

Urbanization and Water Quality Control in Japan

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with Suitable Wastewater Treatment
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1. History of Water Management

Water Pollution of Tokyo in 1970's

Tokyo Bay in 1970's

A river of Tokyo
in 1970's

The Kanda river
(Tokyo) in 1970's



Heavy Industry and Processing Trade

Tendency to cause more pollutant

Pollution from :

Heavy industry >> Light industry, Service industry

Production for processing trade

>> Domestic demand



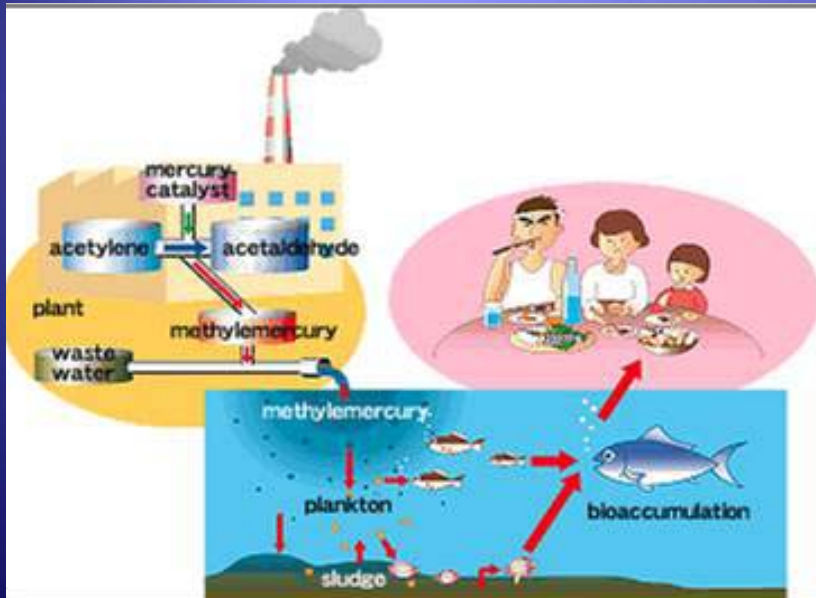
Polluted effluent directly poured into the sea, 1960s



Polluted water around industrial area, Dokai Bay, 1960s, Kyushu

Pollution-related Disease

Minamata Disease, Niigata Minamata Disease and Itai-itai Disease had damaged the health of many people.



(National Institute for Minamata Disease Website)

Minamata Disease is...

- ◆ A neurological syndrome caused by severe mercury poisoning
- ◆ First discovered in Minamata city in Kumamoto prefecture; officially identified in 1956.
- ◆ The second outbreak of Minamata disease occurred in Agano River basin in Niigata prefecture in 1965.

Challenges by local government

Prefectural governments with large industrial areas started to establish ordinances.

■Pollution Prevention Ordinances■

- ◆ Tokyo Metropolitan Government : 1949
- ◆ Osaka Prefectural Government : 1950
- ◆ Kanagawa Prefectural Government : 1951
- ◆ Fukuoka Prefectural Government : 1955

Central government established the laws in 1958

Two Water Quality Laws

- Law Concerning Preservation of Public Water Areas
- Law Concerning Control of Factory Effluent

Water Quality Laws of 1958 is not enough

- The public water area had to be designated to be applicable to Law Concerning Control of Factory Effluent.
- Regulations to meet Water Quality Standards were not stringent enough.

What happened?

- ❑ Polluted areas had spread from large cities to throughout nation.
- ❑ Pollution and facilities which discharged polluted water or wastewater were varied.
- ❑ Pollution had worsen rapidly.

New Measures for water environment conservation was needed

1967

The Basic Law for Environmental Pollution Control

To resolve fundamental pollution problems, extending beyond direct control of pollution sources, through systematic and total administrative action.

1970

Water Pollution Control Law

- Took over two water quality laws
- Unified several regulations
- All public water areas
- National effluent standard
- Direct penal system
- Almost all kind of industry

2. Outline of Measures concerning Water Environment Conservation

Goals of the water environment conservation policy

Environmental Quality Standard for Water Pollution
(health items, living environment items and DXNs)

Measures concerning water environment conservation

- Wastewater regulation for factories & establishments (uniform regulation)
- System to notify specified facilities
- Water quality monitoring (continuous monitoring, voluntary measurement by enterprises)
- Measures for domestic waste water
- Measures for closed water areas

Structure

Goals

Water Quality Standard

Measures for domestic wastewater

Measures for closed water areas

Measures for factories and establishments

Effluent Standard

Notification of facility installation

Monitoring of waste water

Monitoring of public water quality

On-site

Inspection Order Report

Pollution Control

Johkaso

Sewerage

Construction

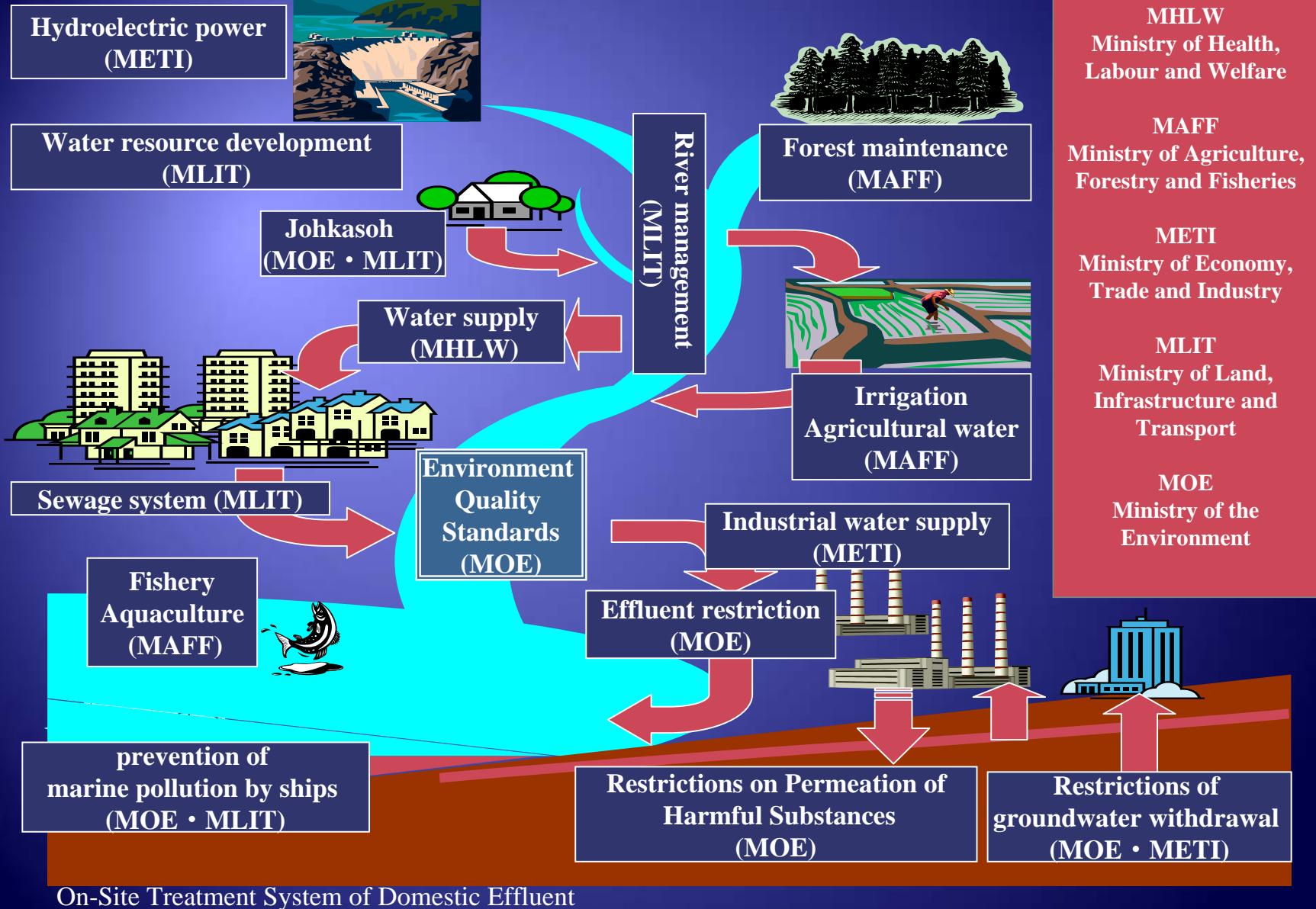
Seto Inland Sea

Lakes

Ariake Sea and Yatsushiro Sea

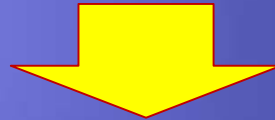
Specific areas/Basic Plan & Control

Administration



3. Water Quality Control with Suitable wastewater treatment

Water Pollution caused by Urbanization and industrialization



Water Quality Control

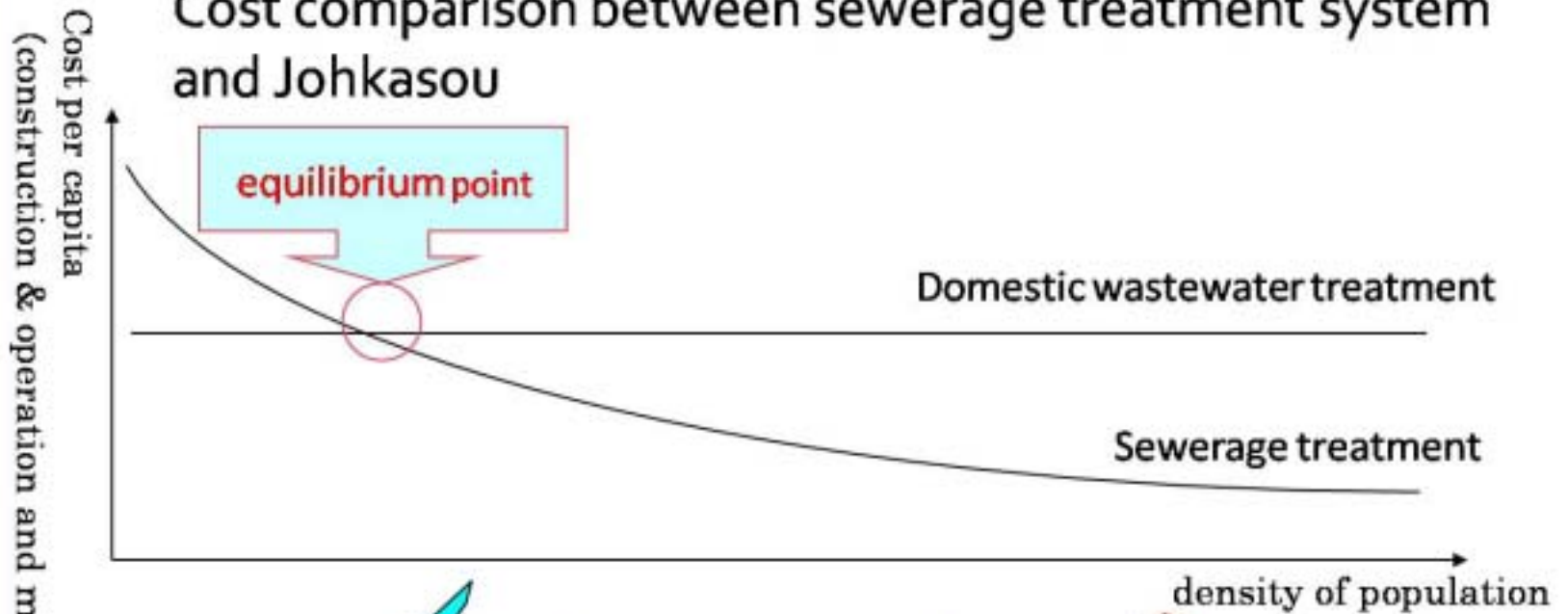
- ◆ With proper wastewater treatment and management in a city



Role sharing between

Centralization and Decentralization system

Cost comparison between sewerage treatment system and Johkasou



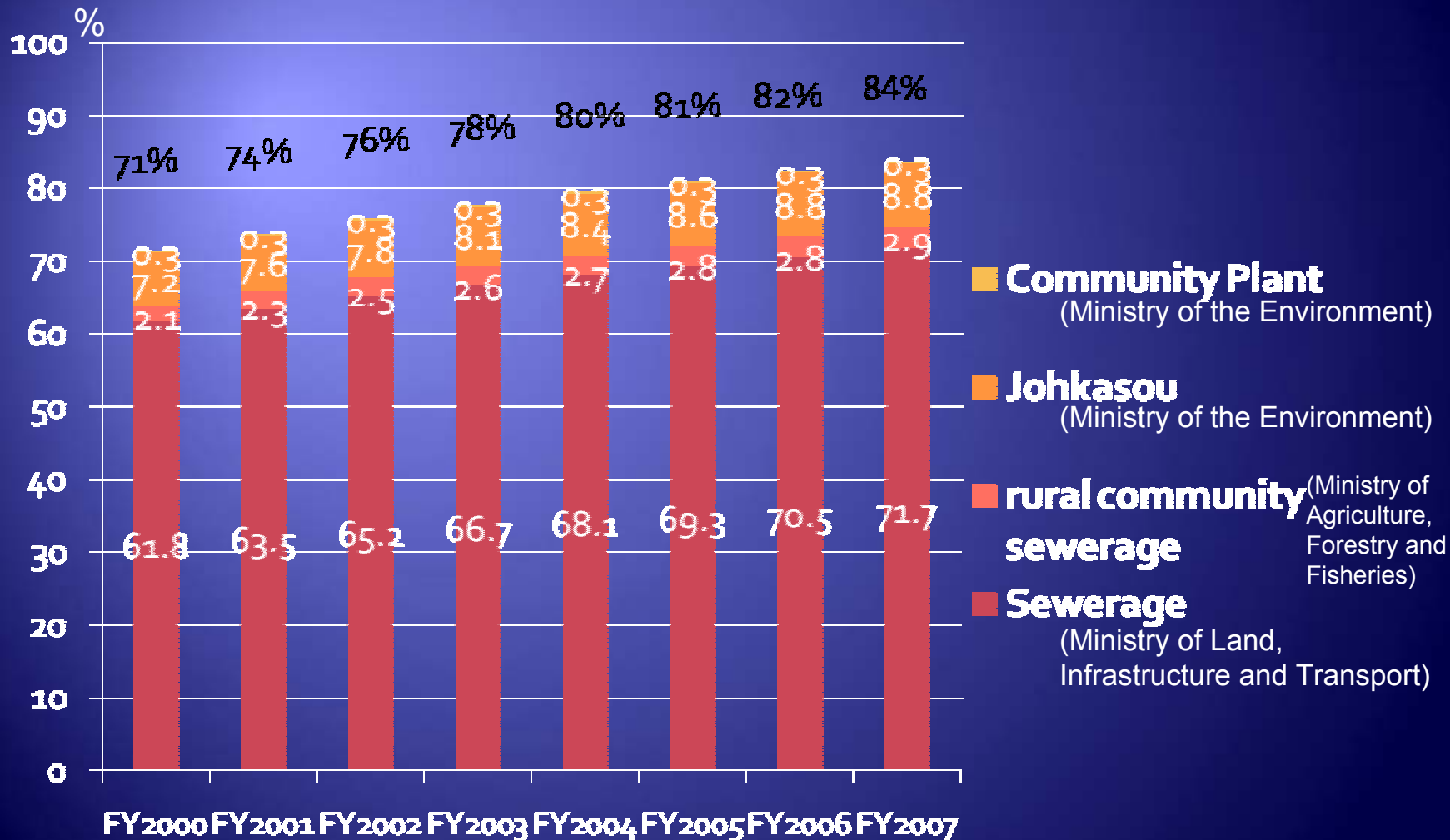
Johkasou(Domestic wastewater treatment tank) is cost-effective

Sewerage treatment system is cost-effective

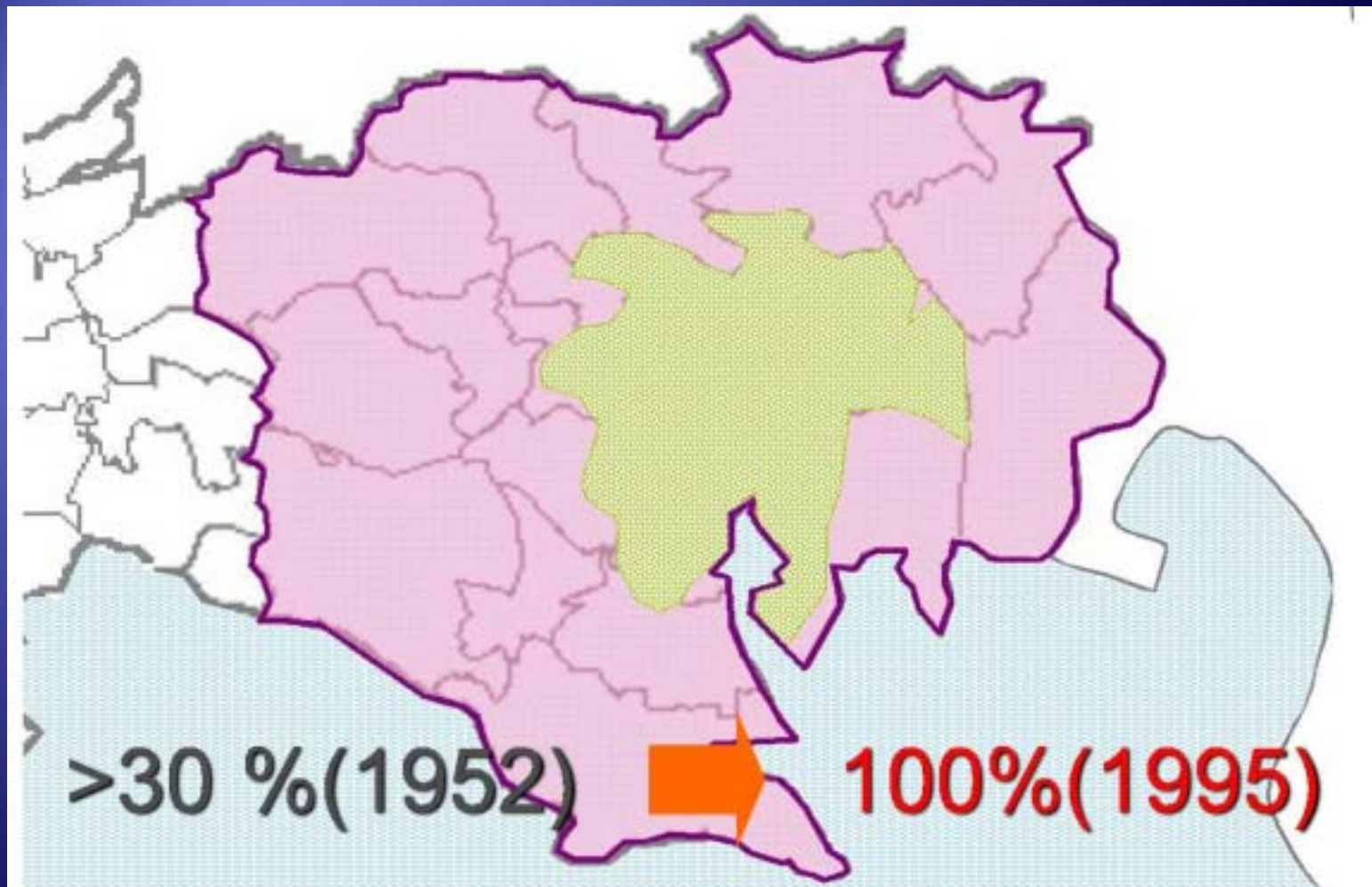
Comparison

		Sewerage treatment system	Johkasou (Domestic wastewater treatment)
Function		Wastewater treatment and Prevention of inundation	Wastewater treatment
Object		Treating wastewater collectively	Treating wastewater individually
Suitable area		Urban area	Area of scattered population
Administrator		Municipality	Individual or Municipality
Useful life of facility	legal	Treatment plant : 23 years Piping system : 50 years	7 years
	past results	Treatment plant : 15-70 years Piping system : 50-120 years	main body : over 30 years equipment : 7-15 years

Treatment Methods of Domestic Effluent and their Prevalence Rate

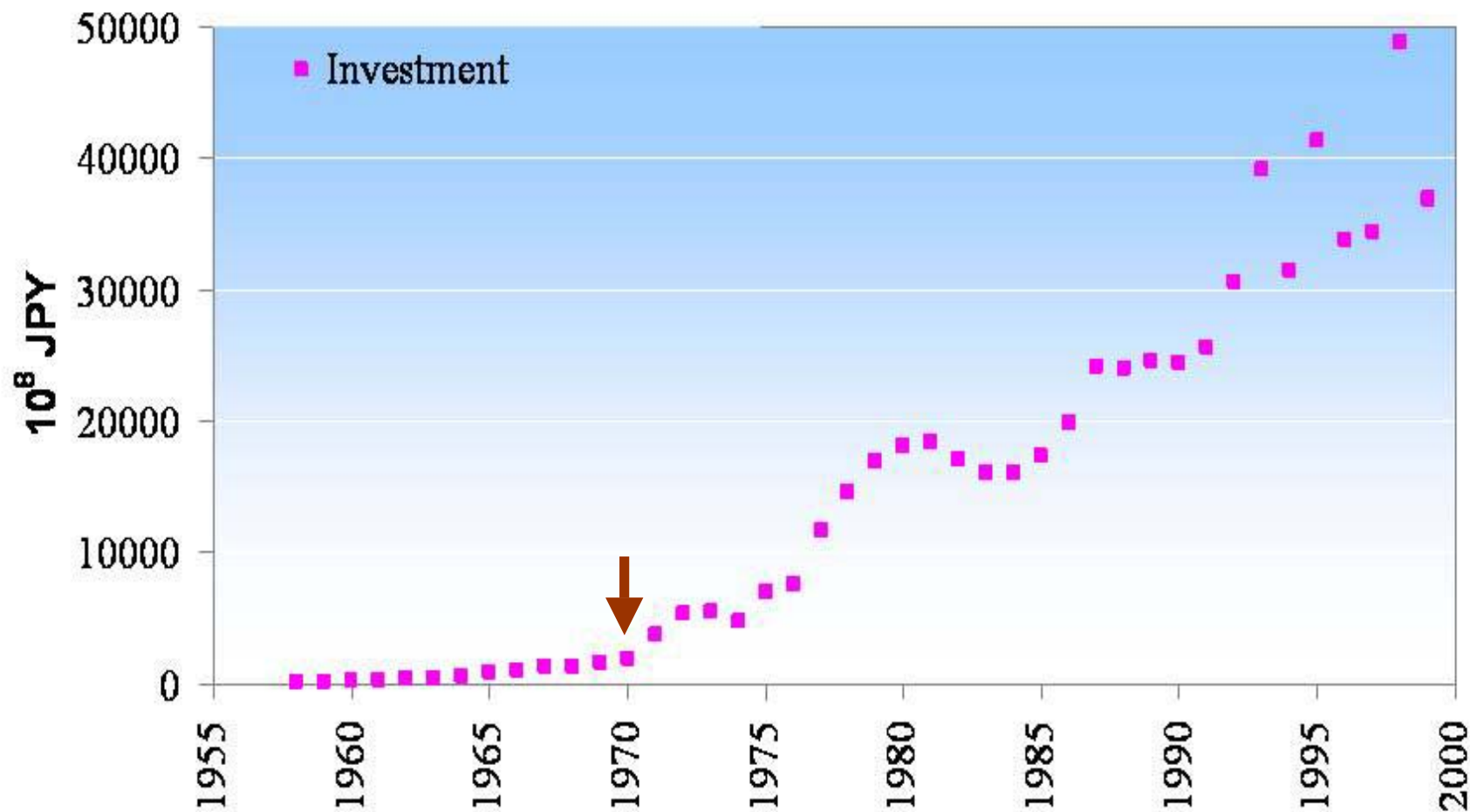


Development of Sewage Works of Tokyo



Source: Sewerage Bureau of Tokyo Metropolitan Government

Investment of Sewage Works



4. How to spread the Sewerage system in Japan?

The Issue:

- a. Lack of Public's knowledge
- b. Shortfall of Financial resources
- c. Shortage of Engineer

The Approach:

- d. Development of legal system
- e. Financial resources

a. Lack of Public's knowledge

In 1870s, Spread of Cholera

In 1950s, Water pollution in rivers and the public water bodies became prominent, and environmental pollution became a serious concern.

Necessity of sanitary facility was recognized



National Government and Municipality inform the necessity of Sewerage system through Education and Public relations

Basic of the Sanitation

- > Water Supply
- > **Sewerage System**
- > Cleanup the Waste

b. Shortfall of Financial resources

It is very hard to gain the profit through the sewerage works

Public responsibility for development infrastructure as National Minimum.

The Sewerage System has the great effects on the National power, because it improves the Sanitary Condition and Productive capacity.

The role of the Sewerage System is mainly to play public benefit and public purpose (Improvement of the living environment, conserve the water quality of public water body)

Incentives and Resources are necessary



National Government established a sustainable financial base by the Law

- > Subsidy System
- > Local Bond
- > Payment by beneficiary
- > Usage fee

At first, the Financial Regulations (Subsidy system and Fee Collection, etc.) were lacked in the Sewerage Law of Japan, so local governments were in financial distress and they could not construct the Sewage system.

c. Shortage of Engineer

Lack of engineers in Local government



National government make
the **Technical Guidelines**

National government and Local
government set up the **Japan Sewage
Works Agency (JS)**

Japan Sewage Works Agency (JS)

- > Technical Support as the dispatch of Engineer
- > Construction of the Core Facilities
- > Conduct the Training
- > Technical Development, Technical assessment

d. Development of Legal system

To enforce the development of sewerage system

Regulation and Control by National Government is important



Development of the legal system

Regulation, Control, System of approval,
Right of Inspection, Right of Fee Collection

It is important to clear the following points by development of legal system.

>To clarify the Responsibility / Role-sharing

National Government, Municipality, Public (Land owner, House owner)

> To set up the regulation as Technical Criteria

> To set up the regulation about the usage of sewage system

Duty of setting Drainage facilities

Duty of connecting to the Sewage system

Duty of setting Equipment for safety disposal

>To limit the obstacle activities

>To establish the system of Check

It is important to clear the following points by development of legal system.

- >To set up the system of the usage fee and the payment by beneficiary
- >To set up the Subsidy system, free loan and transfer of the government-owned land

e. Financial Resources

- Construction and Management Cost -

To construct and manage the sewerage system continuously, huge cost and long term is necessary



It is very important to establish a sustainable financial base

In Japan, Sewerage fee is not enough to cover all administration cost (construction and O&M)

For construction, National government subsidy and Local bond is necessary.

Money transferred from General account is necessary to make up the lack of sewerage fee

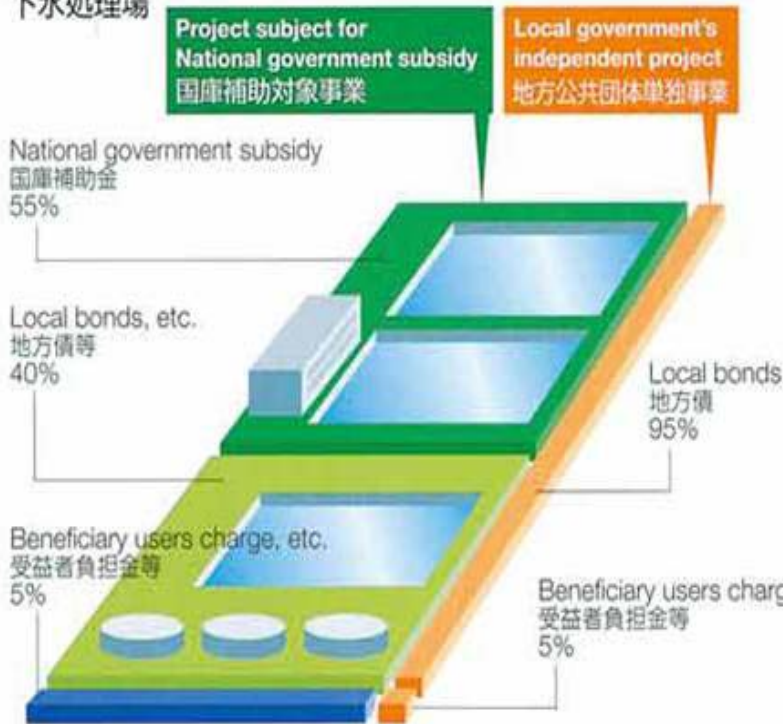
Breakdown of resources 1/2

Construction Cost of Sewerage Systems

下水道の建設費

Wastewater treatment plants

下水処理場



Sewer pipes, etc.

下水道管きよ等

● Cost of a project for national government subsidy
国庫補助対象事業費

● Cost of a local government's independent project
地方公共団体単独事業費

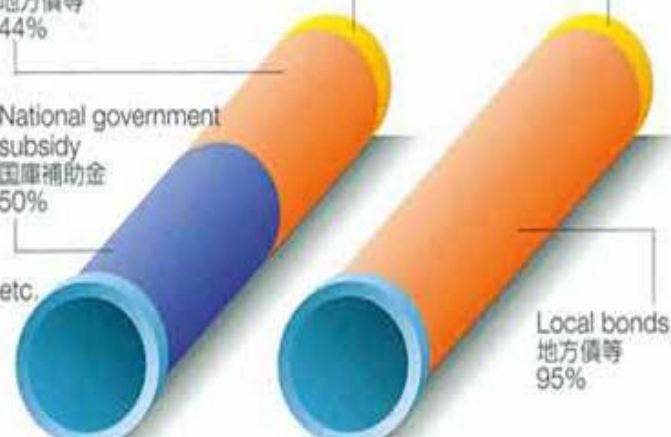
Beneficiary users charge, etc.
受益者負担金等
6%

Local bonds, etc.
地方債等
44%

National government
subsidy
国庫補助金
50%

Beneficiary users charge, etc.
受益者負担金等
5%

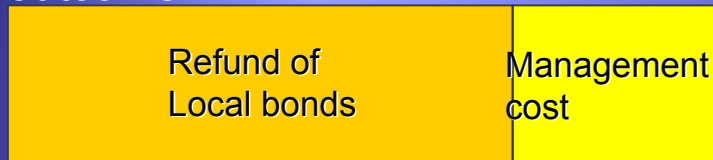
Local bonds, etc.
地方債等
95%



Breakdown of resources 2/2

Administration cost

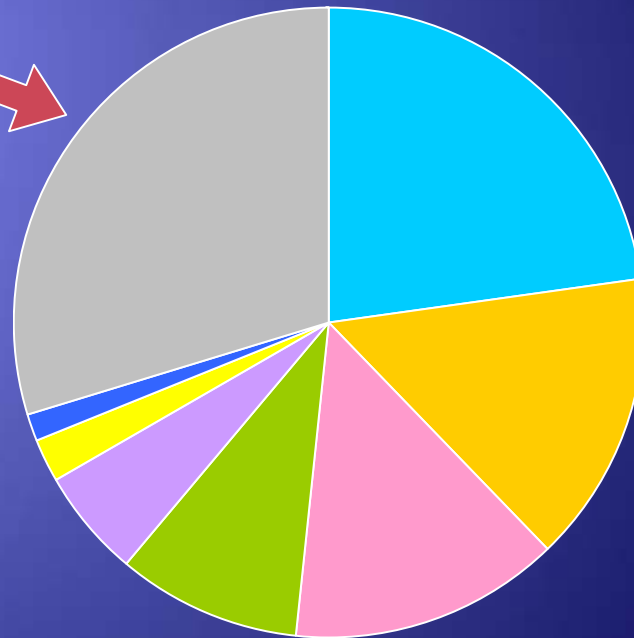
outcome



income



Management Cost



- Personnel cost
- Consignment cost
- Repair cost
- Electric power cost
- Sludge disposal cost
- Chemical cost
- Cleaning cost
- Other

About 70% of the Administration cost is Refund of Local bonds.

About 60% of the Administration cost is financed by the Sewerage Fee.

Subsidy System

Public responsibility for development infrastructure as National Minimum.

The Sewage System has the great effects on the National power, because it improves the Sanitary Condition and Productive capacity.

The role of the Sewage System is mainly to play public benefit and public purpose (Improvement of the living environment, conserve the water quality of public water body)



So National Government established the Subsidy system to develop and spread the sewage system.

Local Bond

Sewage works is not a business so local bond is issued by a low interest rate

Payment by beneficiary

Give back some of the asset value of land that is improved by the Sewage system

Usage Fee

Pay a cost according to the Polluter–pays principle (PPP)

Japan have a long history with the Water Environment.
The Water Environment is linked very closely to the Lifestyle
and Culture in Japan.



Thank you for your attention