第 6 章　資料編

6.1. 第 13 回アジアにおける分散型汚水処理に関するワークショップ

6.1.1. フライヤー

環境省 Ministry of the Environment

13th International Workshop on Decentralized Domestic Wastewater Treatment in Asia
Organized by Ministry of the Environment, Government of Japan (MOEJ)

Operation & Maintenance and Associated Capacity Development of High-Performance Decentralized Wastewater Treatment Facilities

Language : English & Japanese | Venue : JECES (Hybrid via Zoom Webinar)

13:00 – 17:00　11th November 2025　(Japan Standard Time)

Please register from the website link below
https://zoom.us/webinar/register/WN_QGUjrymSRZicnkOSL5Z6dg

To comply with stricter restriction effluent standards and environment regulations in Asian countries, the adoption of high-performance decentralized wastewater treatment facilities that meet these standards has been progressing in Special Economic Zones, factories, or large-scale facilities, etc. As these high-performance decentralized wastewater treatment plants become more widespread, attention is being paid to the importance of operation and maintenance (O&M), as well as the development of the human resources required to carryout the O&M.

In this workshop, we will share information on the current situation of O&M of decentralized wastewater treatment plants around the world, including Asia, as well as trends in developing the human resources required for such O&M. We will also discuss related challenges and necessary actions.

PROGRAM

Moderator Dr. Pierre Flamand, Manager - International Affairs, Japan Sanitation Consortium (JSC)

Opening Remarks Mr. Masashi Taketani, Director, Office for Promotion of Johkasou, Waste Management Division, Environmental Regeneration and Material Cycles Bureau, MOEJ

Keynote O&M of Johkasou and system of qualified person in Japan
Mr. Shuichiro Nakayama , Section Chief, Office for Promotion of Johkasou, Waste Management Division, Environmental Regeneration and Material Cycles Bureau, MOEJ
Dr. Yurie Shirakawa, Japan Education Center of Environmental Sanitation (JECES)

Presentation

1. **Current status of O&M of decentralized wastewater treatment plants in developing countries and human resource development**
   Dr. Roshan Raj Shrestha, Deputy Director, Water, Sanitation & Hygiene, Gates Foundation
2. **The contents of O&M for decentralized wastewater treatment plants in the United States, the qualification system, and human resource development**
   Mr. Chris LeClair, R.E.H.S, Director of Otter Tail County Land & Resource Management, and President of National Onsite Wastewater Recycling Association
3. **Human resource development for the O&M of the high-performance decentralized wastewater treatment systems in rural areas in China (case study from Zhejiang Province and Jiangsu Province)**
   Dr. Min Yang, Professor, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences
4. **O&M for the high-performance decentralized wastewater treatment plants and human resource development in India**
   Dr. Absar Ahmad Kazmi, Professor, Environmental Engineering, Department of Civil Engineering, Indian Institute of Technology Roorkee
5. **O&M of Johkasou installed in residential areas in Vietnam and training of technicians**
   Mr. Yoshihisa Tahara, Chairman and Representative Director of Showa Eisei Center Co. Ltd.
   Mr. Nguyen Duc Son, Vice president, Hoshi Densetsu Viet Nam Limted Company
6. **Challenges regarding the O&M of high-performance decentralized wastewater treatment plants in Indonesia**
   Mr. Akhmad Rivai, Overseas Business Division Manager of Earth Creative., Co., Ltd, and General Manager of PT. Earth Creative Indonesia

Panel Discussion / Theme: - How should human resources for O&M be developed? - What are the key factors for making the O&M business an attractive market?

Panelists: Speakers of Presentation Session, Officials from MOEJ
Moderators: Dr. Kiyoshi Kawamura, Former Professor of Graduate School of Science and Engineering, Saitama University, and, Dr. Pierre Flamand, Manager - International Affairs, JSC

Closing Remarks Mr. Shuichiro Nakayama, Section Chief, Office for Promotion of Johkasou, Waste Management Division, Environmental Regeneration and Material Cycles Bureau, MOEJ

KEY PERSONS

Dr. Roshan Raj Shrestha is Deputy Director of the Water, Sanitation, and Hygiene (WSH) Division at the Gates Foundation, with over 35 years of experience advancing inclusive sanitation across Asia and Africa. He has led global efforts to scale non-sewered sanitation, fecal sludge management, and citywide inclusive sanitation, establishing transformative platforms such as the Sanitation Trust Fund at the Asian Development Bank, the Global Sanitation Graduate School, and the Global Water and Sanitation Center at AIT. Previously with UN-Habitat and founder of ENPHO in Nepal, he is recognized for pioneering household water treatment solutions and decentralized wastewater innovations. He serves on the Board of Trustees of AIT and chairs the Advisory Board of GWSC, and was honored with the Bill Gates Sr. Award in 2023.

Mr. Chris LeClair has been a professional regulator in the environmental health field since 1993. He completed his Bachelor of Science in Natural Resources & Environmental Studies at the University of Minnesota. In 1996, Chris joined Washington County as an Environmental Health Specialist, a role in which he served for 22 years. He was assigned to the septic system regulation program at Washington County in 2002. In 2018, Chris relocated to Otter Tail County, Minnesota, where he assumed the position of Director of the Land & Resource Management Department. This department is responsible for regulating septic systems, wetland conservation, and shoreland development. He joined the Minnesota Pollution Control Agency's SSTS Advisory Committee and was elected to the Minnesota Onsite Wastewater Association in 2009. By 2019, he was on the National Onsite Wastewater Recycling Association's Board of Directors and in 2022, he became President-Elect of NOWRA. As of 2024, Chris also oversees the County's environmental health specialists.

Dr. Min Yang is a world's leading scientist in drinking water research. He has been involved as a vice team leader of the expert team responsible for the national drinking water research program more until 2020, and made a great contributions to the modification of national drinking water standard. He has also been leading the drinking water taste and odor research, and has established the methods for the identification and detection of taste and odor compounds, and developed technologies for the on-site control . These methods and technologies have been applied widely in the drinking water industry. He has also devoted a lot of energy to the identification and control of AMR risks in antibiotic manufacturing wastewater, and has contributed as a lead expert to WHO WASH-AMR Policy Brief (Water, sanitation and hygiene, and Antimicrobial Resistance : Preventing Infection and Preparing for a Post-Antibiotic World).

Dr. Absar Ahmad Kazmi is currently a Professor in the Department of Civil Engineering at IIT Roorkee. His major research and technological development interests are in advanced wastewater treatment, reuse and solid waste management. He has published over 200 papers in peer-reviewed journals > with an index of 45 and ~7,560 citations. He is a member of several technical committees in various states, ministries, and the National Green Tribunal. He is one of the key committee members of CPHEEO Manuals on Sewerage and Sewage Treatment and Technical Options for Solid and Liquid Waste Management, published by the Ministry of Drinking Water Supply and Sanitation. He has also authored a book on O&M of Sewerage Works jointly published by the Governments of India and Japan. He has been involved with several research and consultancy projects sponsored by the Government of India and international agencies.

Mr. Yoshihisa Tahara joined Showa Sanitation Center Co., Ltd., a company in Fukushima Prefecture that provides O&M and desludging for Johkasou in 1989, and has over 35 years of experience. He established a water quality analysis department specializing in Johkasou within the company, and worked to ensure the accuracy of water quality analysis, including BOD. He became a chairman of his company in April 2025. In addition, from 2018, he participated in the JICA project "Verification Survey with the Private Sector for Disseminating Japanese Technologies for Improvement of Domestic Wastewater Treatment through Introducing Johkasou in Hung Yen" for five years, collaborating with Hung Yen Provincial People's Committee and Provincial Department of Natural Resources and Environment in Hung Yen, Vietnam. This project aimed to establish Johkasou O&M service, desludging, and water quality inspection in Vietnam.

Mr. Nguyen Duc Son has worked as a technical intern trainee at Hoshi Densetsu Co., Ltd. in Japan from 2015 for three years. After the intern, he returned to Vietnam and used his experience and knowhow gained in Japan to work at HOSHI DENSETSU VIETNAM Co., Ltd., where he is engaged in the construction and maintenance of electrical equipment and water supply and drainage equipment. He currently serves as the company's vice president. Since 2018, he has been cooperating with the JICA project "Verification Survey with the Private Sector for Disseminating Japanese Technologies for Improvement of Domestic Wastewater Treatment through Introducing Johkasou in Hung Yen", and receiving the technical instruction from Mr. Tahara and his colleagues on whole system of Johkasou from installation to O&M of Johkasou. He is currently engaged in the O&M work of Johkasou in Hanoi.

Mr. Akhmad Rivai is the General Manager for PT. Earth Creative Indonesia, overseas affiliate of Earth Creative., Co. Ltd. a waste and wastewater management company located in Ube, Yamaguchi Prefecture in Japan. Since 2019, his company has been actively involved in in the construction and Operational & Maintenance of small, medium and large scale of Sewage Treatment Plant (STP) and Wastewater Treatment Plant (WWTP) in Bali, Indonesia. Currently, His company's main costumer include hotel, hospital and public building. His company also contributed to industrial and domestic wastewater regulation control for river and lake in Bali island.

Dr. Kiyoshi Kawamura was formerly a Professor, Graduate School of Science and Engineering, Saitama University. Prior to that, he served as a section chief of the waste management division in a research institute of the Ministry of Health and Welfare (now the Ministry of Health, Labor and Welfare) , and then as the director of a research institute for the environment in Saitama Prefecture. In these institutes, he had conducted research and teaching, and also contributed to many committee activities at the national and local governments, and the related agencies. Through these experiences, he had made many efforts on the improvement of domestic wastewater management and supporting for the dissemination of johkasou technology world wide. He is one of the pioneers in Japan to contribute to the promotion of the healthy water environment and sanitation system.

Dr. Flamand Pierre is the Manager of International Affairs at the Japan Sanitation Consortium (JSC). He has over 20 years of experience in sanitation, with particular focus on fecal sludge management. Since joining JSC in 2009, he has been involved in sanitation projects in Viet Nam, Malaysia and Bhutan. He is the co-author of 'Sanitation and Sustainable Development in Japan' (ADB 2016) and 'Accountability Mechanisms for Inclusive City-Level Public Services in Asia' (ADBI 2023). Since 2015, he has been involved in several Working Groups of ISO/TC 224 as an expert representing Japan for the development of international standards. Pierre holds a doctoral degree in regional development studies and is also a visiting researcher at Toyo University in Japan.

SECRETARIAT CONTACT

Japan Education Center of Environmental Sanitation (JECES) is a secretariat of this Workshop. If you have any questions in advance, please contact Secretariat (shirakawa@jeces.or.jp) via email.

6.1.2. 発表資料

1) 基調講演：日本の浄化槽の維持管理と資格者制度 (共同発表)　（Keynote: O&M of Johkasou and system of qualified person in Japan）

Operation and Maintenance of Johkasou and System of Qualified Person in Japan

11th November 2025

Mr. NAKAYAMA Shuichiro
Section Chief, Office for Promotion of Johkasou

環境省
Ministry of the Environment Government of Japan

Office for Promotion of Johkasou
Waste Management Division
Environmental Regeneration and Material Cycles Bureau
Ministry of the Environment
Government of JAPAN

https://www.env.go.jp/recycle/jokasou/en/

Table of Content

- General Information of Johkasou
- Legal Framework and O&M system of Johkasou in Japan
- Challenge of improving the O&M implementation rate

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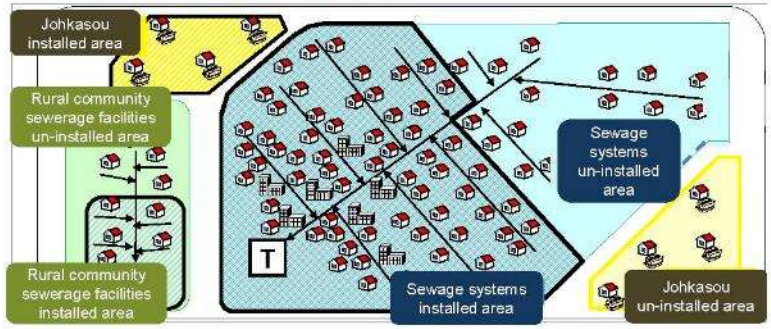
General Information of Johkasou

1. Domestic Wastewater Treatment Systems in Japan



- **Sewage Systems** : managed by the Ministry of Land, Infrastructure, Transport and Tourism
- **Rural community sewerage facilities**: managed by the Ministry of Agriculture, Forestry and Fisheries
- **Johkasou**: managed by the Ministry of the Environment

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General Information of Johkasou

3. General Information of Johkasou

- "Johkasou" is categorized as a decentralized wastewater treatment system for domestic wastewater discharged by household, building and similar sources.
- Johkasou have a combined purification structure capable of treating both night soil (black water) and miscellaneous wastewater (gray water).
- Johkasou achieve high and stable performance comparable that of sewage treatment plants, and more than 4 million units have been installed across Japan.

Typical layout of small scale Johkasou for household

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General Information of Johkasou

2. Current situation of population served for treating domestic wastewater

Type of treatment facility	Population served (x 1,000 people) End of FY2024	End of FY2023
Sewage systems	**101,397 (81.8%)**	101,279 (81.4%)
Rural community sewerage facilities including Facilities for fishing villages, Facilities for forestry villages, Simple wastewater facilities	**2,835 (2.3%)**	2,938 (2.4%)
Johkasou	**11,746 (9.5%)**	11,772 (9.5%)
Municipal Johkasou Installation Program	817	824
Johkasou Installation and Maintenance Program	6,220	6,229
Other Johkasous	4,708	4,719
Community plants, etc.	**148 (0.1%)**	154 (0.1%)
Total population served	116,126	116,144
Percentage of population served	**93.7%**	93.3%
Total population	123,964	124,483
Total population not served	7,838	8,339
Population without domestic wastewater treatment	**6.3%**	6.7%

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General Information of Johkasou

4. Application of Johkasou for domestic wastewater management and installation example overseas

Application of Johkasou for domestic wastewater management

a) Rural, agricultural area, Geographical isolated area

For household and community

b) Closed water area

For household and community surround closed water area

c) City

For important point source (Ex., Hospital, Public Toilet, Apartment) (In advance before installing sewage system)

d) Rapid development area

(Ex. Huge apartment project)

e) Emergency hygiene improvement area (if any)

(Ex. Poverty houses where frequent water-born diseases are infected)

f) Monumental Area (Ex. For natural reserve, world heritage, etc.)

Employee dormitory (Saudi Arabia: 530m³/d)

Example of Johkasou installation overseas

Restaurant (China: 10m³/d)

Toilet in factory (Vietnam: 5m³/d)

Canteen & toilet (Myanmar: 30m³/d)

At the end of 2024, totally over 64,000 units of Johkasou are installed overseas

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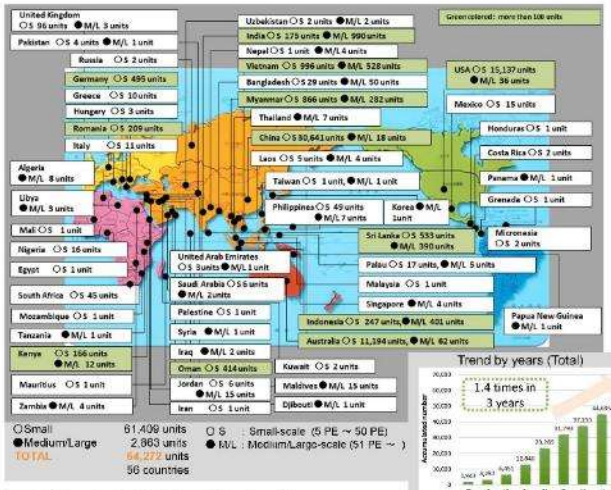
General Information of Johkasou

5. Installation Records of Japanese Johkasou Overseas (as of Dec.2024)



As of the end of December 2024 by Johkasou System Association

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Legal Framework and O&M system of Johkasou in Japan

1. Overall concept of water environment improvement and related legal framework

Basic Environment Law
Basic National Environmental Policies

Domestic Wastewater Measures

■ Sewerage Law
Sewerage System Establishment

■ Johkasou Act
Installation of Johkasou etc.

■ Purpose

- Strengthen regulations of manufacturing, installation, operation, maintenance and desludging of Johkasou.
- Provides qualifications for Johkasou installation workers and operators
- Provides registration systems for Johkasou installation vendors and maintenance vendors
- Provide licensing systems for desludging vendors

Promotion of domestic wastewater treatment by Johkasou for conservation of water quality in public water area, preservation of the living environment and improvement of public health

National Government

- Vision
- Law & Regulations
- Technical Standards
- National Subsidies

Sharing responsibility

Local Government

- Master Plan and its implementation
- Ordinance
- Construction, operation and management of sewerage facilities
- Advice and guidance on Johkasou operation and maintenance

■ Definition

- Johkasou is the decentralized wastewater treatment facility that can treat both black water and gray water from household, building and so on and discharge effluent comply with effluent standards.
- Johkasou should be installed when installing a flush toilet under the Building Standard Law, unless the wastewater is discharged to sewerage systems.

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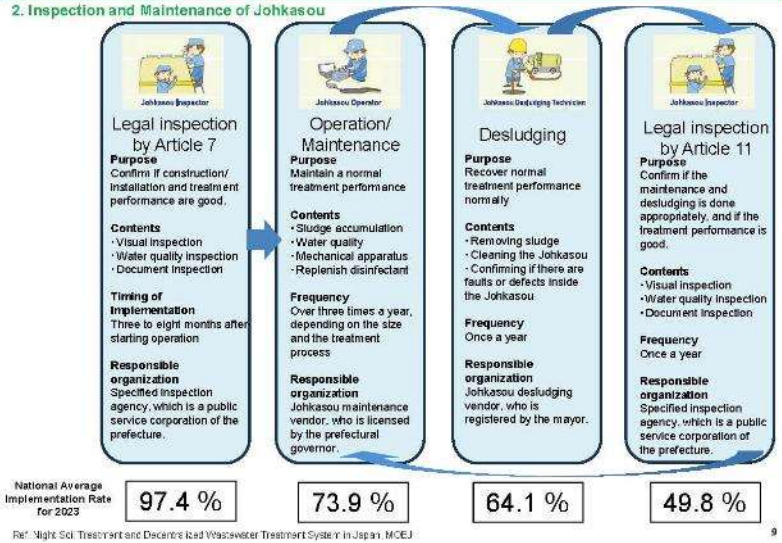
Legal Framework and O&M system of Johkasou in Japan

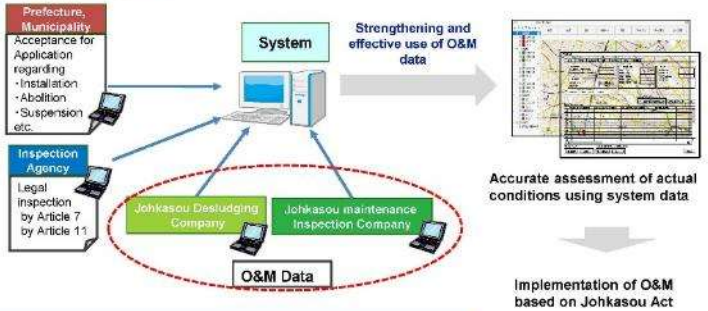
2. Inspection and Maintenance of Johkasou



Ref: Slight Sol. Treatment and Decentra lized Wastewater Treatment System in Japan, MOEJ

Challenge of improving the O&M implementation rate

1. Johkasou Data System



The Purpose of the Johkasou Data System

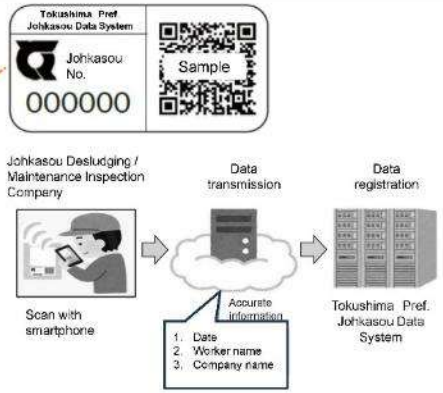
Accurate assessment of actual conditions using system data Prompt and appropriate guidance by administrative authorities

Thorough Operation and Maintenance based on the Johkasou Act

Challenge of improving the O&M implementation rate

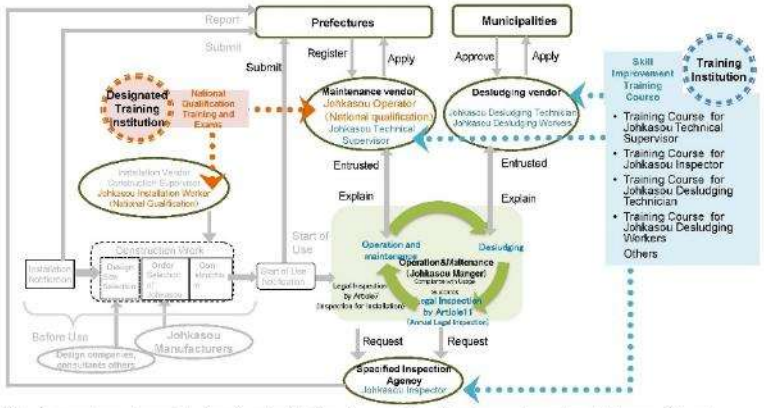
2. Example of local government initiatives

◆ Tokushima Prefecture has begun attaching QR code stickers to each household with a Johkasou from 2024.
During cleaning and maintenance inspection, workers scan the QR code and send the work results to the Johkasou Data System.



Challenge of improving the O&M implementation rate

3. Human resources development for Johkasou O&M



The figure above shows the flow from installation to operation of Johkasou based on Johkasou Act and regulations, along with the roles of relevant businesses and personnel, and an overview of human resource development.

Adapted from "Flow of Johkasou from the Perspective of Johkasou Managers (Users)," Material 1, presented at the 13th Meeting of the Johkasou Expert Committee, Waste and Recycling Subcommittee, Central Environment Council, on February 17, 2006

Challenge of improving the O&M implementation rate

4. Training courses for Johkasou Technicians

- Johkasou Technicians should possess extensive knowledge not only in wastewater treatment and Johkasou, but also in water environment conservation and public health.
- The training curricula for Johkasou Operator and Johkasou Installation Worker are outlined as below.

Johkasou Operator by Article 45		Johkasou Installation Worker by Article 42	
Basic of Johkasou	8 hrs	Basic of Johkasou	8 hrs
Laws and regulations related with Johkasou	4 hrs	Laws and regulations related with Johkasou	3 hrs
Structure and function of Johkasou	22 hrs	Structure and function of Johkasou	15 hrs
Introduction of installation of Johkasou	4 hrs	Management of Johkasou installation	8 hrs
Operation and maintenance of Johkasou	30 hrs	Introduction of O&M and desludging of Johkasou	3 hrs
Water quality management of Johkasou	10 hrs		
Introduction of desludging of Johkasou	2 hrs		
Total 80 hours (13 days) Test 2 hours		**Total 37 hours (5 days) Test 2 hours**	

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Thank you for your kind attention

Check Japan's Johkasou System on Youtube

https://www.youtube.com/watch?v=r4xOKGbYWes

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The role and practice of training institutions, JECES

Japan Education Center of Environmental Sanitation (part 1)

- Founded in 1966 as an institution for training and research Johkasou in Japan. Recognized as a foundation by the Ministry of Health and Welfare (now by the Ministry of the Environment, MOEJ). JECES is the only professional educational and research institution on johkasou system in Japan, and JECES has trained more than 200,000 qualified various technicians related to the Johkasou system since 1966.
- Carry out the examination for qualifying Johkasou Operator as the only designated institution by MOEJ, and the examination for qualifying Johkasou Installation Worker as the only designated institution by MLIT (Ministry of Land, Infrastructure, Transport and Tourism).
- Seminar courses for Continuing Professional Development (CPD) of Johkasou technicians
  - ✓Special seminar for Johkasou desludging workers
  - ✓Special seminar on installation management of Johkasou
  - ✓Special seminar on O&M of compact type Johkasou
  - ✓Special seminar on desludging practice of compact type Johkasou

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Japan Education Center of Environmental Sanitation (part 2)

- Technical advice to municipalities to help them in making Domestic Wastewater Treatment Plan and promoting Johkasou installation.
- Publication of monthly journal "JOHKASOU" and books related Johkasou technology/ administration
- Holding a national conference on Johkasou technology, Johkasou technicians and other stake-holders coming together for exchanging information and discussing issues on Johkasou businesses.

Technical Standard for O&M of Johkasou

- **Technical standards for maintenance** (Ordinance for Enforcement of Johkasou Act Related the Ministry of the Environment, Article 2)
  "Maintenance items" and "Adjustment/repair items" are stipulated for every Johkasou unit and auxiliary devices. To prevent the functional depression of the Johkasou, the standards also stipulate the "timing of the desludging" so that cleaning must be carried out as soon as possible if certain conditions are detected.
- **Technical standards for desludging** (Ordinance for Enforcement of Johkasou Act Related the Ministry of the Environment , Article 3)
  Standards for desludging stipulate the implementation method to be carried out during desludging by each unit and auxiliary device (e.g. methods for discharging the sludge).
- **Guidelines for O&M** (official notice)
  This guideline is issued by Ministry of the Environment as a specific guidance for operations and maintenance of Johkasou which is designed to ensure the appropriate maintenance, inspections, and desludging are carried out optimally according to the each characteristics of treatment method.

Various training programs

In addition to the Training course for qualifying Johkasou Operator and Training course for qualifying Johkasou Installation Worker, JECES conduct various trainings as followings.

- Training programs for the qualifying **Johkasou Technical Supervisors**

The course to train those who are recognized to have the same or higher knowledge and skills as a person who has a qualification as a Johkasou Operator and has more than two years of practical experience in technical work related to maintenance, inspection and desludging of johkasou with a scale of 501 PE or more.

- Training programs for the qualifying **Johkasou Desludging Technicians**

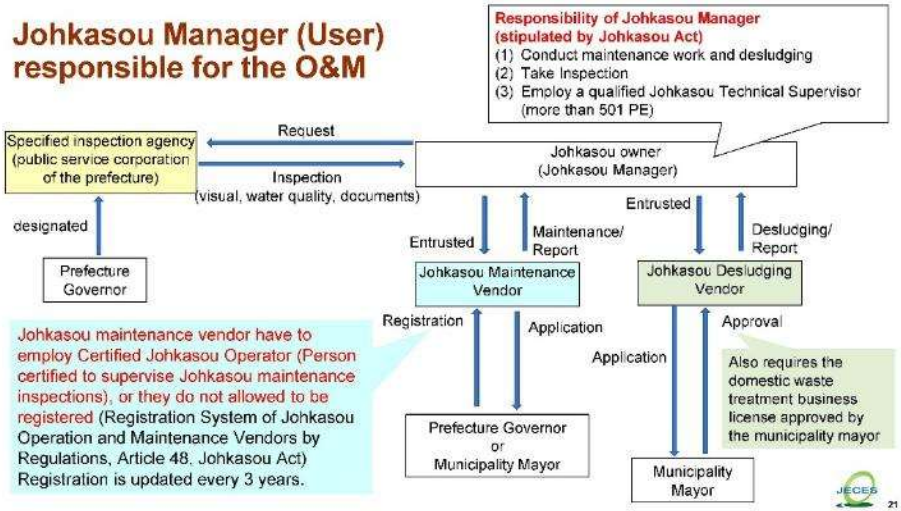
The course to train the people with specialized knowledge and skills related to Johkasou desludging.

- Training programs for the qualifying **Johkasou Inspector**

The course to train the people with specialized knowledge and skills regarding Johkasou inspection, which are required designated condition for the designated inspection organizations.

Mechanisms and Market of the O&M related to the Johkasou system

Johkasou Manager (User) responsible for the O&M



Vendors and Technicians of Johkasou system in Japan

Johkasou Technicians / vendors	Registrant / vendor (FY 2024)	Business content
Johkasou Operator (Article 45, Johkasou Act)	41,816	Maintenance
Johkasou Technical Supervisor (Article 10, Johkasou Act)	8,084	Management of Johkasou over 501 PE
Registered Johkasou Inspector (Article 5, Ordinance of Johkasou Act)	1,495	Legal inspection
Specified Inspection Agency (Article 7 , Johkasou Act)	65	Legal inspection
Johkasou Maintenance Vendor (Article 48, Johkasou Act)	12,129	Maintenance
Johkasou Desludging Vendor (Article 35, Johkasou Act)	6,310	Desludging
Johkasou Installation Vendor (Article 21, Johkasou Act)	25,017	Installation/construction

Source: 環境省令和6年度 浄化槽の指導普及に関する調査結果 (FY 2024 Survey Results on Guidance and Promotion of Johkasou) Ministry of Environment, Japan)

Fee of the National Exams and Training courses

- Although the fees for the national examination and training course are relatively substantial, they are typically borne by the trainees or examinees. In some instances, employers assume responsibility for these expenses on behalf of their employees.
- As Johkasou construction companies and O&M companies are mandated to employ certified personnel, possession of these national qualifications can serve as a considerable advantage in securing employment opportunities.

Qualification of Technicians	Number of exam / course takers	Pass rate	Fee (1 USD = 150 JPY)
National Exam for Johkasou Operator	889	21.1 %	23,600 JPY (157 USD)
Training course for qualifying Johkasou Operator	1,327	90.1 %	153,400 JPY (1,022 USD)
National Exam for Johkasou installation worker	663	15.7 %	31,700 JPY (211 USD)
Training course for qualifying Johkasou installation worker	327	86.5 %	133,100 JPY (887 USD)

Market of Johkasou O&M in Japan

- According to JECES's estimates, the market for O&M of 5 to 10 PE Johkasou is estimated to be approximately 200 billion yen (1.3 billion USD) per year in Japan.
- MOEJ is now focusing on efforts to convert Old type Johkasou (which treat only toilet wastewater, black water) to Johkasou and to improve the implementation ratio of O&M. Also, some areas are considering installing Johkasou due to the aging of sewerage infrastructure and a declining population, and it could potentially expand the Japanese Johkasou O&M market.

condition	**Unit number of installed Johkasou (5~10 PE, estimated)**	**3,700,000**	**Units**
	Implementation ratio of maintenance (FY 2023) *	81.2	%
	Implementation ratio of desludging (FY 2023) *	67.4	%
	Unit number of installed Old Type Johkasou (5~10 PE, estimated)	**3,000,000**	**Units**
	Implementation ratio of maintenance (FY 2023) *	65.2	%
	Implementation ratio of desludging (FY 2023) *	60.4	%

* Source: 環境省令和6年度 浄化槽の指導普及に関する調査結果 (FY 2024 Survey Results on Guidance and Promotion of Johkasou) Ministry of Environment, Japan)

Summary: Mechanisms and Market of the O&M related to the Johkasou system

- The Johkasou Act clearly defines the aspects shown in the table below and, which enable Japanese Johkasou systems to function properly.

Points of Johkasou Act	outcome
Obligation of O&M	Mandatory of O&M will create the O&M market and enable it to become a viable business.
Technical standard and the Qualification system	Qualification system will ensure the technical level of O&M work.
Business registering system	A business registration system will ensure the employment opportunities for qualified individuals and enhance the motivation to get the qualification.

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Case of capacity development practiced by the private entities involved in the O&M of Johkasou

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Fuji Suishitsu Kanri Co., Ltd.

- Established in 1974. 76 employees. 13 locations nationwide.
- Because the company undertakes maintenance of large-scale and facilities and the advanced treatment equipment for major companies, only sends employees with a certain level of technical skill to the site.
- The Japanese construction industry is ordinally struggling to recruit engineers, but an even bigger issue is the inability to train them. Fuji Suishitsu Kanri Co., Ltd. was also facing an issue where the number of maintenance requests is increasing, however the technical level was not catching up. And in 2023, they finally established a in-house training system.
- Since there were only a limited number of practical seminars related to Johkasou available outside the company, they established a specialized department within the company and created their own in-house curriculum (textbooks, etc.). Visualize the technical levels of employee using over 50 in-house evaluation criteria.

Image of the in-house training system

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Fuji Suishitsu Kanri Co., Ltd.

- They introduced in-house awards system that recognizes employees who share good maintenance techniques and know-how, and they also provide individual support to new hires to address their concerns through one-on-one interviews.
- They have established a Fuji Suishitsu Kanri training center where employees can actually operate and experience equipment such as switchboards and pumps, preventing variations in technical level due to years of employment.

Image of the in-house awards

Image of the individual support

Image of the training at the Fuji Suishitsu Kanri training center

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Goto Eisei Consultant Ltd.

- Established in 1963. 36 employees. Construction and O&M of Johkasou, collection and transportation of municipal and industrial waste, etc. are the main business.
- Stepping up O&M skills: The employee will start their work from small-scale Johkasou to medium and large-scale Johkasou, to rural sewerage Johkasou, and acquire know-how in the area of O&M.
- Converting individual knowledge into collective knowledge: Employees take company the issues and insights they discover through O&M work and share the risks, countermeasures, and tips within the company (in-house classroom training & on-site training) .



Image of the in-house classroom training



Image of the on-site training

Goto Eisei Consultant Ltd.

- The company's unique efforts to strengthen its technological capabilities of employees have earned it a good reputation among users, leading to increased sales opportunities, such as receiving referrals from existing customers.
- Issues: Aging employees are becoming dominant. A negative social image of Johkasou, making it difficult to attract young employees even when recruiting.
- Accepting visitors from Japan and overseas: Accept visitors from Japan and overseas and introduce them to the O&M work of Johkasou. This contributes to improving the public image of Johkasou.



Image of accepting the visitors from Japan



Image of accepting the visitors from overseas

Hiyoshi Corporation

- Established in 1958. 377 employees. Main business activities include environmental analysis, sales of industrial chemicals, construction and maintenance of infrastructure such as Johkasou, etc.
- Rotational training for new hires: Established after approximately 30 years of trial and error. Each year, about ten new employees join the company, and each is assigned a dedicated tutor on a one-on-one basis. The first year, as a training period, new employees are provisionally assigned to all departments on a rotational basis to gain an understanding of each department's roles and operations. Content of on-the-job training (OJT) vary by department. After the one-year rotation training, employees are formally assigned to a department based on their preferences.




Image of Rotational training for new hires

Hiyoshi Corporation

- Environmental learning conducted by new hires: As an opportunity for new hires to experience the company's management philosophy "A company that contributes to society through technology," co-host an environmental learning program with the Omihachiman City Children's Association and Development Association, for elementary school students in Omihachiman City, and has been well received by the new hires for providing valuable hands-on learning experience.
- "Hiyoshi Juku (cram school) ": For the past 20 years or so, the company has been independently conducting lectures on the basics of environmental analysis and water treatment. Upon graduation, a certificate is issued, to benchmark skill levels in the company. All new hires are required to take the course.
- Other programs to improve skills: Incentive system for obtaining qualifications, bonus system for those who obtain qualifications, holding study groups, providing e-learning (hydraulics, electricity, programming), and encouraging employees to attend external training courses.

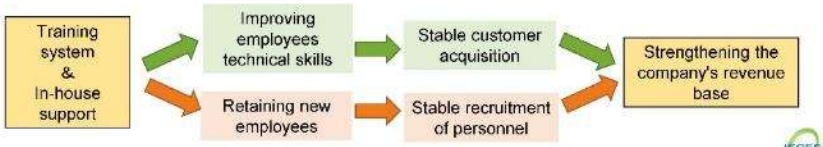

Image of Environmental learning conducted by new hires



Image of "Hiyoshi Juku"

Summary: capacity development practiced by the private entities

- Even after obtaining qualifications such as a Johkasou Operator, Vendors and Technicians continue to improve their skills through the various efforts.
- By providing various opportunities for employee to improve the skills according to their level, it will lead to the retaining new employees and the improving employees technical skills.



33

JECES

Thank you for your attention !

34

2) 途上国における分散型汚水処理施設の維持管理の状況（Current status of O&M of decentralized wastewater treatment plants in developing countries and human resource development）

13th International Workshop on
Decentralized Domestic Wastewater Treatment in Asia
11th - 12th November 2025 in Tokyo, Japan

O&M of Decentralized Wastewater Treatment in Developing Countries and Human Resource Development

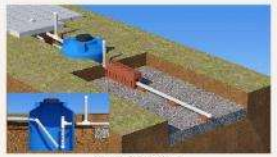
Roshan Shrestha, PhD, Deputy Director
Global Growth Opportunities, Water, Sanitation, and Hygiene

11 November

Gates Foundation

Overview of Decentralized Wastewater Treatment Systems


ET Water Economy
DAIKI AXIS: JAPANESE TECH DRIVING SUSTAINABLE WATER SOLUTIONS FOR A RESILIENT INDIA


Safewater garden


MBBR

- Small-scale & decentralized sanitation can serve 10–1,000 households.
- Offer modular, flexible, low-cost solutions with local reuse potential.
- Over 20,000 small-scale plants installed in India; similar growth regionally.

Urbanization, Water, and Wastewater Management

2/3rd population lives in areas facing water scarcity for at least one month a year

50% of people (more than 2.5 billion) facing water scarcity live in India and China

In 2020, **3.6 billion people lacked safely managed sanitation services,** 2.3 billion lacked basic hygiene services and **more than 2.5 billion live in water-stressed countries** with lack of access to safe drinking water.

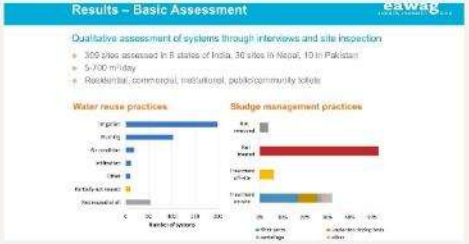
In developing countries, average

Asia is home to 4.5 billion people, who use approx. **65% of the world's water supply. Around 30% of the Asian population is facing water scarcity.**

Challenges in Decentralized Wastewater Treatment Systems – South Asia

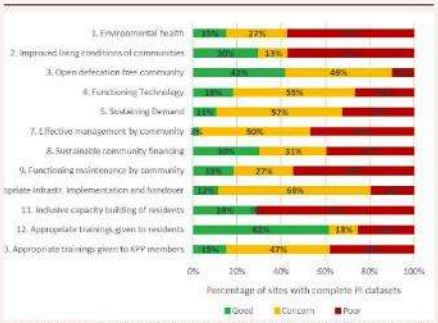
Key challenges:

- **Untrained operators:** 40% had no formal training (South Asia)
- **Weak accountability:** unclear ownership after handover.
- **Minimal monitoring:** no flow meters or automation.
- **Underfunded O&M:** <60% cost recovery on average.
- **Unsafe sludge disposal:** untreated discharge common.
- **Spare parts gaps:** poor access outside cities
- O&M often handled by **Short-term private vendors** with limited expertise



Source:
https://www.eawag.ch/en/department/sandec/projects/sesp/4s-small-scale-sanitation-scaling-up/

Indonesia Learning on Decentralized Wastewater Treatment



Source: https://www.adb.org/sites/default/files/media/documents/2021-03/SANIMAS%20Model_as%20an%20Approach%20for%20Providing%20Decentralized%20Sanitation_March%202021.pdf

- Challenges are consistent across India, Nepal, Bangladesh, Indonesia, and the Philippines
- Systems fail due to weak institutions, poor monitoring, and lack of professionalized maintenance—not technological limits

Recommendations

Sludge & Resource Management

- Establish **mandatory operator certification and licensing.**
- Create **regional training hubs**
- Develop **career progression pathways** for sanitation professionals.
- Include **hands-on modules** in biological processes, safety, and troubleshooting

Governance & Standards

- **Standardize design,** handover, and O&M documentation.
- **Mandate 5-year build–operate**–train contracts for new systems.
- **Empower utilities** to act as regulators/enablers, not just operators.
- **Implement fit-for-purpose reuse** and microbial standards.

Regional Collaboration Opportunities

- **Shared training and certification** frameworks.
- **Cross-country pilot exchanges:** Bangalore ↔ Jakarta ↔ Manila.
- **Regional database** and learning platform.
- **Partners:** GWSC, GSCOE, GSGS etc.

Recommendations

Professionalize O&M

- Build semi-centralized **sludge treatment hubs for multiple SSTPs.**
- Require **on-site dewatering or drying beds.**
- **Enable co-treatment** at FSM plants.
- **Develop reuse markets** for compost, biosolids, and biogas

Institutional Support

- Designate **"operators of last resort"** for failed systems.
- Deploy **backstopping engineers** for audits and technical support.
- Set up **municipal O&M support** units linked to wastewater treatment management.
- Define **clear accountability** between builders, owners, and regulators.

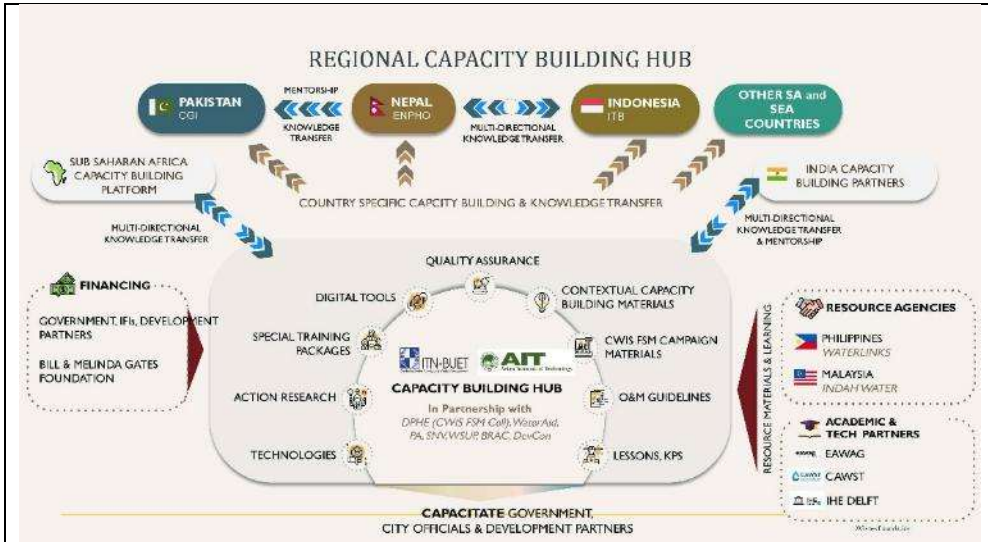
Digital Monitoring

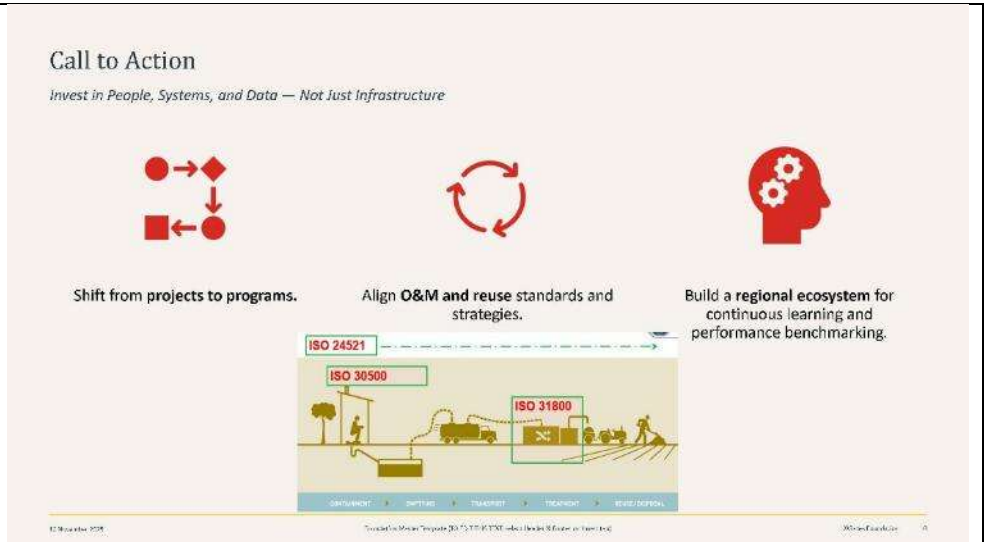
- Require **flow meters, sensors, and remote data logging.**
- Build **national or regional dashboards** for system health tracking.
- Introduce **IoT-based alerts** for system failure.
- Use **traffic-light scorecards** to visualize compliance (Green = Good; Red = Poor).

Sustainable Financing

- Create dedicated **operations and maintenance (O&M) funds or escrow accounts.**
- **Adopt performance-based contracts** tied to effluent quality.
- Offer **tax rebates or reuse credits** for compliant systems.
- Blend **public, private, and user contributions for O&M continuity.**

Global Sanitation Graduate School (GSGS)





If you want to go fast,
go alone.

If you want to go far,
go together.

—African Proverb

gatesfoundation.org

Gates Foundation

3) アメリカ合衆国における分散型汚水処理施設の維持管理の内容と資格者制度と人材育成（Decentralized Wastewater in America）

Decentralized Wastewater in America

Christopher W. LeClair, R.E.H.S.
Director, Otter Tail County Land & Resource Management
President, National Onsite Wastewater Recycling Association

13th Annual Workshop on Onsite Wastewater Solutions in Asia
November 11, 2025
Tokyo, Japan

NOWRA
National Onsite Wastewater Recycling Association

- United States:
  - 342 million people
  - 3,809,525 mi² (9,866,624 km²)
  - 89.8/mi² (34.7/km²)
- Japan:
  - 124 million people
  - 145,937 mi² (377,975 km²)
  - 849.7/mi² (328.1/km²)

National Onsite Wastewater Recycling Association (NOWRA)

- AzOWRA (Arizona)
- CPOW (Colorado)
- FOWA (Florida)
- GOWA (Georgia)
- IOWWA (Iowa)
- KSFA (Kansas)
- MOWPA (Maryland)
- MOWRA (Michigan)
- MOWA (Minnesota)
- MSO (Missouri)
- NDOWRA (North Dakota)
- OZWA (Oregon)
- OOWA (Ohio)
- OOWA (Oklahoma)
- POWRA-NM (New Mexico)
- POWRA-PA (Pennsylvania)
- SCOWA (S. Carolina)
- TOWA (Tenn)
- TxOWA (Texas)
- UOWA (Utah)
- VOWRA (Virginia)
- WOSSA (Washington)
- WOWRA (Wisconsin)
- YOWA (New England)

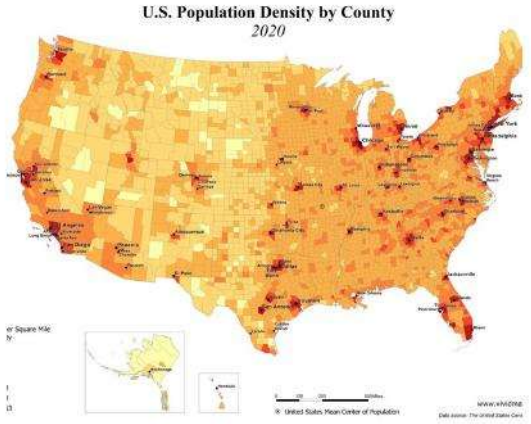
Blue = NOWRA State Affiliates
Gold = Non-affiliated state organizations
Red = States with no onsite association

5,500+ Members
29 states
24 affiliates

Decentralized Wastewater in America

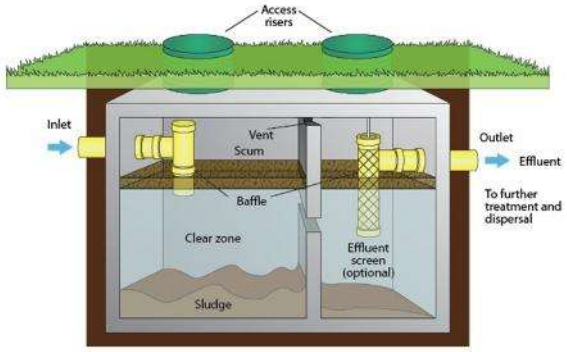
25% of Americans (31 million households) do not have access to centralized wastewater management and rely on decentralized wastewater management

- Onsite systems
- Septic systems
- Subsurface sewage treatment systems



Septic Tank

- Primary Treatment
  - Septic tank separates solids, fats/oils, liquid
  - Solids & Fats/Oils accumulate in the tank
  - Effluent (liquid) leaves the tank

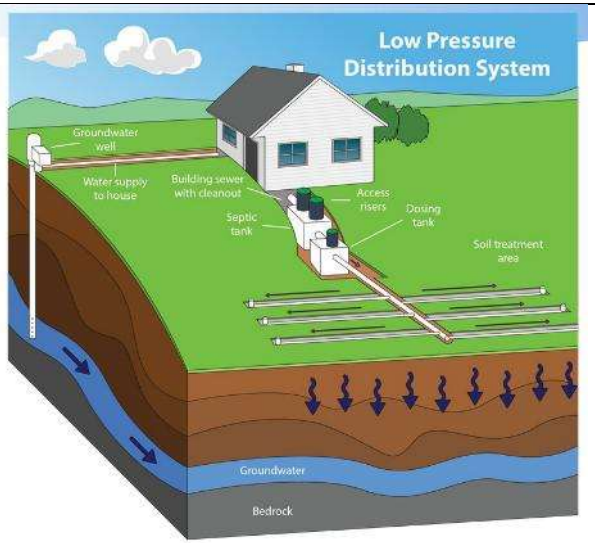


Decentralized Wastewater in America

- The overall goal of design standards of decentralized wastewater management systems is to maintain swimmable, fishable and drinkable water.
  - Surface water – lakes, rivers, streams
  - Groundwater aquifers – source of drinking water for 38% of Americans

Soil Treatment Area

- Secondary Treatment & Dispersal
  - Distributes effluent over infiltrative area
  - Unsaturated soil under soil treatment area
    - Aerobic microorganisms in the soil consume pathogenic microorganisms in the effluent



Treatment Performance of Soil

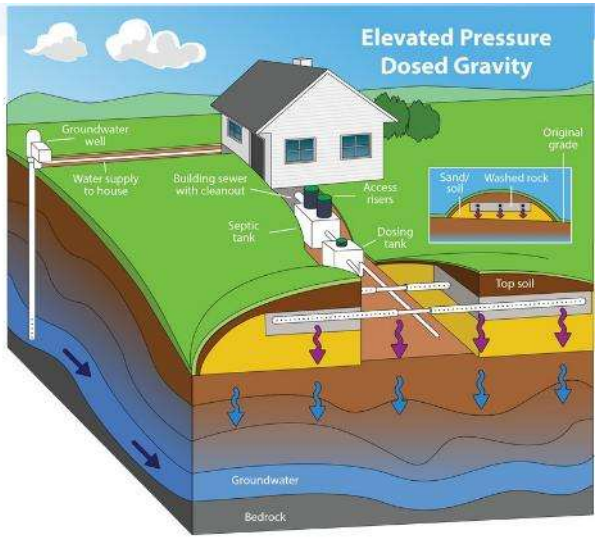
Contaminant	Raw Waste	Septic Tank Effluent	One Foot Below Trench	Three Feet Below Trench
BOD (mg/L)	270-400	140-220	0	0
TSS (mg/L)	300-400	45-65	0	0
Fecal Coliform (MPN/100ml)	1,000,000-100,000,000	1,000-1,000,000,000	0-100	0
Viruses (PFU/ml)	unknown	1,000-1,000,000,000	0-1,000	0
Nitrogen				
Total (mg/L)	100-150	50-60	-	-
NH_4 (mg/L)	60-120	30-60	*B-60	*B
NO_3 (mg/L)	<1	<1	*B-40	*B-40
Total Phosphorus (mg/L)	10-40	10-30	*B-10	*B-1

*B=Background

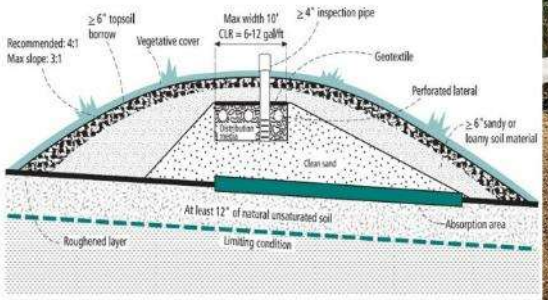
Soil Treatment Area – Gravity Trench "Drainfield"

Soil Treatment Area

- Above ground soil treatment and dispersal area
  - Used if property has high-water table conditions
- Commonly referred to as a "mound" system

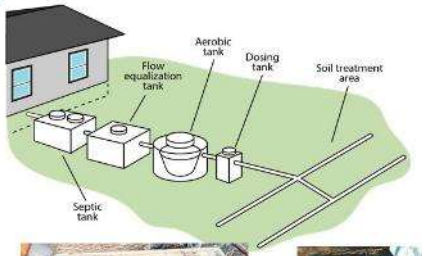


Soil Treatment Area – Above Ground "Mound"



Advanced Treatment Systems

- Most systems are designed for domestic strength waste:
  - Biochemical Oxygen Demand BOD ≤ 170 mg/L
  - Total Suspended Solids ≤ 70 mg/L
  - Oil & Grease ≤ 25 mg/L
- Any system with elevated levels of those constituents must pre-treat the waste prior to discharging to the soil
  - Aerobic Treatment Unit (ATU)
- These advanced systems need more frequent and more robust operation and maintenance by a licensed Service Provider



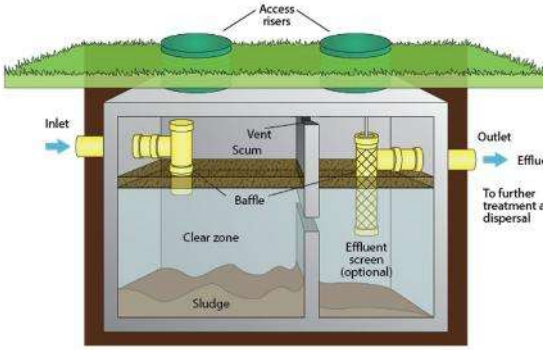
Regulatory Framework

- The decentralized wastewater industry in the United States is not regulated federally.
  - Regulation of decentralized wastewater systems are left up to each state.
  - Some states have different regulations county by county
- The U.S. Environmental Protection Agency does enforce U.S. Code of Federal Regulations Title 40, Part 503 regarding the land application of septage

Operation & Maintenance (O&M)

- Primary Treatment
  - Septic tank separates solids, fats/oils, liquid
  - Effluent (liquid) leaves the tank
  - Solids & Fats/Oils accumulate
- The accumulated solids/fats & oils must be periodically removed by pumping out the contents of the septic tank
- Critical in maintaining the system

Septic Tank

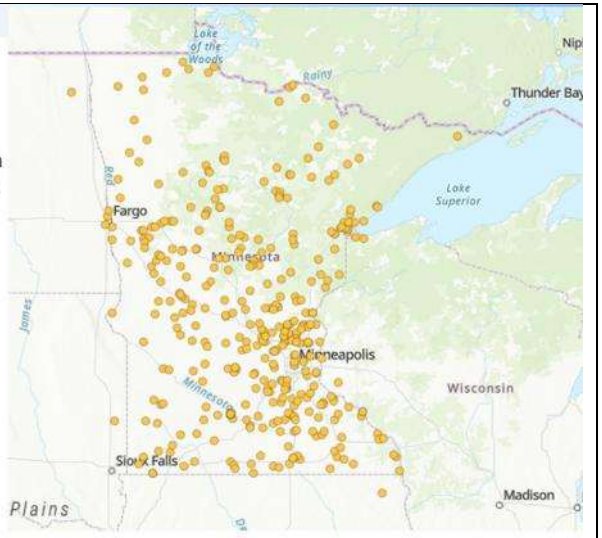


Operation & Maintenance (O&M)

- State and local regulations require that decentralized systems be periodically maintained
  - In Minnesota, the owner of decentralized system is required by code to remove the solids from the septic tank once every three years
  - Must be performed by a licensed maintainer
  - Pumper truck disposes of septage at the local municipal wastewater treatment plant, or more commonly in the rural parts of the US, land applies the septage on a farm field

Operation & Maintenance (O&M)

- 383 Licensed Maintainers in Minnesota
  - Required to take several courses at the University of Minnesota
    - Intro – 3-day course & exam
    - Maintainer – 5-day course & exam
- Licensed Maintainer businesses must obtain 18 hours of continuing education every three years keep license current



Operation & Maintenance (O&M)

- Challenges with operation & maintenance
  - Getting people to remember to maintain their system – memories fade
    - Lack of enforcement at local level
  - Homeowners turning off alarm
- Solutions
  - Refrigerator magnets
  - Detailed pumping records
    - Maintainers keep lists of customers and when their system was pumped last
  - Some local units of government will send out reminder postcards
  - My office requires maintainers to submit data online for each system maintained
    - Allows us to inform homeowners when maintenance is due
    - System automatically sends a homeowner an email (if we have it) when the system is three months from being due for maintenance

EPA Requirements – Land Application of septage

- Code of Federal Regulations, 40 CFR 503
  - Applies to any person who applies sewage sludge to the land, to sewage sludge applied to the land, and to the land on which sewage sludge is applied.

Direct Application w/Lime

Injection/Incorporation

EPA Requirements – Land Application of Septage

- Pathogen/Vector attraction reduction
  - Injection/incorporation
  - Lime to pH of 12
- No application when ground frozen
- Annual nitrogen application rate
- Record keeping
  - Location where septage applied
  - Number of acres
  - Date of each application
  - Nitrogen requirement for the crop grown
  - The rate (gallons per acre per 365 days) applied
  - How pathogen requirements were met
  - How vector attraction reduction was met

Restricted Activity	Waiting Period
Food crops whose harvested part may touch the soil/septage (melons, squash, tomatoes, etc.)	14 months
Food crops with harvested parts below the surface (potatoes, carrots, etc.)	38 months
Feed, food, or fiber crops that do not touch the soil surface (field corn, sweet corn, soybeans, hay, etc.)	30 days

EPA Requirements – Land Application of Septage

Slope & Season Requirements

Slope (%)	Surface Application	Injection or Immediate Incorporation
Summer		
0-6%	Allowed	Allowed
>6-12%	Not Allowed	Allowed
>12%	Not Allowed	Not Allowed
Winter		
Only areas with slopes from 0-2% can be used for winter applications of septage		

EPA Requirements – Land Application of septage

Setback Requirements

Feature	Surface Applied	Incorporated within 48 hours	Injected
Private drinking water supply wells	200 ft		
Public drinking water supply wells	1000 ft		
Irrigation wells	50 ft		25 ft
Residences	200 ft		100 ft
Residential developments	600 ft		300 ft

Christopher W. LeClair, R.E.H.S.
Director, Land & Resource Management, Otter Tail County MN
President, National Onsite Wastewater Recycling Association (NOWRA)
cleclair@ottertailcounty.gov

4) 中国(浙江省・江蘇省)における高性能な分散型汚水処理施設の維持管理の内容と人材育成（Human resource development for the O＆M of the High-Performance decentralized wastewater treatment systems in rural areas in China, case study from Zhejiang Province and Jiangsu Province）

13th International Workshop on
Decentralized Domestic Wastewater Treatment in Asia

Human resource development for the O&M of the decentralized wastewater treatment systems in China

-Case studies from Zhejiang and Jiangsu Provinces-

Prof. Min Yang

Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences

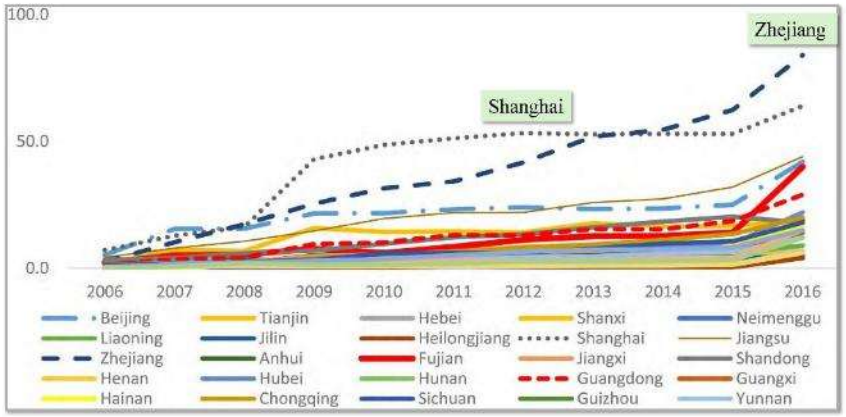
North Center for Rural Wastewater Treatment Technology,
Ministry of Housing and Urban-Rural Development

Outline

- Development of DWT in China
- Efforts by RCEES, CAS
- Cases in Jiangsu and Zhejiang Provinces

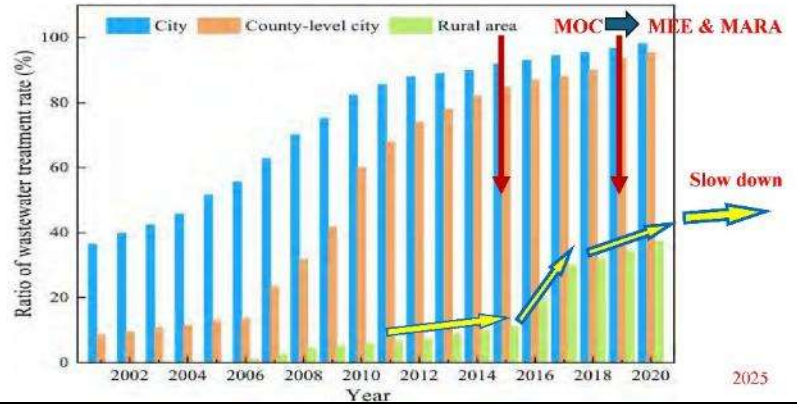
Starting of rural wastewater treatment

Started around 2005, with Shanghai and Zhejiang as pioneers.



Fast development of rural wastewater treatment

The development of rural wastewater treatment was accelerated by the event in selecting“100 Rural Wastewater Treatment Demonstration Counties”.



National and Industrial Standards Setting

Multiple national and industrial standards have been formulated successively, and a relevant standard system has been initially established.

- 《Technical Code for Village Renovation》 GB50445-2008
- 《Technical Specification for Town (Township) and Village Sewerage Engineering》 CJJ124-2008
- 《Technical Manual for Village Renovation - Drainage Facilities and Sewage Treatment》，2009
- 《Technical Guidelines for Rural Domestic Sewage Treatment by Region》，2010
- 《Specification for Village Sewage Treatment Facilities》（CJJ/T163-2011）
- 《Industry Standard for Household Domestic Sewage Treatment Equipment》(CJ/T441-2013)
- 《Technical Guidelines for Village Domestic Sewage Treatment》2015年
- 《Technical Standard for Rural Domestic Sewage Treatment Facilities》（GB/T 51347-2019）
- 《Technical requirements for operation performance evaluation of rural domestic sewage treatment facilities》(GB/T 40201-2021)
- …

Highlighting importance of facility O & M

Both Ministry of Ecology and Environment and Ministry of Agriculture and Rural Affairs are paying more attention to the O & M of rural DWT facilities.

- **Instruction on Promoting Rural DWT**

  2019-07 Department of Rural Social Affairs Promotion, MARA

  ...promote the establishment of a **sustainable operation and maintenance mechanism** including systems, standards, personnel, funding, and supervision.

- **Technical guideline on O&M of rural DWT facilities**

  2022-11 Department of Soil Ecology and Environment, MEE **T/CAEPI 51-2022**

  Regularly submit reports of **operation and maintenance**, and encourage **self-assessment** of the **operation and maintenance** of rural DWT facilities or the introduction of **third-party evaluations**.

- **Instruction on Further Promoting Rural DWT**

  2024-01 Ministry of Ecology and Environment; MARA **000014672/2024-00025**

  Organize quarterly inspections and conduct water quality monitoring every six months, incorporating these activities into the digital rural construction initiative.

Group standards covering production, evaluation, and maintenance

《Standard for Small-Scale Domestic Sewage Treatment Equipment》（T/CCPITCUDC-001-2020）

《Specification for Evaluation of Small-Scale Domestic Sewage Treatment Equipment》（T/CCPITCUDC-002-2020）

《Specification for Operation and Maintenance of Rural Domestic Sewage Treatment Facilities》（T/CCPITCUDC-003-2020）

Outline

- ☐ Development of DWT in China
- ☐ **Efforts by RCEES, CAS**
- ☐ **Cases in Jiangsu and Zhejiang Provinces**

Establishment of NRCRWTT

North Center for Rural Wastewater Treatment Technology was established in 2008 by Ministry of Housing and Urban-Rural Development.

Unveiling Ceremony

Four pillars of tasks:

- Survey and exchanges
- Technology development
- Standard setting
- Consultancy and training

Survey

Hangzhou (100m³/d)

Changshu, 200m³/d

Jiangxi, 200m³/d

Establish the industry alliance

In April 2017, the industry alliance was established including over 40 enterprises, with Liu Junxin serving as the leader and the Water Industry Market acting as the secretariat.

- Organize technical exchanges and forums among enterprises within the alliance
- Publish annual reports on industry development
- Cooperate with the Rural Center to conduct industry surveys and technical training

。。。。。。

Promoting international exchanges and cooperation

2018.10, In Tsukuba

- 2009.11: SWIF Conference "Rural Sewage Treatment Technology Sub-session", Beijing
- 2011.1: "China-Japan Rural Sewage Treatment On-site Exchange Conference", Changshu
- 2016.3: International Seminar on Decentralized Sewage Treatment, Beijing
- 2017.9: Study Tour on Japan's Septic Tank Evaluation System, Tokyo, Japan
- 2018.6: "China-Japan Exchange Conference on Application and Operation & Maintenance of Decentralized Sewage Treatment Technology", Beijing
- 2023.12: IWA WCDE in Kigali for exhibition
- 2025.12: IWA WCDE in Bangkok for exhibition

Organizing annual conferences

Organizing "Forum on Water Environment Governance in Rural Areas and Small Towns" each year since 2009.

8th Forum in Shanghai

14th Forum in Yinchuan

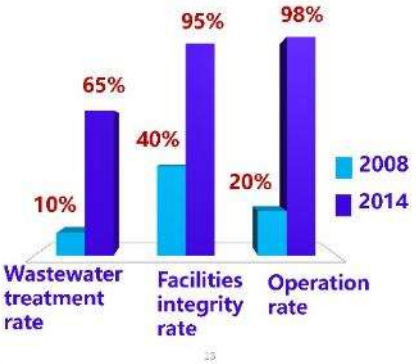
- 1st Forum, Beijing, 100 participants (2009)
- 2nd Forum, Beijing, 200 participants (2010)
- 3rd Forum, Beijing, 350 participants (2011)
- 4th Forum, Beijing, 350 participants
- 5th Forum, Nanchang, 350 participants
- 6th Forum, Beijing, 400 participants
- 7th forum, Nanchang, 500 participants
- 8th Forum, Shanghai, 600 participants
- ...
- 13th Forum, Jiangyin, 400 participants (2024)
- 14th Forum, Yinchuan, 600 participants (2025)

Establishment of rural DWT model in Changshu

By developing the so-called Changshu Model, the wastewater treatment performance has been improved significantly within short period.

Unified
- **Planning**
- **Construction**
- **Management**
- **Operation & Maintenance**

Changshu Model



National Level Training Programs

National Training Class for Rural Domestic Wastewater Treatment

Wuxi city in **Jiangsu province**

2023-05

It is emphasized that rural domestic sewage treatment and **daily operation and maintenance** should be included in the battle of pollution prevention and control, and **online rural domestic sewage treatment** acceptance should be implemented to realize big data query and analysis.

Rural ecological environment management training course

Jinhua city in **Zhejiang province**

2024-10

Investigate and share **successful practices** on the normalization of rural environmental remediation. Adhere to the principles of **"seeking needs from farmers," "seeking advice from farmers,"** and **"evaluating effectiveness with farmers."**

National Rural Black and Odorous Water Treatment Training Course

Xiaogan City in **Hubei Province**

2025-04

It advocates the use of treatment facilities **without chemicals, no sludge**, but also remote **monitoring and operation**, to maximize the improvement of **farmers ' living environment** and improve **people 's satisfaction**.

National Rural Environmental Remediation Training Course

Haidong City in **Qinghai Province**

2025-06

Shared **the valuable experience** of rural environmental remediation and rural domestic sewage treatment facilities **construction and operation**, emphasizing the improvement of **long-term management mechanism**.

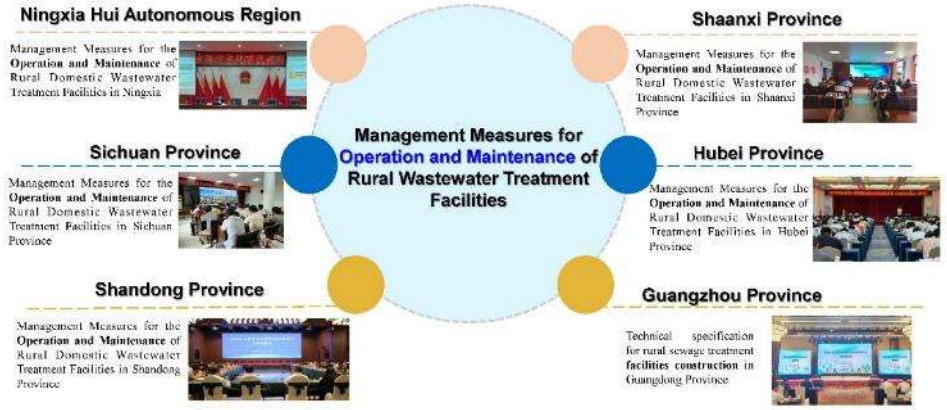
Training courses for O & M

Starting training since 2018. Over 200 trainees from environmental protection companies and local authorities participated the courses.

Outline

- ☐ Development of DWT in China
- ☐ Efforts by RCEES, CAS
- ☐ **Cases in Jiangsu and Zhejiang Provinces**

Provincial O & M Regulations and Training Courses-2



Provincial O & M Regulations and Training Courses-1

Jiangsu Province

- Management Measures for the **Operation and Maintenance** of Rural Domestic Wastewater Treatment Facilities in Jiangsu Province
- Regulations for operation and maintenance of rural domestic sewage treatment facilities (DB 3204/T 1074—2024)
- Management Measures for the **Operation and Maintenance** of Rural Domestic Wastewater Treatment Facilities in Zhangjiagang City

Encourage the **village committee** to incorporate the **operation and maintenance** requirements of rural domestic sewage treatment facilities and the responsibility for facility protection into the village regulations.

Zhejiang Province

- Regulations on the **Management** of Rural Domestic Wastewater Treatment Facilities in Zhejiang Province
- Interim Measures for the **Operation and Maintenance** Management of Rural Domestic Wastewater Treatment Facilities in Hangzhou
- Management Measures for the **Operation and Maintenance** of Rural Domestic Wastewater Treatment Facilities in Longquan City

Conduct **training classes** for rural domestic wastewater operation and maintenance workers to **master general theoretical knowledge** of operation and maintenance, as well as **basic knowledge** of equipment operation and repair.

Shanghai City

- The Technical Guideline for **On-line Monitoring System** of Rural Sewage Treatment Facilities in Shanghai
- Safety Production Management System for **the Operation and Maintenance** of Rural Domestic Wastewater Treatment Facilities in Jiading District
- Management Measures for the **Construction and Operation and Maintenance** of Rural Domestic Wastewater Treatment Facilities in Qingpu District

Rural domestic wastewater treatment facilities should be equipped with **IoT gateways** to enable **perception and communication networks**, and **support unattended** operation and **automatic equipment** operation.

Jiaxing Model: Dual Enhancement Training

Through the **compact programme** and **hands-on exercises**, achieve low-cost, rapidly deployable county-specific training.

- Over forty participants from county, town and village levels attended the training programme, which comprised policy lectures and practical exercises.
- On-site completion of ledger forms with mutual verification, taking away replicable village-level ledger templates.

On-site training

Practical exercises

Ningbo Model: Regulations and Technological Advancements

The training programme spans four key areas, enabling managers to advance both administrative compliance and technical capabilities simultaneously.

Regulatory Compliance Training

Authoritative interpretation of the latest policies and regulations, clarifying management boundaries and fundamental principles.

Waterlogging Point Assessment

Analysing the challenges of combined sewer systems in local areas, learning renovation strategies and case studies.

High-efficiency denitrification

Exchange low-carbon denitrification technologies such as MBBR to enhance treatment efficiency.

Integrated Operations and Maintenance

Exploring an integrated operation and maintenance model for treatment plants, pipelines, and waterways to enhance management efficiency.

Shaoxing Model: Problems resolved on the spot

Expert guidance systematically breaks down common challenges in construction and operations, enabling trainees to intuitively grasp resolution methods.

- Insufficient burial depth of pipelines leading to frost damage or pressure
- Manhole misalignment
- The constructed wetland has become clogged, resulting in a decline in treatment efficiency.

Training Outcomes: Compilation of a corrective action list, directly translating into rectification tasks.

List of Issues
Questions collected during the training session

Rectification
Notification issued within two weeks

Review the issues
Random sampling re-inspection

Yancheng Model: Integration of Construction and Operations

Small-group training programmes will integrate construction and operations maintenance into a unified training framework, thereby achieving technical handover through training.

Construction Section
Design/Construction/Supervision

End-to-end training
Standardized Drawings/Responsibility Boundaries

Operations and Maintenance Section
Technical details

O & M Funding: Calculation method

1

Zhejiang Province : Uniform pricing, dynamic adjustment

Zhejiang categorises facilities into four tiers based on daily processing capacity, specifying an annual unit price per facility for plains, hills and islands. Household equipment is calculated at an annual unit price per household, with provisions for dynamic adjustment.

2

Jiangsu Province :one-station-one-price

Jiangsu Province has established a "one-station-one-price" system to reflect operational and maintenance costs, taking into account factors such as influent water volume, water quality compliance rates, process complexity, and transport conditions.

O & M Funding:Funding sources

1

Zhejiang Province

Funding shall be jointly managed by county and municipal governments, with subsidy proportions determined according to assessment results.

2

Jiangsu Province

Jiangsu adopts a model of "county-level coordination with shared responsibility between towns and villages". Third-party operation and maintenance is encouraged.

3

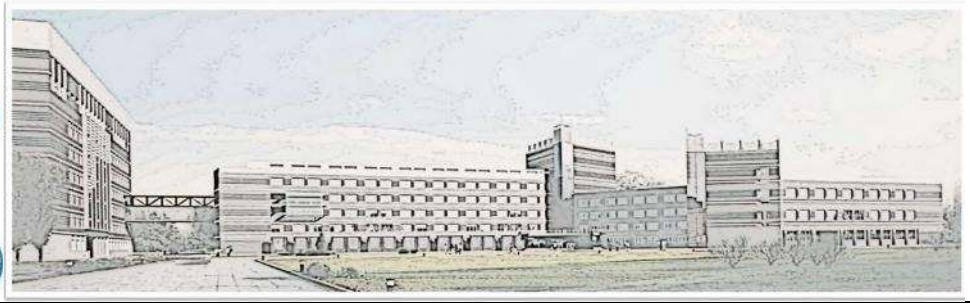
Supplementary channels

Both encourage donations from social organizations and enterprises to supplement funding.

In Summary

- Central Government is taking actions, and standard system has been basically established.
- Zhejiang, Jiangsu and Shanghai are taking the lead.
- The industrial chain has been established.
- Challenges: No legal status; No mechanisms established in funding the construction and O & M.
- International cooperation is important to promote the further development of DWT

Thank you!
Look forward to your kind suggestion!



5) インドにおける高性能な分散型汚水処理施設の維持管理の内容、そして人材育成（O&M for the High-Performance decentralized wastewater treatment plants and human resource development in India）

13th International Workshop on Decentralized Domestic Wastewater Treatment in Asia
11th November, 2025

O&M for the High-performance Decentralized Wastewater Treatment Plants and Human Resource Development in India

A. A. Kazmi
Professor
Department of Civil Engineering
IIT Roorkee, Roorkee, India

JOHKASOU INTRODUCTION IN INDIA
MANUAL ON SEWERAGE & SEWAGE TREATMENT-2013

CHAPTER-9 -ON-SITE SANITATION

MANUAL ON SEWERAGE
AND SEWAGE TREATMENT SYSTEMS

PART A: ENGINEERING
THIRD EDITION - REVISED AND UPDATED

MINISTRY OF URBAN DEVELOPMENT, NEW DELHI
http://moud.gov.in

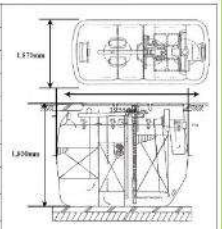
CENTRAL PUBLIC HEALTH AND
ENVIRONMENTAL ENGINEERING ORGANIZATION

IN COLLABORATION WITH

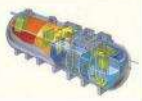
JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

NOVEMBER 2013

Capacity (A)	
10 Persons (2.0 m³/day)	
Weight (equipment only)	
470 kg	
Main body material	
FRP	
Tank volume, Equipment capacity	
Anaerobic filter tank	No. 1: 2.13 cum No. 2: 1.414 cum
Contact aeration tank	2.037 cum
Sedimentation tank	0.717 cum
Blower	120 L/min × 130 W



Package-type			On-site construction-type
Small-scale	Medium-scale	Large-scale	Medium/Large-scale
(About 5 to 50 people)	(About 51 to 500 people)	(Approx. 500 to 5,000 people)	(More than 500 people)


13th International Workshop on Decentralized Domestic Wastewater Treatment in Asia
11th November, 2025

BACKGROUND

NATIONAL GREEN TRIBUNAL (NGT)
Matter OA No. 673 of 2018

- *Many States/ UTs are constructing or have proposed to develop STPs in Polluted River Stretches with capacity less than 2 MLD. States, in such situations, may consider to adopt installation of* ***decentralized modular STPs; which offer advantages in form of lesser time involved in commissioning of systems, less land footprints, easy operations; instead of conventional centralized STPs based on techno-commercial considerations.*** *This will also enable them to comply to NGT stipulated timelines.*

STRICT EFFLUENT STANDARDS: BOD-10 mg/L , TSS- 20 mg/L, TN – 10 mg/L

Johkasou system introduced in India by Daiki Axis- 2018

NATIONAL NEWSPAPER

IIT-Roorkee validates adaptability of Japanese technology-based STPs for hilly regions

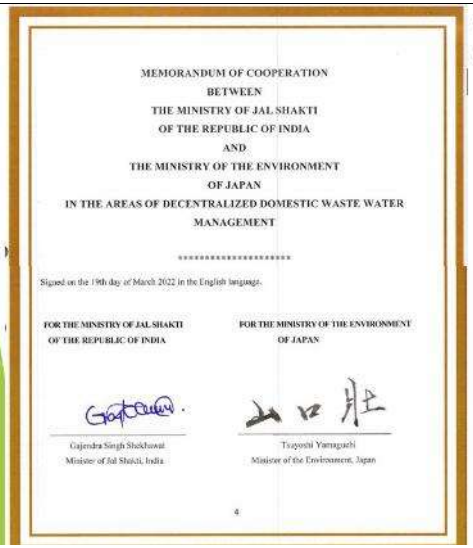
THE TIMES OF INDIA Tapan Susheel / TNN / Oct 12, 2022, 23:19 IST

SHARE | AA | FOLLOW US

Environmental researchers at IIT-Roorkee have carried out research on Japan's Johkasou technology (JT) for its adaptation and validation in Indian conditions. JT deals in sewage treatment plants (STPs).

ROORKEE: Environmental researchers at IIT-Roorkee have carried out research on Japan's Johkasou technology (JT) for its adaptation and validation in Indian conditions. JT deals in sewage treatment plants (STPs).

Japanese company Daiki signed an MoU in December 2020 with IIT-R. The researchers said that although JT can work effectively across the country, its implementation in Uttarakhand, particularly in



MEMORANDUM OF COOPERATION
BETWEEN
THE MINISTRY OF JAL SHAKTI
OF THE REPUBLIC OF INDIA
AND
THE MINISTRY OF THE ENVIRONMENT
OF JAPAN
IN THE AREAS OF DECENTRALIZED DOMESTIC WASTE WATER MANAGEMENT

Signed on the 19th day of March 2022 in the English language.

FOR THE MINISTRY OF JAL SHAKTI OF THE REPUBLIC OF INDIA

Gajendra Singh Shekhawat
Minister of Jal Shakti, India

FOR THE MINISTRY OF THE ENVIRONMENT OF JAPAN

Tsuyoshi Yamaguchi
Minister of the Environment, Japan

4

INDO-JAPAN-MEMORANDUM OF COOPERATION- MARCH 2022

- Exchanging information and expertise on decentralized domestic wastewater management.
- Seminars, conferences and meetings.
- Capacity building through trainings, workshops and on job sites.
- Other forms to be mutually decided upon

Indian Standard
IS 18797 : 2024
Packaged Sewage Treatment Plant — Specification

September 2024

Bureau of Indian Standards

HOME | ABOUT THE ACTIVITY | STANDARD OF THE WEEK | STANDARD OF THE MONTH | BIS TALKS | KNOW YOUR STANDARD | CONTACT US | Login

History

Document Details

Name of Department/Committee :	CED 24
Document Number :	CED 24 (24325)
Document Title [English] :	Packaged Sewage Treatment Plant - Specification
Document Title [Hindi] :	[illegible]
Document Type :	New
Language :	English
Priority :	3
ICS Code :	93.030, 13.060.30
Date of Project Approval :	31-08-2023

S.No.	P-Draft Completion Date	WC-Draft Completion Date	Final-Draft Completion Date	Project Completion Date(Gazette)	Entered By	Entered On
1	04-12-2023	04-05-2024	19-07-2024	04-12-2024	Mr. Dheeraj Damachya	04-12-2023

Table 7 Parameters for Evaluation and Frequency of Testing

(*Clause* B-6)

Sl No.	Parameter	Unit	Frequency
(1)	(2)	(3)	(4)
i)	Daily influent flow	litre/day	As desired
ii)	Inflow period	hour/day	As desired
iii)	Inflow pattern	Percentage versus hour	As desired
iv)	Peak influent flow	litre/minute	As desired
v)	Temperature of influent	°C	As desired
vi)	Daily effluent flow	litre/day	As desired
vii)	Sludge level	metre	Monthly (or more frequent)
viii)	Scum level	metre	Weekly (or more frequent)
ix)	Biological/biochemical oxygen demand (BOD)[1]	mg/l	Weekly (or more frequent)
x)	Chemical oxygen demand (COD_{cr})[1]	mg/l	Weekly (or more frequent)
xi)	Total suspended solids (TSS)[1]	mg/l	Weekly (or more frequent)
xii)	Total nitrogen (TN)[1]	mg/l	Weekly (or more frequent)
xiii)	Total phosphorous (TP)[1]	mg/l	Weekly (or more frequent)
xiv)	Faecal coliform (FC)	Most probable number (MPN) per 100 ml	Weekly (or more frequent)
xv)	*p*H[1]		Weekly (or more frequent)

ROUTINE OPERATION AND MAINTENANCE PROCEDURES

F-1 ROUTINE OPERATION AND MAINTENANCE PROCEDURES

F-1.1 The following routine inspection shall be carried out by the user once a week:

a) Check pretreatment units (bar screens, O and G trap, grit chamber, etc);

b) Check state of operation of blowers;

c) Check state of operation of pumps and float switch/level switch/float; and

d) Check state of operation of disinfection system.

F-1.2 The following routine inspection shall be carried out by the service provider once a month:

a) Check media or filter conditions;

b) Clean air filters of blowers; and

c) Check leakage, clogging, etc, in influent, effluent, internal, inter-connection, aeration pipes for leakage, clogging.

F-1.3 The following routine inspection shall be carried out by the service provider once in six months:

a) Replacement of air filters of blowers;

b) Sludge level check;

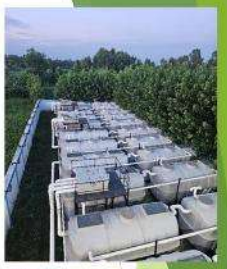
c) Check scum in all chambers;

d) Sludge removal; and

e) Cleaning of media and filter.

Experiences on performance of public (Government) Johkasous in India

500 m³/day Small Wastewater Treatment Plant, Beljudi-Govt. of India Namami Gange Program



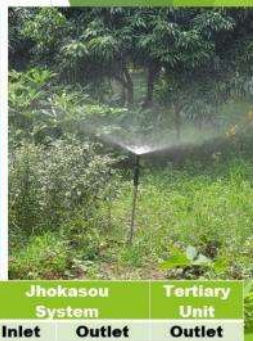
Parameter	Unit	Inlet	Outlet
pH	-	7.1	8.1
TSS	mg/L	76	14
COD	mg/L	118	30
BOD	mg/L	69	13
TN	mg/L	21.4	7.7

500 m³/day Small Wastewater Treatment Plant, Mukundpur-Govt. of India Namami Gange Program

Parameter	Unit	Inlet	Outlet
pH	-	7.3	7.9
TSS	mg/L	136	12
COD	mg/L	172	32
BOD	mg/L	78	12
TN	mg/L	22.9	7.7

Governor House-Dehradun- 10KLD





Parameter	Unit	Jhokasou System		Tertiary Unit
		Inlet	Outlet	Outlet
pH	-	7.2	7.3	7.6
TSS	mg/L	189	24	20
COD	mg/L	594	127	107
BOD	mg/L	175	25	19

Case study: Launching the lecture to acquire the ability of O&M of Johkasou in Sri Vishwakarma Skill University

10 KLD- Delhi Development Authority Park Direct Lifting of wastewater from stormwater drain and use it for horticulture-SDG6 for clean water


O&M Training Courses of Johkasou by Sri Vishwakarma Skill University

SHRI VISHWAKARMA SKILL UNIVERSITY

India's first Government Skill University, dedicated to providing high-quality skill education.

MoU with Daiki Axis on Skill Development Courses In Water Conservation & Wastewater Recycling

Pilot Training to develop Skill for Operators



1 Week Training for 20 Student of Vishvakarma Skill University : Appointed 4 best students those qualified the exam and Trained them for 6 month. Now each is managing 20-30 Johkasou systems in India

Skill Mapping

- Japan technical team visited India for 2 months to check the skill level of Daiki Axis India Maintenance staff and partners service staff.
- Skill Checks for Installation and Quality Control during installation at site
- 70 point check list for general construction and safety purposes
  - Foundation
  - Levelling
  - Wiring
- To build a strong framework for proper installation and maintenance similar to the Johkasou act in Japan.

SITE EVALUATION

- Local tool kit

TYPICAL SITE EVALUATION

M-Code	Site Name	Date	Location	State	Model	Installation Type	Operational Since	Partner	End use	Priority
M248920012	HPCL	17/10/2024	Mumbai	MH	AIE-50	Underground	Jul-24	Centaac		
· There are no major problems regarding installation										
< Comment · Instruction >										
1)Control panel wire penetrations are not properly finished. Caulking at the ends is not done.										
2)Piping support, especially outdoors, was not sufficient										
(no particular support was provided around the tertiary treatment area, but there were no major problems).										
3)Suction side piping of RWP uses hose piping. The explanation was that the original piping was PVC piping, but this was changed due to suction										
frequent problems such as improper										
Vibration of the pump may have caused the union to loosen, resulting in poor suction. The lack of piping support may have affected the problem										
5)I heard that there are plans to integrate the separated machine rooms, and I request that support and other problems be improved at that time.										

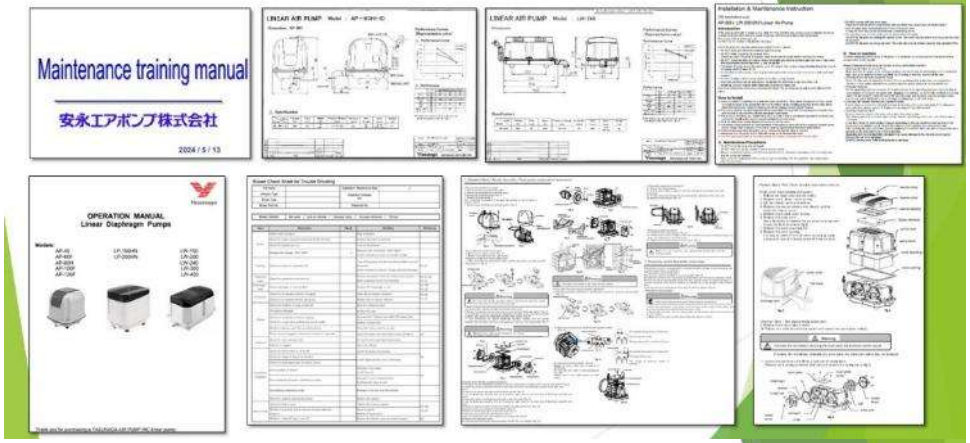
Final Evaluation(total)	Detail Quality	Follow Planning	Control system	Accessibility
80	20	20	20	20

TO INCENTIVISE DEALER AND CHANNEL PARTNER

Maintenance Skill Check for Channel Partners

Transparency, DO, Sludge Depth , visual inspection of media, scum, blower: Filter, Current, noise, air flow, Recirculation volume

TRAINING MATERIAL: Blower



PRACTICAL TRAINING

Repair of Blower at Local Level

PRACTICAL TRAINING SESSIONS

Expected Efforts in India

The 5th International Forum on Asian Water Environment Technology (IFAWET-5)
6-8 August 2025, Dehradun, India

UTokyo UPES

Edition IN English Delhi 29°C

THE TIMES OF INDIA

City Dehradun Mumbai Delhi Bengaluru Hyderabad Kolkata Chennai Agra Agartala Ahmedabad

Weather Uttarakhad Elections Uttarakhand@25

News / City News / Dehradun News / Japanese Tech Proposed To Treat Sewage At Kedar...

Trending Bengaluru Roads Disha Patani Lucknow Suicide Delhi BMW Crash Andra

Japanese tech proposed to treat sewage at Kedarnath

Tanmayee Tyagi / Sep 11, 2025, 22:58 IST

Japanese tech proposed to treat sewage at Kedarnath

Tanmayee Tyagi / Sep 11, 2025, 22:58 IST

DEHRADUN NEWS

Dehradun: The National Mission for Clean Ganga (NMCG), a flagship programme of the Govt of India, in an affidavit before the National Green Tribunal (NGT), has proposed introducing the Japanese Johkasou sewage treatment system at Kedarnath. The move follows a state govt report recommending decentralised wastewater solutions for locations not covered by the ongoing centralised 600 KLD sewage treatment plant (STP) project.

The Johkasou system, which treats wastewater close to its source, was recommended by professor AA Kazmi of IIT Roorkee. The proposal targets 155 fixed toilets at Kedarnath that currently rely on soak pits and fall outside STP's design.

EXTENSION OF MEMORANDUM OF COOPERATION

MEMORANDUM OF COOPERATION
BETWEEN
THE MINISTRY OF JAL SHAKTI
OF THE REPUBLIC OF INDIA
AND
THE MINISTRY OF THE ENVIRONMENT
OF JAPAN
IN THE AREAS OF DECENTRALIZED DOMESTIC WASTEWATER MANAGEMENT

PARAGRAPH VIII
SETTLEMENT OF PROBLEMS

Any problem arising from the implementation or interpretation of this MOC will be settled amicably through consultations or negotiations between Both Sides.

PARAGRAPH IX
MODIFICATION

This MOC may be modified at any time through mutual written consent by Both Sides.

PARAGRAPH X
COMMENCEMENT, DURATION AND DISCONTINUATION

1. The cooperation under this MOC will commence on the date of its signature.
2. The cooperation under this MOC will continue for a period of two (2) years and may be extended by mutual consent of Both Sides or be discontinued at any time by either Side by giving written notification at least six (6) months prior to the date of the intended discontinuation.
3. The discontinuation of the cooperation under this MOC will not affect the duration of any on-going activity until the completion of such activities.

Signed on the 20th day of August 2025 in the English language.

FOR THE MINISTRY OF JAL SHAKTI OF THE REPUBLIC OF INDIA
Chandrakant Raghunath Patil
Minister of Jal Shakti, India

FOR THE MINISTRY OF THE ENVIRONMENT OF JAPAN
ASAO Keiichiro
Minister of the Environment, Japan

New Tenders/Projects

"Research Experiential Learning Centre on Sustainable Energy and Circularity" IIT Roorkee

Annexure A-2

2. Wastewater Recycling and Resources Recovery Technology Labs

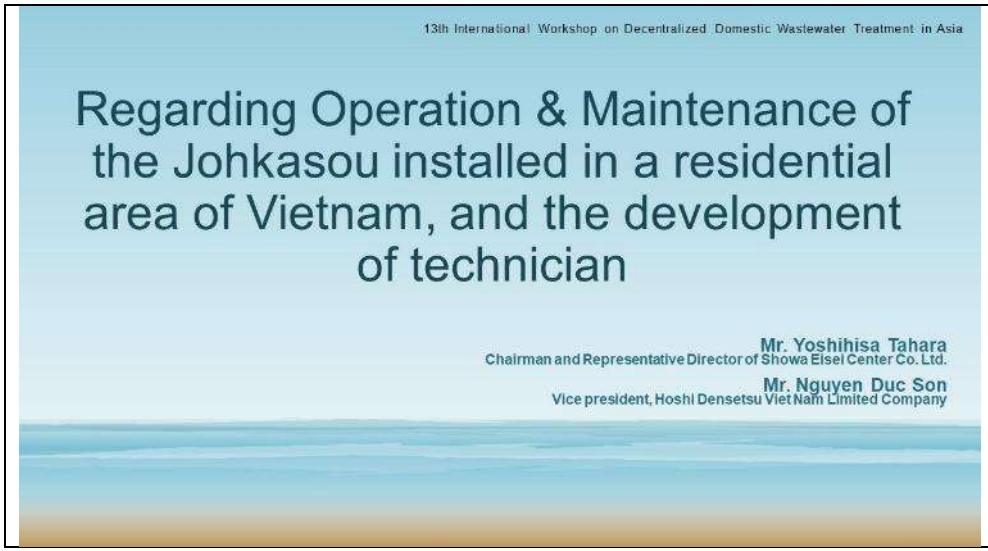
S. No.	Category	Equipment /Units		Technical Specifications			QTY	SET	Year		
				Item	Material / Type	Capacity / Details			1	2	3
5	Waste Water and Resources Recovery Technology Park (50KLD JOHKASOU Based STP)	a.	-	• Sedimentation & Separation Chamber, • Anaerobic Contact Media Chamber, • Moving Bed Biofilm Reactor (MBBR) Chamber, • Secondary Sedimentation Chamber, • Disinfection Chamber, • Internal Water Circulation System	-	50 KLD	-	01	-	-	Y

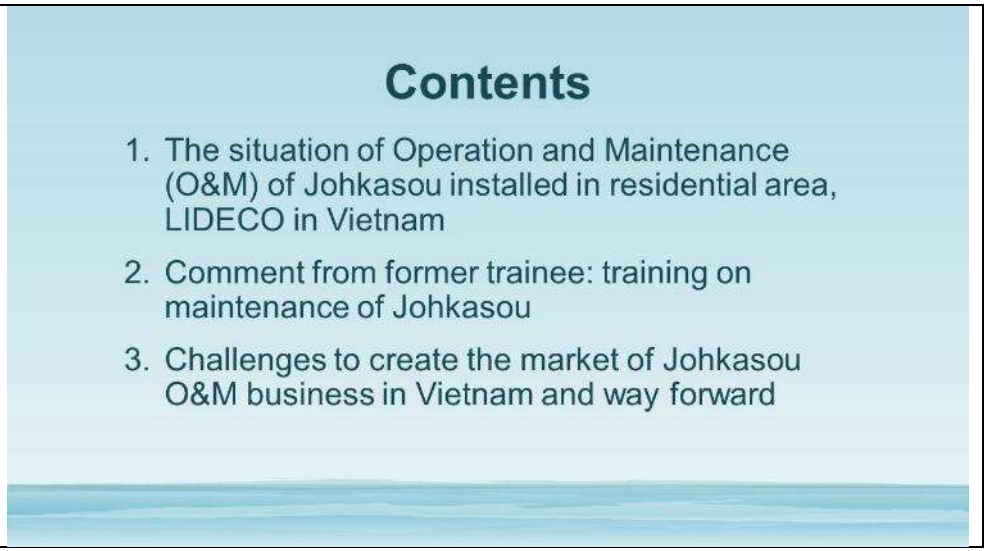
SHILLONG MUNICIPAL BOARD

Office of
The Chief Executive Officer,
Shillong Municipal Board,
Bishop Cotton Road, Shillong.

Tender Document for Sewage Treatment Plant (STP) Based on JOHKASOU TECHONOLOGY at Reserved Police, Thana Road, Shillong.Capacity of Treatment Plant: 300 KLD

6) ベトナムの住宅街に設置された浄化槽の維持管理と技術者の育成 (共同発表)（O&M of Johkasou installed in residential areas in Vietnam and training of technicians (Joint presentation)）





Background

- From May 2018 to January 2023, Joint Ventures formed by Kankyo Bunseki Kenkyusho Co.,Ltd. (a water quality analysis company), and Kansui Corporation (a Johkasou installation company), and Showa Eisei Center Co.,Ltd., thoes are from Fukushima Prefecture, involved in a JICA project in Vietnam, entitled "Improvement of Domestic Wastewater Treatment through Introducing Johkasou in Hung Yen".
- This project aimed to demonstrate Johkasou's suitability and effectiveness by installing and conducting appropriate O&M in Vietnam under the local situation, while also formulating plans for business expansion in Vietnam.
- Among this project, we conducted O&M (desludging and maintenance) for 5 (five) units Johkasou in an upscale residential area in Hanoi, where about 100 small-scale Johkasou (treatment capacity: 1.0 m^3/day) had already been installed.
- In this presentation, I briefly report on cases of problem we discovered through the JICA project, and the on-the-job training we implemented.

1. The situation of a Johkasou installed in an upscale residential area in Vietnam before O&M

②. Until that time, Johkasou have rarely been implemented maintenance, resulting in various problems as below.

- The **air filter of blower was clogged**, causing insufficient aeration.
- The water flow was weak because **the filter media in the contact aeration chamber was clogged with sludge.**
- **Because the water had not been disinfected with chlorine**, a large amount of coliform bacteria was detected in the treated water.

1. The situation of a Johkasou installed in an upscale residential area in Vietnam before O&M

①. Until that time, **the sludge of Johkasou has rarely been removed**, so that too much amount of sludge has accumulated inside the tank.

Clogging of air filter (Example)

Washing of the air filter

Clogging of filter media of contact aeration chamber (Example)

Add chloride to the cartridge (Example)

1. The situation of a Johkasou installed in an upscale residential area in Vietnam before O&M

③ Troubles caused by improper construction and installation work of Johkasou

Water had been accumulated inside the discharging pipe, because the slope of the discharging pipe was reversed.

Inspecting the inside of the discharge pipe with an internal camera

Outlet of treated water of Johkasou

2. Comment from former trainee: training on maintenance of Johkasou

② Unlike in Japan, Johkasou installed in Vietnam are often covered with soil and decorative tiles on top to address odor issues and improve appearance.
Therefore, before the maintenance work, the soil and decorative tiles on top of the manhole had to be removed, which was a difficult work that took longer time than the maintenance work itself.
To solve this problem, we proposed a pit-structure manhole cover to the residence developers. As a result, currently, pit-structure manhole covers can be seen more often which are easier to work with and to access for.

the soil and decorative tiles on top of the manhole had to be removed before the maintenance work

pit-structure manhole cover

2. Comment from former trainee: training on maintenance of Johkasou

① First, regarding the maintenance, I learned the basics of Johkasou and the necessary of maintenance work.

Following, I got an in-situ instruction on the usage of equipment for maintenance work, and I realized that using the transparency meter and sludge thickness measuring device was not that difficult.

I learned that pH and DO meters need to be calibrated every time when it use, which I thought it was little bothersome. However, I got an instruction that this is necessary for accurate measurements.

2. Comment from former trainee: training on maintenance of Johkasou

③ In LIDECO residential areas, Johkasou are installed when buildings are built and sold, then after a while, some buildings are used as restaurants or apartment complexes for large groups of people.

As a result, the water volume and BOD load of actual influent will exceed the designed treatment capacity of Johkasou, then treatment performance CAN NOT be sustained or improved only with a maintenance work.

2. Comment from former trainee: training on maintenance of Johkasou

④ At first, I had to fill up the paper maintenance report sheet and then enter the information to a computer after returned to the office. Now, software was created and that allows us to enter the information in Vietnamese, on-site. Therefore, we can create the maintenance report faster than once.

2. Comment from former trainee: training on maintenance of Johkasou

⑤ maintenance report sheet (Japanese)

maintenance report sheet (Vietnamese)

2. Comment from former trainee: training on maintenance of Johkasou

⑥ In Vietnam, because septic tanks which often do not need regular maintenance are common, most of the Johkasou users do not understand the necessity of O&M.
Sometimes, we have been asked by the users like "Why is the O&M necessary even if we use a Japanese-made Johkasou".
I believe that efforts are needed to acquire the citizen's understanding that Johkasou needs to be implemented O&M after they are installed.

Resident information session in a residential area

2. Comment from former trainee: training on maintenance of Johkasou

Comment from the TRAINER

Among Johkasou that had already been installed in Vietnam, some were not aerating because the blower pipes had been connected incorrectly, and some were not installed level, which caused poor water flow within the Johkasou.

Therefore, I consider that it is also necessary to develop technicians with the knowledge to properly install and construct the Johkasou.

3. Challenges to create the market of Johkasou O&M business Johkasou in Vietnam and way forward

①. **For establishing a O&M work as a business, a large number of Johkasou are necessary.**

(Example) Assume the following conditions;

- 1 Johkasou operator can maintain 8 units of small-scale Johkasou (10 PE or less) per day
- Johkasou operator is working 20 days per month
- Implement the maintenance work every 4 months for every Johkasou

➡ 1 Johkasou operator shall maintain 640 units of Johkasou per year.

8 units / person・day × 20 days / month × 4 months = **640 units / person**

3. Challenges to create the market of Johkasou O&M business Johkasou in Vietnam and way forward

②. It is **necessary to introduce the regulations** like **Johkasou Act.**

We need regulations / laws that stipulate the mandatory of the Johkasou manager (user) who is implementing desludging work and maintenance work appropriately to secure the effluent water quality.

Without the regulations / laws, few people will be willing to pay for the O&M of Johkasou, will cause negative impact for the environmental conservation.

3. Challenges to create the market of Johkasou O&M business Johkasou in Vietnam and way forward

③. **It is necessary to develop the personnel with sufficient knowledge regarding the Johkasou as below.**

- **Development of Johkasou installation worker** who can correctly install and construct Johkasou
- **Development of Johkasou operator** who can correctly implement maintenance Johkasou
- **Development of Johkasou desludging worker** who can correctly remove sludge Johkasou
- **Development of supervisor** regarding the work above involved with Johkasou and **training personnel (trainer) to provide guidance** to users of Johkasou

Thank you for your attention

7) インドネシアにおける高性能な分散型汚水処理施設の維持管理に関する課題（Challenges regarding the O&M of High-Performance decentralized wastewater treatment facilities in Indonesia）

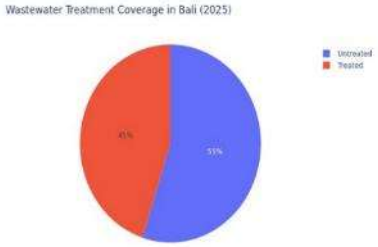
13th International Workshop on Decentralized Domestic Wastewater Treatment in Asia
11th November, 2025

Challenges Regarding the Operational & Maintenance of High-Performance Decentralized Wastewater Treatment Plants in Indonesia

AKHMAD RIVAI (アハマド　リパイ)
General Manager PT Earth Creative Indonesia
Overseas Business Manager Earth Creative., Co., Ltd

Wastewater Management in Bali, Indonesia

- Bali faces significant challenges in managing wastewater due to rapid urbanization and tourism growth.
- Key Statistics:
  - Only 45% of wastewater is treated before discharge.
  - Tourism contributes to over 40% of wastewater generation.
  - Major affected areas: Denpasar, Kuta, and Sanur.
- Efforts are underway to expand treatment facilities and promote sustainable practices.

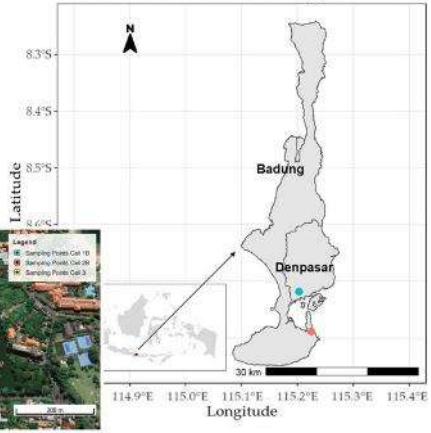


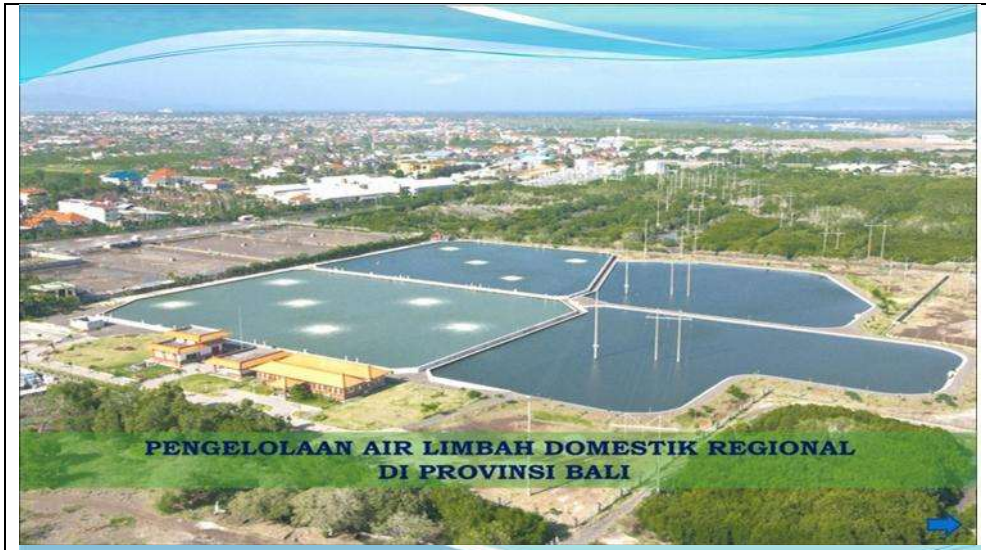
PT. Earth Creative Indonesia is a representative of Earth Creative Co., Ltd in Indonesia. Our company operates in wastewater treatment plant operational and maintenance

Established : 1968 (Japan), 2019 (Indonesia)
Profits : 530 Million JPY (2017)
Business Description : Waste Collection, Transportation & disposal, Wastewater treatment plant Operational & Maintenance, Drainage Cleaning & Maintenance, Drinking Water

Current Infrastructure and Treatment Coverage

Facility	Location	Capacity (L/d)	Coverage
Suwung WWTP	Denpasar	51.000	Urban Areas
ITDC WWTP	Nusa Dua	20.000	Tourism Areas



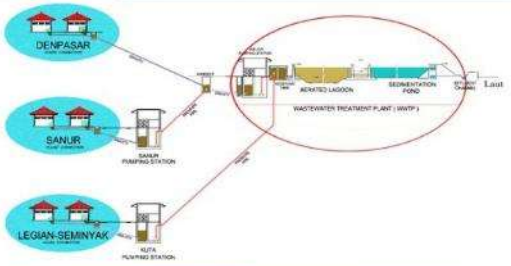


Available Service on SUWUNG WWTP

Domestic Wastewater Treatment Plant
(Capacity : 51.000 m^3/hari)

Sludge Treatment Plant
(Capacity : 400 m^3/hari)

DSDP (Denpasar Sewerage Development Project) MasterPlan



	DSDP (I)	DSDP (II)	DSDP (III)
Service Area, (ha)	1,145	805	2,179
Population Served (jiwa)	103,300	50,600	329,600
House Connection (unit)	8,647	7,500	31,050

Instalasi Pengolahan Air Limbah (IPAL) - Suwung

Domestic WWTP

Location : Suwung, Desa Pemogan,Denpasar
Luas Area : 10 ha (built 5,5 ha)
Capacity : 51.000 m³/hari

- Aeration Pond
- Sedimentation Pond
- Inflow pumping station
- Sub station/electrical building
- Control building
- Holding tank
- Warehouse
- Generator room

Pipeline

- Main pipeline : Ø 300 mm – 1200 mm (pipa RC, L=41.653m) RC : Reinforced Conrete
- Sekunder/Tersier : Ø 200mm – 250mm (RC Pipe, L=70.693m)
- lateral : Ø 150 mm (pipa PVC)
- force main : Ø 500 mm – 600 mm (Steel; L= 8.495 m)
- Pipe length : 200 Km

Pump Station

- Sanur : capacity 12,4 m³/min (3 unit pompa/1 cadangan)
- Kuta : capacity 23,8 m³/min (3 unit pompa/1cadangan)

Common Problem on DSDP

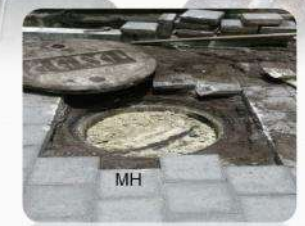
Technical Aspect

- ✓ Plastic and garbage disposed to DSDP pipeline
- ✓ Oil and grease directly disposed to drain (restaurant)
- ✓ Manhole forcefully open during heavy rain
- ✓ Sand in grit chambers (in Kuta and Sanur area)
- ✓ Aging pipeline

Non Technical Aspect

- o Out of date costumer data base
- o High percentage of failed payment by costumer
- o Costumer mindset

Oil and Grease Problem



During heavy rain, people open manhole to let storm water in

Opportunities Challenge of Wastewater O & M Company in Bali and Indonesia

Challenges

- **Inadequate Infrastructure**: Much of the existing infrastructure is poor, outdated, or poorly designed (e.g., malfunctioning septic tanks), making maintenance complex and less efficient.
- **Limited Financial Resources:** Financial constraints, both for the government and low-income households, are a major barrier to building and maintaining sufficient capacity of treatment plants and network connections.
- **Low Public Awareness and Irregular Maintenance:** Many households and businesses lack awareness of the benefits of regular maintenance (e.g., desludging of septic tanks) and proper operation of treatment systems, leading to irregular servicing and system failure.
- **Competition and Market Fragmentation:** The market is highly fragmented with many players, requiring companies to compete effectively on factors like experience, cost, time, and service quality.
- **Regulatory Implementation and Enforcement Issues:** Despite a legal framework, enforcement can be a challenge, with fragmented implementation across different regions and government levels.

Opportunities Challenge of Wastewater O & M Company in Bali and Indonesia

Opportunities

- **Market Needs**; Indonesia is the fourth most populous country in the world, has significant gaps in sanitation. This presents vasts opportunities for providing maintenance and treatment services for municipal, commercial, and industrial clients
- **Rapid Urbanization and Industrialization;** in 2024, estimated 16.4 million tourist has come to visit Bali. combined with 6.4 million of population in Bali. Increased tourism industry are generating more wastewater, driving the demand for professional and sustainable management solutions
- **Stricker environmental regulation**; The government is implementing and strengthening regulations, such as Minister of Environment regulations on quality standards, which obligate businesses and industries to treat their wastewater and comply with specific standards. This creates a mandated market for maintenance and compliance services.
- **Lack of Skilled Providers**: There is a lack of sufficient and skilled sanitation service providers in many areas, offering a competitive advantage to professional and well-equipped maintenance companies.

Before Contract Operational and Maintenance

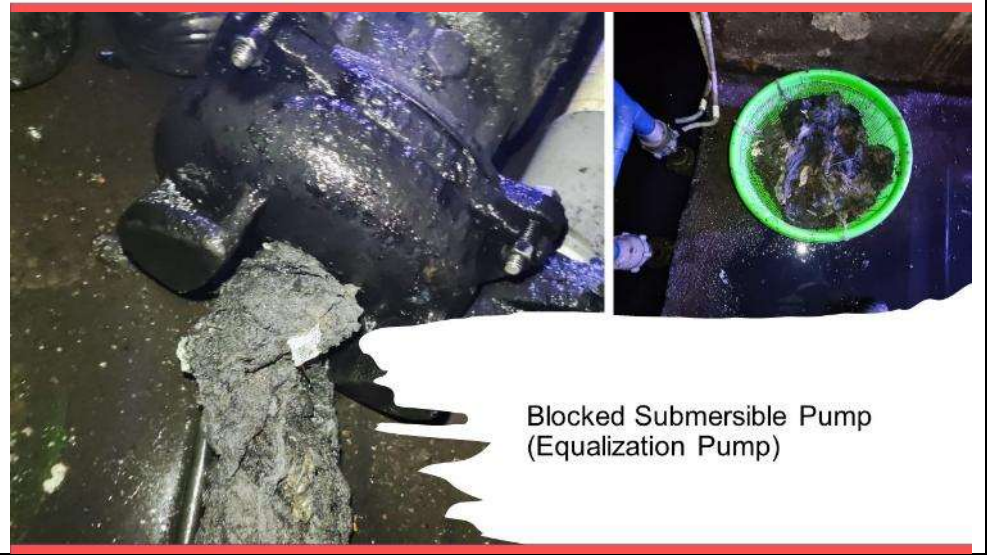
After Contract Operational and Maintenance

Case Hotel A :

1. Garbage, plastic debris on bar screen
2. Blower not working due to overheating
3. Odor from WWTP
4. High BOD, COD ammonia content

Case Hotel B :

1. Flooded Wastewater Treatment Plant due to severe rain combined with effluent pump malfunctions
2. inability of staff to cope with emergency situation



Blocked Submersible Pump (Equalization Pump)

Case Hotel C : Sludge Carry over due to improper Operational & Maintenance

Case D Hotel : Improper grease trap design

Case E Hotel : 1. Outdated wastewater treatment facility
2. Improper design

Case F Hotel : Restoration Project, installation 4 unit YASUNAGA LW 240

Case G Shopping Mall : 1. STP location is difficult for sludge handling and transportation
2. Mechanical malfunction (Blower, Pump)

Case H Hospital : Daiki Johkasou, 80 m^3/d (BJ 80)

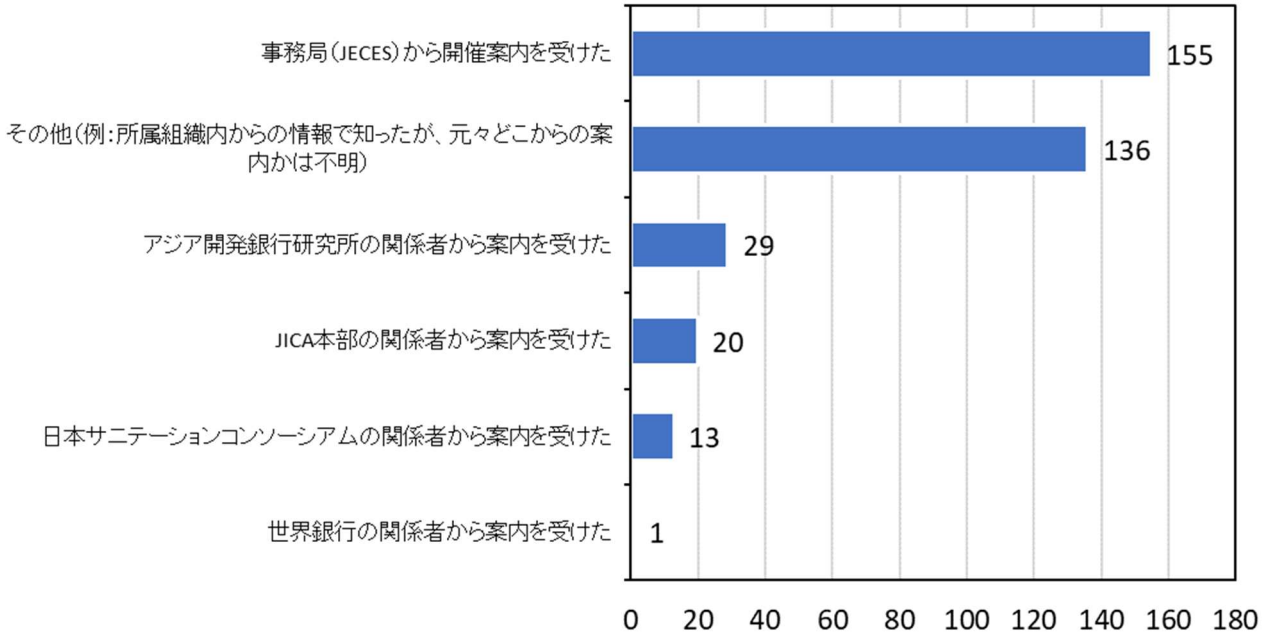
1. Modified by previous O & M company, clarity to 10 cm
2. Complained by community, reported to local environmental agency
3. Restored by Earth Creative, clarity 30 cm+
4. Low BOD, COD, ammonia content

Installation of IoT System in Hotel X

6.1.3. 参加登録時のアンケート調査結果

回答結果

Q1 このワークショップはどのようにご存知になりましたか？



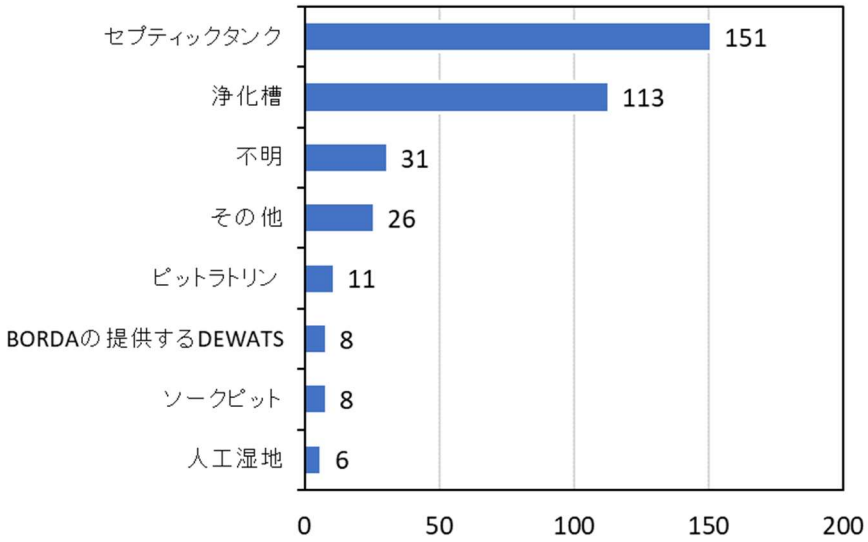
事務局からの開催案内を受けて参加登録をされた方が半数程であった。事務局の人的ネットワークを拡大するとともに、開催案内の拡散に協力いただける国内外の機関を増やしてく取り組みが求められる。

Q2 浄化槽のことはご存知でしたか？

選択肢	回答数
Yes	232
No	122
	354

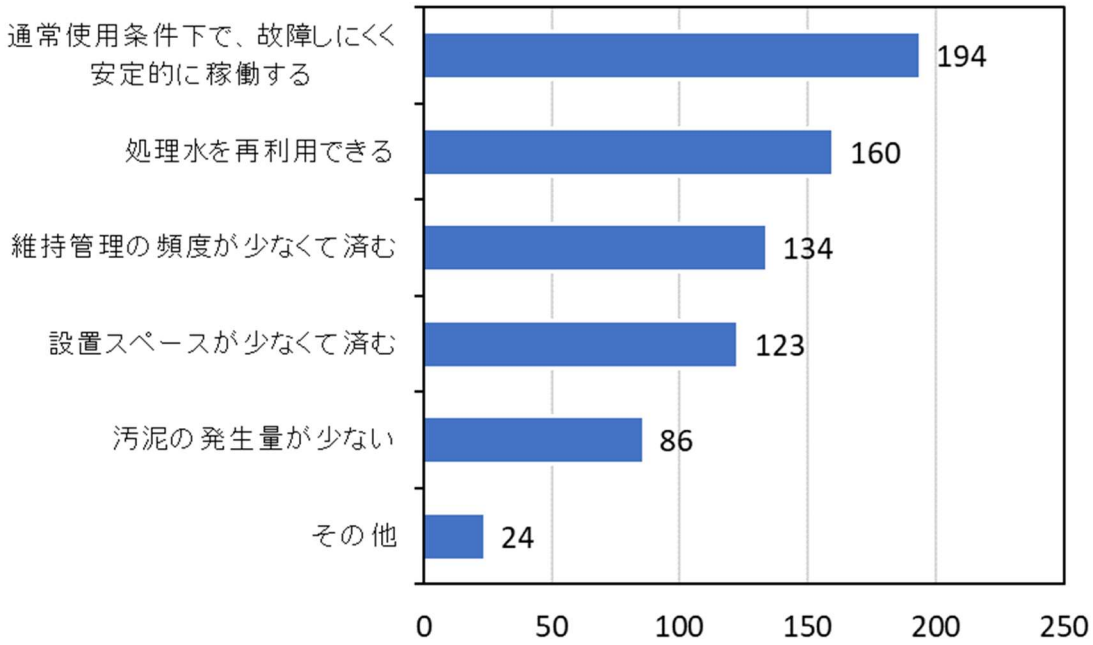
参加登録者のうち、約 3 分の 2 の方が浄化槽を既に認知していたことは前向き捉えるべきだが、約 3 分 1 の方は、浄化槽そのものではなく、今回のワークショップのテーマである「高性能な分散型汚水処理施設の維持管理と人材育成」に関心を寄せていたと思われ、海外でも汚水管理における下水道以外の選択肢である分散型汚水処理施設への期待の高まりの現れと推察される。

Q3 あなたの国で最も普及している分散型汚水処理施設は何ですか？



日本を除く、海外からの参加登録は 247 件であったが、その約 6 割が、セプティックタンクが最も多く普及していると回答している。各国における高性能な分散型汚水処理施設に対する需要の高まりを背景に、今回のワークショップのテーマに関心を持ち参加登録を頂けたものと推察される。

Q4　あなたの国で、もっとも重視される「高性能」な分散型汚水処理施設の条件は何ですか？（複数回答可）

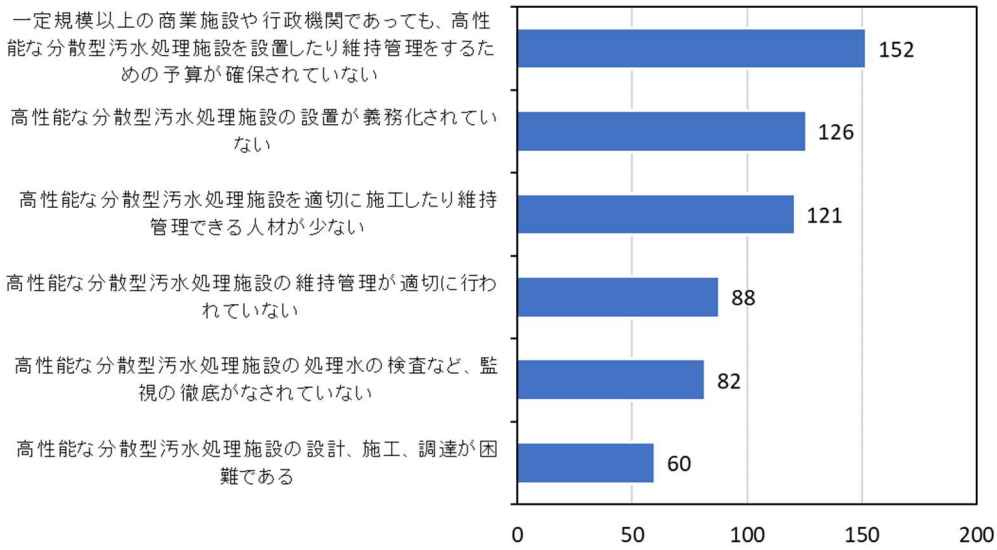


故障せずに安定的に稼働することに対する需要が大きいことが分かる。インドネシア国からの招聘者から事例紹介があったように、既設の分散型汚水処理施設がうまく稼働していないことが多い。適切に維持管理を行えば、浄化槽は安定的に稼働し汚水を処理することが出来る点は、浄化槽のアドバンテージとしてアピールすることが出来るものと考えられる。また、処理水が再利用できることに対する期待も高いことが明らかとなった。しかし、日本では 9 割以上の浄化槽が戸建て住宅に設置されており、流入汚水にし尿が含まれていることからも、その処理水はほとんど再利用されずに水路などへ放流されている。国内外における中大型浄化槽を中心に、その処理水の再利用事例について調査し、留意事項や利点などを整理しておくことは、浄化槽の海外展開を促進するうえで重要であると思われる。

Q5 上記質問で「その他」と回答された場合、それは何ですか？

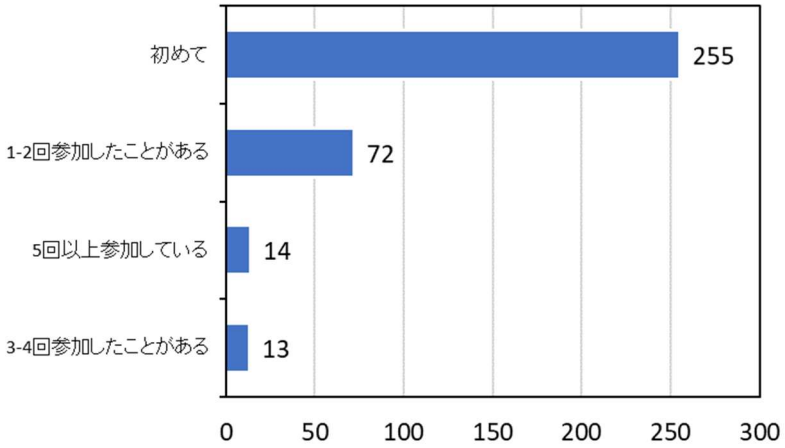
- 地球温暖化に与える影響が少ないこと
- 環境負荷が小さいこと
- 高度な処理能力を持つ
- It must be cheap and user owned（安価でユーザーが所有するもの）
- low cost （低コスト）
- Cost, affordability （コスト、購入可能な価格）
- requires maintenance（メンテナンスが必要であること）
- ある程度の維持管理が（技術者ではなくても）簡単にできる
- It's easy to install (less technical capabilities)（施工が簡単、建設技術能力が低くても可能）
- 建設にそれほど時間がかからない（特に家庭の接続部分） The construction doesn't take very long (especially the part involving household connections).
- 集成式污水处理设备(統合型排水処理装置)
- Treated water（処理水）
- Treated water re-use（処理水の再利用）
- Wastewater treatment process weak in my country and I want to know from this workshop how to maintain the water.　（私の国では排水処理が不十分なので、このワークショップで、どのように維持していくかを知りたいです。）
- TTUF（tertiary treatment ultrafiltration, 三次処理限外ろ過）
- TTUF and modular STP（三次処理限外ろ過とモジューラー型下水処理プラント）
- drainage systems（排水システム）

Q6　あなたの国において、高性能な分散型汚水処理施設を普及させるための課題は何ですか？（複数回答可）



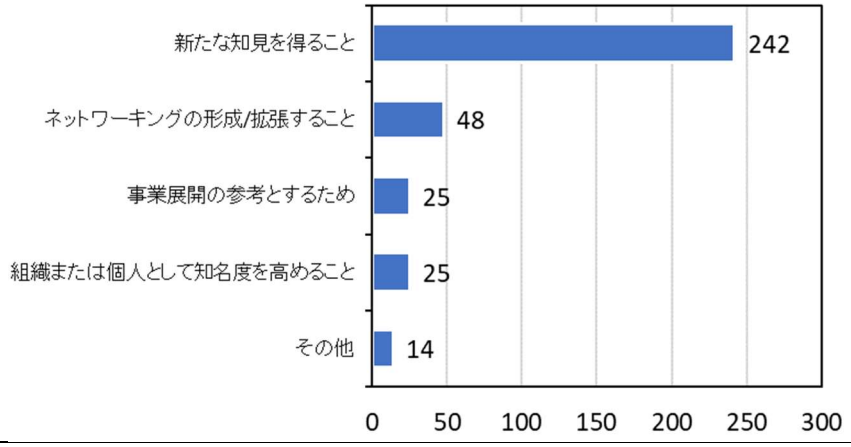
高性能な分散型汚水処理施設を普及させるための課題を尋ねたところ、予算が確保されていない、設置が義務化されていない、維持管理できる人材が少ない、との回答が多かった。セプティックタンクが主流である国や地域においては、直ちに戸建て住宅に小型浄化槽を普及させることは難しいと思われるが、一定規模以上の商業施設であれば、高性能な分散型汚水処理施設の設置費用及び維持管理費用を賄うことがある程度容易であると考えられる。また、高性能な分散型汚水処理施設の設置基数が増えることで維持管理業界が拡大し、関連する人材も増えるものと思われる。

Q7 これまでアジアにおける分散型汚水処理に関するワークショップに参加したことはありますか？

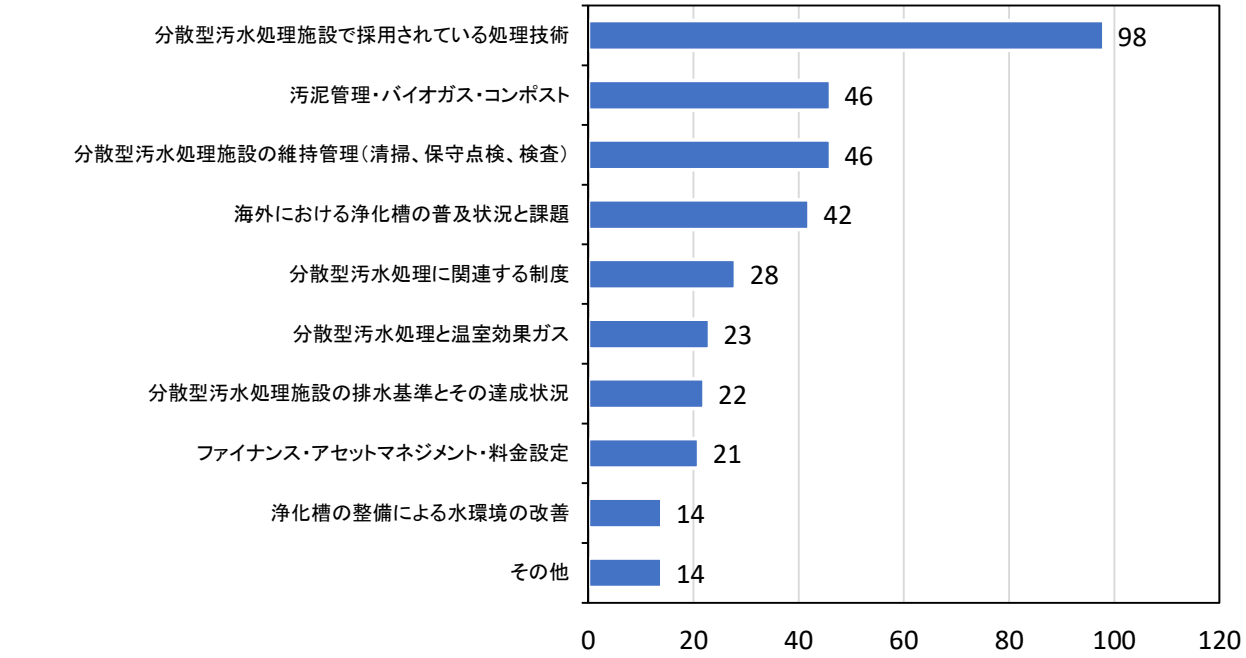


2.6. 節の第 13 回ワークショップの開催成果でも述べたように、第 12 回ワークショップの接続件数が 122 件であったことを踏まえると、一定のリピーターがいたと思われる。他方で、255 件が始めて参加登録を行ったということから、今回のワークショップで設定したテーマに対する関心が高かったものと思われる。

Q8 ワークショップへ参加した主な目的は何ですか？



Q9 もし、第 14 回ワークショップが開催される場合、テーマや話題など何かご要望はありますか？



分散型汚水処理施設で採用されている処理技術について知りたいとの回答が最も多かった。これは、前回のワークショップにおける参加登録アンケートの際と同様の傾向を示している。他国で普及している分散型汚水処理施設を比較し、自国に適した技術を取り入れたいという考えが一部あるものと推察される。

Q10 上記質問で「その他」と回答された場合、それは何ですか？

- I suggest for “ Finance, Asset Management and Pricing” and “ Sludge management, biogas, composting” （「財務、資産管理、価格設定」と「汚泥管理、バイオガス、堆肥化」）
- sludge order control（汚泥の臭気コントロール）
- Decentralized wastewater treatment and greenhouse gases, Sludge management, biogas, composting, The current status and challenge（ 分散型排水処理と温室効果ガス、汚泥管理、バイオガス、堆肥化、現状と課題）
- 法整備（Legal Framework）
- Are decentralized wastewater treatment systems really appropriate in future sustainable ecosystems?（分散型排水処理システムは将来の持続可能な生態系に適しているのか）
- 公共事業政策としての分散型汚水管理の進め方（How to proceed with decentralized wastewater management as a public works policy）
- Nature-based Solution for wastewater treatment technology （排水処理技術のための自然ベースのソリューション）
- Need design knowledge on MBBR (Moving Bed Biofilm Reactor) and to custom large systems. MBBR(流動床式生物膜担体処理法)及び大規模システムのカスタマイズに関する設計知識が必要

6.1.4. ワークショップ開催中に行われた質疑応答

#	質問／Question	回答／Answer [回答者／Respondent]
1.	How do you suggest to engage with Private Sector in promoting more sustainable domestic wastewater treatment? Is there a working example in Japan? (GWSC AIT, Thailand) より持続可能な生活排水処理を促進するために、民間セクターとどのように連携していくべきでしょうか？日本には実例はありますか？ -	[事務局／Secretariat] To collaborate with the private sector, it is believed a law should specifically establish a sustainable collaborative system for desludging, maintenance, and inspection. In Japan, the Johkasou Act stipulates that Johkasou managers (users) are obligated to perform desludging, maintenance, and undergo legal inspection (conducted by third party designated by prefectural governor). This brings demand for maintenance, inspection, and desludging services. Furthermore, all Johkasou in Japan are desludged at least once a year by Johkasou managers, and desludging work is carried out by businesses approved by the mayor of municipalities. Maintenance work is carried out by technicians who have obtained national certification as Johkasou Operator. Businesses wishing to engage in Johkasou maintenance must employ individuals who hold this certification, “Johkasou Operator.” To obtain Johkasou Operator certification, employees must complete a training course held by a government-designated institution or pass a national examination. This ensures a consistent level of skill for those engaged in maintenance and desludging work. The Johkasou Act provides detailed instructions to ensure that this series of maintenance, desludging, and legal inspections are carried out continuously. An English version (tentative) of the Johkasou Act can be downloaded from the following website, so please refer to it. https://www.env.go.jp/recycle/jokaso/en/act.html 民間セクターと連携するには、清掃や保守点検、検査について持続可能な連携のシステムを具体的に法律において定めるべきだと思います。 日本では浄化槽法において、浄化槽管理者（利用者）が、清掃、保守点検を実施し、検査を受検する義務があると明記されています。これにより保守点検や清掃のサービスに対する需要が生じます。 さらに、日本の全ての浄化槽は、浄化槽管理者によって毎年1回以上の清掃が行われますが、清掃は、市長村長の許可を受けた事業者が行います。保守点検に関しては浄化槽管理士という国家資格を取得した技術者が行います。なお、浄化槽の保守点検業を行おうとする事業者は、この浄化槽管理士の資格を有した者を雇用しなければなりません。浄化槽管理士を取得するには、国が指定する機関が実施する講習会を受講するか、浄化槽管理士国家試験に合格する必要があります。これにより保守点検作業及び清掃作業に従事する者の技術レベルが一定に保たれることになります。これら一連の保守点検と清掃、そして法定検査が継続的に実施されるよう、詳細に浄化槽法に依って定められています。浄化槽法の英語版（仮訳）は以下のサイトからダウンロードすることが出来ますのでご参照ください。

#	質問／Question	回答／Answer [回答者／Respondent]
		https://www.env.go.jp/recycle/jokaso/en/act.html
2.	To Dr. Roshan Shrestha, will you research the reason why it didn't work somewhere in the world? Or is it already existed any study papers? ロシャン・シュレスタ博士、なぜ世界中で効果がなかったのか、その理由を研究する予定はありますか？それとも、すでに研究論文は存在するのでしょうか？	[ロシャン氏／Dr. Roshan (WS の中で回答済み／Answered within the workshop)] Please browse @GSGS.network, you will find many papers related to the topic
3.	トレンチについて質問します。ミネソタにおいて、たとえ処理水質がよくても、トレンチが閉塞する可能性があると予測されます。その点、いかがでしょうか？また、閉塞した際にはどのような対策をとられますか？ I have a question about trenches. In Minnesota, even if the treated water quality is good, it is predicted that trenches may become clogged. What do you think about that? Also, what measures will be taken if they become clogged?	[ルクレアー氏／Mr. Chris LeClair（WS 終了後に回答いただいた／Responses received after the workshop）] Because the effluent leaving a septic tank is anaerobic, a thin layer called a “biomat” (about one inch thick) gradually forms at the bottom of the trench. At first glance, this might seem problematic, but it’s actually an essential part of the system’s design. The biomat acts as a natural filter, slowing the infiltration of effluent into the surrounding soil and creating unsaturated flow conditions beneath the trench. These conditions allow aerobic bacteria in the native soil to further treat the effluent. This process depends on a delicate balance between the anaerobic bacteria in the effluent and the aerobic bacteria in the soil. When this balance is maintained, the biomat remains at a beneficial thickness. However, if the system is misused, the balance can be disrupted, causing the biomat to thicken excessively. In severe cases, this can block infiltration entirely, leading to hydraulic failure of the system. セプティックタンクから排出される処理水は嫌気性であるため、トレンチの底には「バイオマット」（厚さ約 2.5cm）と呼ばれる薄い層が徐々に形成されます。一見すると問題に見えるかもしれないが、実際にはシステム設計において不可欠な要素である。バイオマットは天然のフィルターとして機能し、処理水の周囲の土壌への浸透を遅らせ、トレンチの下に不飽和流動状態を作り出す。この状態により、土壌中の好気性細菌が処理水をさらに処理することが可能になる。 このプロセスは、処理水中の嫌気性細菌と土壌中の好気性細菌の微妙なバランスに依存している。このバランスが維持されている間は、バイオマットは適切な厚さが維持される。しかし、システムが誤って使用されると、バランスが崩れ、バイオマットが過度に厚くなる可能性がある。深刻な場合には、浸透が完全に遮断され、システムの水圧機能不全につながる可能性がある。
4.	To Mr. LeClair, thank you for your presentation. I would like to learn the mechanism of monitoring of land application regulated by USEPA 40 CFR part 503 ルクレアー様、ご講演ありがとうございました。米国環境保護庁（USEPA）40 CFR Part 503 で規制	[ルクレアー氏／Mr. Chris LeClair（WS 終了後に回答いただいた／Responses received after the workshop）] A licensed maintainer must keep detailed records of the methods used to provided odor and vector control. The most common method used is to add sodium bicarbonate to the sludge to get the pH to 12 for a minimum of 30 minutes before the septage is land applied to a farm field.

#	質問／Question	回答／Answer [回答者／Respondent]
	されている土地利用のモニタリングの仕組みについてご教示いただければ幸いです。	資格を有する維持管理者は、悪臭及び媒介生物の駆除に使用した方法について詳細な記録を保持する必要がある。最も一般的な方法は、汚泥を農地に散布する前に、汚泥に重曹を加え、pH を 12 にするまで 30 分間以上放置すること。
5.	[Question for Director LeClair] In the application of septage to agricultural land, are there any requirements to test the septage for heavy metal/arsenic content etc.? 農地にセプティックタンクから引き抜いた汚泥を散布する場合、汚泥の重金属やヒ素含有量などを検査する義務はありますか?	[ルクレアー氏／Mr. Chris LeClair（WS の中で回答済み／Answered within the workshop）] There is not. The federal government does require that, lime or calcium carbonate be added to the septage, but that's effort to reduce odors and vectors in the septage, but there's no requirement to test for metals or other pollutants. ありません。連邦政府は、汚泥に石灰または炭酸カルシウムを添加することを義務付けていますが、これは汚泥の悪臭や病原生物を減らすための措置であり、金属やその他の汚染物質の検査は義務付けられていません。
6.	To Mr. Chris LeClair, does your Septic Tank system regulate any prohibited materials? Johkasou has the prohibited materials to prevent excessive microorganisms, wastewater concentration, SS and so on. ルクレアー様、アメリカ合衆国システムには禁止物質の規制はありますか？浄化槽には、過剰な微生物の増殖、汚水の濃度、SS などを防ぐために禁止物質が使用されています。	[ルクレアー氏／Mr. Chris LeClair（WS 終了後に回答いただいた／Responses received after the workshop）] In the state I'm from, Minnesota, the code that regulates subsurface sewage treatment systems allows for the disposal of household chemicals if used as directed. The specific code language says: Footing or roof drainage and chemically treated hot tub and pool water must not be discharged into any part of a system. Products containing hazardous chemicals and hazardous waste must not be discharged to a system other than in normal amounts of household products and cleaners designed for household use. Substances not intended for use in household cleaning, including but not limited to solvents, pesticides, flammables, photo finishing chemicals, paint, and dry-cleaning chemicals must not be discharged to the system. Other unused products or substances, or unused medicines, must not be discharged to the system solely as a method of disposal. Floor drains from garages serving dwellings must not be connected to the system. 私の出身州であるミネソタ州では、地下下水処理システムを規制する規則により、指示通りに使用された場合、家庭用化学薬品の廃棄が認められている。具体的な規則文言は次のとおりです。 「住宅の基礎や屋根からの排水、及び化学処理された温水浴槽やプールの水は、システムのいかなる部分にも排出してはならない。有害化学物質や有害廃棄物を含む製品は、家庭用に設計された家庭用製品や洗剤の通常の量を除き、システムに排出してはならない。溶剤、殺虫剤、可燃物、写真現像用化学薬品、塗料、ドライクリーニング用化学薬品など、家庭用の洗浄用途ではない物質は、システムに排出してはならない。その他の未使用の製品や物質、または未使用の医薬品は、その廃棄手段としてシステムに排出してはならない。住宅に供給されているガレージの床排水は、システムに接続してはならない。」

#	質問／Question	回答／Answer [回答者／Respondent]
7.	いくつか質問があります。 1. For Mr. Roshan Shrestha, PhD You said that in "key challenge", Untrained operators. 40% had no formal training. is it related with the price for training, so they don't want get any training? 1. Roshan Shrestha 博士へ 「主要な課題」の中で、トレーニングを受けていない作業員が 40%もいるとおっしゃっていましたが、これは受講費用の高さと関係があるのでしょうか？そのため、彼らはトレーニングを受けたくないのでしょうか？ 2. For Mr. Christopher W. LeClair about slide "Land Application of Septage". after waiting period, we can do activity but restricted. after waiting period, is contamination will decrease? thank you 2. Christopher W. LeClair 氏へ スライド「土地利用」について、「一定の経過期間後」、汚染は減少するのでしょうか？ありがとうございます。	[ロシャン 氏 Dr. Roshan (WS の中で回答済み／Answered within the workshop)] 1. It is not price, but there is no mechanism and compulsion for such training program, but it is slowing being realized for its need. 1. 価格の問題ではなく、そのようなトレーニングプログラムのための仕組みや強制力がないためだが、その必要性が徐々に認識されつつある。 [ルクレアー氏／Mr. Chris LeClair（WS 終了後に回答いただいた／Responses received after the workshop）] Yes, that is the idea. After the waiting period specified by the U.S. EPA, crops can be grown in accordance with regulations. This requirement is especially critical for crops intended for human consumption. For this reason, in many areas—including the area I live in—septage is most often applied to alfalfa fields, where the waiting period is significantly shorter since the crop is used for animal feed rather than direct human consumption. その通りである。米国環境保護庁（EPA）が定める経過期間が過ぎれば、規制に従って作物が栽培できる。この要件は、特に食用作物にとって重要である。そのため、多くの地域（私が住んでいる地域も含む）では、アルファルファ畑に汚泥を施すことが最も多くなっている。アルファルファ畑では、作物が直接食用ではなく飼料として利用されるため、経過期間が大幅に短縮されている。
8.	How is septic tank sludge and scum typically treated and managed in the United States after extraction? 米国では、セプティックタンク汚泥やスカムは搬出後、一般的にどのように処理され、管理されるのでしょうか?	[ルクレアー氏／Mr. Chris LeClair（WS 終了後に回答いただいた／Responses received after the workshop）] Outside of land application of septage, a maintainer would take the septage removed from a septic tank to a local municipal wastewater treatment facility. セプティックタンク汚泥を土地に散布しない場合は、セプティックタンク管理者がセプティックタンクから除去した汚泥を地元自治体の下水処理施設に運ぶ。
9.	is cost recovery for decentralized sanitation system linked to potable retail water tariff? or, is it a separate stand-alone cost recovery? which method is the most effective. 分散型衛生システムの費用回収は飲料水小売料金と連動していますか？それとも、独立した費用回収です	[ロシャン 氏／Dr. Roshan (WS の中で回答済み／Answered within the workshop)] If the decentralized sanitation system can produce better water quality, there is market for such treated water especially in water scarce cities like Bangalore, Chennai in India.

#	質問／Question	回答／Answer [回答者／Respondent]
	か？ どちらの方法が最も効果的ですか。	分散型衛生システムによってより良い水質を生成できれば、特にインドのバンガロールやチェンナイのような水不足の都市では、そのような処理水の市場が生まれるだろう。
10.	what is the typical CAPEX and OPEX of a small- and large -scale Johkasou decentralized WTP? 小規模及び大規模浄化槽の一般的な CAPEX と OPEX はいくらですか?	[事務局／Secretariat] Please refer" Night Soil Treatment and Decentralized Wastewater Treatment Systems in Japan", which is published by Ministry of the Environment, Gov. of Japan. URL is shown below. https://www.env.go.jp/recycle/jokaso/en/pamph/wastewater_treatment_systems.html In this brochure, it is suggested that in Japan, the annual OPEX of BOD removal type 5 PE Johkasou is around 65,000 JPY including the annual fee for the inspection, electricity, desludging, and maintenance, and CAPEX will be 840 thousand JPY for 5 PE. On the other hand, regarding the large scale Johkasou, CAPEX and OPEX varied widely, and it is difficult to inform a reasonable amount. Thank you for your understanding. 環境省が発行している「日本におけるし尿処理と分散型排水処理システム」を参照されたい。URL は以下の通りである。 https://www.env.go.jp/recycle/jokaso/en/pamph/wastewater_treatment_systems.html このパンフレットでは、日本における BOD 除去型 5PE 浄化槽の年間 OPEX（運用費用）は、年間点検費用、電気代、汚泥引抜費用、メンテナンス費用を含めて約 65,000 円、CAPEX（設備投資）は 5PE で約 840,000 円と見積もられている。一方、大規模浄化槽については、CAPEX と OPEX が大きく変動するため、一概に申し上げることはできない。
11.	How many percent is cost recovery for decentralized water treatment systems. Which Public Private Partnerships (PPP) model is using for decentralized water treatment system? 分散型水処理システムの費用回収率はどのくらいですか？分散型水処理システムにはどのような官民連携（PPP）モデルが採用されていますか？	[ヤンミン氏／Prof. Yang Min (WS の中で回答済み／Answered within the workshop)] Decentralized wastewater treatment systems face significant challenges in cost recovery, especially in rural areas and for ordinary households, making government financial support essential. Outside Japan, very few countries have established legal or institutional frameworks—such as Japan's Johkasou Act—that systematically support rural wastewater treatment. In developing countries, systems can be built on a case-by-case basis, but it is difficult to implement them in a sustainable and institutionalized manner. While installation is more feasible in revenue-generating facilities such as hotels, it remains difficult for private households. As a result, public funding and public–private partnership (PPP) models are critical issues for the wider adoption of decentralized wastewater treatment systems. 分散型汚水処理システムは、特に農村部や一般家庭では費用回収が難しく、政府の財政支援が不可欠である。日本以外では、農村部の排水処理を体系的に支える法律や制度（日本の浄化槽法のようなもの）を持つ国はほとんどない。発展途上国では個別事例としてシステム構築は可能だが、持続的・制

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		度的な展開は困難である。ホテルなど収益を生む施設では導入が進む一方、一般家庭では設置が難しく、官民連携（PPP）や公的資金の活用が重要な課題となっている。
12.	How is the cost for sludge treatment typically charged? Is it collected directly from the residents? 汚泥処理費用は通常どのように請求されますか？住民から直接徴収されるのですか？	[事務局／Secretariat] Yes, in case of Japan, residents pay the charges for desludging services. According to the "FY 2023 Report on the Investigation and Review of the Actual Situation of Statutory Inspection and Maintenance of Johkasou" published by MOE, the average annual charge for desludging service is around 25,000 JPY for 5 PE Johkasou. はい、日本の場合、住民が汚泥引抜きサービスの料金を負担します。環境省が発表した「令和 5 年度 浄化槽の法定検査及び維持管理の実態把握に関する調査検討業務報告書」によると、5 人槽浄化槽の場合、汚泥引抜き（清掃）サービスの年間平均料金は約 25,000 円です。
13.	Is there any decentralized sanitization system in Bangladesh operated or supervised by JECES? or by Johkasou manufacturing company? バングラデシュには、JECES または浄化槽製造会社によって運営または監督されている分散型衛生システムはありますか?	[事務局／Secretariat] As of the end of December 2024, according to the report from Johkasou System Association (JSA), 29 units of small scale Johkasou and 50 units of Middle/Large scale Johkasou have been installed in Bangladesh. Unfortunately, we JECES does not supervise the Johkasou installation project. 浄化槽協会（JSA）の報告によると、2024 年 12 月末現在、バングラデシュでは小型浄化槽 29 基、中大型浄化槽 50 基が設置されています。残念ながら、JECES は浄化槽設置事業の監理を行っておりません。
14.	1. Is the Operation and Maintenance (O&M) of Johkasou systems managed by the government or private sector? 2. If the government is responsible, how is the management structure organized? 3. If the private sector is allowed to handle Johkasou O&M, how do they get permission or license from the authorities? What kind of requirements or standards must they meet? 4. What is the role of local government or municipalities in Johkasou management? 5. Who is mainly responsible for monitoring and inspection of	[ヤンミン氏／Prof. Yang Min (WS の中で回答済み／Answered within the workshop)] The government covers the operation and maintenance (O&M) costs for 15 years. Therefore, the companies receive both the capital cost and the O&M payments guaranteed for a 15-year period. They are responsible for operating the facility and supplying treated water, while receiving stable payments over those 15 years. This can be described as a hybrid model. The total project cost—both capital expenditure and 15 years of operation costs—is calculated and structured in a way that provides financial motivation for the companies. There is a significant gap in the performance of small-scale wastewater treatment plants, and many of them are not functioning properly. Because of this situation, companies are motivated to participate in this model, even though the projects are small in scale. We have implemented many projects and faced numerous challenges. However, we have not yet found an effective solution; in fact, only a very limited number of small-scale systems operate successfully. Therefore, the objective is to demonstrate that a workable model can exist at a very small scale while still delivering high-quality public service

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	Johkasou systems after installation? 1. 浄化槽の運転・維持管理(O&M)は、国が管理していますか、それとも民間が管理していますか？ 2. 国が管理している場合、管理体制はどのようになっていますか？ 3. 民間が浄化槽の O&M を行うことが許可されている場合、当局から許可や免許をどのように取得しますか？どのような要件や基準を満たす必要がありますか？ 4. 浄化槽管理における地方自治体の役割は何ですか？ 5. 浄化槽設置後のモニタリングや検査は、主に誰が担当しますか？	supported by the government. That is the main motivation behind this approach. 政府は 15 年間の運営・維持管理（O&M）費用を負担します。そのため、企業は資本コストと 15 年間の O&M 費用の両方を保証された形で受け取ります。企業は施設の運営と処理水の供給に責任を持ちながら、15 年間安定した支払いを受けます。これはハイブリッドモデルと言えるでしょう。資本支出と 15 年間の運営費用を合わせた総事業費は、企業にとって経済的に魅力的な形で算出・構成されています。小規模下水処理場の性能には大きな格差があり、多くの施設が適切に機能していません。このような状況から、企業はプロジェクト規模が小さくても、このモデルに参加する意欲を持っています。私たちは多くのプロジェクトを実施し、多くの課題に直面してきました。しかし、まだ効果的な解決策は見つかっていません。実際、小規模システムで成功しているものはごくわずかです。したがって、この研究の目的は、政府の支援を受けながら、非常に小規模でも実行可能なモデルを構築し、質の高い公共サービスを提供できることを実証することです。それがこのアプローチの背後にある主な動機です。
15.	The web seminar is very good. When private companies are permitted to engage in O&M activities, who is responsible for issuing the business license or authorization? Is the government solely responsible for carrying out these operations? If private companies are allowed to operate, does the government provide any financial support to them? Will all of the discussion materials from the seminar be shared afterwards? Myint Wai (Myanmar) ウェブセミナーは大変有益でした。民間企業が O&M 活動を行うことが許可された場合、事業許可証または認可証の発行責任は誰が負うのでしょうか？これらの事業の実施責任は政府のみにあるのでしょうか？民間企業が事業を行うことが許可された場合、政府は財政支援を行うのでしょうか？セミナーの資料は後日すべて共有されるのでしょうか？ ミャン・ワイ（ミャンマー）	[事務局／Secretariat] Thank you very much. In Japan, the prefectural government manages the registration of operation & maintenance vendors, and the mayor of the municipality issues permission to desludging vendors. The company operates independently and does not receive financial support from the government. The presentation materials for this seminar are available for free download on the following website: https://www.jeces.or.jp/en/pages/431/ どうもありがとうございます。日本の場合は、都道府県が保守点検会社の登録を管理しており、市町村長が清掃会社に許可を出しています。会社が独自に経営をしており、政府が財政支援することはありません。 なお、本セミナーの発表資料は以下のサイトに掲載されており自由にダウンロードいただけます。 https://www.jeces.or.jp/en/pages/431/
16.	Can we get a recording of this Zoom meeting? It would be very helpful. この Zoom 会議の録画を入手できますか？大変助かります。	[事務局／Secretariat] Sorry, we do not provide recording data. 申し訳ありませんが録画の配信は行っておりません。

6.1.5. パネルディスカッションセッションにおける発言要旨

発言者		発言要旨
1.	フラマン氏	河村氏は、埼玉大学大学院の元教授で、厚生労働省の研究機関や埼玉県環境科学国際センターの所長を歴任した経歴を持つ。本セッションでは、第 1 テーマ「分散型汚水処理施設の維持管理を担う人材育成はどのように実施されるべきか」を河村氏が、第 2 テーマ「維持管理ビジネスを魅力的な市場にするためのポイントは何か」をフラマンが担当する。
2.	河村氏	本ワークショップは、アジアにおける分散型水処理をテーマとし、サニテーションバリューチェーンの各要素のうち、昨年は分散型汚水処理施設の性能評価、本年は高性能施設の維持管理と人材育成に焦点を当てて実施された。 各発表を振り返ると、日本の浄化槽法を基礎とした制度紹介では、設置から運用、維持管理、清掃、法定検査までの流れと、それに関わる事業者や技術者の役割が示され、特に維持管理と人材の資格制度の重要性が強調された。各国事例からは、維持管理の未徹底や人材不足、利用者の理解不足といった課題が指摘され、日本や中国などでは研修制度、資格取得支援、段階的な育成、ビジネスとしての成立条件などが紹介された。 維持管理を義務化する法制度、資格者制度、事業者登録制度、浄化槽台帳の整備が、技術者確保と適切な運営、迅速な対応に有効であるといえる。本パネルディスカッションでは、①維持管理を担う人材をどのように育成するか、②維持管理を魅力あるビジネスとして成立させるための条件、の 2 点を主要テーマとして議論したい。 先ずは環境省浄化槽推進室の中山係長にお尋ねする。日本では人口が減少し高齢化社会が進行しており、浄化槽の維持管理を担う人材の確保が難しくなってきているとの発表があった。こういう問題に対して国の方では何か検討されているか。
3.	中山係長	人口減少社会における維持管理分野の人材確保については、現場レベルではすでに人材確保の困難さが顕在化しており、今後、維持管理の実施率が十分に向上しないのではないかという危機感が省内で共有されている。現時点では本格的な事業化には至っていないものの、対策案の一つとして、基調講演でも紹介したように、浄化槽台帳の整備と、その報告作業の電子化による業務効率化を進めることで、人材不足への対応につなげていきたいと考えられている。
4.	河村氏	ルクレアー氏へお尋ねする。維持管理とか、あるいは維持管理技術者の育成ということについて、日本の浄化槽法のような法律的なルールがあるかどうかということと、実際の維持管理は自治体レベルで行っているのか、あるいは民間事業者が行っているのか。
5.	ルクレアー氏	アメリカ合衆国では、連邦レベルで規制されているわけではなく、州ごとに規制されている。ミネソタ州を例に挙げると、ミネソタ州では、メンテナンス担当者、ポンプ担当者、あるいは、いわゆる「汚泥除去」を行う人は、作業を行う前に訓練と資格取得を受けることが義務付けられている。人材育成の実務について、ミネソタ州では地元のミネソタ大学が行っており、トレーニングを実施し、そのトレーニングの後に試験がある。そして、試験に合格すると、州から免許が与えられる。つまり、州最大の大学とミネソタ州との共同事業となっている。
6.	河村氏	中国の農村排水処理モデル事業について、人材育成とは別の観点から、排水処理システムに関する特徴的な取り組みや、施設の選定条件などの具体的な工夫点があるか。中国では現時点において、日本のように法令や地方規定に基づく厳格な資格制度が整備されているわけではない、と理解して良いか。
7.	ヤン氏	中国では、国全体で統一された人材育成制度を導入する段階にはまだ至っていないものの、地域や市町村レベルでさまざまな試みが行われている。多くは講義形式の研修が中心だが、一部では現地実習や実際の課題に対応させる実践的な訓練も実施されている。現在は、民間企業と連携し、講義と現場研修を組み合わせた人材育成を試行しているが、これを制度的な仕組みに発展させることが今後の課題である。
8.	河村氏	アメリカ合衆国のミネソタ州で大学が関与しているということであったが、インドの Skill University でも研修を行っているということであった。人材育成に関し、インドの場合、大学の関与は大きいのか。
9.	カズミ氏	現在、大学や政府、JICA が若手・中堅技術者向けの研修を実施しているが、オペレーター向けの正式な認証プログラムは存在していない。現状は、技術者向けに 5 日程

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		度の技術研修（小規模・大規模浄化槽、新技術の導入や運転・維持管理に関する基礎知識の習得など）が中心で、認証取得は含まれていない。 今後の提案としては、日本の協力を得て、民間企業や大学教授の支援のもと、13～14 日間の実践的研修を提供するトレーニングセンターを設立し、講義と現場訓練を組み合わせた認証プログラムを整備することが挙げられる。また、研修内容には電子・機械設備の操作や倫理教育も含めることが想定されており、州ごとに大学や技術系カレッジ、Skill University を活用した分散型の研修センターの設置も検討されている。現状では民間企業が独自に研修を行っており、これを公式な認証制度に発展させる必要がある。
10.	河村氏	顧客の理解が重要だということだが、浄化槽が設置されている住宅団地で、市民の方に維持管理の重要性を何かアピールしたか。
11.	田原氏	我々が JICA の事業を実施していた際、住宅街で住民説明会を開催した。そこで、浄化槽には油を入れると処理ができないこと、あるいは、決まった人数以上で使うと処理ができなくなる、というような、浄化槽の使用準則について住民説明会を開き説明した。説明会参加者の中には、浄化槽の使い方について初めて話を聞いた方もおり、浄化槽メーカーには、せっかく良い製品を作っているので、その使い方や維持管理方法まで丁寧に説明してほしかった。また、星電設ベトナム社では、若手スタッフ 6 名が在籍しており、社長のソン氏自身が指導を行いながら維持管理について教育を実施している。
12.	河村氏	インドネシアのリバイ氏にお尋ねする。発表の中で、様々なトラブルに対処した事例の紹介があった。分散型汚水処理施設のオーナーからリバイ氏の会社に、トラブルを解決してほしいという依頼があるのか。
13.	リバイ氏	インドネシアの分散型汚水処理施設における事故に関して、所有者との契約上の責任の所在が問題になることがある。たとえば、雨水が直接処理施設に流れ込む危険性について、事前に所有者側に注意喚起をし、規制上も雨水は処理施設に直接放流してはならず、分離された排水システムが必要であることが示されているにもかかわらず事故が発生することもある。さらに、施設の維持管理は通常、日中（8:00～16:00）に行われているが、深夜に事故が発生することもある。
14.	河村氏	質問が無いようであれば次のトピックスに移りたい。
15.	フラマン氏	次の議題は、「維持管理ビジネスを魅力的な市場にするためのポイント」である。維持管理をビジネスとして考える前に、多くの国ではまだ定期的な維持管理の制度自体が整っていない現状がある。そこで、浄化槽などの分散型汚水処理施設の定期的な維持管理システムを構築する上での課題について、田原氏、ソン氏、カズミ教授に先ず質問したい。具体的には、維持管理が十分に行われていない浄化槽の状況を踏まえ、どのような課題があり、どのように対処すべきかを議論したい。
16.	カズミ氏	インドのガンガ浄化プログラム（Namami Gange Program）の例から、運営と維持管理（O&M）の資金確保は重要であるといえる。このプログラムでは、政府が 15 年間の O&M 資金を提供しており、これにより施設の維持管理が確実に行われる仕組みになっている。一方で、民間施設や工場では、規制当局（Pollution Control Board）が監督しており、違反があればペナルティを科すことで遵守を促すことができる。しかし、自治体の管理下にある下水処理施設の場合、政府自身が管理責任者であるため、違反や不備があっても個人を罰することが難しく、責任の所在が不明確になりやすいという課題がある。多くのインド国内の州において、通常の支援スキームでは、O&M 資金が 5 年間しか提供されない。このため、その後の維持管理が問題になることが多い。その点、ガンガプログラムの 15 年間の資金提供と厳格なルールは、長期的な維持管理の実施に有効である。
17.	田原氏	ベトナムにおける浄化槽の導入では、従来使用されてきたセプティックタンクとの違いを理解してもらうことが重要。浄化槽は年 1～2 回の清掃や、定期的なメンテナンスが必要であり、その重要性を利用者に周知する必要がある。また、土地が狭く建物の基礎の下に設置されることが多いため、マンホール蓋の上をタイルで覆うなどメンテナンスが困難な状況が生じやすい。こうした文化や習慣にも対応していく必要がある。維持管理の推奨と並行して、利用者の意識改革や啓発活動が不可欠である。一方、住民への啓発だけではなく、メンテナンスのしやすさを考慮した設置基準、建築基準も導入される必要があり、これは法律など規制が必要である。

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18.	フラマン氏	ここで強調したいのは、規制が不十分なケースがあるということ。標準化が必要である。例えばベトナムでは、多くの浄化槽や生活排水処理施設が家の地下に設置されている。浄化槽にアクセスするには床を壊さなければならず、清掃や保守点検に時間を要する。アクセスのしやすさを踏まえて標準化する必要がある。 次の話題では、分散型汚水処理施設のモニタリングについて尋ねたい。日本では、都道府県が設置する第三者機関による法定検査がある。発表で研修について紹介していたヤン ミン先生、また、ルクレアー氏には、メンテナンスが適切に行われていることをどのように確認するか、第三者機関によるモニタリングの必要性について伺いたい。
19.	ヤン氏	中国では、地域ごとに排水基準が異なり、以前は各省が独自の基準を設けていた。しかし、2018 年に中央政府の関連省庁（建設省、環境省など）が協力して通知を出し、各地方自治体は地域環境や施設の処理能力に応じて排水基準を設定できることになった。具体的には、処理能力が 1 日あたり 500 ㎥以下の小規模施設では比較的緩やかな窒素・リンの排出規制となるが、500 ㎥を超える施設は都市排水処理基準に準拠する必要がある、というように規模に応じた管理が行われている。 排水施設の処理水のモニタリングは基本的に地方の環境監視機関が行っている。第三者機関ではなく地方環境機関に所属する組織が担当する。施設所有者、維持管理会社もサンプル採取や分析を行い、基準を満たしているか確認する必要がある。しかし、家庭レベルの小規模施設では全てのサンプルを取るのは困難。大規模施設（1 日 500 ㎥）では、敷地内に 1～2 か所の監視設備を設置し、COD やアンモニア濃度などを常時監視する体制が整備されているなど、管理体制は急速に発展している。
20.	ルクレアー氏	アメリカにおける分散型汚水処理施設やオンサイト排水処理システムの維持管理は、車のオイル交換に例えられる。車の場合、オイル交換後、フロントガラスに次回交換時期のステッカーが貼られ、定期的なリマインダーとなる。しかし、分散型汚水処理施設ではそのような恒常的な通知がなく、住民にいつメンテナンスが必要かを知らせる仕組みがない。そこでアメリカ合衆国の州や地方自治体は創意工夫をしている。たとえば、浄化槽のメンテナンス事業者は、ポンプ作業や点検を行うたびにスマートフォンで報告書を提出し、所有者のメールアドレスを登録する。もし登録された所有者がまだ同じ家に住んでいれば、例えば 3 年ごとの定期メンテナンスが近づくと、自動的にメールでリマインドされる。これにより、住民がメンテナンスを忘れずに行えるよう工夫している。
21.	フラマン氏	日本では、浄化槽の維持管理制度により、事業者が所有者に定期的な保守点検や清掃の実施時期を通知している。しかし、すべての家庭で 100%実施されているわけではない。日本で維持管理の実施率を向上させるために残された課題は何か。
22.	中山係長	ご指摘の通り、日本の浄化槽法に基づき、清掃や保守点検などの維持管理は定められているものの、実施率はまだ 100%には達していない。環境省では、浄化槽台帳などを活用して、事業者や自治体からの情報を集約化して把握し、浄化槽の現状や維持管理の実施状況を確認する仕組みを整備しているところ。その上で、自治体が適切に助言・指導を行う流れを構築することが、維持管理体制の強化においても重要と考える。
23.	フラマン氏	一部の自治体では浄化槽管理者が維持管理を実施しやすくするため、補助金制度など経済的インセンティブを導入し、定期的なメンテナンスを促進している。 定期的な維持管理を確実に行うためには、そもそも適切な設計・施工が不可欠である。既に設置されたシステムは改善や変更が難しいため、設計段階で適切な施設を整備することが、運用・維持管理の成功につながる。リバイ氏に尋ねる。自身の経験から何か助言はあるか。
24.	リバイ氏	インドネシア・バリ島の事例では、既存の浄化槽施設が適切に機能していないケースが多く、まず設備を正しく補修、再構築することが最初の課題となる。具体的には、送気装置や沈殿槽の調整や交換、担体の入れ替え、シーディング剤の投入などを行い、約 2 か月の順養期間を経て、やっと維持管理の契約の協議を行うことになる。維持管理契約を結ぶ際には、オーナー側の知識不足や競合企業の存在が問題になることもあるが、適切な補修と信頼関係の構築によって契約を獲得できるケースがある。現在、バリ島の病院などでも同様の維持管理契約が進んでいるところ。
25.	フラマン氏	終了時間が迫っているため、あと一人に質問したい。広く市民に衛生サービスにお金

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		を払う必要がある理由を理解してもらう必要があり、また、政策決定者の理解も得る必要がある。それを達成するには何が必要か。
26.	ルクレアー氏	それを理解できる人は宝くじを買うべきである。まさに、そこが課題である。
27.	フラマン氏	同じ意見である。それでは河村氏にお返しする。
28.	河村氏	今日のディスカッションをまとめるのは非常に難しいため、別な情報を一つ提供したい。こちらにいるパネリストのご出身の 6 つの国の人口を合わせると世界人口の何パーセントになると思うか。先ほど計算したところ 46%であった。今日の議論や情報を何らかの形で自国に持ち帰っていただき、何らかの形で利用していただくことが、この本日のワークショップの一番大きな成果になるのではないかと思う。

6.1.6. ワークショップ終了時の参加者からのフィードバック

※任意回答。53 件の回答（匿名）を得た

Q1　第 13 回ワークショップの内容と構成はご期待に沿うものでしたか？ 1-10 で評価してください

平均：7.98

Q2　最も興味を持った発表はどれでしたか？

途上国における分散型汚水処理施設の維持管理の状況	12
インドネシアにおける高性能な分散型汚水処理施設の維持管理に関する課題	10
"アメリカ合衆国における分散型汚水処理施設の維持管理の内容と資格者制度と人材育成	9
ベトナムの住宅街に設置された浄化槽の維持管理と技術者の育成	9
インドにおける高性能な分散型汚水処理施設の維持管理の内容、そして人材育成	8
【基調講演】日本の浄化槽の維持管理と資格者制度	4
中国における高性能な分散型汚水処理施設の維持管理の内容と人材育成	1

Q3　ワークショップや発表に対してコメント、質問、提案などありますか？

1. 浄化槽を国際的に展開する際に、法整備や維持管理についてどの国でもが大きな課題となっていることが良く分かった。
2. 大変有意義なお話を多数ありがとうございました。事務局のご尽力に感謝いたします。一部聴講できない箇所もありましたので、投影されていた資料だけでも公開頂ければありがたいです。
3. no, the presentation over my expectation
4. A perfect workshop.
5. 維持管理に財政支援を実施している日本の市町村の事例発表を聞きたい。
6. The workshop was very informative and well-structured. I especially appreciated the presentations about O&M systems in Asian countries. It would be great if future workshops could include more case studies or technical demonstrations related to small-scale wastewater treatment systems
7. Great
8. もう少し長く話を聞きたい
9. Keynotes seemed very fast, was hard to keep up. Other talks were easier to follow. Translation was generally good-
10. Thanks for the brainstorming workshop on Decentralized wastewater treatment systems in different region. I want to know more about the Decentralized wastewater treatment systems, especially operation in Bangladesh. I have one suggestion for the future workshop, please include a technical part or visit any treatment plant in Japan, and make it free for students who are interested."
11. Very useful for me

12. Need to attend in this interesting global event in person. Thank you very much.
13. I have heard about Johkasou from 7 years ago through some factories in a special economic zone. From this workshop I get an opportunity to understand the whole scope. Thank you very much for a resourceful presentations and discussions.
14. 各国の汚泥引き抜き業者の収益はどのようにして得ているのかを知りたい。
15. それぞれの国に適した（カスタマイズ、ローカライズ）された、最適化（ローコスト、低 GHG）の取り組みが必須と感じました。　民間からのプレゼンターに、特に敬意を払いたく。
16. I would like to suggestions that there is the one easily install and O & M system, you should present use for in developing countries. So, we can understand and apply in our Countries.
17. 非常に有意義なワークショップでした。ありがとうございます。ただ、ウェビナーへのアクセスがスムーズにできませんでしたので、次回は改善して頂ければ幸いです。
18. 半日のワークショップでしたが、自身の業務と並行して聴講していたため、休憩時間などのおおよその目安があると参加しやすいと感じました。維持管理や設計基準といった、浄化槽やその他の分散型排水処理設備に関する課題は、長年にわたり共通しており、改善が難しい現状があるように思いました。日本の浄化槽をそのまま展開するのではなくシステムの強化の一環として、技術と制度構築支援を一体として行う重要性を感じました。また、浄化槽は生活排水対策として開発されたことは理解していますが、産業廃水対策など他の分野にも応用できる可能性/応用されている事例があるのかについても知りたいと感じました。
19. The workshops and presentations were very informative, especially the discussions on different wastewater treatment plants from various countries. Having an interpreter also made the sessions easier to understand and more inclusive. Excellent organization overall.

6.1.7. 参加登録時及びワークショップ終了時に受け付けた質問に対する回答

1) 参加登録時

#	Affiliation	Position	Question	Answer / Comment from Secretariat
1.	National Water Supply and Drainage Board 国家下水道公社	Area Engineer (Wastewater Treatment Plant and Network) エリアエンジニア（下水処理場及びネットワーク担当）	practically lesson more valuable 実践的実例がより有益です。	Thank you for your feedback. We understand that you would like to know the practical examples of introducing Johkasou overseas. We will refer your voice when setting themes for next year and beyond. ご意見ありがとうございます。浄化槽の海外導入に関し実践的な事例紹介を希望されていると理解しました。次年度以降のテーマ設定の際に参考にさせていただきます。
2.	Osaka City 大阪市	Counselor 参事	As sewerage systems become more widespread, they may include areas where decentralized treatment facilities have already been established. What regulations are introduced in Japan and other countries to avoid criticism of inefficiency and duplicated investment?	In Japan, in 1991, the "Notice on Coordination between Johkasou Installation and Development Projects and Sewerage Projects (Notice No. 32 of the Director of the Water Supply and Environment Department, Environmental Sanitation Bureau, Ministry of Health and Welfare, dated June 12, 1991)" was issued, which stated that "In designated areas pursuant to Article 3, Paragraph 2 of the Law Concerning Special Measures for the Preservation of Lake and Pond Water Quality and in priority areas for domestic wastewater measures pursuant to Article 14, Paragraph 6, Paragraph 1 of the Water Pollution Control Law, where the promotion of domestic wastewater countermeasures is highly urgent,

#	Affiliation	Position	Question	Answer / Comment from Secretariat
			下水道が普及していくと、先行して整備した分散型処理施設とそのエリアを含む場合も考えられる。非効率や二重投資の指摘を回避するため、日本や諸外国ではどのような規制があるのか？	Johkasou Installation and Development Projects can be implemented in areas where sewerage construction is not expected for 7 years or more, even if they are within sewerage project planning areas." However, some have pointed out that once the sewer system is installed, people will have to connect to the sewer system without using a Johkasou, which would amount to double investment. On the other hand, even in areas where it will take long time to install a sewer system, installing a Johkasou brought the advantage of allowing people to live without discharging untreated domestic wastewater. Furthermore, in January 2026, the Ministry of Land, Infrastructure, Transport and Tourism published the second summary of the "Committee on the Basic Structure of Water Supply and Sewerage Policy," which stated its policy that "In order to smoothly proceed with the transition to a decentralized system in areas already equipped with sewerage systems, the government should organize issues, including changes to various plans and the use of small-scale treatment methods, and clarify the procedures for reducing or abolishing sewerage areas." Furthermore, in January 2026, the Ministry of Land, Infrastructure, Transport and Tourism published the second summary of the "Committee on the Basic Structure of Water Supply and Sewerage Policy," which stated its policy that "In order to smoothly proceed with the transition to a decentralized system in areas already equipped with sewerage systems, the central government should organize issues, including changes to various plans and the use of small-scale treatment methods, and clarify the procedures for reducing or abolishing sewerage areas." The abolition of existing sewerage facilities and conversion to Johkasou has also been criticized as a double investment, however on the other hand, developing appropriate infrastructure to suit a society with a declining population is important from the perspective of the sustainability of municipal finances. It's believed that the cost-effectiveness of wastewater treatment infrastructure should continue to be investigated from various perspectives. 日本では、1991 年に「合併処理浄化槽設置整備事業と下水道事業との調整について（平成三年六月一二日付け衛浄第三二号厚生省生活衛生局水道環境部長通知）」が示されており、「生活排水対策を推進する緊急性の高い地域として、湖沼水質保全特別措置法第三条第二項に基づく指定地域及び水質汚濁防止法第一四条六第一項に基づく生活排

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				水対策重点地域においては、下水道事業計画区域内であっても、原則として7年以上下水道の整備が見込まれない区域において合併処理浄化槽設置整備事業を実施できる」とされました。しかし、下水道が整備された後は下水道に接続しなければならないことから、二重投資になってしまうのでは、との指摘もあります。一方で、下水道整備に時間がかかる地域であっても、浄化槽を設置することで生活排水を未処理放流することなく生活することができるというメリットがもたらされました。 更に、令和8年1月に国土交通省は「上下水道政策の基本的なあり方検討会」の第2次とりまとめを公表し、「下水道の既整備区域における分散型システムへの転換を円滑に進めるため、国は、各種計画の変更や小規模処理手法の活用を含む課題等を整理するとともに、下水道区域を縮小・廃止する際の手続きを明確にすべき」との方針を示しました。既設の下水道施設を廃止し合併処理浄化槽に転換することについても、二重投資との批判がありますが、一方で、人口減少社会に合わせて適切なインフラを整備していくことは、市町村財政の持続可能性の観点から重要です。今後も、汚水処理インフラの費用対効果の「効果」について、様々な観点から検証されるべきだと思います。
3.	Shiga Prefecture Living Environment Business Association (Public Interest Incorporated Association) 公益社団法人滋賀県生活環境事業協会	Chairman 会長	Could you please tell us about the current status of decentralized wastewater treatment facilities in developing countries, as well as the legal systems and regulations related to these facilities? 開発途上国における分散型汚水処理施設の普及状況、及び施設に係る法制度、規制等はどのようになっているのか、ご教示をお願いします。	The status of overseas Johkasou installation is published annually on the Ministry of the Environment's Johkasou Website as a survey result by the Johkasou System Association, and can be browsed at the following website (Japanese only): (https://www.env.go.jp/recycle/jokaso/manual/report/jisedai/) Details on the current status of decentralized wastewater treatment facilities in developing countries, as well as the legal systems and regulations related to these facilities, are provided in the "WEPA Asia Water Environment Management Outlook 2024," a publication of the Ministry of the Environment's Water Environment Partnership in Asia (WEPA) project, which can be accessed and browsed at the following website: <Japanese version> /https://www.iges.or.jp/en/publication_documents/pub/policyreport/en/14293/WEPA_Outlook2024_JP_Web-a.pdf <English version> /https://wepa-db.net/wp-content/uploads/2025/05/WEPA_Outlook2024_EN_Web-a.pdf

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				浄化槽の海外普及状況については、環境省の浄化槽サイトにて浄化槽システム協会の調査結果として毎年公表されており、下記の HP から確認できます（日本語のみ）。 （https://www.env.go.jp/recycle/jokaso/manual/report/jisedai/） 開発途上国における分散型汚水処理施設の普及状況、及び施設に係る法制度、規制等については、環境省のアジア水環境パートナーシップ（WEPA）事業の成果物「WEPA アジア水環境管理アウトルック 2024」に詳細な記載があり、下記の HP から入手し確認することができます。 ＜日本語版＞ /https://www.iges.or.jp/en/publication_documents/pub/policyreport/en/14293/WEPA_Outlook2024_JP_Web-a.pdf ＜英語版＞ /https://wepa-db.net/wp-content/uploads/2025/05/WEPA_Outlook2024_EN_Web-a.pdf
4.	Asian Development Bank アジア開発銀行	Social Field Facilitator for Shrimp Aquaculture Project エビ養殖プロジェクトのソーシャルフィールドファシリテーター	I am very interested in learning more about the practical applications of Johkasou systems in rural and coastal communities, especially how they can be integrated with community-based wastewater management and aquaculture activities. 私は、農村や沿岸のコミュニティにおける浄化槽システムの実際的な応用、特にコミュニティベースの排水管理や養殖活動とどのように統合できるかについて、さらに学ぶことに非常に興味を持っています。	There are also Johkasou suitable for agricultural and fishing communities (called Rural Sewerage system in Japan). However, unfortunately, we are not aware of any cases overseas where Johkasou have been used in conjunction with domestic wastewater treatment to treat aquaculture wastewater. However, as long as the influent volume and quality are within the design range of the Johkasou, it will be possible to treat the wastewater appropriately. 農業集落や漁業集落に対応した浄化槽もあります。しかしながら、申し訳ありませんが、海外における、水産養殖業排水と生活排水を浄化槽で併せて処理する事例を把握しておりません。しかし、流入水量と流入水質が浄化槽の設計値の範囲内であれば、適切に処理することは可能だと思います。
5.	Environmental Conservation Department, Myanmar	Assistant Director 次長	I would like to know that which method is suitable for fish meal production factories to reduce BOD and COD from	Basically, Johkasou is designed to treat the domestic wastewater (black water and gray water), but not for treating the industrial wastewater. However, depends on the condition of influent (C/N/P ratio, waster volume, BOD

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	ミャンマー環境保全局		discharged water in Asian countries. アジア諸国の魚粉製造工場の排水から BOD と COD を削減するには、どの方法が適しているかを知りたいです。	concentration, etc.,), Johkasou is able to accept the wastewater. 浄化槽は基本的に生活排水（し尿・雑排水）の処理を目的としており、産業廃水の処理には適していません。ただし、流入水の状態（C/N/P 比、汚水量、BOD 濃度など）によっては、浄化槽は様々な排水を受け入れることができます。
6.	JICA Sri Lanka JICA スリランカ	Officer 職員	It is currently difficult to identify a truly high-performance decentralized wastewater treatment system in Sri Lanka. While several systems are in operation, many significant challenges related to design, maintenance, and environmental compliance. スリランカにおいて、真に高性能な分散型排水処理システムを特定することは現在困難です。いくつかのシステムが稼働していますが、その多くは設計、保守、環境コンプライアンスに関する重大な課題を抱えています。	The challenge, how to secure the quality and performance of the decentralized wastewater treatment facility is common in many other countries. In Japan, performance evaluation testing system for the Johkasou has been established. If the Johkasou manufacturing company want to produce and sell their product in the market, they have to pass this test and to get the certification from Minister of Land, Infrastructure, Transport and Tourism. In some Asian countries, research and development on decentralized wastewater treatment and the production of factory-produced plants are progressing. Product standards and performance evaluation test methods are being formulated and product certification systems are being considered and implemented. To share those situation and information, MOEJ held the 12th Workshop focused on “Testing and evaluation system for decentralized wastewater treatment facilities” in 2024. Please refer the website below for more information. https://www.jeces.or.jp/en/pages/377/ 分散型排水処理施設の品質と性能をどのように確保するかという課題は、多くの国で共通しています。 日本では、浄化槽の性能評価試験制度が確立されています。浄化槽製造業者が製品を製造・販売するには、この試験に合格し、国土交通大臣の認証を取得する必要があります。 アジア諸国では、分散型排水処理に関する研究開発や工場生産プラントの生産が進んでおり、製品規格や性能評価試験方法の策定、製品認証制度の検討・導入が進んでいます。これらの状況や情報を共有するため、環境省は 2024 年に「分散型排水処理施設の試験・評価制度」をテーマとした第 12 回ワークショップを開催しました。詳細は、以下のウェブサイトをご覧ください。 https://www.jeces.or.jp/en/pages/377/

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7.	Ministry of Natural Resources and Environmental Conservation, Environmental Conservation Department 天然資源環境保全省環境保全局	Assistant Director 次長	How much benefit Decentralized Domestic Wastewater Treatment in developing countries? I would like to know advantages and disadvantages? 開発途上国における分散型生活排水処理はどれほどのメリットをもたらすのでしょうか？ メリットとデメリットを知りたいです。	First, both centralized and decentralized or on-site treatment facilities for domestic wastewater treatment have their own characteristics and are applicable to different regions. The type of facility to be constructed depends on the conditions of the target region. The basic premise for this question is that a wastewater treatment facility is being constructed in an area suitable for on-site treatment. The advantages and disadvantages are summarized as the following. 1) Advantages a) Facilities are often small-scale (ranging from individual houses to apartment complexes and public facilities), and construction can be completed in a relatively short period of time, from one week to several months, allowing for early realization of the effect of wastewater treatment and water environment improvement. b) There are many treatment technologies available for on-site wastewater treatment, and the appropriate technology can be selected based on the required treatment performance, allowing for relatively low-cost construction of the facility. c) In rural areas or areas with water shortages, treated water and sludge can be easily reused for agricultural use or landscaping. Furthermore, treated water is discharged into nearby streams and ponds, contributing to the local water cycle. 2) Disadvantages a) In developing countries, there is no certification system for on-site treatment facilities, and information on objective evaluations of the performance and quality of specific treatment technologies and wastewater treatment plants is unavailable. This makes it difficult to select appropriate technologies and facilities, especially those with advanced treatment performance. 2) On-site facilities require appropriate maintenance and management according to their respective usage conditions. A challenge is to develop a management system that trains maintenance engineers and engages them in maintenance work. c) On-site facilities require facilities to regularly remove accumulated sludge and further treat or recycle it. A challenge is to

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				develop a management system and facilities to implement this. まず、生活排水施設としての集合処理施設とオンサイト施設は、それぞれ特徴があり、適用される地域があり、どの種類の施設を整備するかは対象とする地域の条件によって異なります。この質問の前提条件としては、オンサイト処理に適した地域で汚水処理施設を整備することになった場合でう。そのメリットとデメリットを以下に示します。 1）メリット ①施設が小規模（個人住宅用から集合住宅や公共施設まで）な場合が多く、施設の建設は１週間から数カ月までの比較的短い期間で完成し、汚水処理と水環境改善の効果が早期発揮できあす。 ②オンサイト汚水処理には多くの処理技術が存在し、必要な処理性能に応じて適切な処理技術を選択し、比較的少ない費用で施設を整備することができます。 ③農山村地域、または水が不足している地域では、処理水及び汚泥の農業利用や景観用水などの再利用がしやすいです。また、処理水が付近の小川や池などに放流され、地域の水循環にも貢献します。 2）デメリット ①途上国では、オンサイト処理施設の認証制度がなく、特定の処理技術や汚水処理プラントの性能や品質に対する客観的な評価に関する情報が入手できず、適切な技術や施設、特に高度な処理性能処理技術と施設に関しては、その選定が難しいです。 ②オンサイト施設は、それぞれの使用状況に応じて適切な維持管理が必要であり、維持管理技術者を育成し、維持管理の業務に従事させる管理体制の構築が課題です。 ③オンサイト施設は、施設内に蓄積された汚泥を定期的に引き抜き、さらに処理または資源化する施設が必要です。それを実施する管理体制の構築と施設の整備が課題です。
8.	Ministry of Natural Resources and Environmental Conservation, Environmental Conservation Department	Environmental Quality and Standard Division 環境品質基準課	Would like to know the current status and challenges of installing decentralized wastewater treatment system in Asia. アジアにおける分散型排水処理システムの導入の現状と課題を知りたいです。	本表 No. 3 のコメントを参照ください。 Please refer the comments for the Question No. 3.

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	天然資源環境保全省環境保全局			
9.	Environmental Conservation Department 環境保全部	Assistant Director 次長	How did the Waste Water Treatment technique build in Japan? 日本で排水処理技術はどのように構築されたのでしょうか?	The development and widespread adoption of Johkasou (onsite wastewater treatment systems) in Japan has a long history. Traditionally, night soil was used as fertilizer, and vault toilets were therefore widely used. However, following the 1965 “Nationwide Flush Toilet Initiative,” the spread of flush toilets accelerated. In areas without sewerage systems, the increase in detached houses led to the rapid adoption of Old Type Johkasou that treated only toilet wastewater (black water), with approximately 7.22 million units installed by 2000. However, due to insufficient legal frameworks and maintenance systems, social problems such as water pollution and foul odors emerged. In response, the Johkasou Act was enacted in 1983 to protect the living environment, establishing procedures and qualification systems for installation, maintenance, cleaning, and inspection. The 2000 amendment prohibited the new installation of Old Type Johkasou and promoted Johkasou (which treat both black water and gray water), while the 2005 amendment explicitly added the conservation of public water quality to the Act’s objectives and strengthened supervisory measures. The introduction of a performance evaluation testing system and the strong commitment and technological innovation efforts of Johkasou manufacturers have also been key factors. Please refer to the materials below for further details. “Night Soil Treatment and Decentralized Wastewater Treatment Systems in Japan” https://www.env.go.jp/recycle/jokaso/en/pamph/wastewater_treatment_systems.html “Operation and Maintenance and Performance Monitoring of On-Site Wastewater Treatment Systems in Japan: A Proposal for India” https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5210668 浄化槽が日本で開発され普及に至るまでには、長い歴史があります。日本では、し尿を肥料として活用する慣行から汲み取り便所が普及していましたが、1965 年の「一億総水洗化目標」を契機に水洗トイレの普及が進みました。下水道未整備地域では戸建住宅の増加に伴い、水洗トイレとトイレ排水のみを処理する単独処理浄化槽が急速に普及し、2000 年までに 722 万基が設置されました。しかし、法整備や維持管理体制が不十分であったため、水質汚濁や悪臭などの社会問題が発生しました。これを受け、1983 年に生活環境の保

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				全を目的に浄化槽法が制定され、設置・保守点検・清掃・検査の手続きや資格制度が整備されました。2000 年の法改正では単独処理浄化槽の新設が禁止され合併処理浄化槽へ転換が進み、2005 年の法改正では公共用水域等の水質の保全が目的に明記され、監督体制も強化されました。浄化槽の性能評価試験制度の導入、浄化槽メーカー各社の技術開発に対する熱意と努力も重要な要素です。詳しくは以下の資料をご参照ください。 "Night Soil Treatment and Decentralized Wastewater Treatment Systems in Japan" https://www.env.go.jp/recycle/jokaso/en/pamph/wastewater_treatment_systems.html "Operation and Maintenance and Performance Monitoring of On-Site Wastewater Treatment Systems in Japan: A Proposal for India" https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5210668
10.	Environmental Conservation Department 環境保全局	Wastewater Treatment Facilities 汚水処理施設	How do you maintain water resource? Water resources is very important in the worldwide. 水資源をどのように維持していますか？水資源は世界中で非常に重要です。	As you pointed out, water resources are extremely precious, as climate change is causing droughts and shrinking water sources in some areas. For example, the Tokyo Metropolitan Government's Bureau of Waterworks manages approximately 25,000 hectares of water conservation forests in the upper reaches of the Tama River, where the water source is located. https://www.waterworks.metro.tokyo.lg.jp/kouhou/meisho/suigenrin In addition, some sewage treatment plants supply its effluent in the surrounding area. In some cases, effluent from Johkasou installed overseas is reused for gardening and other purposes. Local use of treated water from domestic wastewater treatment plants could reduce water consumption and contribute to the conservation of water resources. 気候変動の影響により干ばつが発生したり水源が縮小している地域もあることから、ご指摘の通り、水資源は非常に貴重です。例えば、東京都水道局では、水源のある多摩川上流域に広がる約 25,000 ha の水道水源林を管理しています。 https://www.waterworks.metro.tokyo.lg.jp/kouhou/meisho/suigenrin また、一部の下水道施設では、処理水が周辺地域で活用されています。海外に設置された浄化槽については、その処理水がガーデニングなどに再利用されるケースもあります。汚水処理施設の処理水も地域で活用することで、水道使用量を減らし水源の保全に寄与できると考えられます。
11.	Dhaka WASA ダッカ水道下水道公社	Executive Engineer	I want to know about the sludge management and energy recovery from sludge as well.	Thank you very much for your suggestion. We will take this into consideration when considering themes for future workshops.

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		エグゼクティブエンジニア	汚泥管理や汚泥からのエネルギー回収についても知りたいです。	ご提案いただきどうもありがとうございます。次回以降のワークショップのテーマを検討する際に参考にさせていただきます。
12.	Goshu Kohsan (Bangladesh) Co., Ltd. 五洲興産バングラデッシュ	Plant Engineer-(Civil) プラントエンジニア（土木）	I am interested in learning more about advanced and decentralized wastewater treatment technologies and their practical applications in developing countries. 私は、先進的かつ分散型の排水処理技術と、その発展途上国における実用化についてさらに学びたいです。	Thank you very much for your suggestion. We will take this into consideration when considering themes for future workshops. ご提案いただきどうもありがとうございます。次回以降のワークショップのテーマを検討する際に参考にさせていただきます。
13.	Department of Buildings 建築局	Chief Engineer (Water Supply and Sewerage) 主任技師（給水・下水道担当）	This workshop is a best opportunity I have to develop my knowledge to apply for the projects handled by the Department of Buildings of Sri Lanka. このワークショップは、スリランカ建築局が扱うプロジェクトに応用する知識を深める絶好の機会です。	Thank you very much. We look forward to your participation in future workshops. どうもありがとうございます。次回以降のワークショップへのご参加もお待ちしております。
14.	Sleman Regency Environmental Service スレマン県環境サービス局	young expert environmental impact controller 若手専門家環境影響管理者	- What is the definition and key principles of a decentralized wastewater management system? - How does decentralization differ from a centralized system in terms of efficiency, cost, and community participation? - 分散型排水管理システムの定義と主要原則は何ですか？	The key principles include planning, design, manufacturing, construction, installation, and O&M. In general, when population density is high, centralized system is more cost-effective, whereas when it is low, decentralized one is more cost-effective. 主要な原則として、計画、設計、製造、施工、設置、維持管理が考えられます。 一般的に、人口密度が大きい場合は集合処理、小さい場合は個別処理の方が費用効果は大きくなります。

#	Affiliation	Position	Question	Answer / Comment from Secretariat
			- 効率性、コスト、地域社会の参加という観点から、分散型システムは集中型システムとどのように異なりますか？	
15.	Centre for Economic and Social Studies (CESS) Hyderabad 経済社会研究センター（CESS）ハイデラバード	—	Hope this event may address inclusive and sustainable development issues with Lesson learning and policy influence. このイベントが、教訓からの学びと政策への影響を通して、包括的かつ持続可能な開発の問題に取り組むことを願っています。	Thank you very much. We hope this workshop will help promote decentralized wastewater management overseas. どうもありがとうございます。このワークショップが、海外における分散型汚水管理の推進に役立つことを願っております。
16.	Dhaka Water Supply and Sewerage Authority ダッカ水道下水道公社	Additional Chief Engineer 主任技師補	Is this technique / technology popular outside of Japan? If yes, please provide the list of counties where it is adopted and operating successfully. この技術は日本国外でも普及していますか？普及している場合は、導入され、成功している国のリストをご提供ください。	According to a survey by the Johkasou System Association, as of the end of December 2024, a total of 64,272 units Johkasou (61,409 units Johkasou with a capacity of 50 PE or less, and 2,863 units Johkasou with a capacity of 51 PE or more) have been installed in 56 countries other than Japan. Please refer Figure 4. 浄化槽システム協会の調べによると、2024 年 12 月末現在、日本以外の 56 か国に合計 64,272 基の浄化槽（50 人槽以下の浄化槽が 61,409 基、51 人槽以上の浄化槽が 2,863 基）が設置されています。図 12 を参照ください。
17.	SP vision consultancy SP ビジョンコンサルタント	Solid Waste Management (SWM) and Information, Education, and Communication (IEC) Expert 固形廃棄物管理と情報・教育・コミュニケーション エキスパート	Online training on Decentralized Domestic Wastewater Treatment with Share SPOT. Share SPOT を活用した分散型生活排水処理に関するオンライン トレーニング。	Thank you very much for your feedback. Japan Education Center of Environmental Sanitation, which serves as the secretariat of this Workshop, holds seminars for obtaining qualifications such as Johkasou Operator, however the textbooks and instructors are only in Japanese. For your information, the international cooperation organizations such as JICA may also offer training courses on wastewater management. ご意見を頂きどうもありがとうございます。事務局である日本環境整備教育センターでは浄化槽管理士などの資格取得のための講習会を実施しておりますが、テキストや講師の使用言語は日本語のみです。なお、JICA などの国際協力機関では、汚水管理に関する研修コース等を設けている場合があります。

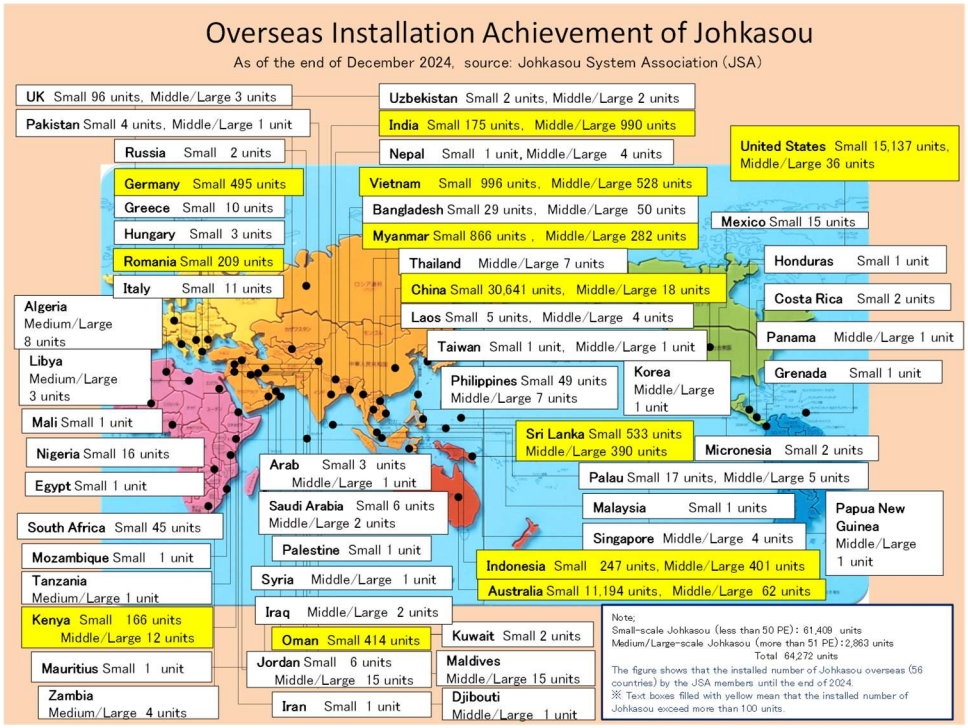

図 12　浄化槽海外設置実績

出所：環境省 令和６年度 次世代浄化槽システムに関する 調査検討業務報告書 (浄化槽システム協会)より抜粋、一部改編

2) ワークショップ終了時

#	Question	Answer / Comment from Secretariat team
1.	Thanks for the brainstorming workshop on Decentralized wastewater treatment systems in different region. I want to know more about the Decentralized wastewater treatment systems, especially operation in Bangladesh. I have one suggestion for the future workshop, please include a technical part or visit any treatment plant in Japan, and make it free for students who are interested. 様々な地域における分散型排水処理システムに関するブレインストーミング・ワークショップを開催いただき、ありがとうございました。分散型排水処理システム、特にバングラデッシュにおける運用について、もっと詳しく知りたいと思っています。 今後のワークショップについて一つ提案があります。技術的な部分を含めるか、日本の処理施設を見学し、興味のある学生は無料で参加できる形式にしていただければと思います。	Thank you very much for your feedback. We will consider whether we can include technical content in future workshop topics. While Bangladesh's population is growing, many areas lack sewerage infrastructure. Therefore, we believe that the introduction of decentralized wastewater treatment facilities such as Johkasou would be suitable for many areas. While technological development is certainly important for the widespread adoption of decentralized wastewater treatment facilities, not just in Bangladesh, institutional systems are also crucial, including mechanisms for proper construction, sustainable maintenance, and inspection to ensure effluent meets standards. Anyone can participate in this workshop free of charge. For your information, international cooperation organizations such as JICA may also offer training courses on wastewater management. ご意見を頂きどうもありがとうございます。今後のワークショップのテーマに技術的な内容を含めることが出来るか検討したいと思います。 バングラデッシュでは人口も増えている一方、下水道インフラが整備されていない地域も多いと思われますので、浄化槽などの分散型汚水処理施設の導入が適した地域も多いと推察されます。バングラデッ

#	Question	Answer / Comment from Secretariat team
		シュに限らず、分散型汚水処理施設を普及させるには、技術開発も勿論重要ですが、適切に工事が行われるための仕組み、維持管理が持続的に実施されるための仕組み、処理水が基準をクリアしているか検査する仕組み、など、制度的なシステムも重要になります。このワークショップは誰でも無料で参加することが出来ます。なお、JICA などの国際協力機関では、汚水管理に関する研修コース等を設けている場合があります。
2.	I would like to know how sludge removal companies in each country make their profits. 各国の汚泥引き抜き業者の収益はどのようにして得られているのかを知りたいです。	In many countries, sludge removal companies (desludging vendors) collect fees directly from homeowners and other users of decentralizes wastewater treatment facilities, such as septic tank. However, in some cases, sludge treatment facilities are underdeveloped, or the cost of transporting the sludge to the treatment facility is higher than the sludge treatment fee, resulting in a noticeable number of cases where the extracted sludge is illegally dumped in rivers or mountains. It is necessary to promote decentralized wastewater management, including sludge management. 多くの国では、汚泥引き抜き業者は家主などの汚水処理施設を利用している方から直接、料金を徴収しています。しかし、汚泥処理施設が未整備であったり、清掃料金よりも汚泥処理施設への搬入料金が高い場合があり、河川や山地に引き抜いた汚泥が不法投棄されるケースが目立ちます。汚泥管理も含めて分散型汚水管理を推進していく必要があります。
3.	I would like to suggestions that if there is the system easy installation and O & M, you should present how to use in developing countries. So, we can understand and apply in our countries. 設置と維持管理が容易なシステムがあれば、途上国での利用方法も提示していただければと思います。そうすれば、私たちも理解し、自国で活用できるようになります。	Thank you very much for your feedback. We will take it as a reference when considering themes for future workshops. For your information, Johkasou is high-performance decentralized wastewater treatment facility, and the staff involved in their installation, construction, and maintenance require specialized knowledge. ご意見を頂きどうもありがとうございます。今後のワークショップのテーマを検討する際に参考にしたいと思います。なお、高性能な分散型汚水処理施設である浄化槽は、設置工事や維持管理にあたる職員にも専門的知識が求められます。
4.	It was a half-day workshop, but since I was attending while also working, I found it easier to participate if there was a rough idea of break times and other schedules. Issues with septic tanks and other decentralized wastewater treatment facilities, such as maintenance and design standards, have been common for many years, and it seems that the current situation is difficult to improve. I realized the importance of integrating technology and institutional support as part of strengthening the system, rather than	We apologize for the lack of information regarding the progress of the workshop, such as break times. We will strive to improve this for the next event. In addition, regarding the overseas expansion of septic tanks, we appreciate your opinion that rather than simply expanding Japanese septic tanks overseas, we should position it as part of strengthening wastewater management systems and provide technical and institutional support in an integrated manner. We also very much appreciate your opinion that future workshops should focus on examples of septic tank use in other fields, such as industrial wastewater treatment,

#	Question	Answer / Comment from Secretariat team
	simply deploying Japanese septic tanks as is. Furthermore, while I understand that septic tanks were developed to deal with domestic wastewater, I wanted to know whether they could be applied to other fields, such as industrial wastewater, and whether there are any examples of their application. 半日のワークショップでしたが、自身の業務と並行して聴講していたため、休憩時間などのおおよその目安があると参加しやすいと感じました。維持管理や設計基準といった、浄化槽やその他の分散型排水処理設備に関する課題は、長年にわたり共通しており、改善が難しい現状があるように思いました。日本の浄化槽をそのまま展開するのではなくシステムの強化の一環として、技術と制度構築支援を一体として行う重要性を感じました。また、浄化槽は生活排水対策として開発されたことは理解していますが、産業廃水対策など他の分野にも応用できる可能性/応用されている事例があるのかについても知りたいと感じました。	rather than just domestic wastewater treatment. We will take these points into consideration when determining themes for future workshops. 休憩時間などワークショップの進行に関して十分な周知が出来ていなかったとの御指摘、申し訳ありません。次回、ワークショップを開催する際に改善できるよう努めたいと思います。 また、浄化槽の海外展開に関して、日本の浄化槽を海外にそのまま展開するのではなく、汚水処理システム強化の一環と位置付け、技術と制度構築支援を一体的に進めていくべき、とのご助言をありがとうございます。また、次回以降のワークショップのテーマとして、生活排水処理だけではなく、産業廃水対策など他の分野における浄化槽の活用事例を取り上げてはどうか、とのご提案も頂きどうもありがとうございます。今後、ワークショップのテーマ等を検討する際に参考にさせていただきます。