

Measures to make Horikawa River Limpid

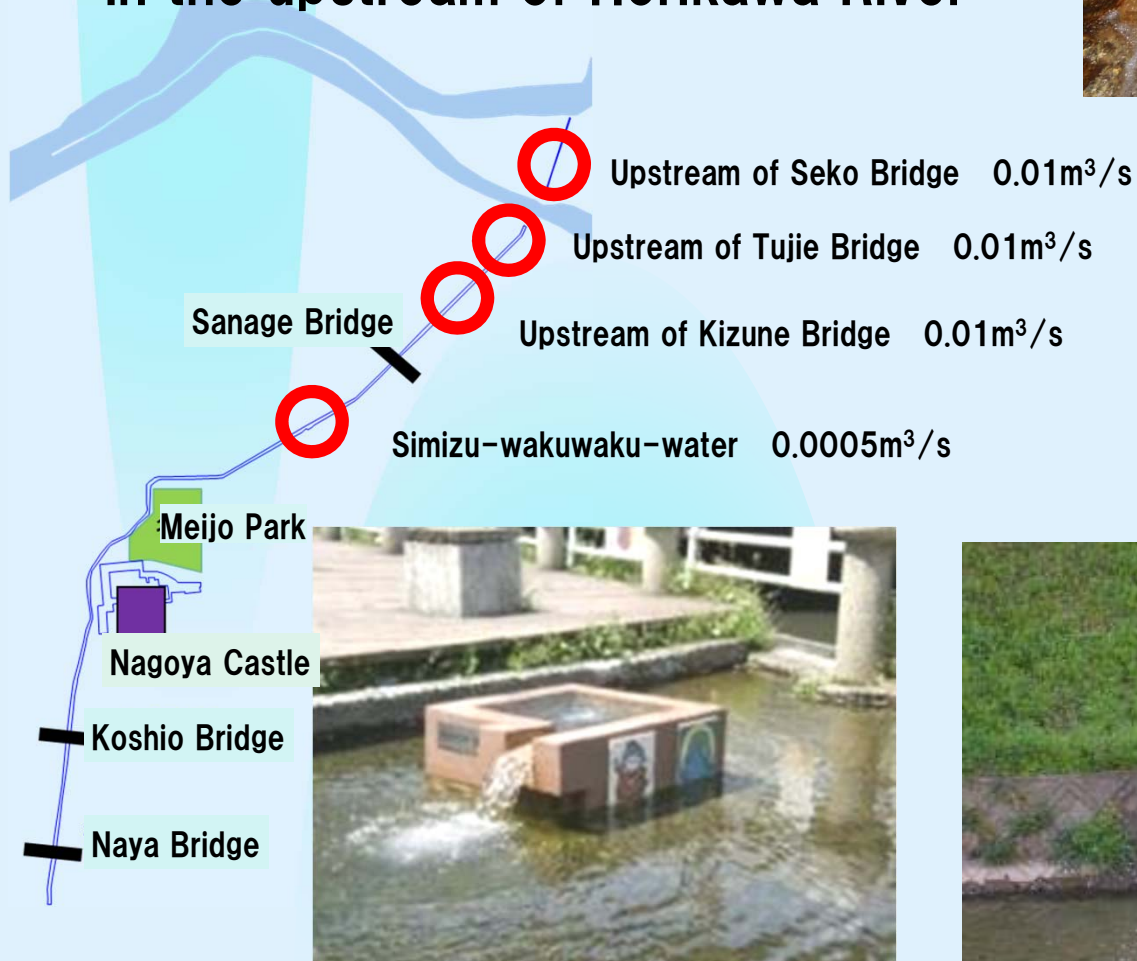
Implementation by Nagoya city

Sep.29th .2013

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

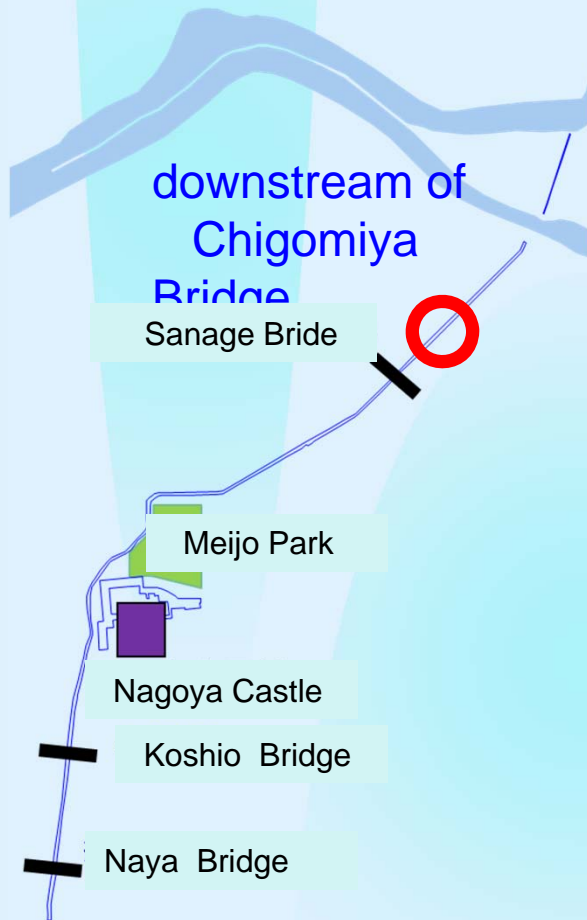
Reservation of additional water source

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



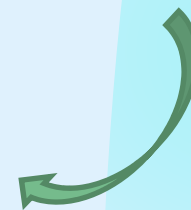
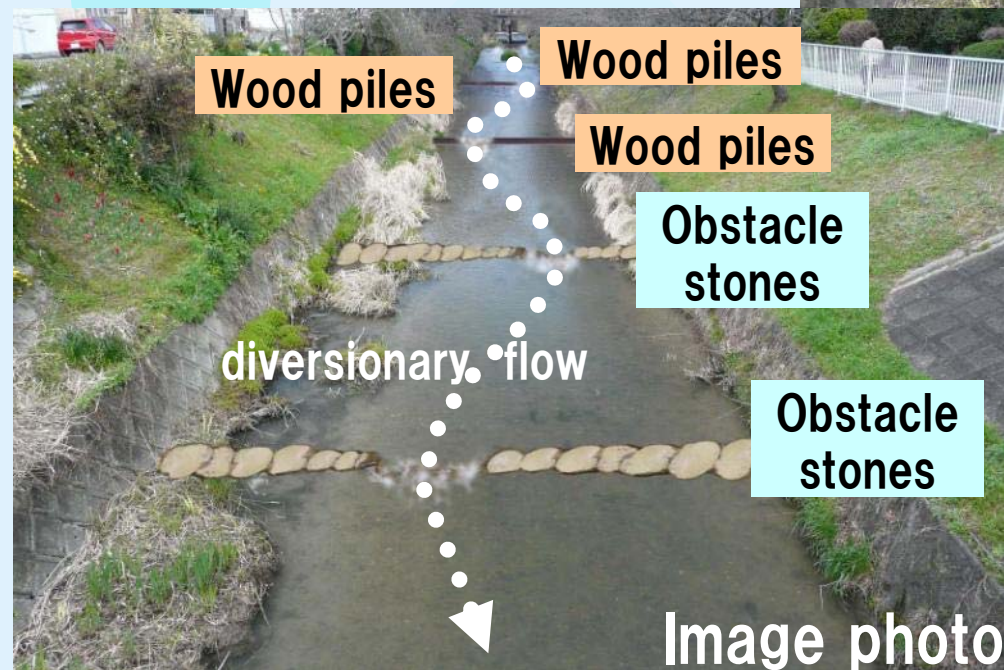
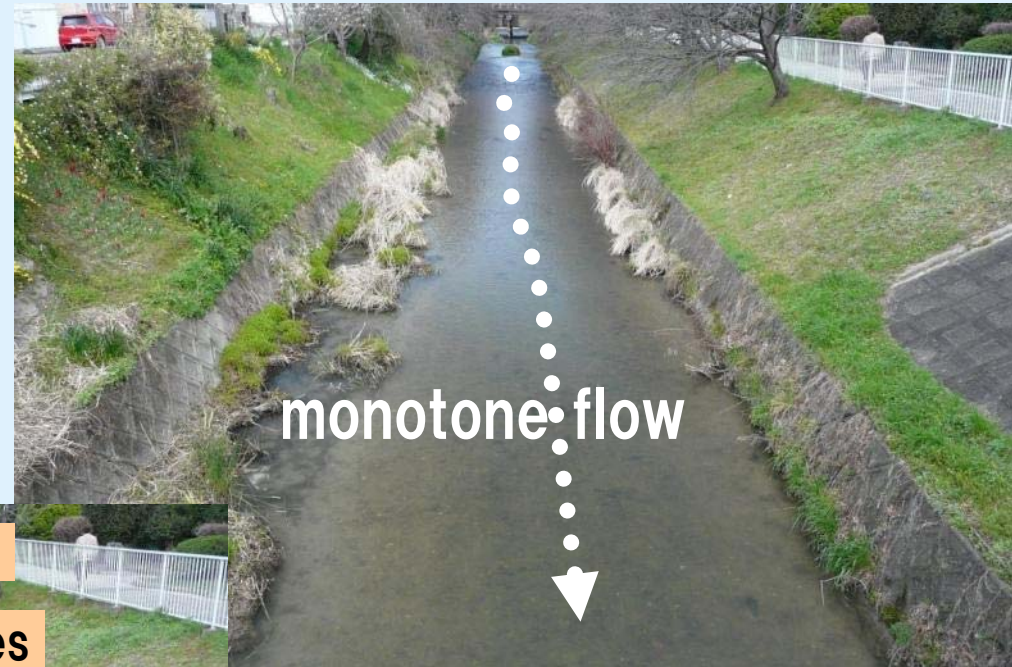
■ Reservation of additional water source (fiscal year 2013)

- ◆ At downstream of Chigomiya Bridge
transmitted into Horikawa River ($0.01\text{m}^3/\text{s}$)



■ Improvement of water quality

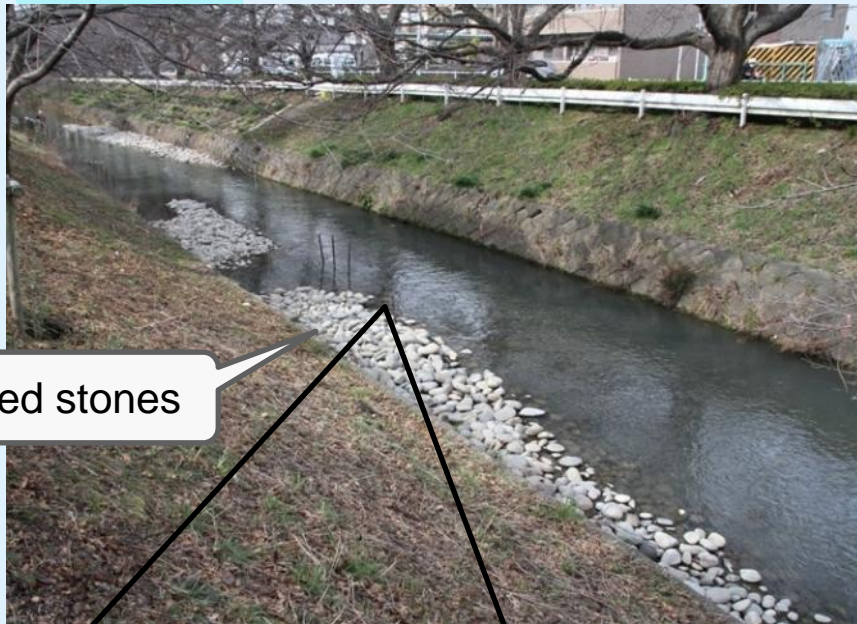
- ◆ Improvement in the self-clarification by changing monotone straight flow to diversionary flow with wood piles, stones and vegetation.



Improvement of water quality 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.



Piled stones



U-shaped gutter

PVC pipes

Artificial habitat
Under piled stones



Children also supported this activity.



6 months later, September 2013

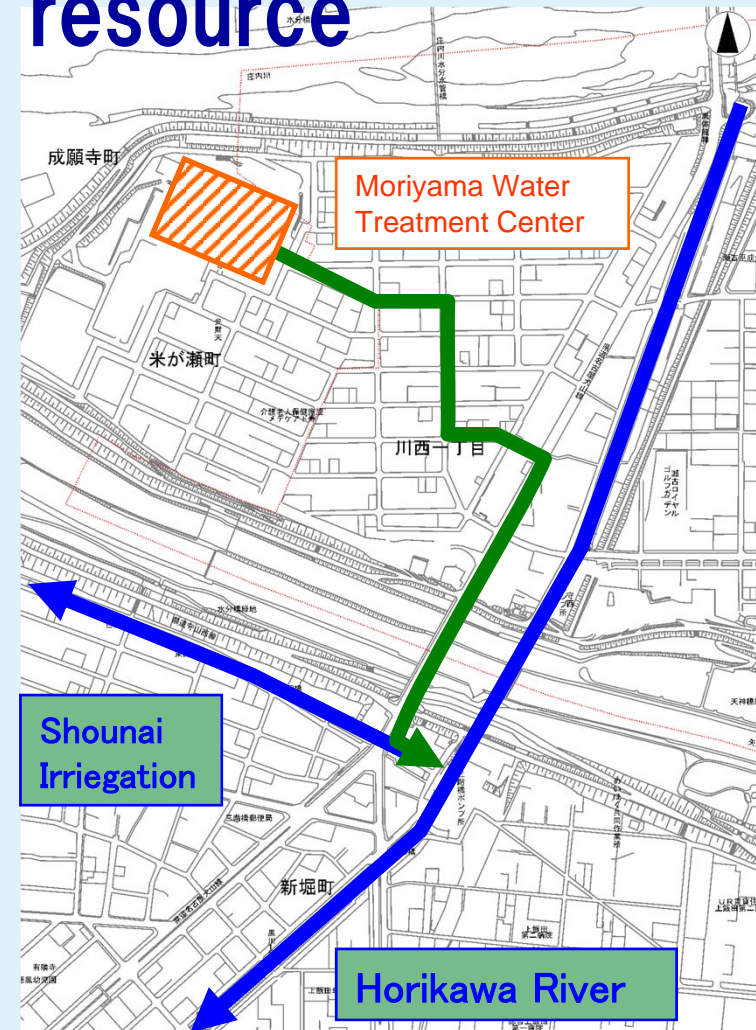
Reserve additional water resource

◆ Use of reclaimed wastewater

Conducting reclaimed wastewater that was membrane filtered in Moriyama Water Treatment Center into Horikawa River up to 4000m³/day



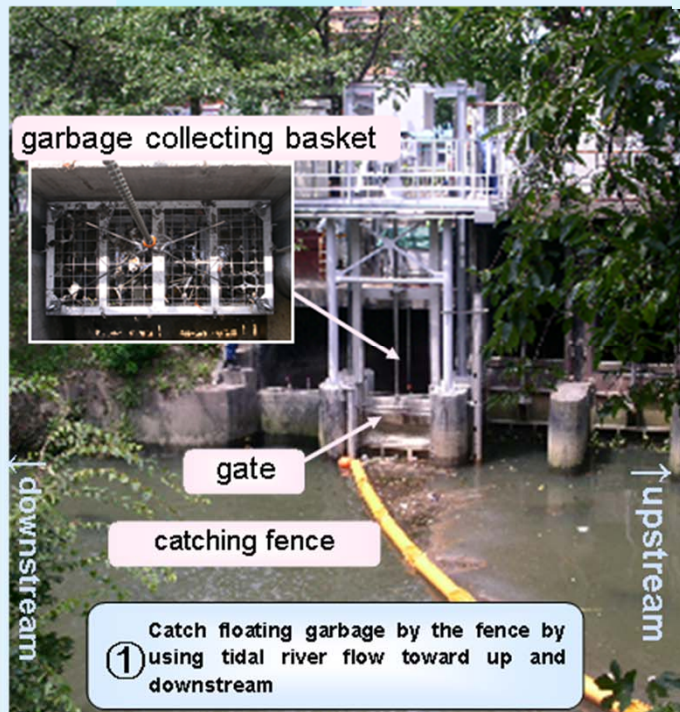
Membrane units



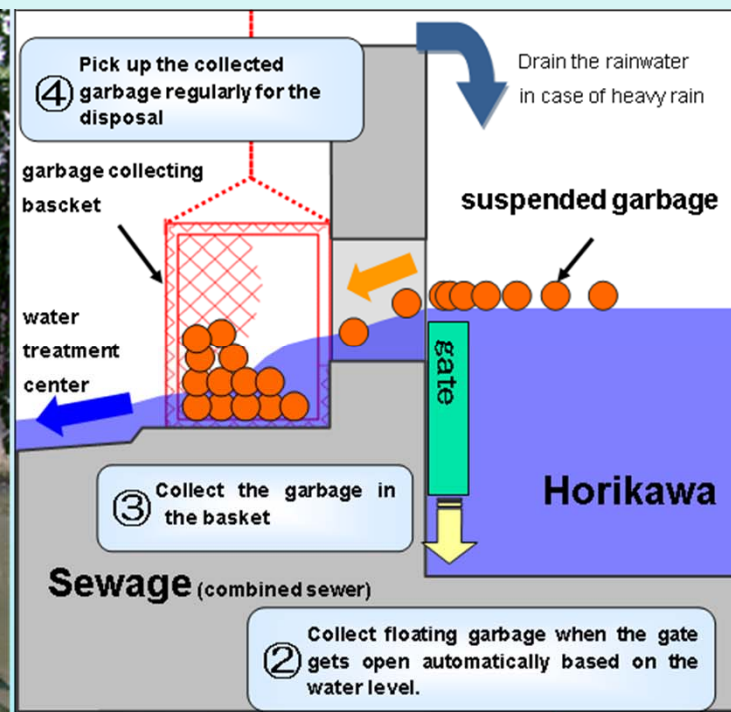
Reclaimed wastewater was conducted during irrigation season (Apr.-Oct.)

■ Removal and inflow reduction of pollutants

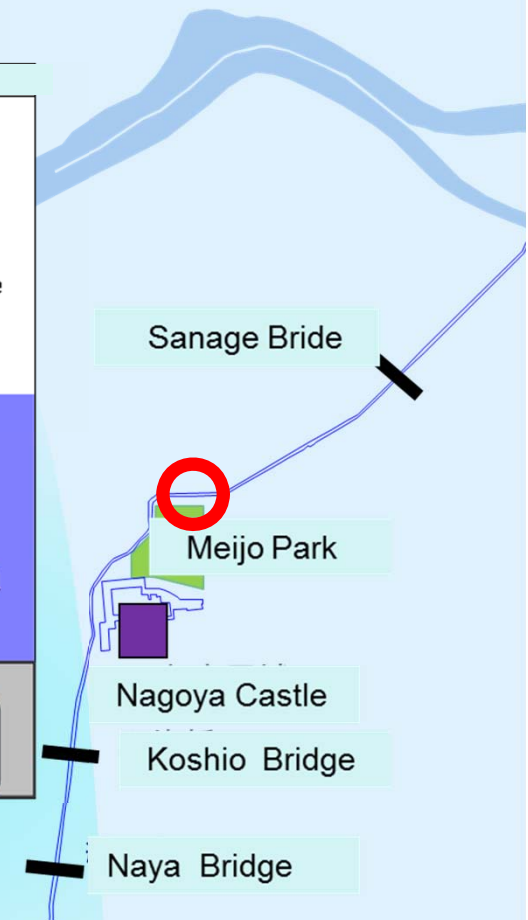
◆ Garbage Catcher (near Johoku Bridge)



Situation of the facility



Cross section (image)



FY 2012 collected 1.1t

■ Removal and inflow reduction of pollutants

◆ Advanced water treatment in Meijo Water Treatment Center

Filtering equipment ,Disc Filters, removes more fine particles remaining in treated water.



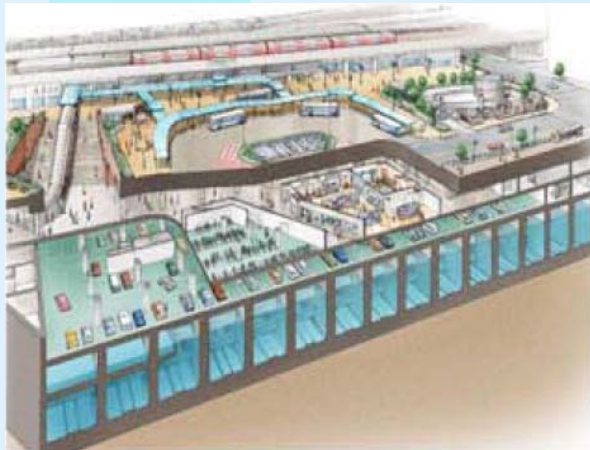
	Average before introduction (2007~2009)		Average (2012)
BOD	5.5	24% →	4.2
SS	3.3	Over 70% →	1

■ Removal and inflow reduction of pollutants

◆ Control of combined sewer overflow

Rain-water reservoirs (RWR) for pollution control are constructed for storing rainwater temporarily and decreasing pollution load.

Ozone RWR



Completed in 2006
(12,000m³)

Horikawa-Ugan RWR



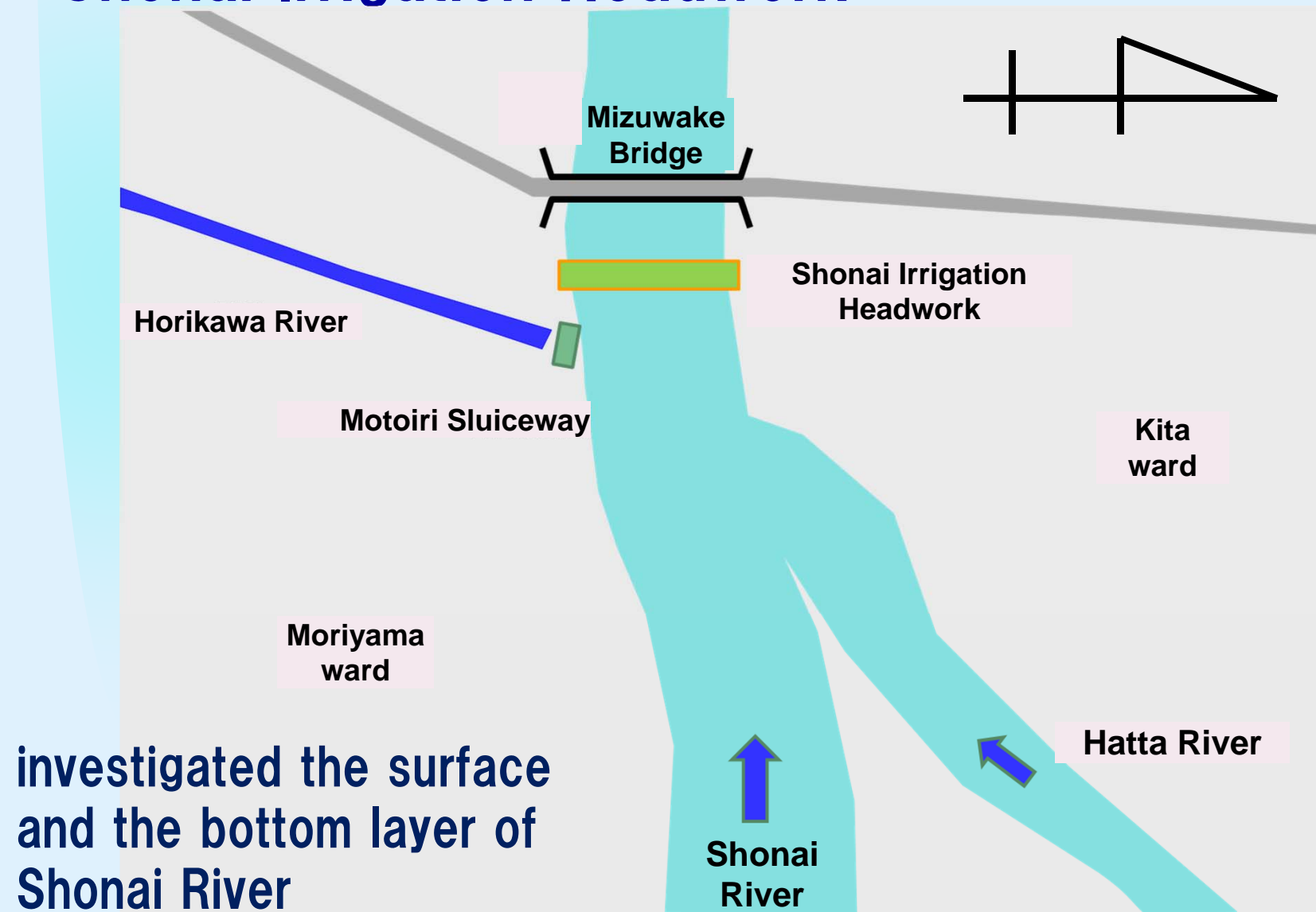
Completed in 2010
(13,000m³)

Horikawa-Sagan RWR



Under construction
(14,000m³)

■ Water quality survey with operating gate of Shonai Irrigation Headwork



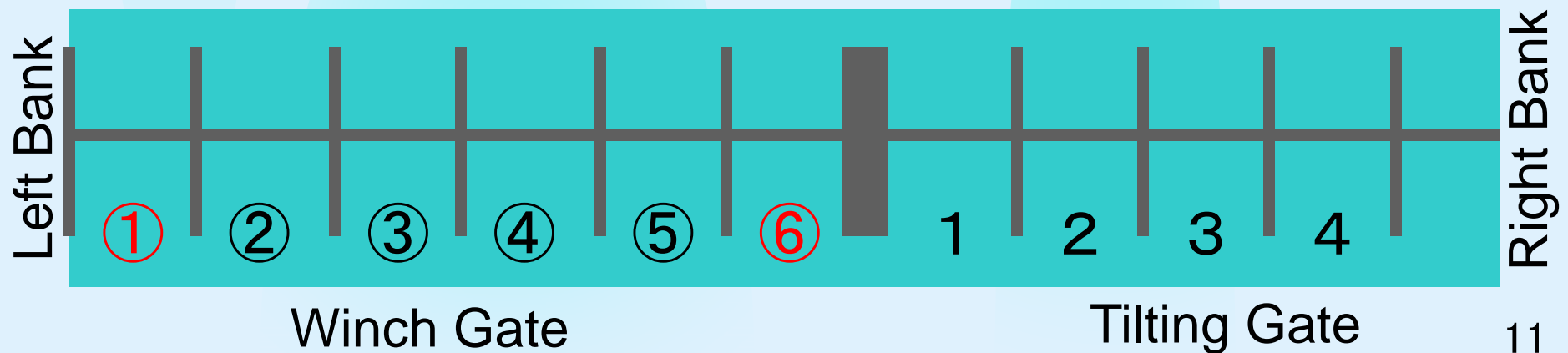
■ Gate Number



(Left Side) 6 winch gates



(Right Side) 4 tilting gates



■ The difference between Winter and Summer

Winter

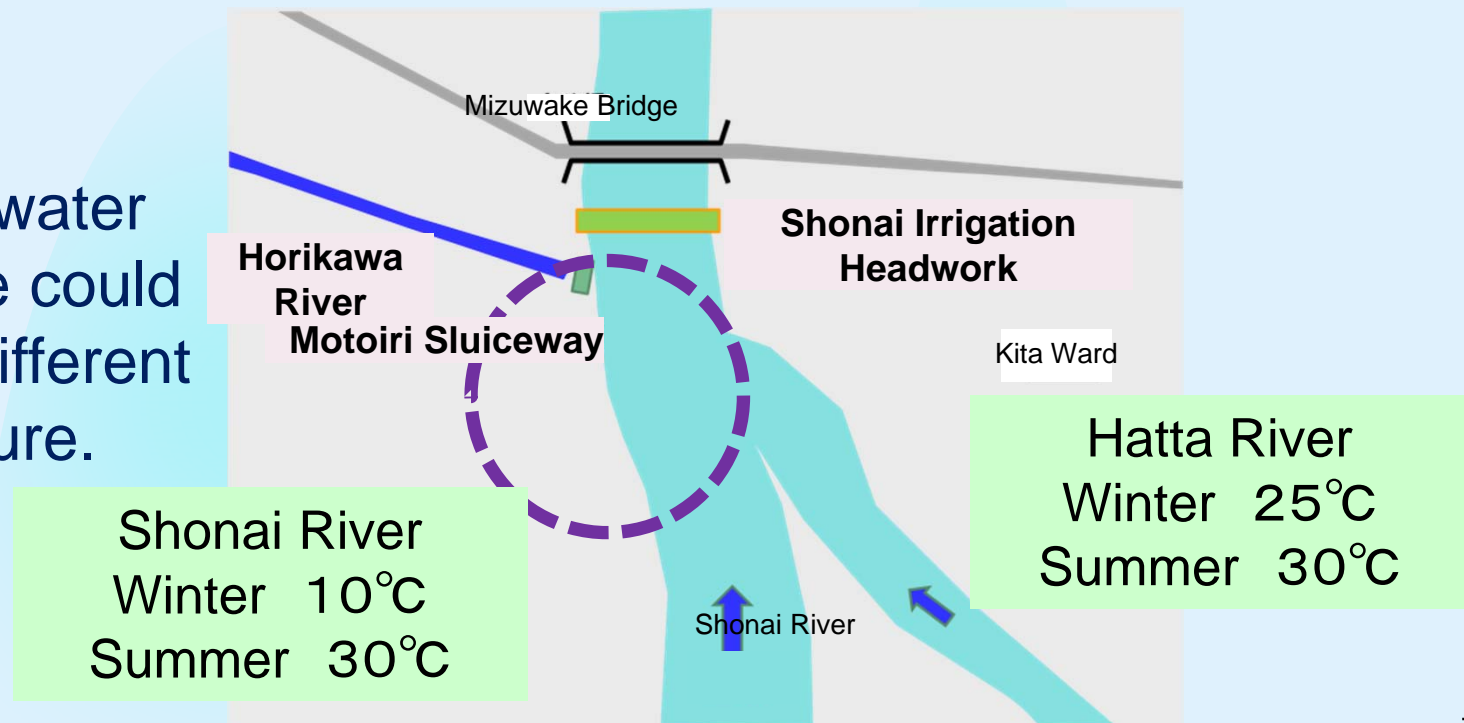
Water quality tends to be better when a winch gate near left bank is open.

Summer

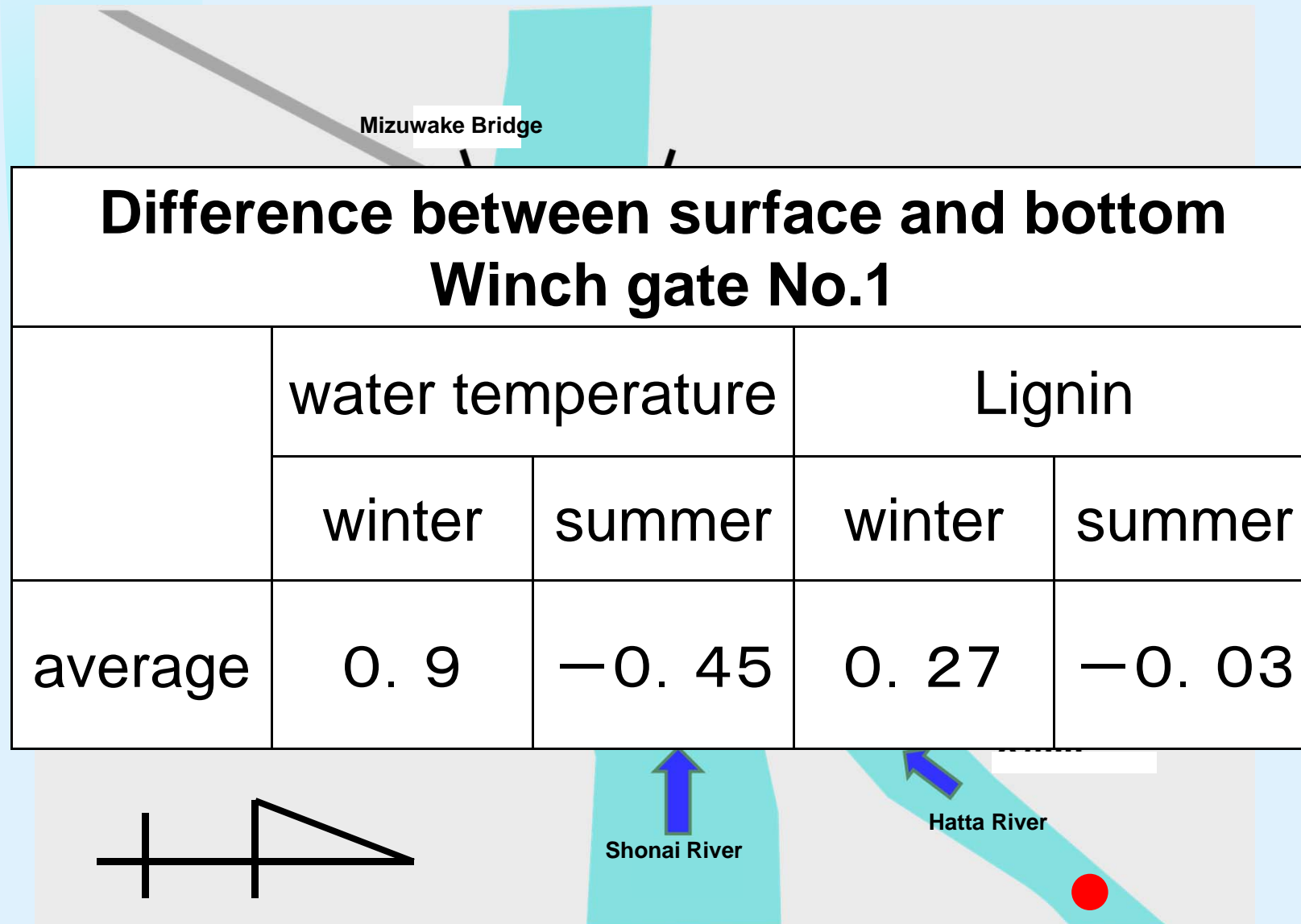
Water quality does not seem to depend on which gate is open.



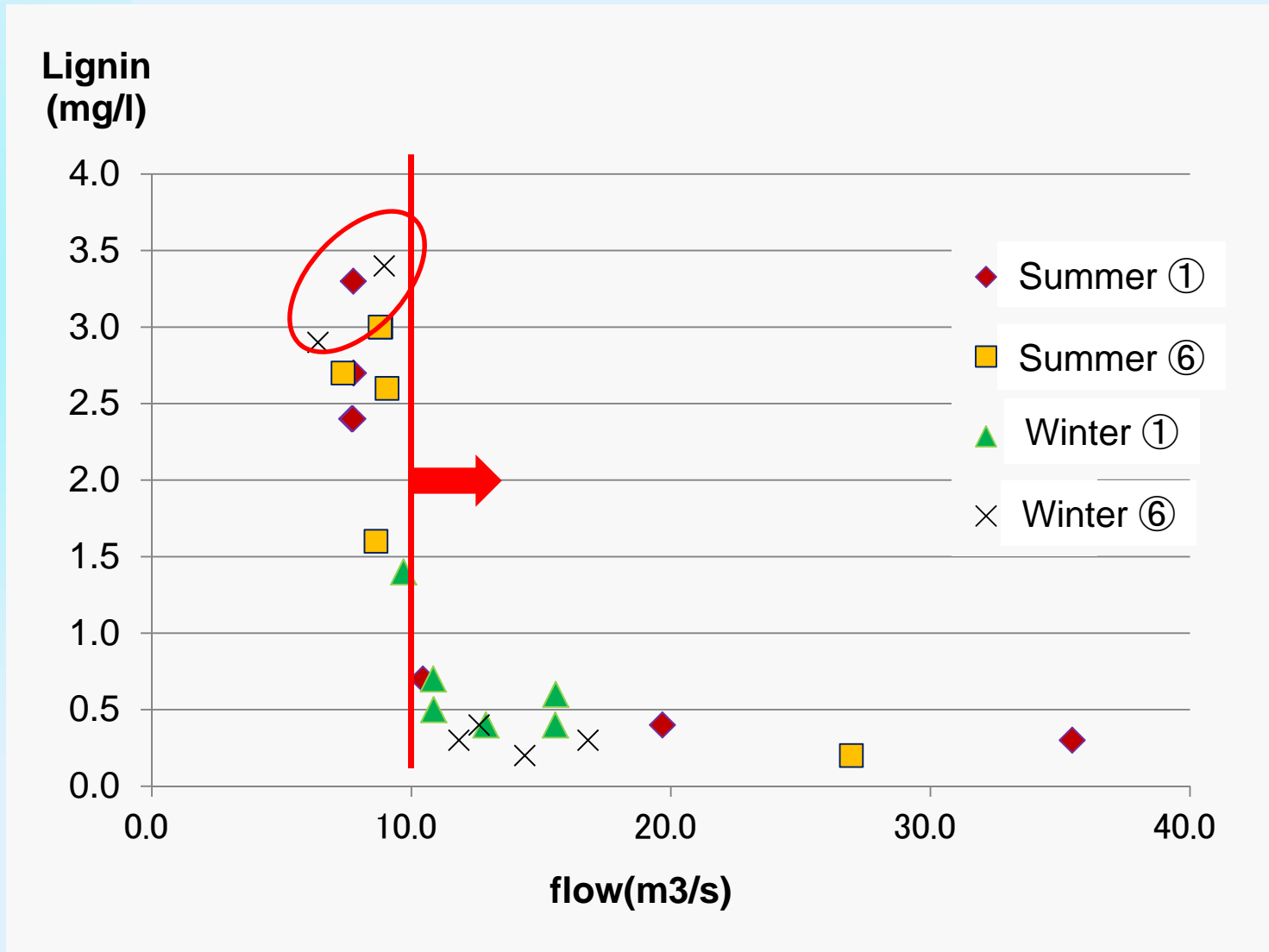
The gap of water temperature could cause the different way of mixture.



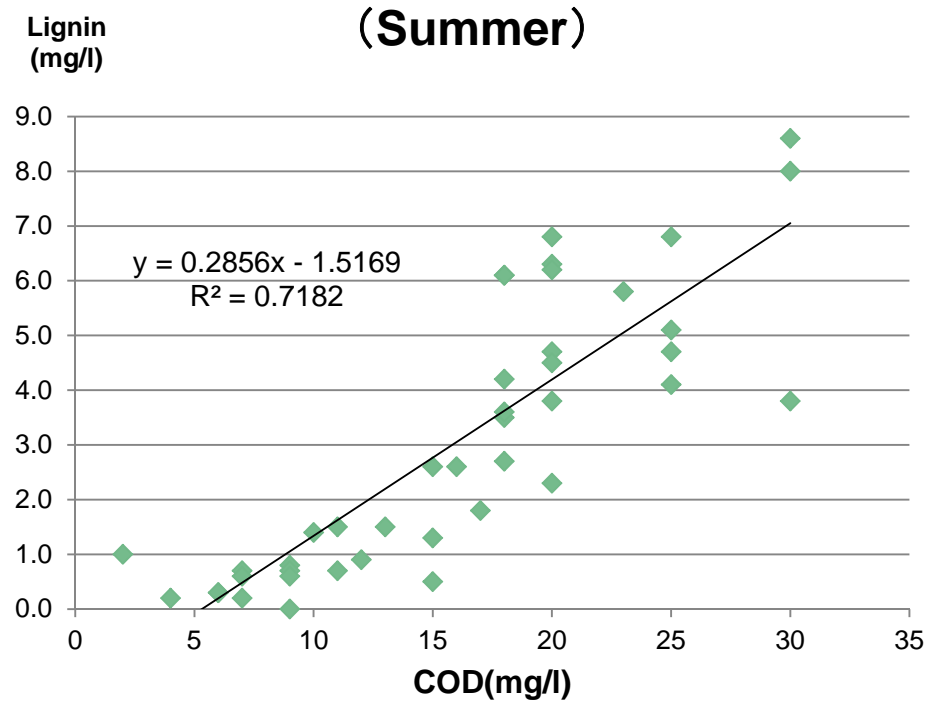
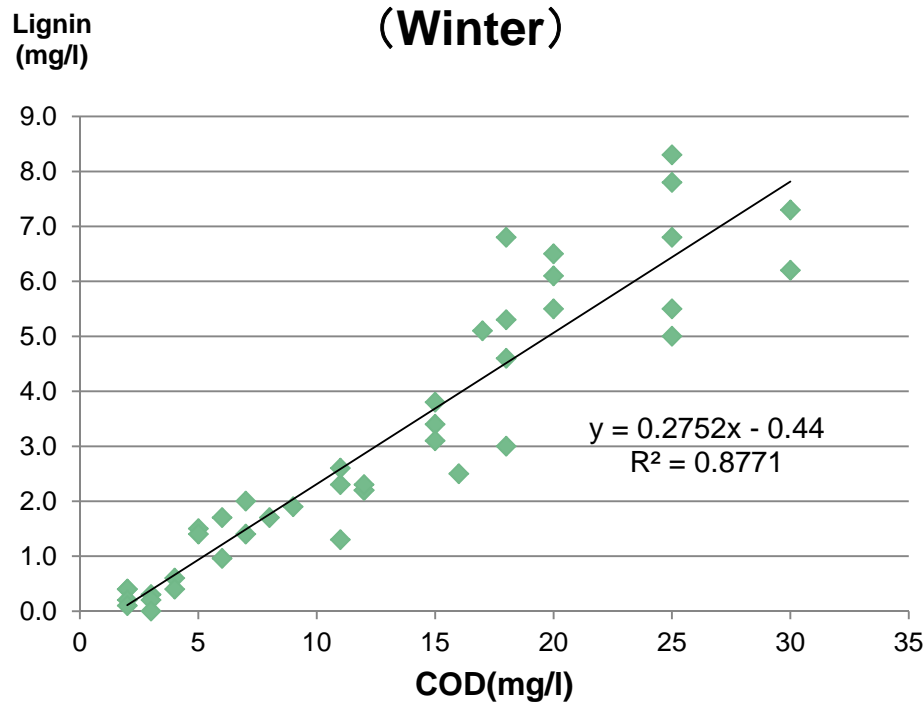
■ Result of survey



■ Relation between flow and concentration of Lignin

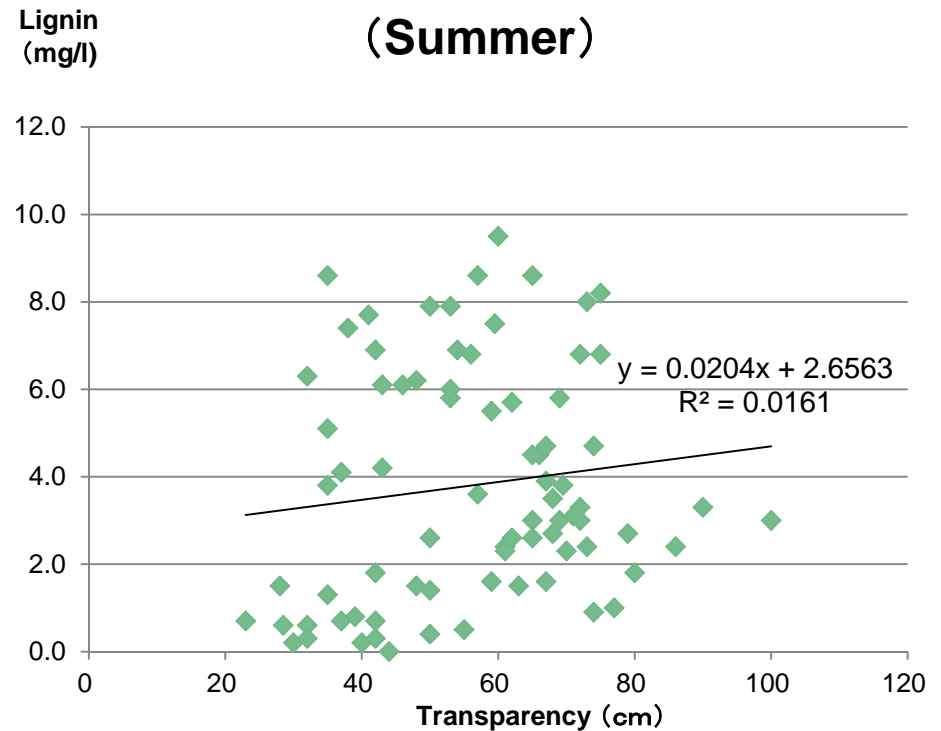
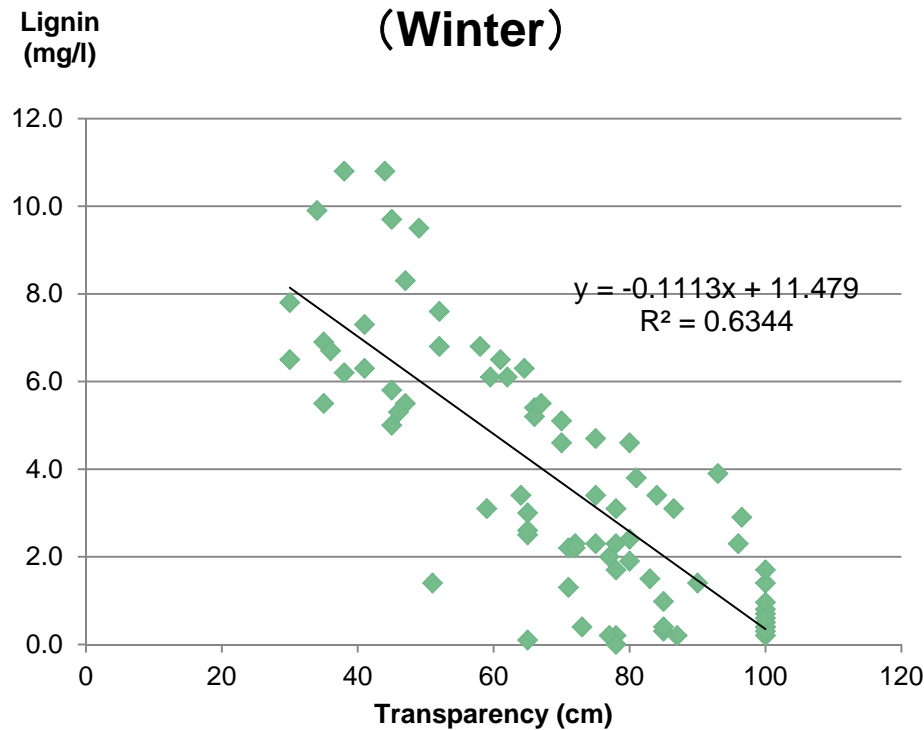


■ Relation between COD and concentration of Lignin



COD and concentration of Lignin relate each other
In the research of both Winter and Summer.

■ Relation between transparency and concentration of Lignin



Transparency and concentration of Lignin relate each other in Winter but not in Summer.

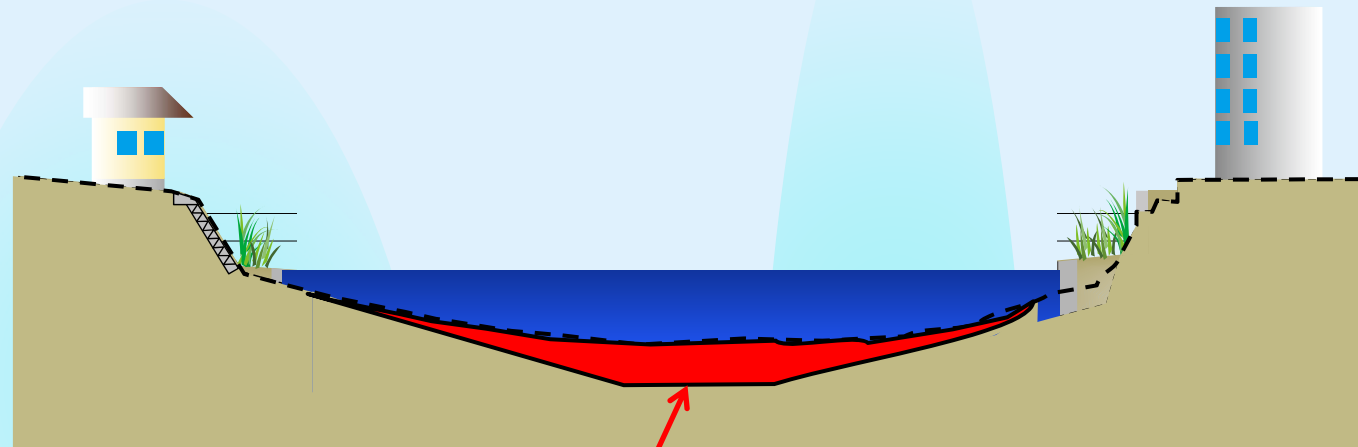
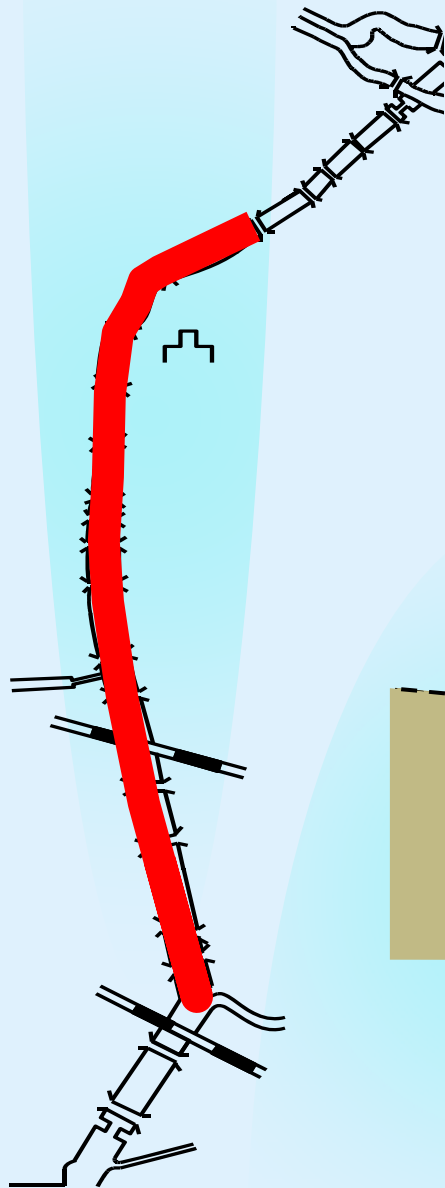
■ Conclusion of survey

- 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.
- The difference of water quality caused by the operation of gates appears in winter, but does not in summer.
- 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.

◎ We keep operating gates from the left side.

Removal of Sludge

- mainly around the ebb water route
- completed from Shiga Bridge to Shin-Horikawa River confluence



**Removing sludge on
the ebb water route**

Removal of Sludge

- removed near to the river-wall when river-bed excavation as flood prevention works



completed by the place that is close to Kameya Bridge

