheets

Flat membrane unit



※ Reclaimed wastewater is conducted during irrigation season (Apr. to Oct)

Appearance of Sludge

Sludge appears from riverbed on the ebb tide.

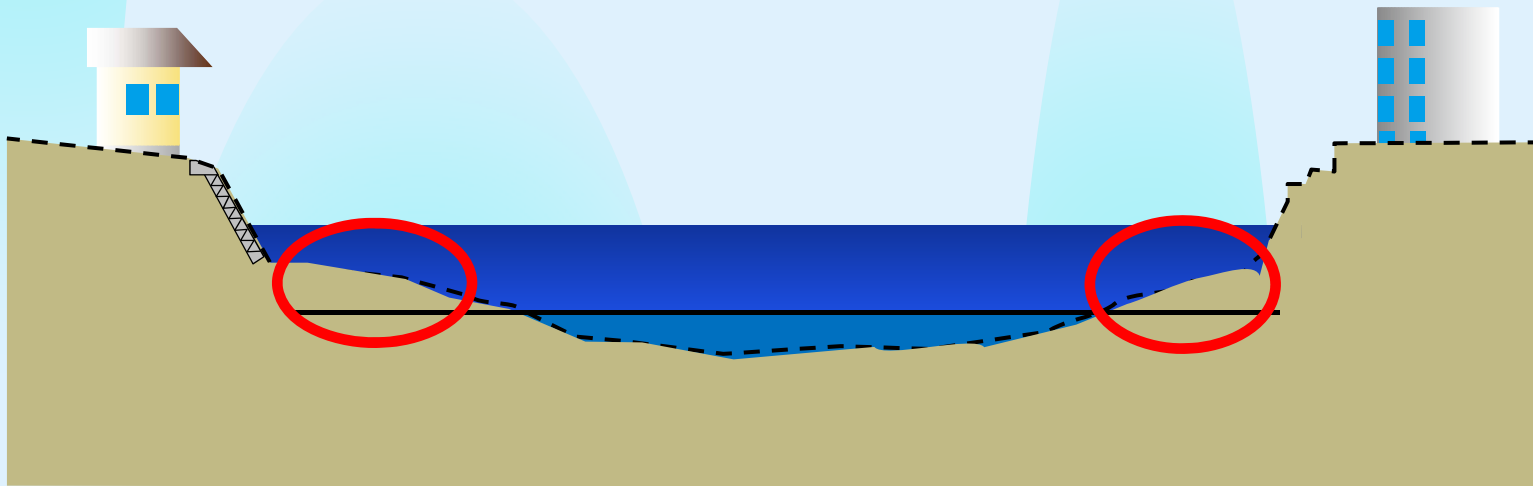


Toxic and stinking **H₂S** gas pass out from exposed sludge.



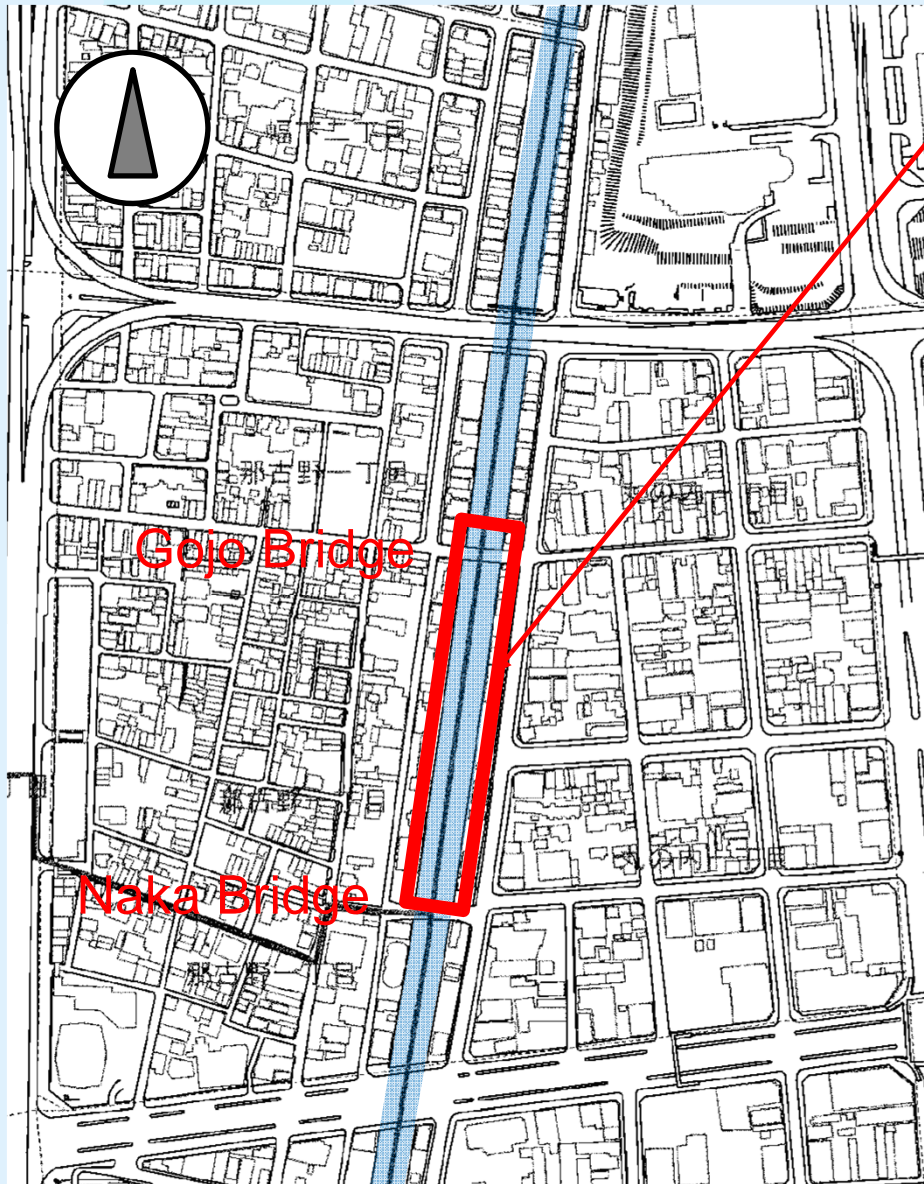
Outline of Clarification Experiments

- We, City of Nagoya implemented several clarification experiments that focused on sledge appeared on ebb tide.

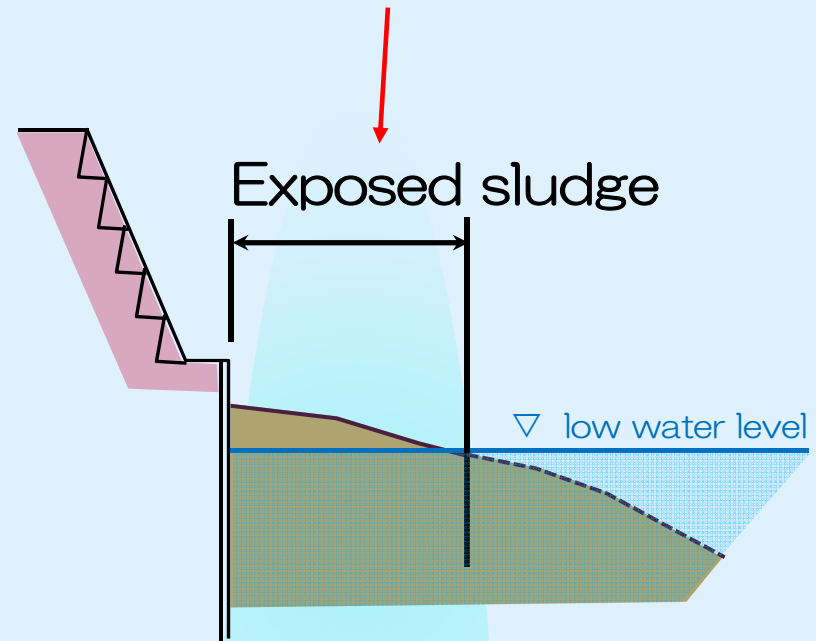


Outline of Clarification Experiments

Location



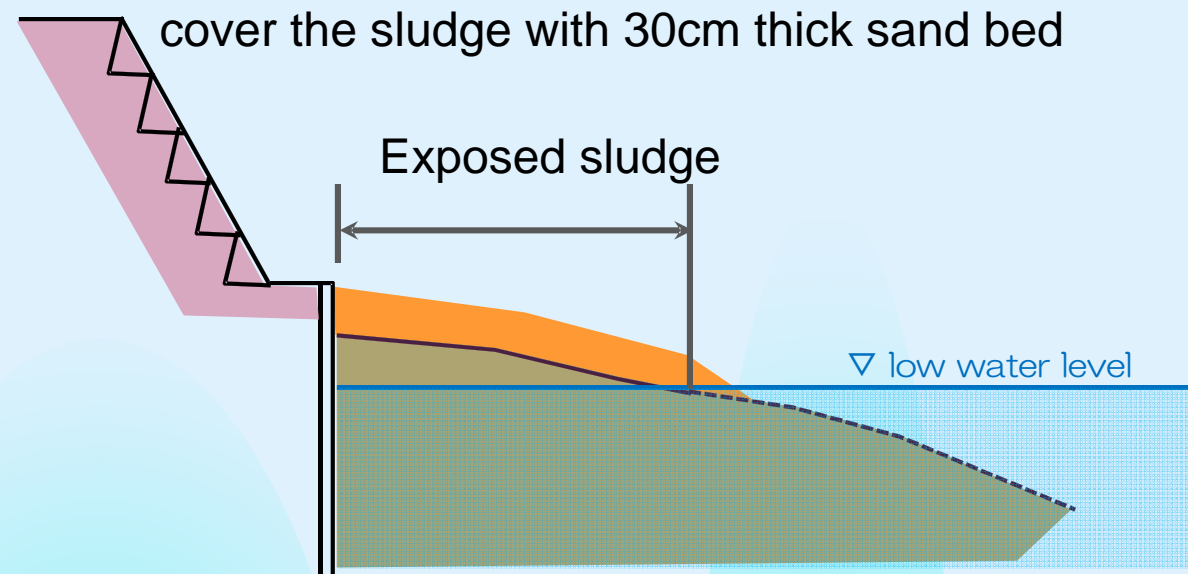
- 300m long
- 3m wide on each side



- 5 kinds of trial pattern in this section

Outline of Clarification Experiments

Experiment ① cover with sand bed



【expected effects】

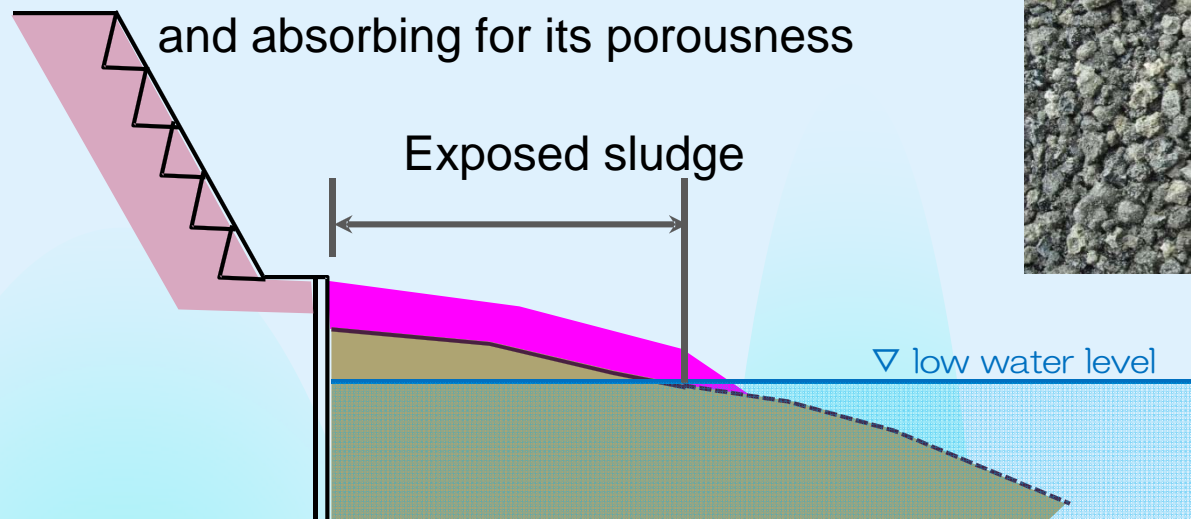
- inhibit elution of nutrient salt ⇒ prevent deterioration
- inhibit generation of H₂S ⇒ remove bad odor
- As H₂S is inhibited, ecosystem is getting restored and water quality will be improved more.

Outline of Clarification Experiments

■ Experiment ② cover with clarification materials

cover the sludge with 30cm thick clarification materials made from ash (by-product of coal thermal power station)

and absorbing for its porousness

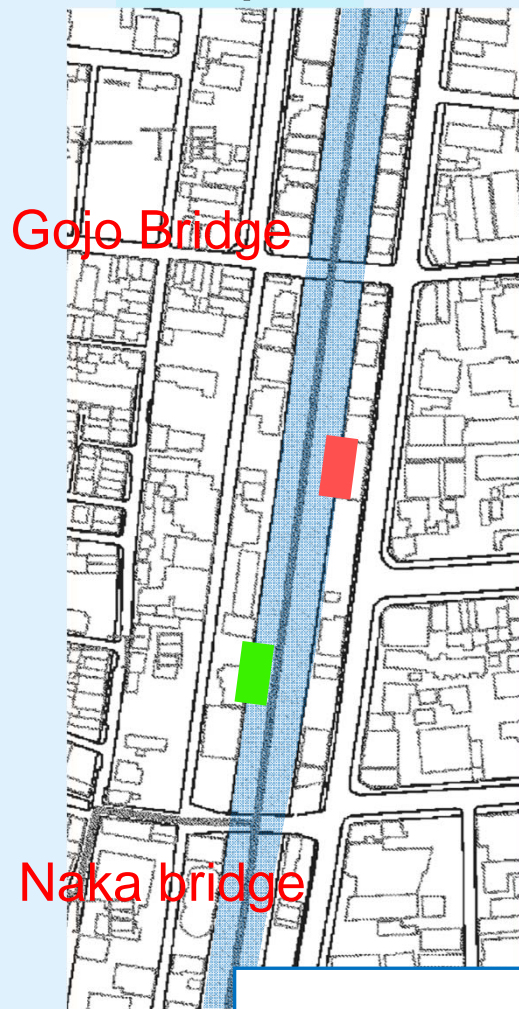


[expected effects]

- works like ① sand bed (see P12)
- might get better result than sand bed does due to features of clarification materials

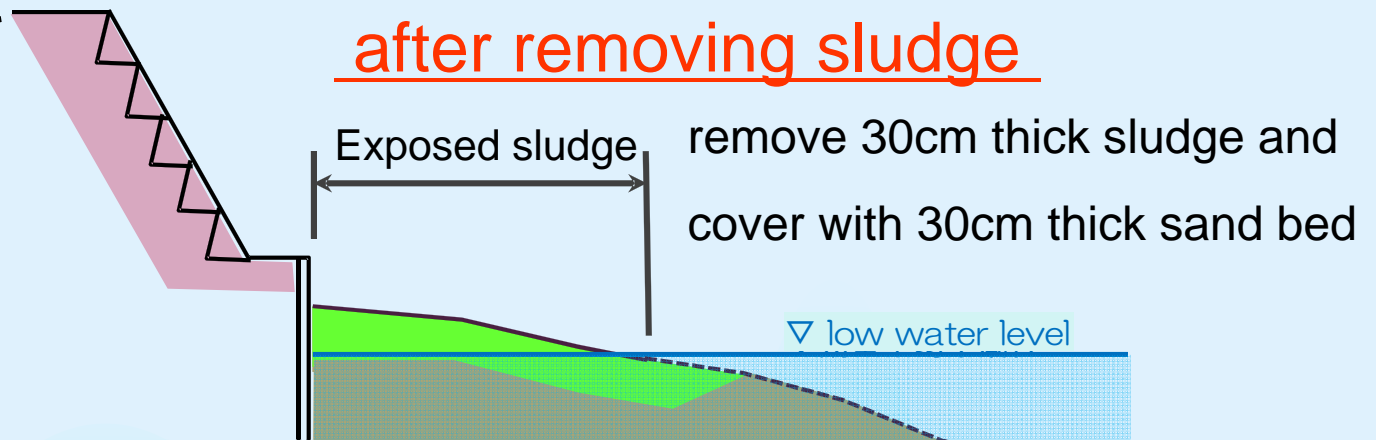
Outline of Clarification Experiments

Experiment

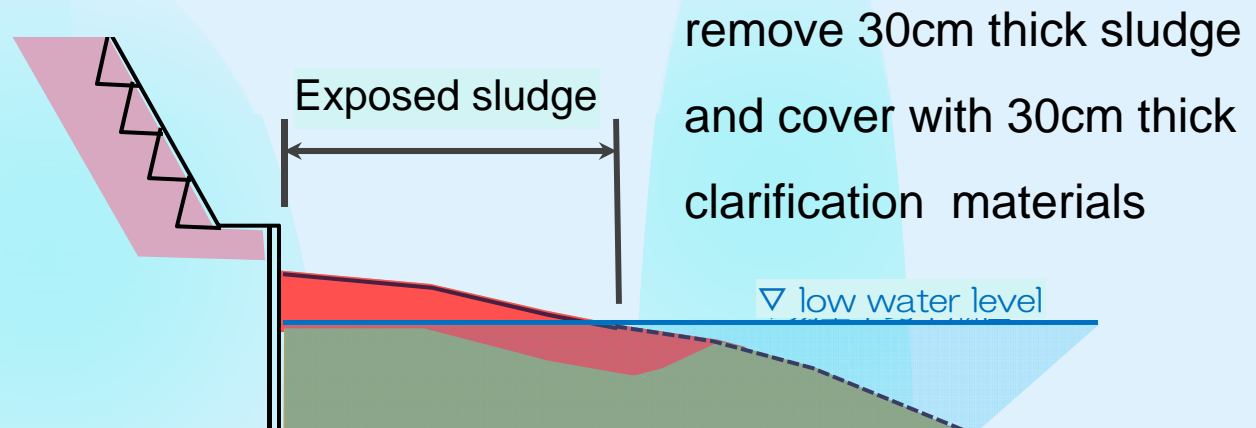


③ cover with sand bed

after removing sludge



④ cover with clarification materials

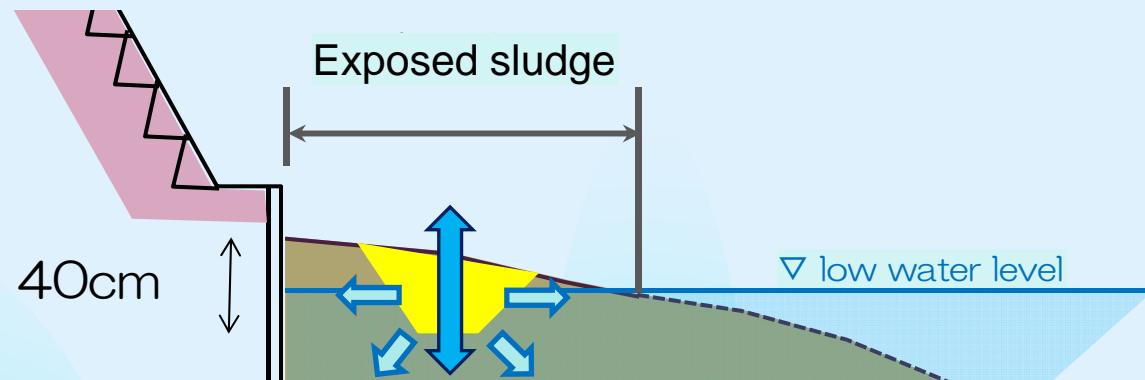
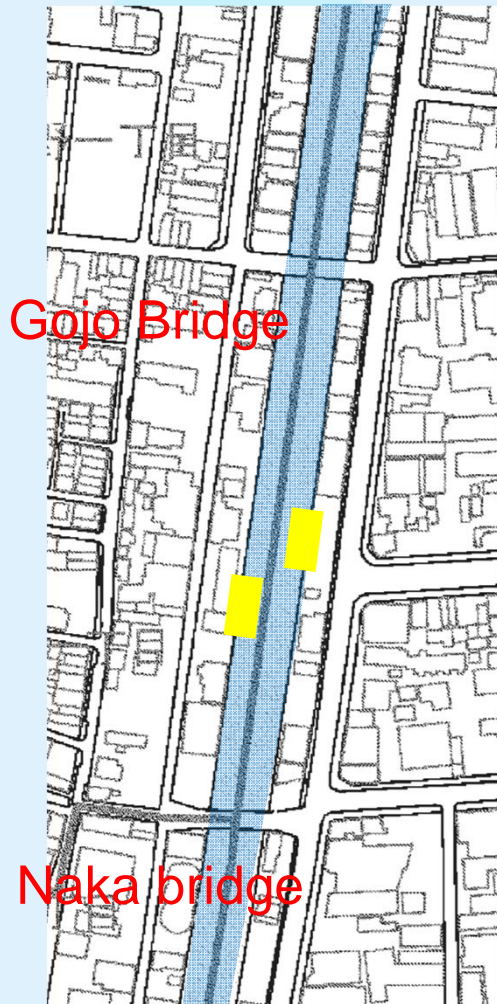


In order to see the difference between ①, ②, ③ and ④

Outline of Clarification Experiments

■ Experiment ⑤ settle infiltrators

settle corn-shaped infiltrators made with solid clinker ash every 1m through sludge



【mechanism of infiltrator】

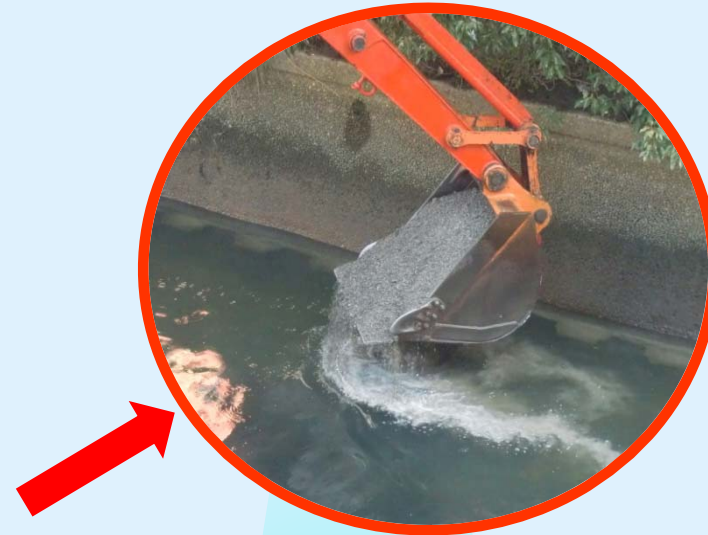
- make stream inside the facilities by ebb and flow
- supply oxygen into the bottom
⇒ improve the bottom layer

【expected effects】

- improve sludge layer by supplying oxygen
- restored ecosystem made water quality better

Making the experiment site

from Jan.16 to Jan.23



Construction machines set on a float made the experiment site.



Making the experiment site

(upstream of Naka Bridge)



Before works



After works

Survey of the experiment

■ verification of the effects

We, Government of Nagoya City verify the effects of experiments for several years

survey items...bottom layer, odor, benthic aoganism

■ sensory survey

We hope Horikawa Sen-nin Chosatai makes sensory surveys.

Example...impression of water clearness, odor, living things