



Decentralized wastewater treatment system and its legal **framework** in Japan

September 19, 2018



Ministry of the Environment
Government of Japan

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Outline

1. History of Wastewater Treatment and development of measures

2. General information on Johkasou

3. Legal system and measures on Johkasou

4. Overseas Promotion of Johkasou

Dr.Johkasou



1. History of Wastewater Treatment and Development of Measures

- Water pollution in Japan during rapid economic growth



Sumida River (Tokyo) in '70s



Dohkai Bay (Kitakyushu) in '60s



Chofu Weir, Tama River (Tokyo) in '70

1. History of Wastewater Treatment and Development of Measures

▪ History of wastewater treatment and infectious diseases

- Up to 1950s, night soil had been used as agricultural fertilizer and regarded as resource.
- From the late 1950s, night soil had become “waste” due to introduction of chemical fertilizers and urbanization. Lack of night soil treatment facilities and hygienic treatment had become big problems.
- Spread of infectious diseases had continued until the rapid economic growth period of 1970s.

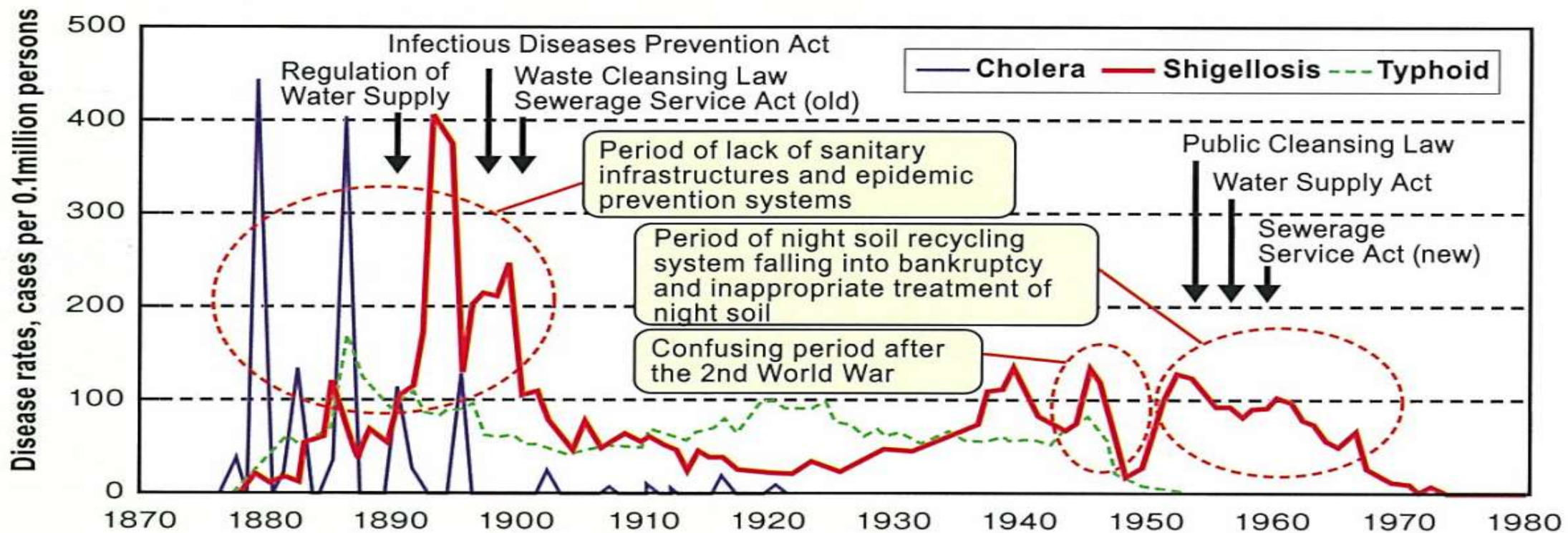
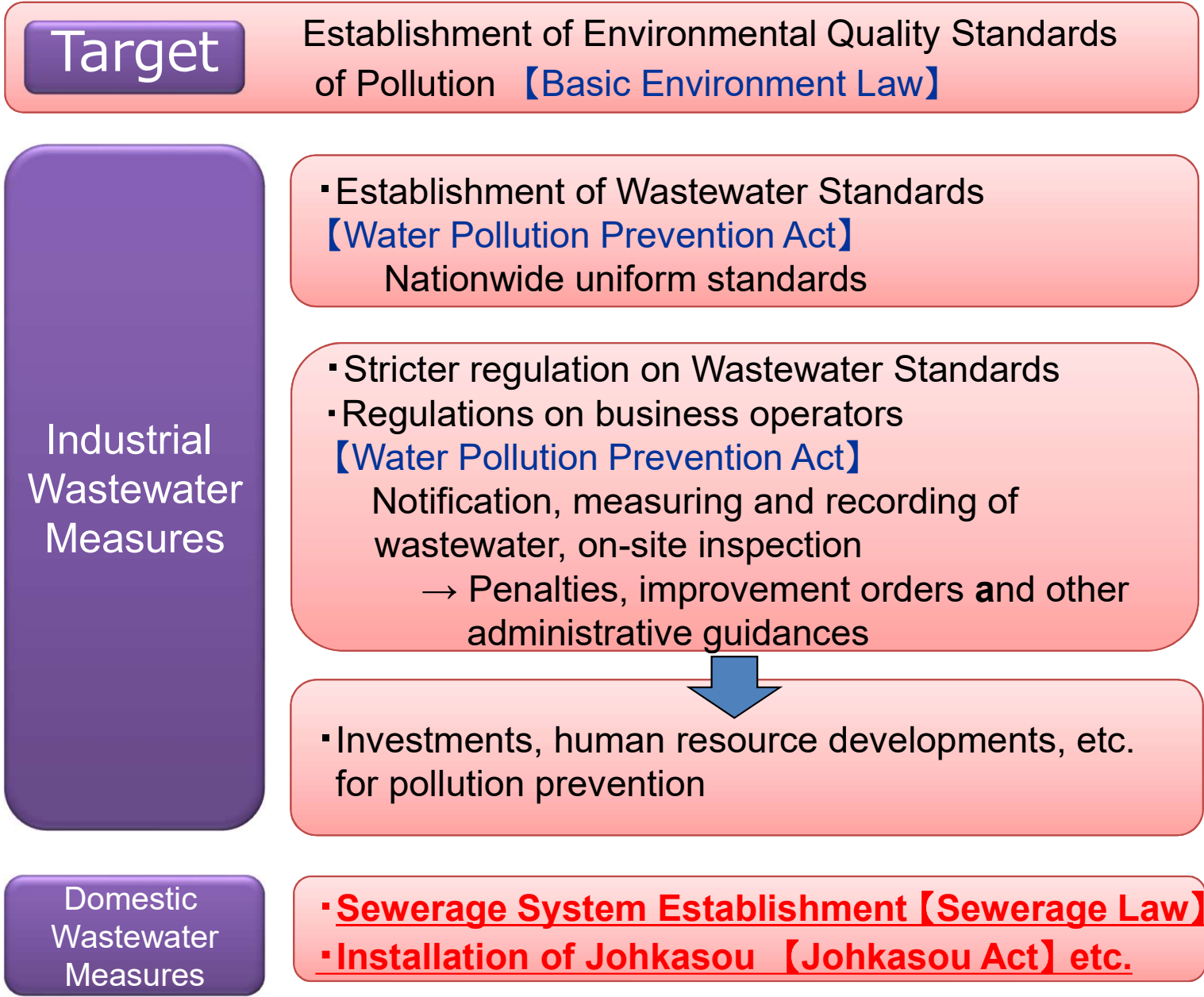


Figure 3 Trends of waterborne disease rates in Japan⁽³⁾

1. History of Wastewater Treatment and Development of Measures

• Overall concept of water environment improvement



1. History of Wastewater Treatment and Development of Measures

MDGs



SDGs

Target 6.3
Having the proportion of
untreated wastewater

- Sanitary improvement
- Expansion of flush toilet
(1960s ~ in Japan)

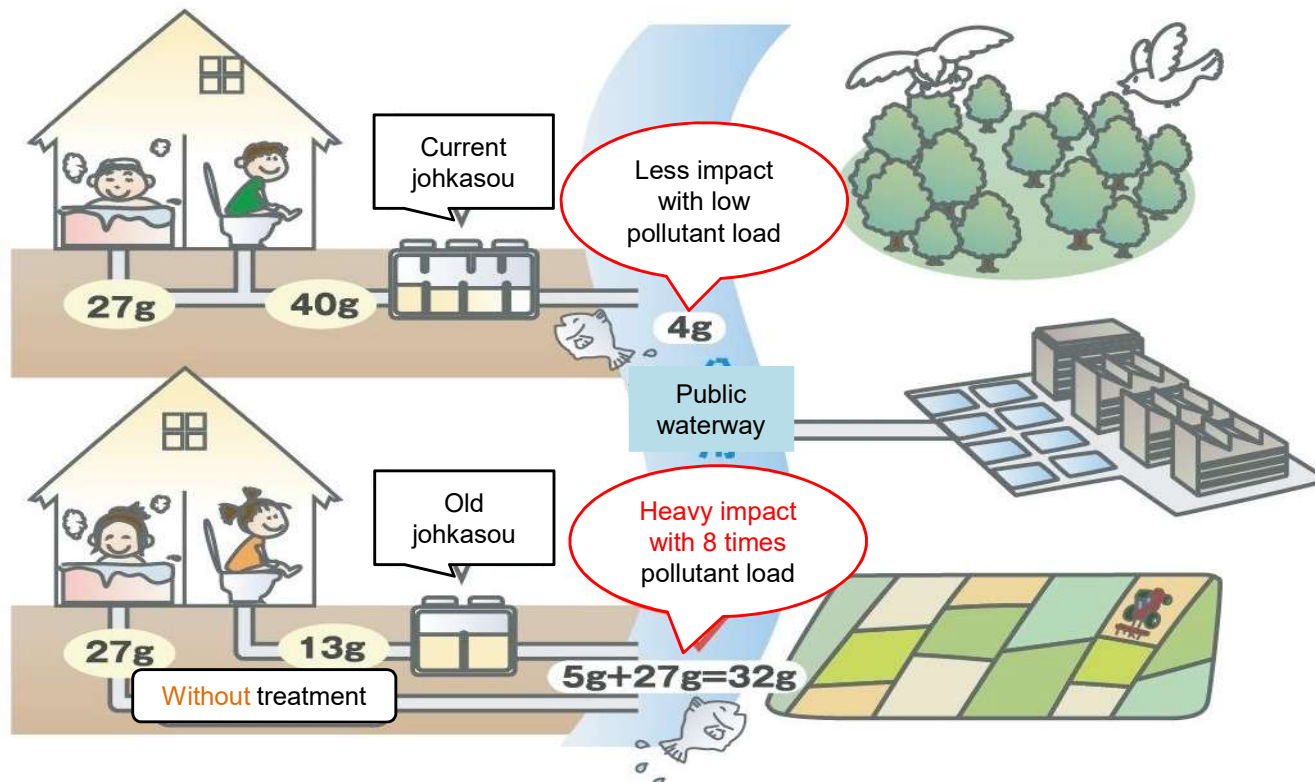
- Environmental protection
- Treatment of all domestic wastewater
(Black water + Gray water)

Current type Johkasou

- ✓ To treat both black & gray water
- ✓ BOD 4g per person daily discharged to public water

Old type Johkasou

- ✓ To treat black water only
- ✓ BOD 32g per person daily discharged to public water
- ✓ New installation was prohibited from 2001



1. History of Wastewater Treatment and Development of Measures

MDGs



SDGs

Target 6.3
Having the proportion of
untreated wastewater

Our biggest challenge!!!
Still, half the number of operating
Johkasou is old type installed before
2001, harming the environment!!
Shall be converted into current type.

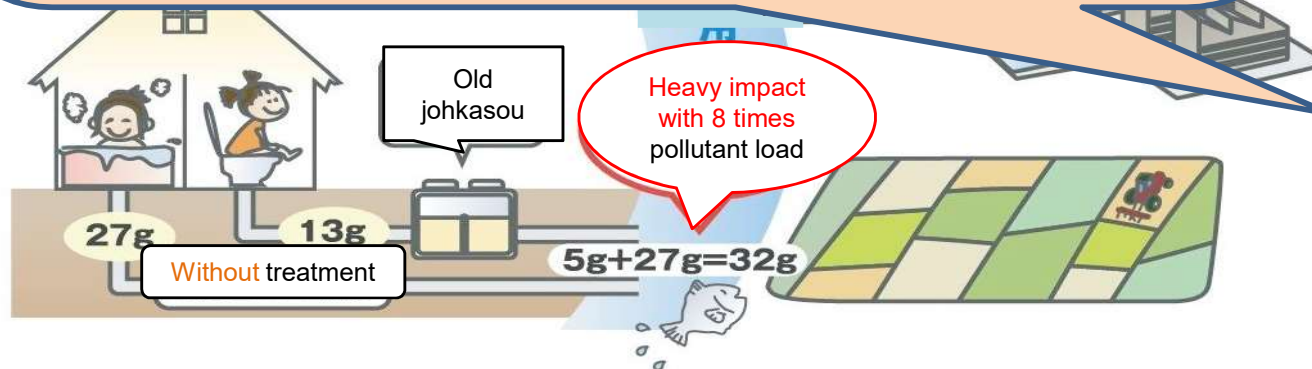
Water pollution
of all domestic wastewater
(Black water + Gray water)

Current type Johkasou

- ✓ To treat both black & gray water
- ✓ BOD 4g per person daily discharged to public water

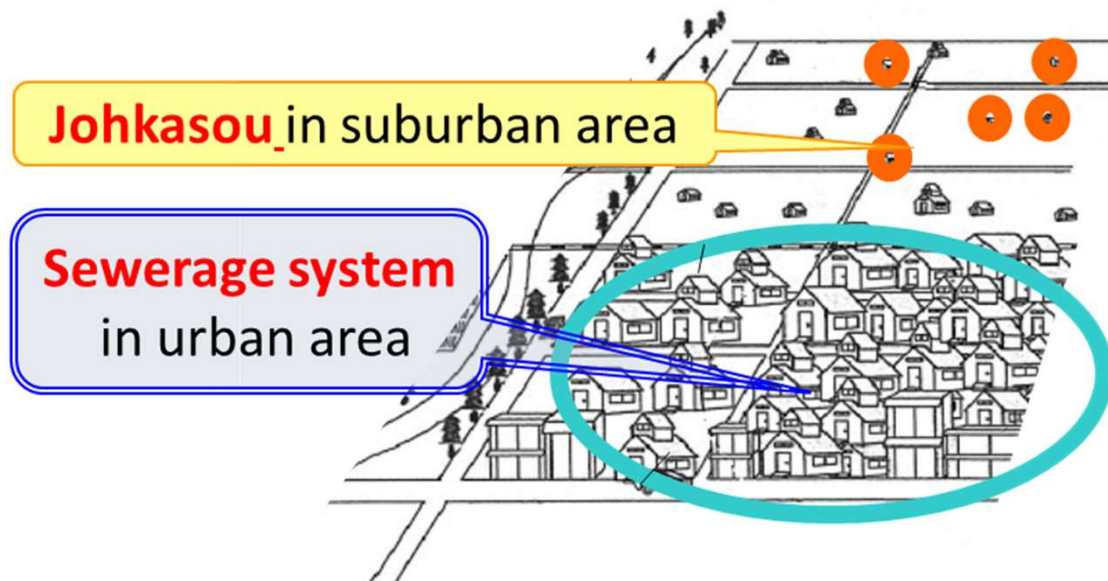
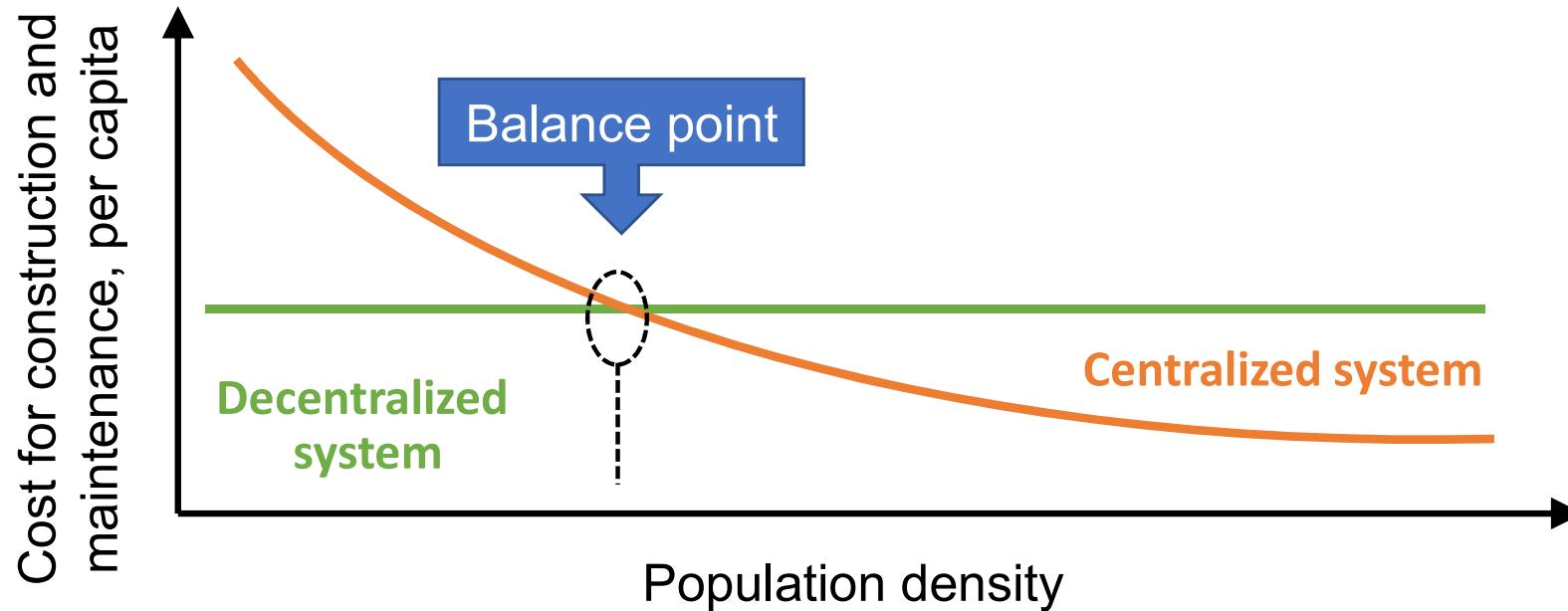
Old type Johkasou

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- ✓ BOD 32g per person daily discharged to public water
- ✓ New installation was prohibited from 2001



1. History of Wastewater Treatment and Development of Measures

- Demarcation of wastewater treatment systems



Local governments are responsible for Master Plan of wastewater treatment scheme including this demarcation in each region.

2. General Information on Johkasou

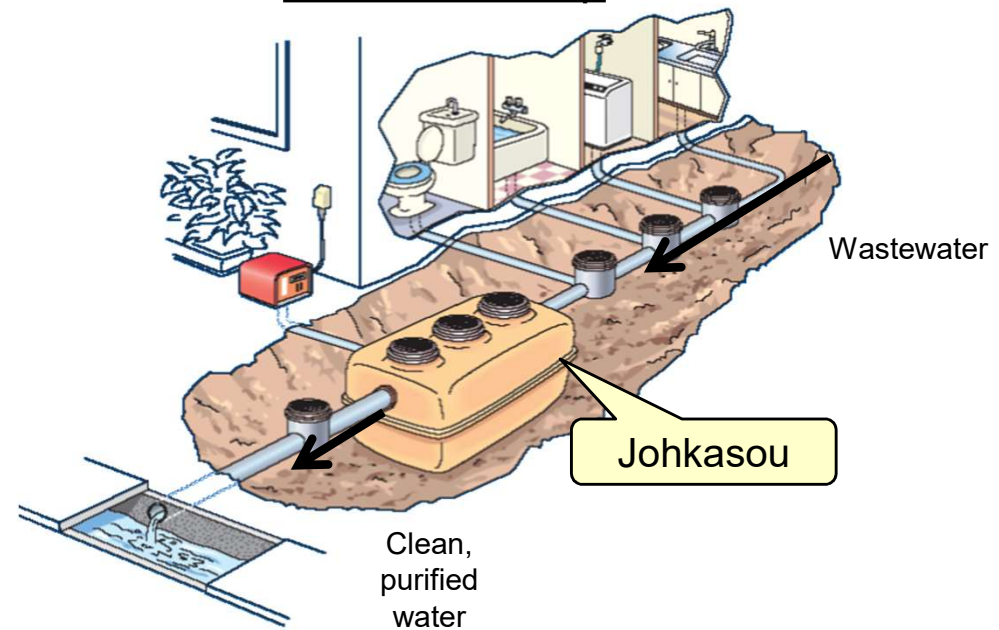
▪ General idea of johkasou

- Johkasou are decentralized wastewater treatment devices that are designed for individual households or other structures and typically handled by the private sector
- Johkasou have a combined purification structure capable of treating both night soil (black water) and domestic wastewater (gray water)

Key features of johkasou

- Utilizes the purification capacity of microorganisms to turn out treated water on par with water treated at municipal sewage treatment plants (BOD 20mg/L or less)
- Low-cost equipment
- Efficient wastewater treatment equipment in hilly, mountainous, and other rural areas
- Installation is quick, requiring only about a week
- Can be set up in a compact space (equivalent to just one parking spot)
- Treated water is discharged on location, contributing to sound water cycles and maintaining consistent river flow volume
- Resistant to earthquakes, supporting swift recovery in the wake of a disaster

Johkasou setup



Size comparison (example)

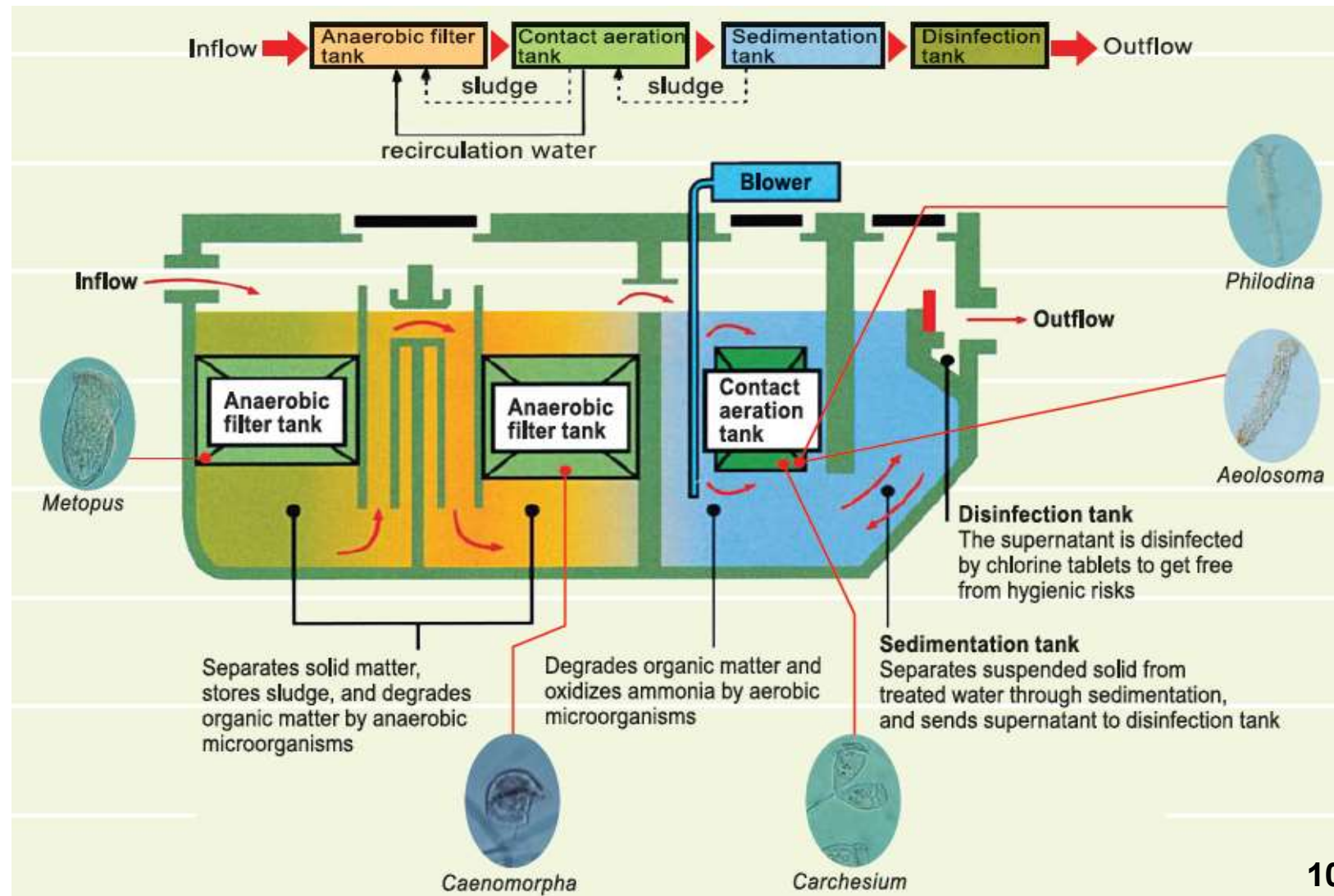


2. General Information on Johkasou

▪ structure and treatment principle of Johkasou

- Johkasou tanks contain bacteria and other microorganisms, which are used to break down and purify the contaminants contained in wastewater
- They include a solid-liquid separation function, sludge storage function, and disinfection function in order to maximize purifying capabilities

Graphic representation




2. General Information on Johkasou

Capacities of Johkasou

- Size of the johkasou is for a minimum of 5 people, the maximum is several tens of thousands people.
- Depending on the size of the city, you can change the size of johkasou.
- In Japan, johkasou are installed in each household, so the size for five to ten people is widely used.
- Johkasou with advanced treatment performance are capable of removing BOD to 10 mg/L or less and removing phosphorus and nitrogen.

Small size

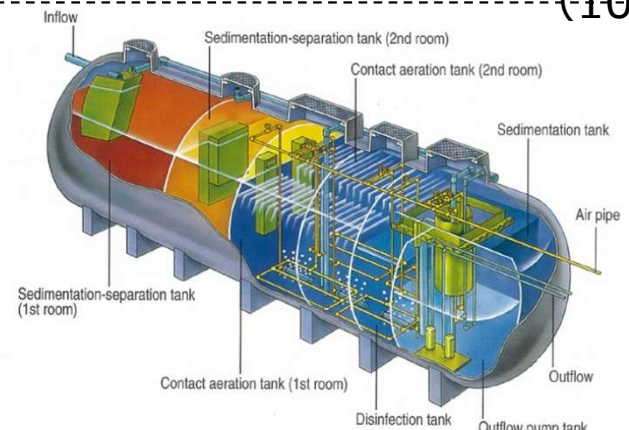
For 5~50 people
(~10m3/day)



The diagram shows a compact, green, oval-shaped unit with a cutaway view revealing internal components. Labels include: Inflow pipe, Disinfection Chamber, Outflow pipe, Sedimentation chamber, Contact aeration chamber, and Anaerobic filter chamber.

Middle/large size

For 51~
(~10m3/day~)



The diagram shows a long, horizontal unit with multiple colored sections. Labels include: Inflow, Sedimentation-separation tank (2nd room), Contact aeration tank (2nd room), Sedimentation tank, Air pipe, Sedimentation-separation tank (1st room), Contact aeration tank (1st room), Disinfection tank, Outflow pump tank, and Outflow.

Case of overseas installation



Restaurant(China:10m3/d)



Hospital(Vietnam:250m3/d)



Employee dormitory
(Saudi arabia:530m3/d)



Factory(Myanmar:30m3/d)

3. Legal Systems on On-Site Treatment – Johkasou Act

History of Johkasou Act

1960 to around 1980	With increasing population of flush toilet, rapid installation of tandoku (old type) johkasou to treat black water only
1983	Johkasou Act enacted (legislation introduced by a Diet member, came into force in 1985)
1987	National subsidy program for gappei (current type) johkasou (to treat both black and gray water) established
2000	Revised: New installation of tandoku-shori johkasou systems basically prohibited
2005	Revised: Stricter water quality management systems introduced, defining water quality conservation targets

During high economic growth period, water pollution accelerated.

To promote the spread of gappei johkasou and the replacement of tandoku johkasou systems

Purpose of Johkasou Act

Promotion of human waste and gray water treatment by Johkasou for;

- Conservation of water quality in public water area, preservation of the living environment and improvement of public health

⇒Articles in the Law

- ①Johkasou installation (✕related to “Building Standard Law”)
- ②**Operation/maintenance** of Johkasou
- ③**Approval of Johkasou models**
- ④**Johkasou business** for Installation and Operation/Maintenance
- ⑤**Nationally qualified “Johkasou technicians”**
- ⑥Miscellaneous and penalties

3. Legal Systems and measures on On-Site Treatment

Water quality standards (Article 4-1)

Technical standards for discharged water quality

- Water discharged from gappei-shori johkasou must have a biochemical oxygen demand (BOD) concentration of 20 mg/L or less
- $(\text{Influent BOD} - \text{effluent BOD}) \div \text{influent BOD} \geq 0.9$

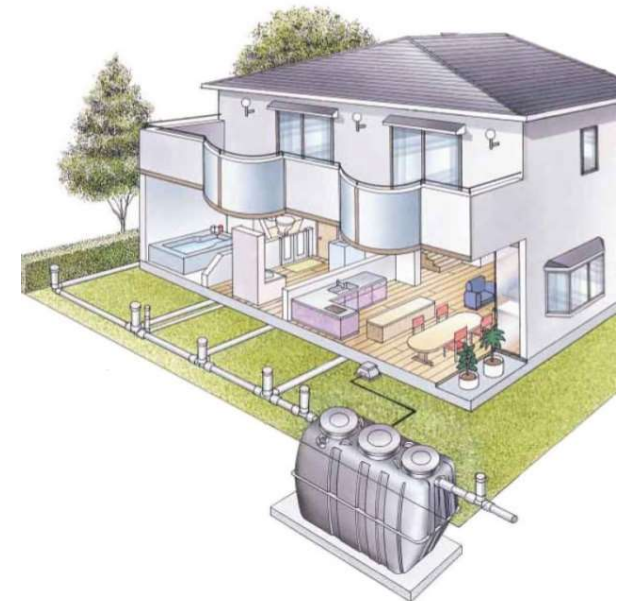
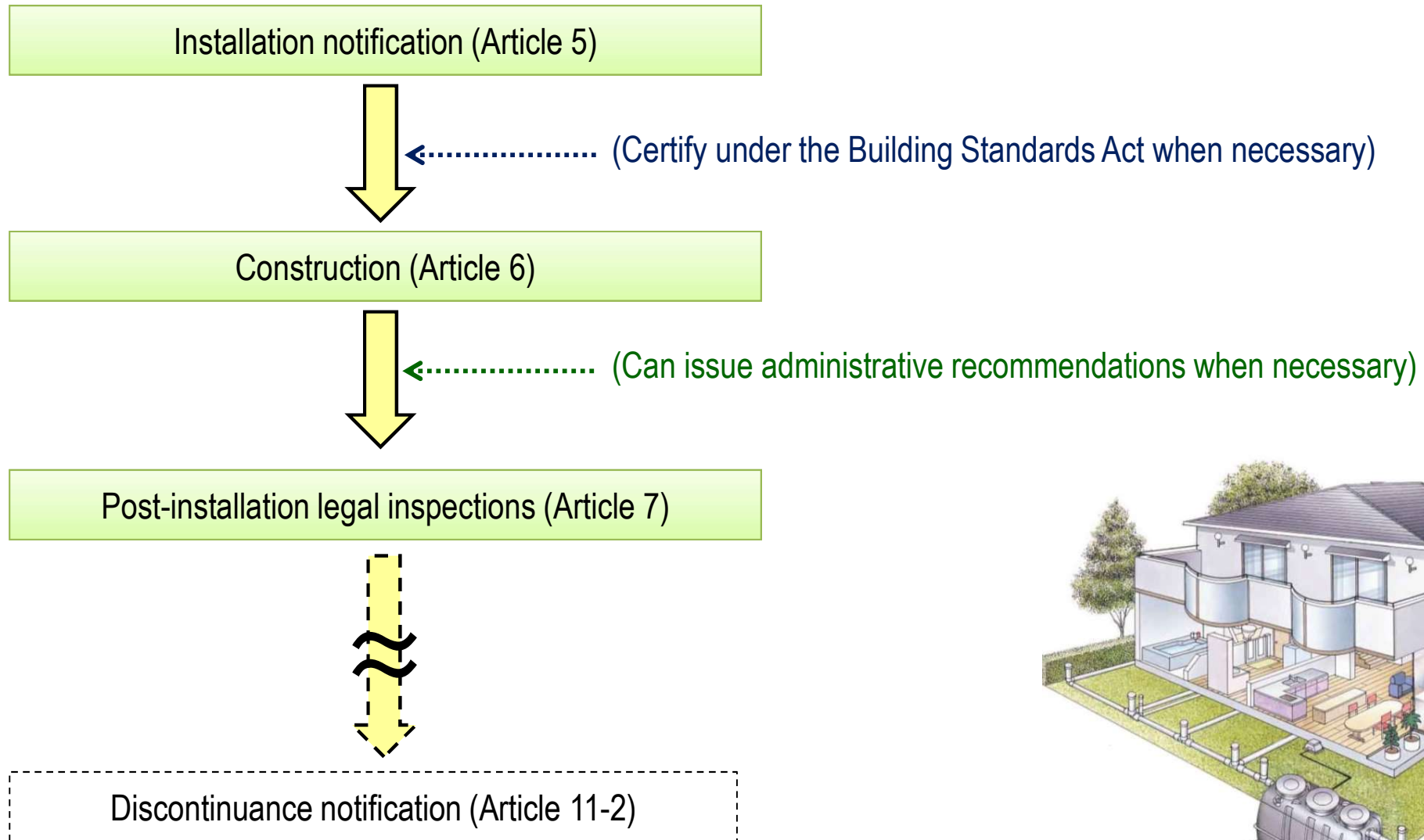
* Comparable to the treatment level of sewerage treatment plant

(Johkasou Enforcement Ordinance Article 1-2)

- The above regulations were created to reflect current technological standards in light of best available technologies (BAT) or best available techniques not entailing excessive costs (BATNEEC) according to the development and spread of johkasou.

3. Legal Systems and measures on On-Site Treatment

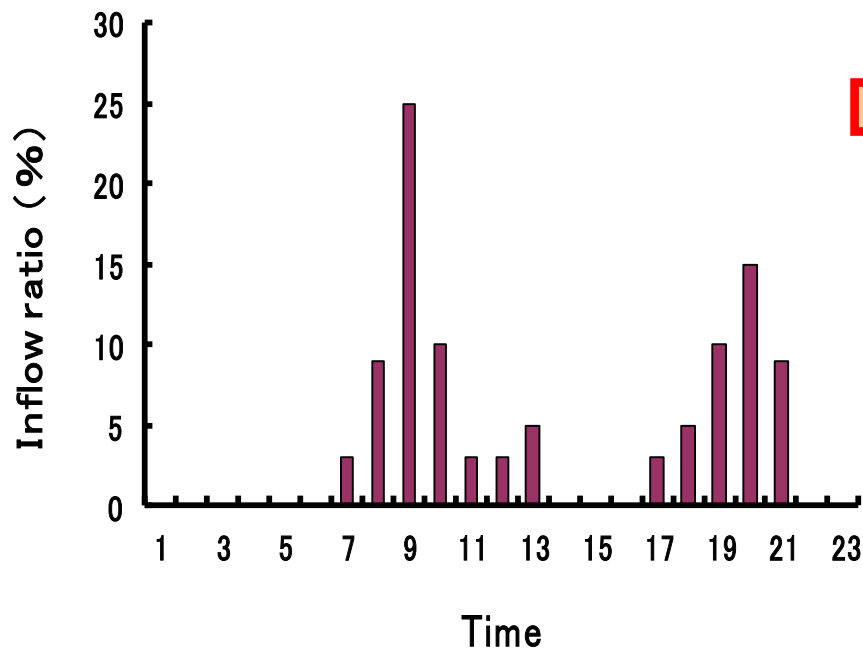
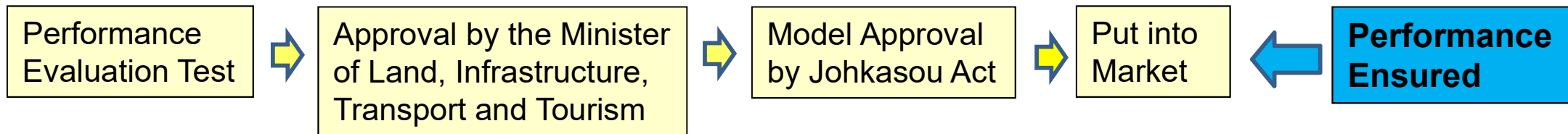
- Johkasou Installation Procedure



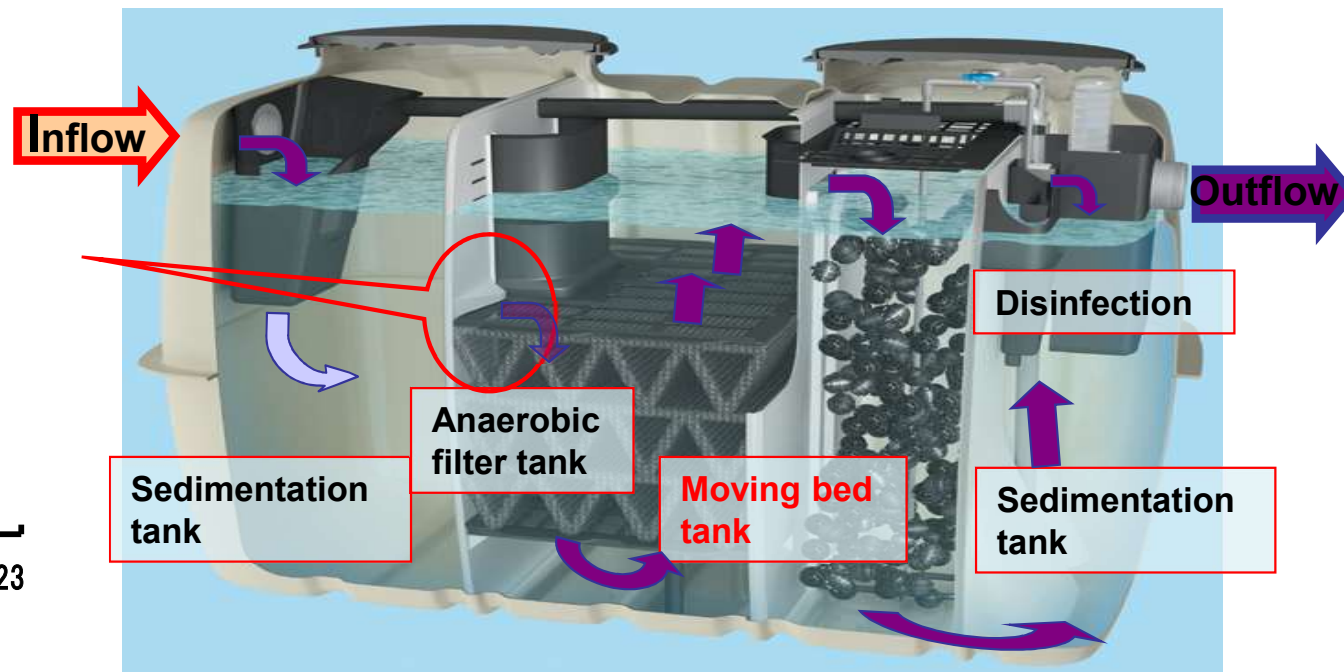
3. Legal Systems and measures on On-Site Treatment

▪ Approval process for types of Johkasou (Johkasou Act Article 13)

- Parties intending to manufacture Johkasou in production plants shall obtain approval from the Minister of Land, Infrastructure, Transport and Tourism (MLIT) for the type of Johkasou to be manufactured (does apply to test manufacturing).
- This process is subject to Performance Evaluation System.



Inflow Pattern



Performance Evaluation Type Johkasou

3. Legal Systems and measures on On-Site Treatment

▪ Test methods and Criteria

1) Performance Criteria

BOD[20、15、10、5]、T-N[20、15、10、5]、T-P[2、1、0.5、0.1]

SS[20、15、10、5]、n-Hex[20、10、5、3]、COD[30、15、10]

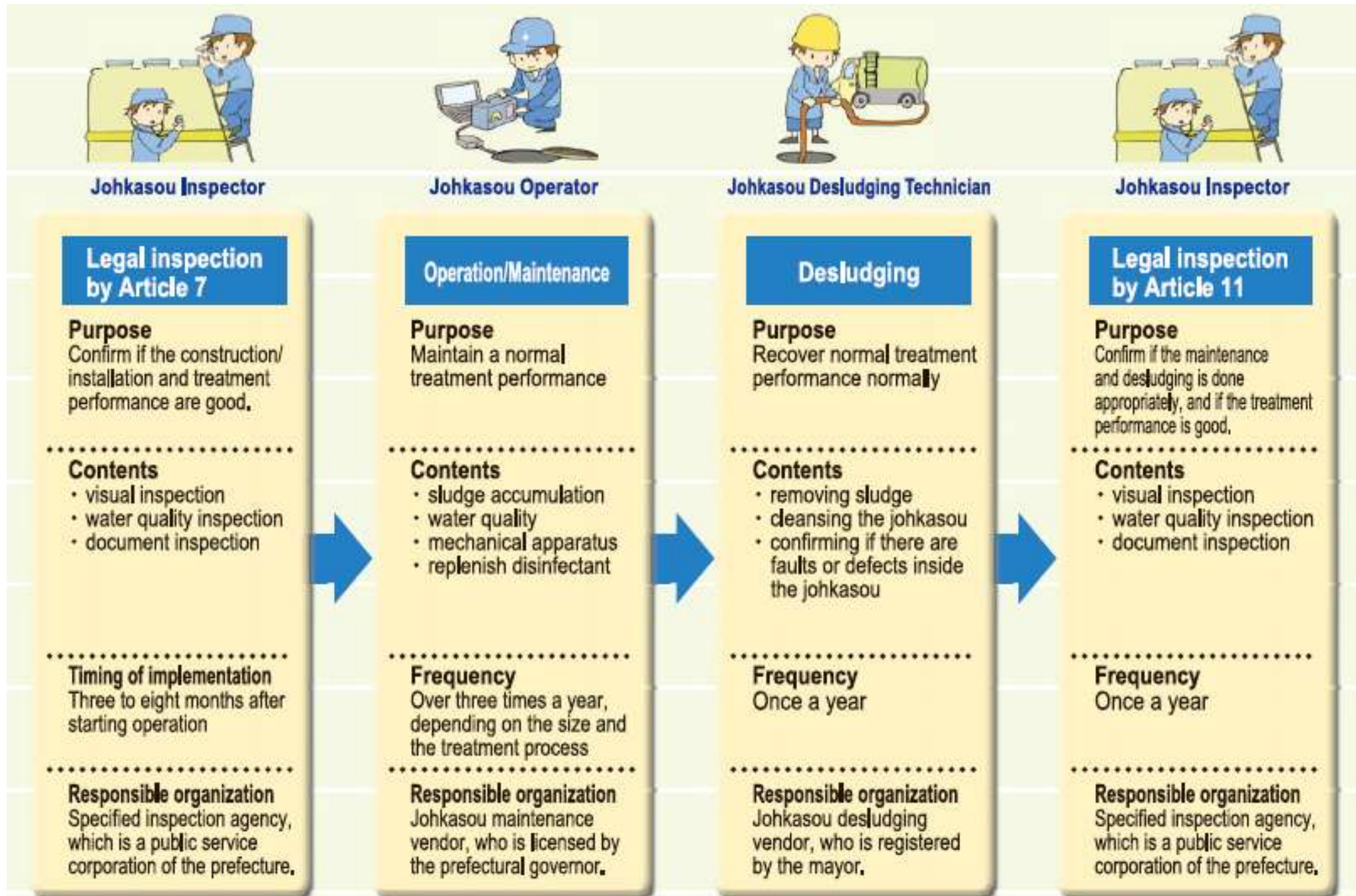
2) Test Categories and Duration

Sludge may be added in case of ①

Category	Test Method	Duration (weeks)	No. of unit	Evaluation Points
①	Short period constant temperature	Breeding - over 16 wks (13 & 20°C 8 wks respectively)	1 or 2	Water Quality/Sludge/Management
②	On-site test 1	Breeding + over 48 wks	1	Water Quality/Sludge/Management
③	On-site test 2	Breeding + over 48 wks	3	Water Quality/Sludge/Management

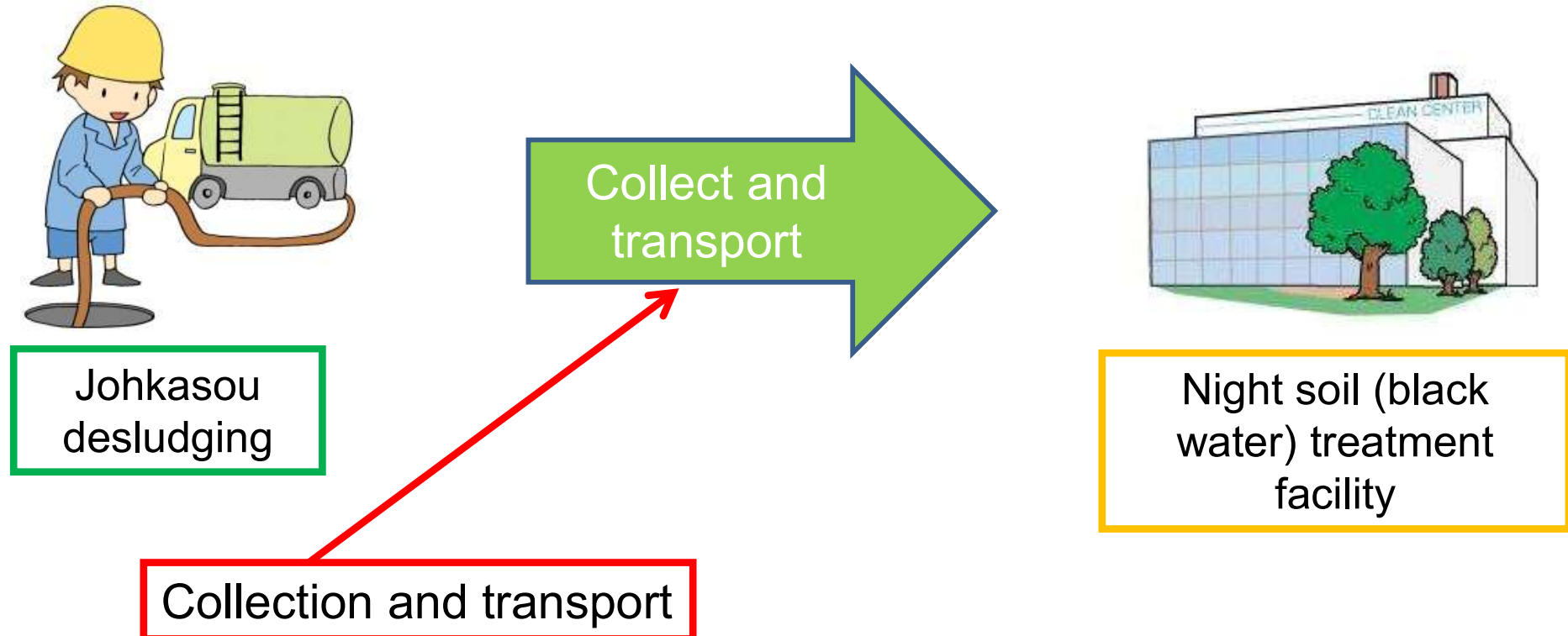
3. Legal Systems and measures on On-Site Treatment

• Inspections and Maintenance



3. Legal Systems and measures on On-Site Treatment

Sludge collection, transport and treatment (Waste Disposal Act)



Municipalities shall, in line with their general waste treatment plans, collect and transport johkasou sludge (general waste) in a manner that poses no threat to the maintenance of healthy living environments or public health, and treat the sludge at a black water treatment facility

(Article 6-2 of the Waste Management and Public Cleansing Law)

3. Legal Systems and measures on On-Site Treatment

- Johkasou corporate registration process

Prefecture

Registration

Instructions, advice,
recommendations, etc.



Johkasou
construction company

Municipality

Approval

Instructions, advice,
recommendations, etc.



Johkasou Desludging Technician

Johkasou
desludging company

Prefecture
or other

Registration

Instructions, advice,
recommendations, etc.



Johkasou Operator

Johkasou
maintenance
inspection company

- National qualifications

【Certified Johkasou Installer】

Person certified to supervise johkasou
construction





【Certified Johkasou Operator】

Person certified to supervise johkasou
construction



3. Legal Systems and measures on On-Site Treatment

National johkasou qualifications

National qualification	Description	Certifying agency
Certified Johkasou Installer	Person certified to supervise johkasou construction	 MLIT Ministry of Land, Infrastructure, Transport and Tourism
Certified Johkasou Operator	Person certified to carry out maintenance inspections on johkasou	 Ministry of the Environment 環境省 Government of Japan


3. Legal Systems on On-Site Treatment (Human Resource Development)


MOE is hosting Top Seminars and Block Seminars for municipal governments, and Johkasou Forum for residents and stakeholders such as NPOs.

For Johkasou Technicians by Japan Education Center of Environmental Sanitation (JECES)

- ◆ Johkasou technicians should be equipped with extensive knowledge on not only wastewater treatment/johkasou, but also water environment conservation and public health.
- ◆ Curriculums for johkasou operator and johkasou installation worker are as shown below.

Johkasou operator		Johkasou installation worker	
➤ Fundamental of johkasou	8 H	❑ Fundamental of johkasou	8 H
➤ Laws and regulations related with johkasou	4 H	❑ Laws and regulations related with johkasou	3 H
➤ Structure and function of johkasou	22 H	❑ Structure and function of johkasou	15 H
➤ Introduction to installation of johkasou	4 H	❑ Management of johkasou installation	8 H
➤ Operation and maintenance of johkasou	30 H	❑ Introduction to O&M and desludging of johkasou	3 H
➤ Water quality management of johkasou	10 H		
➤ Introduction to desludging of johkasou	2 H		
		Total	37 Hours
Total	80 Hours		



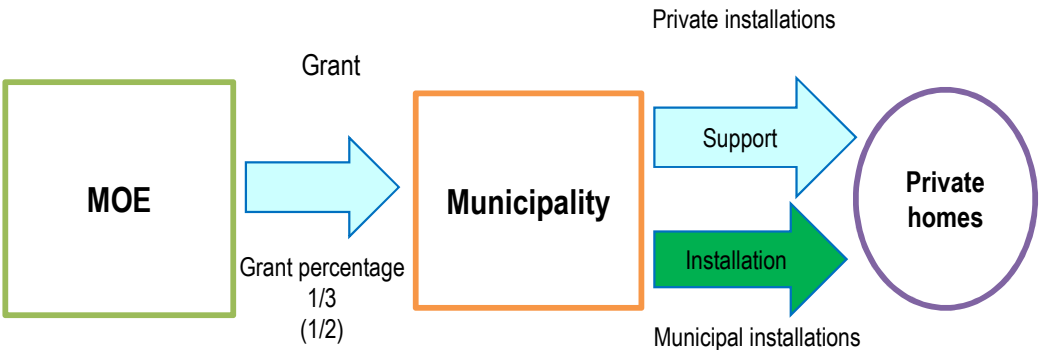


3. Legal Systems and measures on On-Site Treatment

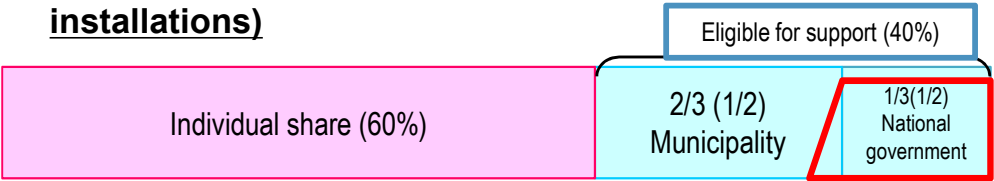
Measures to accelerate Johkasou installation and conversion of old types

Subsidies from the government and municipalities

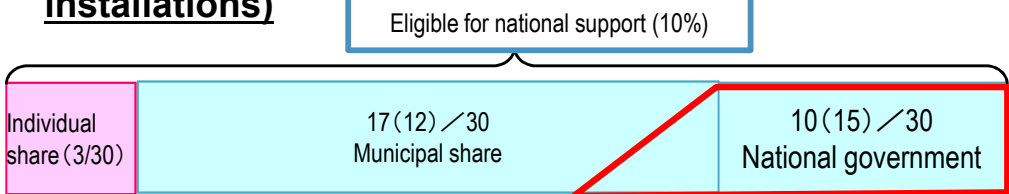
- **Johkasou Installation Project (private installations)**
Subsidizes municipalities supporting their residents (private citizens) with johkasou installation
- **Johkasou Municipal Installation Project**
National subsidy program for municipalities taking the lead in installing johkasou systems. The municipality is responsible for operations and maintenance.



○ Johkasou Installation Project (private installations)



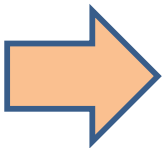
○ Johkasou Municipal stallationProject (municipal installations)



PFI (Private Finance Initiative) Projects

Demerits of Johkasou Municipal Installation

- Increase of budget burden on municipalities
- Increase of workload on municipalities



Merits of PFI projects

- PFI operators are responsible for installation, operation and maintenance.
- Municipalities can utilize private financing, technology and know-how on business.
- Decrease of overall project cost and workload on municipalities, and improvement of residential services.

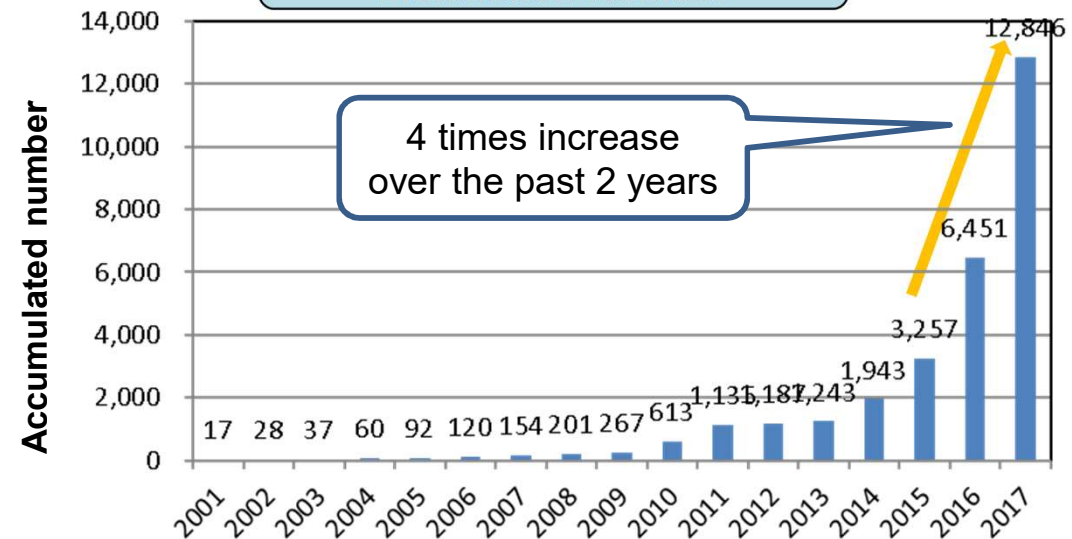
4. Overseas Promotion for Johkasou

- The number of Johkasou overseas installation has explosively increased for the past few years. Johkasou makers request systematic promotion support from the Government for performance evaluation system and O & M management to popularize it to South East Asia.
- Ministry of the Environment (MOEJ) works in harmony with stakeholders to strategically promote circular industries overseas through standardization of Johkasou suitable to ASEAN countries, etc.

Main activities of MOEJ

- National Institute for Environmental Studies is doing a research project for fair treatment evaluation system establishment suitable to ASEAN countries to standardize Johkasou.
- MOEJ hosts International Workshop on Decentralized Wastewater Treatment in Asia to share Japanese legal systems, regulations and experiences and to promote Johkasou.
- MOEJ also hosts Johkasou Seminars and site surveys to further promote Johkasou to stakeholders of the counterparts and to support overseas business of domestic Johkasou related companies.

Johkasou Overseas Yearly Installation Number



Workshop in Myanmar

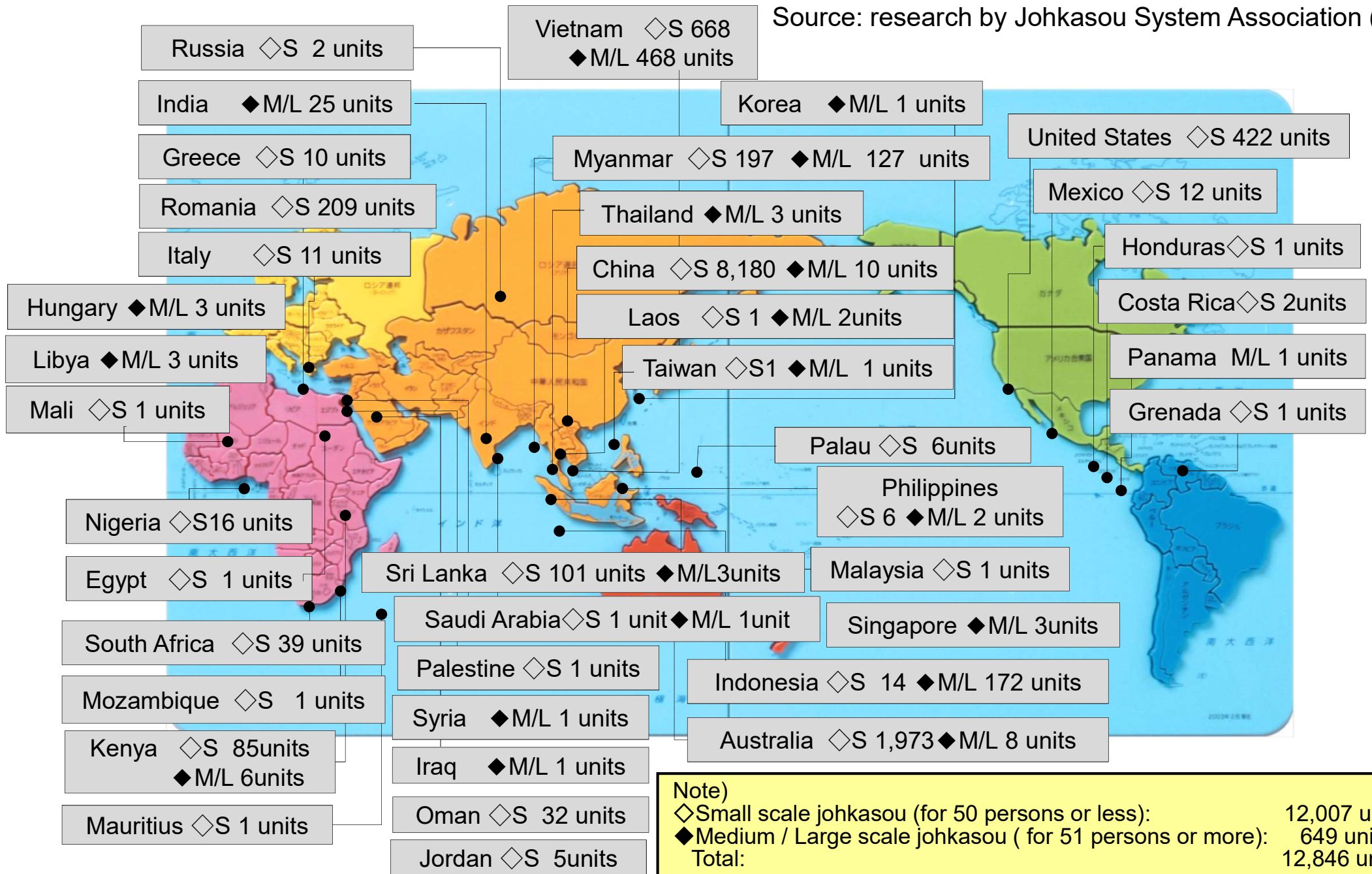


- Seminar in India
- Site survey in Vietnam
(from left to right)

Johkasou Overseas Installation

As of the end of December 2017

Source: research by Johkasou System Association (JSA)



A photograph of a small waterfall in a forest. The water is white and foamy as it falls over a series of large, moss-covered rocks. The surrounding area is lush with green foliage and trees. The text "THANK YOU FOR YOUR KIND ATTENTION." is overlaid in white, bold, sans-serif font across the middle of the image.

THANK YOU FOR YOUR KIND ATTENTION.

At kikuchi gorge, Kikuchi City, Kumamoto Prefecture