Change for the future.
Change by Japan.
CHALLENGE 25

Japan's Lessons on Overcoming Environmental Pollution

Osami Sagisaka

Director-General

Environmental Management Bureau
Ministry of the Environment, Japan

24 August 2010

Bangkok, Thailand

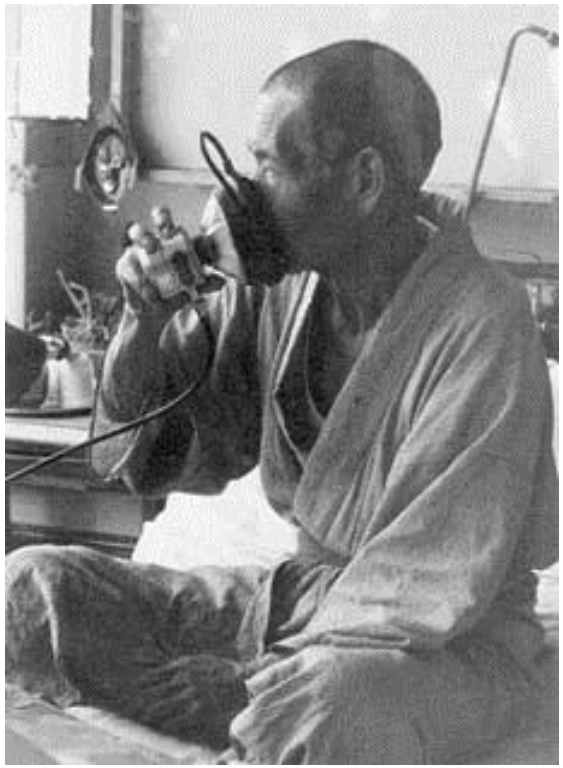
Change for the future.
Change by Japan.

CHALLENGE 25

I. An Overview of Japanese Experience on Environmental Pollution

Serious Health Damage from Pollution (1)
- Case of Yokkaichi Asthma -

Yokkaichi Asthma as caused by industrial pollution.



Reference: From the website of Yokkaichi City

Serious Health Damage from Pollution (2) - Case of Itai-itai Disease -

- **Victims legally designated: around 200 persons**

- **The total amount of damages** (including damages to human health and agricultural production such as reduction of yield and pollution of agricultural land)**: estimated around 50 billion yen**

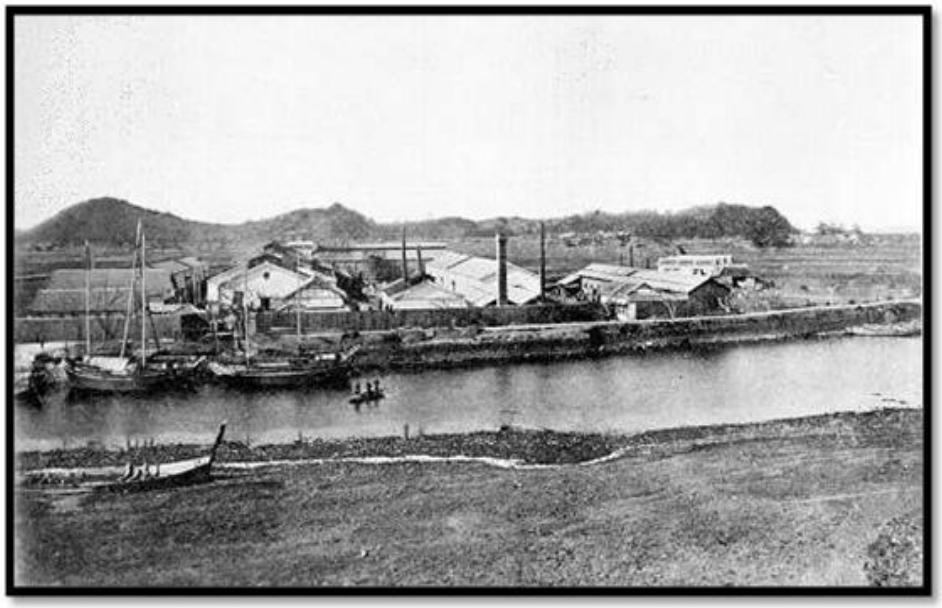
Source: From the website of Universiteit Hasselt

Serious Health Damage from Pollution (3) - Case of Minamata Disease -

- **Victims legally designated: around 3,000 persons**

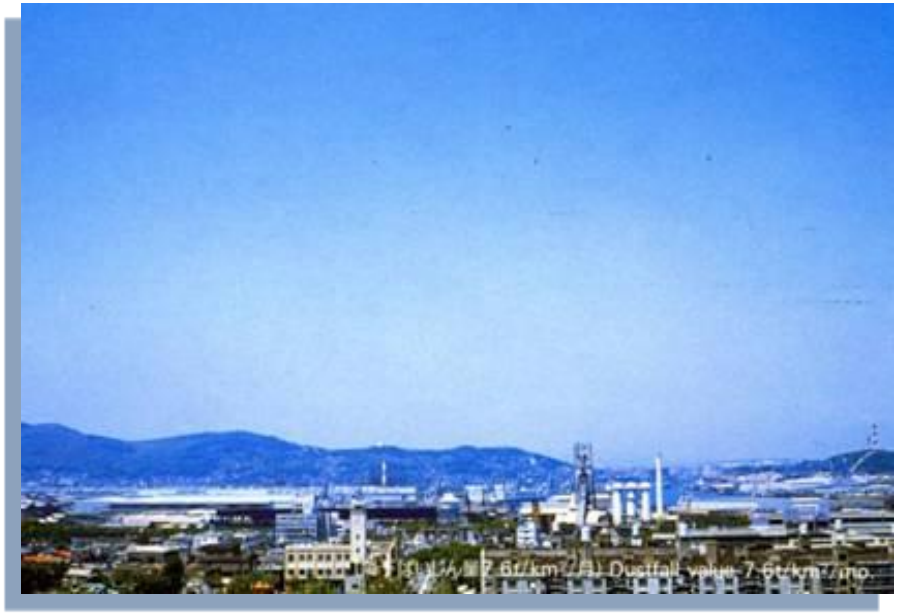
- **The total amount of damages** (including health damages, contamination of sediment and damage to fisheries)**: estimated around 378.9 billion yen**

- **5 suits are still on-going.** (Number of plaintiffs is approx. 1,500.)



Source: From the Website of Minamata City

Change of Air Quality in Kita Kyushu



Polluted 1960s

Present

History of Pollution Countermeasures

Pollution Prevention Ordinances

- Tokyo Metropolitan Government (1949)
- Osaka Prefectural Government (1950)
- Kanagawa Prefectural Government (1951)
- Fukuoka Prefectural Government (1955)

1960s

- Basic Law for Environmental Pollution Control (1967)
- Air Pollution Control Law (1968)

1970s

- Water Pollution Control Law (1970)
- **Establishment of Environment Agency (1971)**

1980s-90s

- Law Concerning Special Measures for the Conservation of Lake Water Quality(1984)
- Automobile NOx Law (1992)
- Environment Basic Law (1993)

2000s～

- **Inauguration of the Ministry of the Environment (2001)**
- Automobile NOx PM Control Law (2001)
- Amendment of Air Pollution Control Law and Water Pollution Control Law (2010)

Major Framework of Air Pollution Control

Basic Environment Law (1967) *[MOE]*

- **NAAQS** (National Ambient Air Quality Standards)

Air Pollution Control Law (1968) *[MOE]*

- **Stationary source** regulation for basic air pollutants (concentration control, K-value control, total emission control)
- **VOCs** emission control
- Countermeasures on **Other Hazardous Air Pollutants**
- **Mobile source** control (on-road, emission standards only)

Mobile Service Control

Road Trucking Vehicle Law (1951) *[MLIT]*

- **On-road** vehicles regulation (vehicle type approval, inspection etc.)

Emission Regulation Law for Non-road Special Vehicles (2005) *[MOE, METI & MLIT]*

- **Non-road** special vehicles regulation (incl. emission standards)

Automobile NOx PM Law (1992) *[MOE]*

- **Additional** mobile source regulation in **major urban area** (Tokyo etc.)

Major Framework of Water Pollution Control

Basic Environment Law (1967)

➢ **NAWQS** (National Ambient Water Quality Standards)

- Measures Common to the Whole Country

Water Pollution Control Law (1970)

➢ regulation for factories & establishments **throughout the country**

➢ Total Pollutant Load Control System **in enclosed Sea Areas**

- Special Measures for Specified Water Areas

Law concerning Special Measures for the Conservation of Lake Water Quality (1984)

➢ Special measures for designated **lakes**

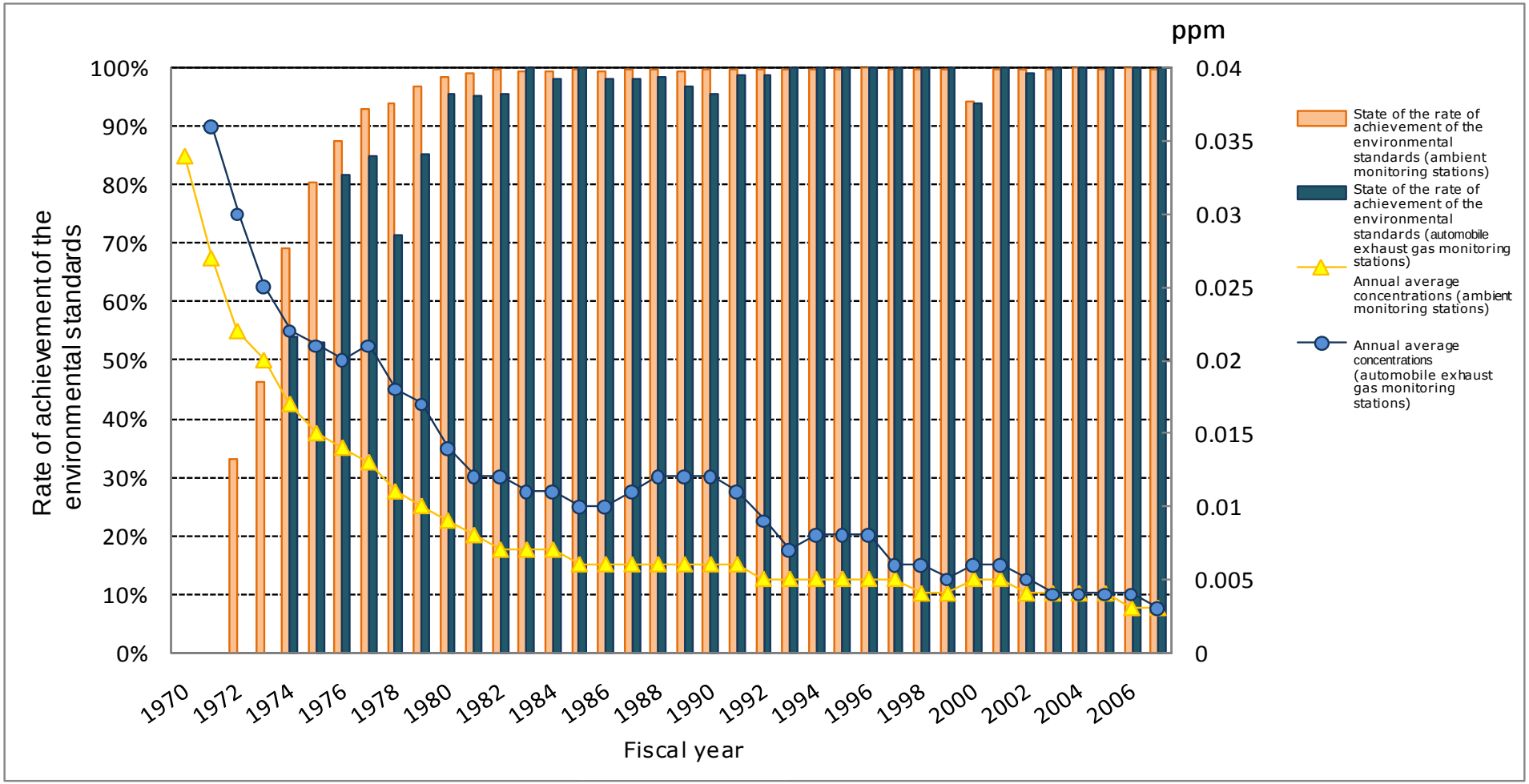
Law concerning Special Measures for the Conservation of the Environment of the Seto Inland Sea (1973)

➢ Environment conservation measures of **the Seto Inland Sea**

Law concerning Special Measures for the Rejuvenation of the Ariake Sea and Yatsushiro Sea (2002)

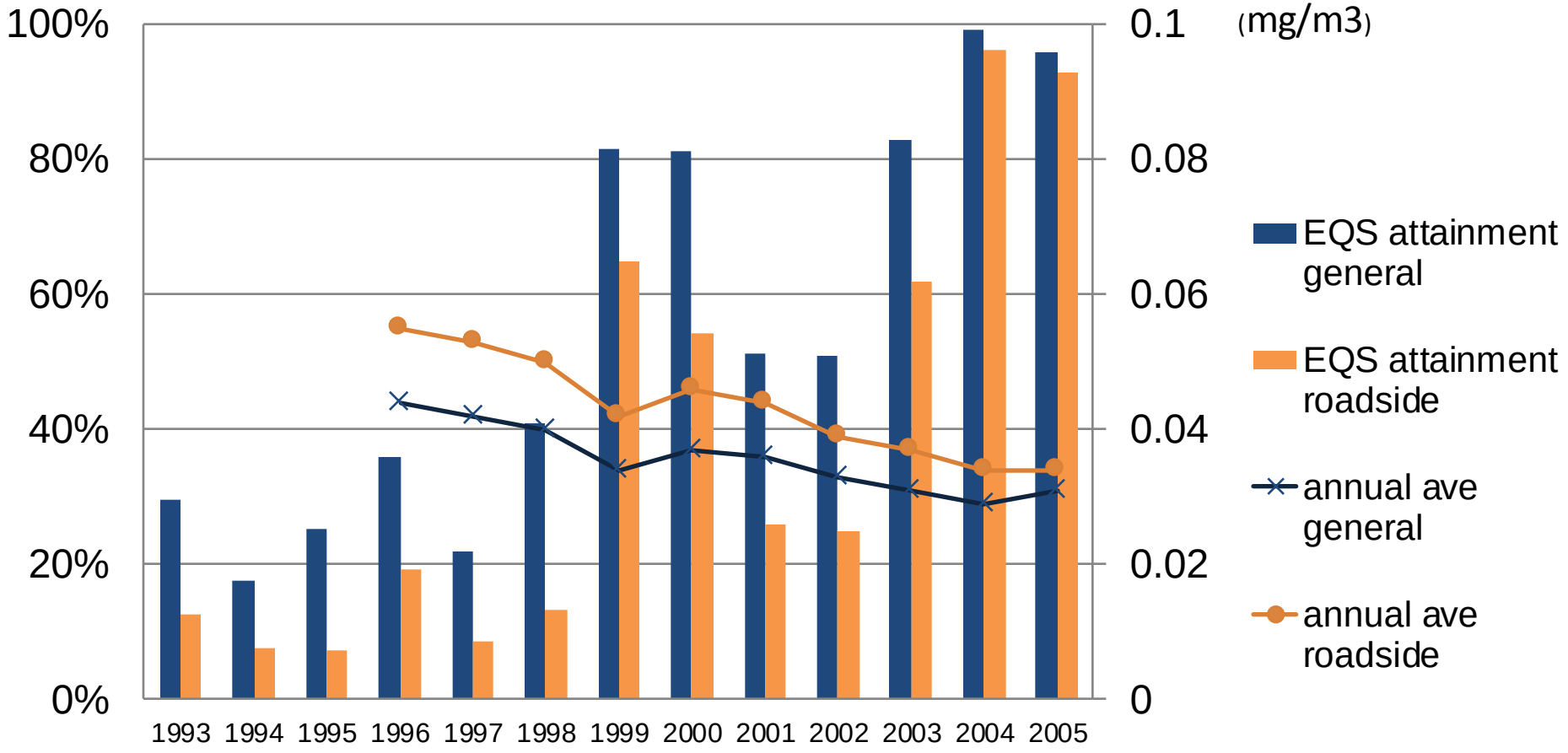
➢ Rejuvenation measures of **the Ariake Sea & the Yatsushiro Sea**

Trend of Sulfur Dioxide (SO2) Concentrations

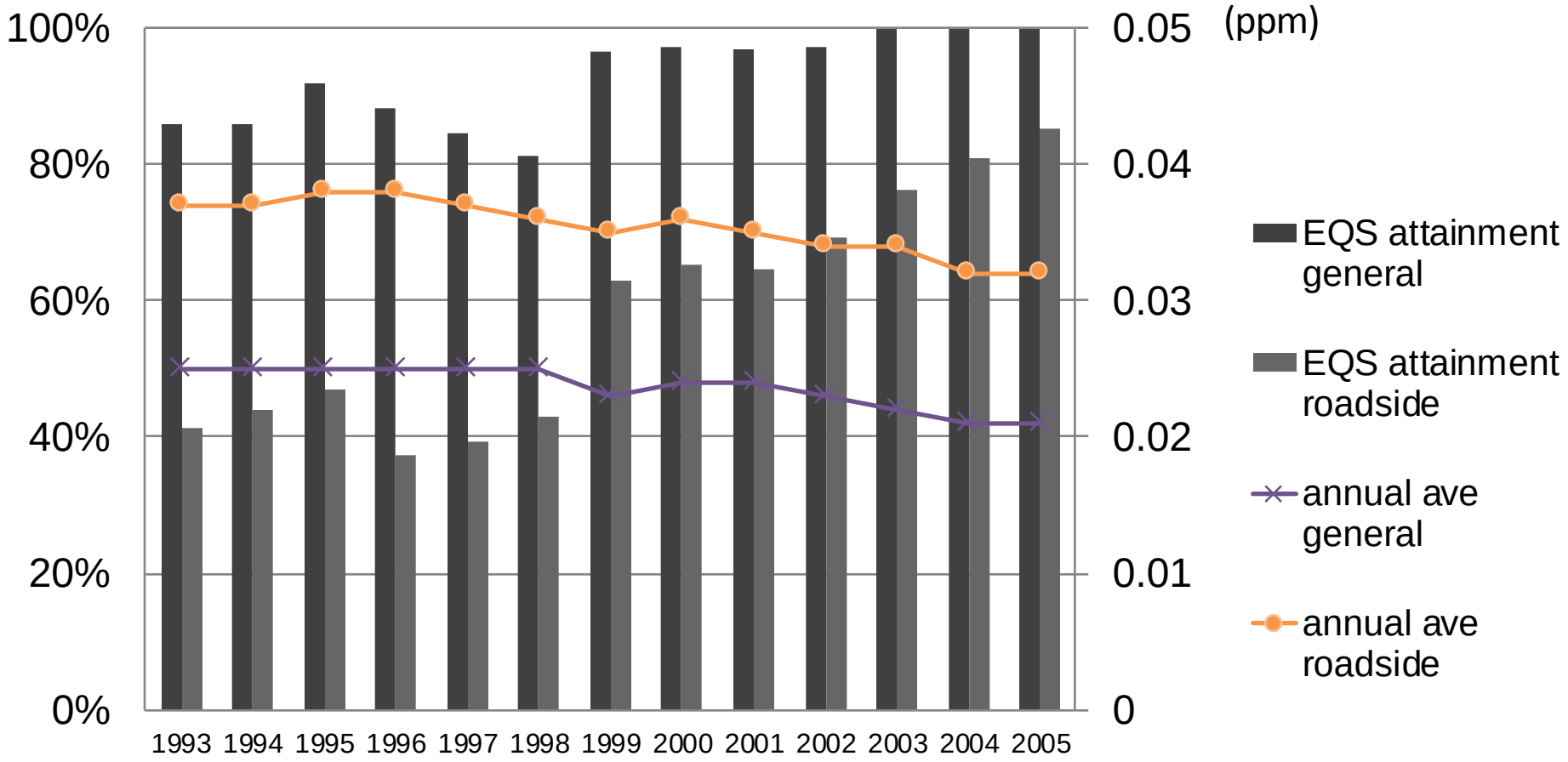


Significant improvement from 1965 to 1985, with a recent leveling off

Trend of SPM Air Quality in Metropolitan Area

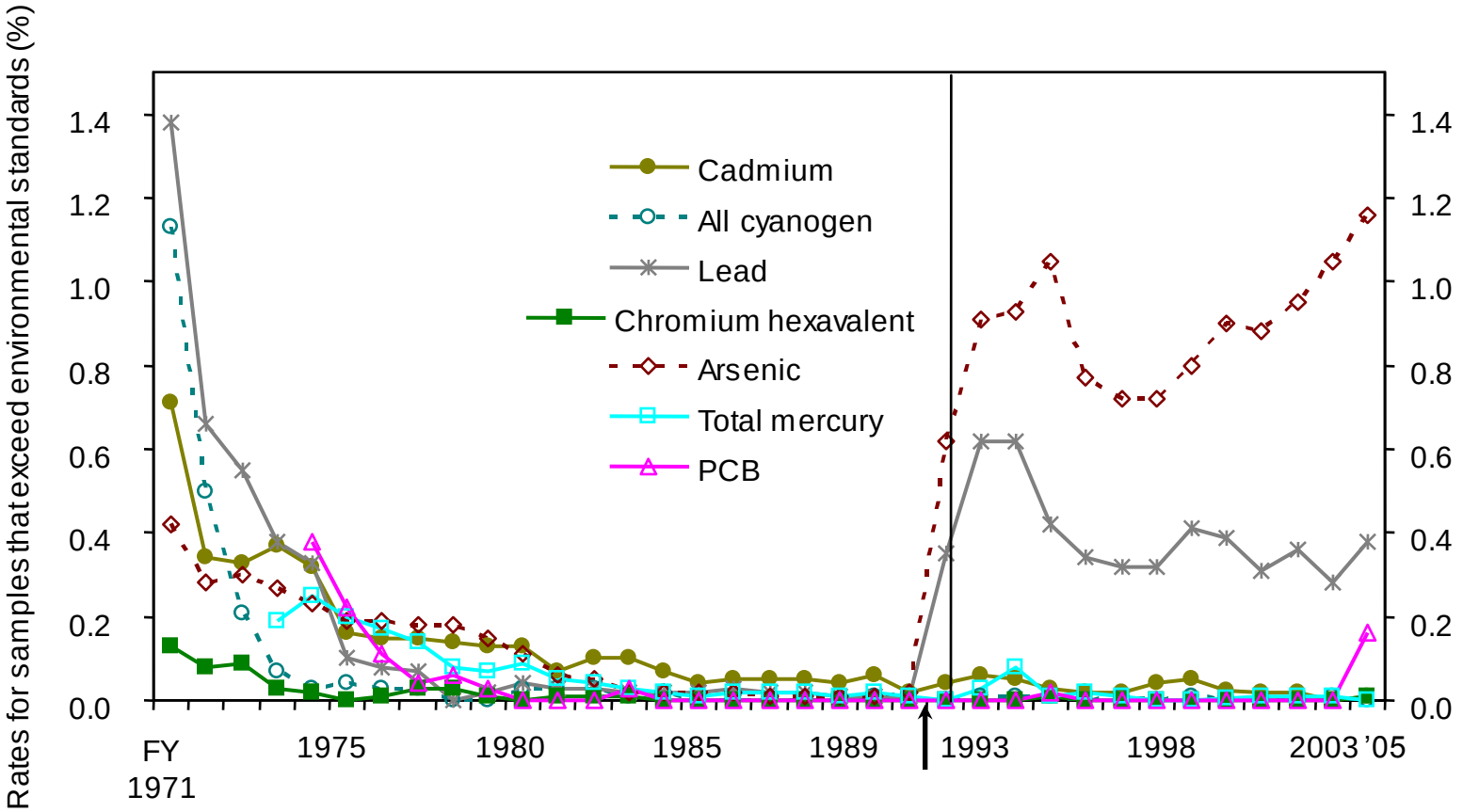


Trend of NO2 Air Quality in Metropolitan Area



Status of the Achievement of Water Environmental Quality Standards（Health Items）

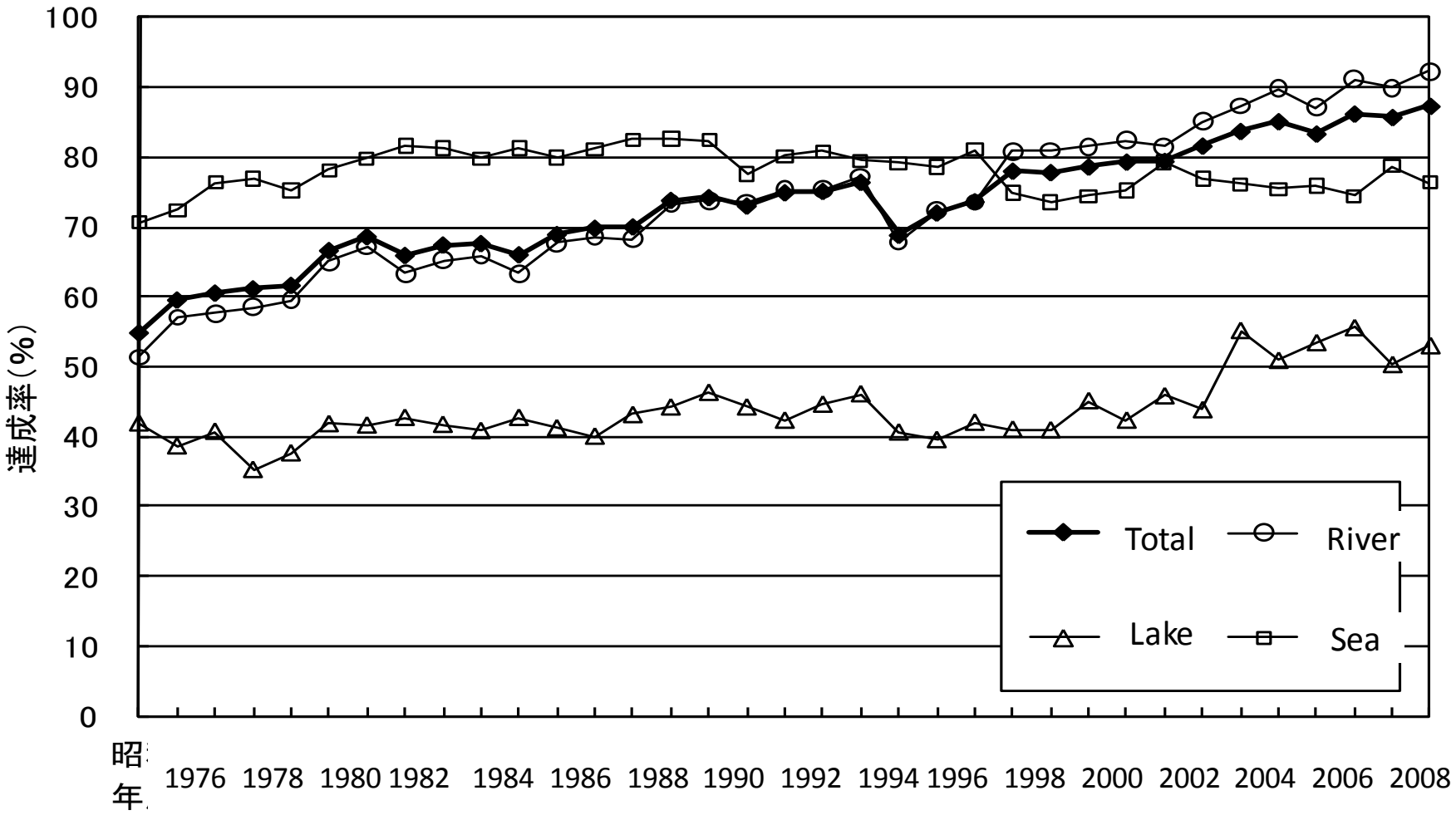
Currently, environmental standards have been achieved in almost all over the country.



Environmental quality standard values for lead and arsenic were revised (March, 1993).

(Lead: 0.1 → 0.01 mg/L, arsenic: 0.05 → 0.01 mg/L)

Status of the Achievement of BOD/COD Standards



II. Environmental Monitoring

Role of the Local Government

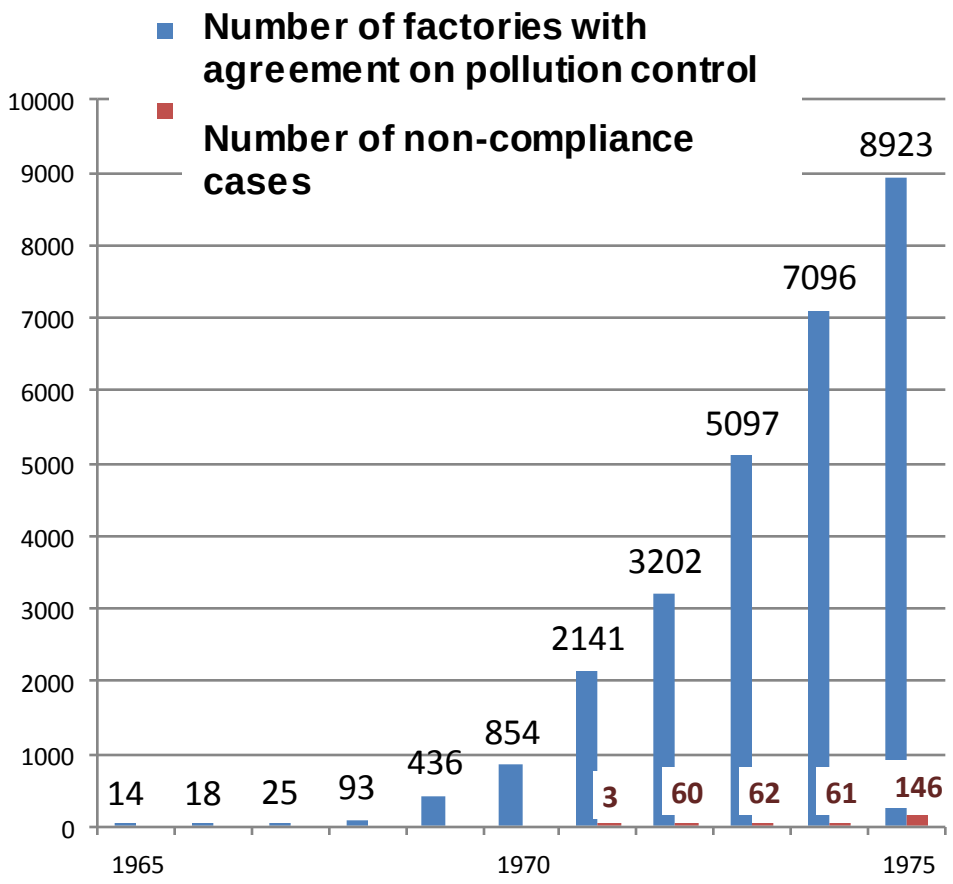
- Environmental monitoring
- Explanation of environmental policies to local community
- Frequent on-site inspection
- Persistent technical guidance to business
  - Check not only end-of-pipe, but also production processes
  - Persuade industries to take countermeasures for pollution prevention

Efforts by the Private Sector

- Agreement on environmental pollution control between private sector and local governments/citizens groups

Functions of the Agreement

1) Supplementary pollution control measure
2) Implementation of pollution control with close attention to local conditions
3) Promotion of future pollution control measures and development of pollution prevention technologies
4) Prevention of protests against location of factories by getting agreement from local residents



Pollution Control Manager System

The main function of Pollution Control Managers is to supervise workers at the facilities to meet environmental standards for exhaust gas and waste water.

Factories "beyond a certain scale" are obliged to appoint:

"Beyond a certain scale" means;

Smoke emission: 40,000 m3/h or more

Effluent: average 10,000 m3/day or more

Supervisor for Pollution Control

(Factory Manager)

Chief Manager for Pollution Control

(Exhaust Gas & Waste Water)

(Environment Control Department Manager)

Pollution Control Manager

(exhaust gas)

(Environment Control Division Chief)

Pollution Control Manager

(waste water)

(Environment Control Division Chief)

Pollution Control Manager

(noise/vibration/dust & dioxins)

(Environment Control Division Chief)

Role of Non Governmental Organizations (NGOs)

The number of NGOs aiming at restoration of atmospheric environment: 161

The number of NGOs aiming at restoration of water and soil: 959

Environmental Restoration and Conservation Agency of Japan（environmental NGO database 2008）

＜Example: The Aozora（Brue Sky）Foundation ＞

History

1) The 1978 lawsuit over air pollution in Osaka's Nishiyodogawa area ended in a March 1995 settlement in which the plaintiffs and nine defendant corporations agreed to work together to redevelop pollution-stricken areas.
2) Pollution victims wished for a future with a blue sky,which they had hoped the lawsuit would achieve.
3) To pass that wish on to the next generation, in September 1996 they donated part of the settlement to establish the Center for the Redevelopment of Pollution-damaged Areas in Japan

Activity

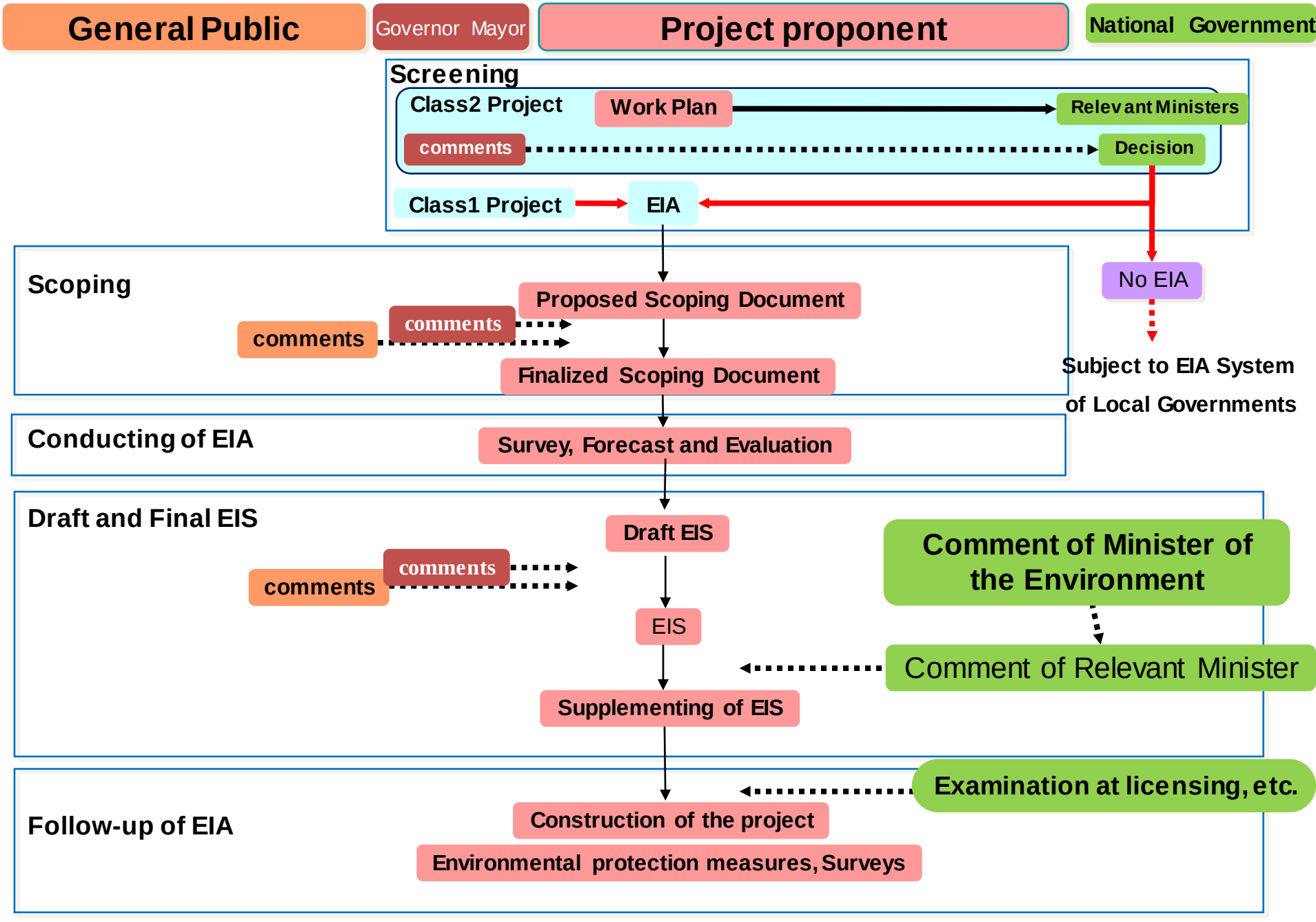
1) Developing pollution-free communities
- people- and environment-friendly road policy

2) Relating the experience of severe pollution
- The Nishiyodogawa Library on Pollution and the Environment
- hosting people for observation tours and training, and exchanges with Asian environmental NGOs.

3) Learning about nature and the environment
4) Making life worthwhile for pollution victims

The Aozora Foundation HP(http://www.aozora.or.jp/newenglish/eindex.htm)

Procedures of Environment Impact Assessment Law



Projects Subject to Environment Impact Assessment Law

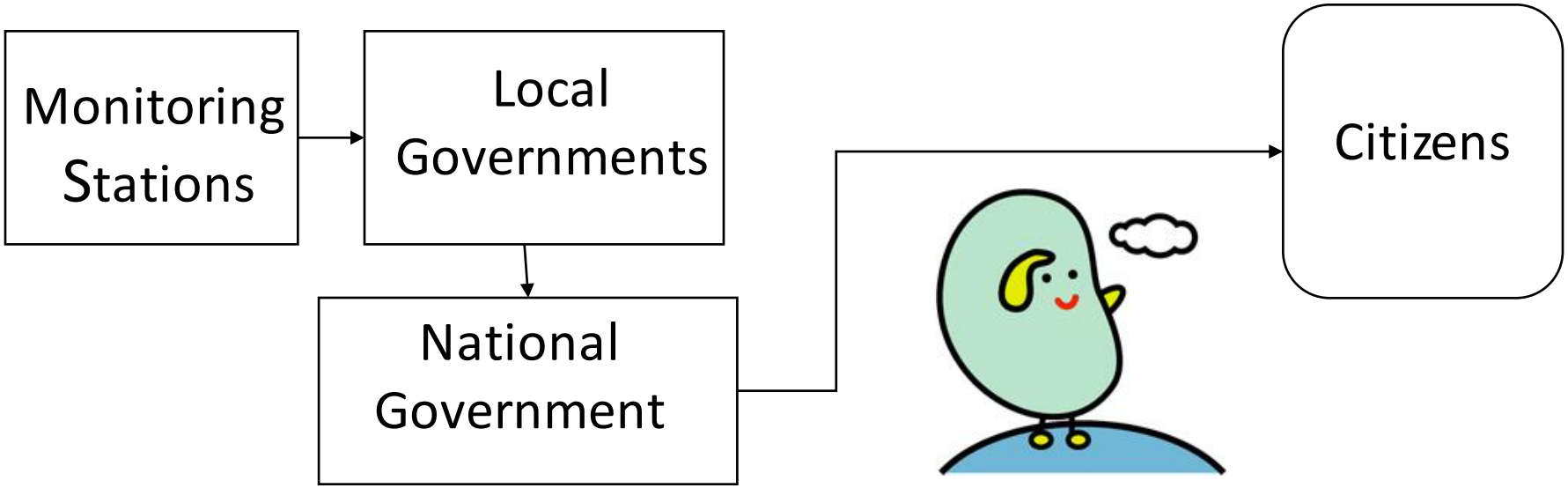
1. Roads (National expressways, Metropolitan Expressways and so on)
2. Dam and other river projects such as flood ways
3. Railroad (Shinkansen super-express railway, etc.)
4. Airports
5. Power plants
6. Waste Disposal Sites
7. Land reclamation
8. Land adjustment
9. New urban residential area
10. Industrial complex
11. Urban infrastructure development
12. Distribution complex
13. Land creation by public cooperation
14. Port and harbor plan

Large-scale projects of the above list are required to follow the EIA Law

Environment Monitoring System "Soramame-Kun" (Air Pollution)

Monitoring results are made public on the web-site on a real time basis.

An effective conveyance of information on status of environmental warnings, etc.



Soramame-kun : http://soramame.taiki.go.jp/

“Soramame-Kun”

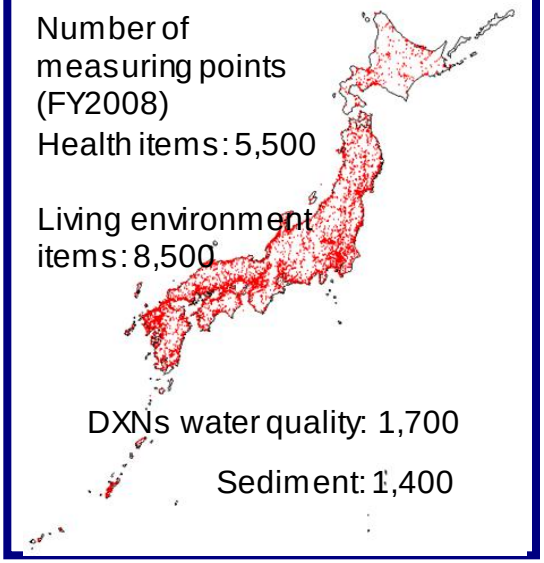
Environment Monitoring（Water Quality）

Monitoring System

Quality of the public water (river, lake, sea) (about 8,500 spots in the country) and the ground water is monitored.

- ◆To understand the characteristics of water quality
- ◆To understand changes and quality trends of water in the long-term
- ◆Early detection of water pollution
- ◆To maintain of meeting environmental standard for water quality
- ◆To implement environmental protection measures
- ◆To respond to accidents related to water pollution

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



◆ Summarizing the results of water quality measurement

- ・Responding to water pollution accidents
- ・Response to the excess of environmental quality standards or the water areas that fails to achieve environmental quality standards

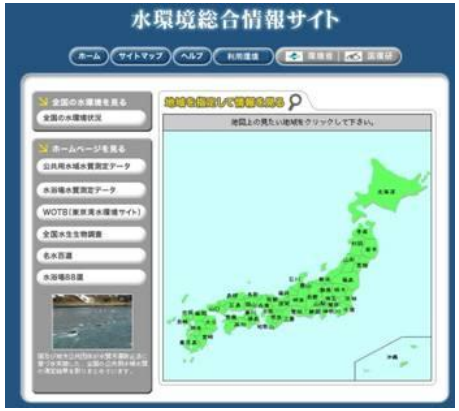
Collection & analysis of water quality data of the country and database development

Official Announcement

Information Disclosure

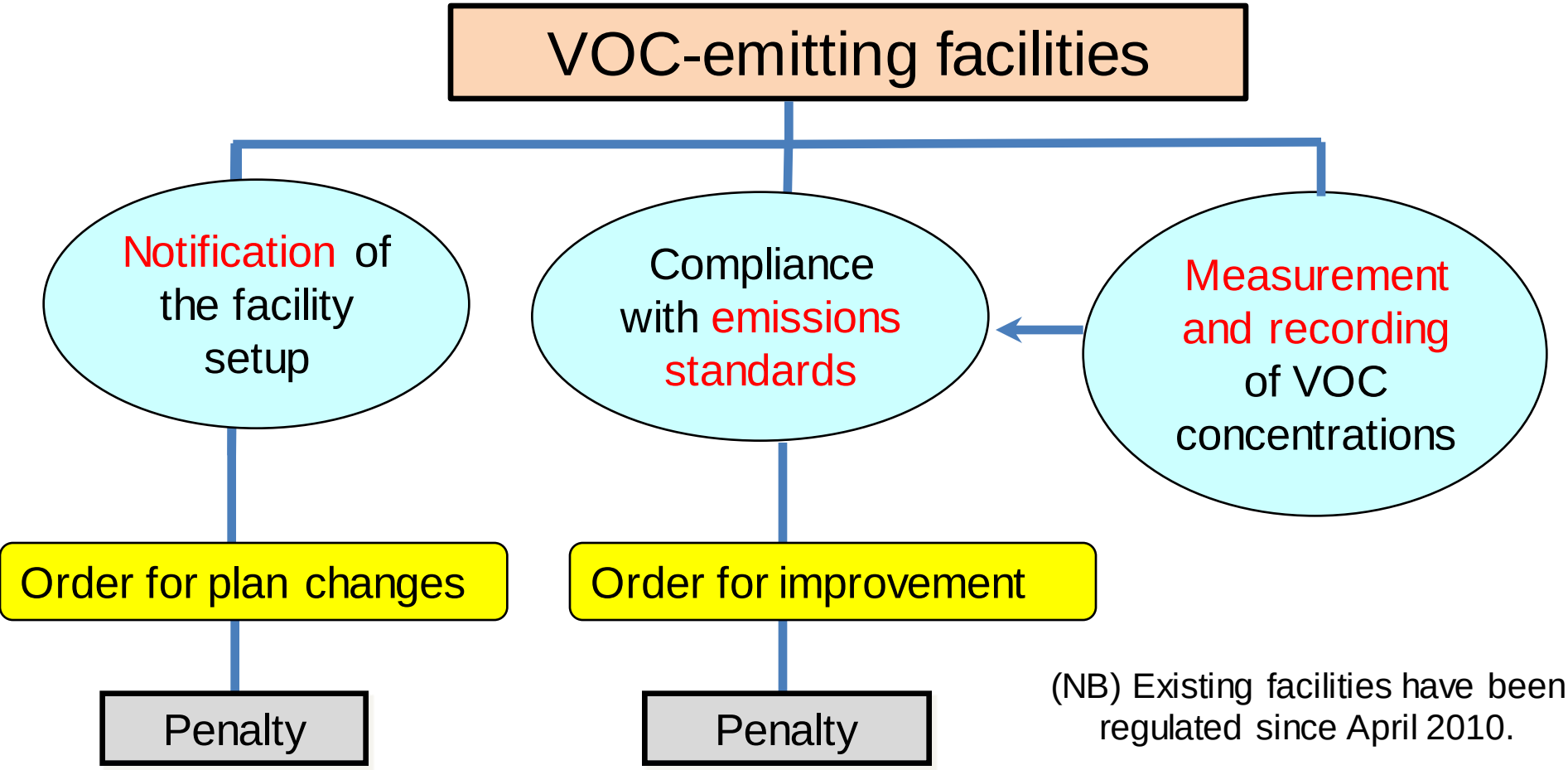
◆White paper ◆ Homepage

◆ Results of water quality measurement



III. Recent Actions to Address Environmental Pollution

Volatile Organic Compounds (VOC) Laws and regulations



(NB) Existing facilities have been regulated since April 2010.

(1) Drying facility for chemical manufacturing	(4) Drying facility for printing
(2) Drying facility for spray painting and for painting	(5) Industrial cleaning facility
(3) Drying facility for adhesives	(6) Storage tank

Particulate Matter (PM) 2.5
Background to the Issue

- Recently, concern has been raised about the health effects of suspended particulate matter, particularly particulates of 2.5μm or less in diameter (called PM2.5) since they easily penetrate the depths of the human respiratory system and they also tend to absorb various toxic constituents or absorb them on their surface.

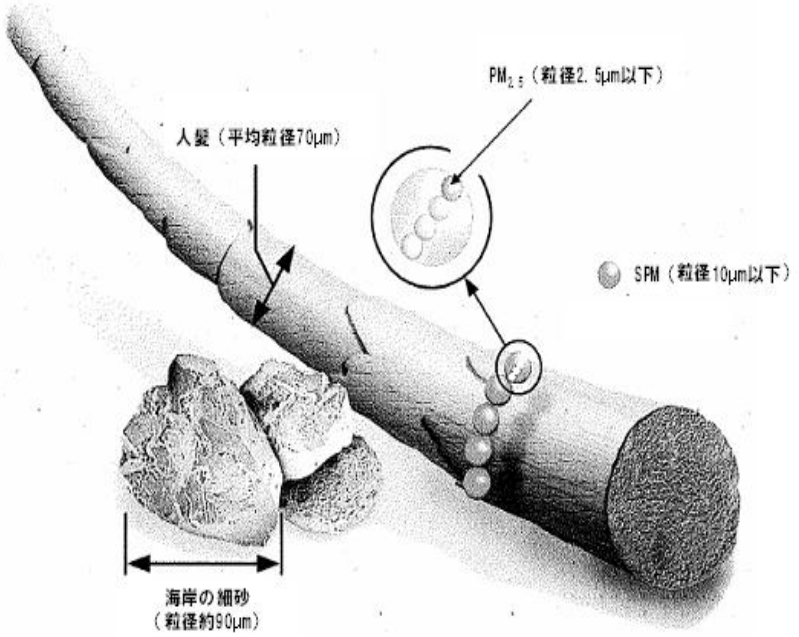


Figure - Size of PM (in comparison with a human hair and fine beach sand (Conceptual figure)

(Source: EPA-document)

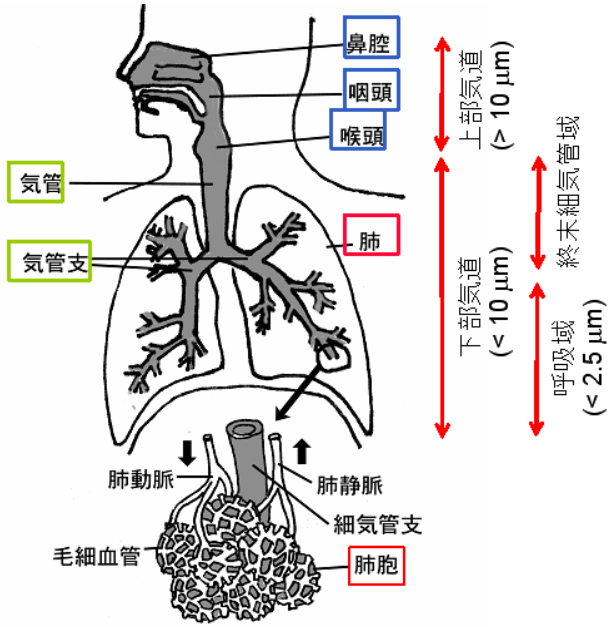
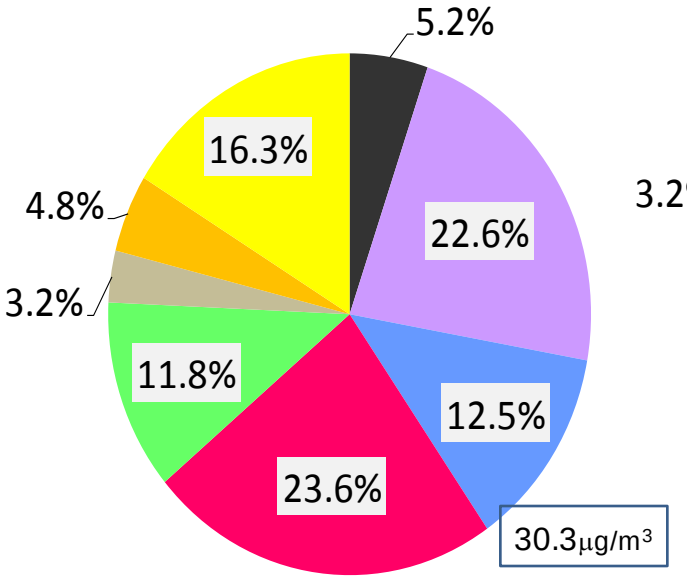


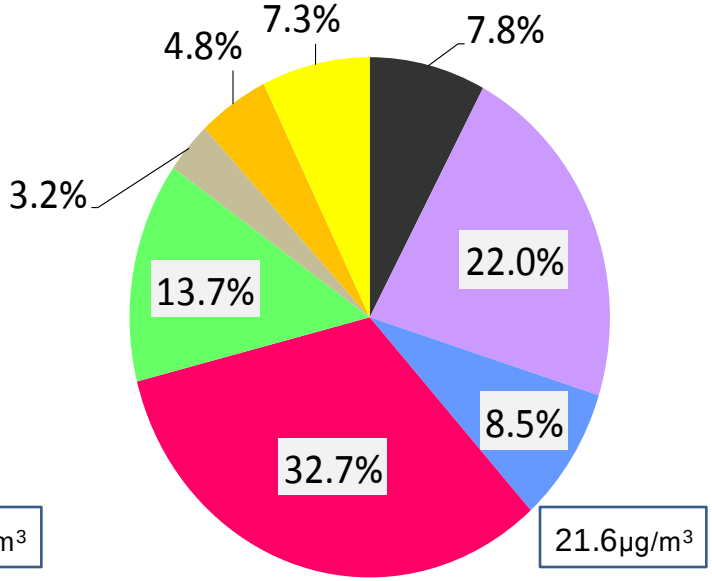
Figure - Human respiratory system and the regions where there is particulate deposition (Conceptual diagram)

(Source: document of the National Institute for Environmental Studies)

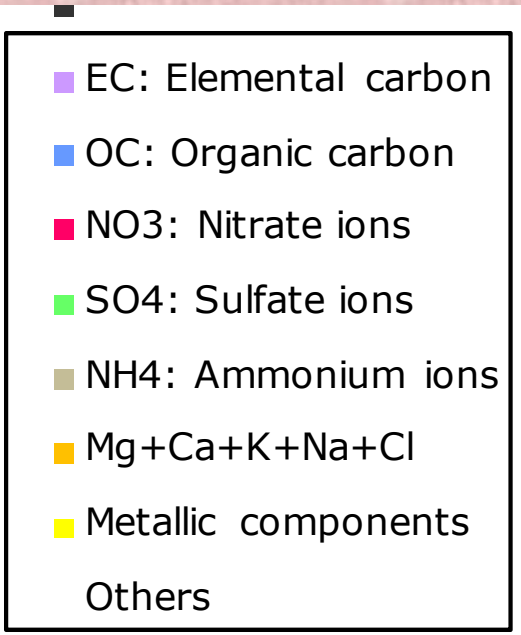
PM2.5 - Seasonal variation in the constituents -

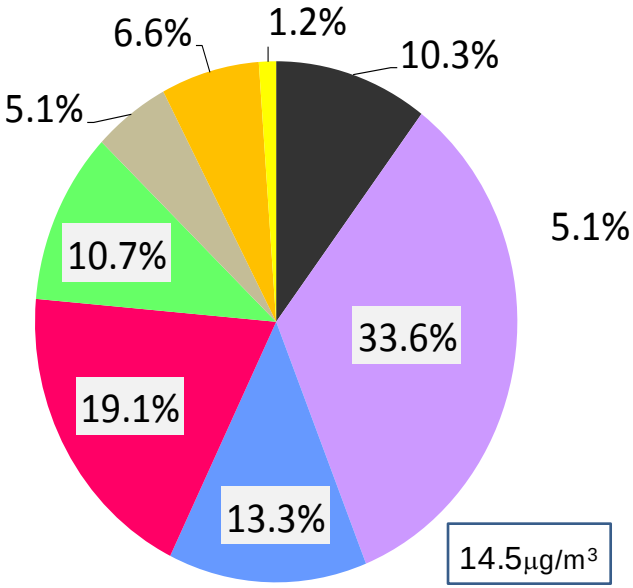


Spring season
(2 weeks in April 2008)

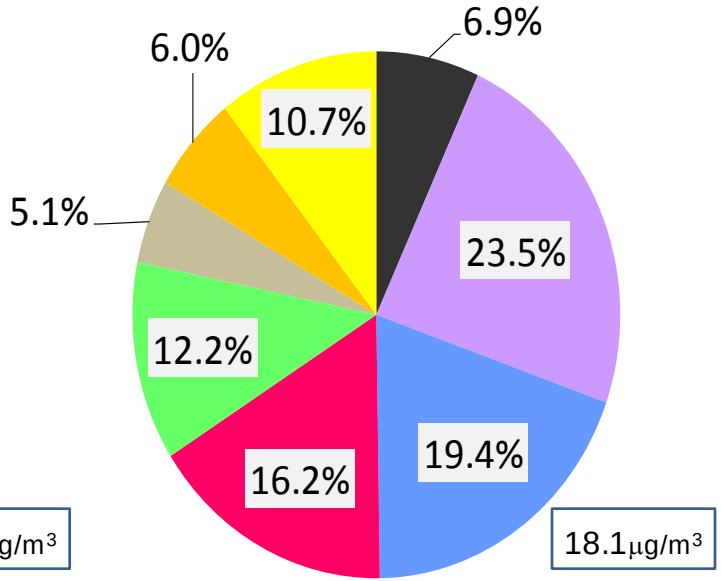


Summer season
(2 weeks in August 2007)





Autumn season
(2 weeks in October 2007)



Winter season
(2 weeks in February 2008)

The results of the analysis of the constituents show that sulfate ions dominate in the summer season and nitrate ions in the winter, with high percentages for organic carbon and ammonium ions. Elucidation of generating mechanisms and exhaust origins for each constituent is a pre-requisite for investigating exhaust reduction measures.

Water Quality Improvement of Lakes and Reservoirs

Present State

Despite the fact that water quality of lakes and reservoirs are gradually improving, they have not achieved desired quality; they are not meeting communities' expectations.

①Destruction of ecosystem: change of phytoplankton species, loss of native species, explosive propagation of algae, drastic decreasing of catch in fisheries
②Difficulties in water utilization: taste and odors, filter troubles
③Diluted communication: loss of water activities, deterioration of scenery, etc.

Setting positive outcomes

Review on the water quality conservation target
*** Optimal features of lakes and reservoirs for communities.**
- **water-quality indicator**
  -DO(understory), transparency, TOC, etc.
- **targets of utilization and conservation**
  (the rate of native species, catch in fisheries, the number of swimmers in the lake , etc.)

Identification of root causes

Study on pollution mechanism
- **Biodegradable organic matters, internal production**
- **Relationship between N/P ratio and phytoplankton**
- **Environment quality of bottom sediment, dissolution of bottom sediment**
- **Investigation on pollution load of catchment area**
- **Pollution mechanism of brackish lakes**

〔Review on water-quality control measures〕

*Measures for catchment area (area-source measures, small-scale establishment measures)

*Inner lake measures (conservation of ecosystem in coastal area, restoration and use of natural purifying function , utilization of plants and animals)

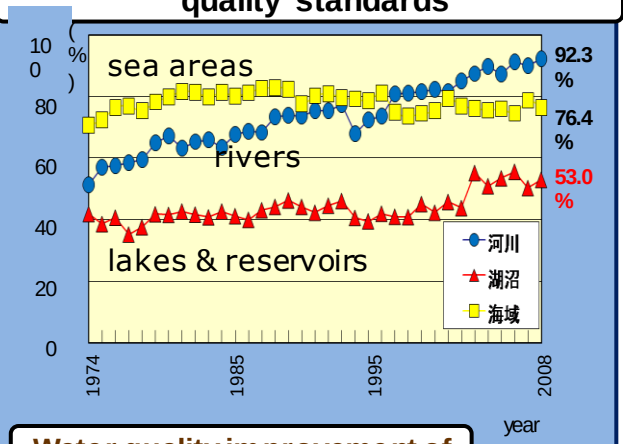
*Optimal features of healthy water circulation in lakes & reservoirs and catchment area

*Establishment of management method for picturing material circulation, e.g. nitrogen, phosphorus.

Realization of the optimal lake and reservoir for a community

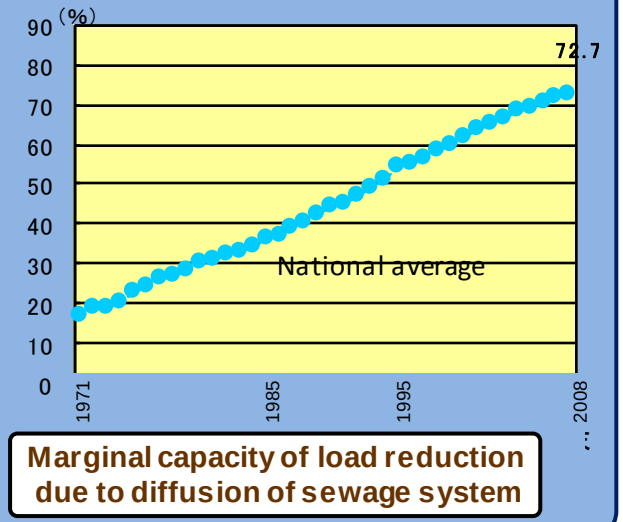
Present State of Lake Environment

Achievement status of environmental quality standards



Water quality improvement of lakes & reservoirs are required

Diffusion rate of sewage system

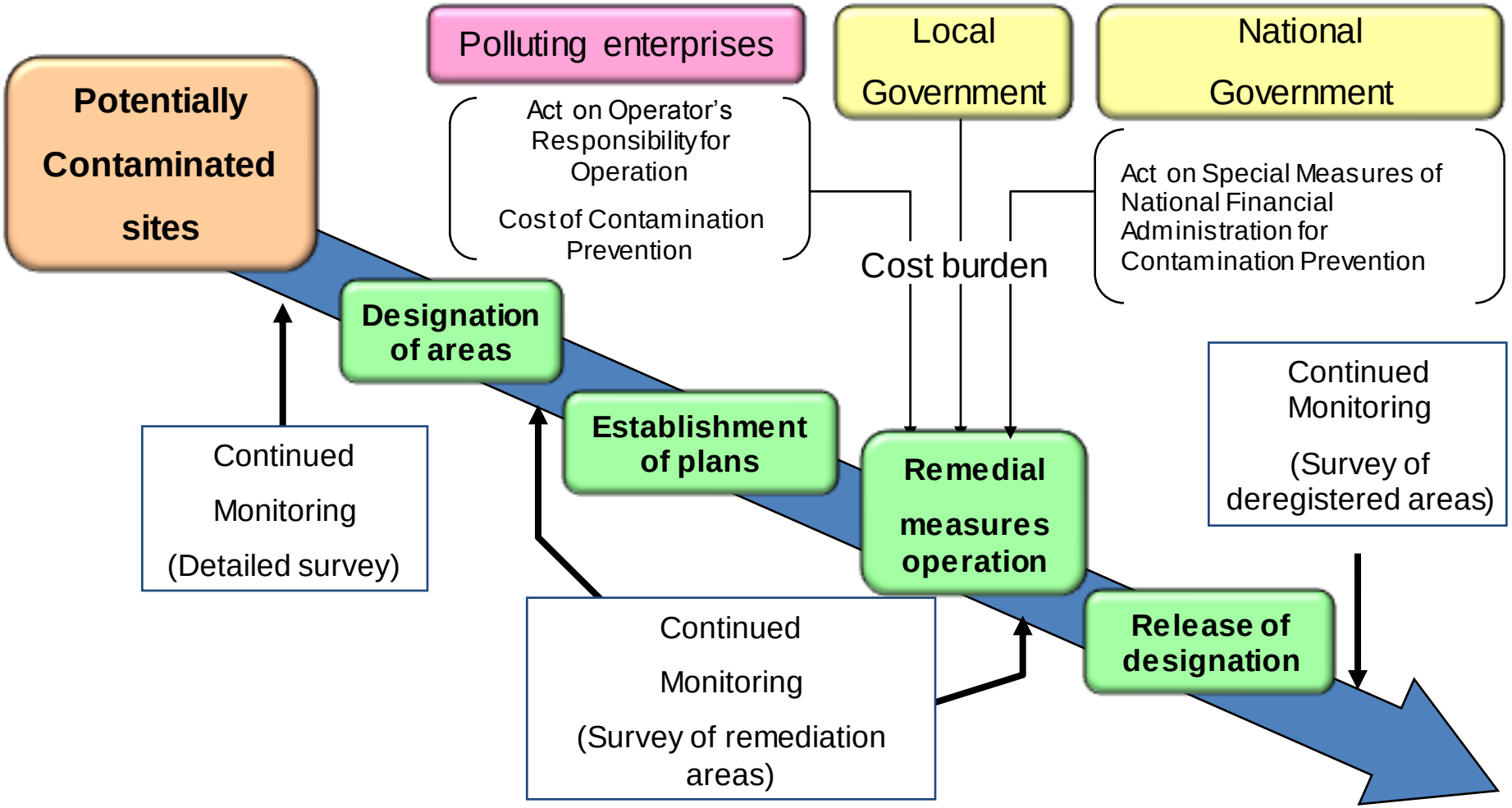


Marginal capacity of load reduction due to diffusion of sewage system

Soil Contamination Countermeasures

-Outline of the Agricultural Land Soil Pollution Prevention Act-

Enacted in 1970



Concept of Soil Contamination Countermeasures Act after amendment

Purpose

In order to implement the Soil Contamination Countermeasures Act, and to protect human health, measures for investigating situations of soil contamination, and measures for the prevention of harmful effects on human health by such contamination are instituted

Institution

Investigation

- When closing down specific facilities which use harmful substances (Article.3)
- When prefectural governors and city mayors receive notification on changes in land characteristics for an area of over 3,000 ㎡, and suspect soil contamination in this area (Article.4)
- When prefectural governors and city mayors are concerned that human health would be damaged by soil contamination

Land owners can request that their own lands be designated by prefectural governors and city mayors when contamination is found through voluntary investigation (Article. 14)

Land owners, etc (proprietors, managers or occupants) ask specific research institutes to implement research and the results are reported to prefectural governors and city mayors

【When soil contamination levels do not match the quality standards】

Zone Designation

①Designated Zone for countermeasures (Article. 6)

Because this zone has the potential to cause human health impacts, countermeasures are needed such as removal of contaminations

→Prefectural governors and city mayors indicate measures for removing contaminations, etc (Article. 7)

→Prohibition to change the land characteristics (Article. 9)

When intake routes of contaminants have been blocked

②Notification Zone for Changing Land Characteristics (Article.11)

Because this zone has no potential to cause human health impacts , measures to remove contaminations are not needed (this includes zones where intake routes have been blocked)

→Plan notification is necessary when characteristics of soil are going to be changed (Article. 12)

When contamination removal has been completed, the designation is withdrawn

Regulation for transporting contaminated soil

- Regulation on transporting contaminated soil from zones ① and ② (pre-notification, plan change orders, and countermeasure orders for transfers which do not follow the transport standards)
- Duty to deliver and preserve manifests related to soil contamination
- Permit for facilities to dispose contaminated soil transported from above Zone

※Amendment of Soil Contamination Countermeasures Act is executed since 1 April. 2010

※Contents of the amendment are shown in underlined sections

Measures for Bottom Sediment

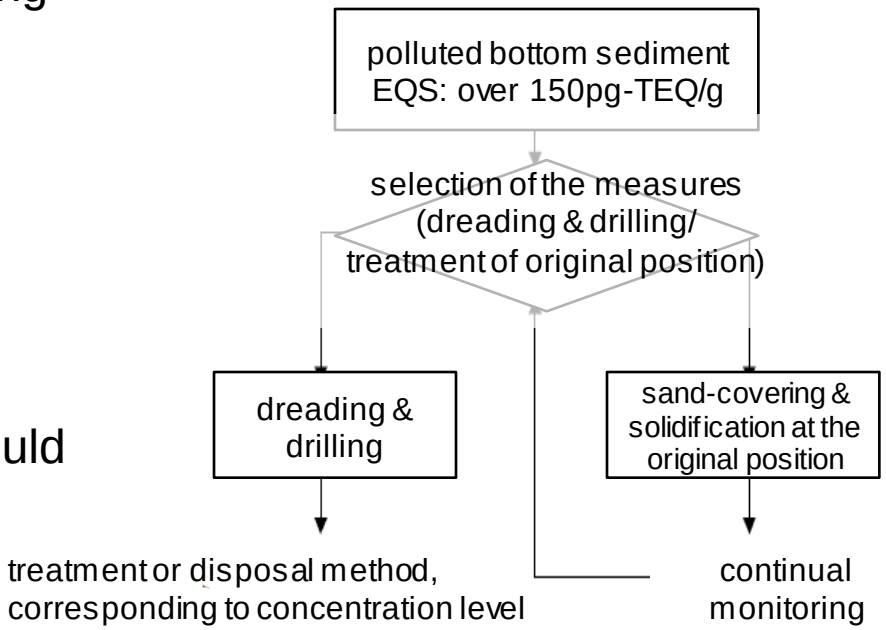
- Monitoring the bottom sediment of exceeding environmental quality standard; statements of basic conditions and important notices regarding construction methods

- Bottom sediments subject to the measures
  - dioxins
  - mercury
  - PCB
- Treatment(construction) methods

The regulation is provided that <u>operators</u> should explain following steps with examples, take efficiency and economy into consideration and select a method, regarding the treatment itself as important.

(1) dredging and drilling
(2) containment
(3) elimination of the toxicity
etc

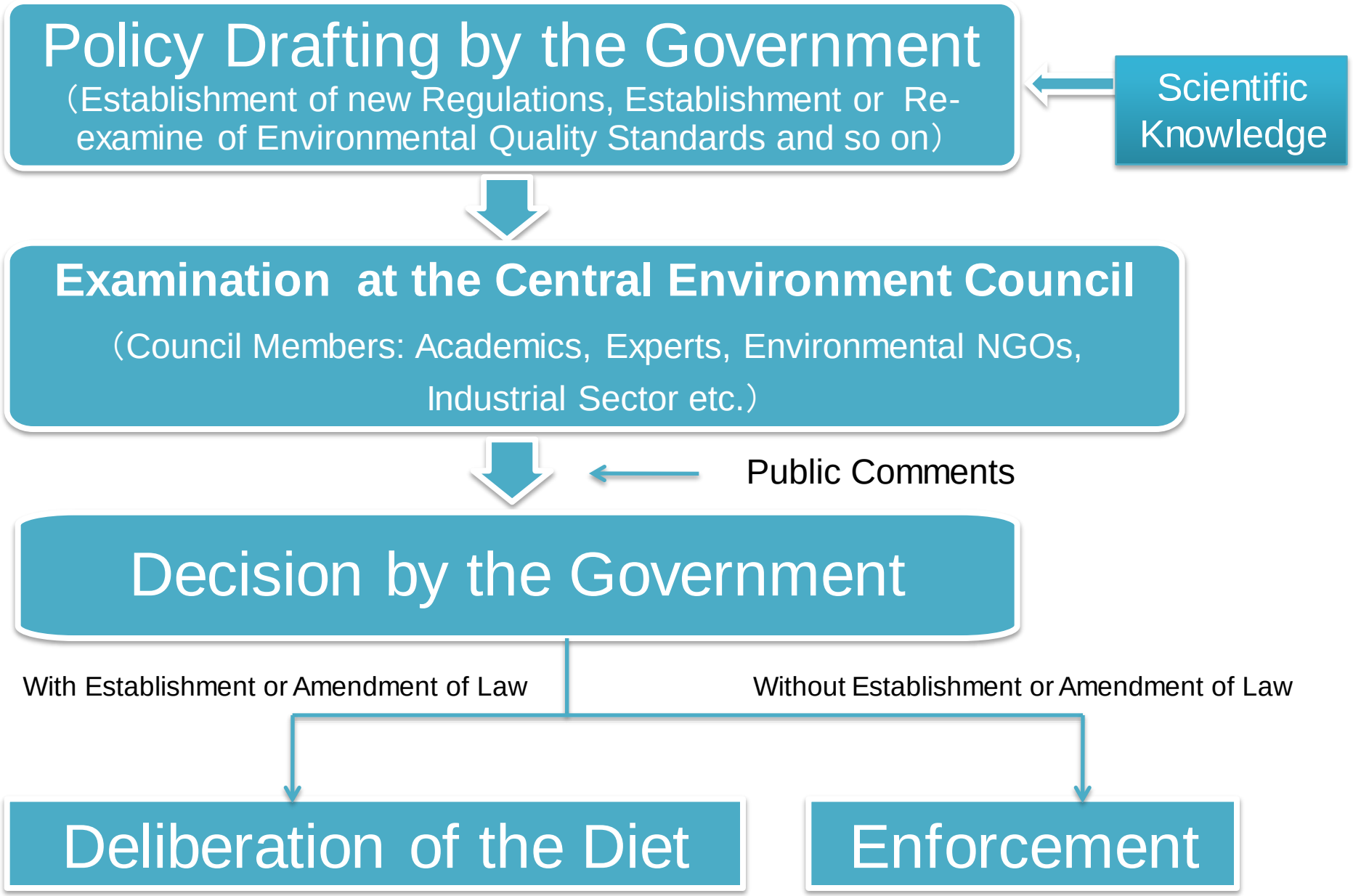
Example: Basic Steps of Measures for Bottom Sediment: Dioxins



Reference:
"Basic Views on Measures for Bottom Sediment Dioxins" (March 2003)
by Ports and Harbours Bureau, River Bureau of Ministry of Land, Infrastructure, Transport and Tourism

IV. Framework of Environmental Policies

Environmental Policy Making Process



Essentials for Environmental Regulations

- Predictability is required when private sector makes investment decisions to take measures for compliance with environmental regulation.

- Required information for the introduction of environmental regulations.
  - Subject of control (type of industry, scale, installation time, etc.)
  - Timing when the regulation comes into force
  - Standards for existing and new facilities
  - Measuring methods for pollutants
  - Contents of report to administration

Economic loss without due Consideration of the Environment

Case of pollution	Economic loss (yen/year)	Expenditure for pollution control (yen/year)
Minamata Disease	12.6 billion	0.1 billion
Itai-Itai Disease	2.5 billion	0.6 billion
Yokkaichi Asthma	1.3 billion without any countermeasures taken 21 billion	14.7 billion

*The above values are 1989 price of equalized values of economic loss and actual pollution control expenditure with assumption that maturity period is 15 to 30 years.

Conclusion

- Japan has overcome severe environmental pollution problems by the efforts made by the national and local governments, private sector and citizens.
- Recent challenges include VOCs measure and others.
- The decision-making process mechanism in which stakeholders participate in is playing an important role in environment policy.
- Clarification of scientific information and the regulation is necessary when introducing an environmental control.
- A lesson learnt is that investment for environmental measures is economical.