

Horikawa Sen-nin Chosatai 2010 (HSC) Summary meeting for the 24th stage

Place:
Nagoya Urban Institute
Conference room (11th floor)



The secretariat of Horikawa Sen-nin Chosatai 2010
Feb.23rd.2019

1. Horikawa Sen-nin Chosatai 2010

~Transmission of Raw Water from Kiso River~

The formation of HSC (April.22nd.2007)

With a viewpoint and a sence of citizens, the survey of the clarification effect of TRWKR started

1.Purpose

To verify the clarification effects of TRWKR with citizens

- (1) Develop to new clarifying measures
- (2) Asses the influence on an ecosystem
- (3) Sustain and enhance citizens' activities
- (4) Develop citizens' awareness in the entire Horikawa River basin



2.Water source and Volume of transmission of raw water

- (1) Water Source : Kiso River
- (2) Volume of transmission of raw water : Maximum 0.4 m³/s

3.Pilot project period

- (1) Evaluation and Survey term : About 5 years
(from Apr.2007 to Mar.2012)
(Including the term of follow-up survey and evaluation after the stop of TRWKR)
- (2) TRWKR period : about 3 years
(from Apr.22nd.2007 to Mar.22nd.2010)

■ The survey from a viewpoint and a sence of citizens'
*Clearness *Transparency *Color *Bubble *Smell
*Garbage *Living things, etc



The first Nagoya City Environmental Practice Prize, February.2012
Branch of contribution for Regional Environment Development Award for Excellence

■Increase of Transmisson Volume from the Shonai River (additional pilot project)

1.Water source and Volume of transmission of raw water

- (1) Water Source : Shonai River
- (2) Transmission Usual 0.4m³/sec (maxium 0.7m³/sec)

2.Period of Increase

- (1) Experiment Period : Oct.1st – Dec.31st.2010
- (2) Period of Increased Transmission Volume : Oct.5th – Nov.2nd.2010



Water Resource Contributor Awards
Minister of Land, infrastructure and Transportation) Aug.2016



Transmission of Raw Water from Kiso River

3 years from April.22nd.2007(Stopped on March.22nd.2010)

To verify the clarification effects of TRWKR

Surveys during TRWKR period :

April.2007 ~ March.2010

Surveys after the stop of TRWKR period :

April.2010 ~ March.2012



Horikawa Sen-nin Chosatai

April.2007 ~ March.2012

- Fixed Point Observation Groups
Surveying effects of TRWKR
- Free Survey Groups Researching
Horikawa River by free themes
- Horikawa Cheering Groups Cheering
clarification of Horikawa

The survey from
a viewpoint and a
sence of citizens

Results of pilot project (Clarification effects of TRWKR)

- It was confirmed that the water quality tended to improve during TRWKR between Sanage Bridge and Matsushige Bridge.
- Network of citizens who wish for clarification and restoration of Horikawa River expanded.
- Citizens' awareness of cleaning of the river was developed.

■ Role of Horikawa Sen-nin Chosatai

(Conclusions of Summary Meeting for the 10th Stage)

① More surveys should be implemented.

- Continuity of investigation, clarification of the situation of the river, identification of cause of pollution in the river, are needed.
- We improve our plan and take action against the pollution.
- After that, citizens and public administration do what is possible to clean the river.

② There are many things that citizens can do.

- We expand our partners who love Horikawa River and hope TRWKR again.
- We deepen exchanges with people living in the basin of Kiso, Nagara, and Ibi River.
- We check the effects of pollution removal from domestic wastewater and implement it in each house.

Water Environment of Horikawa River

Area of basin: 51.9km²

Length: 16.2km (Tidal effect section 13.6km)

Change in temperature, precipitation and hours of sunshine

Kiso River is our water source.

Cause of breeding of phytoplankton, nitrogen and phosphorus are included in wastewater from houses, factories and stores.

The primary cause of water pollution is wastewater from houses, factories, and stores.

Wastewater is discharged after treatment in wastewater treatment plant.

After heavy rain, wastewater is discharged without treatment.

Shonai River

Provisional raw water transmission: 0.3m³/s

Tide Gate

Wastewater Treatment Plant

Sanage Bridge

Motoiri Sluiceway

▼High Tide Horikawa River

▼Ebb Tide Difference of water level is more than 2m between high tide and ebb tide.

Water level, direction of current and velocity are changed, by tide.

It has looked like red tide or blue tide. In Nagoya Port and downstream of Horikawa, it is said that phytoplankton does over breeding and extinction, so water basin is polluted

Nagoya Port

Ise Bay

Rising

Sludge rises and floats.

Groundwater, etc

Shimizu wakuwaku-sui

Red Tide

Blue Tide

Floating Sludge

Raised Sludge

Observation method at fixed-point

Measurement of Transparency

Transparency
Meter
100cm

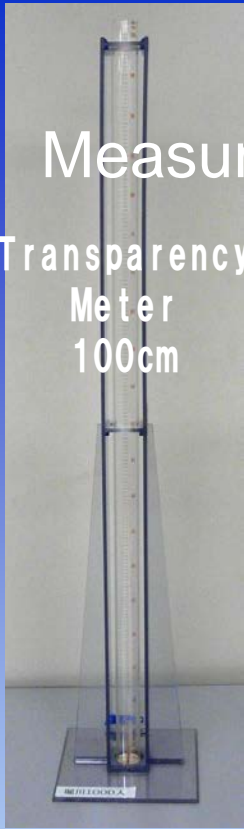


Photo: Shinko Survey Group



Measurement of COD

COD: Chemical Oxygen Demand

This is an index of water contamination used for sea, lakes, and marshes.

It is an oxygen consumption required for oxidation of organic matters dissolved in ample water.

The higher COD, the more it is contaminated.

堀川1000人調査隊2010 記録表 ver.2.1

①調査隊名 _____ ②調査地点 _____ 橋 付近

③調査日時 平成 ____ 年 ____ 月 ____ 日 (調査開始 午前/午後 ____ 時 ____ 分)

④天 候 _____ ⑤川の流れの方向 (○で囲んでください) _____ ⑥風の方向 (○で囲んでください) _____

下流→上流 流れ無し 下流→上流 下流→上流 風無し 下流→上流 橋から

○堀川のように、各項目の評価する番号に○をつけ、気づいた異変、潮の流れなどの状況も随筆で、コメント欄に記入してください。

1. 水の汚れ

(1) 水の汚れに対する印象を5段階で評価してください。

きたない ややきたない どちらともいえない ややきれい きれい

① ② ③ ④ ⑤

(2) 水の汚れの印象を評価した主な項目を1つ選んで○をつけてください。

①色 ②におい ③透明度 ④ごみ ⑤濁り ⑥生き物の様子 ⑦その他

コメント _____

2. 水の色

似ている水の色に○をつけてください。また、その色印象を5段階で評価してください。

(1) 似ている水の色に○をつけてください。

①無色 ②乳白色 ③黄色 ④黄緑色 ⑤緑色 ⑥灰色 ⑦黄灰色 ⑧淡灰色 ⑨灰黄緑色 ⑩灰緑色 ⑪淡灰色 ⑫淡黄灰色 ⑬黄褐色 ⑭褐色 ⑮緑褐色

参考: 水質環境目標値モニタリング調査マニュアル、平成18年度版、名古屋市環境局

(2)(1)で答えられた色印象を5段階で評価し、該当する項目に○をつけてください。

不快 やや不快 どちらともいえない やや快適 快適

① ② ③ ④ ⑤

3. 水の臭い

水の臭いの強さと印象を5段階で評価して、臭いの種類を記入してください。

(1) 水辺に立ったときの臭いですか。汲んだ水を直接嗅いだ臭いですか。該当する項目に○をつけてください。

(2) 水辺に立った時の臭い ②汲んだ水を直接嗅いだ臭い

(2) 水の臭いの強さを5段階で評価して、該当する項目に○をつけてください。

ひどくにおう ややひどくにおう におい におわない

① ② ③ ④ ⑤

(3)(2)で答えられた臭いの印象を5段階で評価し、該当する項目に○をつけてください。

不快 やや不快 どちらともいえない やや快適 快適

① ② ③ ④ ⑤

(4) どのような臭いですか。(1)で臭う(①~④)と答えられた方のみ記入してください。(複数可)

①どぶの臭い ②ヘドロの臭い ③腐った臭い ④バールの臭い ⑤糞の臭い ⑥その他

コメント _____

4. COD値 COD調査者の調査隊のみ測定値を記入してください。

COD _____ mg/L

5. 水の透明度 透明度調査者の調査隊のみ透明度計で透明度を3回測定して、測定値を記入してください。

項目 1回目 2回目 3回目

透明度 _____ cm _____ cm _____ cm

6. ごみの状況

(1) 調査地点で5分間観察し、確認できた汚物の種類を記入してください。

種類	確認数
レジ袋	
ビニール袋	
カップめん容器	
ペットボトル	
空き缶	
空きビン	
空き缶	
その他	

(2) 調査地点周辺(路上)に落ちているごみの種類を記入してください。

種類	確認数
紙屑	
新聞紙	
雑誌	
その他	
空き缶	
空きビン	
空き缶	
その他	

7. 泡の発生

(1) 調査地点から川を観察し、泡の発生状況について記入してください。

①泡が川底からわいてくる ②泡が上流から流れてくる

(2)(1)で泡があると答えられた方のみ記入してください。

①川の全面 ②川の中央部分 ③川の右岸寄り ④川の左岸寄り

(3)(1)で泡があると答えられた方のみ記入してください。

①すぐに消える泡 ②洗剤でできるような泡 ③泡の色

①無色 ②白色 ③その他の色(何色かを記入)

8. 生物

調査地点で川を5分間観察し、確認できた魚類の種類を記入してください。

種 名	確認数

9. その他、本日の調査で気がついたことがありましたら記入してください。

コメント _____



2. Number of Participants of Horikawa Sen-nin Chosatai

(Horikawa Sen-nin Chosatai started accepting participation on 26th Mar.2007)

Network of citizens who wish for clarification and restoration of Horikawa River is growing.



More than 50 thousand citizens' network

Horikawa, the Mother River of Nagoya, was polluted in rapid economic growth..
The citizens have risen to get the past back.



	Start 22nd Apr.2007	Now 23rd Feb.2019
Fixed Point Observation Groups	55 groups 497 persons	101 groups 1,010 persons
Free Survey Groups	22 groups 234 persons	40 groups 650 persons
Horikawa Cheering Groups	88 groups 1,531 persons	2,598 groups 51,920 persons
Total	165 groups 2,262 persons	2,739 groups 53,580 persons

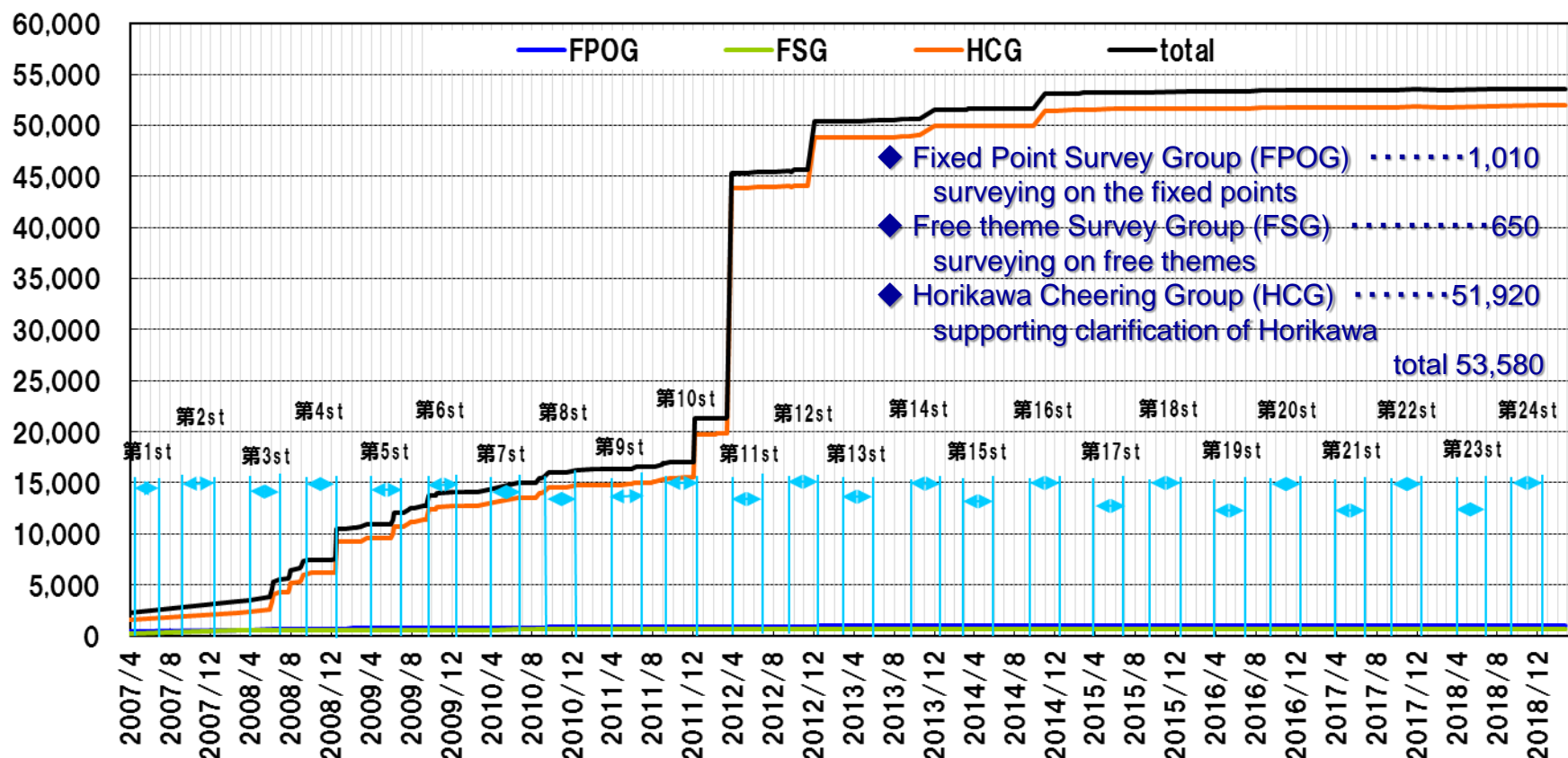






Number of Participants



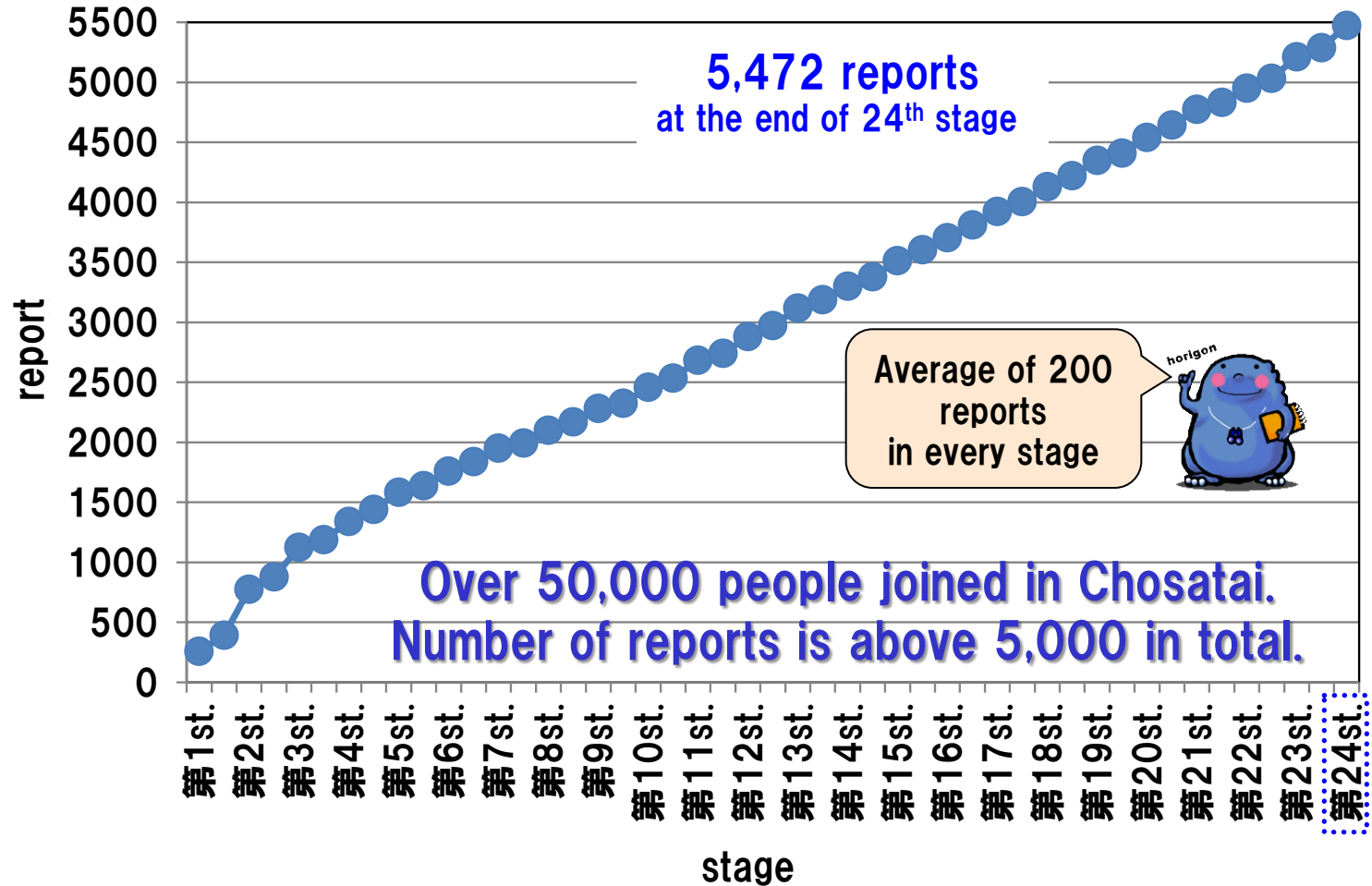
Number of Participants in 3 classes



3. Survey Periods and Number of Reports

Survey Period				reports	Horikawa River	Shin-Horikawa River
 <p>With TRWKR</p>	<p>Utilization of shallow ground water At upstream fo Kitashimizu bridge</p>	1st stage	Spring~Early summer / Apr.22nd~Jun.30th.2007	258	258	-
		interval	Jul.1st~Sep.7th.2007	134	134	-
		2nd stage	Autumn~Early Winter / Sep.8th~Dec.16th.2007	383	383	-
		interval	Dec.17th.2007~Mar.31st.2008	103	103	-
		3rd stage	Spring~Early summer / Apr.1st~Jun.30th.2008	245	245	-
		interval	Jul.1st~Sep.27th.2008	64	64	-
<p>Introduction of advanced water treatment at the Meijo Water Treatment Center</p>		4th stage	Autumn~Early Winter / Sep.28th~Dec.16th.2008	152	152	-
		interval	Dec.17th.2008~Mar.31st.2009	100	100	-
		5th stage	Spring~Early summer / Apr.1st~Jun.30th.2009	145	145	-
		interval	Jul.1st~Sep.26th.2009	54	54	-
		6th stage	Autumn~Early Winter / Sep.27th~Dec.16th.2009	120	120	-
		interval	Dec.17th.2009~Mar.31st.2010	81	81	-
 <p>In-service of Horikawa Ugan Rain-Water Reservoir for pollution control</p> <p>Utilization of reclaimed wastewater from Moriyama Water Treatment Center from Apr. to Oct.</p> <p>At upstream of Seko Bridge</p> <p>At upstream of Sanage Bridge</p> <p>Covered sand</p> <p>At upstream of Shiga Bridge</p> <p>At upstream of Nakatodo Bridge</p> <p>Odor control at Shin-Horikawa River</p> <p>At upstream of Kinjo Bridge</p>		7th stage	Spring~Early summer / Apr.1st~Jun.30th.2010	111	111	-
		interval	Jul.1st~Sep.11th.2010	44	44	-
		8th stage	Autumn~Early Winter / Sep.12th~Dec.17th.2010	104	104	-
		interval	Dec.18th.2010~Mar.31st.2011	72	72	-
		9th stage	Spring~Early summer / Apr.1st~Jun.30th.2011	112	112	-
		interval	Jul.1st~Sep.10th.2011	42	42	-
		10th stage	Autumn~Early Winter / Sep.11th~Dec.16th.2011	133	133	-
		interval	Dec.17th.2011~Mar.31st.2012	77	77	-
		11th stage	Spring~Early summer / Apr.1st~Jun.30th.2012	148	148	-
		interval	Jul.1st~Sep.21th.2012	60	59	1
		12th stage	Autumn~Early Winter / Sep.22th~Dec.16th.2012	139	135	4
		interval	Dec.17th.2012~Mar.31st.2013	92	78	14
		13th stage	Spring~Early summer / Apr.1st~Jun.30th.2013	145	129	16
		interval	Jul.1st~Sep.28th.2013	70	55	15
		14th stage	Autumn~Early Winter / Sep.29th~Dec.17th.2013	113	99	14
		interval	Dec.18th.2013~Mar.31st.2014	79	68	11
		15th stage	Spring~Early summer / Apr.1st~Jun.30th.2014	133	117	16
		interval	Jul.1st~Sep.28th.2014	91	78	13
		16th stage	Autumn~Early Winter / Sep.29th~Dec.16th.2014	99	90	9
		interval	Dec.17th.2014~Mar.31st.2015	107	89	18
		17th stage	Spring~Early summer / Apr.1st~Jun.30th.2015	113	100	13
		interval	Jul.1st~Sep.19th.2015	81	69	12
		18th stage	Autumn~Early Winter / Sep.20th~Dec.16th.2015	126	109	17
		interval	Dec.17th.2015~Mar.31st.2016	91	79	12
		19th stage	Spring~Early summer / Apr.1st~Jun.30th.2016	127	116	11
		interval	Jul.1st~Sep.19th.2016	62	54	8
		20th stage	Autumn~Early Winter / Sep.20th~Dec.16th.2016	130	107	23
		interval	Dec.17th.2016~Mar.31st.2017	104	84	20
		21st stage	Spring~Early summer / Apr.1st~Jun.30th.2017	129	100	29
		interval	Jul.1st~Sep.18th.2017	58	48	10
		22nd stage	Autumn~Early Winter / Sep.19th~Dec.20th.2017	121	93	28
		interval	Dec.21st.2017~Mar.31st.2018	80	67	13
		23rd stage	Spring~Early summer / Apr.1st~Jun.30th.2018	180	107	73
		interval	Jul.1st.2018~Sep.19th.2018	76	44	32
		24th stage		Autumn~Early winter / Sep.20th~Dec.16th.2018	184	106
total				5,472	4,962	510

Number of Reports



We got 5,472 reports in total by when 24th stage finished.
The number of reports by Shin-Horikawa River were 510 out of 5,472.
Lots of people research the water environment of Horikawa River
continually from a viewpoint and sense of citizens.

4. State of the weather

(Overview)

From mid to late September, the autumn rain front and Typhoon No. 24 brought a lot of rain and little sunshine. From October to early December, the temperature was quite high, with the maximum temperature exceeding 20 C in early December.

in the 24th Stage (September–December)



■ Temperature

It fell below normal in September, but has risen above October since October. The average temperature of the period (September to December) was 16.1 ° C, higher than the average value (15.4 ° C).

■ Precipitation

Although it became more than normal in September under the influence of the autumn rain front and the typhoon No. 24, stable weather continued in October and November. Especially October was around 20% of the average year.

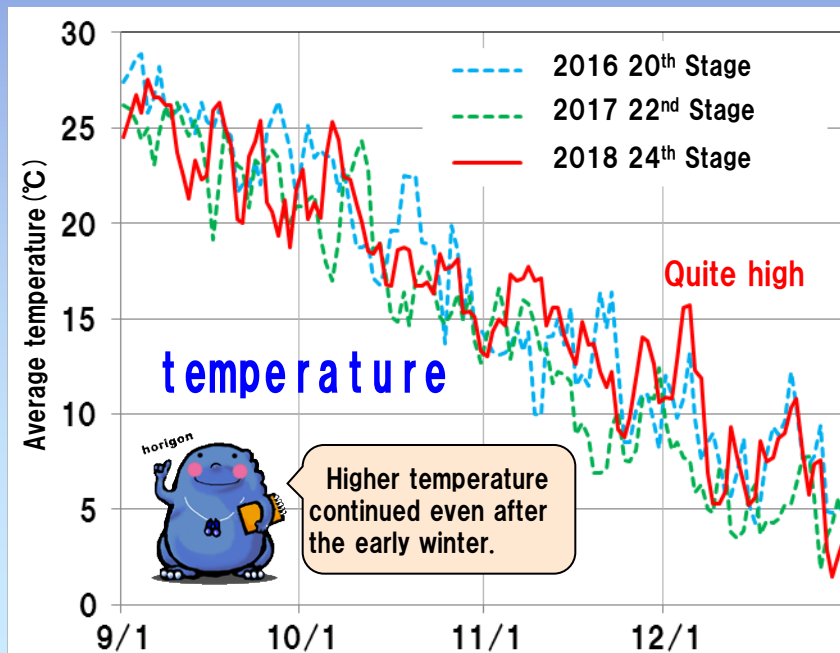
■ Sunshine Hours

It became shorter than normal in September when there was a lot of rain. In October and November there were more sunny days, longer than normal.

Nagoya Local Meteorological Observatory

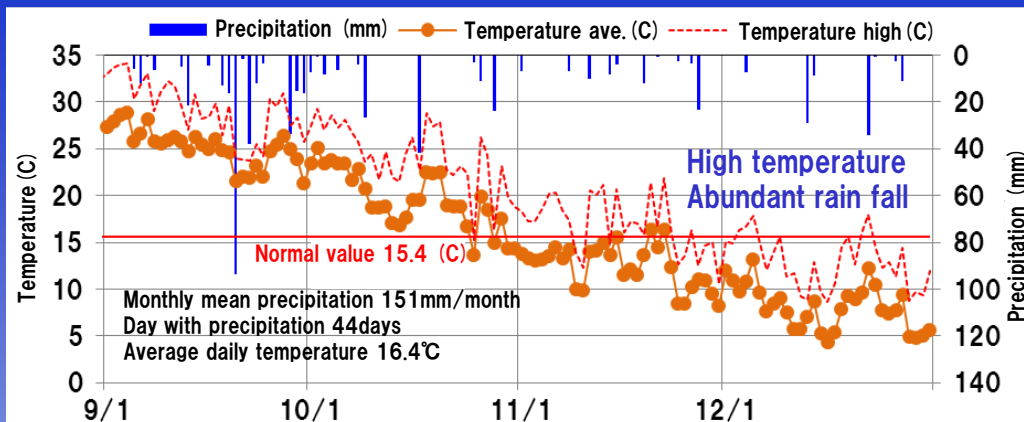
区分	降水量 (mm) 合計	気温 (°C)			日照時間 (時間) 合計
		平均	最高	最低	
統計期間	1981 ~2010	1981 ~2010	1981 ~2010	1981 ~2010	1981 ~2010
資料年数	30	30	30	30	30
4月	124.8	14.4	19.9	9.6	196.6
5月	156.5	18.9	24.1	14.5	197.5
6月	201.0	22.7	27.2	19.0	149.9
平均	160.8	18.7	23.7	14.4	181.3
9月	234.4	24.1	28.6	20.7	151.0
10月	128.3	18.1	22.8	14.1	169.0
11月	79.7	12.2	17.0	8.1	162.7
12月	45.0	7.0	11.6	3.1	172.2
平均	121.9	15.4	20.0	11.5	163.7

Source: Meteorological Agency _ Meteorological Statistics
<http://www.jma.go.jp/jma/menu/report.html>

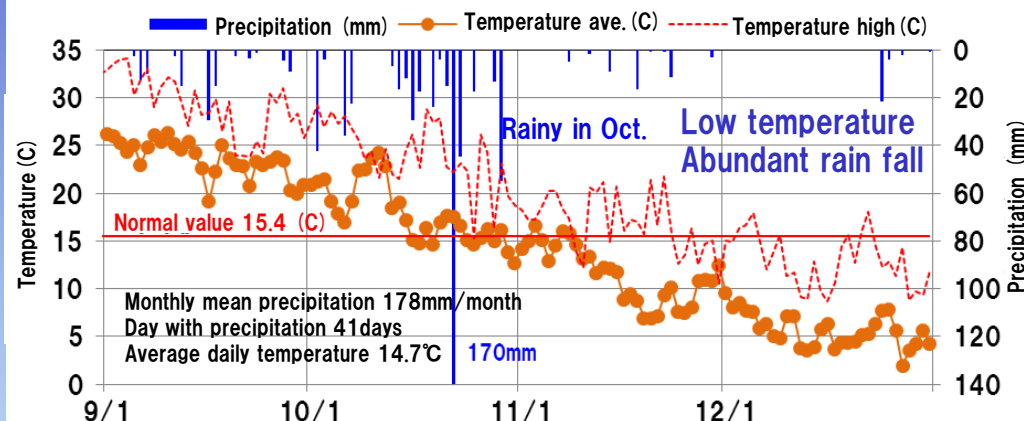


Nagoya Local Meteorological Observatory average daily temperature and precipitation

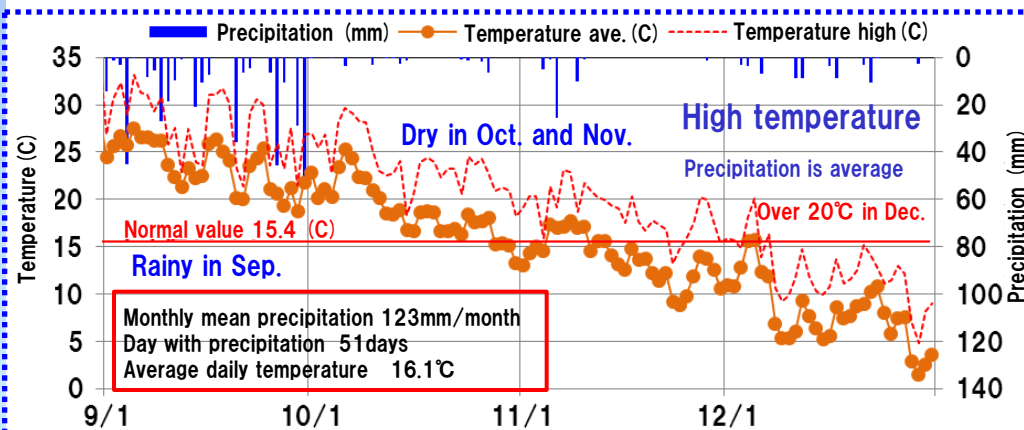
20th stage
(2016)



22nd stage
(2017)



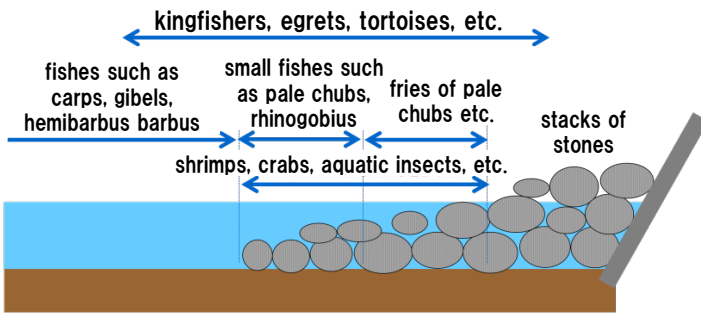
24th stage
(2018)



Average temperature from October to December is high compared to the average year. Precipitation is high in September. Precipitation is low in October and November.



■ Shaping of Rapids and Pool



■ Rise of self-purification by food chain

dirt of water (organic substance, nitrogen, phosphorus)

Algae and microbes stick on stones with the dirt as nutrition.

Small fishes, shrimps, aquatic insects feed the algae and the microbes.

Big fishes and birds prey the small fishes and aquatic insects.

It was identified that various organisms breed and grow when rapids and pools were shaped.

It was a place of inhabiting and growing of creatures that prefer the environment, such as Oikawa, which has stones and moss. When winter comes, some ducks are waiting for spring here.



Prawns and Japanese mitten crabs are organisms that migrate between rivers and the sea.

Waterside

Water

*denizen

kingfishers, egrets, etc.

mauremys reevesii, trachemys scripta*

carps, hemibarbus barbus, catfishes, black basses*, bluegills*, northern snakeheads*

gibels, pale chubs, goby minnows, rhinogobius, mosquitofishes*, etc.

palaemon paucidens, prawns, Japanese mitten crabs, aquatic insects, etc.

Rapids and pools shaped in the past keep a diversity with change according to environment.

Kurokawa No.1 Bridge



Mallard



photo by the secretariat January in 2019

Newly sand-cover construction

Bet. Sakura – Habashita Bridge

Jan.2015–Feb.2015,Dec.2017–Jan.2018



Securement of a water source

(Using shallow ground water)

A well at upstream of Kinjo Bridge

started its operation in Mar 2018



Measures against smells

at Shin-Horikawa River

(Dredging·Sand covering)

Downstream Dec.2017–May.2018

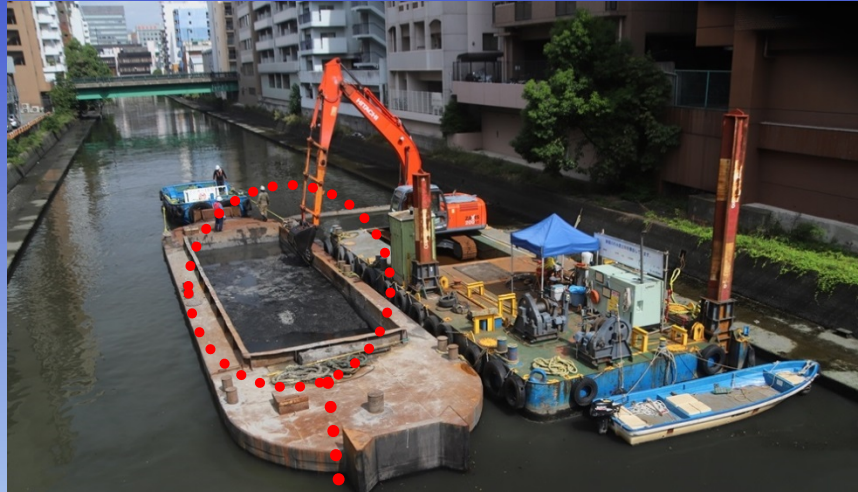


Countermeasure against bad smell of Shin-Horikawa –Dredging work for sludge removal–

Area: Upstream Tateishi Brdg. ~ Upstream area

Term: Sep.2018~Feb.2019

Upstream of Kinen Brdg.
Oct.5th .2018



it was the situation of
removal sludge.



5. 24th stage survey report

5.1. Introduction ~Column~

~Column~ For the clarification and regeneration of Horikawa River

Horikawa Sen-nin Chosatai (HSC) was established on April 22nd, 2007 for clarification and regeneration of Horikawa River, as a place for citizens' activities (Fixed Point Observation Group, Free Survey Group and Cheering group).

Fixed Point Observation Group examines Horikawa River to confirm the clarification effect by the water quality improvement measure and to make clear the condition of water quality and cause of pollution, from a viewpoint and a sense of citizen. Free Survey Group studies Horikawa River from various view points. Cheering Group supports clarification and regeneration of Horikawa River in various-free ways. These three groups wish for clarification and regeneration of Horikawa River, and work together in a large network.

Currently (as of 23rd), there are 2,739 groups and 53,580 people in HSC. (101 groups in Fixed Point Observation Groups, 40 groups in Free Survey Group and 2,598 groups in Cheering Group)

At the time of launch of HSC, there were 165 groups and 2,262 people. It shows that the network of citizens wishing for clarification and regeneration of Horikawa River has expended greatly

Fixed Point Observation Group have observed 5,472 times from 1st stage to 24th stage. So far, we found ever-changing state of the water due to the influence of the tides, at the downstream from the Sanage Bridge. And we found that a lot of observation results from the Fixed Point Observation Group can capture the average state of water quality of Horikawa River from citizens' point of view and sense, and understand the tendency of the change of water quality.



5. 24th stage survey report

5.1. Introduction ~Column~

~Column~ For the clarification and regeneration of Horikawa River

~Pilot project of the clarification of Horikawa River~;

we confirmed the clarification effect of TRWKR from April.2007 to March.2012

We confirmed that water quality between Sanage Bridge and Matsushige Bridge had been improved by TRWKR (0.4m³/sec.) in this five years. And in this period, we confirmed that garbage (artificial garbage: plastic type garbage etc.) were reduced. It is considered that because the citizen's awareness changed, and cleaning activity became active.

【Five years summary】

- We confirmed clarification effect of TRWKR.
- Network of citizens wishing for clarification and regeneration of Horikawa River has expanded greatly.
- Citizen's awareness changed, and the cleaning activity became active.



(1) Weather Condition

As the trend of weather conditions in the 24th stage (from September to December 2018), we are able to mention that amount of rainfall is usual level and temperature is high.

From middle to end of September, there was a lot of precipitation and the sunshine time was short, due to autumn rain front and typhoon No. 24. And then, from October to beginning of December, stable weather continued, temperature was high and the amount of precipitation was low except for early November. (In early November, heavy rainfall was observed due to the trough line and fronts.)

Especially, maximum temperature in early December exceeded 20 degrees Celsius, temperature tended to be high. (Feature of weather in the 24th stage: High temperature and average annual amount of rainfall)

(2) New Measures for Water Quality Improvement

After the stop of water conduction from the Kiso River in March 2010, new measures for water quality improvement of Horikawa River have been implemented. Shallow and deep in upstream section of Sanage Bridge for improvement of self-purification function has been implemented since 2010. Also, advanced water treatment at Meijo Water Treatment Center was installed, and river rain-water reservoir for pollution control in right bank of Horikawa River was available in 2010.

Water conduction to Horikawa River (max. 4,000 m³/day, Period: Apr.-Oct) using recycled waste water (advanced treatment/ membrane filtration method) of Moriyama Water Treatment Center) started since 2011. Experiment of covering sand for water purification between the Naka Bridge and the Gojo Bridge started in Feb. 2015. The 8th well was dug in the upstream section of Kinjo Bridge in March 2017 and utilization of shallow ground water (0.01m³) started as new water source. (Utilization of shallow ground water has been implemented in 2004).

Furthermore, in reference to the results of the Horikawa River purification experiment with citizens which started in February 2015, covering sand was carried out for waterside environment improvement of Habashita Bridge to Gojo Bridge and Naka Bridge to Sakura Bridge in 2018.

Also, since deposition and exposure of sludge, air bubbles and cloudiness were confirmed in the Shin Horikawa River junction through citizen's survey, dredging and converting sand were carried out as measures against odors.

Such a measures were also proceed in the upstream district since September 2018.

And then, new shallow and deep was formed upstream of the Kizune Bridge on the Horikawa River.

(3) Change of the water quality of Horikawa River

The impression of the clearness of Horikawa River worsened after stopping water conduction from the Kiso River. However, after that, generally we can confirm the trend of improvement little by little from upstream though water quality sometimes deteriorated due to weather conditions, etc... Especially, it was possible to confirm remarkable improvement trend regarding to “impression of water pollution”, “transparency” and “scent” in the 24th stage.

The average transparency between Sanage Bridge and Oseko Bridge was more than 80 cm, and transparency between Asahi Bridge and Oseko Bridge was around 90 cm in particular.

In addition, “bubble from bottom of river” and “percentage of ditch-smell / mud-smell” decreased, so percentage of odorless increased to 75% between Sanage Bridge and Oseko Bridge.

As we mentioned above, some improvements were confirmed in the several clauses surveyed by citizen's viewpoints and senses, such as the condition of the riverbed, transparency (perspective), and scent, in the mid and downstream sections of Horikawa River in the 24th stage.

We think that reason of such a result is the change of public awareness for “purification & regeneration of Horikawa River”, implementation of new water quality improvement procedure after water conduction, and maintenance of revetment including removal of sludge on the river channel.

Impression of Water Clearness(Section Average)

The ratio of “Clean”, “Slightly clean” and “Ordinary

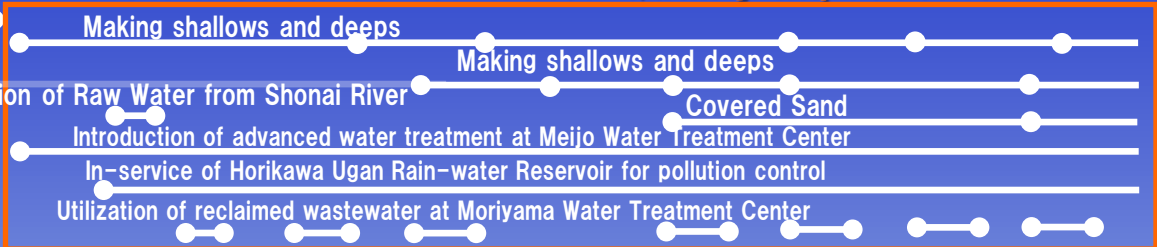
(Note) Except the data between Minatoshin Brdg. and Oseko Brdg. for not enough data

The 1st-6th stage : With TRWKR
No rain on the day and the previous day
The 7th-24th stage: No TRWKR
No rain on the day and the previous day

(Evaluation)

New Measures for Water Quality Improvement

With TRWKR



(upstream)

Btwn. SakaeBrdg. and SanageBrdg.
(Not enough data)

Btwn. Sanage Brdg. and Johoku Brdg.

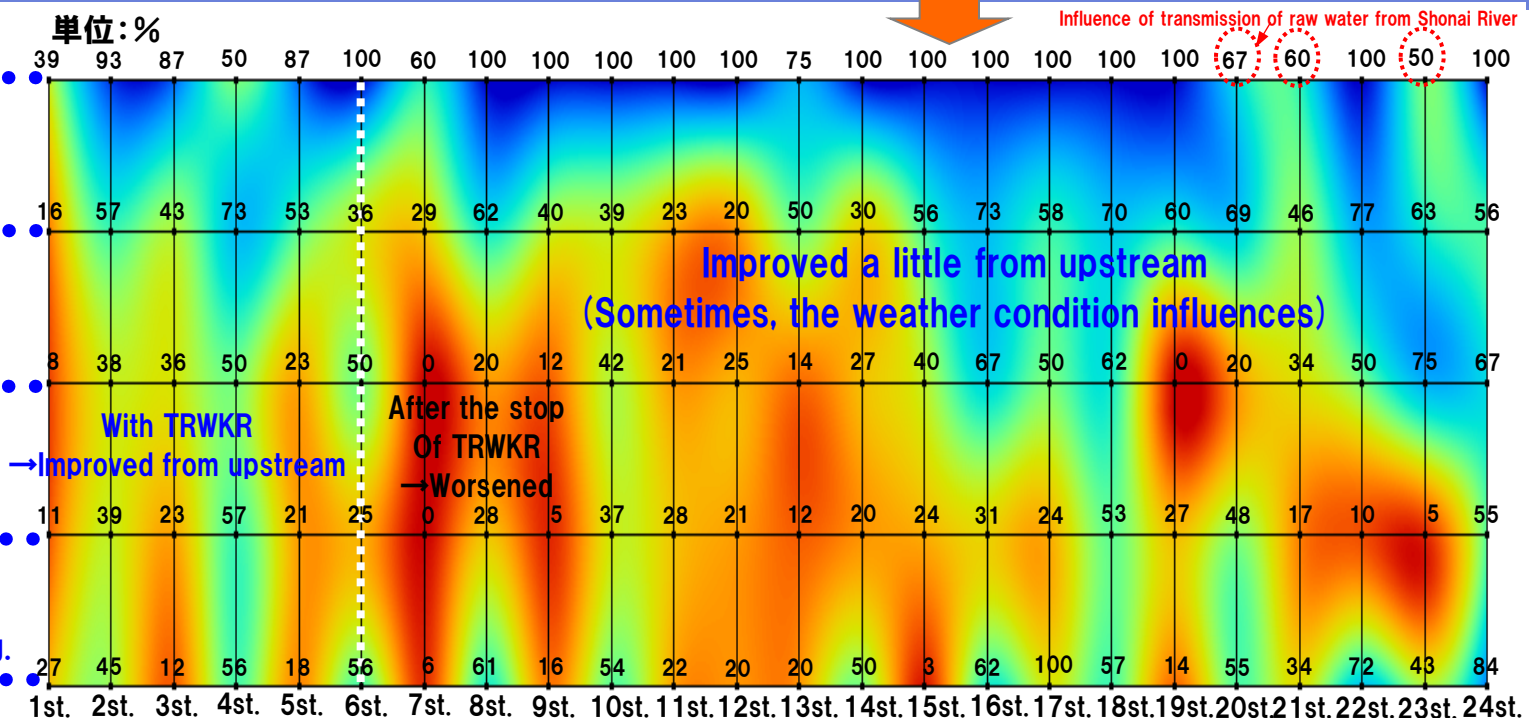
Btwn. Johoku Brdg. and Asahi Brdg.
(Not enough data)

Btwn. Asahi Brdg. and Matsushige Brdg.

Btwn. Matsushige Brdg. and Oseko Brdg.

(downstream)

単位: %



* “Clean”, “Slightly clean” and “Ordinary” are categorized as the acceptable range for citizens.



Hot Heavy rain Hot Heavy rain Hot Little rain Cold Heavy rain Hot Heavy rain Hot Heavy rain

Impression of water clearness could see the tendency of the improvement from upstream with TRWKR. But it worsened after the stop of TRWKR. After that, overall it improved a little from upstream. (sometimes it deteriorated by the weather condition.) It is thought that this is the effect by change in citizen consciousness and new measures for water quality improvement after the stop of TRWKR.



Impression of Water Clearness(Section Average)

Note)Except the data between Minatoshin Brdg. and Oseko Brdg. for not enough data

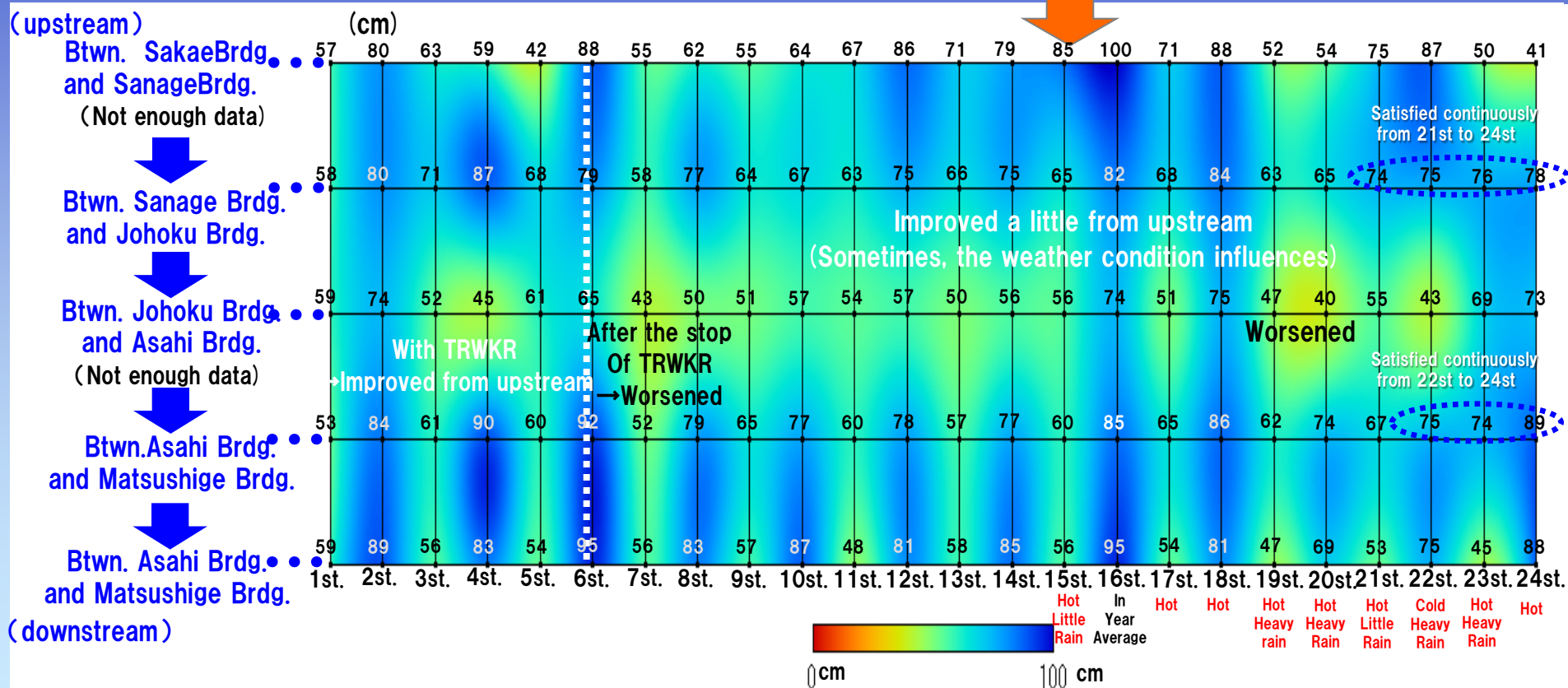
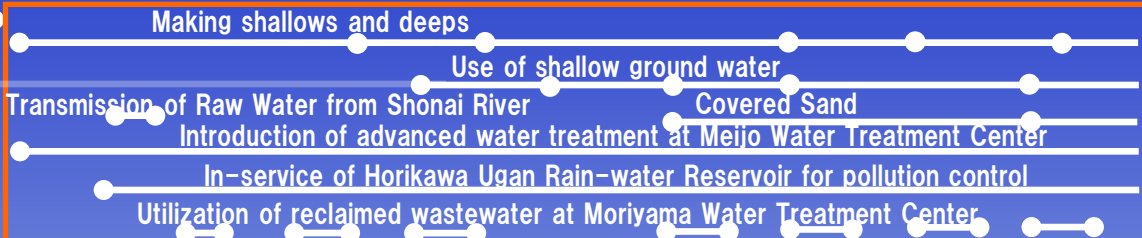
The 1st-6th stage : With TRWKR
No rain on the day and the previous day
The 7th-24th stage: No TRWKR
No rain on the day and the previous day

(Evaluation)

With TRWKR

Organize the transparency of 70cm or more as an acceptable of citizen

New Measures for Water Quality Improvement



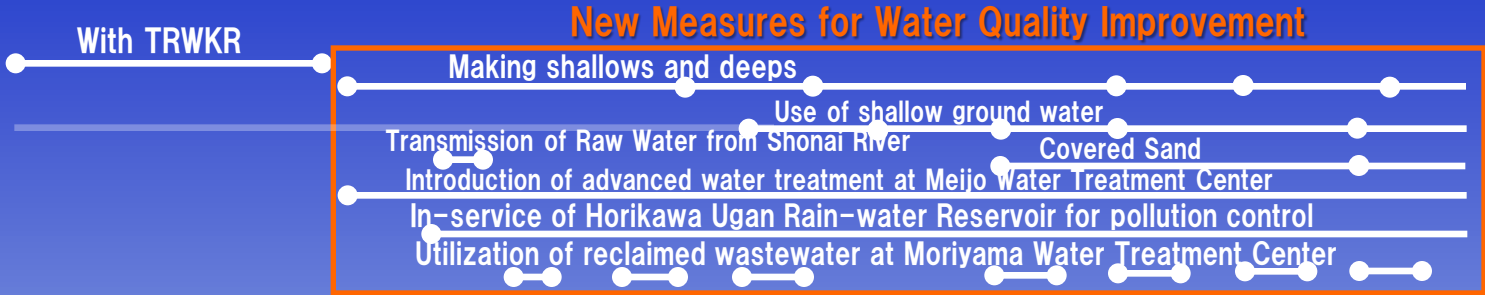
The transparency improved from upstream with TRWKR. But transparency worsened after the stop of TRWKR. After that, the transparency improved a little from upstream (sometimes the weather condition influences). Considered the result of change of public awareness and the new water quality improvement measure. Btwn. Sanage Brdg. and Johoku Brdg. , Btwn.Asahi Brdg. and Matsushige Brdg. Satisfied 70cm of acceptable of citizen continuously.



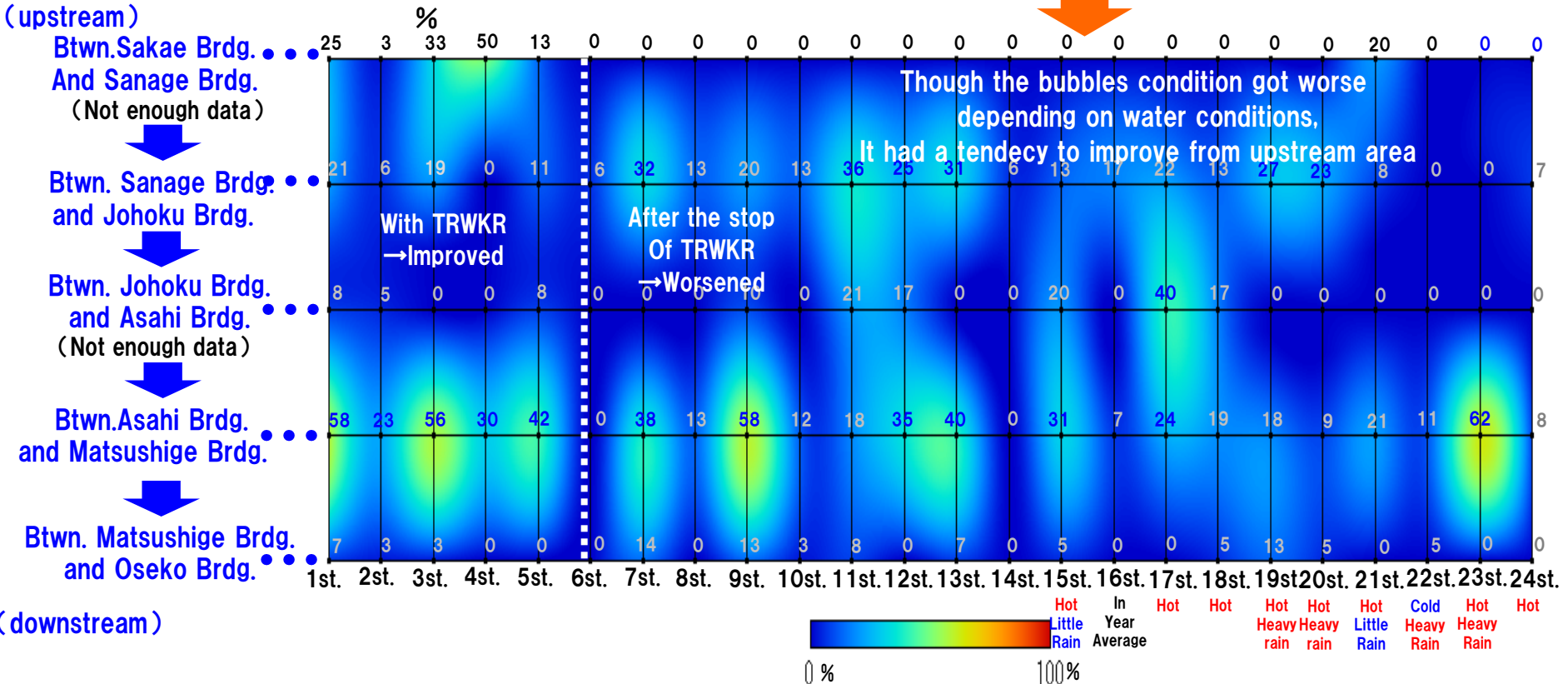
Occurrence of bubbles from river bottom (Section Average)

Note) Except the data between Minatoshin Brdg. and Oseko Brdg. for not enough data

The 1st-6th stage : With TRWKR
No rain on the day and the previous day
The 7th-24th stage: No TRWKR
No rain on the day and the previous day



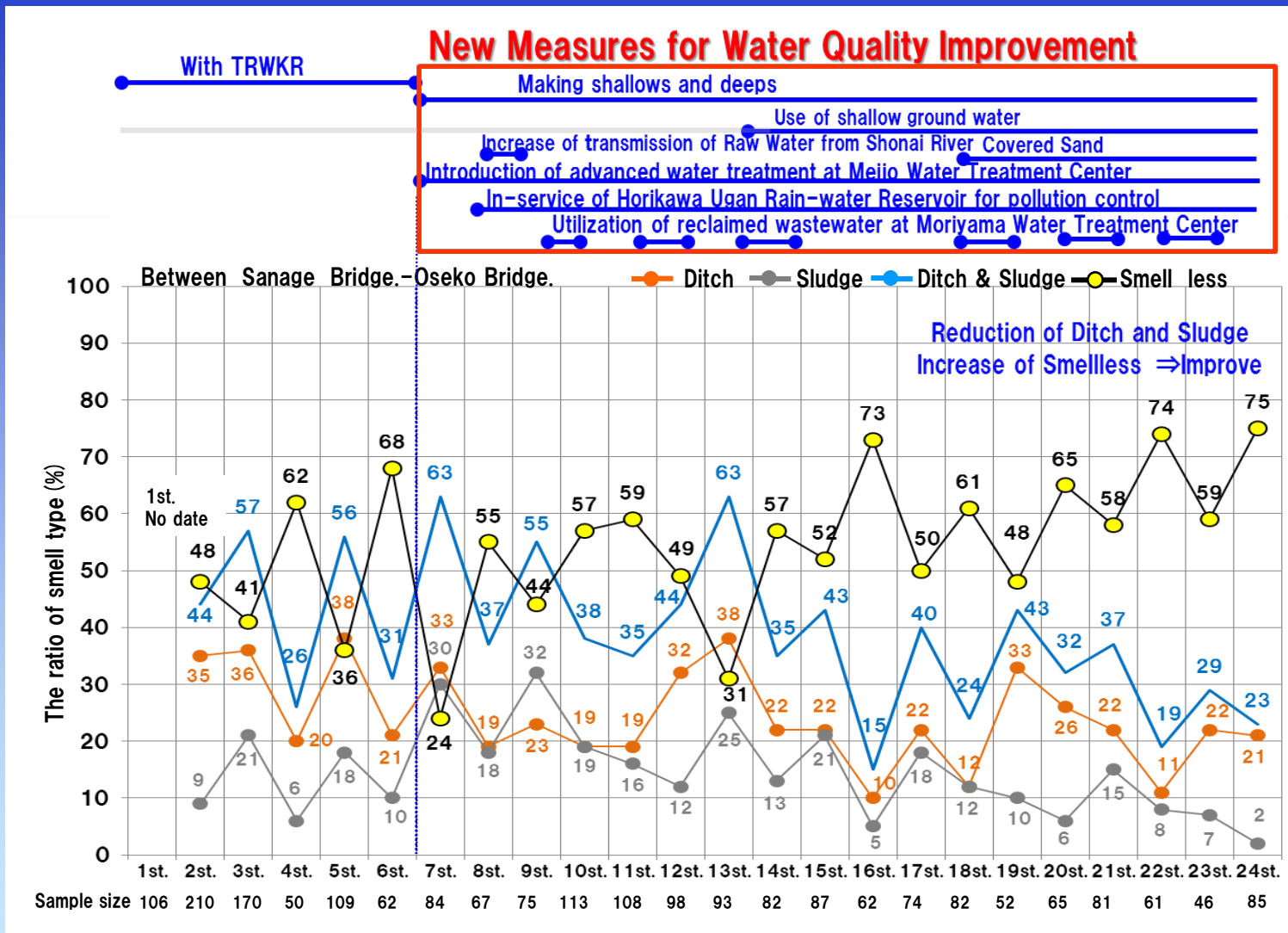
(Evaluation)



It is observed that bubbles from river bottom condition was improved with TRWKR and after TRWKR stopped, it got worse. After that, it had a tendency to improve while bubbles condition has fluctuated repeatedly although weather conditions sometimes made it worse. It is assumed that the change of public awareness and new measures for Water Quality Improvement after stop of TRWKR have effects on this. It seems that the condition of river bottom is gradually improved.

The change of ratio about “Ditch·Sludge·Smell less”

The 1st–6th stage : With TRWKR
No rain on the day and the previous day
The 7th–24th stage: No TRWKR
No rain on the day and the previous day



■ How the ratio of “Ditch·Sludge·Smell less” change?

After stop of TRWKR, the ratio of “Ditch·Sludge” decreases, the ratio of “smell less” increase (improvement) between Sanage Bridge and Oseko Bridge.

Considered the result of change of public awareness and the new water quality improvement measure.

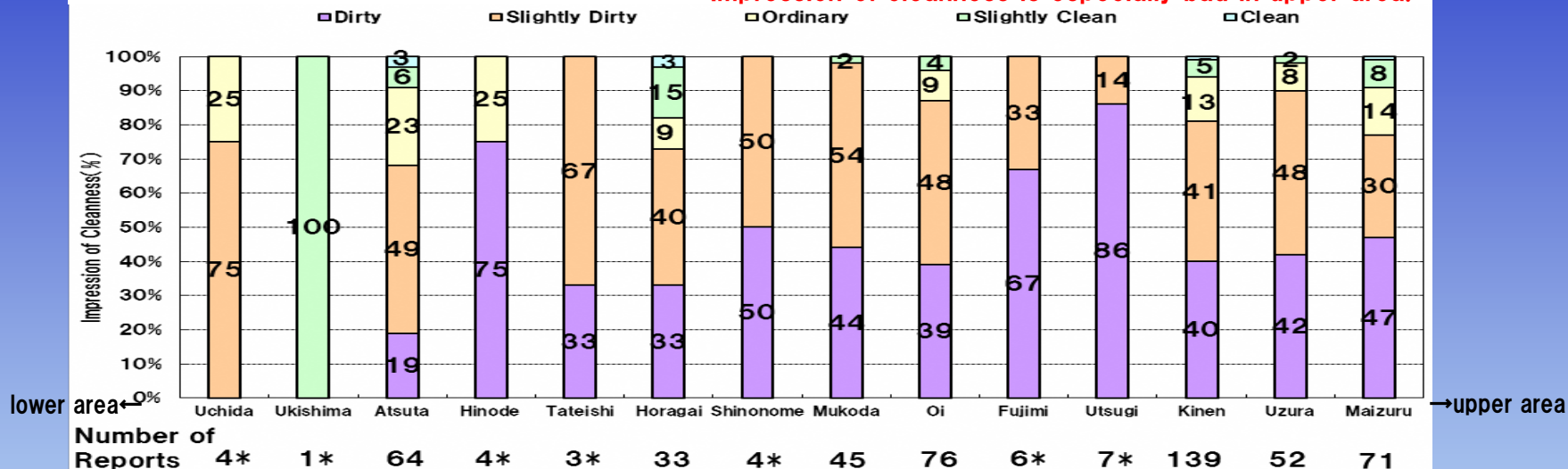


(4) Water Quality of Shin-Horikawa River

We got 510 reports of Shin-Horikawa River by when 24th stage finished. (180 reports in 24th stage)
According to the reports, **it has turned out that impression of cleanness is bad in upper area, many bubbles rise from the bottom, and it always smells (the percentage of "Terrible Smell"-"Slight Smell" is 80-95%)**

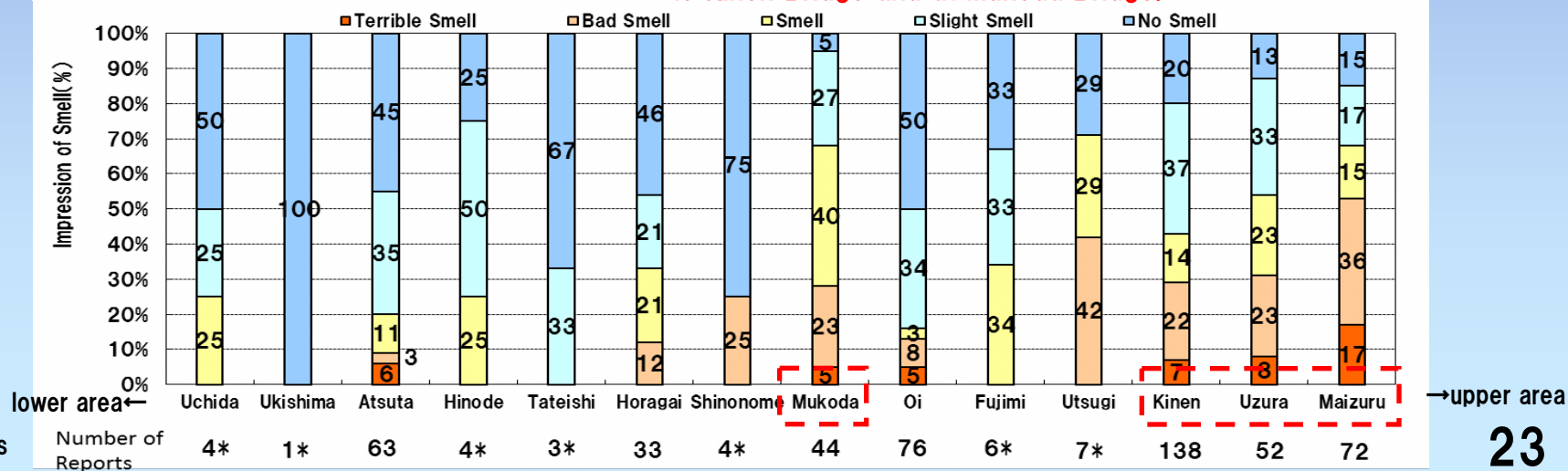
Impression of Cleanness in Shin-Horikawa River

Impression of cleanness is especially bad in upper area.



Impression of Smell in Shin-Horikawa River

It smells hard in upper area, always smells from Maizuru Bridge to Kinen Bridge and at Mukoda Bridge.



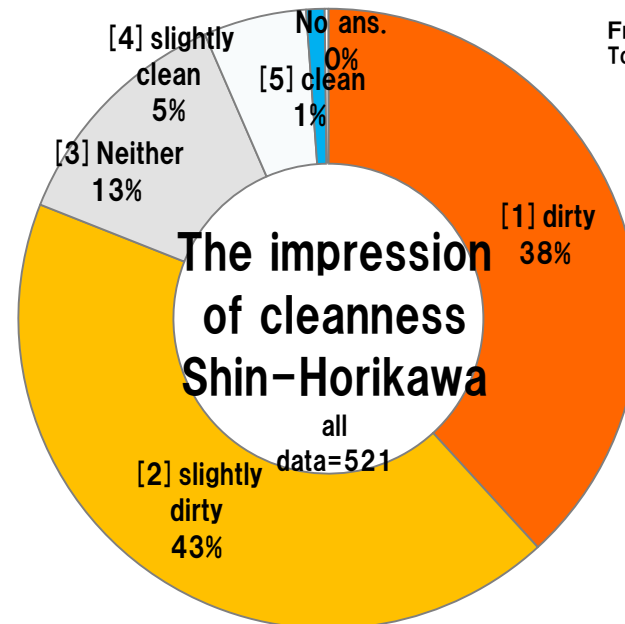
*few reports

We found the impression of cleanness of Shin-Horikawa is bad in any season. We think one of the causes is a sulphide produced at an oxygen-poor bottom sediment or bottom water, that gives off the features of Shin-Horikawa: the rotten egg smell and the white-colored.

We have to know the process of getting dirty to improve the impression if the water cleanness of Shin-Horikawa.

At 24th stage, Based on the result of citizen's survey, We took a new step to investigate how Shin-Horikawa gets dirty.

From Sep.1st 2012
To Dec. 18th 2018



• The impression of cleanness Shin-Horikawa

Ratio of “slightly dirty and dirty”

- Over 80%
- Over 90% in spring and summer
- 60% even in winter



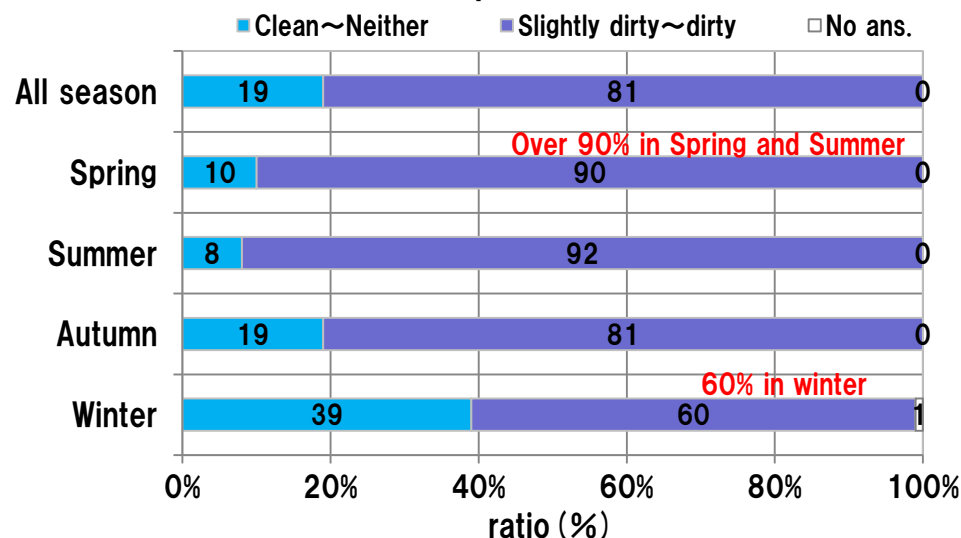
This is a feature of the water cleanness of Shin-Horikawa
Comparing Shin-Horikawa and Horikawa



■ Organize the features of Shin-Horikawa

- Shin-Horikawa's features Shape and water flow)
- How does the sludge accumulate at the confluence of Shin-Horikawa and Horikawa and the Upstream of Shin-Horikawa

The impression of cleanness



• The impression of cleanness by season

Considering mechanism about impression of clearness of Shin-Horikawa River

Impression of clearness of Shin-Horikawa river is not good around the year.

The percentage of 'Dirty' 'Slight Dirty' is :

- Over 80%
- Over 90% in spring and summer
- About 60% in winter

Survey results so far show that impression of clearness of Shin-Horikawa is not good around the year.

According to survey results, we organized features of the impression of clearness, and considered the mechanism of this.

Clarificating mechanism of impression of clearness is the first step to consider improvement measures for impression of clearness.



Impression of clearness of Shin-Horikawa River

■Color is:

- Like 'White cloud' 'red tide' more frequently than that of Horikawa River
- Like 'White cloud' more frequently in spring
- Like 'Red tide' more frequently in summer

■Smell is:

- More terrible than Horikawa River
- 'Like ditch' 'Rotten' more frequently
- 'Like ditch', about 50% people answerd
- 'Rotten' around the year
- 'Rotten' especially in autumn

■COD is:

- Over 20mg/L, about twice the density of Horikawa River
- Especially high in autumn

■Transparency is:

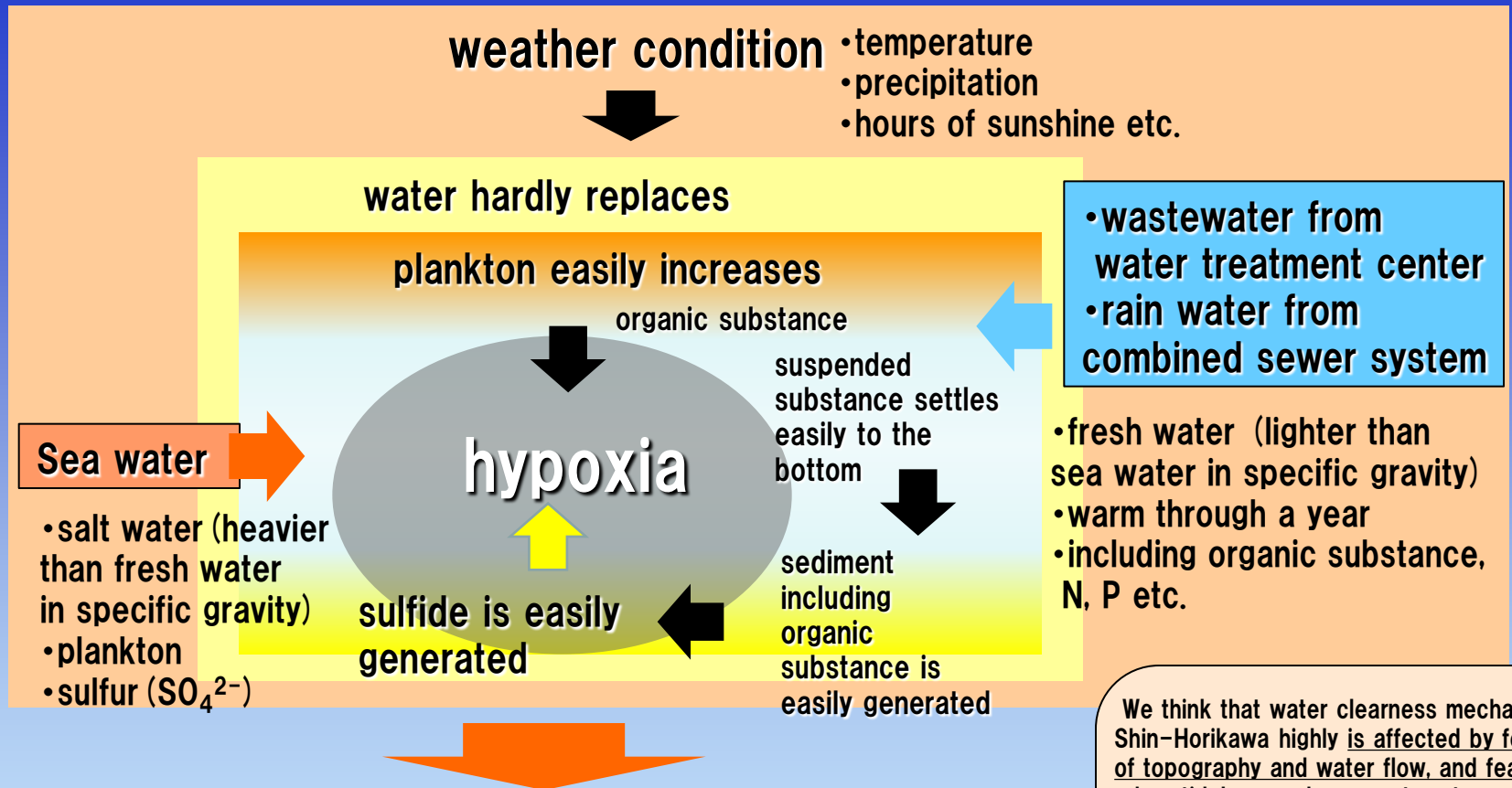
- 64cm, equal to the value of Horikawa River
- not notable about seasonable change

Comparing Shin-Horikawa River with Horikawa River:

- About both Shin-Horikawa River and Horikawa River, percentage of 'Color' is the largest, about 50%
- Evaluation of 'Smell' is larger than Shin-Horikawa River around the year
- Smell of Shin-Horikawa River is more terrible
- Percentage of 'Transparency' 'Garbage' is smaller than that of Shin-Horikawa River
- COD of Shin-Horikawa River is about twice

Why do these things occur?

Features of water clearness mechanism of Shin-Horikawa River



Organizing the features of Shin-Horikawa to think of water clearness mechanism

- Feature of topography and water flow of Shin-Horikawa River
- Mechanism of sludge sedimentation near confluence with Horikawa and that in upstream section

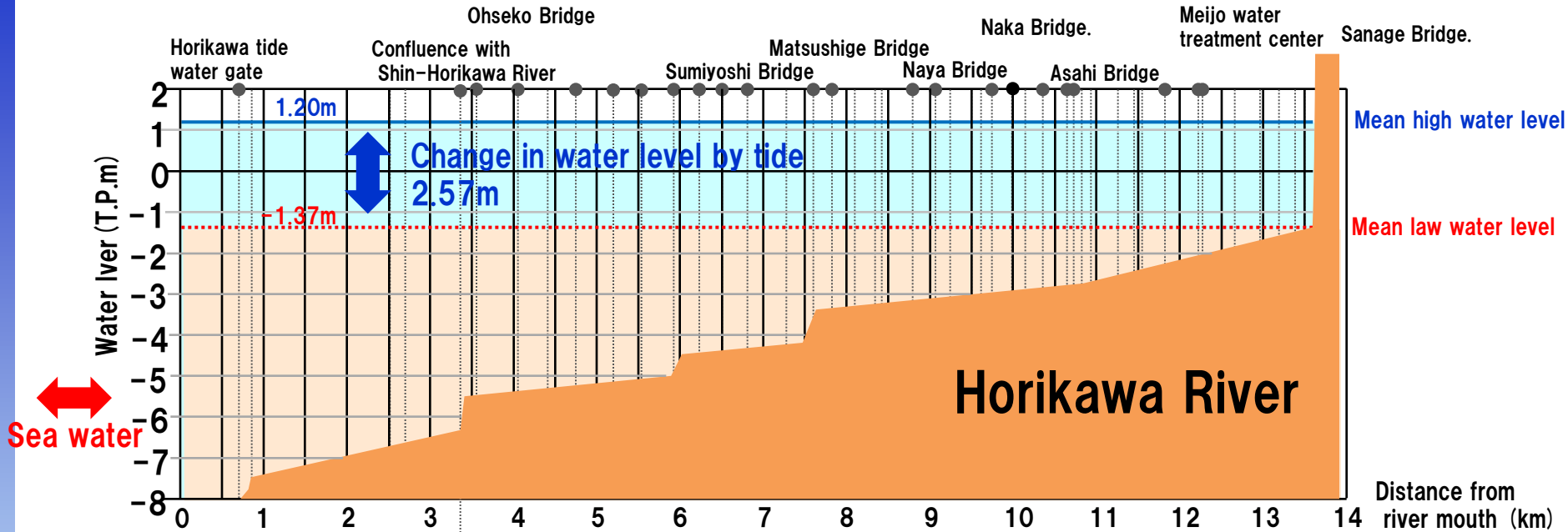
We think that water clearness mechanism of Shin-Horikawa highly is affected by feature of topography and water flow, and feature of urban tidal area where wastewater, which is fresh water and water source of Shin-Horikawa, and sea water is mixed.

Result of citizens' survey let us know the water clearness mechanism of Shin-Horikawa..

We organize the feature of Shin-Horikawa to think of water clearness mechanism.



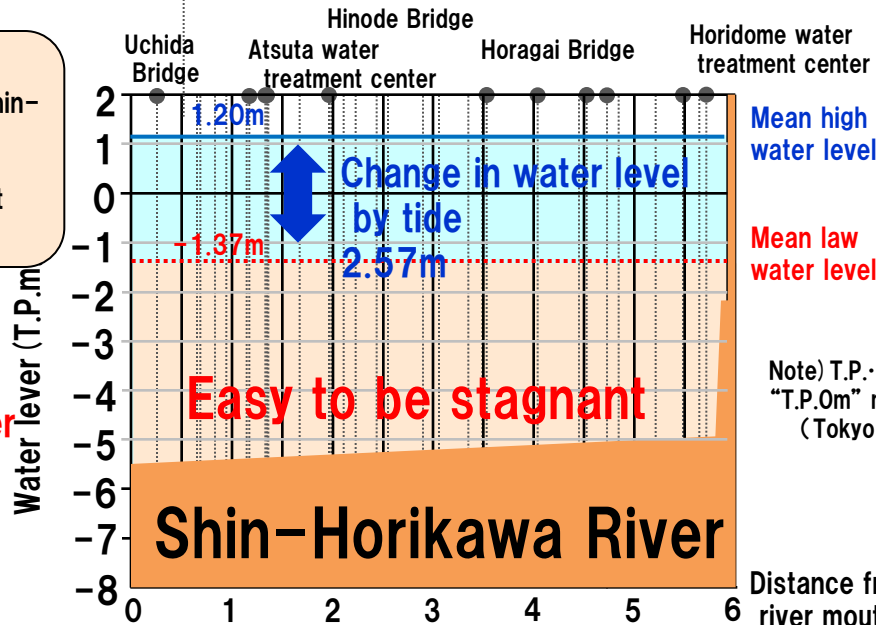
Shape of Shin-Horikawa River and Features of River water flow



By comparing two cross sections of Horikawa and Shin-Horikawa, three features of River flow of Shin-Horikawa River can be showed in right box.



Sea water



Easy to be stagnant

(Main Features)

- River water is hard to be replaced because the bottom of upstream area is not high
- River water is hard to be replaced especially when the change of tide is not often
- Water of bottom layer in upstream area is especially apt to be stagnant

Note) T.P. ...
"T.P.0m" mean sea level of Tokyo Bay
(Tokyo Peil: T.P.)

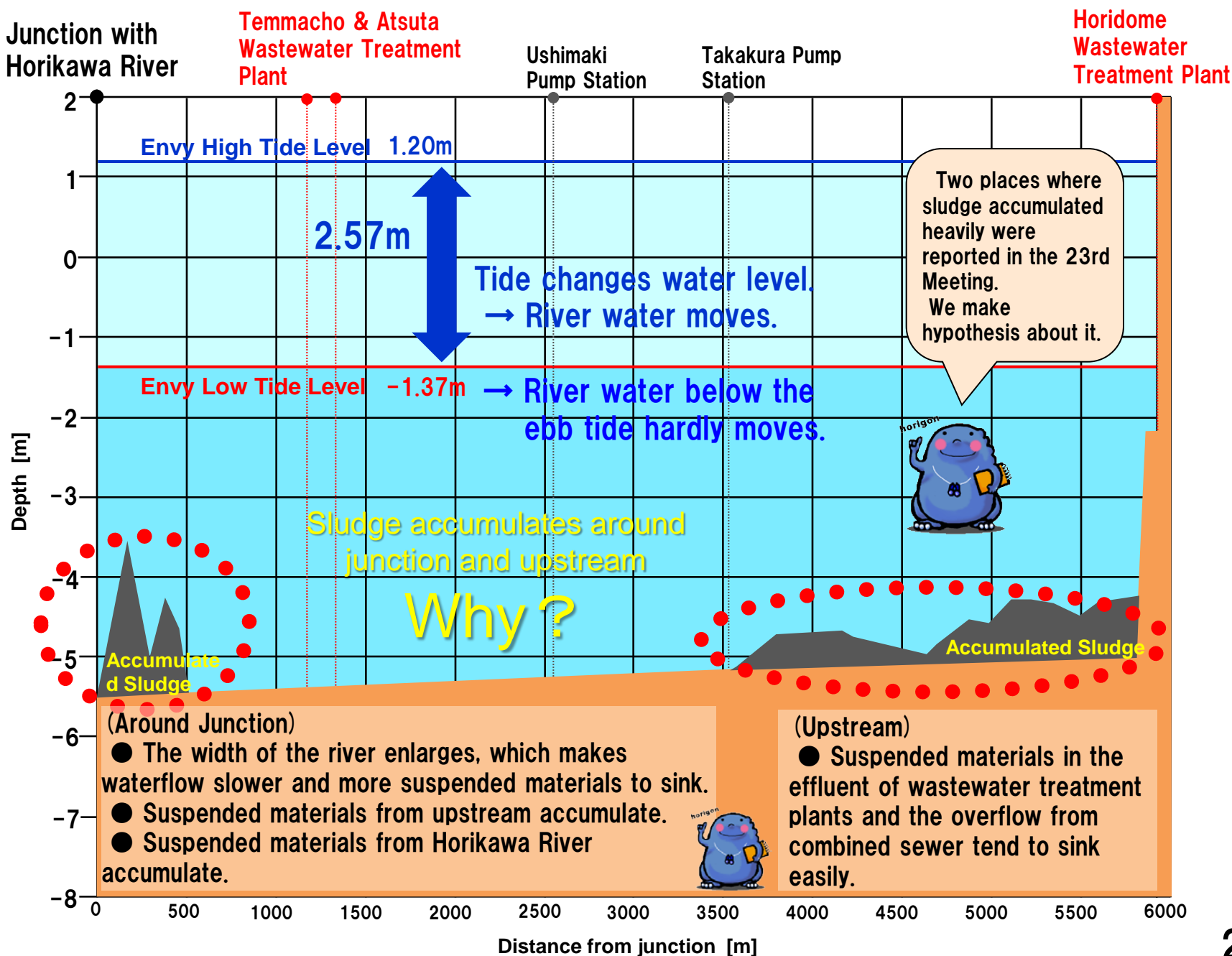
Ref: River development Plan of
Horikawa River Area

p.43 Cross section of Horikawa River

p.44 Cross section of

Shin-Horikawa River

HYPOTHESIS : How sludge accumulates around junction and upstream



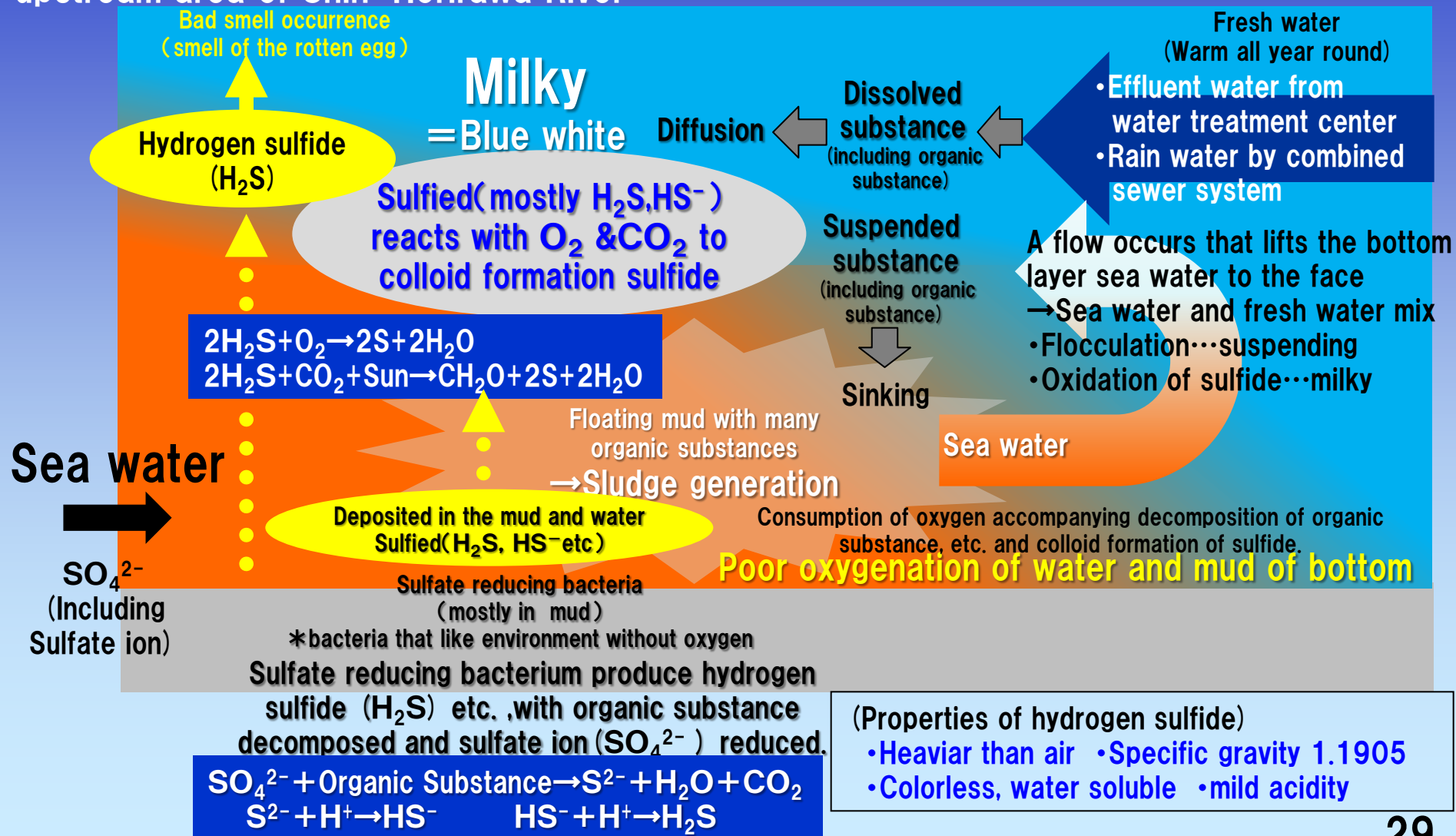
Why is the impression of clearness not Good all year round?

(hypothesis)

Mechanism of contamination in the upstream area of Shin-Horikawa River



Impression of clearness in Shin-Horikawa River is not good all year round. Because river bottom of Shin-Horikawa River is low to upstream from downstream, it is thought that **the bottom water in the lower layer is always stagnant**, and it is difficult for **the water to be replaced**. For this reason, the upstream area where effluent water from water treatment center and suspended substance associated from rain water by combined sewer system is an environment that tends to settle and accumulate on bottom river. And it is thought that **poor oxygenation of water and mud of bottom** is advanced. In the area, it is considered that **a large amount of sulfide is generated, causing milky and bad smell**, and it is a factor that deteriorates impression of clearness.

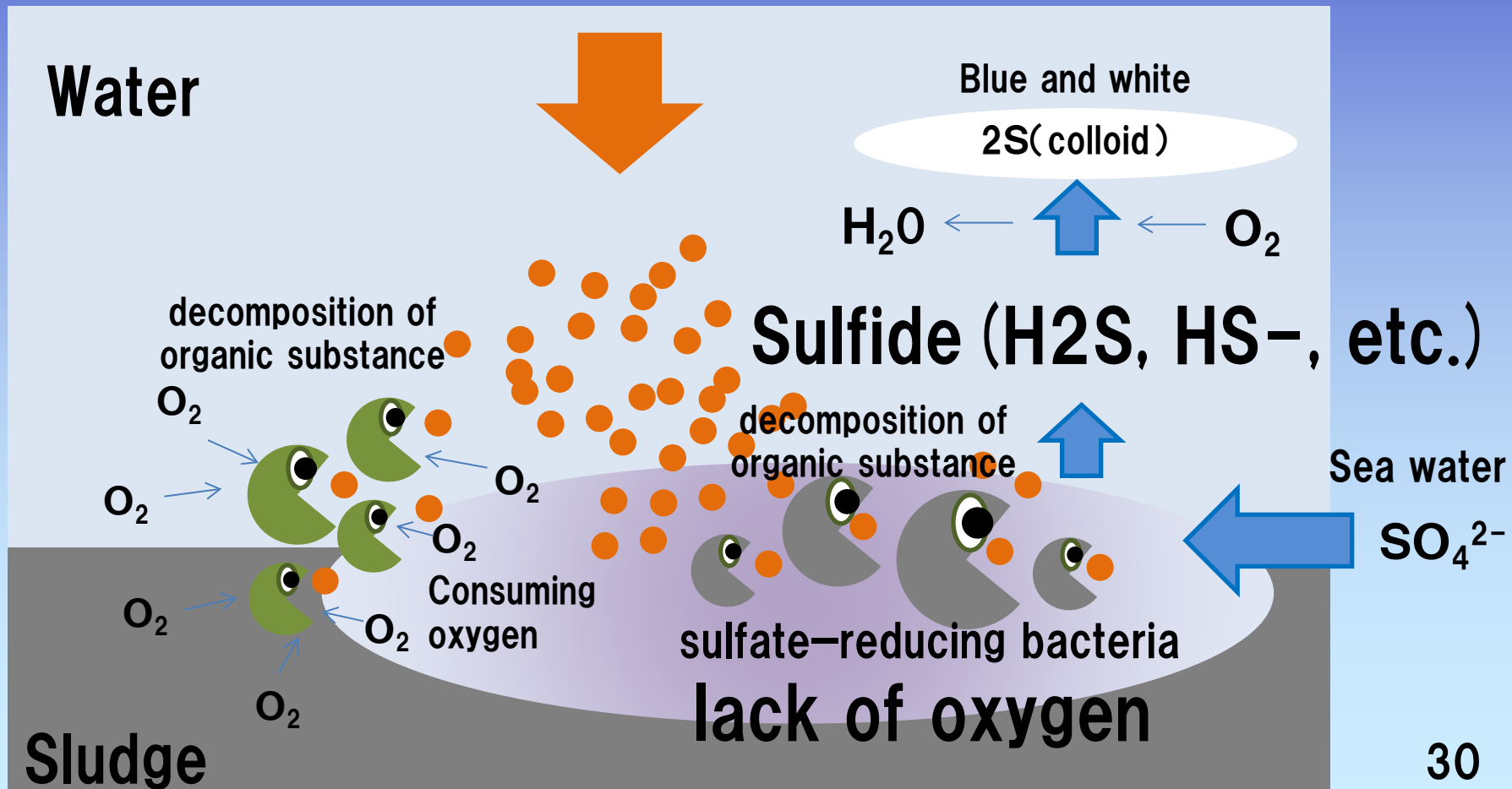


(Reference)

Create of Sulfide by sulfate-reducing bacteria

inflow of organic substance → Lack of oxygen of the bottom water and sludge → Sulfide (H_2S , HS^- , etc.)

Inflow of organic substance



(5) Change of Horikawa river by the regular ship's sailing

We think that the impression of the clearness of Horikawa River is improved that if sailing of the ship becomes frequent, water of Horikawa river is stirred regularly, and environment of the bottom of a river improves because oxygen continues being supplied to the bottom of a river, and bubble, bad smell and muddy white decrease.

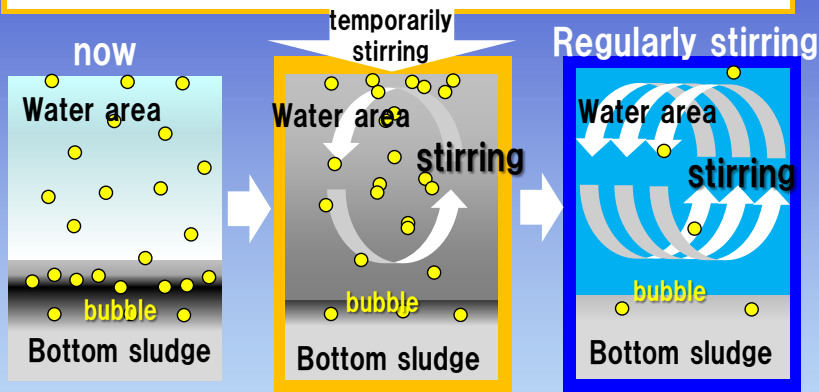
We carried out general survey to examination ship's sailing of Nagoya city (Autumn Cruise: 24th from 23rd and 18th from November 17, 2018) and investigated the change of Horikawa river by the examination ship's sailing from a viewpoint and sense of citizens.

The expectation for the effect of the water quality improvement by the regular ship's sailing

Past discovery of citizens

■ Main viewpoint When a ship moves...

Water Area is stirred. In this way, it is reported that the bottom sludge rolls up, and the water of Horikawa river becomes gray. In addition, when bubbles such as the hydrogen sulfide exist in the bottom sludge, bubbles may appear with sludge raised up on the surface of the water, and the causative agent of the smell may be released by the atmosphere. Therefore, the impression of the clearness of Horikawa River may worsen temporarily.



When a ship is sailed regularly...

Water Area is stirred regularly.

When the bottom sludge is rolled up, the bubbles such as hydrogen sulfide of the bottom sludge are released in the atmosphere regularly, and it is thought that the quantity of bubbles of the bottom sludge decreases than the present conditions.

Furthermore, when a ship is sailed regularly in the future, water area is stirred continuously, and suspended substance (including organic substance) becomes the environment where it is hard to deposit, and oxygen continues being supplied to the bottom of the river.

In this way, the state of the bottom of the river is improved little by little (the sulfide decreases, and sulfide of the bottom sludge decreases), and we think that the impression of the clearness of Horikawa River is improved more.



We expected that when the quality of the water was worsened by decreasing the Transparency or smelling bad, when a ship was sailed temporarily in Horikawa river, sludge was raised up by the stirring with the screw. However, it was not confirmed temporarily that the hoist of remarkable sludge and the bad smell by the examination ship's sailing, and the impression of the clearness of Horikawa River was not worsened. Our expectation was disappointed in a good meaning.

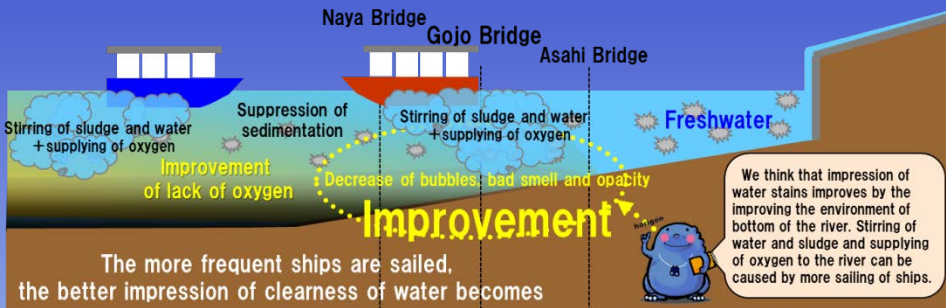
On the other hand, it was confirmed that bubbles were generated to the trail, and those bubbles was hard to clear away.

Why? This reason researches as a future problem.

■ Problems

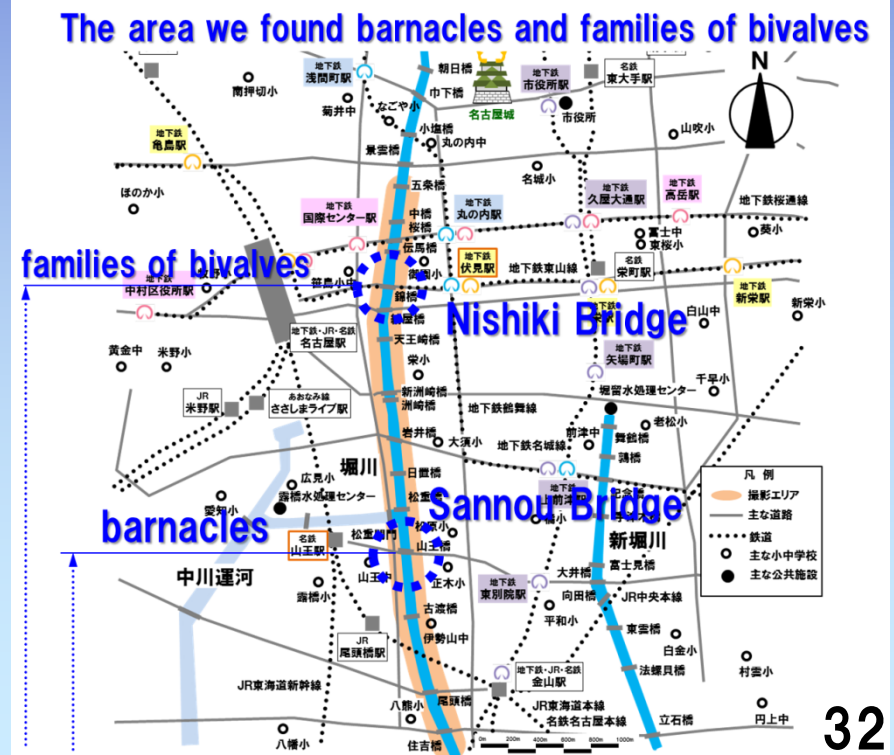
We believe that we need to continue to check and analyze the state of Horikawa in some conditions such as a season, a ship, a section and frequency to understand the effect of water quality improvement by regular operation using the results of this general research as a reference.

We also think that measures such as using more biodegradable cleaners properly in daily lives and business activities are needed to control the bubbles in the river.



(6) Creatures

The secretariat found barnacles (at the upper of Horikawa River from Sannou Bridge) and families of bivalves (at the lower of Horikawa River from Nishiki Bridge) attached to the edge of the water in river walls and abutments using by the information from a party of Kojo, Horikawa and daily lives survey group. They can't move by themselves once they get their places. Growing of these creatures proves that oxygen dissolve continuously in the water. We can say from the condition of these creatures that water quality of Horikawa is improving. In addition, we found common kingfishers and mullets in the upper side of Shin-Horikawa where measures for the bad smell such as a removal of sludge has been carried out.



from secretariat

■ Every data you offer to us is valuable

Information about subtle change you find when you survey Horikawa river can be valuable data to understand the present situation of the river. We're looking forward to your data from now on.

■ Let us introduce your activity

Your activity, such as survey, think and cheer up Horikawa, is the motivation to increase the number of those who love Horikawa, Nagoya City and the Earth.

■ Let's hand down the past appearance of Horikawa as record

To know about the past Horikawa is very important to design the future Horikawa. We refer Horikawa's pictures taken in Taisho and Showa era to know forgotten past Horikawa. Do you keep photos which Horikawa was photographed in in your album? For example, photo of your family with Horikawa in the background of the picture is Okay.

(contact) secretariat

e-mail:2010@horikawa1000nin.jp

Please send comments and pictures (with date and place) from mobile phone or PC.

*We think image quality of picture taken by mobile phone camera is enough.