Conference on Watershed Management for
Controlling Municipal Wastewater in South East Asia

Session1: Overview of the Water Environment Standards and Effluent Standards and its Implementation

Japan

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Masaki SUEHISA
Deputy Director, Water Environment Division
Environment Management Bureau, Ministry of the Environment, Japan

Mt. Fuji & Lake Kawaguchiko (Yamanashi)

1. HISTORY AND FRAMEWORK OF WATER ENVIRONMENT POLICY

Geibikei(Iwate)

Problem：Deterioration of water in public water body

Sumida river in early 70's (Tokyo)

Dokai bay in '60s (Kitakyushu city)

Tama River in '70's (Tokyo)

Framework of the Measures of Water Environment Improvement

Target

Establishment of Environmental Quality Standard
【Environment Basic Law 】

National government

Measures for Industrial Wastewater

・Establishment of Effluent Standard
【Water Pollution Control Law】
Uniform Effluent Standard

National government

・More Stringent Effluent Standards 【Water Pollution Control Law】
・Regulations for the Private Companies 【Water Pollution Control Law】
Notification ,Measure and log pollution status of effluent, On-site inspections
→Penalty, Order remedy, other administrative directions

Local government (Prefecture)

・Investment to pollution control
・Development of human capacities etc.

Private company

Measures for Domestic Wastewater

・Construction of sewerage 【Sewerage Law 】
・Installation of *Johkasou* 【*Johkasou* Law 】 etc.

・National government
・Local government
・Individual

Environmental Quality Standards for Water

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Water Pollution

Toxic substance

Mercury, Arsenic, Chlorinated organic compound, etc

Organic Pollution etc

Dirtiness and muddiness of water
BOD/COD, DO, SS etc

Nutrient salts

Causality of eutrophication
Nitrogen, Phosphorus

Effect on people
(Drinking/seafood intake)

Effects on aquatic life

Environmental Quality Standards (EQS)

Health Item

- Nationally uniform
- 27 substances designated

Living Environment Item

- Designed to conserve the properties as well as the fauna and flora closely related to the living of people
- Set targets by categorizing into classes in accordance with water bodies
- 12 substances designated

Items of EQS for Water(1/2)

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Health items (Public water areas)

Item	Standard Value
Cadmium	0.003 mg/L or less
Total cyanide	Undetected
Lead	0.01 mg/L or less
Hexavalent chromium	0.05 mg/L or less
Arsenic	0.01 mg/L or less
Total mercury	0.0005 mg/L or less
Alkylmercury	Undetected
PCB	Undetected
Dichloromethane	0.02 mg/L or less
Carbon tetrachloride	0.002 mg/L or less
1,2-dichloroethane	0.004 mg/L or less
1,1-dichloroethylene	0.02 mg/L or less
cis-1,2-dichloroethylene	0.04 mg/L or less
1,1,1-trichloroethane	1 mg/L or less
1,1,2-trichloroethane	0.006 mg/L or less
Trichloroethylene	0.01 mg/L or less
Tetrachloroethylene	0.01 mg/L or less
1,3-dichloropropene	0.002 mg/L or less
Thiuram	0.006 mg/L or less
Simazine	0.003 mg/L or less
Thiobencarb	0.02 mg/L or less
Benzene	0.01 mg/L or less
Selenium	0.01 mg/L or less
Nitrate nitrogen & Nitrite nitrogen	10 mg/L or less
Fluoride	0.8 mg/L or less
Boron	1 mg/L or less
1,4-Dioxane	0.05mg/ or less

Items of EQS for Water(2/2)

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Living environment items (Public water areas)

	River	Lake	Sea Area
BOD	≤ 1 - 10 mg/L	-	-
COD	-	≤ 1 - 8 mg/L	≤ 2 - 8 mg/L
pH	6.0 - 8.5	6.0 - 8.5	7.0 - 8.3
SS	≤ 25 - 100 mg/L etc.	≤ 1 - 15 mg/L etc.	-
DO	2-7.5 mg/L ≤	2-7.5 mg/L ≤	2-7.5 mg/L ≤
Bottom Layer DO	-	2.0-4.0 mg/L ≤	2.0-4.0 mg/L ≤
Coliform bacteria count	≤ 50 - 5,000 MPN/100 mL	≤ 50 - 1,000 MPN/100 mL	≤ 1,000 MPN/100 mL
N-hexane extracts	-	-	Undetected.
Total nitrogen	-	≤ 0.1 - 1 mg/L	≤ 0.2 - 1 mg/L
Total phosphorous	-	≤ 0.005 - 0.1 mg/L	≤ 0.02 - 0.09 mg/L
All zinc	≤ 0.03 mg/L	≤ 0.03 mg/L	≤ 0.01 - 0.02 mg/L
Nonyl phenol	≤ 0.0006～0.002mg/L	≤ 0.0006～0.002mg/L	≤ 0.0007～0.001mg/L
LAS	≤ 0.02～0.05mg/L	≤ 0.02～0.05mg/L	≤ 0.006～0.01mg/L

Monitoring System

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Public waters (river, lake, sea) about 9,000 spots throughout the country (environmental standards points, etc.) and the water quality in ground water is monitored.

- ◆ Understanding of the water quality characteristics of water area
- ◆ Understanding of long-term changes & water quality trends
- ◆ Early detection of water pollution

→

- ◆ Achievement & maintenance of environmental standard for water quality
- ◆ Implementation of environmental protection measures
- ◆ Response to water pollution incidents

Government ordinance city

(Water quality measurement in the government ordinance city)

- ◆ Water quality measurement
- ◆ Results of water quality measurements

Adjustment

Prefecture

(Water quality measurement of river, lake, sea and underground water)

◆Formulation of water quality measurement plan

Formulated in order to coordinate with the Ministry of Land, Infrastructure and Transport and government ordinance city and to effectively conduct continuous monitoring of water quality.

Consultation

Ministry of Land, Infrastructure and Transport

(Water quality measurement of the main parts of first-grade rivers)

- ◆ Water quality measurement
- ◆ Results of water quality measurements

◆Water quality measurement

- Health items (cadmium, all cyanogen, etc.)
- Living environment items (BOD, COD, all zinc, etc. of aquatic life item,)

Obtaining water

Sampling

Analysis

Sending results

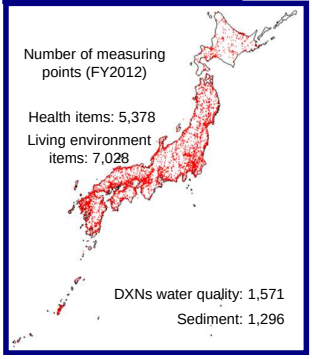
Sending results

◆Summarizing the results of water quality measurement

- Response to a water pollution incident
- Response to the excess of environmental quality standards or the water areas that fails to achieve environmental quality standards

Official announcement

Distribution of water quality measuring points in public waters throughout the country



Direction, notice, technical advice required for the continuous monitoring of water quality

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- ◆ Decision of Environmental Conservation Measure
- ◆ Formulation of a Basic Environment Plan
- ◆ Environmental Quality Standards, effluent control
- ◆ Analytical method, research method
- ◆ Transaction standards for continuous monitoring, etc.
- ◆ Response to water pollution incident

Reporting the results

Official announcement

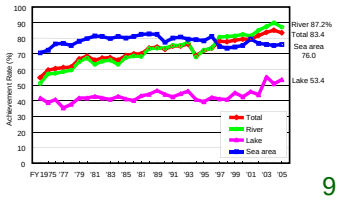
Collection & analysis of water quality data of the country and database creation

Information disclosure

◆ White paper ◆ Homepage ◆ Results of water quality measurement

Water environmental synthesis information site
http//www.env.go.jp/water/mizu.site/index.html

Transition of the status of achievement of environmental quality standards (BOD or COD)



3. MEASURES FOR INDUSTRIAL WASTEWATER

Lake Towada (Aomori)

EQS and Effluent standards for water

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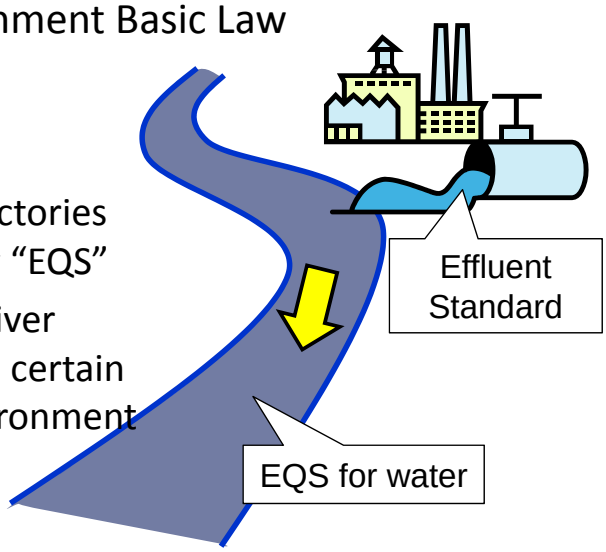
Environmental Quality Standard (EQS)

- Established as part of the government's objectives (standards that are to be followed) to prevent health hazards and conserve the living environment" by the Environment Basic Law

Effluent standards

- "Effluent Standards" are applied on factories and establishments in order to satisfy "EQS"
- In consideration of dilution effect by river water, an effluent standard value for a certain item is decided as **10 times** as an environment quality standard for the same time.
- For some specific business categories that face difficulty to meet the uniform effluent standard for a specific item, **a provisional effluent standard** is applied by specifying a time limit



Effluent standards for water

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【Living environment item】

Kinds of harmful substances	Tolerable limit
Hydrogen ion concentration (pH)	Other than sea area: 5.8 – 8.6 Sea area: 5.0 – 9.0.
Biochemical oxygen demand (BOD)	160 mg/L (Daily mean value: 120 mg/L)
Chemical oxygen demand (COD)	160 mg/L (Daily mean value: 120 mg/L)
Suspended solids (SS)	200 mg/L (Daily mean value: 150 mg/L)
Normal-hexane extracts content (mineral oils content)	5 mg/L
Normal-hexane extracts content (animal and plant fats content)	30 mg/L
Phenols content	5 mg/L
Copper content	3 mg/L
Zinc content	2 mg/L
Soluble iron content	10 mg/L
Soluble manganese content	10 mg/L
Chromium content	2 mg/L
Coliform group number	Daily mean value: 3,000/cm^3
Nitrogen content	120 mg/L (Daily mean value: 60 mg/L)
Phosphorus content	16 mg/L (Daily mean value: 8 mg/L)

Note
The effluent standard shown in this table is applicable to the effluent water discharged by a plant, factory, or business establishment which discharges 50m3/day or more of effluent water on daily average.

【Health item】

Kinds of harmful substances	Tolerable limit
Cadmium and its compounds	0.03 mgCd/L
Cyanide compounds	1 mgCN/L
Organic compound (limited to parathion, methyl parathion, methyl demeton and EPN (ethyl p-nitrophenyl phenylphosphorothioate))	1 mg/L
Lead and its compounds	0.1 mgPb/L
Hexavalent chromium compounds	0.5 mgCr^{6+}/L
Arsenics and its compounds	0.1 mgAs/L
Mercury and alkyl mercury, and other mercury compounds	0.005 mgHg/L
Alkyl mercury compounds	Not detected
Polychlorinated biphenyl	0.003 mg/L
Trichloroethylene	0.1 mg/L
Tetrachloroethylene	0.1 mg/L
Dichloromethane	0.2 mg/L
Carbon tetrachloride	0.02 mg/L
1,2-dicholoroethane	0.04 mg/L
1,1-dichloroethylene	0.2 mg/L
cis-1,2-dichloroethylene	0.4 mg/L
1,1,1-trichloroethane	3 mg/L
1,1,2-trichloroethane	0.06 mg/L
1,3-dichloropropene	0.02 mg/L
Thiram	0.06 mg/L
Simazine	0.03 mg/L
Thiobencarb	0.2 mg/L
Benzene	0.1 mg/L
Selenium and its compounds	0.1 mg/L
Boron and its compounds	Other than sea area: 10 mgB/L Sea area: 230 mgB/L
Fluorine and its compounds	Other than sea area: 8 mgB/L Sea area: 1 mgB/L
Ammonia, ammonium compounds, nitrite compounds and nitrate compounds	(*) 100 mg/L
1,4-dioxane	0.5mg/L

(*) 0.4 times the ammonia nitrogen compound, and the total of nitrite nitrogen and nitrate nitrogen

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Check Points in on-site Inspection

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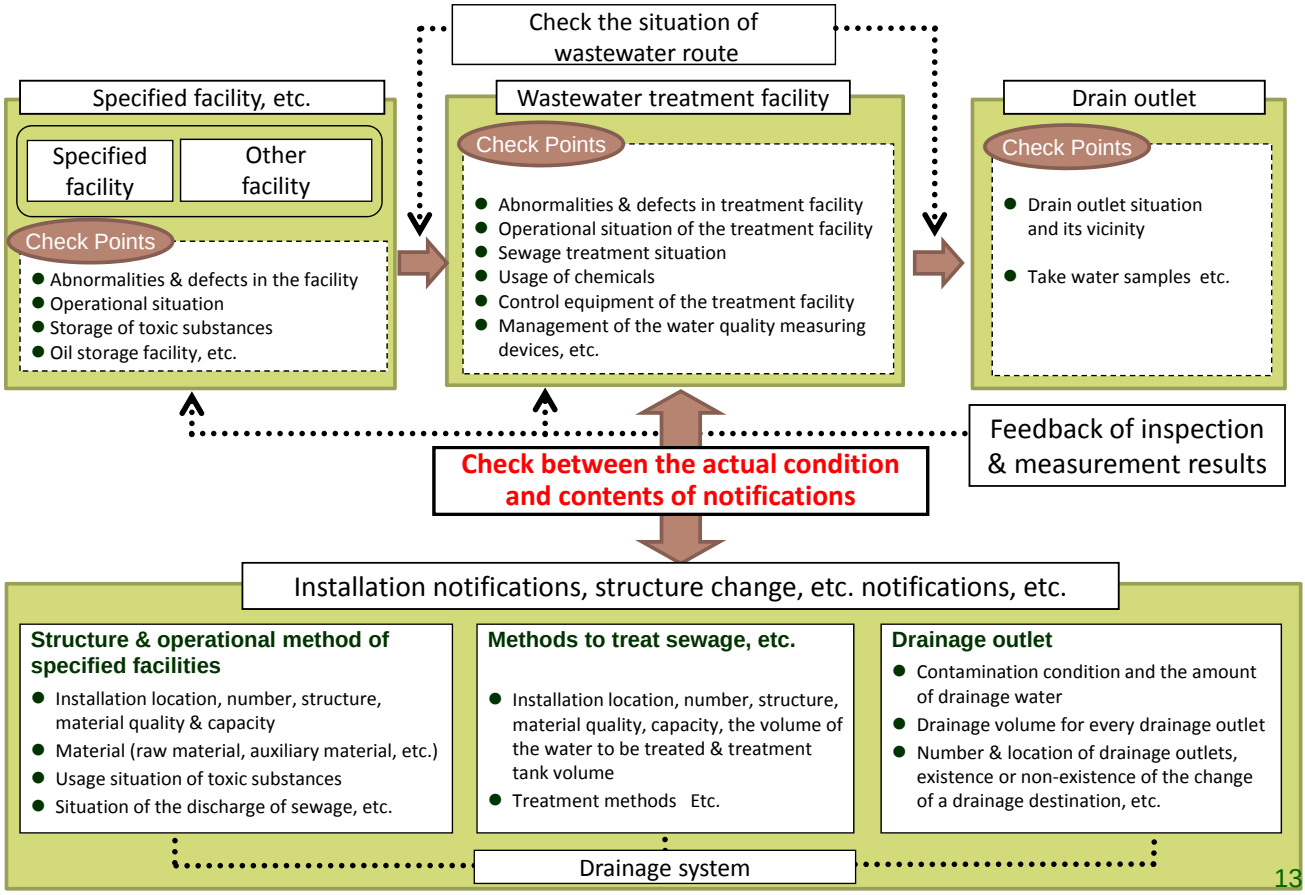

Enforcement status of water pollution control law

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		2010	2011	2012	2013	2014
No. of specified establishments		271,242	266,860	271,168	269,847	267,328
average effluent more than 50㎥/day		33,964	33,529	330,667	32,589	32,381
Notification	Article 5（Establishment of Specified facilities）	5,307	4,989	6,598	5,786	6,026
	Article 7（Structure changes etc.）	3,539	3,924	4,427	4,105	5,006
	Article 8（Order to change plans）	0	0	0	0	0
No of establishments inspected（Article 22.1）		41,260	38,882	43,135	39,490	41,110
inspection during night		588	587	491	465	510
Order for Improvement（Article 13）		16	12	14	11	8
Order to suspend operation（Article 13）		0	0	1	0	3
Order to purify groundwater（Article 14.3）		0	0	0	0	0
Number of administrative direction	in writing	2,880	2,761	2,650	2,503	2,556
	Oral	5,095	4,826	5,432	4,753	4,981
	Total	7,975	7,587	8,082	7,256	7,537
Contents of administrative direction	Installation or improvement of wastewater treatment facilities	2,206	2,474	2,145	1,946	2,192
	temporary suppression of effluent	28	30	16	7	20
	Others	6,010	5,342	6,169	5,613	5,651
	total	8,244	7,846	8,330	7,566	7,863
Violation of effluent standards（Article 31.1.1）		11	8	6	4	4
Violation of order for improvement（Article 30）		0	0	0	0	0
Violation of water pollution control law (others)		0	0	0	0	0
Measures to be taken in case of an accident		433	504	540	565	557

Kinds of wastewater treatment facilities

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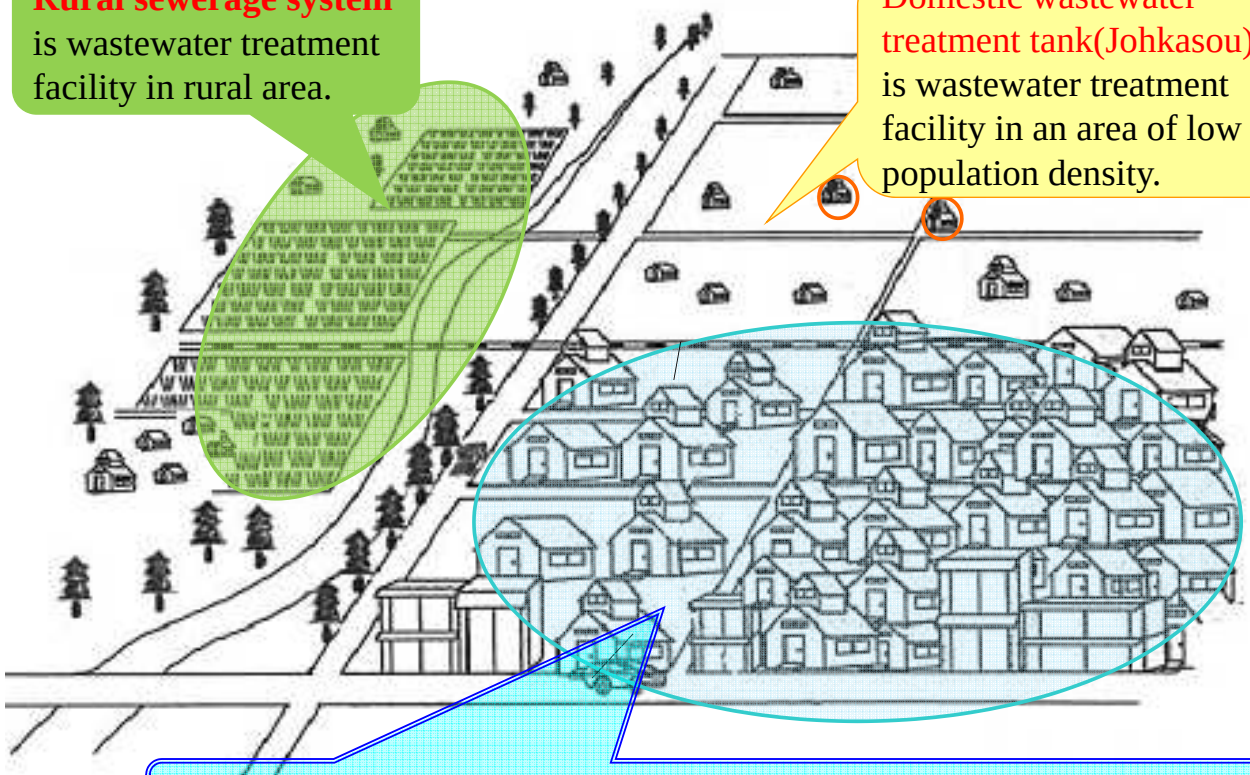
Rural sewerage system is wastewater treatment facility in rural area.

Domestic wastewater treatment tank(Johkasou) is wastewater treatment facility in an area of low population density.



Sewerage system is wastewater treatment facility in urban area.

Pattern Diagram of a Small Septic Tank (FRP)

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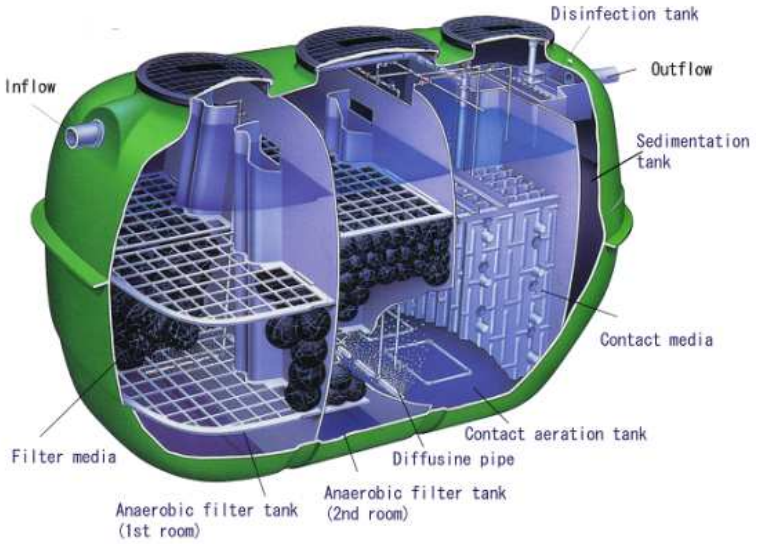
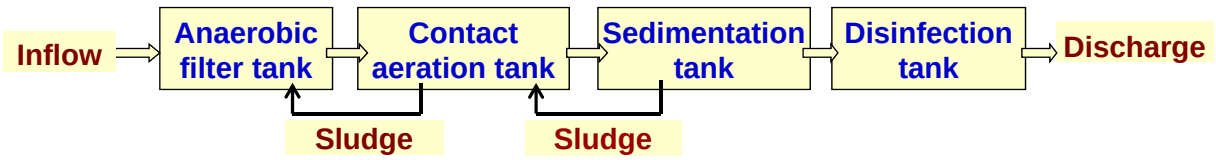
Johkasou

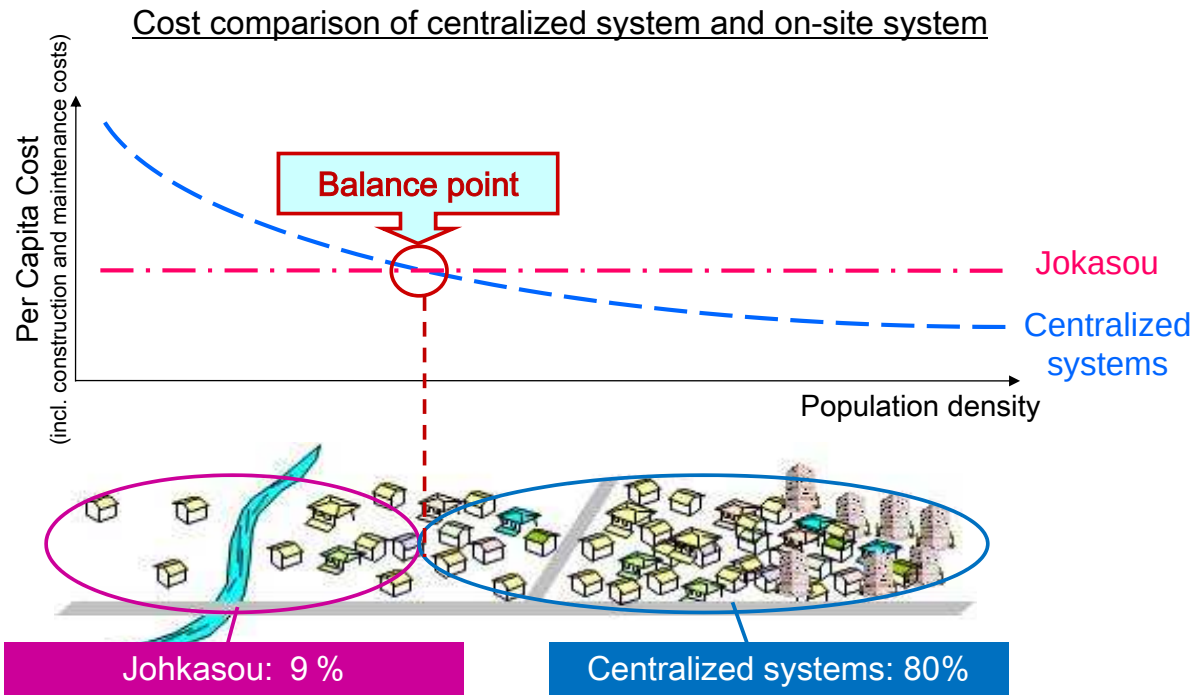


An example of small-scale johkasous

Treated water quality BOD ≤ 20 mg/L



Japan's share of domestic wastewater treatment facilities



Coverage of the population using domestic wastewater treatment facilities (2013)

5. WATER ENVIRONMENT IMPROVEMENT IN JAPAN AND REMAINING CHALLENGES

Mt. HiuChigatake & Oze Pond (Gunma)

Water Quality Improvement in Dokai Bay, Kitakyushu

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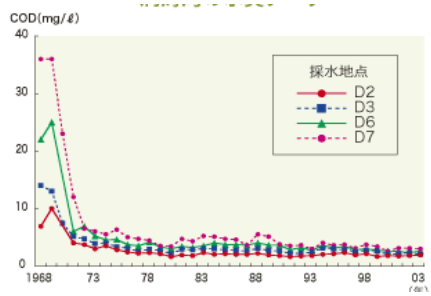
- A miracle city recovering from the “Dead Sea”

“Dead Sea” where fish cannot live

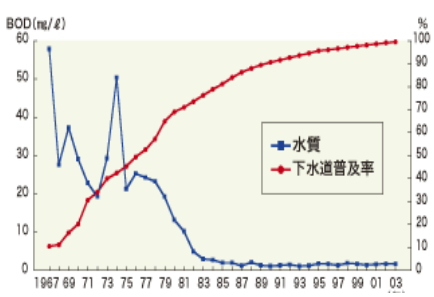
Dokai Bay has recovered



Monitoring data in Dokai bay

Illegal construction along a river

A river as a symbol of the city with water-attracting space

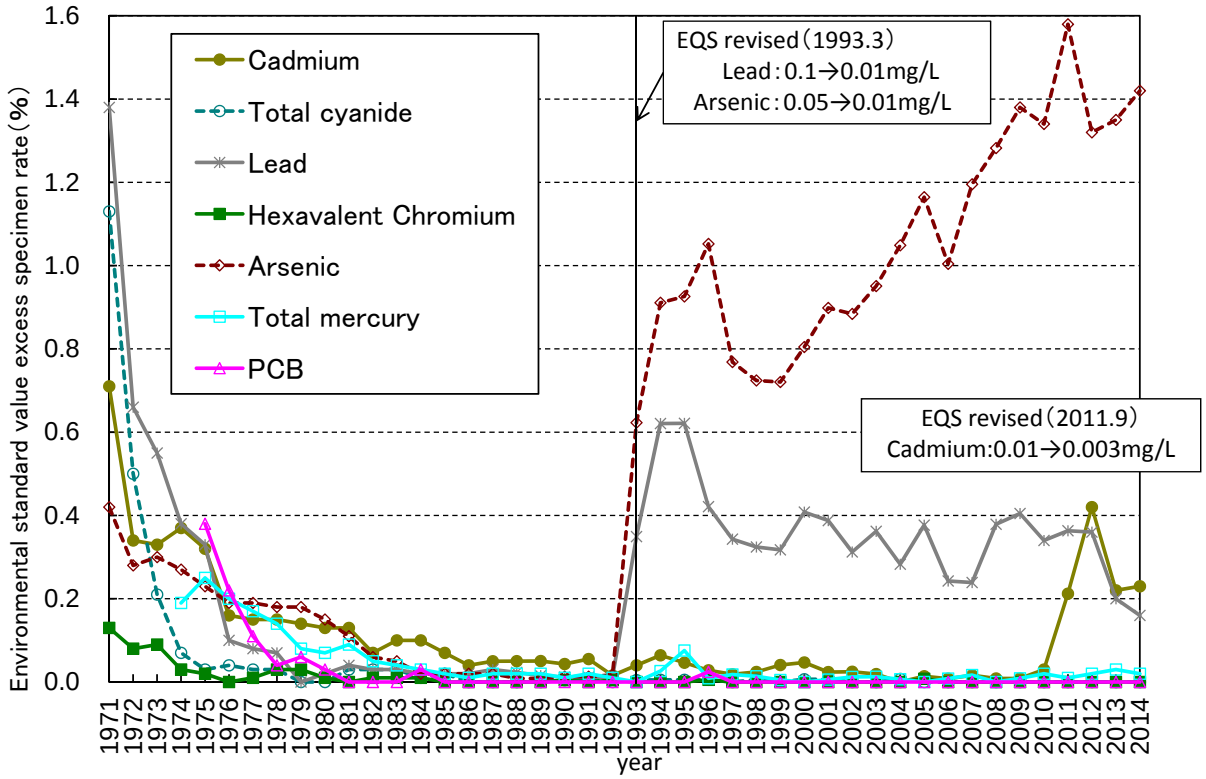


Water quality in Murasaki River and Sewerage coverage ratio

Source: Web site of Kitakyushu city

State of Achievement of Environmental Standard

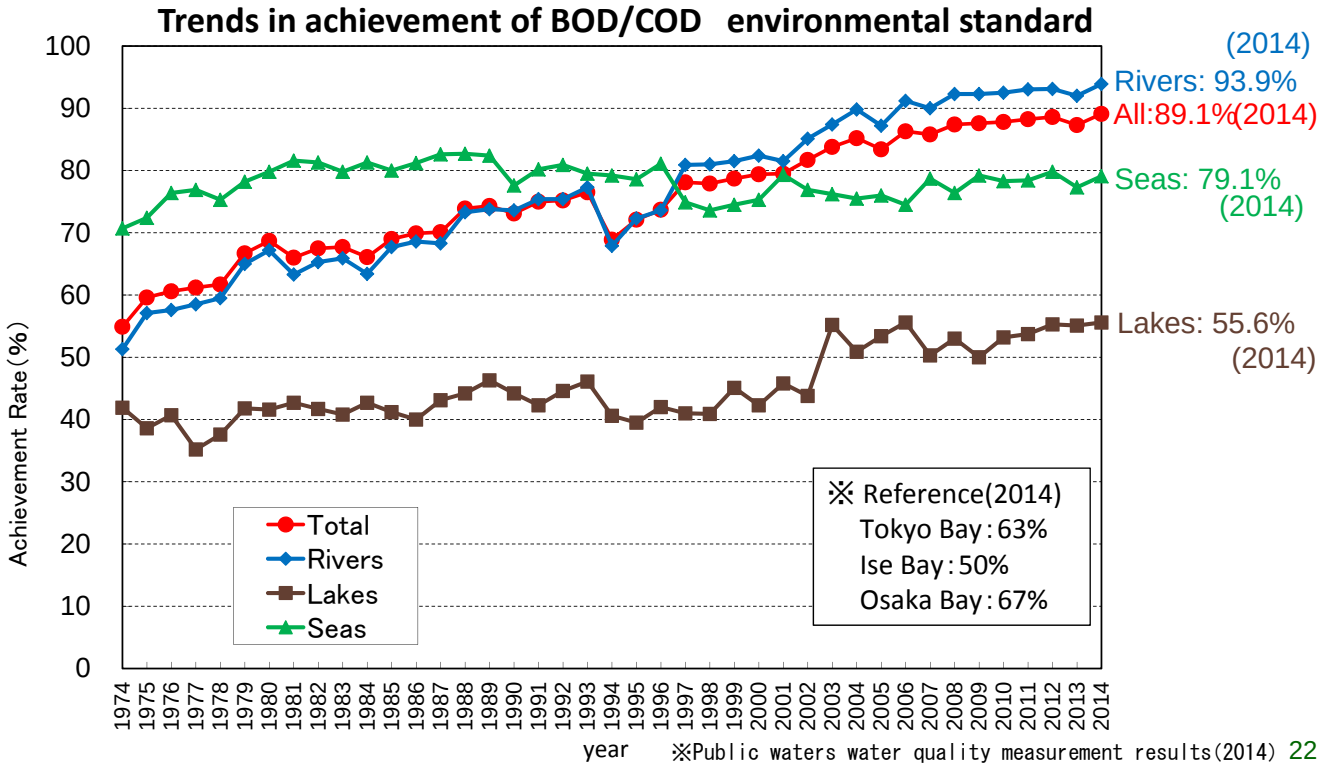
- **Health Items**:
  Achieved Environmental standard almost over the country



※Public waters water quality measurement results(2014)

State of Achievement of Environmental Standard

- **Living Environment Items:**
  Improvement tendency as a whole, but still low achievement rate in enclosed water area such as lakes and inland seas



※Public waters water quality measurement results(2014)

Concept of Water Environment Management

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1.Target Setting for Water Environmental Conservation
(Establishment of Ambient Water Quality Standard)

2.Understanding of State of Water Quality
(Planning, Implementation and Evaluation of Water Quality Monitoring)

3.Identification of Pollution Source
(Evaluation of Pollution Load from Different Sectors)

4.Implementation of Pollution Control Measures

・Regulations for the Private Companies
→Effluent standard,Penalty, Order remedy, etc…

・Planning and Construction of Waste Water Treatment System (Sewerage, Johkasou)

5.Evaluation of Control Measures and Policy Review

Water Quality Improvement in Tama River, Tokyo

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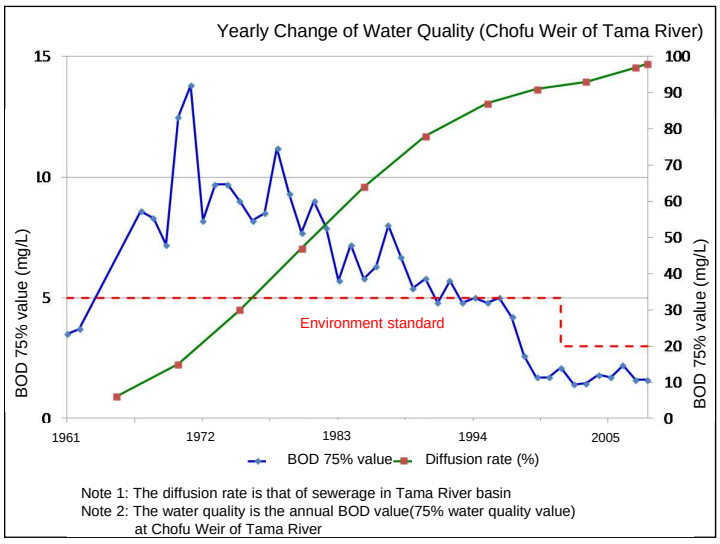
- Water quality in Tama river has been improved by the progress of sewage construction, resulting in creation of good water environment



Note 1: The diffusion rate is that of sewerage in Tama River basin
Note 2: The water quality is the annual BOD value(75% water quality value) at Chofu Weir of Tama River

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Thank you for your attention
Kinkakuji Temple(Kyoto)