



SWWS & ROS 2018 - W2A

A study on septage management efficiency in developing countries and Japan

P. Flamand¹, Y. Shirakawa^{2*}, S. Kumokawa²

¹ Japan Sanitation Consortium (JSC), Intelligent Bldg. Yushima Iyasaka 5F,
3-26-9 Yushima, Bunkyo-ku, Tokyo 113-0034, Japan

² Japan Education Center of Environmental Sanitation (JECES),
2-23-3 Kikukawa, Sumida-ku, Tokyo 130-0024, Japan

Japan Education Center of Environmental Sanitation (JECES)

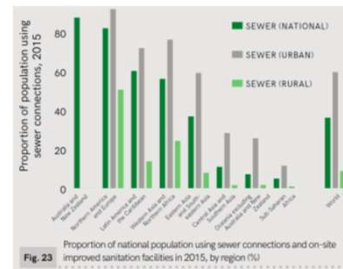
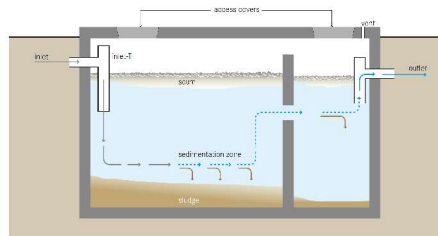
- Founded in 1966 as an institution for training and research on the Packaged Aerated Wastewater Treatment Plant (PAWTP – Johkasou in Japan). Recognized as a foundation by the Ministry of Health and Welfare (now the Ministry of Environment, MOE).
- As the only designated institution by MOE, JECES carries out the examination for the national certification of Johkasou Operators.
- As the only designated institution by Ministry of Land, Infrastructure, Transport and Tourism (MLIT), JECES also conducts the examination for the national certification of Johkasou Installation Workers.
- In addition, JECES provides other training programs for Johkasou technicians.



- (1) Training course for qualifying [johkasou operators](#)
- (2) Training course for qualifying [johkasou installation workers](#)
- (3) Training program for johkasou [technical supervisors](#)
- (4) Training program for johkasou [desludging technicians](#)
- (5) Training program for johkasou [inspectors](#)

2

Why septage management is important for septic tanks or any on-site facility?



- Septic tank is the main sanitation system in many developing countries.
- A septic tank overloaded with sludge stops being a wastewater treatment system and become a pollution source.
- Problem with unsanitary handling of sludge especially if manually done.
- Lack of sludge treatment facilities leads improper disposal (open dumping).

Source: eawag, Compendium of Sanitation Systems and Technologies 2nd Edition.
: World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), Progress on Drinking Water, Sanitation and Hygiene, 2017.

3

Septage Management in Developing Countries: Vietnam

- Septic tank is a property of household, and no desludging occurs unless clogging.
- Some septic tank uses house foundation to make tank wall, which makes difficult access for checking and desludging.



Source: Dr. Nguyen Viet Anh, Decentralized Wastewater Management in Vietnam, 6th International Workshop on Decentralized Domestic Wastewater Treatment in Asia (presentation material), 19 Sep., 2018.

4

Septage Management in Developing Countries: Indonesia

- Although Indonesia has 150 septage treatment plants, 90% are no longer in operation and only 4% of collected septage is treated at a facility.
- Issue with design, and lack of capacity for the operation and maintenance of the septage treatment plants.



Source: United States Agency for International Development, A Rapid Assessment of Septage Management in Asia: Policies and Practices in India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand, and Vietnam, 2010.
 : Dr. Pham Ngoc Bao, An Overview of Septage Management in Asia – Challenges and Opportunities, 6th International Workshop on Decentralized Domestic Wastewater Treatment in Asia (presentation material), 19 Sep., 2018.

5

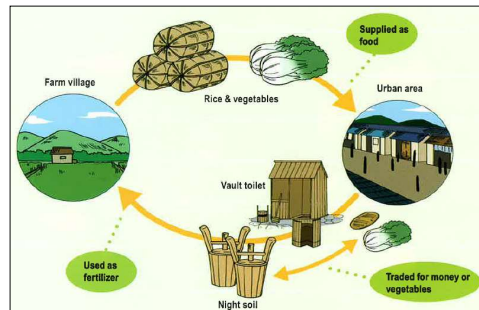
Issues with Septage Management in Developing countries

- Lack of policies, legal and institutional frameworks for septage management, planning and financing . Even if some regulations are in place, enforcement is weak.
- Lack of awareness and capacity at government levels. In many countries, local governments are in charge of sanitation services without guidance, capacity development structures or programs.
- Septic tank desludging is not integrated in a system... only happening when problems occur.
- Lack of information, awareness, education at community level. Low understanding of the importance of sanitation and the individual benefit, willingness to pay is low.
- Desludging tariffs too low to cover transport and/or treatment, thus encouraging negative discharge practices.

6

Septage Management in Japan - History (1) -

- Historically, night soil was considered as a valuable resource not a waste. No consumption of meat with Buddhism, no possible recycling of animal dung.
- It is generally considered that night soil collection and recycling as a resource for agriculture spread throughout Japan in the 12th century.



- Extensive practice in the Edo period (1603-1867), night soil is collected by farmers on a business base. Farmers purchase of night soil to urban residents or exchange with vegetables.
- Work on water and wastewater management systems started in the Meiji era (1868-1912), however sewer systems were only designed to carry away rainwater and graywater (specified in laws) as night soil was considered as a valuable resource.

7

Septage Management in Japan - History (2) -

- With high population growth in cities from the late Meiji era and through the Taisho era (1912-1926) and the introduction of chemical fertilizers, first **shift from night soil recycling to disposal** from late Taisho era-early Showa era (1927-1988)
- With the rapid economic growth starting from the late 1950s, the traditional night soil **recycling system broke up** due to urbanization and the spread of chemical fertilizers *Night soil turns from a resource to a waste.*



Number and capacity of night soil/sludge treatment plants in Japan



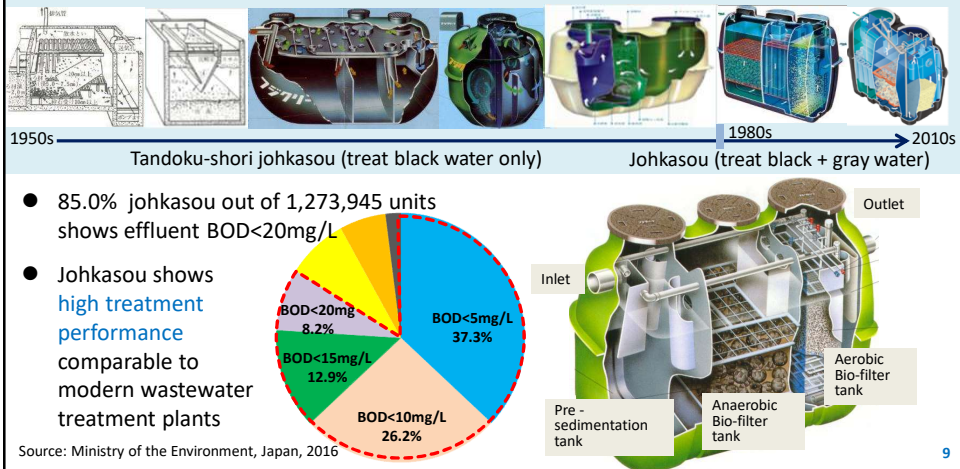
Vacuum vehicles

- Problem with surplus of night soil in cities → **new disposal solutions urgently needed: disposal at sea (second most common method of disposal after agricultural use)**
- Important efforts made to develop **mechanized night soil treatment plants** → 1st NSTP built in Tokyo in 1952... 60 in 1958 ... 1018 in 2012
- Development of **mechanized vacuum vehicles** by Kawasaki City and start of operation in 1952 (first use of such vehicles) → 26,000 vehicles today

8

Japanese On-Site Wastewater Treatment System: Johkasou

Japan is one of the few developed countries where septage management is still a highly developed and profitable business as **more than 20% of its population relies on on-site sanitation**

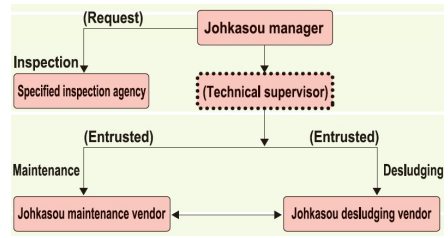


Septage Management in Japan - legal framework -

- 'Johkasou Act' enacted in 1983 to address the problem of gray water treatment and overcome improper installation and/or maintenance of Tandoku-shori Johkasou (treating black water only).
 - clearly define the installation, maintenance, inspection and desludging of manufactured Johkasou. Establishment of a national certification system for Johkasou installation workers and maintenance operators.
 - provides guidelines on manufacturing, installation, maintenance, and desludging of the Johkasou. The effluent water quality of the Johkasou is monitored by the authorized inspection agency once a year in accordance with the law.
- 'Johkasou Act' amended in 2000.
 - new installations of Tandoku-shori Johkasou prohibited.
 - compulsory installation of the Johkasou treating both gray and black water for new constructions.
- Other related laws:
 - 'Building Standard Act' stipulates details pertaining to the Johkasou structure
 - Johkasou effluents must comply with the 'Water Pollution Control Law'.
 - Sludge from Johkasou must be managed in accordance with the 'Waste Disposal and Public Cleansing Law'.

Septage Management in Japan - Johkasou Act (1983) -

Qualifications /vendors	Registrant/ number of vendors	Business content
Johkasou Operators	80,042	Operation and maintenance
Johkasou Installation Workers	86,595	Installation/construction
Johkasou Technical Supervisors	29,794	Management of johkasou over 500 PE
Johkasou Desludging Technicians	16,021	Desludging
Registered Johkasou Inspectors	1,280	Legal inspection
Specified Inspection Agencies	65	Legal inspection
Johkasou manufacturers	18	Research, development and manufacture
Johkasou maintenance vendors	12,435	Operation and maintenance
Johkasou desludging vendors	5,291	Desludging
Johkasou Installation vendors	28,356	Installation/construction



- The Johkasou Act defines the legal framework for O&M, desludging and legal inspection.
- The business environment for septage management has been established by the Johkasou Act.
- The law mandates the Johkasou owner to engage a maintenance contractor as well as a desludging contractor for the Johkasou to be desludged at least once a year and checked several times a year. 11



An example of johkasou desludging



Lessons learned from Japan's experience

- In the case of Japan, long history of night soil recycled as a valuable resource whereas considered as a waste in many countries. As a consequence, night soil was a source of income enabling the creation of a sustainable business between cities and farming villages.
→ culturally accepted practice enhance sustainable business model.
- Even when this system broke up, business continuation was possible with the creation of a system requiring certified professionals for Johkasou maintenance
→ in accordance with the law (Johkasou Act, etc.).
- Hygiene and sanitation education included in school curriculum, and regular communication from municipalities to residents about the sanitation policy in place.
→ foster service demand & willingness to pay
- Strong institutional and regulatory framework for septage management with scheduled desludging (and regular maintenance of Johkasou)
→ health safety and environmental protection

13

Recommendation for improvement on Septage Management in Developing countries

- Establishment of a legal and institutional framework for septage management .
→ includes laws that clearly define all work associated with septage management and clearly designate the institutions involved in this work as well as their responsibilities.
- Capacity building at government levels.
→ includes creation of training institutions for developing an expert workforce.
- Hygiene and sanitation awareness-raising activities, regular communication with stakeholders and involvement of stakeholders in septage management planning.
→ importance of understanding the benefits of good sanitation as a trigger to increase demand & willingness to pay for sanitation services.

Regal Framework

- Obligation to install approved on-site sanitation facilities.
- Regulation / monitoring system
- Regular desludging system
- Educational system



Business-based septage management system



Sustainable septage management

14

Thank you for your attention.

< Acknowledgement >



**Ministry of the Environment
Government of Japan**