Measures to make Horikawa River Limpid

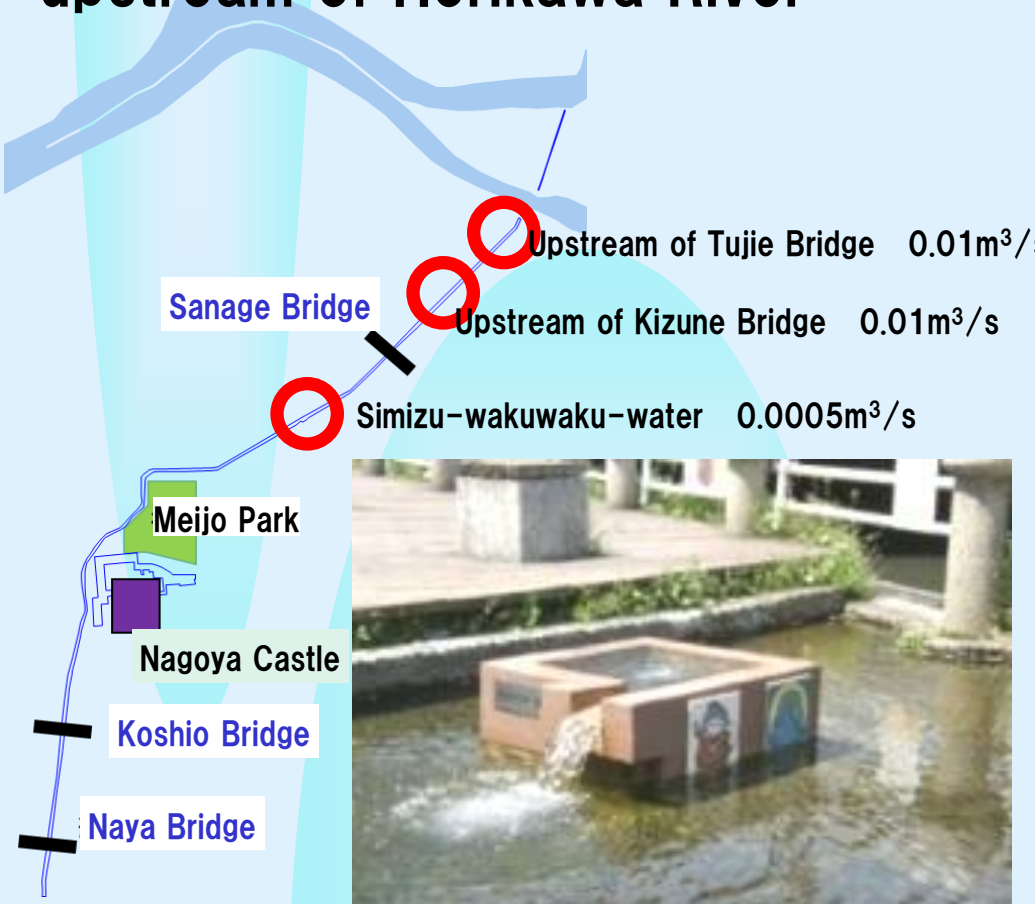
Implementation by Nagoya city

Feb.23rd .2013

Nagoya City Greenification &Public Works Bureau
River Dep.River Planning Div.

Reservation of additional water source

◆Use of shallow ground water
use of shallow ground water in the upstream of Horikawa River



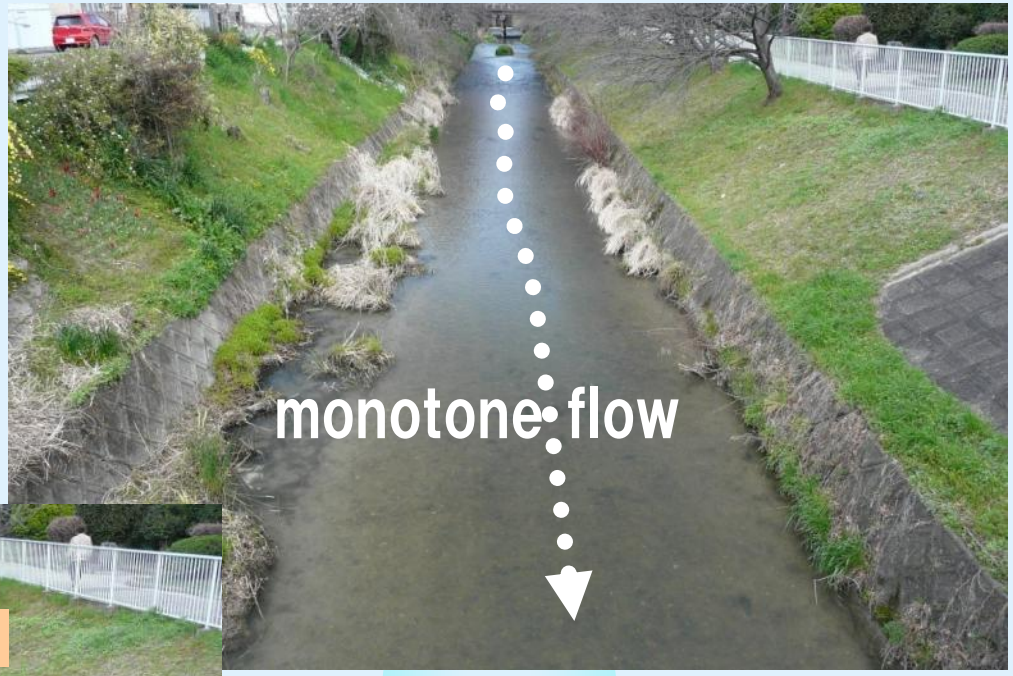
Reservation of additional water source (Implementation of this fiscal year 2012)

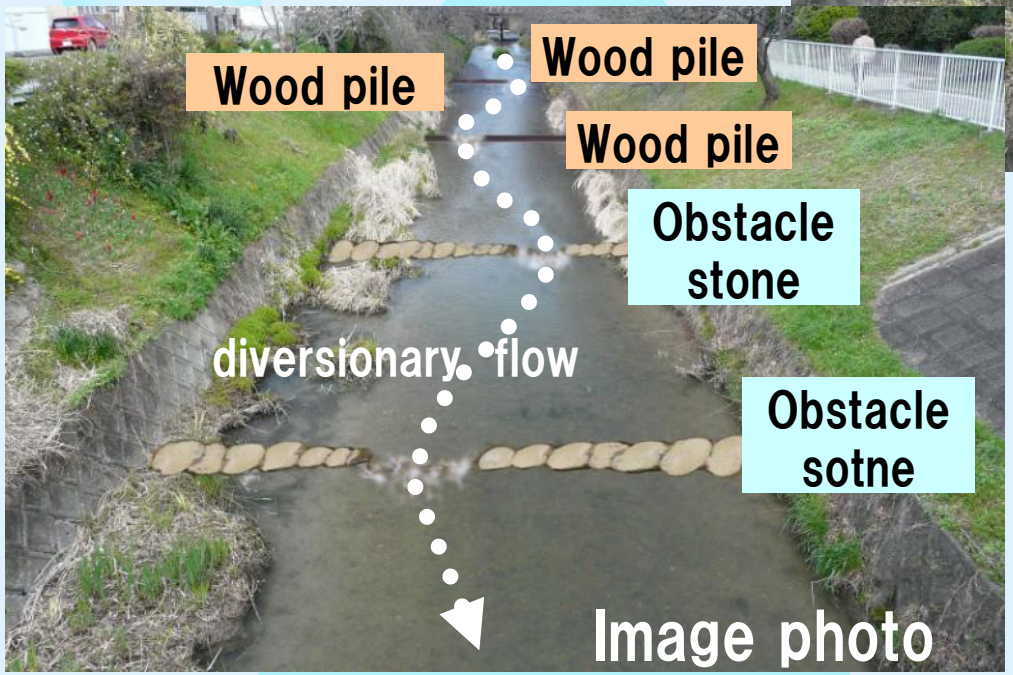
- Well Water in Seko

  transmitted into Horikawa River (0.01m3/s)

Improvement of water quality

◆Improvement in the self-clarification by changing monotone straight flow to diversionary flow with wood piles, stones and vegetation.



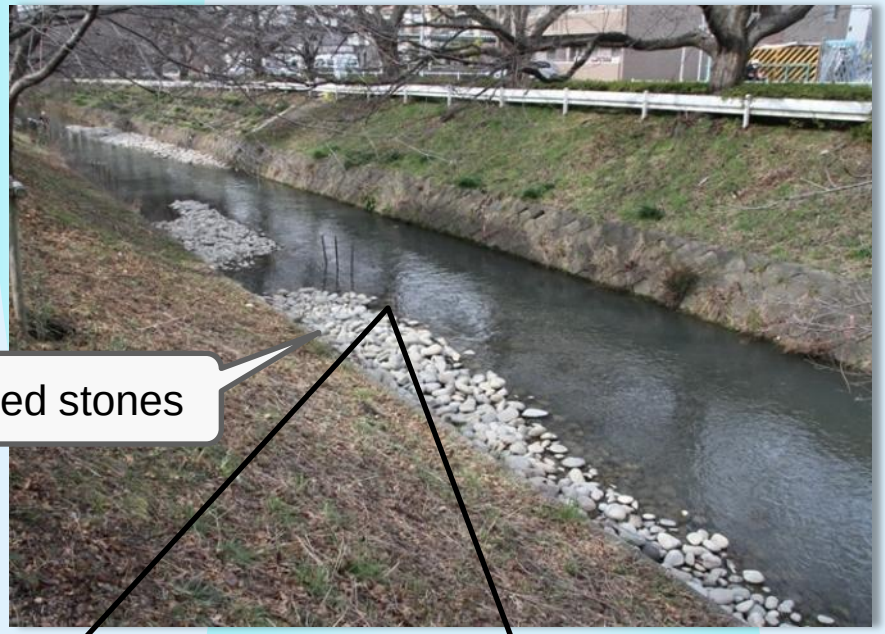


Improvement of water quality

(Activity in fiscal year 2012)

◆Kizune Bridge – Kurokawa No.2 Bridge

Putting stones in the river to change the flow.
Habitats for the living things and Plants were also set under the stones.



Artificial habitat
Under piled stones

Children also supported the activity.

Fish found in the post-survey

pale chub (fresh water minnow)

rhinogobius flumineus

Improvement of water quality

- Removal of sludge

From FY 1994 to 2011

Removed 144,000m^3

Removal and inflow reduction of pollutants

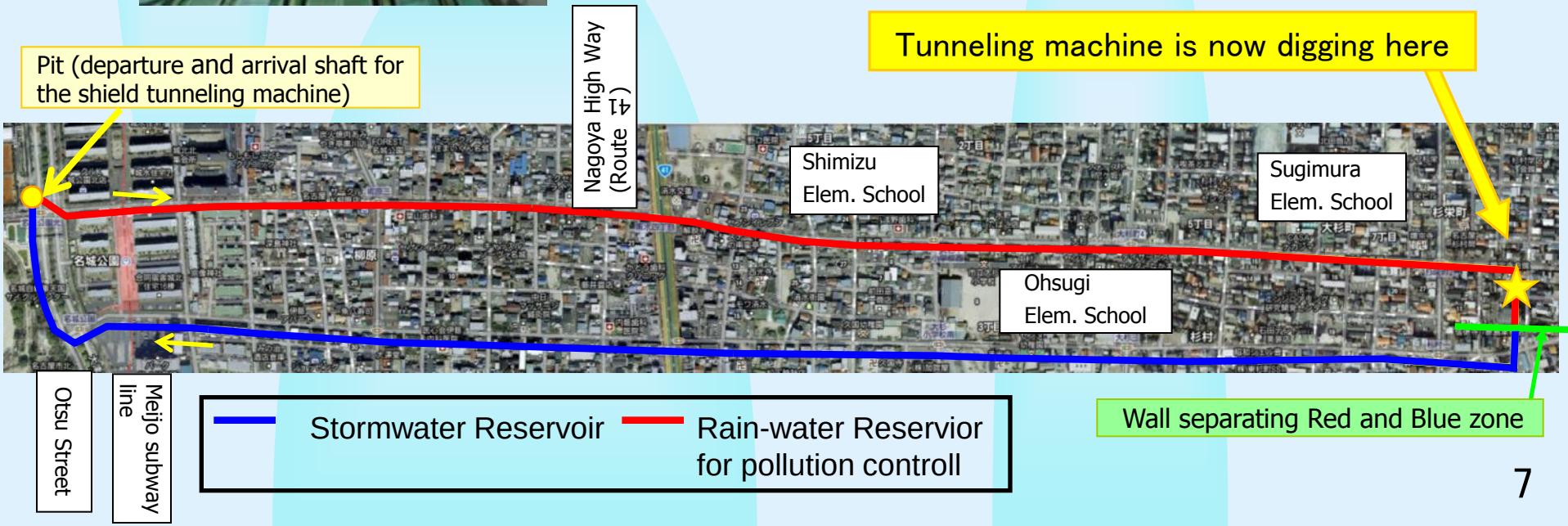
(Nagoya City Waterworks and Sewerage Bureau)

◆Horikawa Sagan Rain-water Reservoir for pollution control (14,000m3)

Now under construction

Rain-water reservoirs for pollution control are constructed for storing rainwater temporarily and decreasing pollution load to be flown into the Horikawa river.

※Stored rainwater is treated at the Meijo wastewater treatment center after the rain stops.

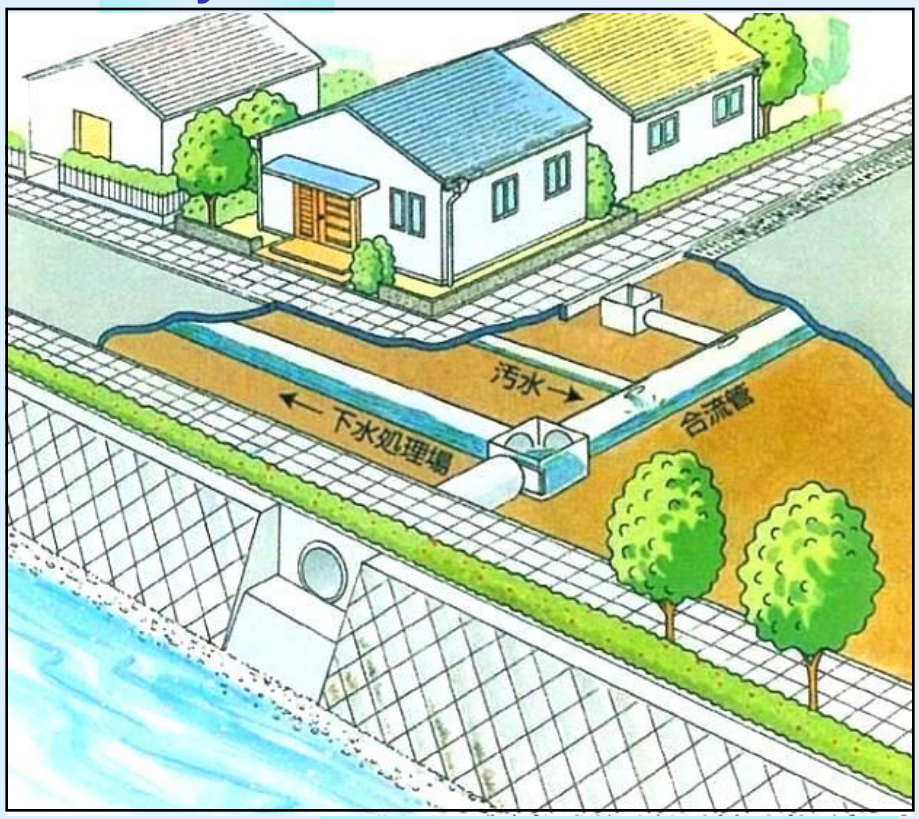


■Reduction of pollutant

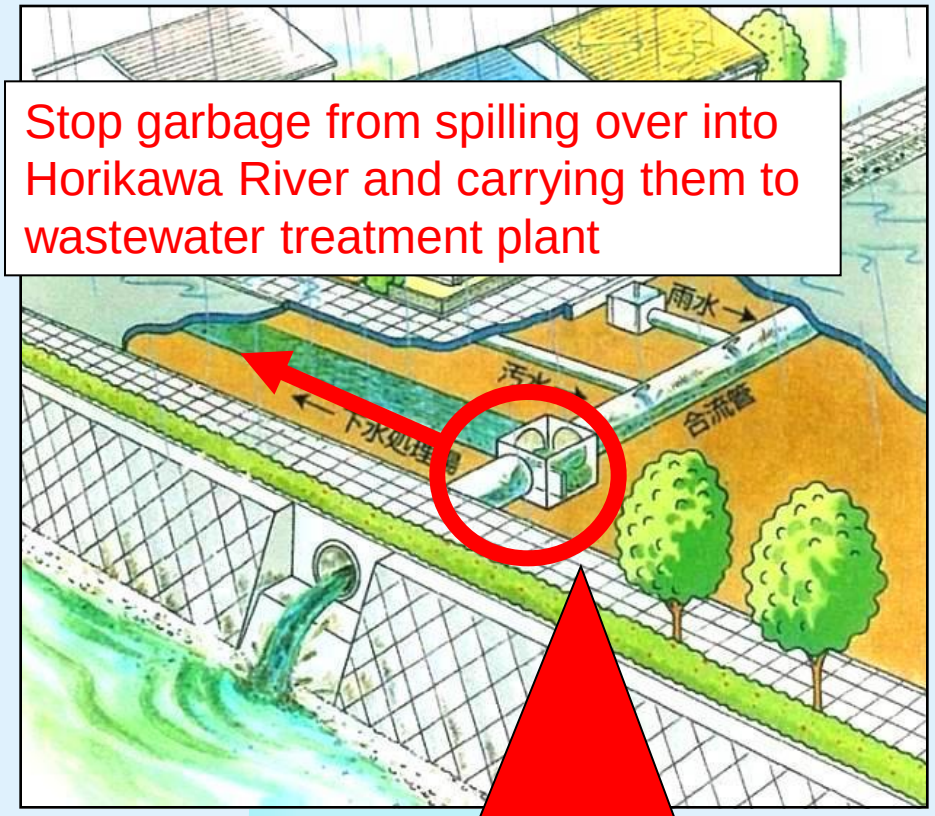
（Combined Sewer Overflow Control）

◆Garbage removal device

Sunny



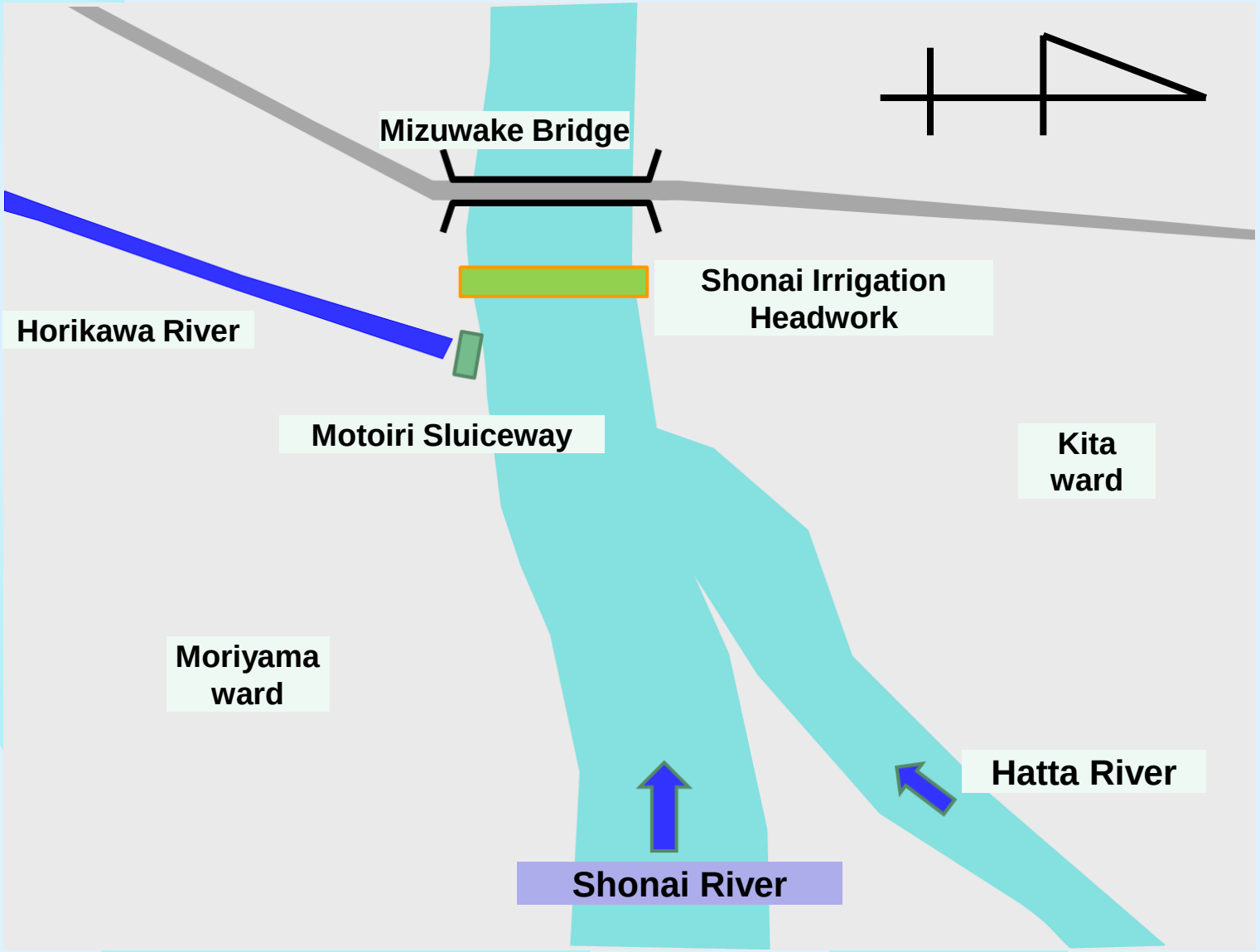
Rain



Stop garbage from spilling over into Horikawa River and carrying them to wastewater treatment plant

Installation of garbage removal device

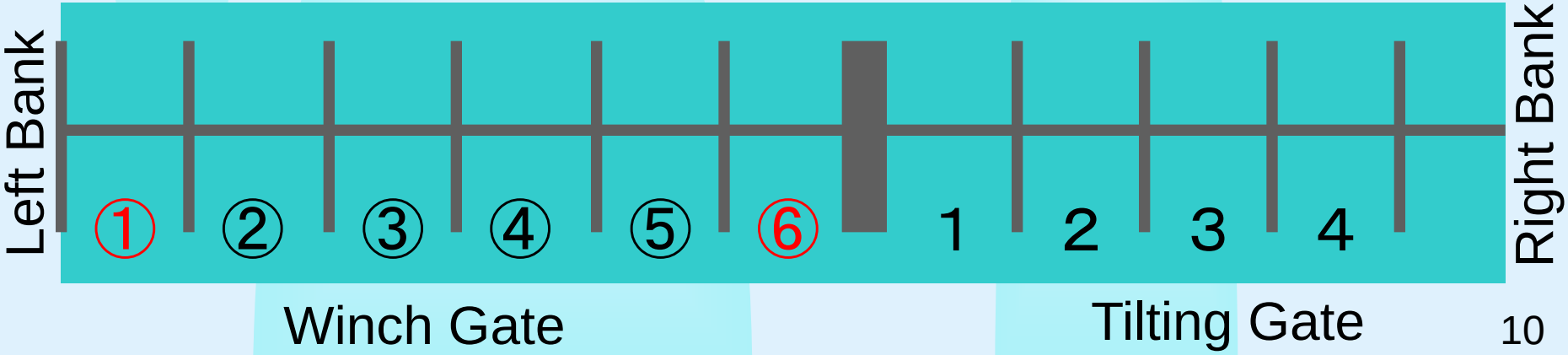
Water quality survey with operating gate of Shonai Irrigation Headwork



Gate Number

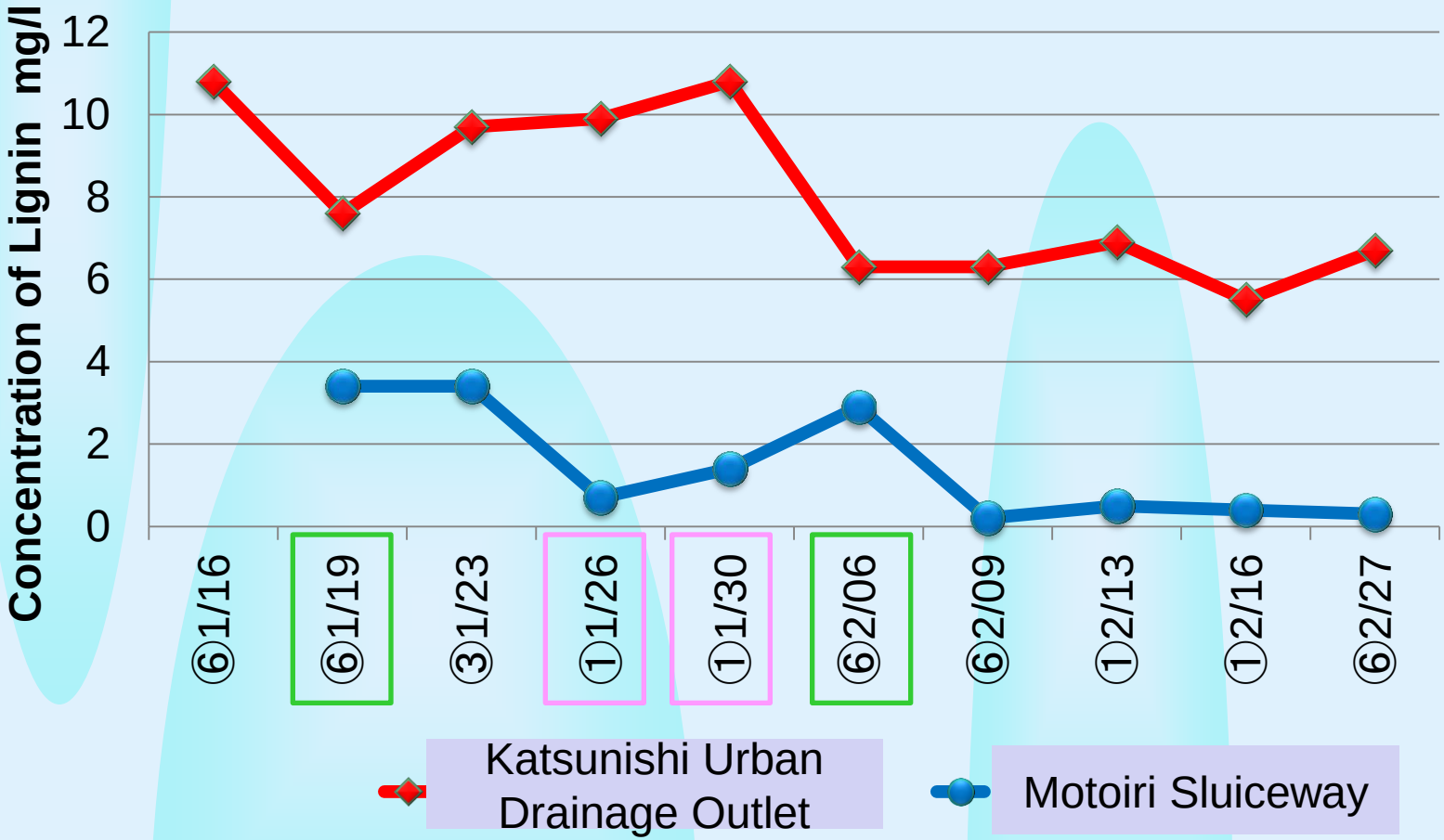
（Left Side）6 winch gates

（Right Side）4 tilting gates



Result of Quality Survey

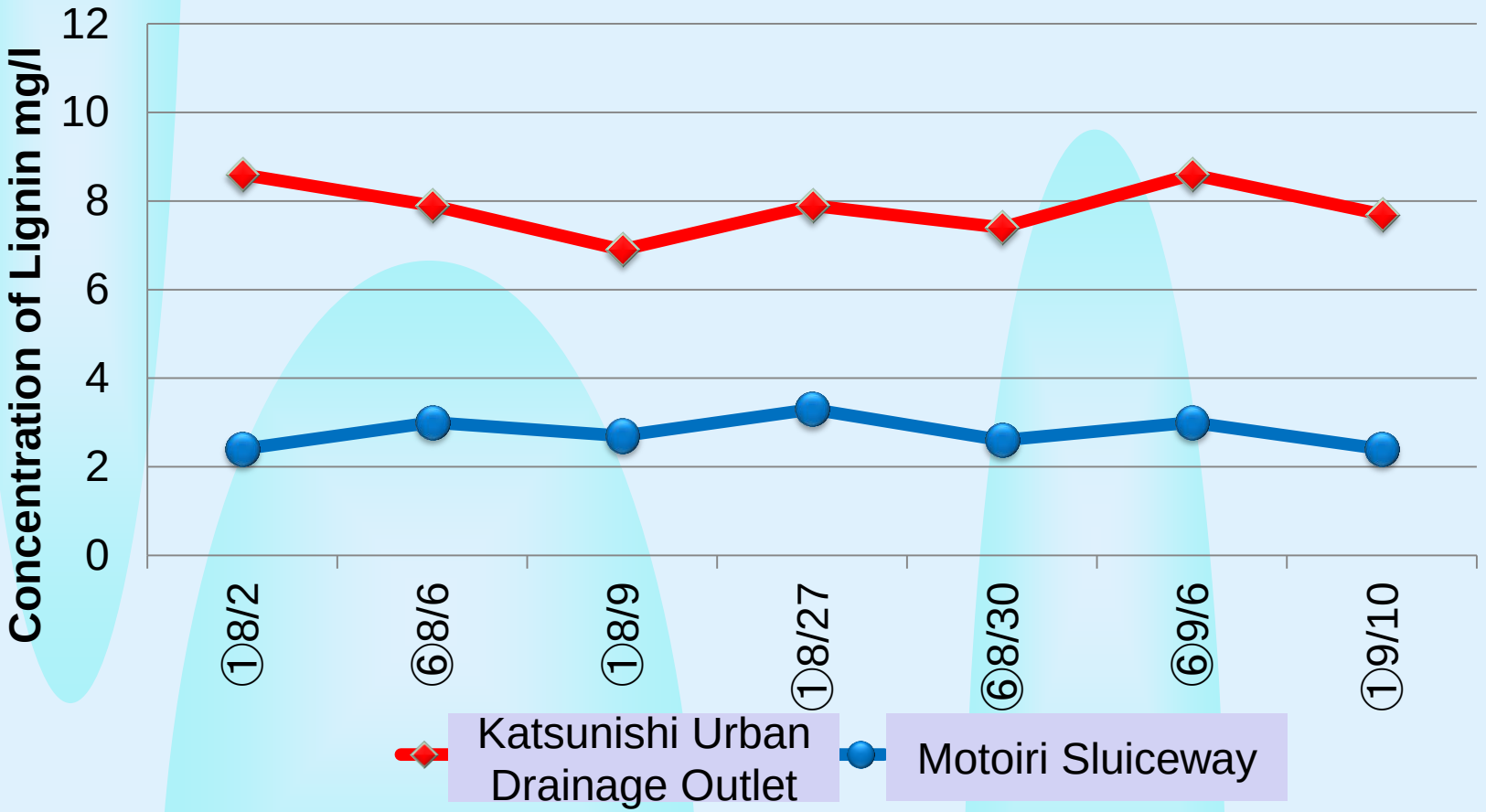
◆Concentration of Lignin（Jan – Feb 2012）



Water quality seems better when the Winch Gate① is open

Result of Quality Survey

◆Concentration of Lignin（Aug – Sep 2012）



The concentration of Lignin does not seem to depend on which gate is open.

The difference between Winter and Summer

Winter

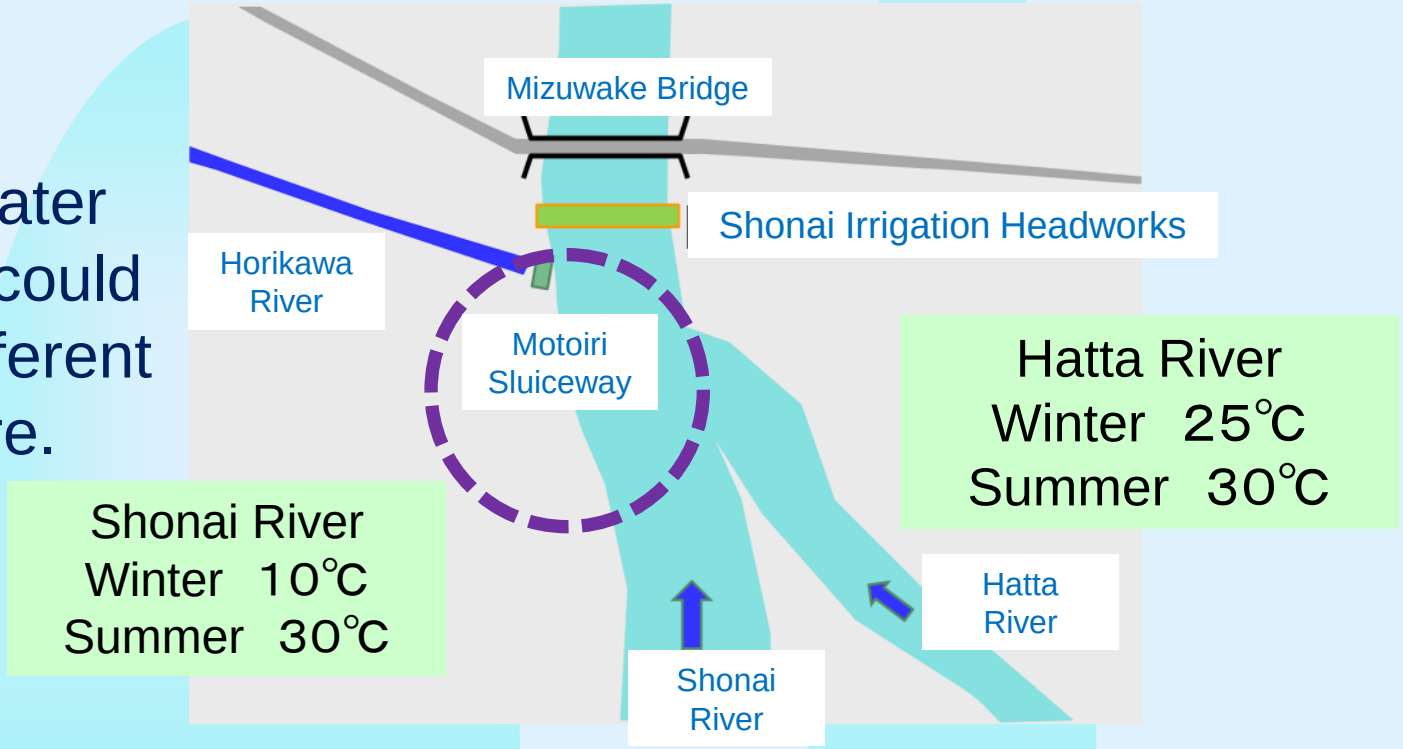
Water quality tends to be better when a winch gate near left bank is open.

⇔

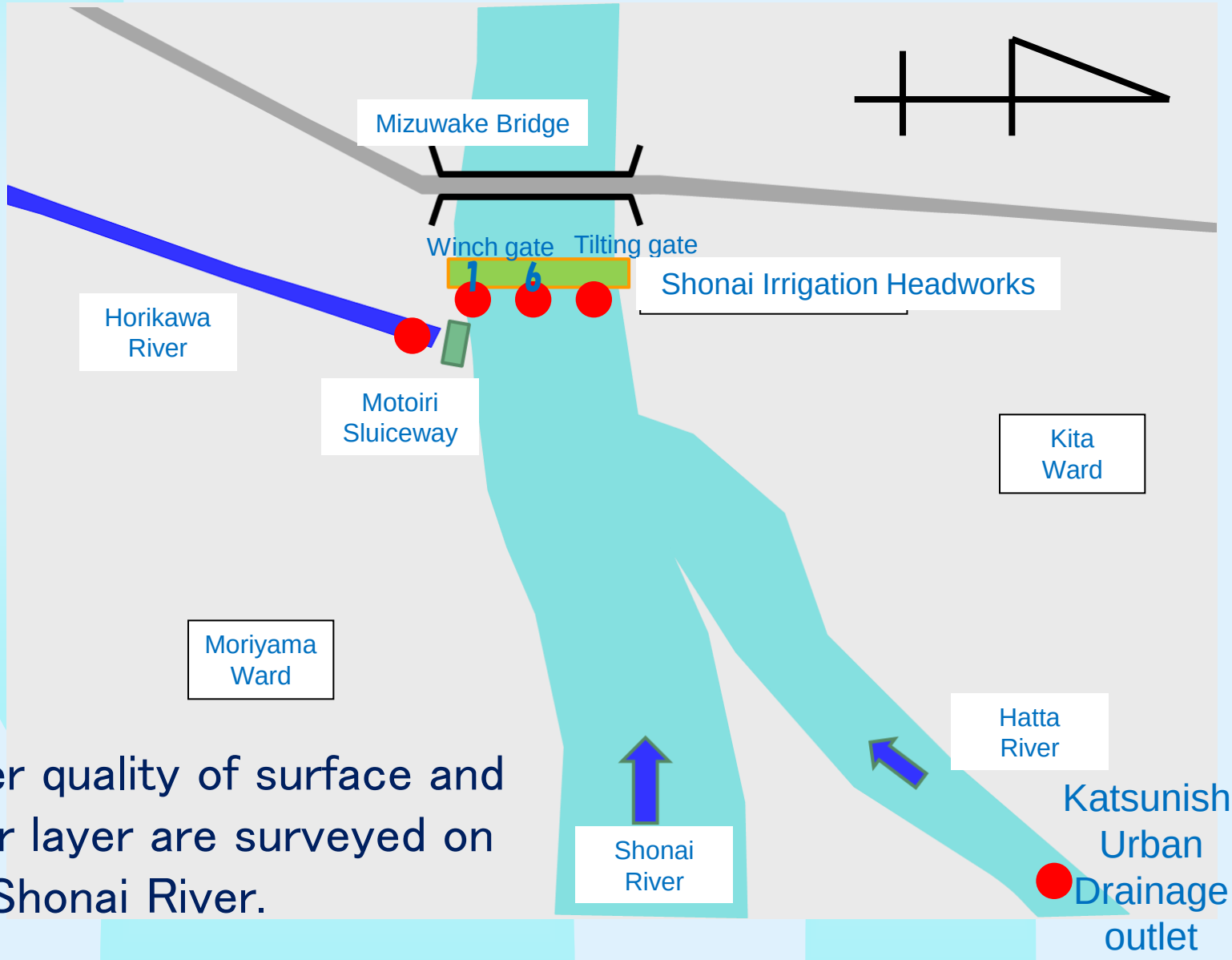
Summer

Water quality does not seem to depend on which gate is open.

The gap of water temperature could cause the different way of mixture.

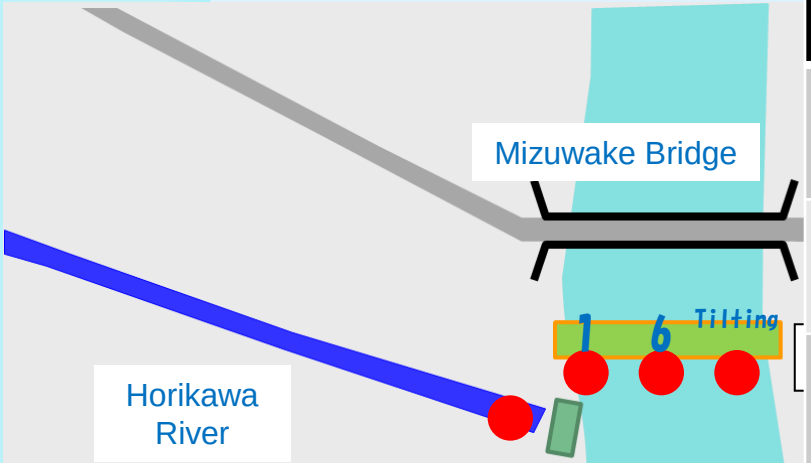


Monitoring point



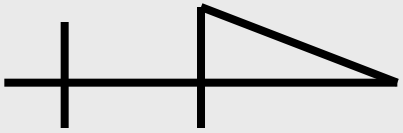
Water quality of surface and lower layer are surveyed on the Shonai River.

Result of survey（water temperature ℃）



Irrigation Headworks		
date Open gate No.	2/8 ①	2/12 ⑥
winch G1	surface 8.5 lower 7.5	surface 4.7 lower 4.6
winch G6	surface 8.0 lower 6.0	surface 15.7 lower 7.9
tilting G	surface 11.5 lower 9.7	surface 15.8 lower 12.2

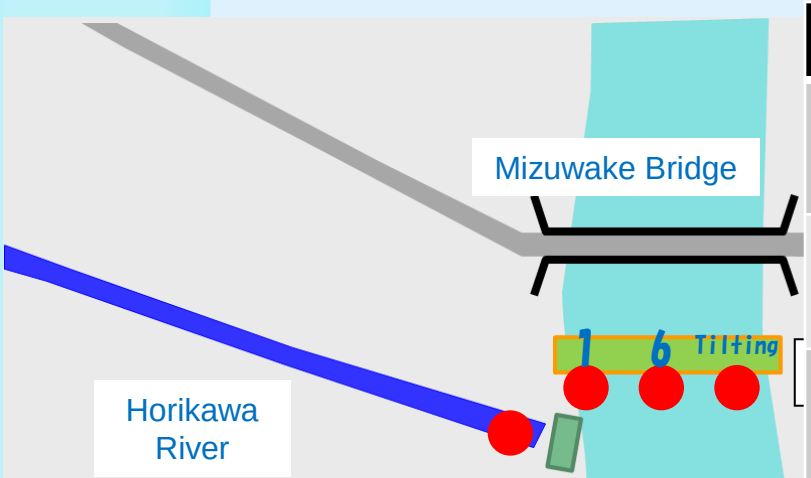
Motoiri Sluiceway （**Horikawa River**）	
2/8 ①	2/12 ⑥
5.3	4.0



Katsunishi Urban Drainage outlet	
2/8 ①	2/12 ⑥
22.3	23.4

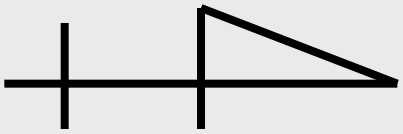
Result of survey（the concentration of Lignin）

mg/L



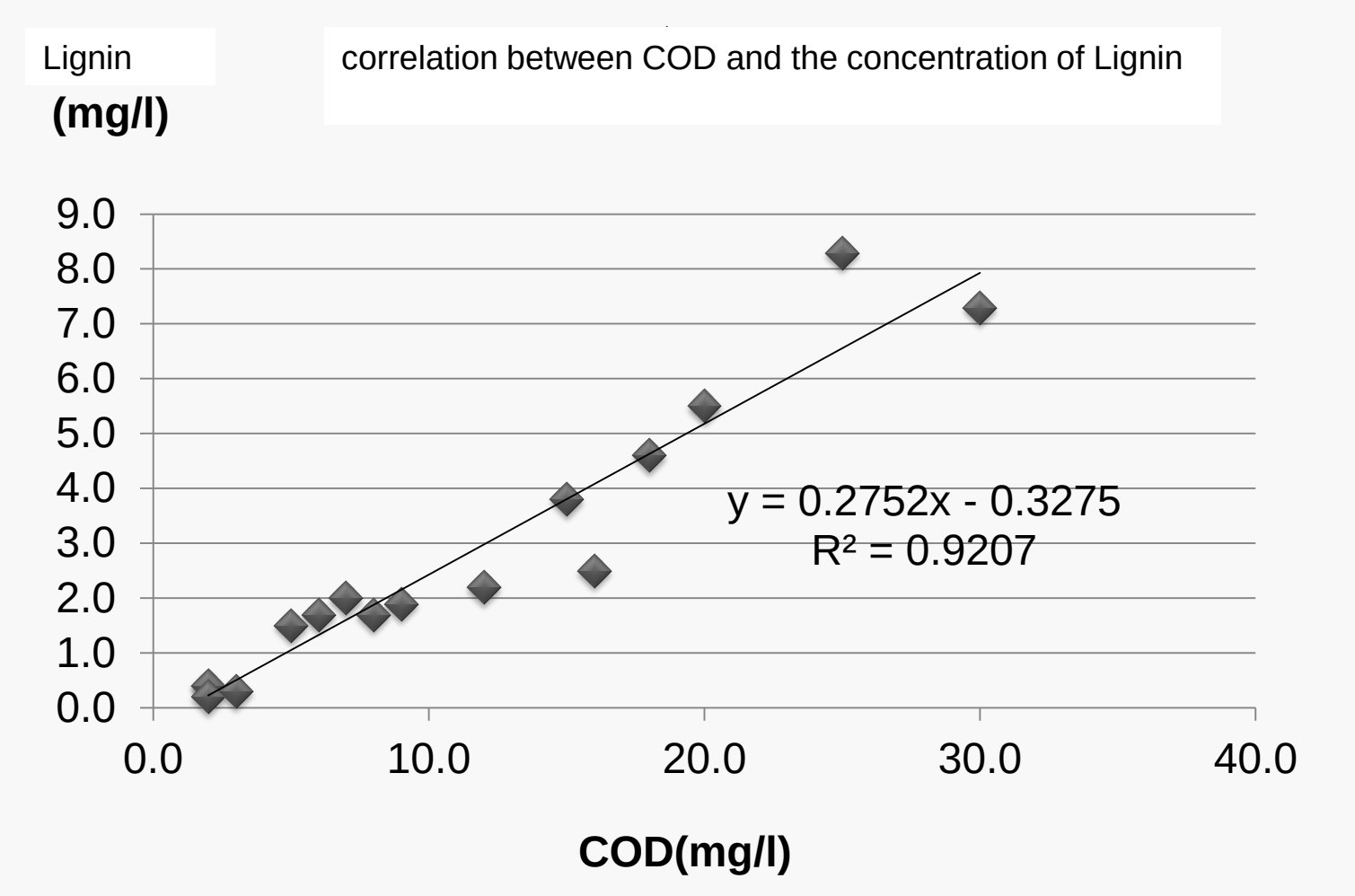
Irrigation Headworks		
date Open gate No.	2/8 ①	2/12 ⑥
winch G1	surface 2.0 lower 1.9	surface 1 or less lower 1 or less
winch G6	surface 1.7 lower 1.5	surface 5.5 lower 1.7
tilting G	surface 2.5 lower 2.2	surface 4.6 lower 3.8

Motoiri Sluiceway （**Hori River**）	
2/8 ①	2/12 ⑥
1 or less	1 or less



Katsunishi Urban Drainage outlet	
2/8 ①	2/12 ⑥
7.3	8.3

Relation between COD and the concentration of Lignin



Conclusions of the winter survey

・Both the concentration of Lignin and water temperature are different between surface and lower layer at the confluence of the Shonai River and the Hatta River. At that point, water from two rivers sometimes make different layers.

・When the flow volume of the main stream of the Shonai River is more than some extent, the concentration of Lignin of inflow into the Horikawa River doesn't probably increase.

・Because there's a correlation between the concentration of Lignin and COD, the volume of inflow from Hatta River can be estimated by measurement of COD.

About future survey

We'll make water quality survey focusing on the relation with water level or flow as well as the gate operation.