Presentation at the WEPA International Workshop

Water Pollution Control in Japan
- Its Concept, Framework and Examples

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Teruyoshi HAYAMIZU

Vice Chair
Geo-Environmental Protection Center (GEPC)

(Note) Materials for this presentation are prepared by the speaker, or based on those provided by the Ministry of the Environment of Japan (MOEJ) and modified by the speaker as appropriate. Views shown here are those of the speaker.

Background of the Speaker

- Majored in chemical engineering at the University of Tokyo and the Graduate School of the University of Tokyo. Studied environmental science and obtained Master Degree.
- Since 1983, worked at Environment Agency (EA) and the Ministry of the Environment (MOE) of Japan for about 35 years, mainly in the areas of chemicals management, pollution control and environmental impact assessment, including some career at the OECD Secretariat in Paris and a local government (Chiba-city).
- Participated in the intergovernmental negotiation for the Minamata Convention on Mercury and served as the Regional coordinator for Asia and Pacific Region from 2010 to 2013.
- Appointed as Director-General, Environmental Management Bureau, MOE in July 2017
- Retired from MOE in July 2018
- Since April 2021, has been working for the Geo-Environmental Protection Center (GEPC) of Japan as the Vice Chair.

Outline of presentation

1. History of Water Pollution and Water Environment Administration in Japan
2. Environmental Quality Standards (EQSs) for Water and Water Quality Monitoring
3. Effluent Standards and Outline of the Measures concerning Water Pollution Control
4. Examples of water pollution cases and measures to recover and prevent them
5. Summary

Points to be discussed:

- Why are preventive measures important?
- How are the environmental quality standards and effluent standards established?
- Why are pollution cases repeated?

(Note) Presentation will not touch groundwater pollution.

History of Water Environment Administration (1) (For basic measures)

End of 19th century: Pollution by heavy metals from the Ashio Copper Mine

1956 - : Minamata disease (by Methyl Mercury)

1958: Clash of fishermen and security force in Edogawa River (Tokyo) because of the pollution by pulp wastewater

1958: Water Quality Preservation Law, The Factory Effluent Control Law (old laws concerning water quality control)

1950s – 1960s: Rapid economic growth spread pollution (Water pollution caused by industry occurred in many places.)

1960 - : Niigata Minamata disease, Itai-itai disease (by Cd）

1967: Basic Law for Environmental Pollution Control enacted

1970: Water Pollution Control Act (current law) enacted

1971: Environment Agency (EA) established

1993: The Basic Environment Act enacted

2001: Ministry of the Environment (MOE) established

Initial Stage of Water Environment Administration

- 1970: Water Pollution Control Act (Water Pollution Prevention Act) was enacted

Established by fundamentally reexamining the old two laws, which turned out to be insufficient to control water pollution

1. From reactive (late) measures to preventive measures
   - Set the limited effluent standards for the already polluted area and regulate only the items for which the standards are set

     => Set uniform national effluent standards for all the water areas and regulate all the items anywhere (local governments are allowed to set more stringent standards)
2. Enhancing regulations to ensure compliance with effluent standards
   - Penalty imposed only after the violation of order for improvement => Direct punishment on violation of effluent standards introduced.

Framework of the Measures for Water Environment Improvement in Japan

Target

Establishment of Environmental Quality Standards
【Basic Environment Act】

National government

Measures for Industrial Wastewater

- Establishment of Effluent Standard
  【Water Pollution Control Act】
  (Nationwide uniform standards)

National government

- More Stringent Effluent Standards 【Water Pollution Control Act】
- Regulations for the Private Companies 【Water Pollution Control Act】
  Notification, Measures and logging of pollution status of effluent, On-site inspections
  →Penalty, Order for remedy, Other administrative directions

Local government (Prefecture etc.)

- Investment in 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 (EQS)

Environmental Quality Standards (Defined by Basic Environment Act)

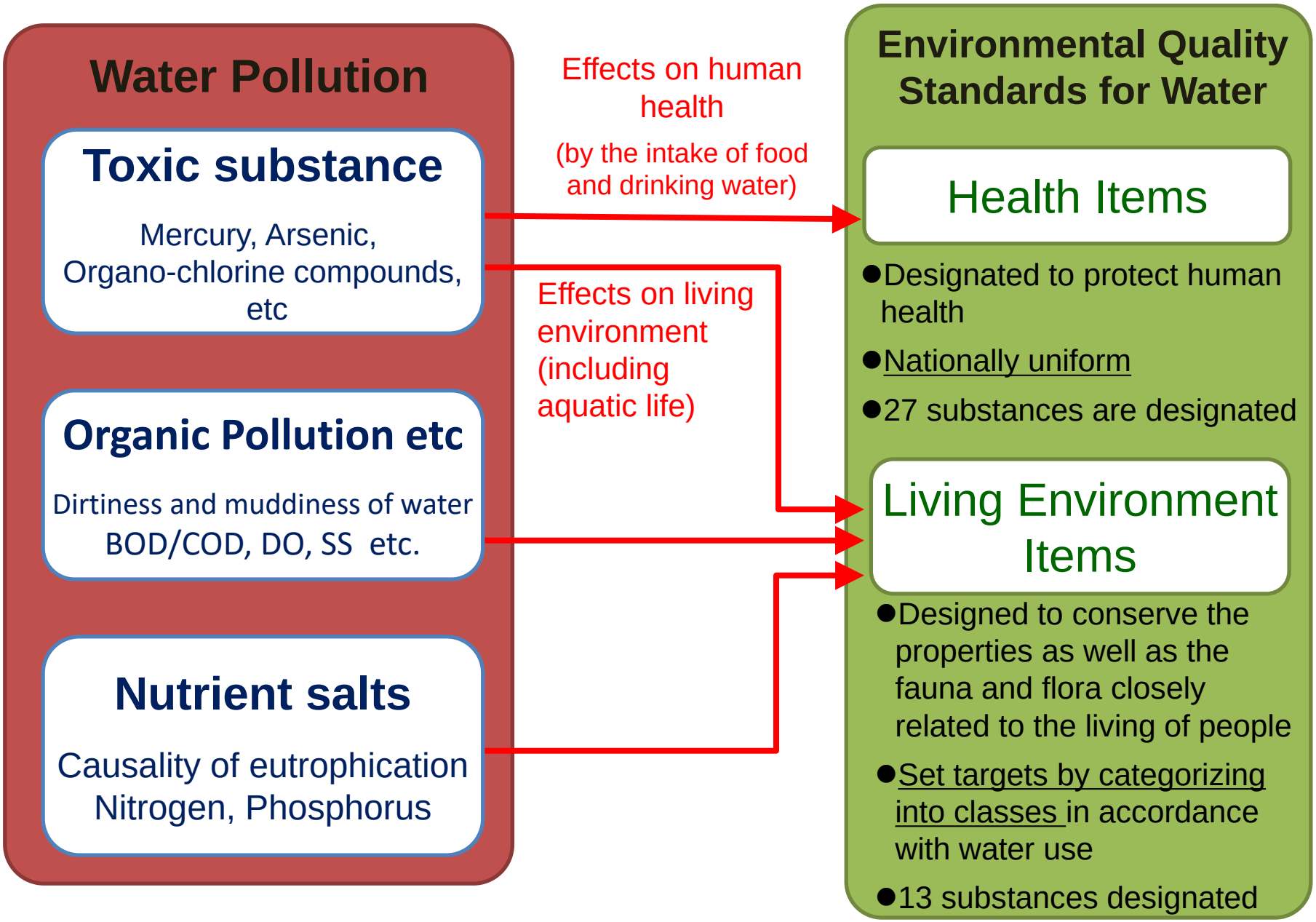
Desirable standards to be maintained for the protection of human health and the conservation of the living environment

- Objectives of administrative policy
  - Goals and cornerstone for the overall promotion of anti-pollution measures
  - Foundation for the implementation of various regulatory measures and facility improvement policies
- Neither maximum allowable limits nor tolerable limits
  - Keep the target level safe enough

(Reference)

- Maximum allowable limit: Pollution up to this limit should be accepted as unavoidable (exceeding this limit results in immediate impact on health beyond a certain level)
- Tolerable limit: Pollution must be tolerated up to this limit

Environmental Quality Standards (EQSs) for Water



Items of Environmental Quality Standards (EQSs) for Water

Health items (Public water areas) (EQSs for groundwater are set for similar items.)

Item	Standard Value
Cadmium	0.003 mg/L or less
Total cyanide	Undetected
Lead	0.01 mg/L or less
Hexavalent chromium	0.02 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	0.1 mg/L or less
cis-1,2-dichloroethylene	0.04 mg/L or less

Item	Standard Value
1,1,1-trichloroethane	1 mg/L or less
1,1,2-trichloroethane	0.006 mg/L or less
Trichloroethylene	0.01mg/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

* Not applied for sea area

Health Items vs. Living Environment Items (1)

Health Items: Keep the water safe (i.e. keep the water drinkable and fish in the water not polluted) everywhere

- Heavy metals (Cd, Pb, As, Hg, etc.): mining, refineries, plating, other related industry, use of natural resources
- Organochlorine compounds (Trichloroethylene, Tetrachloroethylene, etc.): Widely used for solvents, detergents, etc.
- Pesticides, herbicides, etc. (Thiuram, Simazine, etc.)
- Other hazardous chemicals (Total Cyanide, Fluoride, Boron, etc.): Used by a variety of industry

➢ Limited industry sources, not possible to remove once discharged => All the sources from the related industry should be regulated to prevent pollution.

Items of Environmental Quality Standards for Water

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 ≤
E.coli number	≤ 20 - 1,000 CFU/100 mL	≤ 20 - 300 CFU/100 mL	≤ 20CFU/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

Health Items vs. Living Environment Items (2)

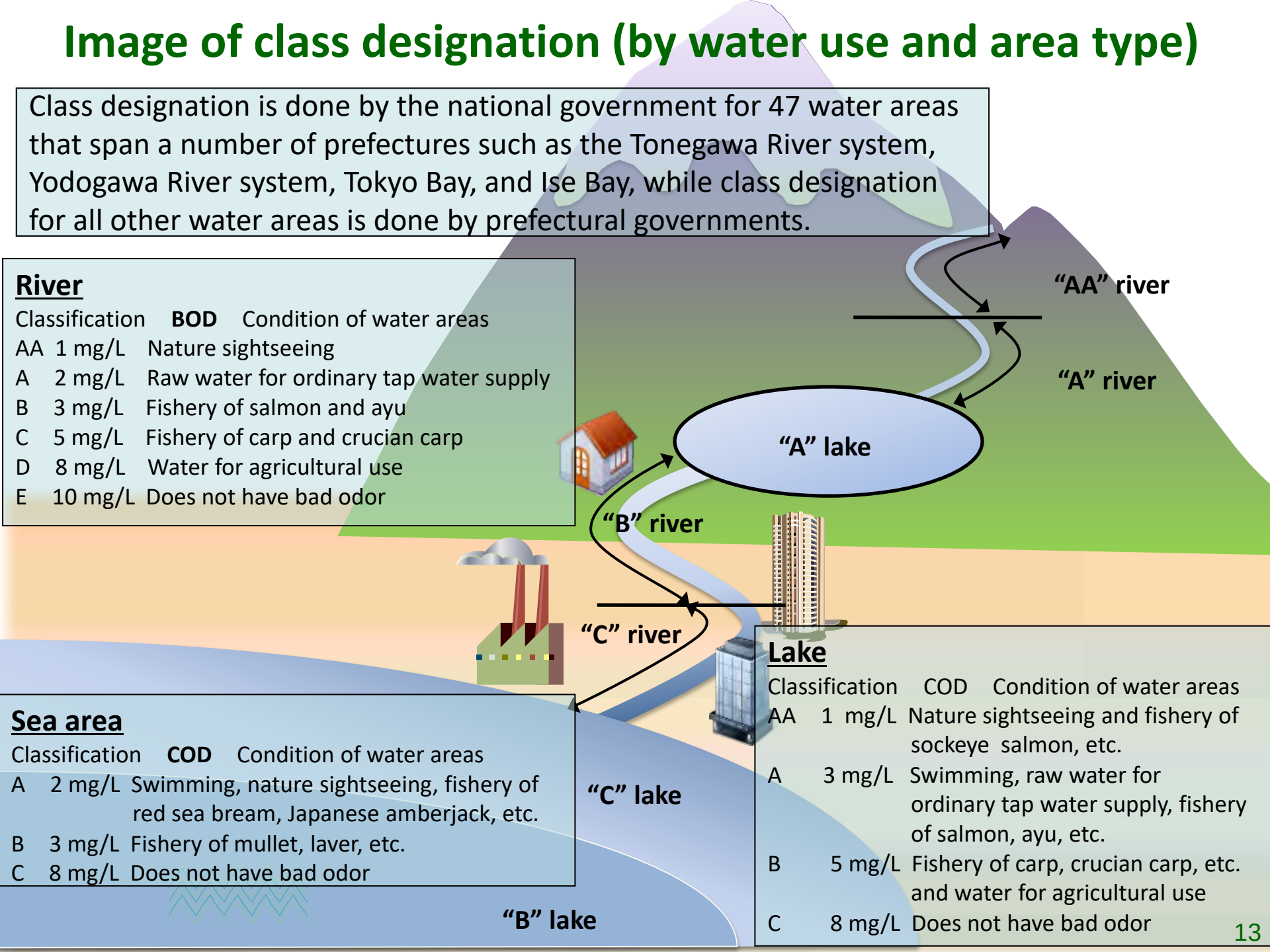
Living Environment Items: Keep the water clean enough for different use and livable for aquatic life

- BOD (Biological Oxygen Demand)/COD (Chemical Oxygen Demand): Organic matters which are easy to decompose in water and consume oxygen
- pH, SS (Suspended Solid), DO (Dissolved Oxygen), coliform bacteria, etc.
- Nutrients (Total Nitrogen, Total Phosphorous): Only applied to lakes and enclosed sea areas to prevent eutrophication
- Hazardous substances to aquatic life (Zinc, LAS, etc.)

➢ Many sources including industry, houses, forests, etc.
=> Large sources should be regulated, but not necessarily regulate all the sources

Image of class designation (by water use and area type)

Class designation is done by the national government for 47 water areas that span a number of prefectures such as the Tonegawa River system, Yodogawa River system, Tokyo Bay, and Ise Bay, while class designation for all other water areas is done by prefectural governments.



River

Classification	BOD	Condition of water areas
AA	1 mg/L	Nature sightseeing
A	2 mg/L	Raw water for ordinary tap water supply
B	3 mg/L	Fishery of salmon and ayu
C	5 mg/L	Fishery of carp and crucian carp
D	8 mg/L	Water for agricultural use
E	10 mg/L	Does not have bad odor

Lake

Classification	COD	Condition of water areas
AA	1 mg/L	Nature sightseeing and fishery of sockeye salmon, etc.
A	3 mg/L	Swimming, raw water for ordinary tap water supply, fishery of salmon, ayu, etc.
B	5 mg/L	Fishery of carp, crucian carp, etc. and water for agricultural use
C	8 mg/L	Does not have bad odor

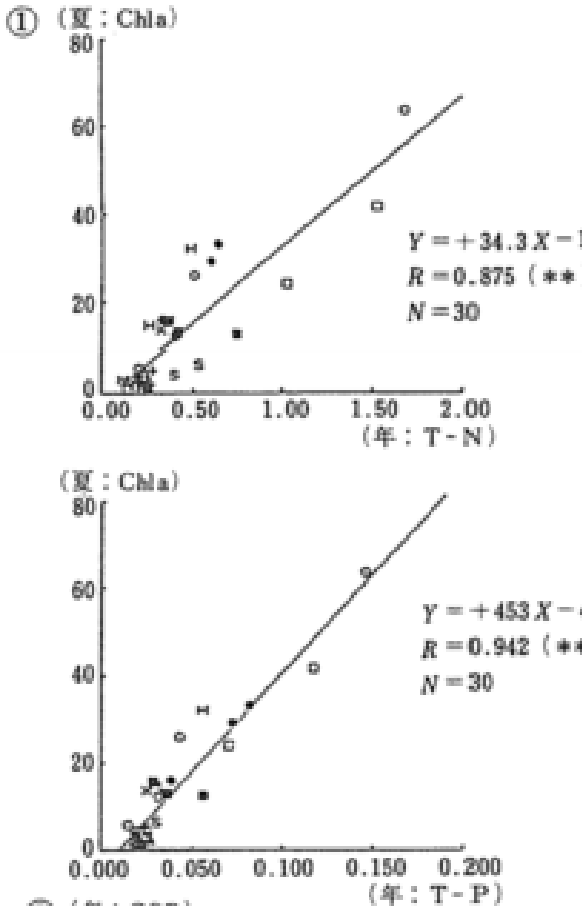
Sea area

Classification	COD	Condition of water areas
A	2 mg/L	Swimming, nature sightseeing, fishery of red sea bream, Japanese amberjack, etc.
B	3 mg/L	Fishery of mullet, laver, etc.
C	8 mg/L	Does not have bad odor

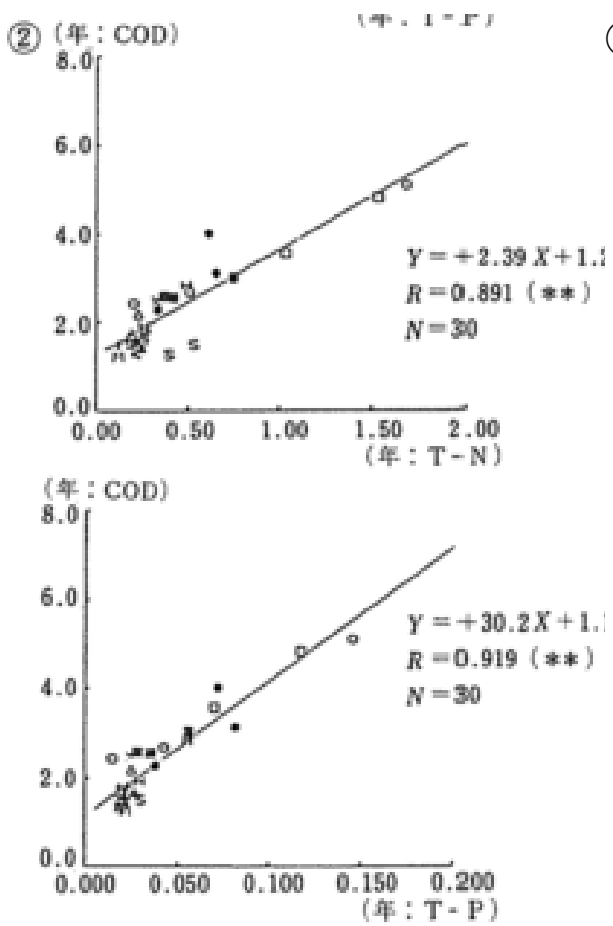
Method for setting EQSs for water (In case of hazardous substances)

- Hazard assessment
  - Based on the results of toxicity and ecotoxicity tests, TDI (Tolerable Daily Intake）or PNEC (Predicted No Effect Concentration) and assessment values in water environment (e.g. μg/L) will be derived including the application of safety factor (i.e. safety margin).
  - Further consideration is needed on
    - Some carcinogenic substances which have no threshold values
    - Substances that may accumulate in seafood
- Comparison with the environmental concentration (monitored or estimated by using models)
  - If exposure levels are likely to exceed the derived assessment values, EQSs will be set and effluent control measures will be considered.
  - If exposure levels are low enough or assessment values are not certain due to the uncertainty of scientific knowledge, such substances will not be subject to effluent regulations, but need to be monitored with guideline values for evaluation (NOT EQSs).

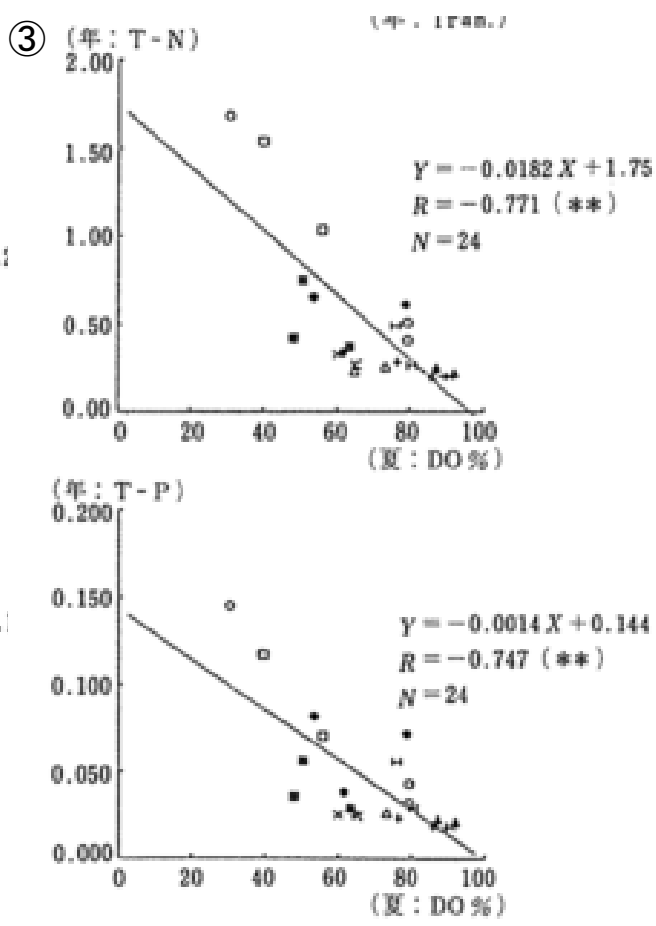
Effects of nutrients on water quality



1. NP vs. Chlorophyl a

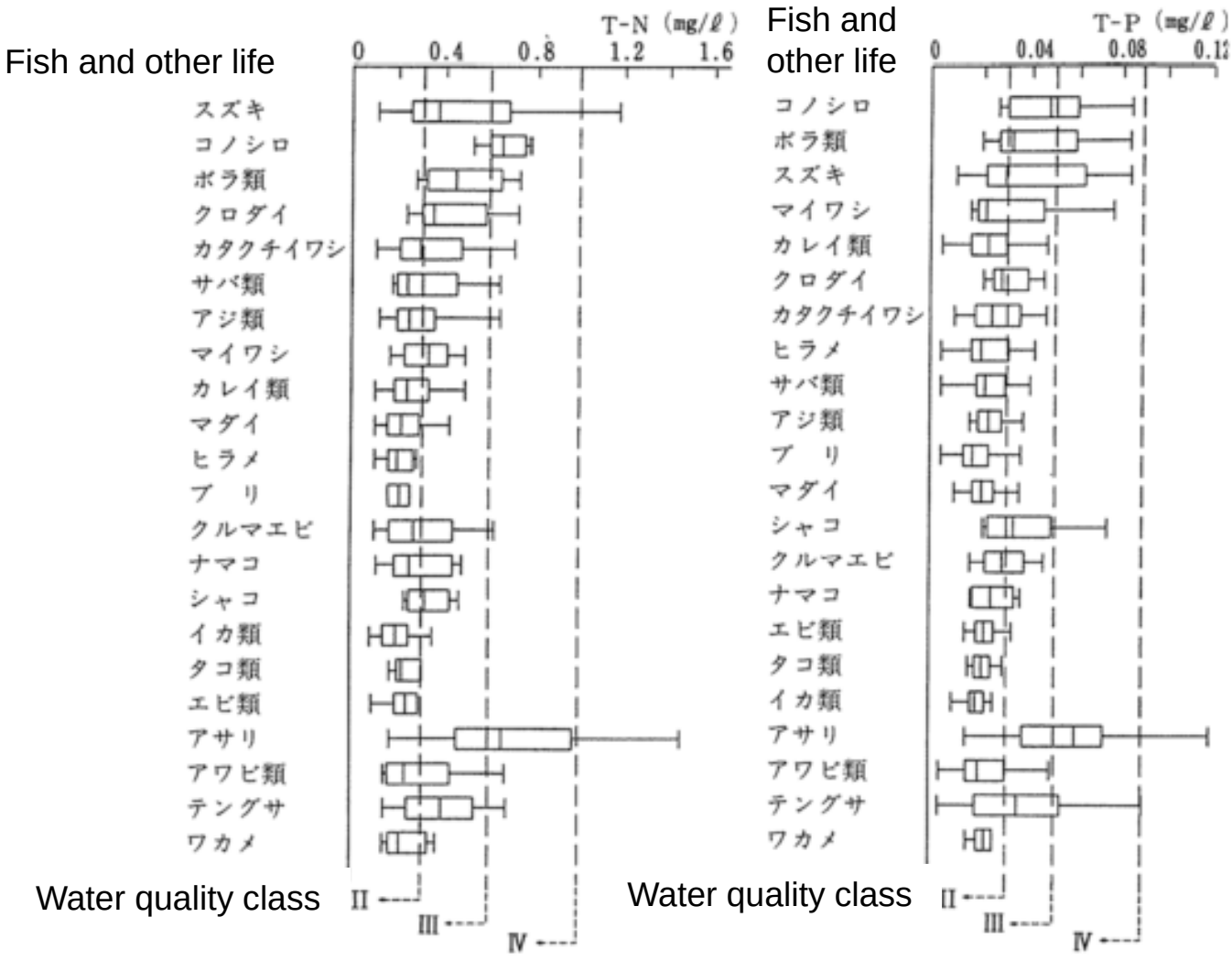


2. NP vs. COD



3. NP vs. DO in bottom layer in summer

Effects of nutrients on the living environment of fish and other marine life



Statistics of water quality where each fish was caught

EQS of Nitrogen and Phosphorous (Applied for enclosed sea areas)

Class	Purpose of water use	Standard values (Annual average)	
		T-N	T-P
I	Conservation of natural environment* Those shown in Class II-IV (except for Fishery-2 & 3)	0.2 mg/l or less	0.02 mg/l or less
II	Fishery-1** Those shown in Class III-IV (except for Fishery-2 & 3)	0.3 mg/l or less	0.03 mg/l or less
III	Fishery-2*** Those shown in Class IV (except for Fishery 3)	0.6 mg/l or less	0.05 mg/l or less
IV	Fishery-3**** Water use for industry Conservation of living environment for flora and fauna*****	1.0 mg/l or less	0.09 mg/l or less

(Note)
*: Conservation of environment in order to explore natural environment
**: Variety of fish and shellfish including those living on the bottom of sea are caught steadily in a good balance.
***: Fish except for those living on the bottom of the sea are mainly caught abundantly.
****: Specific fish tolerable for pollution are mainly caught.
*****: Limit for flora and fauna to be able to live on the bottom of sea through the year

The Role of Environmental Quality Standards (EQSs)

- The importance of shifting from reactive administration to preventive measures
  - Instead of dealing with pollution or damage which had already occurred, we take action before it happened or got serious by setting target values and applying them across the country.

- EQSs are ‘standards requiring countermeasures’
  - EQSs are established only for substances where their establishment will lead to advance comprehensive measures or policies to maintain safety level.
  - Setting carefully and precisely on the basis of scientific knowledge for a relatively small number of substances.
  - Setting targets for substances that will require the polluter to take actions (i.e. effluent control and reduction).

The Role of EQSs: Issues for consideration

- We may reconsider the nature and role of EQSs when policy requirement is changed.

  (Examples)

  - EQSs may need to be set
    - just as ‘target values’ for more items
    - for items that are hard to control environmental levels by effluent control (e.g. POPs, PFAS)

(For your information)

You can find more information about all the EQSs in Japan in the “Compendium of Reference Materials on the Basis for Establishment of Environmental Quality Standards in Japan” (https://www.nies.go.jp/eqsbasis/en/index.html)

- Overview (Concept, Outline, History, etc.): in English
- Information on the basis of each EQS value: in Japanese

Water Quality Monitoring

Purpose

- Getting a full understanding of the status of water pollution in surface water and groundwater, and implementing control measures for the prevention of water pollution in appropriate ways.

Monitoring System

Continuous Monitoring of Water Quality (Prefectures, etc.)

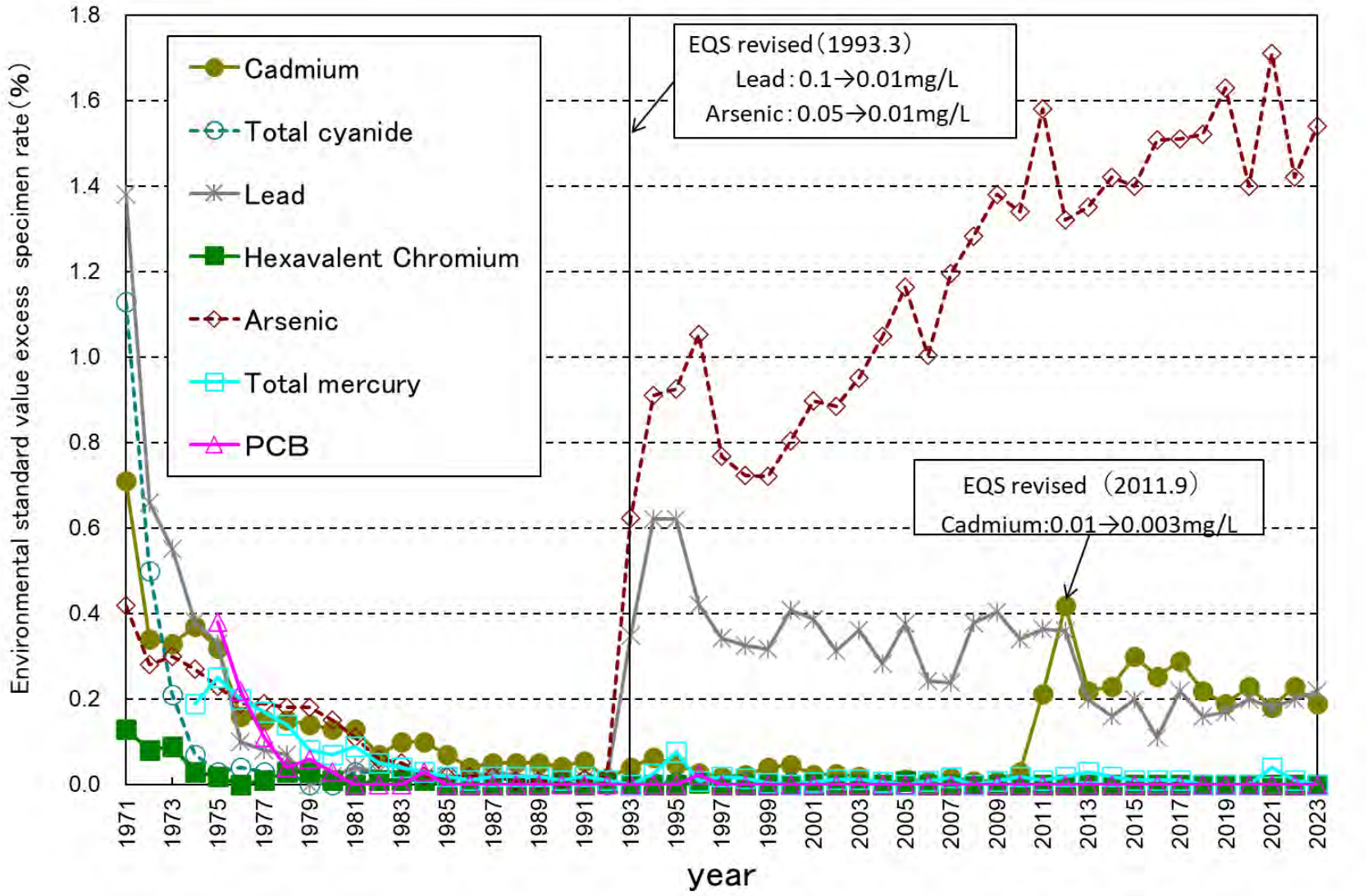
- Monitoring the pollution of water in the environment plays a very important role in getting the basic data for the planning of water environment administration.
- The continuous monitoring of water quality is delegated to prefectural governors, as it is appropriate to conduct it based on the understanding of the local conditions and with mobility.
- It should be carried out throughout the country uniformly and with accuracy. Therefore, the Ministry of the Environment shows a uniform framework including analytical method, detection limit, principle of setting monitoring points, etc.

Monitoring of Effluent

- Mandated by the owners of specified establishments

State of Achievement of EQSs (1)

- **Health Items**：
  Achieved Environmental Quality Standards almost over the country

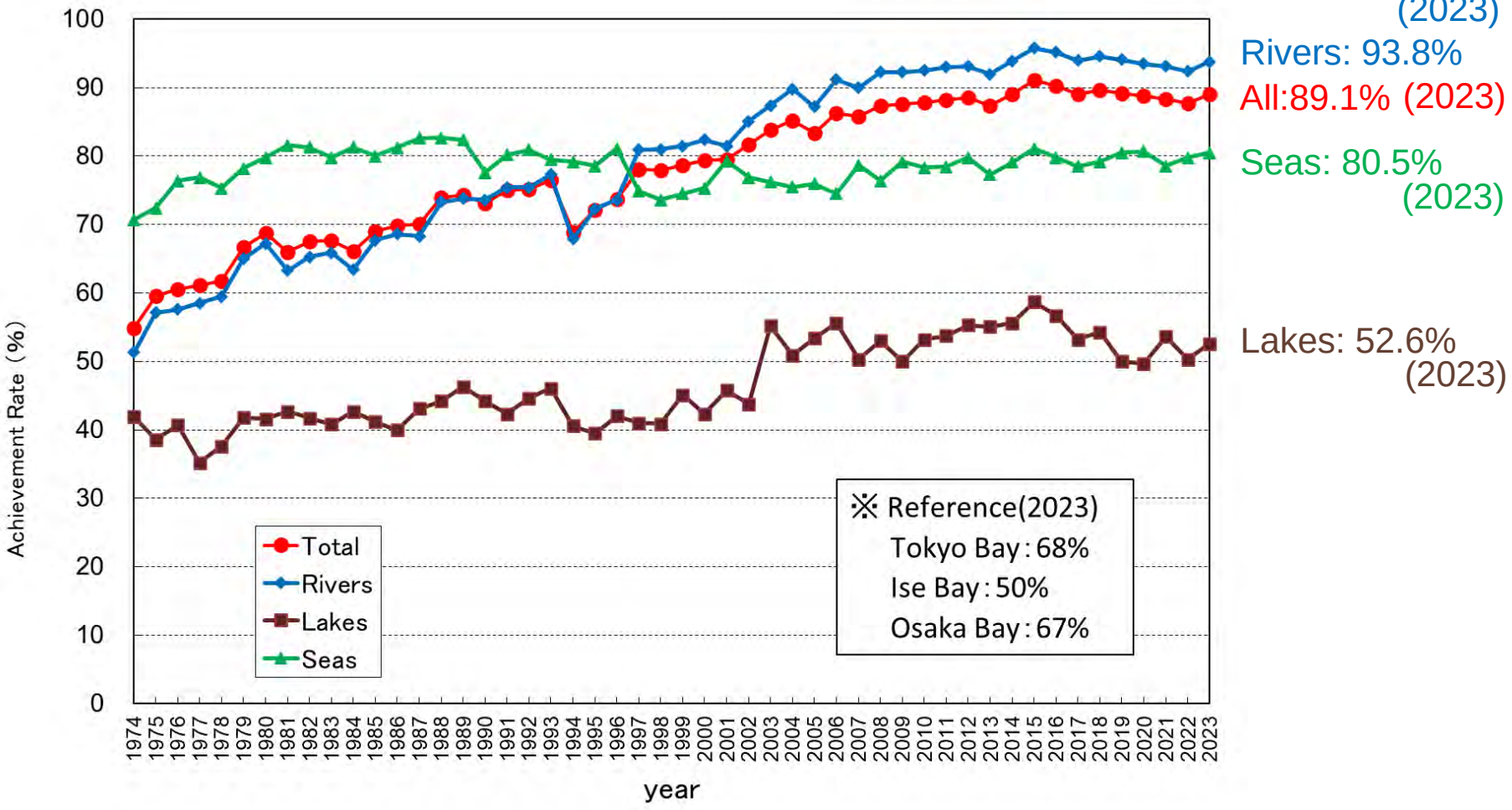


※Public waters water quality measurement results(2023)

State of Achievement of EQSs (2)

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

Trends in achievement of EQS (BOD/COD)



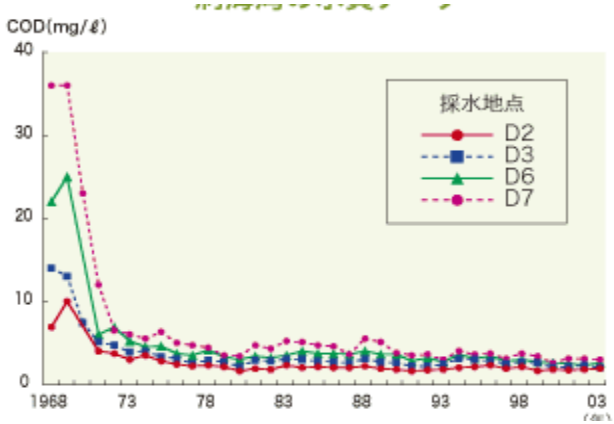
※Public waters water quality measurement results(2023)

Water Quality Improvement in Dokai Bay, Kitakyushu

- A miracle city recovering from the “Dead Sea”

“Dead Sea” where fish cannot live

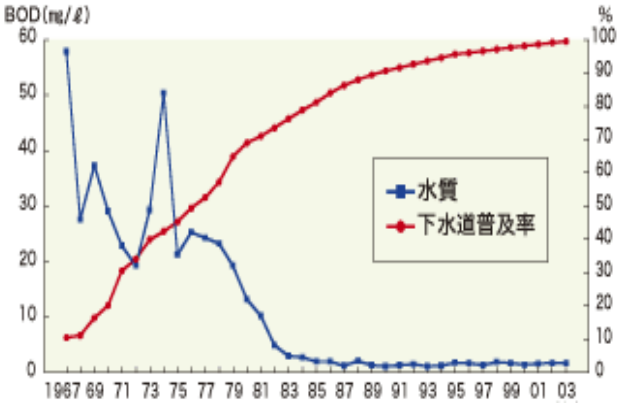
Dokai Bay has recovered



Monitoring data in Dokai bay

Illegal construction along a river

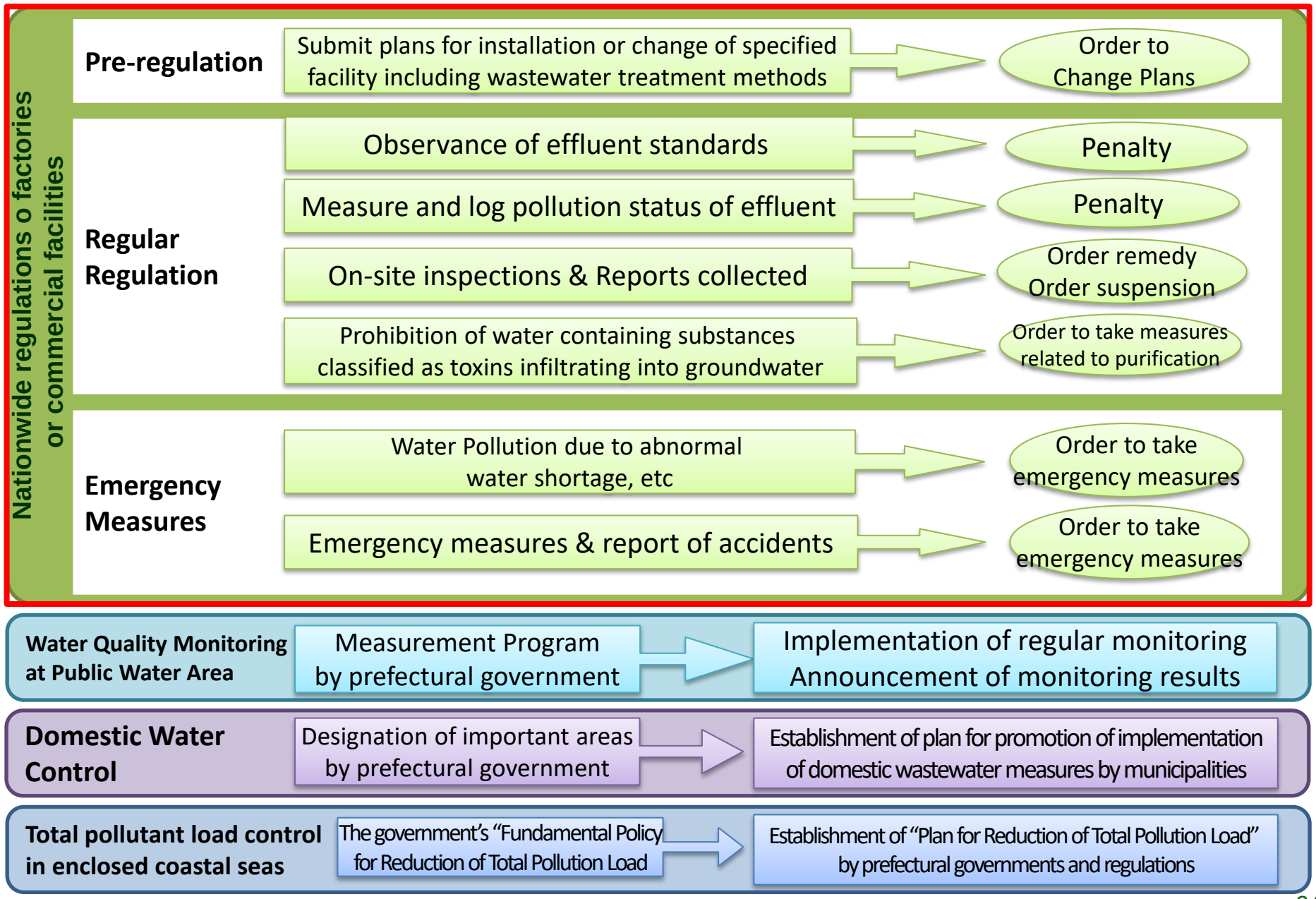
A river as a symbol of the city with water-attracting space



Water quality in Murasaki River and Sewerage coverage ratio

Source: Web site of Kitakyushu city

How the Water Pollution Control Act Works



Target Facilities of Effluent Control

Facility that discharges polluted water or wastewater is defined as a specified facility by the Water Pollution Control Act, and all factories or establishments in which specified facilities are installed are stipulated as the control subjects of Water Pollution Control Act.

Examples :

- Facilities to be used for mining, etc.
- Facilities devoted to stock raising, agriculture, etc.
- Facilities to be used for various types of food manufacturing, etc.
- Facilities to be used for forestry, etc.
- Facilities to be used for pulp manufacturing, etc.
- Facilities to be used for medical goods manufacturing, etc.
- Facilities to be used for cement products manufacturing, etc.
- Facilities to be used for steel or nonferrous metals manufacturing and facilities to be used for other types of manufacturing
- Hotel businesses, restaurants, laundry businesses, photograph development businesses, hospitals, scientific and technological research facilities
- Waste disposal sites
- Final sewage treatment facilities, joint wastewater treatment plants,

  And so on… (Note: some facilities which do not release hazardous substances have threshold values in size.)

As of the end of FY2023, Approx. 250,000 establishments are control subjects

Effluent Standards

【Health item】

Kinds of harmful substances	Tolerable limit
Cadmium and its compounds	0.03 mg/L
Cyanide compounds	1 mg/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 mg/L
Hexavalent chromium compounds	0.2 mg/L
Arsenics and its compounds	0.1 mg/L
Mercury and alkyl mercury, and other mercury compounds	0.005 mg/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	1 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 mg/L Sea area: 230 mg/L
Fluorine and its compounds	Other than sea area: 8 mg/L Sea area: 10 mg/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

【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
E.coli number	Daily mean value: 800 CFU/mL
Nitrogen content	120 mg/L (Daily mean value: 60 mg/L)
Phosphorus content	16 mg/L (Daily mean value: 8 mg/L)

(Note)
The national minimum Effluent Standards (ESs) for living environment items are applicable to the effluent water discharged from specified facilities which discharge 50m^3/day or more of effluent water on daily average, whereas ESs for health items are applicable to all the effluent water discharged from related specified facilities (i.e. no volume limit).

Health Items vs. Living Environment Items (3)

	EQSs	Effluent Standards*
Health Items	• Nationally uniform value is determined and applied to all the water areas	• National minimum values are determined 10 times higher than EQSs • Applied to all the effluent water from specified facilities
Living Environ-ment Items	• Different values (categories) applied depending on the use of water (e.g. BOD 1-10 mg/L for river) • Different items for rivers, lakes and sea areas (Not applied to ground-water)	• National minimum values are determined as achievable level by simple treatment of domestic wastewater (e.g. BOD: 160mg/L) • Applied to the effluent water from the specified facilities which discharge 50m^3/day** or more of effluent water on daily average

* Local governments can lower the standard values

** Local governments can lower the volume limit

Effluent regulation framework

- Uniform Effluent Standards and more stringent standards

Uniform effluent standards by the national government (national minimum regulation)

Health items
Applied to all Specified establishments

Living environment items
Applied to Specified establishments where effluent is 50m^3/day or more

Prefectural governments authorized to tighten controls, according to local conditions

How to set more stringent standards

Local Rigorous Effluent Standards

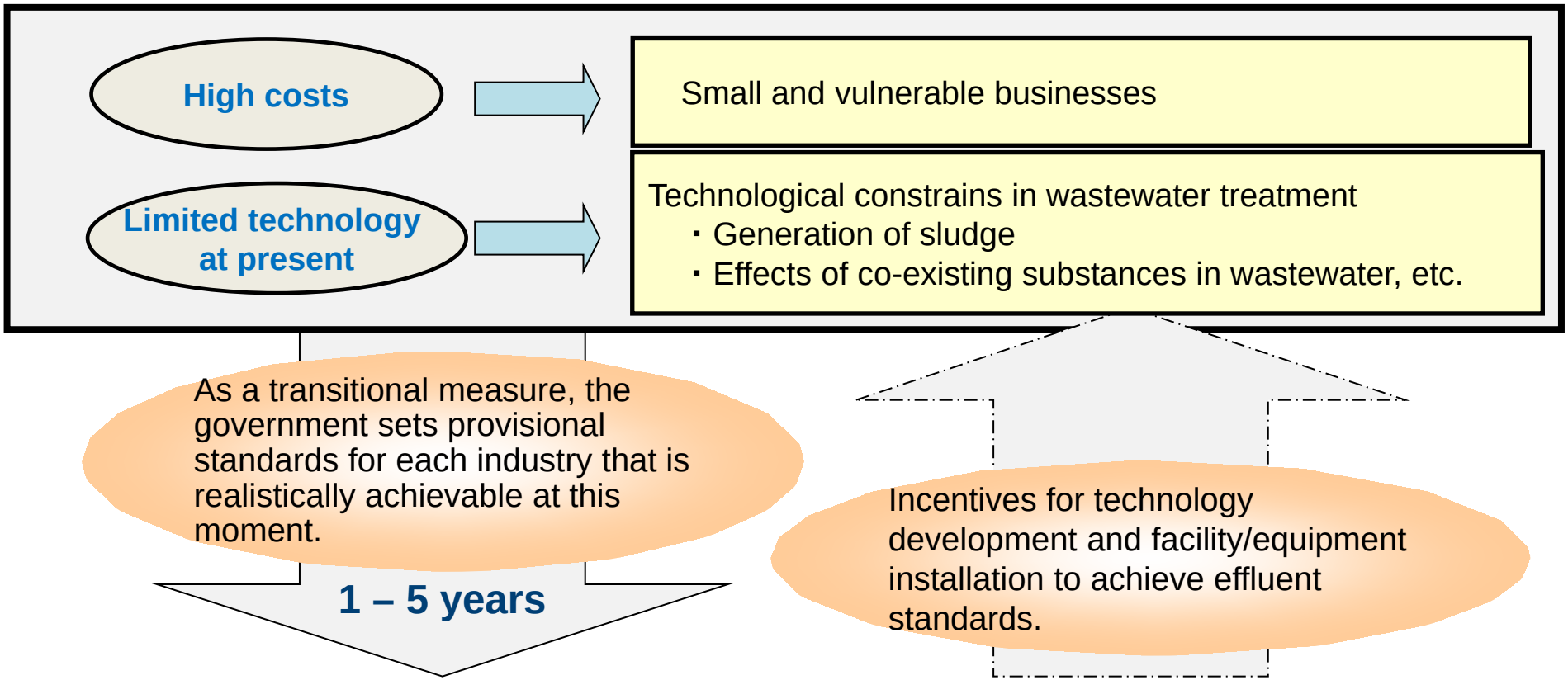
- Prefectural ordinances may set more stringent effluent standard values if the national uniform effluent standards are not sufficient to achieve the EQSs.
- These ordinances may also apply the effluent standards (living environment items) to small businesses (factories/establishments discharging effluent less than 50m^3/day)

Extended Prefectural Regulations

- May Include additional substances/items on top of the uniform effluent standards

Provisional effluent standards

When standards are strengthened or new substances/items are added, industries with technical difficulties to comply may be granted less stringent 'provisional' standards



Provisional effluent standards will be reviewed and revised based on technological developments and actual discharge data.

Report Collection and Inspection

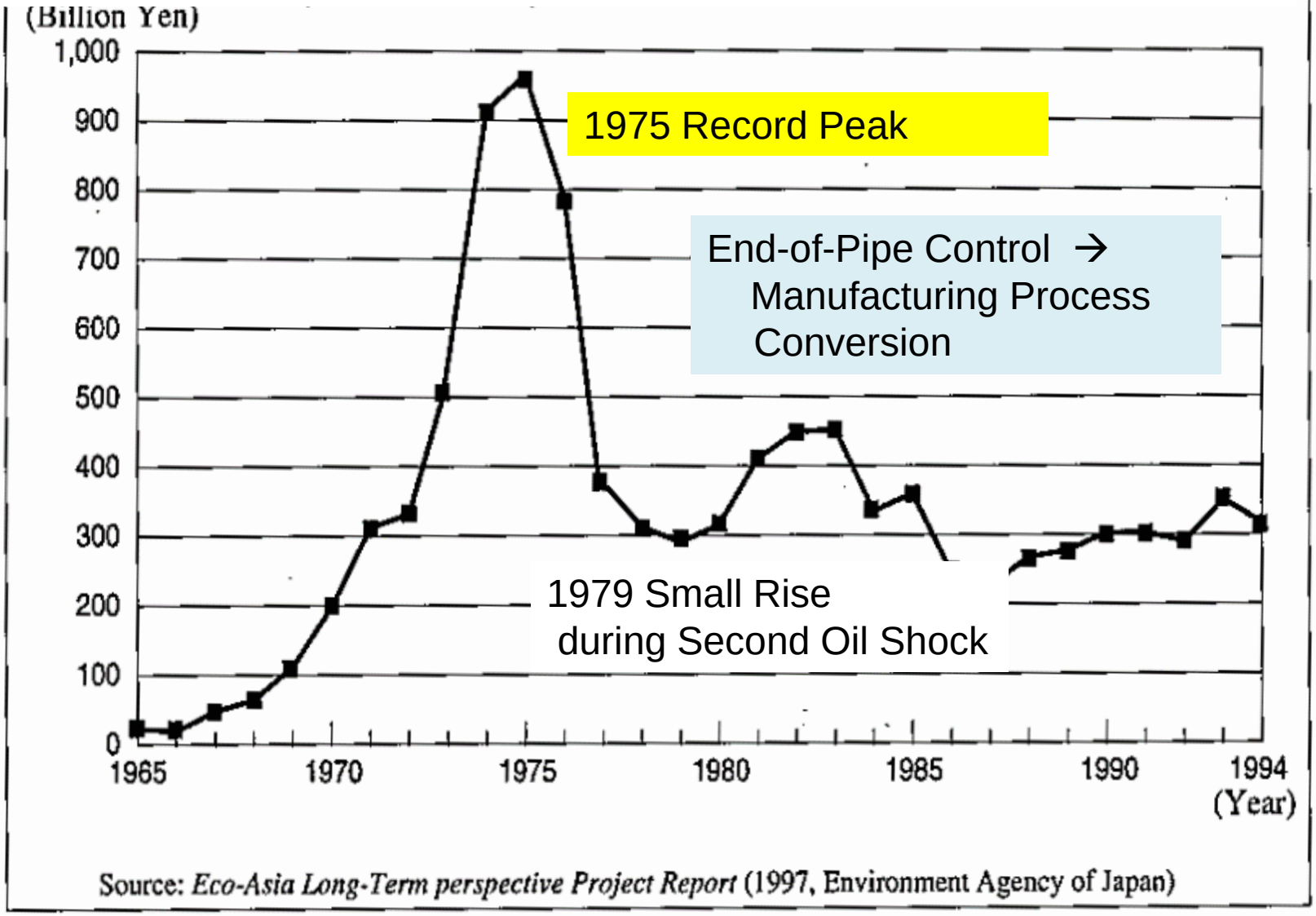
Water Pollution Control Act, Article 22

- The Minister of the Environment or the Governor of a prefecture may in accordance with the cabinet order, call for a report from the owner of a Specified Facility concerning the condition of the Specified Facility, the method of treatment of polluted water, etc., and other necessary matters, within the limits required for the implementation of this Act; or may have his officials enter the Specified Factory and inspect the Specified Facility or other related matters.

Objective of on-site inspection

- To check whether rules for the compliance of regulation standards are operated properly in establishments so that owners always comply regulation standards, and implement necessary measures, if required.
- It is important to check not only compliance with standards by water sampling, but also comparing filed info and actual state, and self-management situation.

Change in Japan's Pollution Prevention Equipment Investment Sums (Nominal Value)



Source: *Eco-Asia Long-Term perspective Project Report* (1997, Environment Agency of Japan)

History of Water Environment Administration (2)
(For additional measures)

- Amendment of Water Pollution Control Act to tackle emerging issues
  - Introduction of total load control system to tackle the pollution and eutrophication in enclosed sea areas (e.g. Tokyo bay) (1978)
  - Introduction of measures for the protection of groundwater quality (prohibition of effluent permeation into ground, etc.) (1989, 1996, 2011)
  - Introduction of measures for domestic wastewater (1990)
  - Introduction of penalty for false record of effluent monitoring (2010)
- Enactment of special laws in order to manage certain areas
  - Clean Lake Act (1984)
  - Special Law for the Conservation of Seto Inland Sea (1973)
  - Special Law for the Conservation of Ariake Bay and Yatsushiro Bay
  - Special Law for the Restoration and Conservation of Lake Biwa (2015)

Violation Case Revealed in 2004

- JFE Steel Corporation, East Japan Works (Chiba District) -

Haneda Airport (Tokyo)

Keihin District (Kawasaki)

Chiba District

Tokyo Wan Aqua-line Expressway

Location (cited from the HP of JFE Steel Corp.)

➢ **What happened first?**

- Japan Coast Guard (JCG) found that highly alkaline wastewater had been flowing into Tokyo Bay from the factory of JFE Steel and estimated that the effluent standard of pH would have been violated.
- JCG therefore inspected the factory, and found out that the leachate from slag deposits which are highly alkaline had been flowing into Tokyo Bay, i.e. violation of effluent standard of pH.

Violation Case Revealed in 2004 (cont'd)

➢ **What happened afterwards?**

- JFE Steel checked the records in the past and found that effluent exceeding standards for cyanide, COD, etc. was discharged, but in-house measurement data were falsified.
- Facilities suspected of discharging cyanide were dismantled and removed without authorization (violation of the pollution prevention agreement).
- Soil and groundwater contamination occurred due to leaks from temporary storage facilities for cyanide-containing sludge, as well as during transportation and cleaning operation.
- It was also found that automatic measuring equipment for COD and other pollution loads were inadequately maintained and resulted in false data, and that monitoring data that needed to be stored were discarded.

(Note) JFE Steel Corporation, East Japan Works, was sued by the residents about polluting air in 1970s and conciliated with them in 1988.

Violation Case Revealed in 2004 (cont'd)

- **Issues raised on the company (JFE Steel) side**
  - Past incidents of similar effluent issues were not shared or passed down within the organization.
  - At large plant with over 2,000 employees, only 12 staff were assigned to environmental management, with just only one person responsible for water quality (who falsified the data).
  - The manufacturing department was unaware of the pollution prevention agreement and presence of cyanide. There was no proper consultation procedure with the environmental management department.
- **Issues raised on the local government (Chiba-city) side**
  - The company's self-analysis records were not checked in the inspection.
  - The past incident of cyanide leakage at the same facility was not adequately examined and it became out of scope of the inspection.
  - The pollution prevention agreement became a mere formality and the reported data were not examined.
- **Both the company and the government have revised their management systems and relevant laws were ammended.**

Violation Case Revealed in 2004 (cont'd)

➢ Administrative responses

- Responses based on the Water Pollution Control Act:
  - The temporary suspension of effluent
  - Orders to improve wastewater treatment methods
  - Temporary suspension of facility operation
  - Orders to improve their structure, usage methods or wastewater treatment methods (cyanide).
- Administrative guidance: Recommendations for improvement and guidance on the effluent management including its system.
- A special committee established under the Chiba City Environment Council reviewed the improvement plans for dust smelting furnace facilities that discharged cyanide compounds and requested the JFE Steel to improve the initial plans by installing new treatment facilities.
- Air Pollution Control Act and Water Pollution Control Act were amended to add penalties for failure to record measured data and false recording.

➢ Penalty

- The head of the ironmaking department, the plant manager and the chief member of the environmental safety department were fined. The company was given a suspended prosecution.

Other Cases

➢ Boracay Island, the Philippines

- Island of Boracay in the Philippines, one of the nation's major tourist destinations, was closed in April 2018 because of the environmental degradation caused by non-treated wastewater, garbage, etc.

Algal bloom in Boracay in April 2018, prior to the resort island's closure (from Wikipedia)

- After the government's efforts for recovery, the area was partly opened in October 2018.

➢ Nippon Steel Corp. in Kimitsu, Chba Prefecture, Japan

- Nippon Steel Corporation, East Nippon Works, located in Kimitsu, Chiba Prefecture, found in 2022 that they falsified their effluent monitoring records (cyanide, COD, etc.) and reported falsified data for several years.

➢ Why do companies repeat pollution and other violation? We should learn lessons from the past.

Summary – Lessons we should learn

- Preventive measures are far more important and effective than reactive (late) measures. Once human health and the environment have been damaged, it is very difficult to recover.
  (Note: Minamata disease case found in 1950s has not been settled yet.)
- Environmental Quality Standards should be set based on the scientific knowledge and their observance in the environment should be monitored to find pollution at an earlier stage.
- Effluent Standards should basically be set to avoid risks, but sometimes technologies and costs may need to be considered.
- Companies should always think about (or imagine) what will occur if they violate the regulation or standards.
- Administration side should always check the implementation of laws and repeatedly instruct companies and workers.

Thank you for your attention!