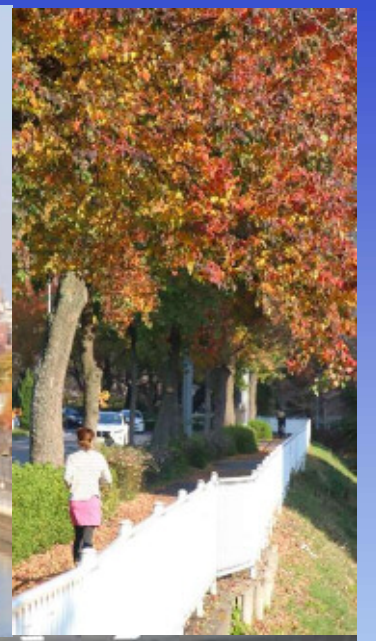
Horikawa Sen-nin Chosatai 2010 (HSC)
Summary meeting for the 28th stage

Place:
WILL AICHI



The secretariat of Horikawa Sen-nin Chosatai 2010

Feb. 13th. 2021

1. Horikawa Sen-nin Chosatai 2010

～Transmission of Raw Water from Kiso River (TRWKR)～

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)

■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 Transmision Volume : Oct.5th - Nov.2nd.2010

The formation of HSC (April.22nd.2007)
With a viewpoint and a sence of citizens, the survey of the clarification effect of TRWKR started

■ 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, Feb.2012
Branch of contribution for Regional Environment Development Award for Excellence

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

Transmission of Raw Water from Kiso River (TRWKR)

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

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 Support Groups Supporting
  clarification of Horikawa

The survey from a viewpoint and sense 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)

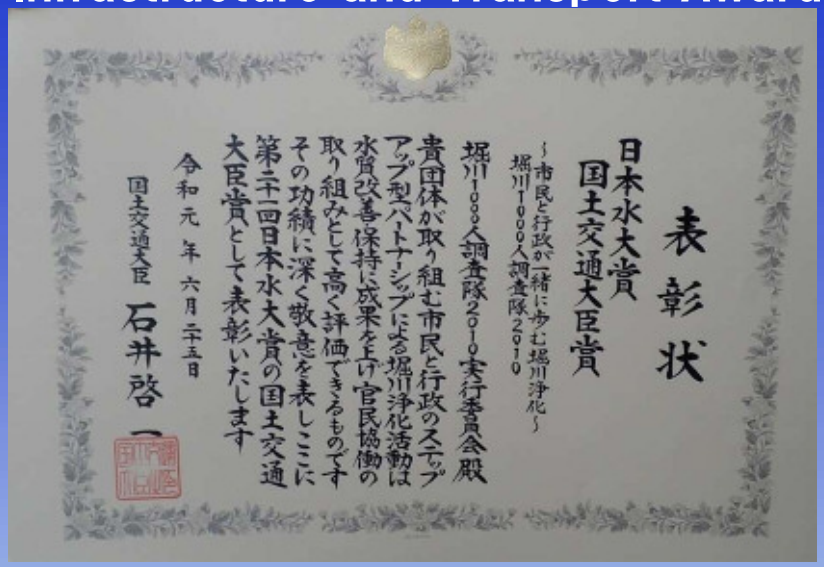
① More surveys should be implemented.

- •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.

②There 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 residence.

Won the21st Japan Water Award Minister of Land, Infrastructure and Transport Award June 2019


表彰状

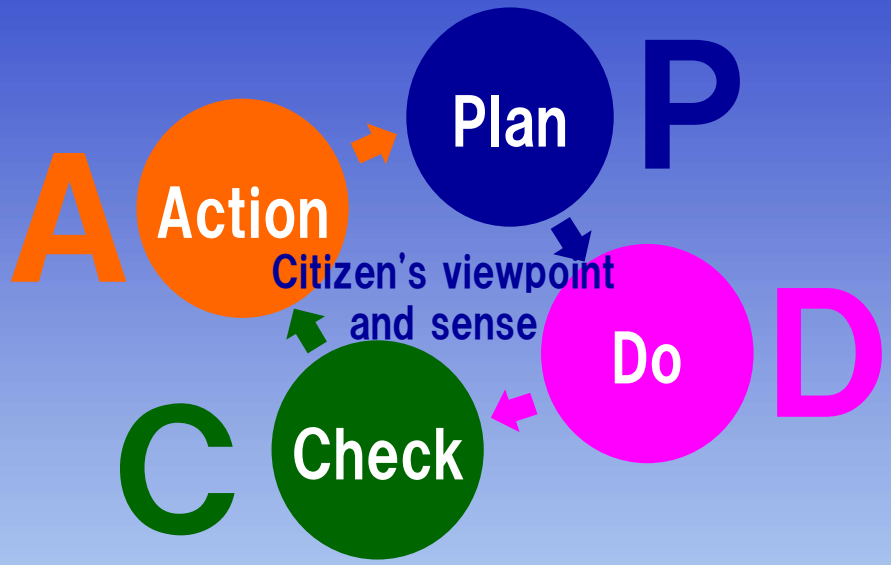
日本水大賞
国土交通大臣賞

～市民と行政が一緒に歩む堀川浄化～
堀川1000人調査隊2010

堀川1000人調査隊2010実行委員会殿
貴団体が取り組む市民と行政のステップアップ型パートナーシップによる堀川浄化活動は水質改善保持に成果を上げ官民協働の取り組みとして高く評価できるものです
その功績に深く敬意を表しここに第二十四回日本水大賞の国土交通大臣賞として表彰いたします

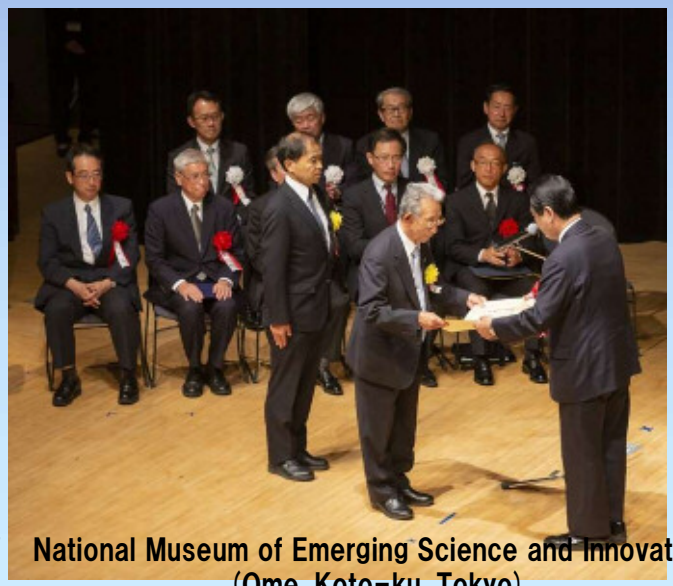
令和元年六月二十五日
国土交通大臣 石井啓一

Public-private academic collaboration step-up partnership



Horikawa Sen-nin Chosatai Executive Committee visited Mayor Kawamura to report getting a prize on the Japan Water Award and Minister of Land, Infrastructure, Transport and Tourism award.

On June 25, 2019, the award ceremony for the 21st Japan Water Awards was held in the presence of Crown Prince Akishino. Horikawa Sen-nin Chosatai Executive Committee received the Minister of Land, Infrastructure, Transport and Tourism Award.



National Museum of Emerging Science and Innovation (Ome, Koto-ku, Tokyo)

Water Environment of Horikawa River

Horikawa-River
Area of basin :52.85km²
Length :16.20km

Shin-Horikawa-River
Area of basin :22.77km²
Length : 5.95km

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
Privisional raw water transmission: 0.3m3/s

Wastewater Treatment Plant

Sanage Bridge

Motoiri Sluiceway

Tide Gate

▼High Tide

Horikawa River

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

▼Ebb Tide

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


Shimizu wakuwaku-sui

Nagoya Port

Rising

Groundwater, etc

Ise Bay

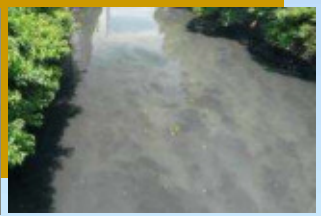
It has looked like red tide or blue tide.
In Nagoya Port and downstream of Horikawa, it is said that phytoplankton does over breeding and extinction, so water basin is polluted


Red Tide


Blue Tide

Sludge rises and floats.


Floating Sludge


Raised Sludge

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

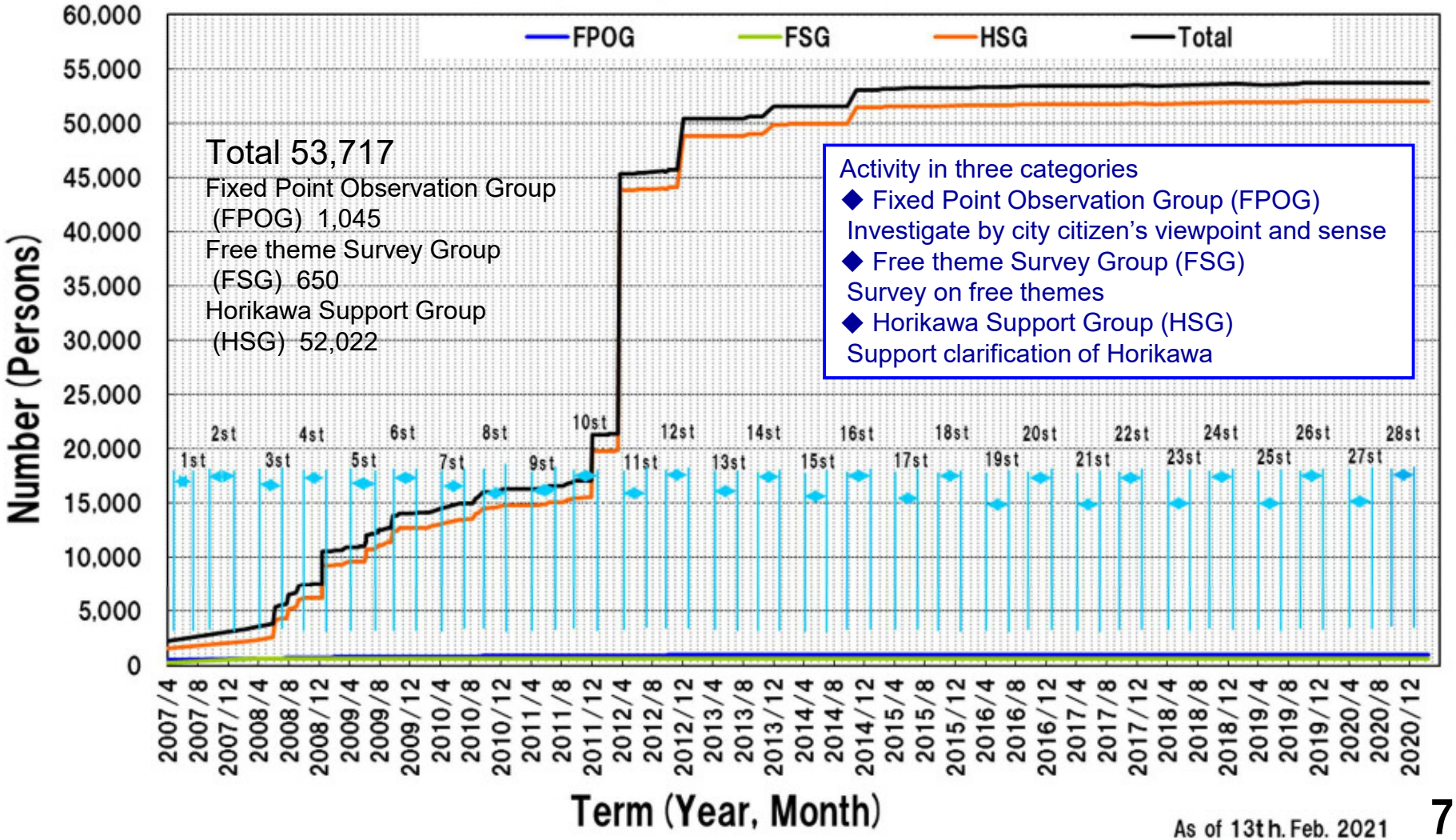
Horikawa, the Mother River of Nagoya, was polluted in rapid economic growth.
The citizens have rised to get the past back.

	Start 22nd Apr.2007	Now 13th Feb. 2021
Fixed Point Observation Groups	55 groups 497 persons	108 groups 1,045persons
Free Survey Groups	22 groups 234 persons	40 groups 650 persons
Horikawa Support Groups	88 groups 1,531 persons	2,605 groups 52,022persons
Total	165 groups 2,262 persons	2,753 groups 53,717persons

Number of Participants

Horikawa Sen-nin Chosatai was established to clean *Horikawa* River and to check the effective of experiment for it by city citizen's viewpoint.
This activities are not only to surveys, but also spread to the clarification, cleanup, enlightenment activities and exchanges between regions.

Number of participants (FPOG, FSG, HSG)



As of 13th. Feb. 2021

3. Survey Periods and Number of Reports

Content		Fiscal year	Survey Period			Reports	Horikawa River	Shin-Horikawa River
Horikawa River Purification Social Experiment	With TRWKR 0.4 m^3/s	2007	1st stage	Spring - Early summer	4/22 - 6/30	258	258	-
				Interval	7/1 - 9/7	134	134	-
			2nd stage	Autumn - Early winter	9/8 - 12/16	383	383	-
				Interval	12/17 - 3/31	103	103	-
		2008	3rd stage	Spring - Early summer	4/1 - 6/30	245	245	-
				Interval	7/1 - 9/27	64	64	-
			4th stage	Autumn - Early winter	9/28 - 12/16	152	152	-
				Interval	12/17 - 3/31	100	100	-
		2009	5th stage	Spring - Early summer	4/1 - 6/30	145	145	-
				Interval	7/1 - 9/26	54	54	-
			6th stage	Autumn - Early winter	9/27 - 12/16	120	120	-
				Interval	12/17 - 3/31	81	81	-
		2010	7th stage	Spring - Early summer	4/1 - 6/30	111	111	-
				Interval	7/1 - 9/11	44	44	-
			8th stage	Autumn - Early winter	9/12 - 12/17	104	104	-
				Interval	12/18 - 3/31	72	72	-
		2011	9th stage	Spring - Early summer	4/1 - 6/30	112	112	-
				Interval	7/1 - 9/10	42	42	-
			10th stage	Autumn - Early winter	9/11 - 12/16	133	133	-
				Interval	12/17 - 3/31	77	77	-
Public-private academic collaboration step-up partnership		2012	11th stage	Spring - Early summer	4/1 - 6/30	148	148	-
				Interval	7/1 - 9/21	60	59	1
			12th stage	Autumn - Early winter	9/22 - 12/16	139	135	4
				Interval	12/17 - 3/31	92	78	14
		2013	13th stage	Spring - Early summer	4/1 - 6/30	145	129	16
				Interval	7/1 - 9/28	70	55	15
			14th stage	Autumn - Early winter	9/29 - 12/17	113	99	14
				Interval	12/18 - 3/31	79	68	11
		2014	15th stage	Spring - Early summer	4/1 - 6/30	133	117	16
				Interval	7/1 - 9/28	91	78	13
			16th stage	Autumn - Early winter	9/29 - 12/16	99	90	9
				Interval	12/17 - 3/31	107	89	18
		2015	17th stage	Spring - Early summer	4/1 - 6/30	113	100	13
				Interval	7/1 - 9/19	81	69	12
			18th stage	Autumn - Early winter	9/20 - 12/16	126	109	17
				Interval	12/17 - 3/31	91	79	12
		2016	19th stage	Spring - Early summer	4/1 - 6/30	127	116	11
				Interval	7/1 - 9/19	62	54	8
			20th stage	Autumn - Early winter	9/20 - 12/16	130	107	23
				Interval	12/17 - 3/31	104	84	20

Content	Fiscal year	Survey Period			Reports	Horikawa River	Shin-Horikawa River
Public-private academic collaboration step-up partnership	2017	21st stage	Spring - Early summer	4/1 - 6/30	129	100	29
			Interval	7/1 - 9/18	58	48	10
		22nd stage	Autumn - Early winter	9/19 - 12/20	121	93	28
			Interval	12/21 - 3/31	80	67	13
	2018	23rd stage	Spring - Early summer	4/1 - 6/30	180	107	73
			Interval	7/1 - 9/19	76	44	32
		24th stage	Autumn - Early winter	9/20 - 12/16	184	106	78
			Interval	12/17 - 3/31	108	67	41
	2019	25th stage	Spring - Early summer	4/1 - 6/30	193	127	66
			Interval	7/1 - 9/19	101	43	58
		26th stage	Autumn - Early winter	9/20 - 12/16	214	105	109
			Interval		123	67	56
	2020	27th stage	Spring - Early summer	4/1 - 6/30	333	168	165
			Interval	7/1-9/19	32	23	9
		28th stage	Autumn - Early winter	9/20 - 12/16	232	161	71
			Interval	12/17-3/31			
Total					6,808	5,723	1,085

Background about COVID-19

2020

1/16 The Infected person was confirmed in Japan.
2/27 Prime Minister requested temporary closure of school.
4/7 The state of emergency was announced in 7 prefectures.
4/10 The state of emergency was announced in Aichi Prefectures.
4/16 The state of emergency was announced nationwide.
13 prefectures were determined under special precautions.
5/31 The state of emergency was lifted.
6/19 Self-restraint of moving across prefectures was relaxed.
8/16 Prefectural emergency was announced in Aichi Pref.
8/24 Prefectural emergency was lifted.

2021

1/14 The state of emergency was announced nationwide. (Including Aichi Pref.)

To date, 6,808 reports have been reported. Of these, the number of reports for Shin-Horikawa River was 1,085.

In the 28th stage, there were 232 reports. Of these, 161 were reported for Horikawa River and 71 were reported for Shin-Horikawa River.

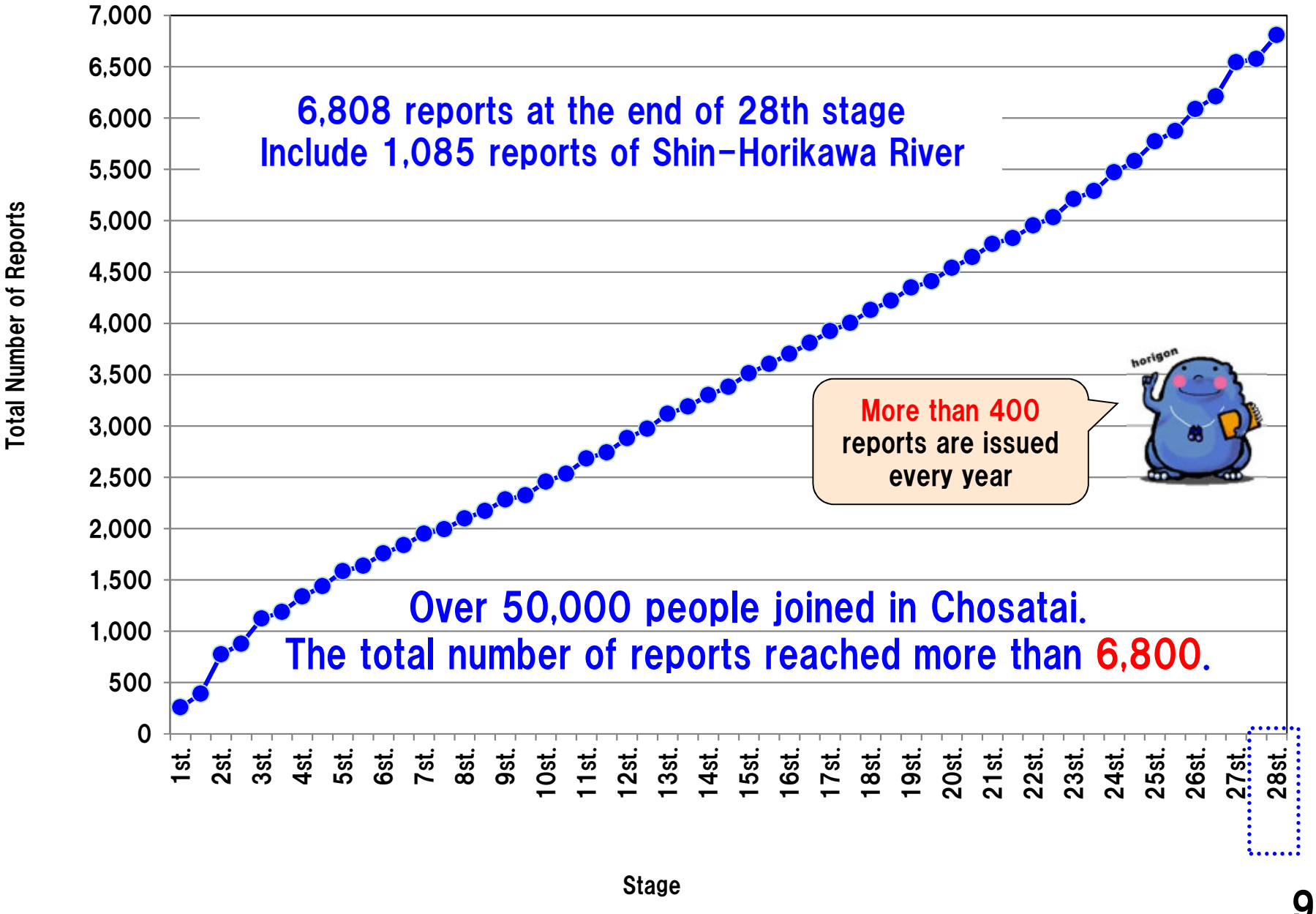
On average, more than 400 surveys are conducted every year in Horikawa River and Shin-Horikawa River.

Many citizens are continuously examining the actual water environment of Horikawa River and Shin-Horikawa River on a daily basis from the perspective and sense of the citizens.

In the 28th stage, infection spread of COVID-19 made survey groups activity avoid "3Cs" (※).

※"3Cs" : Close space, crowded places, close-contact

Total Number of Reports



4. State of the weather

(Overview of the weather in 2020)

The average temperature in Nagoya in 2020 was 17.0℃ (1.2℃ higher than typical year) which was highest as same as last year since they started record in1946.

It was a memorable year with heavy rain in July and high daily temperature in August. There were many sunny days in May, August, November and December, however there were many rainy days in other months. As a result it was annual rainfall was higher than typical year.

The 28th stage (from September to December in 2020)

State of the weather

Characteristic : The daily temperature was high.
The rainfall was as same level as typical year.

The average temperature was 16.2℃, which was a little higher than typical year.

The rainfall was 140mm/month as same level as typical year.

■Temperature

The average temperature was 16.2℃, which was 0.8℃ higher than typical year (15.4℃ from September to December). It was little higher from mid November to early December. Especially the highest temperature was 24.9 ℃ in November.

■Rainfall

The average rainfall was 140mm/month, as same level as typical year (121.9mm/month from September to December). It rained a lot due to the typhoon in October, however the rainfall was low due to the influence high pressure in November and December.

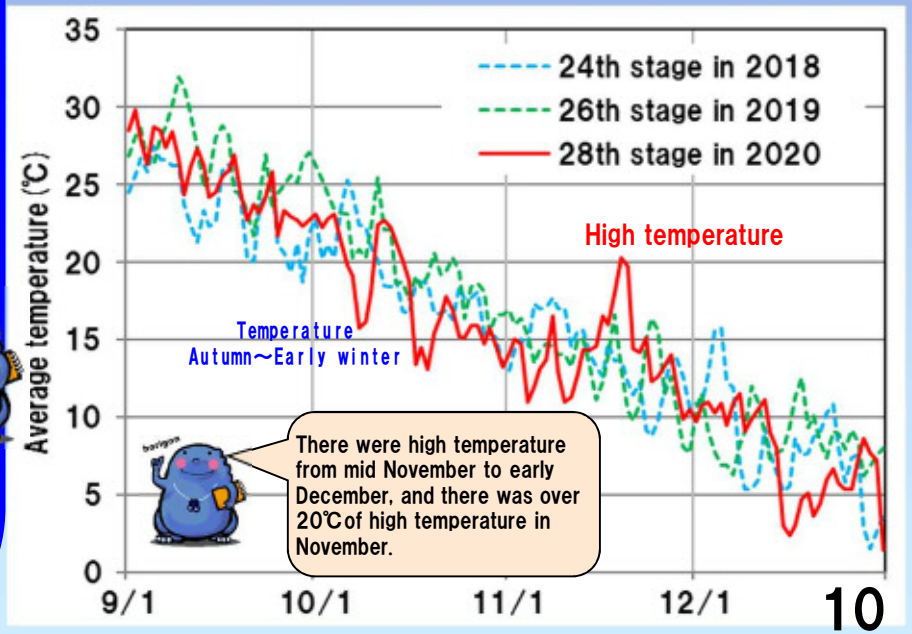
■Daylight hours

The average daylight hours was 177ours/month, which was longer than typical year (163.7hours/month from September to December). Especially there were a lot of sunny days due to a migratory anticyclone in November. As a result daylight hours was over 200hours/month in November.

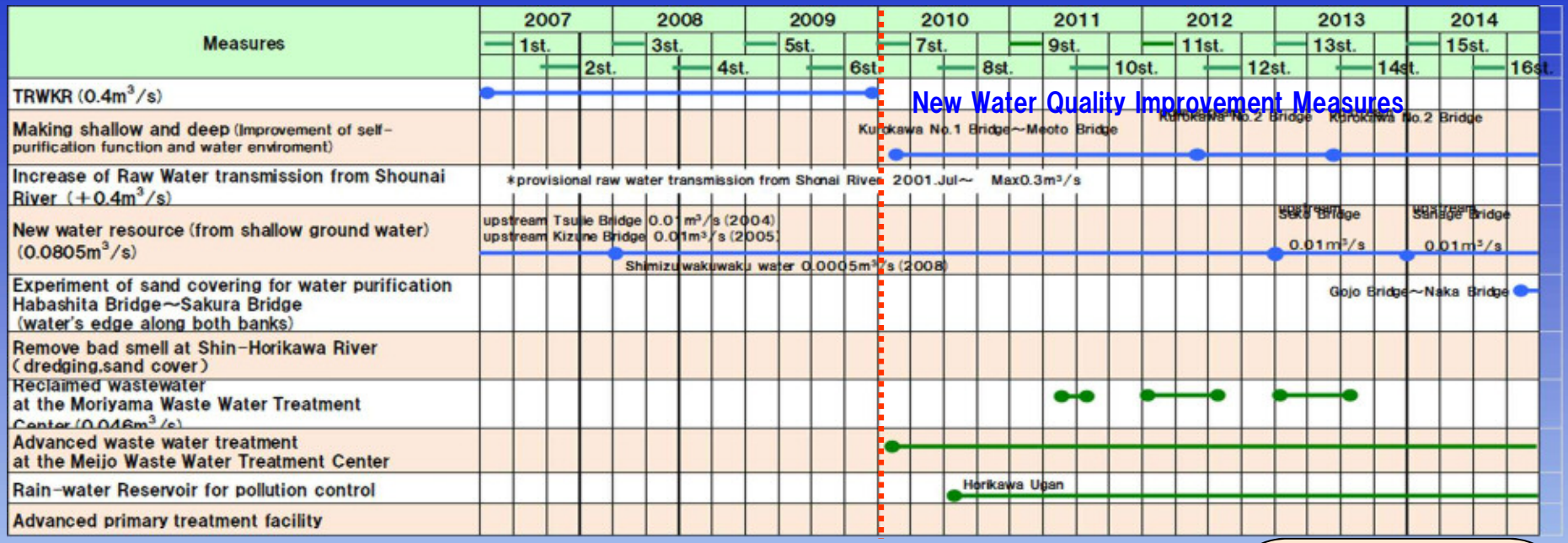
Date of Nagoya Local Meteorological Observatory

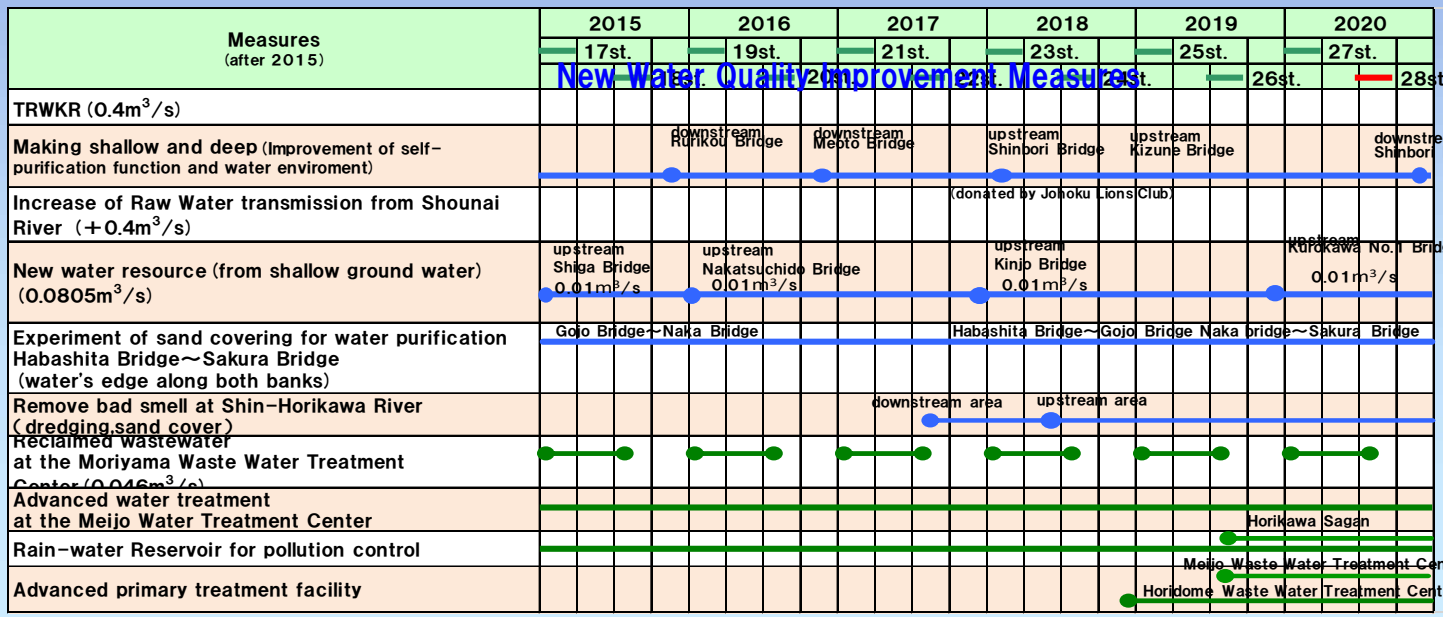
Category	Rainfall (mm)	Temperature (℃)			Daylight (hour)
	total	Average	Higkest/day	Lowest/day	Total
Record period	1981 ~2010	1981 ~2010	1981 ~2010	1981 ~2010	1981 ~2010
Record year	30	30	30	30	30
Year	1535.3	15.8	20.7	11.9	2091.6
April	124.8	14.4	19.9	9.6	196.6
May	156.5	18.9	24.1	14.5	197.5
Jun	201.0	22.7	27.2	19.0	149.9
Average	160.8	18.7	23.7	14.4	181.3
September	234.4	24.1	28.6	20.7	151.0
October	128.3	18.1	22.8	14.1	169.0
November	79.7	12.2	17.0	8.1	162.7
December	45.0	7.0	11.6	3.1	172.2
Average	121.9	15.4	20.0	11.5	163.7

Reference : Nagoya Local Meteorological Observatory
http://www.jma.go.jp/jma/menu/report.html



5. Main Water Quality Improvement Measures





※Advanced waste water treatment at the Tsuyuhashi Waste Water Treatm (Oct. 2017)

The 9th well was dug at upstream of Kurokawa No.1 Bridge for using shallow grand water to Horikawa River (0.01m³/s) last year. Horikawa Sagan Rain-water Reservoir for pollution control and Advanced primary treatment facility at Meijo waste water treatment center was put into service for improvement of combined sewer system.
In this FY, it making shallow & deep downstream of Shinbori Bridge, it will be completed in end of march.

Water quality improvement measures （After water conduction stop from Kiso River）

Source of pollution
house・factory etc

Effulent of sewerage treatment
Drainage in rainy weather from combined sewerage

Improved natural purification function

■Sebuchi formation
(From 2010year 8 points)

Water pollution
Mainly organic matter

brown

Ditch smell

Perspective of citizen's impression・bubble・smell・color

Implement of new water quality improvement mesures

color
Mianly cloudy dark gray、brown

Smell
Mainly ditch、Sludge、putrid etc

Confirm improvement

No color smell

cloudy

dark gray

putrid

sludge

Floating Suspention subsidence
(including organic matter)
↓
Oxgen consumption

Wind up

bubble methane

bubble hydrogen sulfide

Sludge
Riverbed rotting mud

Pollution reduction measures

(Improvement of effulent of sewerage treatment)
■Advanced processing in Meijo treatment center (2010 yesr)
■Advancement of primary treatment in Horidome sewerage treatment center (2018 year)
■ Advancement of primary treatment in Meio sewerage treatment cenetr (2019 year)
(Contamination load reduction from combined sewerage)
■Horikwa right bank stormwater pond (2010year)
■Horikawa left bank storrmwater pond (2019year)

New water source secure

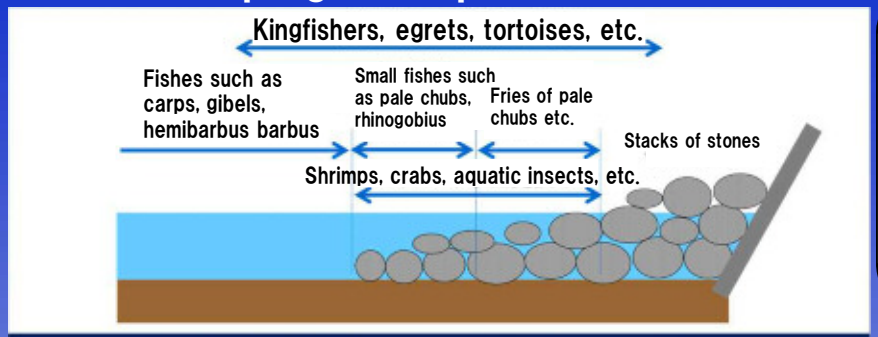
■Conjugation of reclaimed water in Moriyama treatment center (2011year)

■Conjugation of shallow groundwater
(From 2013 year 6 points)

Reduction measures smell・ white turbid from river bed

■ Sand cover
・Horikawa：Habashita.brg～Sakura .Brg vicinity (2017yaer)
■ Pedro removal・sand cover
・Shin Horikawa：downstrem (2017・2018year)
■ Pedro removal
・Shin Horikawa：Tateishi brg.～ Upstream (2018yaer)
・Horikawa：Pedro removal after revetment work

Shaping of Rapids and Pool



Rise of self-purification by food chain

Dirt of water (organic substance, nitrogen, phosphorus)

↓

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

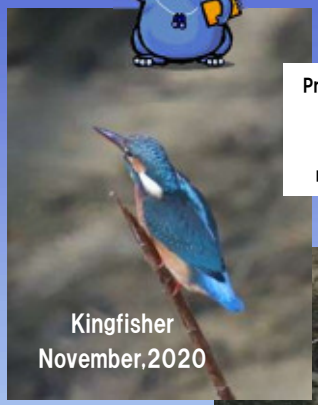
↓

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

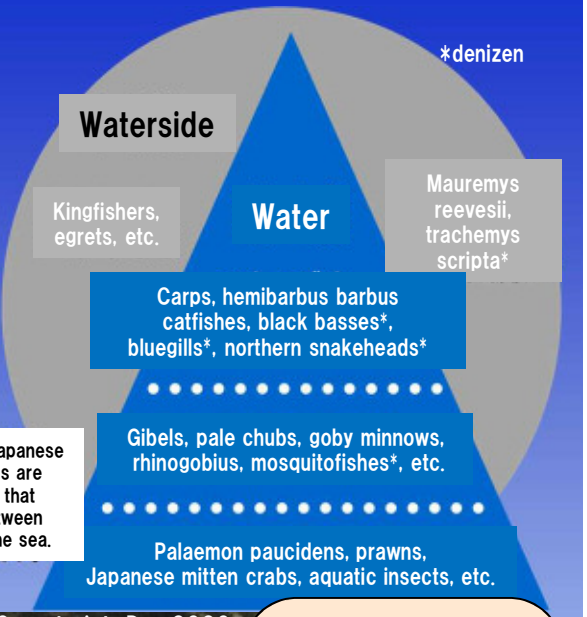
↓

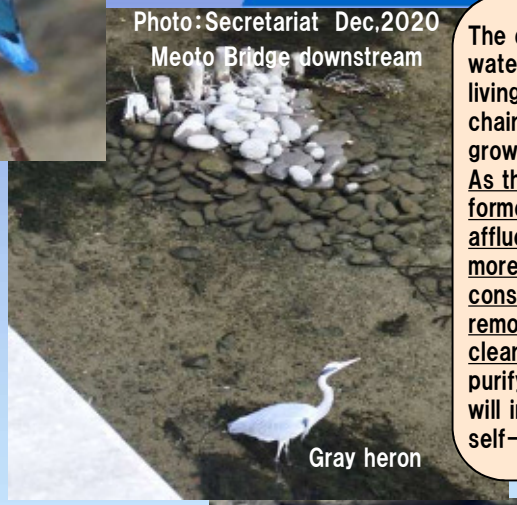
Big fishes and birds prey the small fishes and aquatic insects.

It was identified that various organisms breed and grow when rapids and pools were shaped. This place has been a habitat of organisms that like cobble stones.
It is now possible to observe how kingfishers and herons prey on fish and shrinp.



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





The components of dirt in water are taken up by living things in the food chain and consumed for growth and reproduction. <u>As the riffles and pools is formed and a diverse and affluent ecosystem is built, more dirt components are consumed in a chain and removed from the water, cleaning the water.</u> The purifying effect of the river will increase.(=Increased self-cleaning effect)

The riffles and pools, which was formed in the past, maintains its diversity while transitioning according to the environment.

■ Secured water source
(Use of shallow ground water)
Upstream well in Kurokawa No.1 Brdg.
Mar.2020 operation

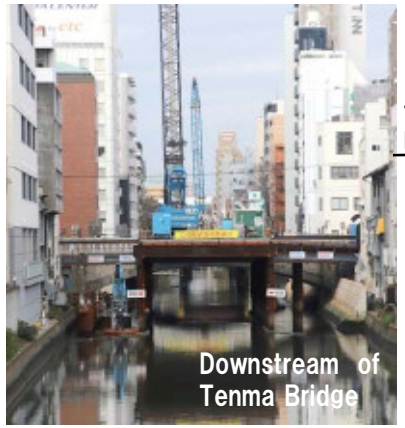
■ Coverd sand construction
Btwn.SakuraBrdg. and HabashitaBrdg.
Jan.-Feb.2015,Dec.2017-Jan.2018

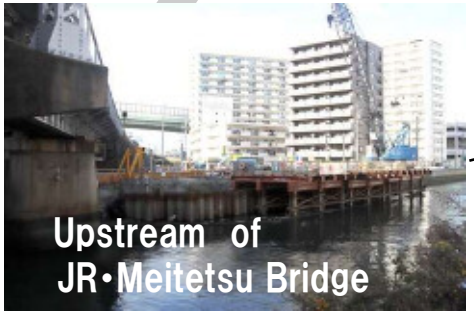
■ Measure against foul odors
in the Shin-Horikawa river
(Sludge dredged・Coverd sand)
Section:Downstream
Period:Nov.2017—May.2018

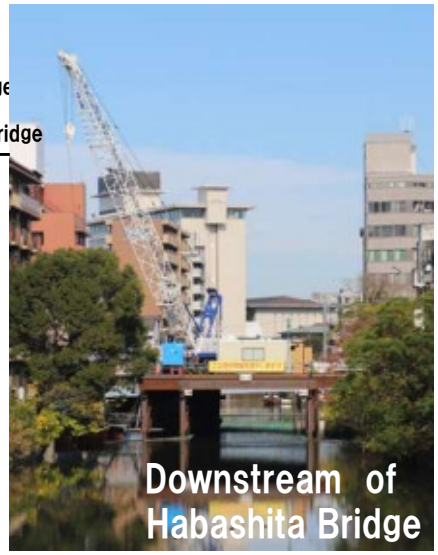
■ Measure against foul odors
in the Shin-Horikawa river
(dredging : Sludge dredged)
Section:Upstream
TateishiBrdg - Upstream end
Period:Sep.2018—Feb.2019

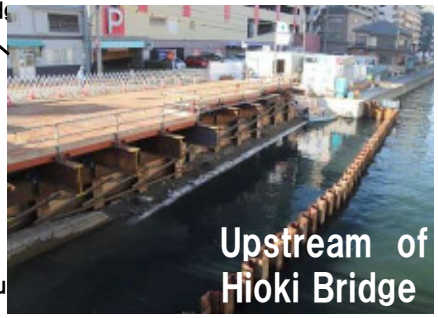
■The state of the middle-class part where the revetment work is progressing (perform sludge removal)

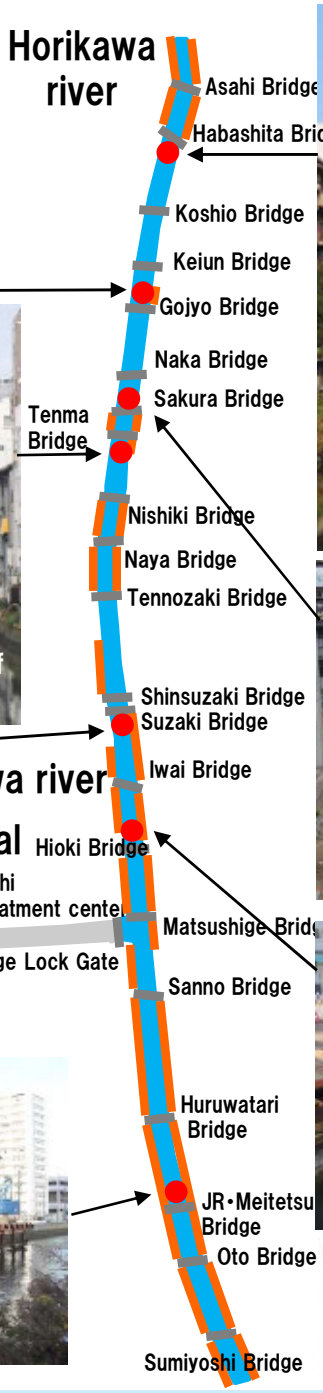
Photo : The secretariat Dec.2020











Progress of revetment works
The secretariat
On site confirmation

Legends

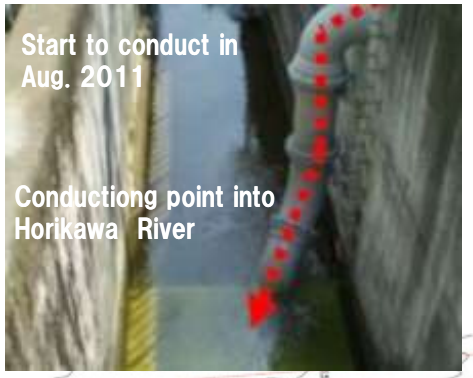
Revetment work section

When the revetment work is over, the seabed is dug and the sludge is removed.

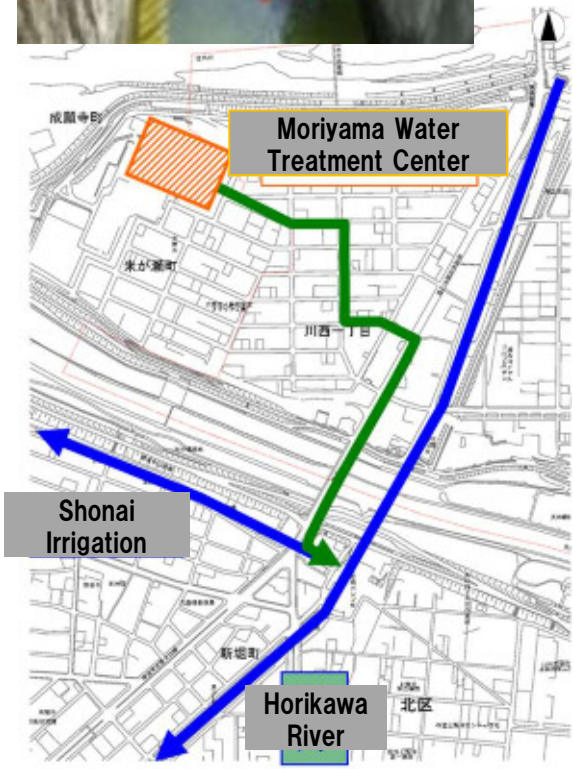
Newly launched facilities after the stop of TRWKR

■Utilization of Reclaimed wastewater (Except winter)

Conducting reclaimed wastewater treated by Membrane filtration at the Moriyama Water Treatment Center (up to 4000m3/day) is discharged.



Reclaimed wastewater is conducted during irrigation season (Apr – Oct)

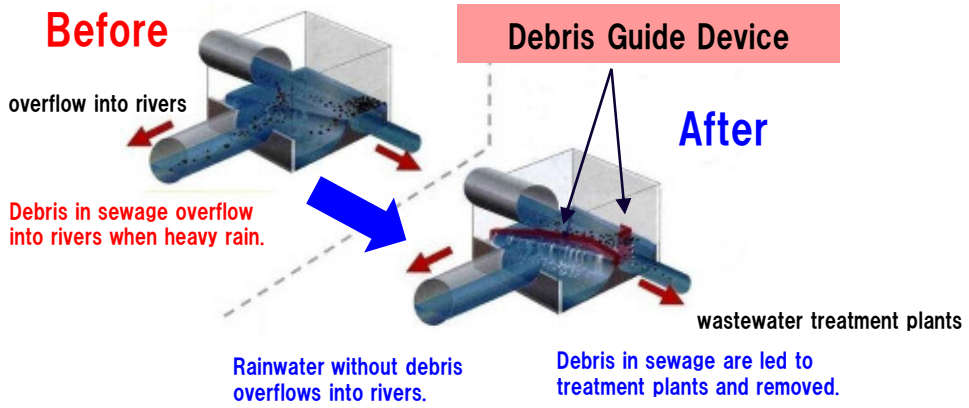


■Improvement of Treatedwater Quality

Meijo Wastewater Treatment Plant installed filtration devices and improved quality of treated water.

Meijo Wastewater Treatment Plant
- Processing method
  : Conventional activated sludge process + Rapid filtration
- Operated since
  : May 2010

■Preventing the outflow of debris into rivers



■Installation of Narrower Slit Screens

- Shirotoribashi Pump Station
- Nakajima Pump Station
- Chitose Wastewater Treatment Plant

◆Interval of Slits
40mm → 25mm

Facilities which started operation after the stop of TRWKR

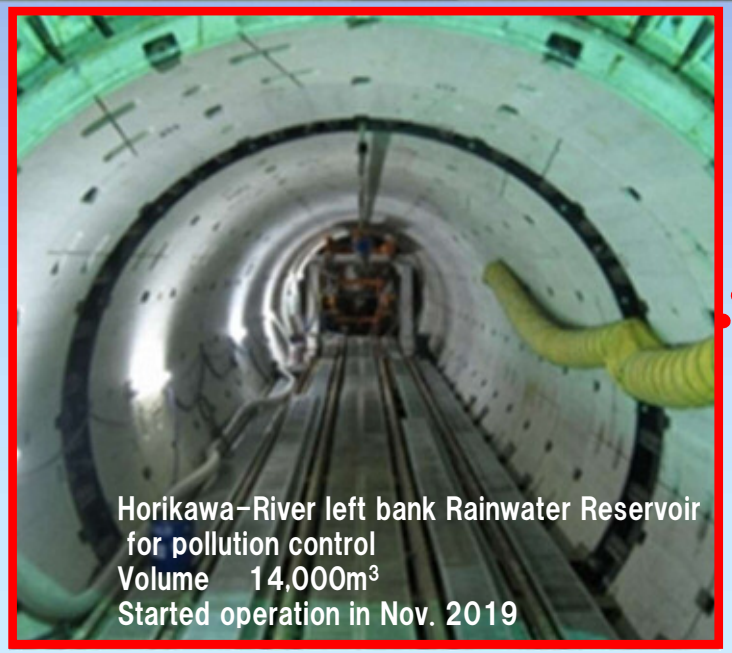
■Control of combined sewer overflow

Reduce volume and frequency of overflow from sewer outlets in rainy weather condition by temporarily store first flush of which pollution load is high

Horikawa-River right bank Rainwater Reservoir for pollution control

Volume 13,000m³

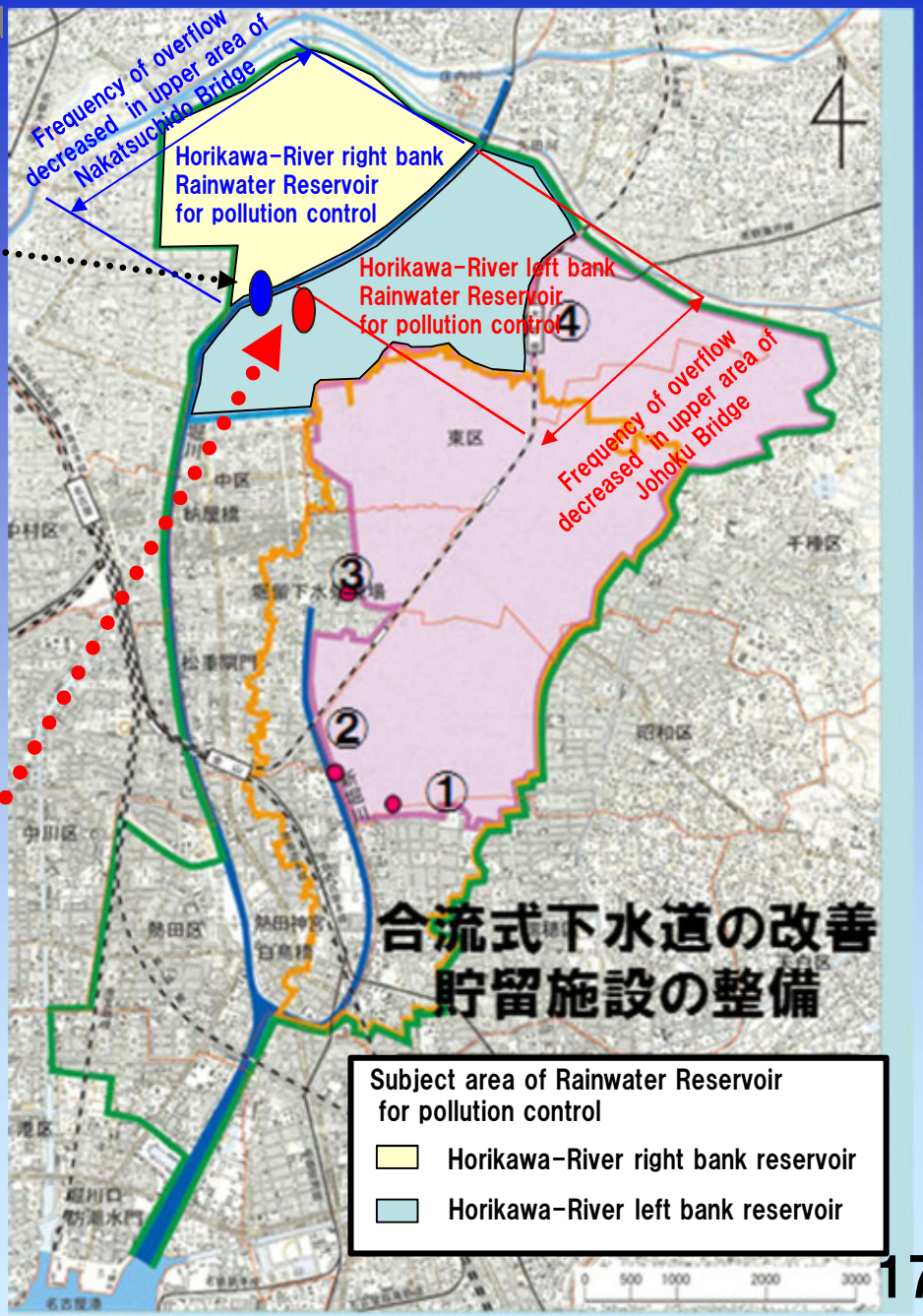
Started operation in Sep. 2010



Horikawa-River left bank Rainwater Reservoir for pollution control

Volume 14,000m³

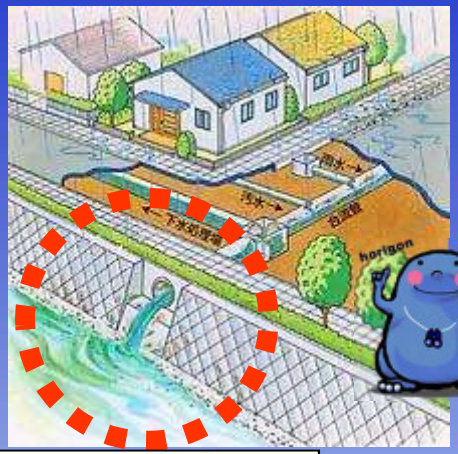
Started operation in Nov. 2019



Advanced Facility for simple treatment in Horidome Water Treatment Center

Started in Mar. 2019

Combined Sewer System in rainy day



Less than certain amount of rainwater is treated with wastewater in water treatment center, but more amount is directly discharged into the river.

Rain-water Reservoir for pollution control is the facility temporally storing the initial rainwater (="first flush" which is particularly dirty).
Accumulated rainwater in the reservoir is delivered to the water treatment center for treatment after rain stops.

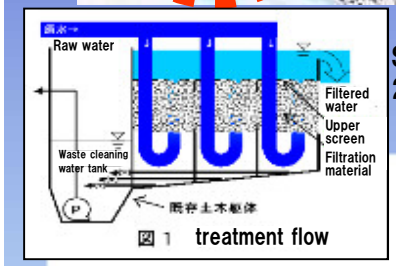
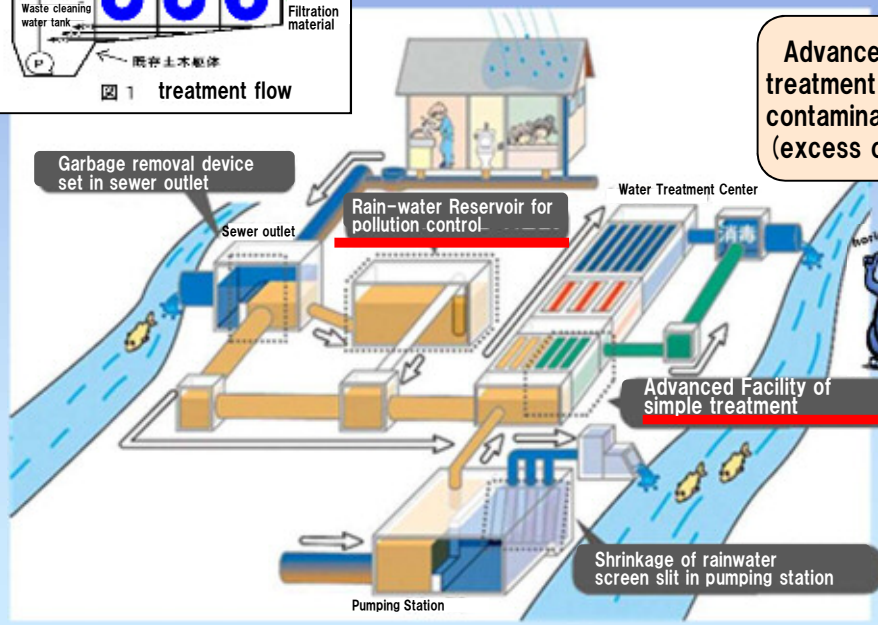


図 1 treatment flow

Source:
25th HSC Conference
(Report by Nagoya City)



Advanced Facility of simple treatment * can remove more contaminants from rainwater (excess of normal treatment).

*By replacing sedimentation tank to filtration facility, water quality improves substantially compared with conventional simple treatment.

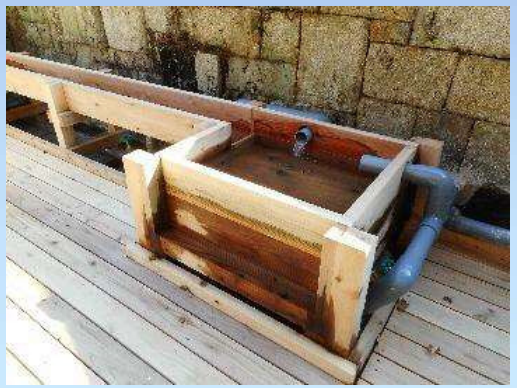
(Source) Website of Nagoya City Waterworks and Sewerage Bureau
https://www.water.city.nagoya.jp/category/mizukankyoukoujou/2096.html

Examination of using ground water for Shin-Horikawa River

- Summarize information of groundwater capable to use for Shin-Horikawa
- Review model cases of using ground water for river clarification

(reference) Well Water of Tsuruma Library

There are many water springs in basement floor of Tsuruma Library. One of springs is abundant (more than 100 litters/min. (fluctuated)) and water quality is good.



(Source) Website of Nagoya City Environment Bureau
http://www.city.nagoya.jp/kankyo/page/0000089008.html

5. 28th stage survey report

～Column～ For the clean-up and regeneration of Horikawa River

Horikawa Sen-nin Chosatai (HSC) was established on April 22nd, 2007 for clean-up and regeneration of Horikawa River, as a place for citizens' activities (Fixed Point Observation Group, Free Survey Group and Support group).
Fixed Point Observation Group examines Horikawa River to confirm the clean-up 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.
Support Group supports clean-up and regeneration of Horikawa River in various-free ways. These three groups wish for clean-up and regeneration of Horikawa River, and work together in a large network.
Currently (as of Feb.13.2021), there are 2,753 groups and 53,717 people in HSC.
(108 groups in Fixed Point Observation Groups, 40 groups in Free Survey Group and 2,605 groups in Support Group) At the time of launch of HSC, there were 165 groups and 2,262 people.
We can see that the network of citizens who wish to purify and regenerate Horikawa-River has expanded significantly.
(Reference. Survey group registration status p.7～8)

We will explain the status of activities of Fixed Point Observation Groups. The Fixed Point Observation Groups carried out 6,808 observations. It has become clear from the surveys so far that the state of the water area changes from moment to moment due to the ebb and flow of the tide at the downstream section (tidal section) from the Sanage Bridge in Horikawa River. Since Fixed Point Observation Groups made many observations from the perspective and sense of the citizens (Observation in various places, tide conditions, and time zones), we are able to grasp the average condition of the water quality of the Horikawa, and trends in that change become clear. (Reference: 3. Survey period / number of reports of survey results_p.9-10)

-Pilot project of Horikawa River clean-up "from Apr. 2007 to Mar. 2012 confirmed the effect of TRWKR"-

In 5 years pilot project of Horikawa River clean-up, it was confirmed that the range of improved water quality due to TRWKR "0.4㎥/sec" was about between Sanage Bridge and Matsushige Bridge. And in this period, it was confirmed that the amount of waste "artificial waste : plastic waste" was reduced. This is probably because the public awareness has changed due to increased cleaning activities.

【Summary of 5 years pilot project】

■Confirmed the effect of clean-up between Sanage Bridge and Matsushige Bridge due to TRWKR
■The network of citizens who wish to clean and revives the Horikawa River has been expanded
■Citizens' awareness of clean-up improved as cleaning activities became active

The weather of the 28th Stage (2021: in September (Sep.) ～ December (Dec.)) ⇒ The spread of the new coronavirus came out again from the middle of October. The activities of the HSC team were forced to carried out with prevention of confined space, dense state, close contact. So its activities were limited.
In addition, we think that evaluation of this survey is not enough at this time, for example such as study of impact for decline in social and economic activities due to new coronavirus as 27th Stage. According to further investigations, we think that it is necessary to reorganize as necessary.

(1) State of the weather (Ref: 4. Weather condition etc._p.11-16)

In the 28th stage (from September to December), the average of temperature was 16.2℃, it was 0.8℃ higher than average year. Precipitation amount was 140mm/month, as much as that in average year (121.9mm/month).

(Feature of the 28th stage weather, etc.)
- The average temperature is higher than normal.
- Precipitation amount was almost usual.

(2) Implementation of new water quality improvement measures

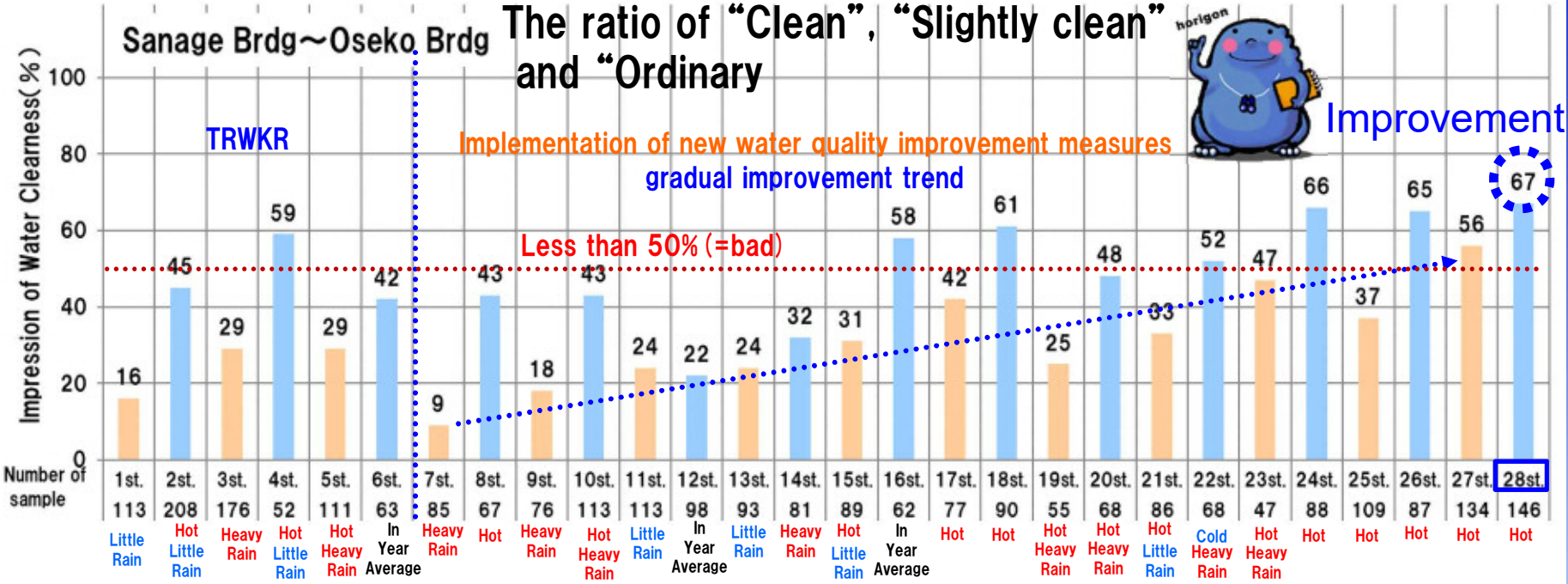
(Ref: 5. Implementation status of main water quality improvement measures_p.17-24)

After the TRWKR was stopped "Mar. 2010", new measures were implemented to improve the water quality.
Last year (2019), ninth well was dug upstream of Kurokawa No. 1 Bridge of Horikawa River to use shallow groundwater, and water conveyance to Horikawa River (0.01 m^3/s) started.
In addition, left side bank rainwater retention pond and the simple treatment advanced facility of the Meijo Water Treatment Center have started operation to improve the combined sewerage system.
Regarding to the Shinhorikawa River, dredging and sand covering of the river channel were carried out near the confluence in 2017 as a countermeasure against bad odors, and similarly, dredging of the river channel was carried out as countermeasure against bad odors in the upstream section in 2018.
And then, In March 2019, the Horidome Water Treatment Center started the operation of simple treatment advanced facility.

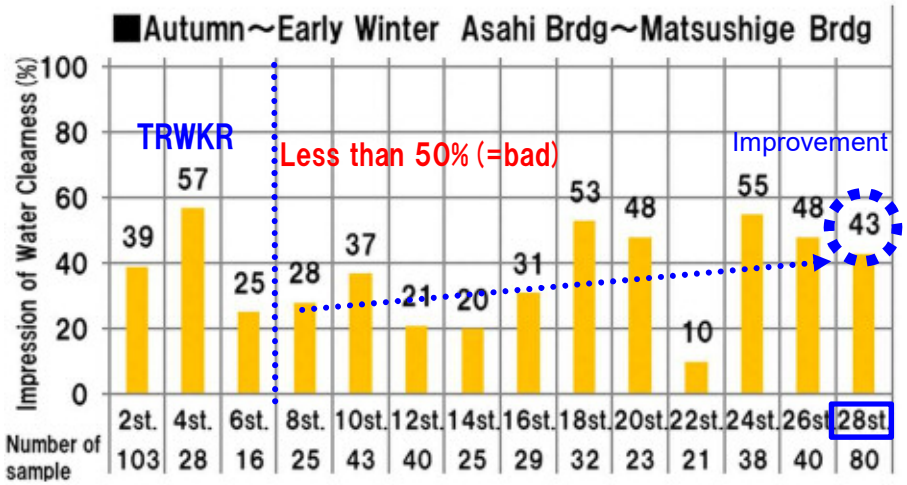
(3) Change in water quality of Horikawa River

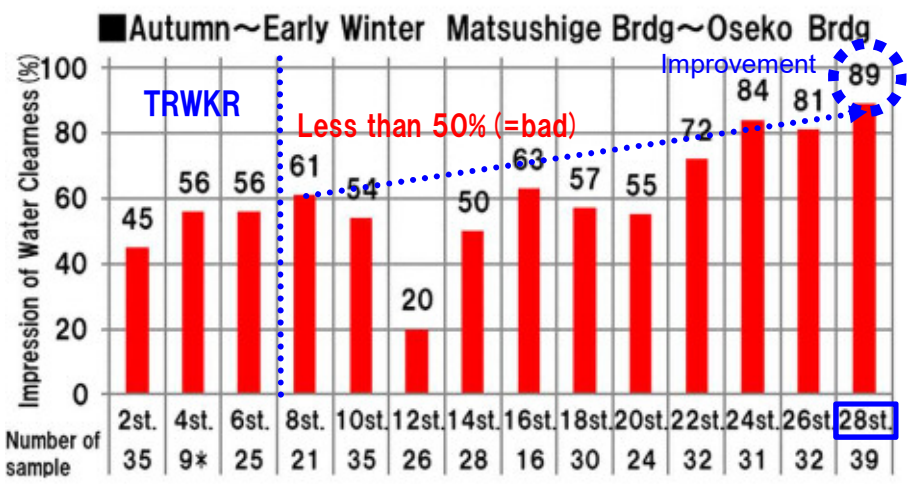
The water quality of the Horikawa deteriorated after the suspension of TRWKR. However, there is a general gradual improvement trend from the upstream, except temporal deterioration due to weather conditions, etc.
At 28 stages, there was a marked improvement tendency especially in "impression of water stains", "bubbles from the river bed" and "smell". Regarding to improvement of "impression of water stains", between Sanage Bridge and Oseko Bridge was remarkable. Especially between Matsushige Bridge and Oseko Bridge, the ratio of "good" or "neither" was totally 89%.
Also, between Sanage Bridge and Oseko Bridge, odors and sludge odors decreased, along with the decrease of "bubbles from the riverbed" and the ratio of odorlessness increased to 75%.
As we mentioned above, in the 27th stage, some clauses checked by human senses such as "smell",were improved along with the improvement of the condition of the riverbed in the middle and lower stream of Horikawa River.

Impression of Water Clearness



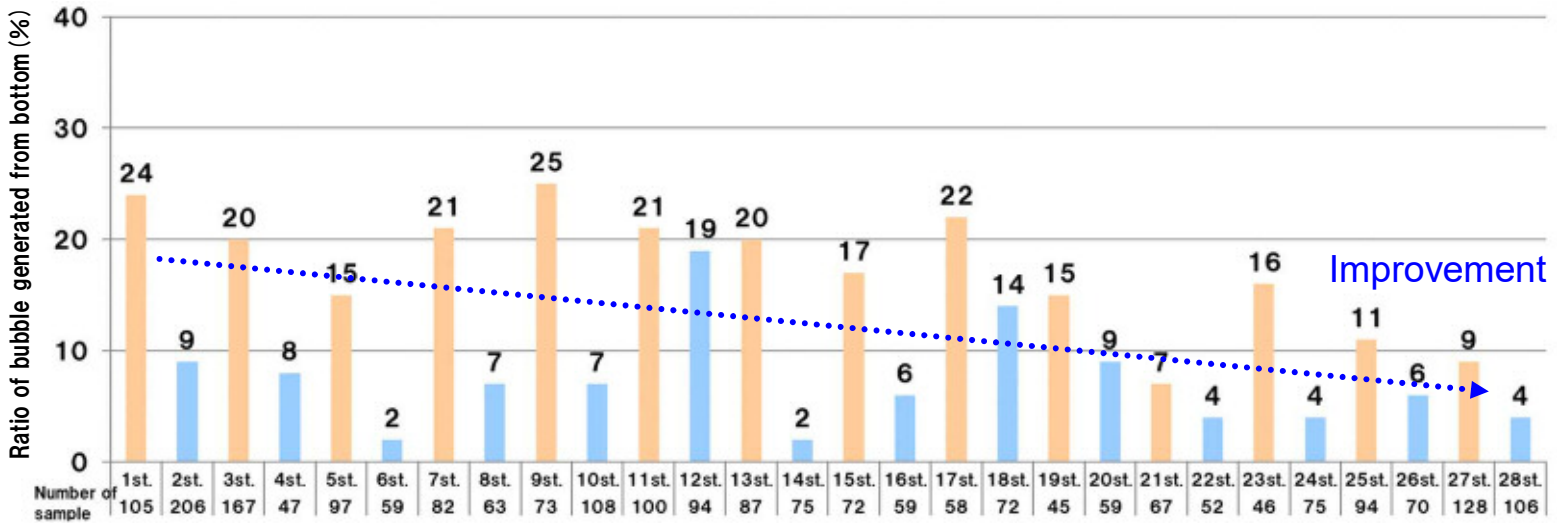
The ratio of “Clean”, “Slightly clean” and “Ordinary



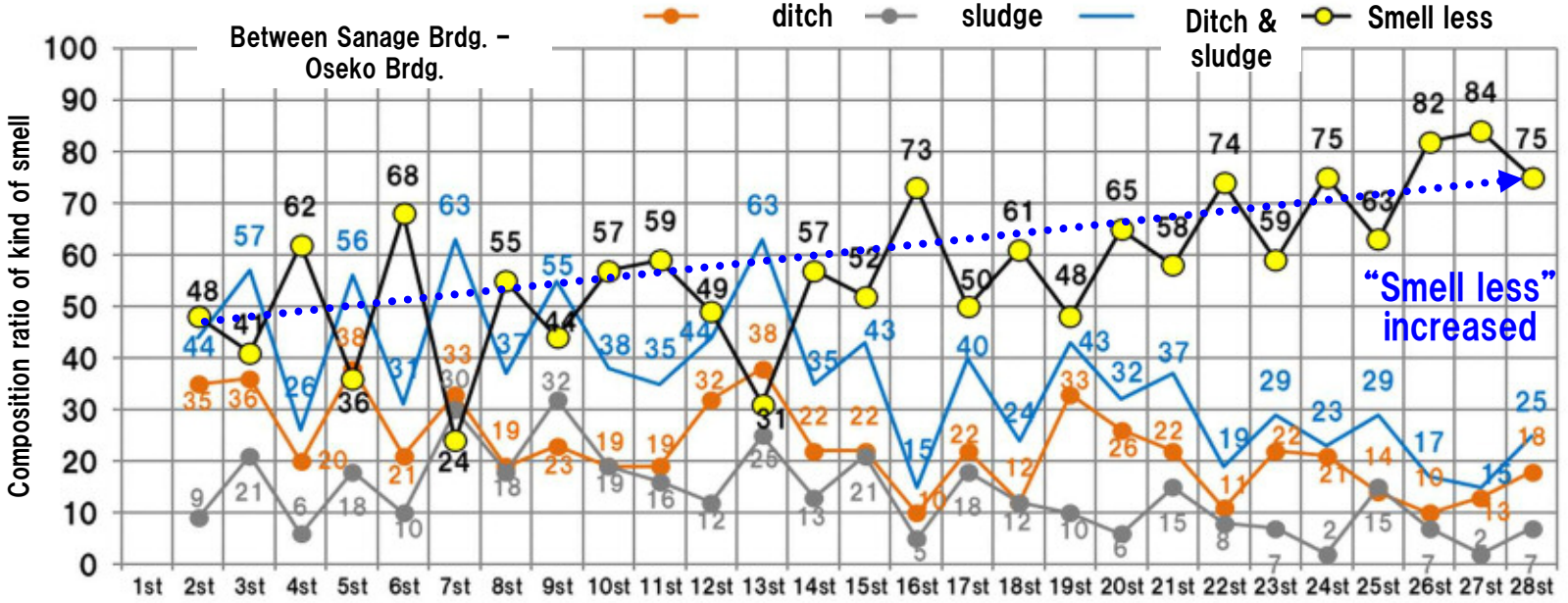


Bubble

Ratio of bubble generated from bottom



Ratio of Ditch, Sludge, Ditch & Sludge, Smell less



■ Garbage

after starting charge for plastic shopping bag, July 2020

Artificial garbage floating on Horikawa is tend to be decreased, but when will there be no garbage in Horikawa?

Some people throw out the garbage and some pick up it. It's in a cat-and-mouse game.

Floating garbage on Horikawa goes upstream and downstream with the tide, and then some sink to the bottom of the river or some float to the sea.

After starting charge for plastic shopping bag in July 2020 we've found garbage such as cups, cans, pet bottles and paper cartons floating on Horikawa with no plastic shopping bag. We guess after people buy food and drink with no plastic shopping bag because of charge for plastic shopping bag, they eat and drink at the riverside, then those garbage dropped to the river. To make matters worse plastic shopping bag with garbage has increased again. Even if plastic shopping bag is charged some people buy it.

AS a result of our continuous cleanup, awareness and survey activities of garbage we guess those who litter, leave or scatter garbage are a small handful of people and only certain people.

We think we have to send much more powerful message appealing for reduction of garbage floating on Horikawa and Shin-Horikawa to citizen. And also it's a citizen's responsibility for the issue of ocean plastic pollution including micro plastic, because the ocean plastic pollution is said to impact global environment including human.

Even though we continue to clean up,
there are same kind of garbage at the same place

A small handful people or only certain people may leave garbage.

our proposal

■Establishment of municipal bylaw for preventing littering, leaving and scattering garbage targeting particularly Horikawa and Shin-Horikawa area and for punishing non penal fine

■Setting up sign to announce the above municipal bylaw at Horikawa and Shin-Horikawa area

■Installing devices to prevent garbage from falling to the river

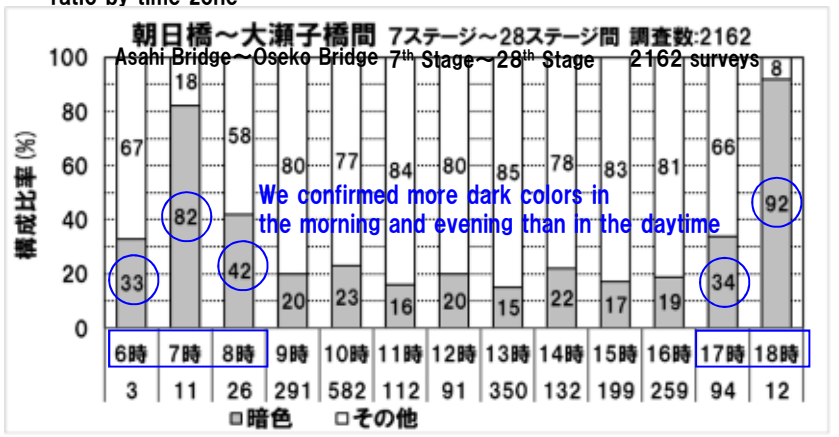
(4) The reason why color of water look black

(ref:6.2.9. The reason why color of water look black p.85～92)

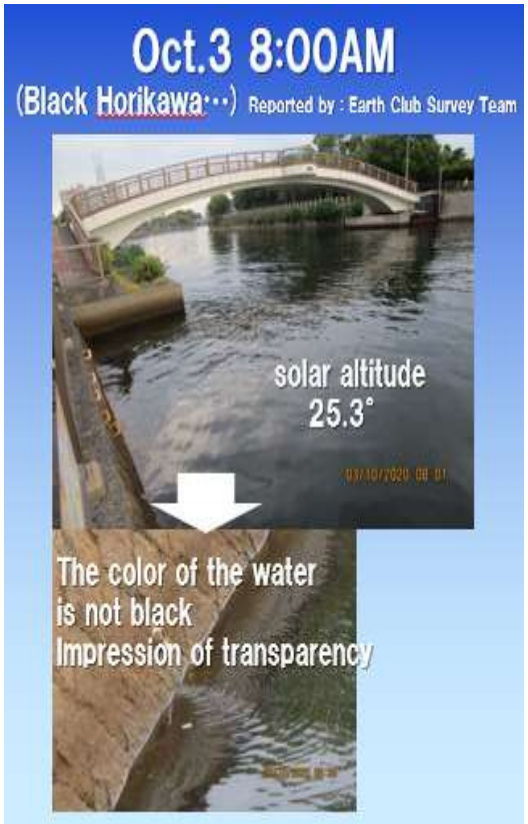
During 28th stage of Horikawa-river, reports of transparency impression" were increased. On the other hand, we received some reports of impression which means "the color of water looks black".

Although we are still in the hypothetical stage, if water is clear and not white turbidity , it is difficult for the light to reach the depth of the water when the sun is low or the sunlight is blocked by clouds or buildings. And then bottom layer looks blackish. When it can be seen through, someone think that the water surface looks black overall.

Dark color composition ratio by time zone



Relationship between transparency and dark color composition ratio (morning/evening) 6:00AM-8:00AM, 17:00PM-18:00PM



(Hypothetical)
The color of the water is not black and we confirmed its impression of transparency. But why does the surface look black?

When the water surface looks black (dark color)

■Water that is not cloudy and has transparent impression
■When it is difficult for sunlight to reach the water
Low solar altitude → morning, evening

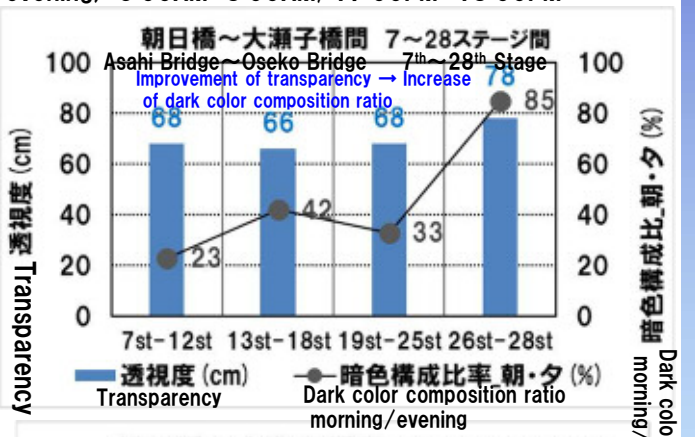
When the solar altitude is low, it is difficult for light to reach the depth of the water.

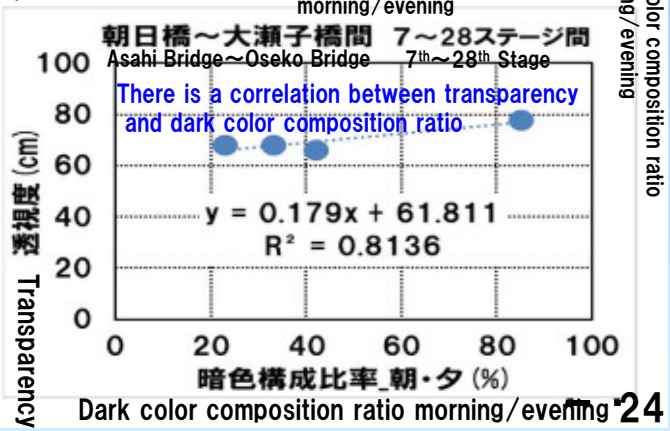
the water surface looks black

Water that is not cloudy and has transparent impression

"The part that the light does not reach" is blackish color (dark color).

■When the sunlight is weak
→ When the sunlight is blocked by clouds or buildings





Dark color composition ratio morning/evening

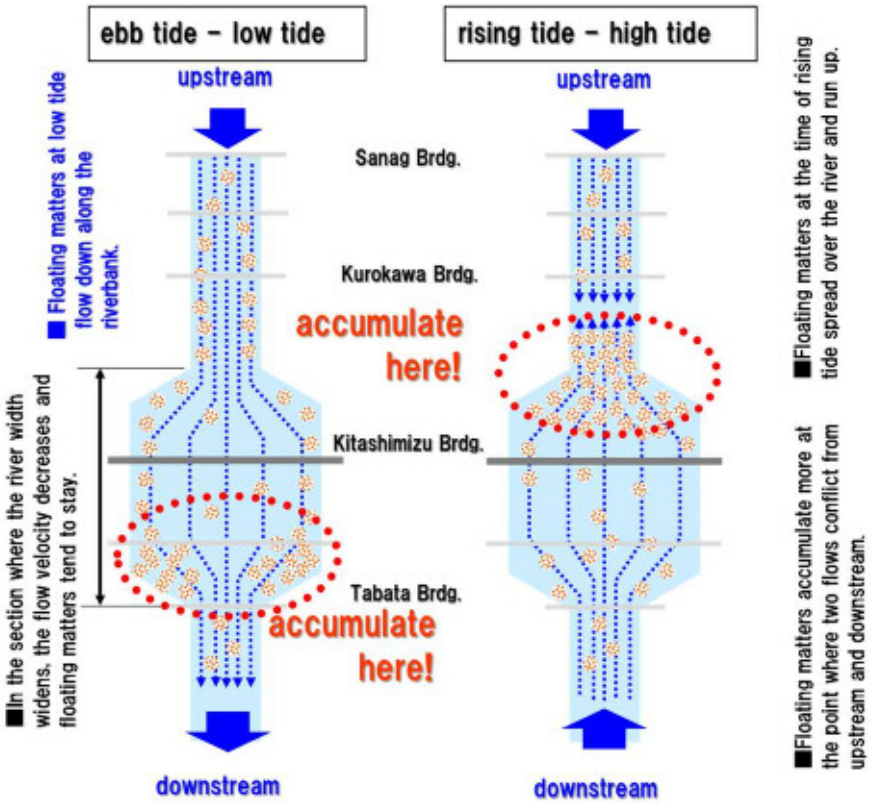
(5) Floating garbage accumulating and moving around Kita-Shimizu Bridge

It is reported that floating matters are accumulating around Kita-Shimizu Bridge and they move upstream and downstream. We investigated its tendency from the pictures HSC took since 2015.
And we found that floating matters are likely to accumulate in wider sections because flow velocity decreases and floating matters repeatedly move and accumulate due to the tide.

■ New findings on floating matters ■

< At the section where the river width widens >
The flow velocity decreases and floating matters stay easily.
Floating matters repeatedly move and accumulate due to the tide.

Floating matters tend to settle and accumulate on the riverbed in the section where the river width is widened.



(6) 12th Simultaneous Survey on Horikawa River

■ Relationship between ship operation frequency and riverbed environment ■

As the ship operations increases more frequently, the water and sludge of the river are regularly agitated, and oxygen is supplied to the riverbed. This improves the environment at the bottom of the river and every aspect of Horikawa River.
In this survey, it was confirmed that the impression of water, transparency, COD, color, bubbles, and odor tend to improve as the frequency of ship operations increases. We believe ship operation has improved the environment of riverbed. It is necessary to continue the investigation.

item	year	2019		2020	
	ship operation	5 days in 2 weeks		8 days in 4 weeks	
	month	Oct.	Dec.	Oct.	Dec.
impression of clearness "clean - ordinary"		56% → 30%		57% → 89%	
		26%down		32% up	
transparency		93cm → 70cm		88cm → 92cm	
		23cm down		4cm up	
COD		9mg/L → 8mg/L		9mg/L → 5mg/L	
		1mg/L down		4mg/L down	
colour "milky"		17% → 20%		43% → 19%	
		3% down		24% down	
bubbles "from the riverbed"		0% → 10%		13% → 4%	
		10% up		9% down	
odor "no smell"		76% → 70%		78% → 92%	
		6% down		14% up	

(6) Changes two years after sludge dredging of Shin-Horikawa River

Sludge dredging was carried out as a measure against bad odors for Shin-Horikawa River in 2017 and 2018. We compared the result of before and after dredging in the upstream.

Data)
Horagai Bridge - Maizuru Bridge
before dredging 24th stage 76data
after dredging 26th(100data)&28th(45data) stage

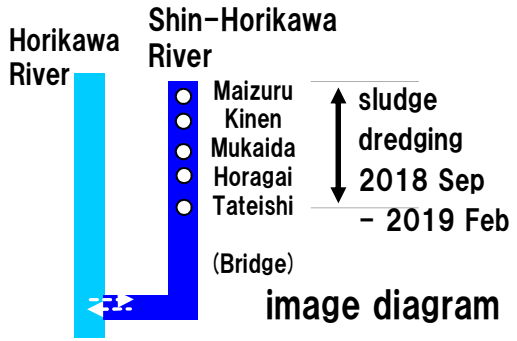


image diagram

State of foraging of mullet

Foraging of duck friends

2 years after dredging (28th stage)

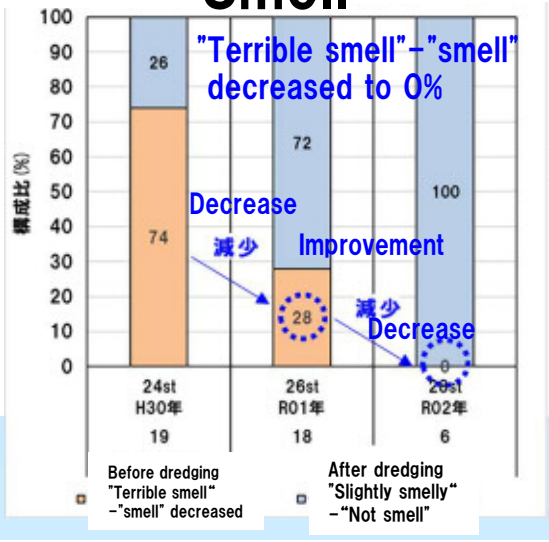
Improvements in "millet," "smell," and "color" were confirmed near Mukaida Bridge, and changes were also seen in the ecological environment of the entire basin.

■Confirmed improvement near Mukaida Bridge
① "I can't say either"-"clean" increased(0%→17%)
② "Foam from the bottom of the river" was not confirmed
③ "Terrible smell"-"smell" decreased to 0%
④ "Odorless" increased and "rotten egg odor" was not confirmed
⑤ "White turbidity" was not confirmed

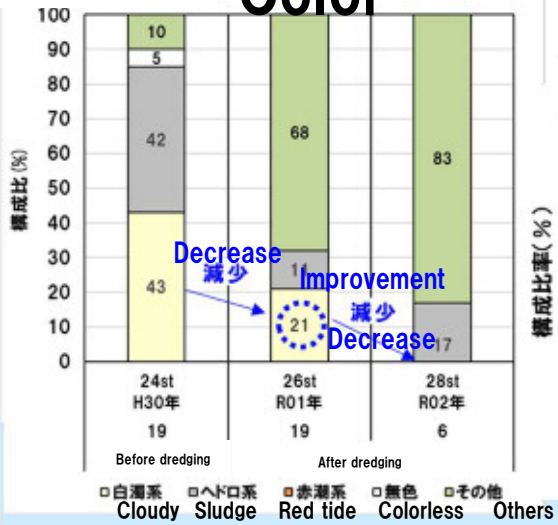
■Changes in the ecological environment of the entire river
① Confirmation of winter bird ducks in the whole river
② Confirmed the run-up of the mullet of 30 cm to 40 cm
→ Ecological environment restored (=Expected to recover self-cleaning effect)

Reduction of organic matter in water and riverbed
↓
Hypoxia improved
↓ ↑
Reduced odor and cloudiness (Reduced sulfide)
↓
Improved transparency
↓
Algae grow
↓
Ecological environment restored (=Expected to recover self-cleaning effect)

Mukaida Bridge **Smell**

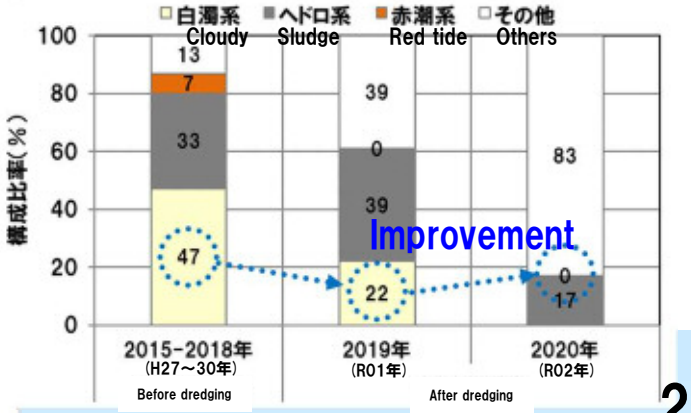


Mukaida Bridge **Color**



ECO-doco応援隊
fixed point observation at Mukaida Bridge
http://www.eco-doco.jp/meiko_line/html/01.html
:2014 Oct. -2020 Dec.

Color Autumn-early winter (Sep.-Dec.)



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 photos 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.