第 7 章　資料編

7.1. 第 11 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

7.1.1. フライヤー

環境省
Ministry of the Environment

11th International Workshop on Decentralized Domestic Wastewater Treatment in Asia
Organized by Ministry of the Environment, Government of Japan (MOEJ)

Water Reuse from Decentralized Domestic Wastewater Treatment Facilities

28th November 2023
15:00 - 18:30
(Japan Standard Time)

Language : English / Japanese

Venue : Webinar via Zoom

Please register from the website link below
https://zoom.us/webinar/register/WN_WIarJuMhQZC7RcX_MTTb9g

Due to the global phenomena caused by climate change, droughts and water shortages are increasingly becoming serious problems affecting the socio-economic development of the countries these days, and accordingly the demand for recycling wastewater, including the effluent from the decentralized domestic wastewater treatment facilities, is increasing.

This workshop will discuss the importance of effectively reusing the treated effluent of decentralized domestic wastewater treatment facilities, as well as the legal and regulatory framework needed to create the environment enabling the scaling up the use of decentralized domestic wastewater management in order to achieve water reuse more widely. In this workshop, the participants are expected to debate actively and exchange their experiences, opinions, and point of views.

PROGRAM

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

Opening Remarks	Mr. Masaki Numata, Director, Office for Promotion of Johkasou, Waste Management Division, Environmental Regeneration and Material Cycles Bureau, MOEJ
Keynote	**Water in Circular Economy and Resilience (WICER)** Ms. Midori Makino, Lead Water Supply and Sanitation Specialist, World Bank
Session A: Case studies on water reuse from the decentralized wastewater treatment facilities	
A-1	**Overseas examples: Utilization of effluent from Johkasou** Mr. Rio Waza, Managing Director, DAIKI AXIS INDIA PVT.LTD.
A-2	**Recycling of treated water by Johkasou** Mr. Shigeyuki Hikotani, General Manager, Special Equipment Department, Kansai Airports
A-3	**Social implementation research on cultivation of rice suitable for sake brewing by effluent from large scale Johkasou -Eco-friendly sake "Sui Shigen" is newly released! -** Dr. Shuhei Masuda, Associate Professor, Department Civil Engineering and Architecture, National Institute of Technology, Akita College
A-4	**Advanced treatment of domestic wastewater using a combination of Johkasou and simple BGF – Examination of production and safety of vegetables and fruits –** Dr. Yasuo Ozaki, Professor Emeritus, Akita Prefectural University
Session B: Regulations for the decentralized wastewater management and potential contribution to water reuse	
B-1	**Mechanisms of Johkasou Act** Mr. Ryoma Sato, Section Chief, Office for Promotion of Johkasou, Waste Management Division, Environmental Regenerationand Material Cycles Bureau, MOEJ
B-2	**Onsite Wastewater Treatment and Recycling Regulations –2023 –Draft** Prof. Srinivas Chary Vedala, Professor and Director, Administrative Staff College of India (ASCI)
Closing Remarks	Mr. Ryoma Sato, Section Chief, Office for Promotion of Johkasou, Waste Management Division, Environmental Regeneration and Material Cycles Bureau, MOEJ

環境省
Ministry of the Environment

KEY PERSONS

Ms. Midori Makino

Midori Makino is the Lead Water Supply and Sanitation Specialist in the World Bank's Latin America and the Caribbean Region. Over the last 25 years she has worked across water and infrastructure sectors in multiple regions including Sub-Saharan Africa, South Asia, and Latin America and the Caribbean where she has managed investment operations and analytical work in more than twenty countries. Her area of expertise includes water sector policy, institutions, and regulation, utility finance, public private partnerships, water in circular economy and resilience, and monitoring and evaluation. Prior to taking on the current assignment, Midori was Manager for Sustainable Development in the Independent Evaluation Group of the World Bank, overseeing all evaluations of World Bank-supported operations in Water, Urban and Disaster Risk Management, Environment and Natural Resources, Climate Change, Agriculture, Social Development, Energy, and Transport sectors. Midori is a Japanese national and holds a Master of Business Administration from Massachusetts Institute of Technology and Master of Science in Economics from the Stockholm School of Economics.

Mr. Rio Waza

Mr. Rio Waza is currently serving as the Managing Director of Daiki Axis India & Daiki Axis Environment Pvt. Ltd, subsidiary companies of Daiki Japan. He has been involved in promoting the Johkasou-STP technologies and decentralized domestic wastewater management in India & overseas for more than 6 years now. Developing sales network across India & south Asia. Before water business, he works as business consultant in India serving in agriculture machinery, Industrial basic machine and financial industries. Communicated more than 20,000 companies in India last 10 years.

Mr. Shigeyuki Hikotani

Mr. Shigeyuki Hikotani is the general manager of Kansai Airport's special equipment department.
He has about 15 years of experience as an airport engineer after working in the planning and design of sewage treatment facilities for about 7 years.
After being involved in the basic design of LCC terminal facilities and the operation of aircraft refueling facilities as an airport engineer, since 2019. He has been in charge of renovation projects for airport-specific facilities (baggage handling systems, passenger boarding bridges, waste incineration facilities, sewage treatment plants). On his days off, he enjoy taking caring for freshwater fish (*Odontobutis obscura,* Dark sleeper) caught in a nearby river and driving.

Dr. Shuhei Masuda

Dr. Shuhei Masuda is an Associate Professor of Department Civil Engineering and Architecture, National Institute of Technology, Akita College. He obtained a doctoral degree at Department of Civil Engineering, Graduate School of Engineering, Tohoku University. He has been researching about the application of wastewater resources to agricultural field and greenhouse gas mitigation from sewage treatment process. He is interested in creating a sustainable society centered on sewage resources. In his free time, he enjoys spending time with his family and gardening.

Dr. Yasuo Ozaki

Dr. Yasuo Ozaki is an emeritus professor at Akita Prefectural University. He had worked as the Assistant of the Water Quality Management Laboratory, Department of Environmental Engineering, Osaka University, then Director of Water Quality Conservation Laboratory, Soil and Fertilizer Department, Agricultural Research Center, Ministry of Agriculture, Forestry and Fisheries (currently, National Agriculture and Food Research Organization), and Professor of Ecological Engineering Laboratory, Department of Biological and Environmental Sciences, Akita Prefectural University. After retiring, he installed the resource recycling purification system of domestic wastewater that is Johkasou combined with a simple BGF ditch (Biogeofilter ditch) at his housing in Tsukuba -city, Ibaraki prefecture. He is investigating the vegetables and fruits will be suitable for this system, and evaluates the safety of harvested vegetables. Currently he grows 14 types of fruit trees and enjoy harvesting with his children and grandchildren. While pruning, he interacting with fruit & garden trees and imagining what will happen 3 to 5 years in the future. Pruning work is his best way to refresh and to find new discoveries.

Prof. Srinivas Chary Vedala

Professor Srinivas Chary Vedala is the Director at the Administrative Staff College of India (ASCI), a premier institution for public policy and capacity development in India. He leads the Centre for Urban Governance, Environment, Energy and Infrastructure Development, which is recognized as a 'Centre of Excellence' by the Government of India. He provides the strategic guidance to its advisory, consulting, research and capacity development programe. He is an urban environmental planner and public health engineer with over two decades of experience in water and environmental sanitation (WASH).

Dr. Pierre Flamand

Pierre is the Manager of International Affairs at the Japan Sanitation Consortium (JSC). He has over 18 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. He has in-depth knowledge on how the country has solved the severe sanitation issues in the 1960s, including the role played by the government in the enactment of policies, guidelines, and legal instruments for wastewater management. Pierre holds a doctoral degree in regional development studies and is also a visiting researcher at Toyo University in Japan.

SECRETARIAT CONTACT

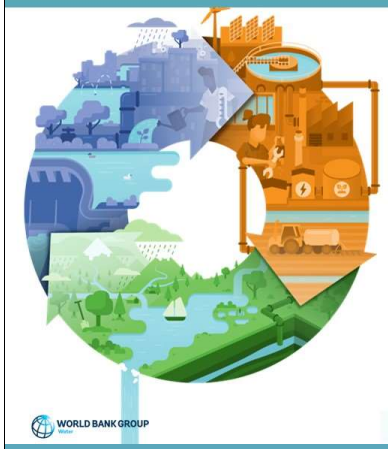
Japan Education Center of Environmental Sanitation (JECES) is a secretariat of this Workshop. If you have any questions in advance, please contact Secretariat (shirakawa@jeces.or.jp) via email.

Dr. Yurie Shirakawa
Researcher, Japan Education Center of Environmental Sanitation (JECES)
Address: 2-23-3 Kikukawa, Sumida-ku, Tokyo 130-0024, Japan
E-mail: shirakawa@jeces.or.jp

7.1.2. 発表資料

1) 基調講演：循環経済とレジリエンスにおける水　（Keynote: Water in Circular Economy and Resilience (WICER)）

Agenda for WICER Presentation



1. Circular Economy – what is it?
2. Water in Circular Economy and Resilience Framework (WICER)
3. WICER Activities

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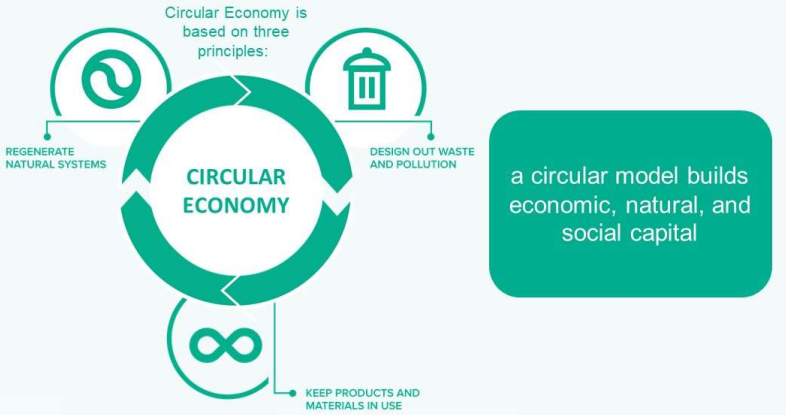
What are the principles of Circular Economy?



a circular model builds economic, natural, and social capital

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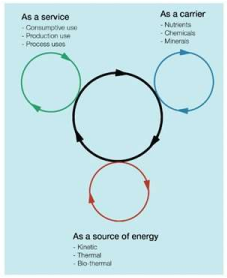
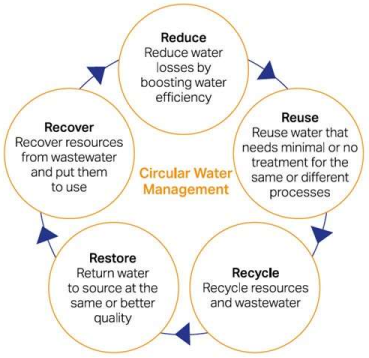
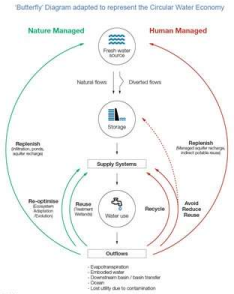
Source: Ellen MacArthur Foundation

Circular Economy in Water







SOURCES

- **International Water Association (IWA), 2016.** "Water Utility Pathways in a Circular Economy." London.
- **World Business Council for Sustainable Development, 2017.** "Business Guide to Circular Water Management: Spotlight on Reduce, Reuse and Recycle." Geneva.
- **Ellen MacArthur Foundation, ARUP, and Antea Group. 2018.** "Water and Circular Economy." White Paper

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We must shift from…

A LINEAR SYSTEM …

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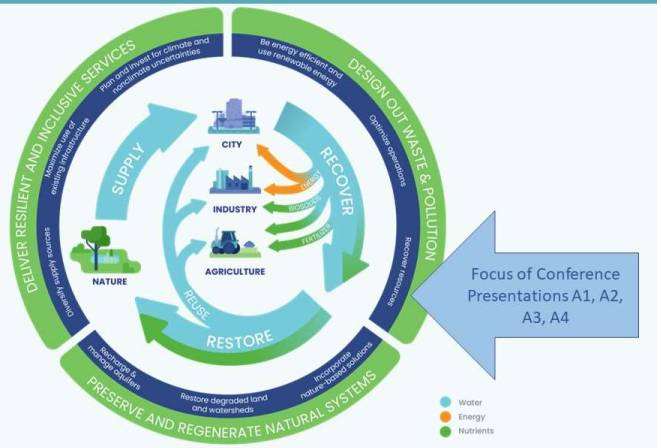
To a Circular System

Water in Circular Economy and Resilience (WICER)



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OUTCOME 1: DELIVER RESILIENT AND INCLUSIVE SERVICES

We need to plan and invest (differently) for climate and non-climate uncertainties

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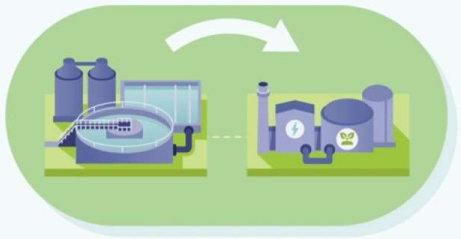
OUTCOME 1: DELIVER RESILIENT AND INCLUSIVE SERVICES

Maximize the use of existing infrastructure



Brazil: Optimizing WWTPs in São Paulo

Ampliação ETES ABC, Parque Novo Mondo, São Miguel e Barueri	Conventional expansion (mirrowing)	Audit Optimization	Tertiary Treatment
	CapEx (USD millions)		
TOTAL	548	320	2399
Savings	228	0	2079

Full case study here: http://hdl.handle.net/10986/36245

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OUTCOME 1: DELIVER RESILIENT AND INCLUSIVE SERVICES

Diversify supply sources

- Diversification of water supply sources (water balance)
  - including sources with different risk and cost profiles, and low vulnerabilities
- Protecting those water supply sources
- Including integrated water storage

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Full case study here: http://hdl.handle.net/10986/35659

OUTCOME 2: DESIGN OUT WASTE AND POLLUTION

Recover resources from water and wastewater

Energy

Water

Nutrients

Examples from this Conference include:

- Effluent reuse from wastewater treatment plants in India
- Kansai Airport's Johkasou
- Brewing of sake from rice cultivated by wastewater effluent in Akita prefecture
- Vegetable and flower cultivated using a combination of Johkasou effluent and biogeofilter

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OUTCOME 2: DESIGN OUT WASTE AND POLLUTION

Water

Industrial processes (paper, textile, etc.)

Irrigation (agriculture, parks, etc.)

Replenish aquifers

Recreational use

Cooling water (power plants)

Indirect potable water

beer with reclaimed water

biogas

phosphate fertilizer

bricks

cellulose

Biofuels (algae)

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OUTCOME 2: DESIGN OUT WASTE AND POLLUTION

Optimize operations

- Reduce non-revenue water
- Increase overall efficiency of processes
- Optimize the amount of energy, minerals, and chemicals used in the operation of water systems

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OUTCOME 2: DESIGN OUT WASTE AND POLLUTION

Be energy efficient and use renewable energy

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OUTCOME 2: DESIGN OUT WASTE AND POLLUTION

Solar panels in roof of Recycled Water Treatment Plant Tuncurry, Australia

Solar panels in WWTP Lianyungang, China

Floating Solar panels in WWTP Kraaifontein, South Africa

Image: University of Cape Town (UCT)

OUTCOME 3: PRESERVE AND REGENERATE NATURAL SYSTEMS

Sponge cities

Upstream reforestation

Constructed wetlands as part of the wastewater treatment

Recover degraded watersheds and land

Green roofs

OUTCOME 3: PRESERVE AND REGENERATE NATURAL SYSTEMS

- Restore degraded land and watersheds
- Manage and recharge groundwater
- Incorporate nature-based solution

Cross-cutting Issues

- Create the right Policy, Institutional and Regulatory (PIR) environment
  - Examples include Johkasou Act in Japan
  - Onsite Wastewater Treatment and Recycling Regulations in Hyderabad, India
- Manage water demand & water use
- Leverage the power of digitalization
- Ensure solutions are inclusive
- Funding and financing

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Implementing circular economy principles also makes economic and financial sense

Circular economy offers the opportunity to:

- Create additional revenue streams
- Reduce O&M costs
- Offer a better return on investment in a sector heavily subsidized

- Potential to create more innovative business models
- Potential to attract the private sector (PPP)
- Potential to tap into other sector's financing (green/climate bonds, environmental impact bonds, etc)

Investments in nature-based solutions such as upstream reforestarion, can reduce treatment needs and costs

Investments in energy efficiency and reducing NRW can be recovered in less than 3 years

Self-generating renewable energy can reduce energy costs, increase system resiliency and lower GHGs

Utilities can create additional revenue streams to cover O&M costs by selling wastewater bypro

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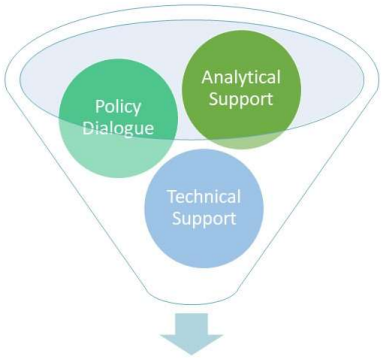
WICER in practice - How is World Bank working with clients to promote a WICER approach?

WICER



Operational Support

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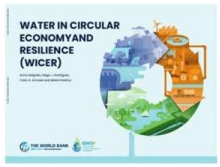
Creating and sharing knowledge

PUBLICATIONS:



WICER - Report

Animated Video

From waste to resource - Report

Infographics, Blogs, etc.

www.worldbankgroup.org/wicer

Conferences, Webinars and other events

- Launch of the WICER Report and Initiative – webinar (Sept 2021)
- Keynote at Karachi International Water Conference
- USAID Middle East and Northern Africa (MENA) Infrastructure and Environment virtual workshop
- WaterReuse symposium 2022 session with USEPA
- World Water Forum 2022
- Singapore International Water Week (SIWW) Water Convention 2022
- IWA World Water Congress 2022
- Co-leading session at AWWA ACE22 with USEPA
- Latinosan 2022

www.worldbank.org/wicer

www.worldbank.org/wastetoresource

Documenting relevant case studies

WICER

www.worldbank.org/wicer

Waste to Resource

www.worldbank.org/wastetoresource

WORLD BANK GROUP www.worldbank.org/wicer

Policy Dialogue

- Review of existing regulatory frameworks in Middle East and North Africa, and the Caribbean Regions (wastewater reuse and desalination)
- Dialogue on regulating reuse and circular economy in Colombia & Turkey
- Advice to Senegal on revision of Water and Sanitation Codes
- Policy, Institutional and Regulatory (PIR) assessment to promote unconventional sources of water in South Africa

Developing Tools and Frameworks

Online quick assessment WICER Tool:

Visual results with colors (traffic light) to assess whether the project or city is circular and resilient – is your project WICER?

- To continue
- To improve
- To start doing/exploring

www.wicer-tool.com

Quantifying Economic and Financial Benefits of WICER vs linear system

Economic and financial analysis and prioritization of investments using the WICER framework.

Circularity is not the end goal, but the means to achieve greater outcomes

Sustainability

Jobs created

Restored Ecosystems

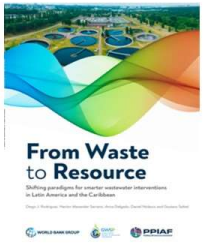
Universal access

Equity

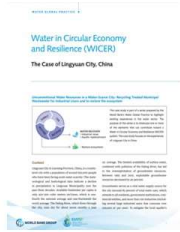
Urban prosperity

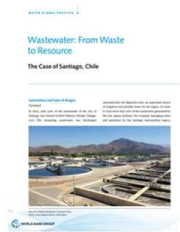
To learn more....

Reports with examples and guidelines to implement the concepts in the water sector



Several case Studies





www.worldbank.org/wicer

www.worldbank.org/wastetoresource

www.wicer-tool.com – check our new online tool!!!

2) 浄化槽（汚水処理施設）は日本のパッケージタイプの汚水処理設備　-‘Swachh Bharat’に貢献-　どのように現場で汚水を処理し再利用するか

（Johkasou-STP, is Packaged Sewage Treatment Plant from Japan -Contribute for ‘Swachh Bharat’- How to Treat waste water at site & Reuse at site）

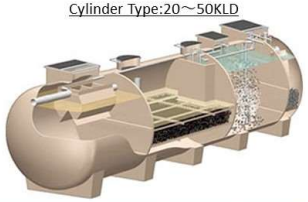
Daiki Axis_ Johkasou-STP

- Johkasou is a de-centralized STP for domestic wastewater treatment, Daiki-Axis Manufacture, Sale, Install & Maintain it in Japan & All over the world

Capsule Type: 1KLD

Capsule Type: 3～25KLD

Cylinder Type:20～50KLD

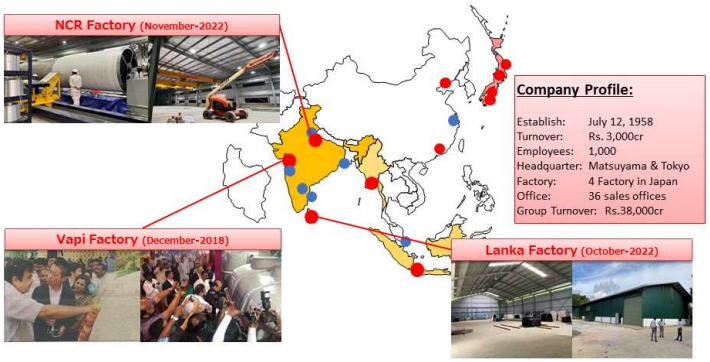


LOW energy consumption (50-75% less)	No need Operator (Auto work)	Quick Maintenance (Monthly 15 min)	
Nitrogen Treatment	No Leak Smell No noisy Sound	No need Equalization Tank	
LOW sludge generation (50% less)	1 day Installation (Plug in play)	Performance guarantee	

Inlet Parameter		AI Outflow	AIJ Outflow	AIM Outflow
6－8	pH	6－8	6－8	6－8
300	BOD	20	10	5
450	COD	100	50	10
240	SS	50	20	5
50	O & G	10	10	5
50	T-N	45	20	10

Daiki Axis_ Company profile

- Daiki Axis focus on onsite treatment system for waste water & drinking water business. And Daiki Axis always try to localize our manufacturing facility & design

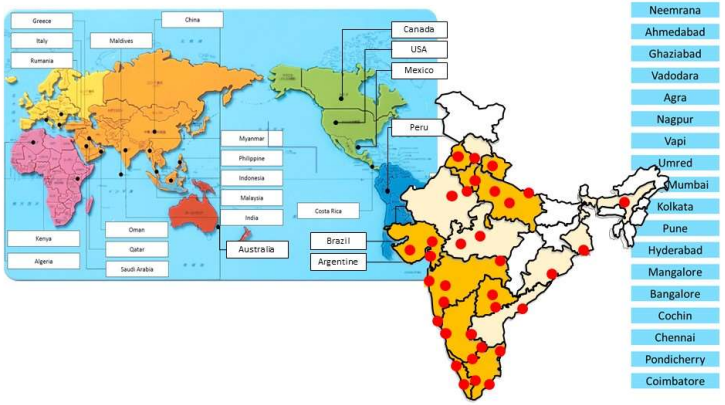


Company Profile:

Establish:	July 12, 1958
Turnover:	Rs. 3,000cr
Employees:	1,000
Headquarter:	Matsuyama & Tokyo
Factory:	4 Factory in Japan
Office:	36 sales offices
Group Turnover:	Rs.38,000cr

Daiki Axis_ sales in the world & India

- We installed over 20 Lakhs units all over the world, and 850 units in India



- New Delhi
- Neemrana
- Ahmedabad
- Ghaziabad
- Vadodara
- Agra
- Nagpur
- Vapi
- Umred
- Mumbai
- Kolkata
- Pune
- Hyderabad
- Mangalore
- Bangalore
- Cochin
- Chennai
- Pondicherry
- Coimbatore

Site references _ above the ground

Site references _ under car parking

Site references _ under the Green area

CAPEX ROI from Running cost_50KLD unit

- ROI point of view, CAPEX will cover with in 1 year from Less electric consumption c

Electric Consumption

		Daiki Axis	Conventional
Units	kW/h	0.744	6.00
	kW/h-day	17.86	144.00
Price	Daily	116.1	936.0
	Yearly	42,363	341,640
Total Units		6.5 Rs/kwh	

	DaikiAxis	Conventional
Pump	0.00	2.25
Blower	0.74	3.75

Rs 1=	1.7 JPY
$1=	115 JPY
$1=	68.0 Rupees

Chemical Goods

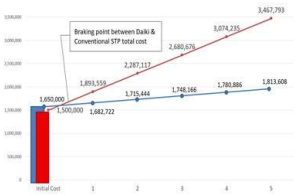
		Daiki Axis		Conventional			
		Chlorine	FeCL	NaOH	Methanol	NaOCL	FeCL
Quantity	Daily Kg/day	0.350	0.070	0.071	0.028	0.558	0.015
	Price Rs./kg	23.5	52.9	29.4	88.2	88.2	52.9
Cost	Daily	8.2	3.7	2.1	2.5	49.2	0.8
	Yearly	3,005.9	1,352.6	757.4	901.8	17,970.9	288.6
Total			4,359				19,919

Maintenance Cost

		Daiki Axis	Conventional
Maintenance Cost	Freqency	1	1
	Price	1,000	2,000
	Yearly	12,000	24,000
Desludging Cost	Freqency	2	4
	Price	2,000	2,000
	Yearly	4,000	8,000
Total		16,000	32,000

Total

	Daiki Axis	Conventional
Electric Consumption	42,363	341,640
Chemical Goods	4,359	19,919
Maintenance Cost	16,000	32,000
Total	52,722	393,559
Yearly Difference		-330,837
5 year Difference		-1,654,184
10 year Difference		-3,308,367



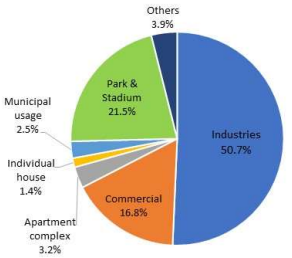
Area where use Johkasou-STP

- From economical & regulation point of view, more than 50% of our sales happen from Industrial client in India

	Sales	Installed
2017年	6	6
2018年	21	21
2019年	51	51
2020年	110	108
2021年	222	214
2022年	337	295
2023年	340	161
	1,087	856

Using Area	Sites	%
Industries	577	53.1%
Commercial	171	15.7%
Apartment complex	33	3.0%
Individual house	14	1.3%
Municipal usage	26	2.4%
Park & Stadium	219	20.1%
Others	47	4.3%
Total	1,087	

Using area of Johkasou-STP in India



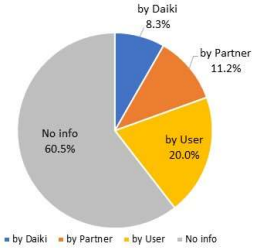
Maintenance status in India

- Maintenance ratio of de-centralized STP in Japan is more than 90%, but same in India is still 40%

	Sales	Installed
2017年	6	6
2018年	21	21
2019年	51	51
2020年	110	108
2021年	222	214
2022年	337	295
2023年	340	161
	1,087	856

Maintenance

by Daiki	by Partner	by User	No info	Total
71	96	171	518	856

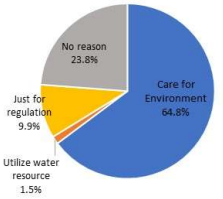


Purpose of water treatment

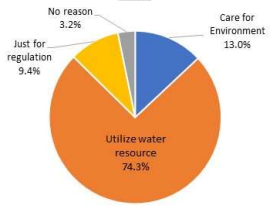
- Primary purpose of water treatment in Japan is just for environment care, but same as in India is re-use of treated water

	Japan	India
Care for Environment	4,641	109
Utilize water resource	104	622
Just for regulation	711	79
No reason	1,704	27
Total	7,160	837

Japan



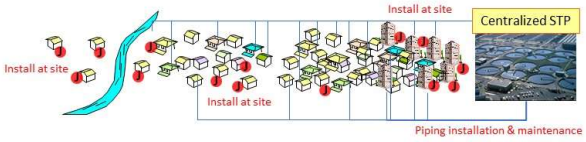
India



Main concept of Johkasou-STP

- 'Treat at site, reuse at site' is main concept of Johkasou-STP, and most suitable concept for Indian demand & circumstances

' Treat at site, reuse at site '



Johkasou STP

- Treat at site, reuse at site
- Following development speed, it can install & increase
- Building by building, block by block it can install
- Small CAPEX

Centralized STP

- Piping cost from house to STP & STP to discharge location
- Based on Long years city development plan
- Pipe maintenance & replacement
- Big CAPEX

Government & municipality activities in India

Delhi govt makes 100% recycling of water mandatory in all its schools

Delhi Govt bans use of groundwater in city parks

Policy matters this week

The proposal for the system has been approved and is likely to be notified later this month.

80,000 parks using 360 MLD water everyday

Government & municipality activities in India

Delhi Jal Board focuses on decentralised sewage treatment plants

Paras Singh | TNN | Updated: Aug 25, 2018, 7:36 IST

Picture used for representational purpose

NEW DELHI: In a major push towards conserving water and replenishing alarmingly dropping groundwater levels, Delhi Jal Board (DJB) has approved a policy for enforcing decentralised waste water treatment systems across the capital.

"Bulk users such as parks, schools, commercial complexes, industries and bigger institutions will be required to install decentralised sewage treatment plants (DSTPs). We will initially provide economic incentives but eventually it will be made mandatory," a senior government official said. DJB will now give 90% rebate on sewer charges for those using such plants for water recycling.

Reference for Reuse_ Greening & Horticulture

Reference for Reuse_ Agriculture

Reference for Reuse_ Construction

Reference for Reuse_ Building usage




Reference for Reuse_ City cleaning




Green certificate in India

- Johkasou-STP is the first Green certificated product in water treatment in India. And awarded many prizes

Skill Development

- Skill development program for water treatment professionals. Education will base up for water industry in India and save the environment

F-STP（Fecal Sludge Treatment）

■ Next step of De-centralized STP, India also need Sludge treatment system very soon, so we suggest basic but low energy consumption process

Step 1	Step 2	Step 3	Step 4
Sample Check (Labo test)	Evaporation test	Coagulation test	Demo machine
BOD, COD, SS Fluctuation of the FS Quality	Understand Organic & Inorganic ratio	Understand matching the type of polymer & density	Dehydrated water goes to Labo. And check water quality

Main Process of Fecal Sludge Treatment

■ Main Process and treatment level of each stage in Fecal Sludge Treatment. Important and Unique stage is Screw Press and Johkasou-STP

	Bar screen	Remove TSS	Biological Treatment	Remove Color & odor
	Remove big verticals	Reduce SS	Treat BOD, COD, Nitrogen	Reduce Color & Smell
BOD	1,000~2,000	250~350	10~20	Less than 10
COD	4,000~6,000	400~600	50~75	30~50
TSS	10,000~20,000	300~600	20~30	Less than 10

3) 浄化槽による処理水の循環利用（Recycling of treated water by Johkasou）

Recycling of treated water by Johkasou

Shaping a New Journey

KANSAI AIRPORTS

Kansai Airports (KAP)

Operator	KANSAI AIRPORTS Concession period KIX and ITAMI : 44 years (April 2016 - March 2060) KOBE : 42 years (April 2018 - March 2060)
	Operating right ⇔ Consideration for operating right
Owner	- New Kansai International Airport Company (NKIAC) - Kobe city Ownership of airport assets such as runways

＊KAP shareholders

ORIX 40% | VINCI Airports 40%

Others 20% 30 companies

KANSAI AIRPORTS 1

Overview of our airports

Kobe Airport (UKB)

PAX	3.3 million in FY2019
Hours	16 hours (7:00 to 23:00)
Runway	2,500 m
Notes	Offshore airport (8 km south of Sannomiya)
ATM	32,825 times in FY2019

Osaka International Airport (ITM)

PAX	15.8 million in FY2019
Hours	14 hours (7:00 to 21:00)
Runway	3,000 m & 1,828 m
Notes	Urban airport (11 km from central Osaka in a straight-line distance)
ATM	137,196 times in FY2019

Kansai International Airport (KIX)

PAX	28.8 million in FY2019
Hours	24 hours a day
Runway	3,500 m & 4,000 m
Notes	Offshore airport (almost no noise issues)
ATM	196,022 times in FY2019

Annual ATMs 366,043

Annual PAX 47.8 million

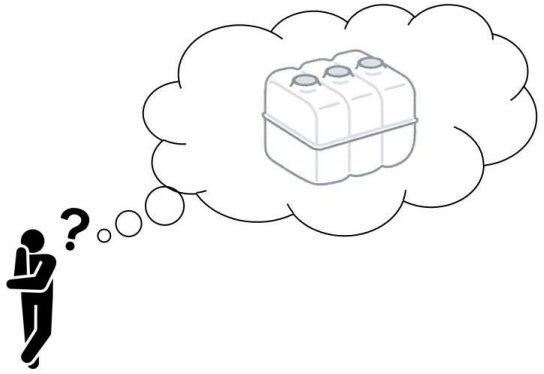
KANSAI AIRPORTS

＊PAX: Number of passengers
＊ATM: Aircraft movements

2

We operate Japan's largest (world's largest?) Johkasou

Japan's largest Johkasou?



KANSAI AIRPORTS 3

History of Kansai International Airport (KIX)

1960s – 1980s Problems at Itami Airport
- Annoying facility (noise pollution)
- Deficient capacity due to restricted air traffic

1962 Wiseman Report

(Japan-UN joint survey)

A new airport to ease the increasing burden borne by Itami Airport should be planned in the Hanshin Metropolitan Area.

1969 Itami Airport noise pollution lawsuit

Pollution lawsuit by which neighboring residents called for flight suspension from 9 pm onwards as well as damage compensation. Settled in 1981.

1982 Condemnation by the US

Continental Airlines could not fly into Itami Airport, condemning the delayed development of airports in Japan as a non-tariff barrier.

History of Kansai International Airport (KIX)

Difficulty in selecting a relocation site
- Annoying facility (opposition by residents against welcoming an airport)
- Concerns over municipalities-borne burden associated with infrastructure development

1974 Government selected the best candidate site
1981 Presented airport data for local consent

(Presented Airport Development Plan to locals)
- Airport development plan
- Environment impact assessment plan
- Philosophy for local preparation

1982 Local consent obtained
1987 Construction started

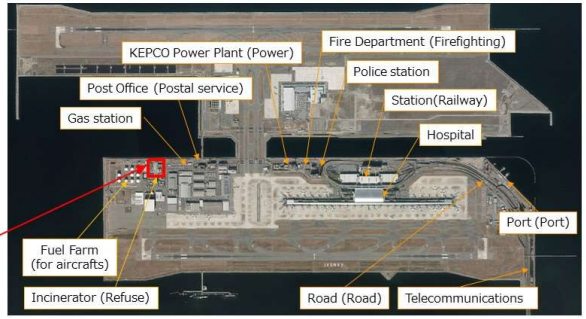
1994 Airport opened

Wastewater/waste generated in the airport island should be treated in the airport
- **Construct and operate a water treatment units**
- Construct and operate incinerators…

Lower the amount of load (T-N, T-P, etc.) caused by the treated water discharged into Osaka Bay (enclosed water area)
- Advanced treatment
- **Re-use of treated water on the island…**

KIX Johkasou

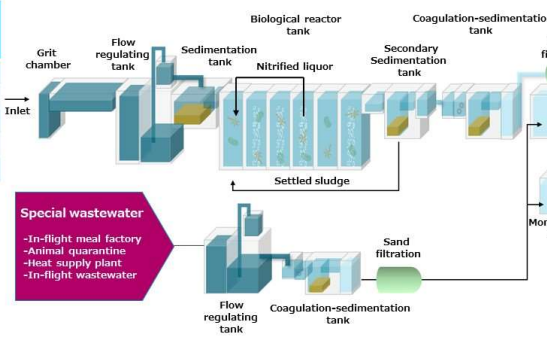
KIX Johkasou	
Type	Domestic wastewater treatment unit
Method	Recycled nitrification/denitrification process
Design Capacity	38,500 PE
Inflow	10,050m³/day



KIX Johkasou

Influent water

Item	Influent water quality [mg/L]
BOD	210
COD	140
SS	150
T-N	70
T-P	7.7



Recycled water (into building)

Item	Water quality standards
Residual chlorine	More than 0.2% *At building end

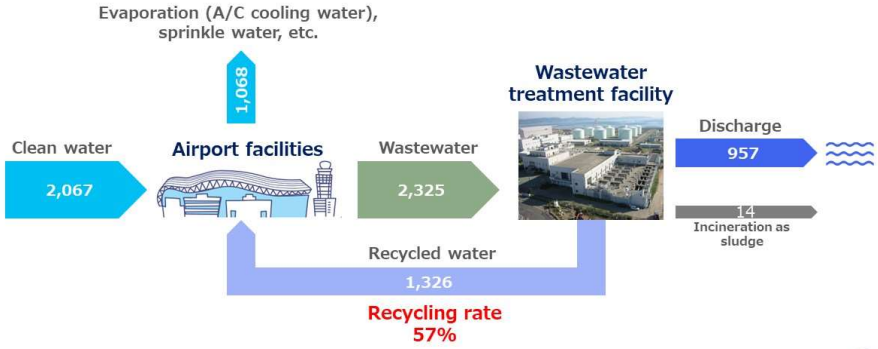
Discharged water (into ocean)

Item	Discharged water quality [mg/L]	Voluntary standards [mg/L]
BOD	10	4.9
COD	19	10
SS	15	3
T-N	15	13.1
T-P	1	0.39

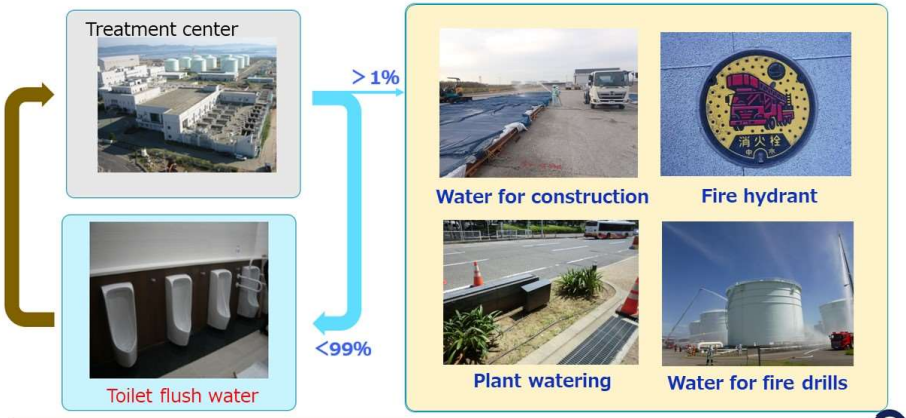
*The law restricts the total volume of N and P to be discharged into the ocean because the discharge destination is the enclosed water area.

KIX Johkasou

Water balance for FY2019 [m³/day]



Use of recycled water

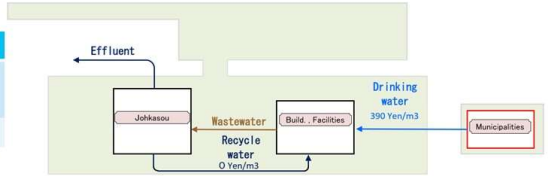


Pros and cons of using recycled water

☞Pros

1)Cut on water bill

Clean water	Recycled water
Purchase from the municipality on the opposite shore	Use treated water (effluent)
390 JPY/m³	0 JPY/m³



*If recycled water of 1,000m³/day is used, water bill will be cut by 390,000 JPY/day

2)Reduced environmental footprints

The total volume of N and P to be discharged into the waters can be reduced by recycling the treated water rather than discharging it.

*If the recycled water of 1,000m³/day is used, rather than being discharged,
(1) T-N : 1,000[m³/d]×13.1[mg/l] = 13.1[kg/d]
(2) T-P : 1,000[m³/d]×0.39[mg/l] = 0.39[kg/d]

Pros and cons of using recycled water

☞Cons

Large initial investment cost

: Recycled water piping
✓ Φ400×Approx. 12km pipe laid (at opening) —
✓ 30kW×3 pump units installed (in the treatment center)

: Passenger terminal building (PTB) (example)
✓ Water receiving tank dedicated to recycled water is required
✓ Piping to each toilet needs to be installed

Recycled water piping in red box (developed in 1994) : Approx. 600M JPY

Recycled water piping in PTB (developed in 1994) : Approx. 500M JPY
->Including the piping for other buildings Approx. 1B JPY (assumed)

(Investment at airport opening) Approx. 1.6B JPY

☞If recycled water of 1,000m3/day was used to replace clean water, the payment of the water bill: 390,000 JPY/day would not be required; hence, the investment could be recovered in **approx. 12 years**.
(In disregard of the maintenance and operation costs, taxes and public dues, interests, etc.)

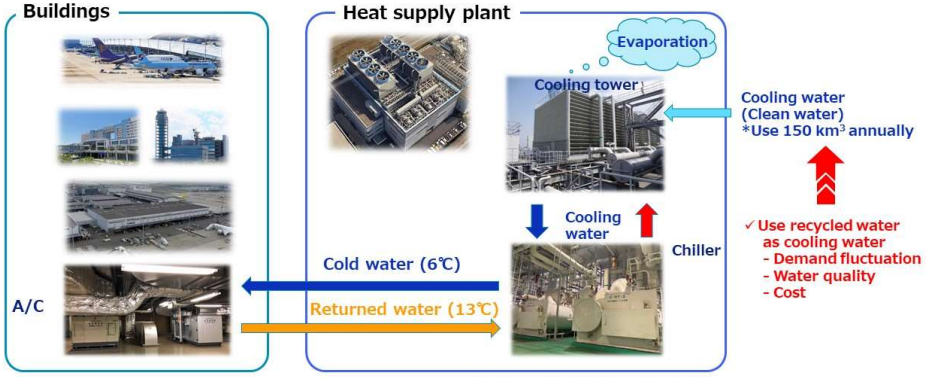
Pros and cons of using recycled water

☞Cons

Chromaticity

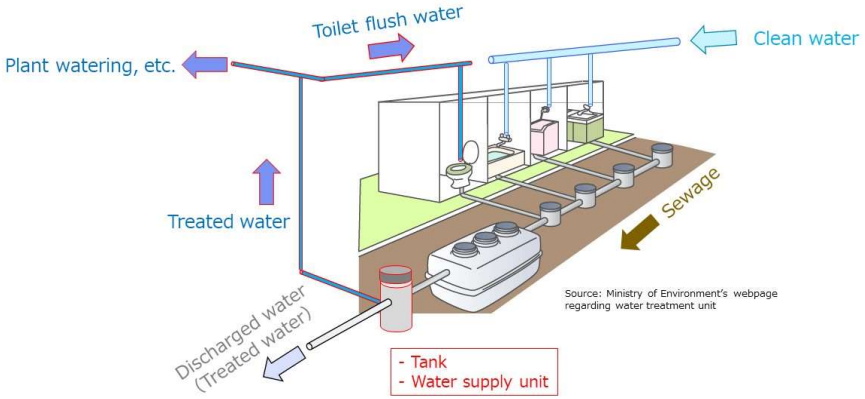
- ✓ Recycled water, affected by humic substances in sewage, somewhat turns yellow. Normal treatment cannot eliminate the substances.
- ☞ Solutions include membrane treatment and ozone treatment which we initially considered implementing. But, we decided against it due to their high cost.

Future vision Further increase the rate of recycled water use



Produce cold water for cooling buildings, and supply/return the water as an A/C refrigerant to/from buildings

Pros and cons of using recycled water



Source: Ministry of Environment's webpage regarding water treatment unit

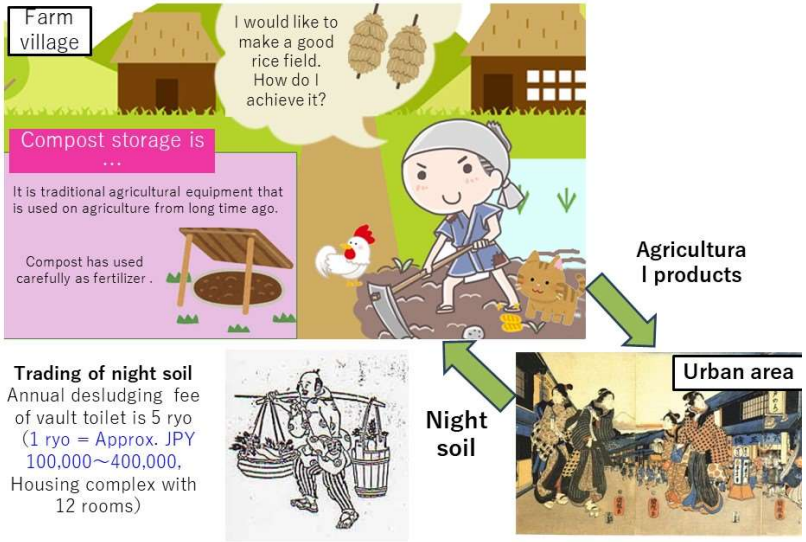
4) 下水処理水を活用した酒造好適米栽培に関する社会実装型研究 ―環境配慮型清酒「酔思源」誕生！―（Social implementation research on cultivation of rice suitable for sake brewing by effluent from large scale Johkasou -Eco-friendly sake “Sui Shigen” is newly released! -）

11th International Workshop on Decentralized Wastewater Treatment in Asia

Social implementation research on cultivation of rice suitable for sake brewing by effluent from large scale Johkasou
—Eco-friendly sake “Sui Shigen” is newly released！—

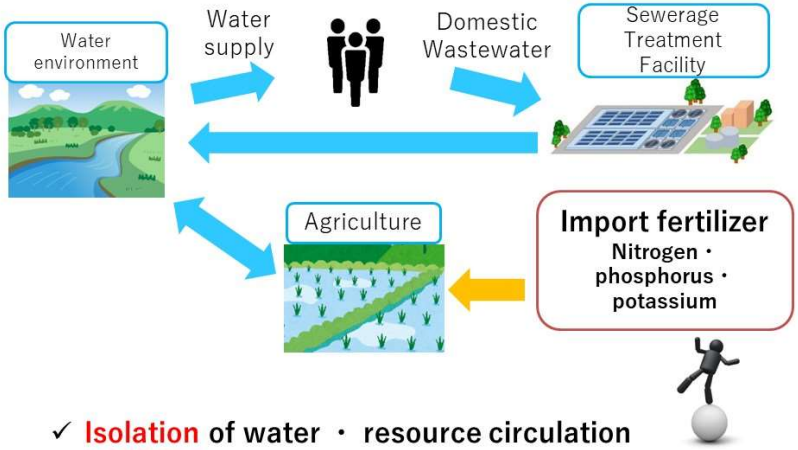
Dr. Shuhei Masuda
Associate Professor, Civil Engineering and Architecture, Department of Creative Systems Engineering, National Institute of Technology Akita College

Medieval Japan：Realization of a resource recycling society by sewerage resource and agriculture



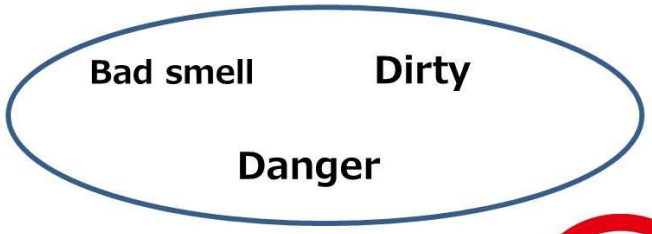
- ✓ Goals for sustainable development
- ✓ Resource circulation in whole society is one of the important themes

Modern times：Disconnection of sewerage system and agriculture



- ✓ Isolation of water ・ resource circulation
- ✓ Agriculture depends on import fertilizer

Formation of stereotype on sewerage resource



Using for agriculture is outrageous!

Advanced treatment : There are cases that require much energy to remove nitrogen and phosphorus

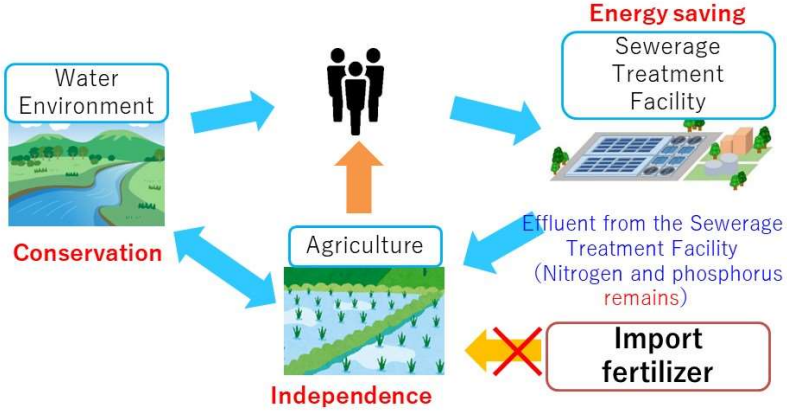
Prevention of hyper bloom of algae
(Prevention of Eutrophication)

Domestic Wastewater Treatment is…

- ✓ **Scientifically safe water** that is implemented by biological treatment and disinfection
- ✓ Containing **nitrogen and phosphorus** can be used as nutrition for plant

It's possible to utilize in hygienically condition as agricultural fertilizer

Vision : Goal of resource circulation



Establishment of sustainable regional community by circulation of water & resource and preservation of environment

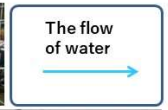
Idea got in Akita prefecture

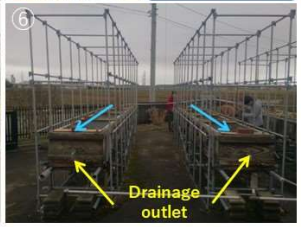
×

Effluent from the Sewerage Treatment Facility
×
Rice suitable for sake brewing （brewer's rice）
×
Sake

Test in the pilot paddy field （brewer's rice "Akita Sake Komachi" × effluent from the Sewerage Treatment Facility）

○Experiment with Reactor（effluent＋rain water）





○Experiment with pot in greenhouse（effluent＋tap water）

History

FY 2017～2019　Test in the pilot paddy field：evaluation of safety
FY 2020～ongoing　Test in the actual paddy field：evaluation of quality & technology

Safety：Influence of heavy metal for soil and unpolished rice

unit：mg/kg

	Item	Measured value	Standard value
Act to Prevent Soil Contamination on Agricultural Land Control standards for the prevention of the accumulation of heavy metals in the soils in the farmland	**Cadmium** (**Rice**：35 samples, 2017～2019)	**0.02** ✓ (Max：0.07)	**0.4**
	Copper (**soil**：2 years)	16.1→**8.8** ✓	**125**
	Arsenic (**Soil**：2 years)	4.8→**4.8** ✓	**15**
	Zink (**Soil**：2 years)	85.0→**84.1** ✓	**120**

Risk of heavy metal by irrigation of effluent is low

NEXT STEP：Search for the paddy field for demonstration

Condition

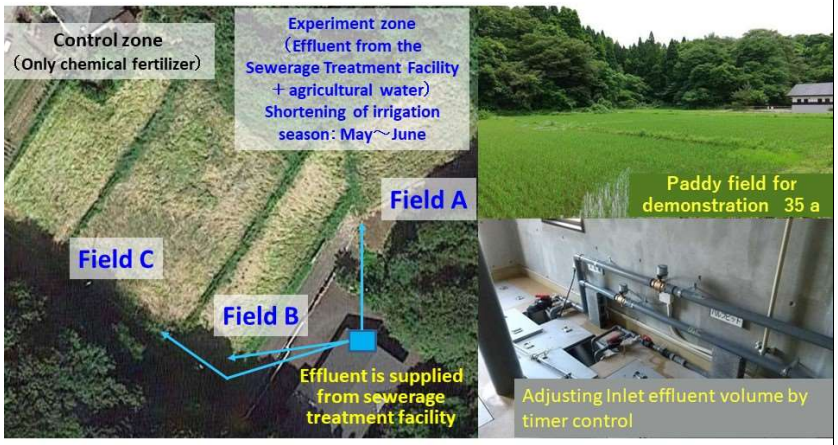
① Paddy field shall be located nearby the sewerage treatment facility
② Can get approval by farmers
③ Irrigation of effluent in paddy field shall not affect to the around water supply

Water and Sewer Bureau in Akita city
↓
Officers of municipal government in Akita city
↓
Introduction of agricultural worker

Source：Tohoku Regional Agricultural Administration Office website

Status of growth

Activities in the actual paddy field（FY 2021）



- ✓ Scale up to 35 a
- ✓ No chemical fertilizer・cultivating brewer's rice by effluent from the Sewerage Treatment Facility＋ irrigation water
- ✓ Load of effluent from the Sewerage Treatment Facility: Field A＜Field B＜Field C

Quality of harvest

	Experiment zone（Average of 3 fields）	Judge	Control zone
Crude protein（6.5～8.0%）	8.9%	△	8.2%
Thousand kernel weight（Less than 28.5g）	26.8g	○	27.1g
Percentage of whole grain（More than 65%）	78.9%	○	77.5%
Cadmium（0.4 mg/kg）	0.06 mg/kg	○	<0.05 mg/kg

- ✓ Total amount of harvest：1.4 t（first class rice）
- ✓ Little higher value of Crude protein in experiment zone however, it is in the permissible range

Towards the Brewing !

Dewatsuru Sake Brewery agreed with the purpose of this project and readily agreed to brew it.（…but requires capital）

Eco-friendly Sake：“酔思源” has debut !

Sui Shi Gen

The name of sake is derived from 「飲水思源 (In Sui Shi Gen)」 which is an idiom made from historical events of China.

National Institute of Technology Akita College x Dewazuru Released in April 2020

飲水思源 (In Sui Shi Gen) ～ Those who drink it should remind of its source.～

Statue by Lake Tazawa

Sake tasting reviews: Gorgeous *ginjoko*, refreshing sour taste, and good balance of rice flavor.

Crowdfunding （FAN AKITA）

*Currently renamed to SCOP

From 1- February to 15-March 2020, 2,168,000 JPY (from 290 people) was collected. Also received support from local businesses.

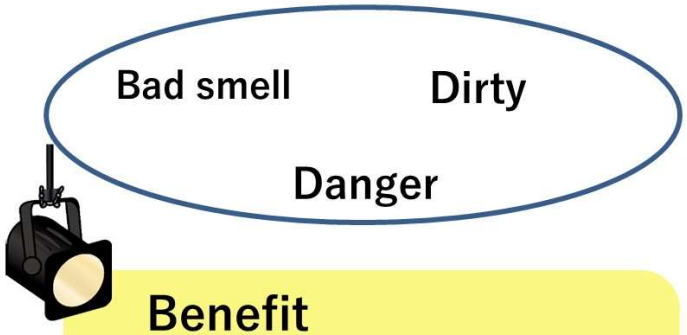
Thank you !

Collaboration with Students

Source: 15-February, 2022, Akita Kai Shimpo

- ✓ Practical studies with actual & onsite experience
- ✓ Education for sustainable development （ESD）
  ; Diversity, Mutuality, Finiteness, Fairness, Collaboration, Responsibility

Image against sewage resources



Benefit

- Circulating use of local resources
- Reducing environmental impact
- Features (ethical consumption)

Acknowledgment

- Akita City Water and Sewerage Bureau
- Akita Prefecture Construction Bureau Sewerage Management Division
- Akita Research Institute for Food and Brewing
- Agricultural cooperative corporation Murakoshi Nosan
- Nissui Con Co., Ltd.
- Nippon Denki Kogyo Co., Ltd.
- Yuai Building Service Co., Ltd.

Part of the content of this presentation was supported by a Sumitomo Foundation Environmental Grant.

Thank you for your attention

5) 浄化槽と簡易ＢＧＦ水路を組み合わせた生活排水の高度処理－野菜や果物の生産と安全性の検討－（Advanced treatment of domestic wastewater using a combination of Johkasou and simple BGF - Examination of production and safety of vegetables and fruits -）

Advanced treatment of domestic wastewater using a combination of Johkasou and simple BGF ditch

- Examination of production and safety of vegetables and fruits -

11th August, 1996

Dr. Yasuo Ozaki
Professor Emeritus, Akita Prefectural University

2. The prototype of BGF ditch and its feature

Prototype simple BGF ditch

W ; 59cm, L ; 5.46m, H ; 31.5cm

①Prototype simple BGF ditch: Create a ditch using waterproof plywood and rubber sheet. Filled with pumice to a height of 28 cm.

② Effluent inlet; The waterway was filled with pumice to a height of 28 cm. (upper part; Particle size 2～6m, bottom part; Particle size 6～11mm)

④Feature: The inflowing effluent from a Johkasou flows down through the pumice stone and flows from the outlet through the PVC pipe into the biotope pond. Therefore, effluent does not rise to the surface layer of the ditch.

③Water outlet: The water depth was set to 17cm. Runoff water passes through PVC pipes and flows into the biotope pond.

1. Purpose of the Research

The presenters developed a BGF ditch (Biogeofilter ditch) that combines useful plants and natural mineral filter media in order to recycle fertilizer components in Johkasou effluent. We have conducted research on combination of useful plants etc., to obtain stable treated domestic wastewater quality throughout the year.[1)]

After retiring, I installed a simple BGF ditch at my home in Tsukuba City in November 2016 using materials that could be purchased at DIY store in order to spread the utilization of BGF ditch, and conducting advanced treatment tests for Johkasou effluent using vegetables, fruits, flowers, etc. We are considering for vegetables and fruits that are suitable for this system, and considering annual cultivation management methods.[2),3)]

I investigated the results of surveys of 2018 and 2023, the safety of harvested vegetables and fruits by referring to the International Organization for Standardization's Guidelines for Irrigation Use of Treated Wastewater[4)] (ISO Guidelines). In this presentation, I will report the summary of the results.

3. Method of the research

☆ Advanced treatment type Johkasou (CENeco-5 type) installed in October 2016.

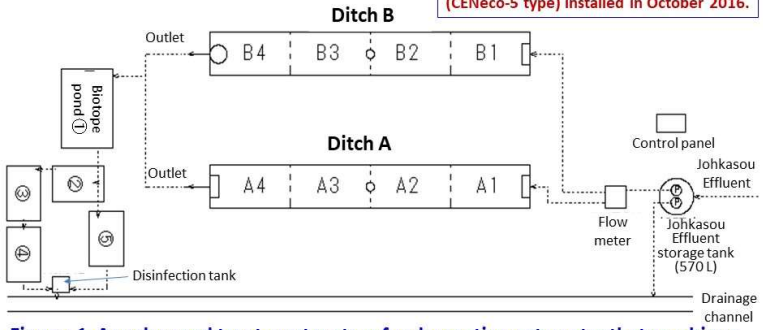


Figure. 1 An advanced treatment system for domestic wastewater that combines a Johkasou, a simple BGF ditch, and a biotope pond.

- **Simple BGF ditch : W ; 59 cm, L ; 5.46 m, H ; 31.5 cm, water depth 17 cm, capacity of retention water: approx. 302 L**
- **Pumice filling height : 28 cm. Fill 450 L of small grains (2 to 6 mm) on top of 450 L of medium grains (6 to 11 mm).**
- **Biotope pond water capacity: approx. 570 L, water area: approx. 2.5 m²**

○ Operation and Maintenance of Johkasou and simple BGF ditch

A fixed amount of Johkasou effluent (see Table 1) is supplied to two lines of simple BGF ditch by a submersible pump every day under timer control (e.g., supplied for 10 minutes, stopped for 50 minutes).

Table. 1 Johkasou operation management method in 2018 and average supply amount of Johkasou effluent (L/day)

survey period	Ditch A (Flowers/ Conifer)	Ditch B (vegetables/ fruits)	Johkasou operation management method
9 April to 17 April	161	160	5-June: Reduce circulating water volume (6.5Q→2.5Q)
18 April to 17 July	258	268	17-July: Continuous aeration → changed to intermittent aeration
18 July to 27 September	238	343	12-September: Intermittent aeration → return to continuous aeration
28 September to 18 March	236	238	2-October: Increase circulating water volume (2.5Q →6.5Q)

survey period ：9-April, 2018 to 18-March, 2019, Q: Inlet water of Johkasou (L/day)

○ Water sampling and Analyzing

- Water sampling was conducted at six points: the treated water storage tank, the midpoint and outlet of both A&B ditches, and biotope pond ②.
- Sampling was conducted 2-3 times a month. Analysis items include COD, SS, nitrogen, and phosphorus. Water sampling will be postponed if rainfall exceeds 10 mm in the three days before water sampling.

4. Research Results in FY 2018

○ Growth status and harvested melons on July 9th

Ditch A　Ditch B

Melon (section B1)

Leaf lettuce, Tomato (section B3)

Asparagus bean, Water convolvulus (Section B3 and B4)

Ditch B (vegetable)

Outlet ←	Water convolvulus (4 plants)	Asparagus bean (5 plants)	Leaf lettuce	Passion fruit (2 plants)
	Molokheiya (4 plants) Taro	Leaf lettuce	Basil (3plants) Tomato (1 plant)	Basil (5 plants) → Inlet
	Water convolvulus (4 plants)	Tomato (3 plants)	Tomato (3 plants)	Melon (2 plants) Edible chrysanthemum
	B4	B3	B2	B1

Ditch A (Flowers/Conifer)

Outlet ←	Zinnia (2 plants)	Torenia (1 plant)	Petunia (4 plant)	Zinnia (2 plants)
	Sunpatience (1 plant)	Gazania (2 plants)	Kochia (3 plants)	Lobelia (4 plants) → Inlet
	Bidens (1 plant)	Marigold (6 plants)	Dwarf sunflower (6 plants)	Bidens (1 plant)
	A4	A3	A2	A1

Figure. 2 An example of planting vegetables and flowers in Ditch A and B (mid-June to September 2018)
Conifer planting location : Al; Red star, A2; Gold crest, A3,A4; Elegante sima

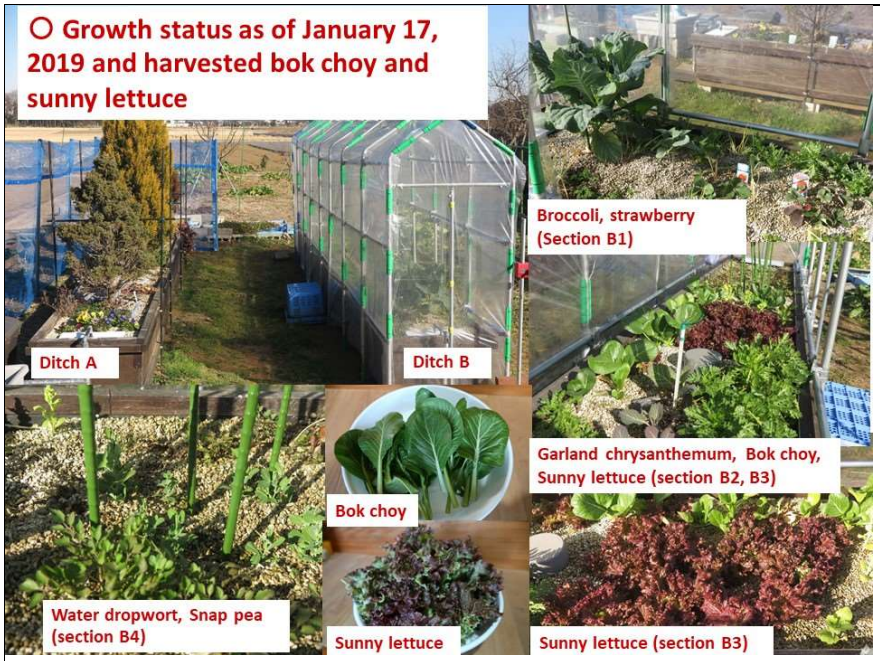
☆After harvesting the vegetables and flowers planted in each plot, the next vegetables and flowers were immediately transplanted.

○ Growth status and harvested passion fruit on September 12th

Ditch A　Ditch B　Harvested passion fruit（section B1）

Passion fruit and Basil (Section B1)　Water convolvulus, Taro, Asparagus bean (section B3, B4)

○ Growth status as of January 17, 2019 and harvested bok choy and sunny lettuce



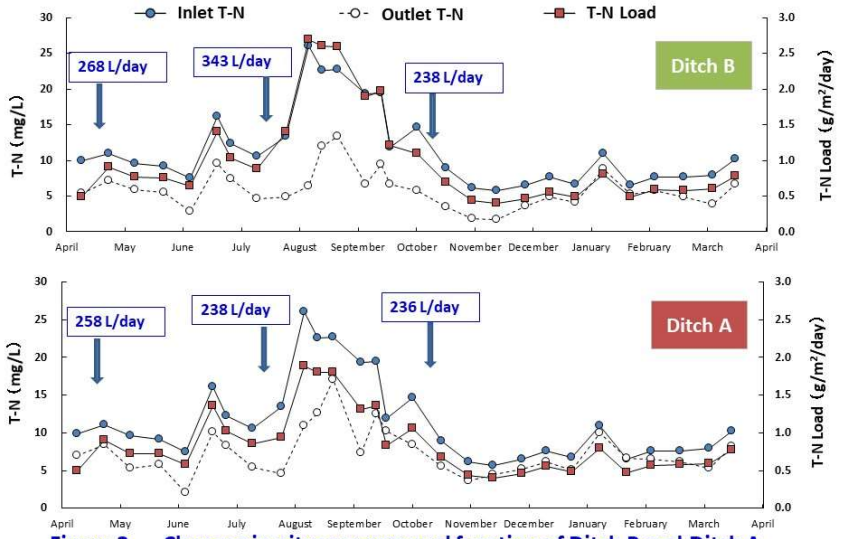


Figure 3. Changes in nitrogen removal function of Ditch B and Ditch A (April 2018 to March 2019)

○ Growth status of Flowers/Conifer (Ditch A)

Table. 2 Nitrogen removal results of simple BGF Ditch (April 9, 2018 to March 18, 2019)

Ditch	survey period	Average nitrogen load ($g/m^2 \cdot day$)	Average T-N concentration of Inlet water (mg/L)	Average T-N concentration of Outlet water (mg/L)	Average nitrogen removal rate ($g/m^2 \cdot day$)	Removal ratio (%)
Vegetables/ Fruits (Ditch B)	Spring(9-April to 22-May)	0.73	9.9	6.0	0.28	38.4
	Early summer (5-June to 10-July)	0.99	11.6	6.1	0.47	47.5
	Summer (25-July to 13-September)	2.35	22.0	9.6	1.31	55.7
	Autumn (18-September to 13-November)	0.66	8.9	3.2	0.42	63.6
	Winter (28-November to 19-February)	0.58	7.9	5.4	0.19	32.8
	Early spring (6-March to 18-March	0.69	9.1	5.3	0.29	42.0
Flowers/ Conifer (Ditch A)	Spring(9-April to 22-May)	0.71	9.9	6.6	0.24	33.8
	Early summer (5-June to 10-July)	0.95	11.6	6.5	0.42	44.2
	Summer (25-July to 13-September)	1.63	22.0	12.1	0.73	44.8
	Autumn (18-September to 13-November)	0.65	8.9	5.5	0.24	36.9
	Winter (28-November to 19-February)	0.58	7.9	6.6	0.10	17.2
	Early spring (6-March to 18-March	0.68	9.1	6.8	0.17	25.0

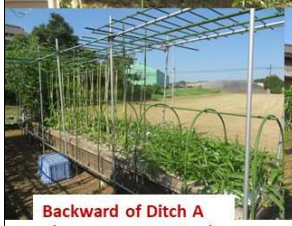
Water sampling and analysis were conducted 2 to 3 times a month, 28 samples in total.

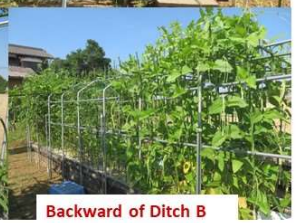
Table. 3 Average concentration and removal ratio of COD, SS, nitrogen, phosphorus, etc. in inlet and outlet water during the survey period

Items	Inlet water (Johkasou effluent,mg/L)	Outlet water (mg/L)	
		Vegetables/ Fruits (Ditch B)	Flowers/ Conifer (Ditch A)
COD_{Mn}	10.2	6.3 (38.2)	5.9 (42.2)
SS	0.5	0.0 (100)	0.0 (100)
T-N	11.7	6.0 (48.7)	7.5 (35.9)
NO_3-N	10.3	5.5 (46.6)	6.9 (33.0)
T-P	4.8	3.7 (22.9)	3.9 (18.8)
PO_4-P	4.8	3.7 (22.9)	3.9 (18.8)
K	13.9	10.1 (27.3)	12.2 (12.2)
Ca	12.3	11.0 (10.6)	11.7 (4.9)
Mg	6.3	5.8 (7.9)	6.1 (3.2)

- Survey period: April 9, 2018 to March 18, 2019, average value of 28 samples in total
- ( ) is the annual average removal ratio

○Growth status on July 25th and harvested Molokheiya, Asparagus bean, and tomatoes


Backward of Ditch A (Water convolvulus)


Backward of Ditch B (Asparagus bean)


Tomato (section A1)


Molokheiya : 181 g
Asparagus bean : 625 g


Tomato (A1: 3150 g, B1: 580 g)

5. Research Results in FY 2023

○ Growth status and harvested sunny lettuce on June 5th


Tomato and Passion fruit (section A1)


Calla and Manchurian wild rice (biotope pond)

forward backward


The grass is taller towards the forward of the ditch.
Corn (section A2 & A3)


Kidney bean and sunny lettuce (section B3)


Harvested sunny lettuce (234 g, section B3)

6. Safety consideration based on ISO guidelines

Table 4. Water quality of treated wastewater and crops that can be used as irrigation water (ISO guidelines)

category (Quality of effluent)	BOD (mg/L)		SS (mg/L)		fecal coliform bacteria (N/100mL)		available crops
	Ave.	Max.	Ave.	Max.	95% ile.	Max.	
A (Very high quality)	≦5	10	≦5	10	≦10 or below the detection limit	100	vegetables consumed raw
B (High quality)	≦10	20	≦10	25	≦200	1,000	processed food crops
C (Good quality)	≦20	35	≦30	50	≦1000	10,000	non-food crops
D (Medium quality)	≦60	100	≦90	140	-	-	industrial and seeded crops

Excerpt from ISO 16075-2, Table 1 (2020)

Table 5. Water quality classification of treated wastewater and number of barrier points required for irrigation of each crop

Crop type	Category of treated wastewater			
	A	B	C	D
Vegetables consumed raw	0	1	3	Prohibit to use
Processing crops, pasture	0	0	2	Prohibit to use
fruit trees, garden crops	0	0	1	3
seeded crops, feed crops	0	0	0	1

Excerpt from ISO 16075-2, Table 3 (2020)

Table 6. Barriers that help improve safety and their scores (example)

Type of barriers	Number of barriers
(1) Drip irrigation using a protective sheet to prevent irrigation water from adhering to crops	1
(2) Cleaning crops with potable water before sale	1
(3) Irrigation cessation or interruption before harvest	1 to 2
(4) Underground drip irrigation at a depth where irrigation water does not rise to the ground surface due to capillary action	3

Excerpt from ISO 16075-2, Table 2 (2020)

In the BGF Ditch, pumice is filled to a height of 28 cm and the water level is maintained at 17 cm, so the effluent from the Johkasou (inlet water) does not rise to the surface of the pumice. For this reason, BGF Ditches are considered to correspond to the 3 points of the barrier similar to underground drip irrigation in the ISO guidelines. Therefore, it is suggested that even vegetables produced in the BGF Ditch into which Category C treated wastewater flows can be used for raw consumption.

At my house, an advanced treatment type Johkasou has been installed so that keeps the BDD and SS concentrations of effluent below than 10 mg/L (performance evaluation value). For this reason, it is thought that effluent with a quality close to Category B is being supplied to the simple BGF Ditch, which is presumed to bring safer.

In addition, in order to safely eat the vegetables and fruits we harvest, our family is reviewing our lifestyle, including refraining from using chemical substances that may have a negative impact on the environment.[2] For this reason, food poisoning caused by harvested raw vegetables such as sunny lettuce, tomatoes, and strawberries has never occurred.

Acknowledgment

I received the cooperation of Ms. Akiko Nagaoka, Dr. Tsuyoshi Ichinari, Dr. Masashi Goto, and many others from FujiClean Co., Ltd for the installation of the Johkasou and water quality analysis. I sincerely thank you for your long-term cooperation.

References

1) Y. Ozaki: Japan Agricultural Research Quarterly, 33(4), 243–249 (1999)
2) Yasuo Ozaki: Journal of Johkasou, October 2019 issue, No. 522, 32–38
3) Yasuo Ozaki: Johkaasou Research, 32 (1), 1–8 (2022)
4) International Standard, ISO 16075-2(2020-11)

Thank you for your attention !

passion fruit

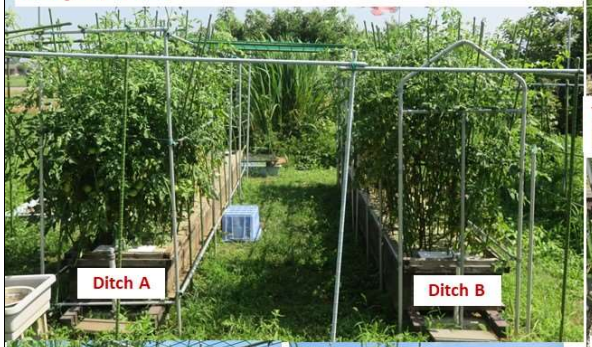
strawberry

7. Summary

1. By supplying Johkasou effluent to the simple BGF Ditch, it was able to produce a wide variety of vegetables and fruits, including sunny lettuce, tomatoes, Asparagus bean , passion fruit, and strawberries.
2. The nitrogen removal rate from Ditch B (Vegetables/Fruits) during the summer when biomass is actively growing was 1.31 g/m^2/day, approximately 1.8 times higher than that of Ditch A (flower/conifer).
3. According to the ISO guidelines, it was suggested that raw vegetables and fruits such as sunny lettuce, tomatoes, and strawberries produced using simple BGF Ditch can be safely consumed.
4. This purification system is an energy-saving and resource-recycling purification system for domestic wastewater that complies with the SDGs, so we would like you to plant crops that suit the characteristics of each region and use it to conserve the water environment and resource recycling.
5. In order to safely eat harvested vegetables and fruits, it is important to review our lifestyles, such as refraining from using chemical substances that may have a negative impact on the environment.

Animals and plants that live in the biotope pond (August 24, 2017)

○ Growth status and harvested corn on July 9, 2023



Ditch A (Tomato, Passion fruit, etc.)

Ditch B (Tomato, Passion fruit, etc.)

Transplanted Asparagus bean (section A2 & A3)

Transplanted Corn (section B3)

Corn (A2: 1,500 g, A3: 1,170 g)

Growth status of tomatoes, passion fruits, etc. (7/17)

Growth status of sunny lettuce, kidney beans, etc. (May 28)

Examples of vegetables and fruits harvested using a simple BGF Ditch (FY 2021, Tsukuba City, Ibaraki Prefecture)

Snap peas（7-April）

Strawberry（23-April）

Leaf lettuce (18-May)

Garland chrysanthemum(18-May)

Sunny lettuce (20-May)

Kidney bean (19-June)

Tomato and Asparagus bean (24-July)

Passion fruit (18-August)

6) 浄化槽法の仕組み（Mechanisms of Johkasou Act）

Mechanisms of Johkasou Act

28th November, 2023

Mr. Ryoma SATO
Section Chief, Office for Promotion of Johkasou

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

環境省
Ministry of the Environment
Government of Japan

https://www.env.go.jp/recycle/jokaso/

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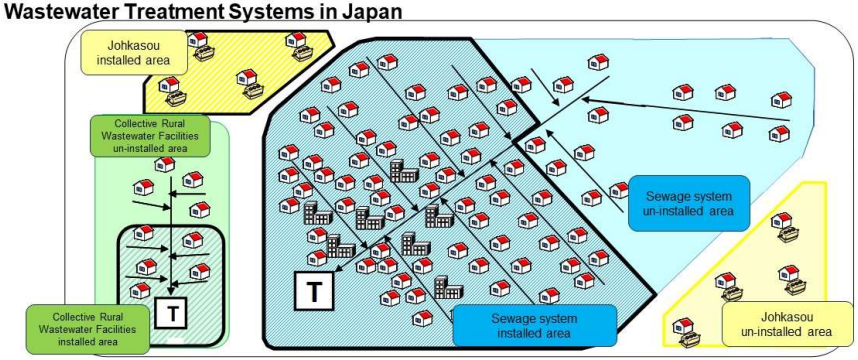
1. General Information of Johkasou in Japan

■ **Wastewater Treatment Systems in Japan**



- **Sewage System** : managed by the Ministry of Land, Infrastructure, Transport and Tourism
- **Collective Rural Wastewater Facilities** : managed by the Ministry of Agriculture, Forestry and Fisheries
- **Johkasou**: managed by the Ministry of the Environment

3

1. General Information of Johkasou in Japan

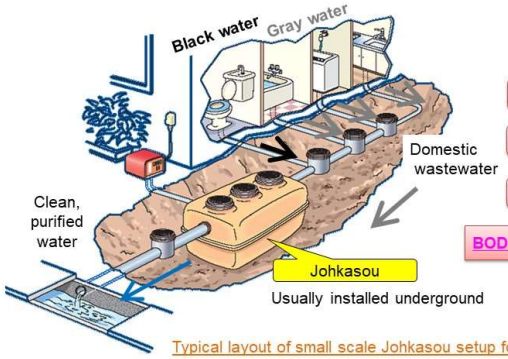
■ **Current situation of population served for treating domestic wastewater by different wastewater treatment facilities in Japan**

Type of treatment facility	Population served (x 1,000 people)	
	End of FY2022	End of FY2021
Municipal sewage systems	101,280 (81.0%)	101,181 (80.6%)
Collective rural wastewater facilities including Facilities for fishing villages, Facilities for forestry villages, Simple wastewater facilities	3,018 (2.4%)	3,103 (2.4%)
Johkasou	11,784 (9.4%)	11,758 (9.4%)
Municipal Johkasou Installation Program	825	831
Johkasou Installation and Maintenance Program	6,229	6,203
Other Johkasou	4,730	4,725
Community plants, etc.	160 (0.1%)	171 (0.1%)
Total population served	116,242	116,213
Percentage of population served	92.9%	92.6%
Total population	125,065	125,540
Total population not served	8,823	9,327
Un-installed rate	7.1%	7.4%

4

1. General Information of Johkasou in Japan

- "Johkasou" is categorized as decentralized wastewater treatment system for domestic wastewater discharged by household, building and so-on."
- Johkasou have a combined purification structure capable of treating both night soil (black water) and miscellaneous wastewater (gray water)
- Johkasou attains high and stable performance as same as that of sewage treatment plant and it has been installed totally more than 3.9 million unit in Japan.



Typical layout of small scale Johkasou setup for household

Industrial wastewater, **Domestic wastewater**

Sewage treatment, **Decentralized treatment**

Septic tank, wetland,DEWATS, etc., **Johkasou**

BOD removal, Nitrogen and/or Phosphorous removal

1. General Information of Johkasou in Japan

■ **Domestic wastewater = Black water (Night soil) + Gray water(kitchen drainage, bath drainage etc.)**

○ Current Johkasou in Japan

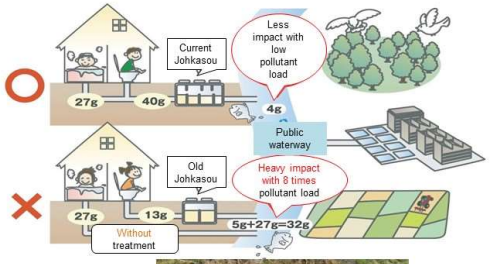
Both Black water & Gray water are treated.

× Old type Johkasou in Japan

Only Black water is treated and have low treating ability

⇒ Heavy impact with 8 times pollutant load

In Japan, old type Johkasou are treated as untreated domestic wastewater.

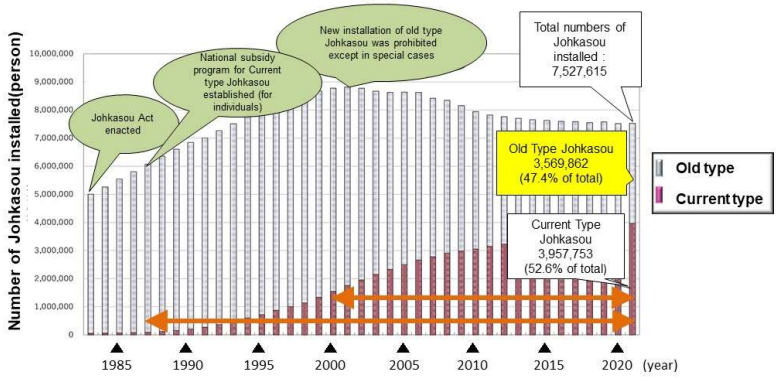


Discharge of untreated wastewater

1. General Information of Johkasou in Japan

■ **Configuration of old & current type Johkasou**

- Though new installation of old type Johkasou was prohibited in 2000, still approx. 3.6 million sets of old type Johkasou are used in Japan.
- It is necessary to promote the conversation to the current type of Johkasou.



1. General Information of Johkasou in Japan

■ **Comparison chart of Sewage, Johkasou and Septic tank**

	Sewage (STP)	Johkasou	Septic tank
Category	Centralized	Decentralized	
Capacity(m3/day)	Large	Small to middle	Small
Application	City covering with pipeline network	For household, building, housing complex, community, hospital, school, public toilet, etc.	
Target	Black water (Toilet) & Gray water		Black water
Method	Aerobic (plus Anaerobic)		Anaerobic only
Treated water quality	- Good - BOD <20mg/L - Nitrogen & Phosphorous can be removed		- Poor, BOD ≒ 100mg/L - Nitrogen and Phosphorous can't be removed
Discharge	Clean discharge is discarded directly to the river, lake, sea and so-on.		- Dirty discharge is penetrated into ground - Gray water is discarded without treatment
Main body	Civil structure constructed at site	FRP manufactured in factory	Civil structure constructed at site
Maintenance works	Checking and adjustment, desludging, inspection, changing spare parts		Desludging only (every 3 to 5 years)
Total period for operation start	Long for planning, financing, construction	Short	

Johkasou can be recognized as a "prefabricated small scale sewage treatment plant" in wastewater management

1. General Information of Johkasou in Japan

■ 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 (Ex., Taung Tha Man Lake)

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.)

■ Example of Johkasou installation overseas

Restaurant (China: 10m³/d)

Toilet in factory (Vietnam: 5m³/d)

Canteen & toilet (Myanmar: 30m³/d)

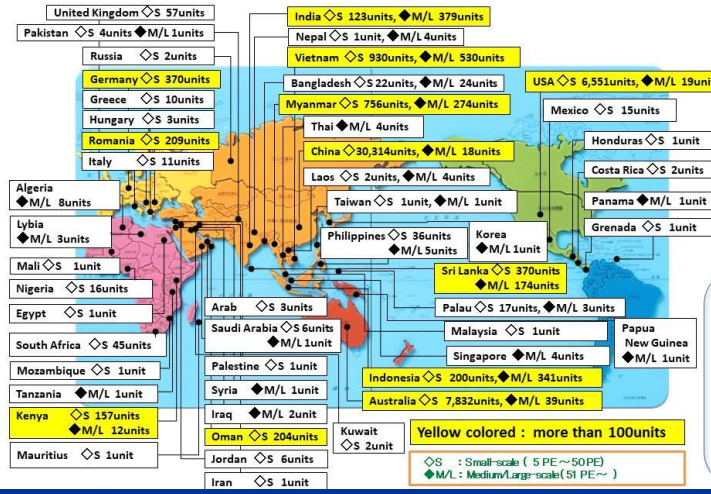
Employee dormitory (Saudi Arabia: 530m³/d)

At the end of 2022, totally over 50,000 sets of Johkasou are installed overseas

1. General Information of Johkasou in Japan

■ Installation records in Overseas (Total)

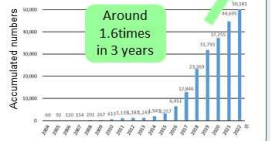
As of the end of December 2022 (Total) by Johkasou System Association



Small size 48,325units
M/L size 1,856units
Total 50,181units

Total 51 countries

■ Trend by years (Total)



2. Legal Framework of Johkasou in Japan

■ Overall concept of water environment improvement

Target: Establishment of Environmental Quality Standards of Pollution 【Basic Environment Law】

Industrial Wastewater Measures

- ・Establishment of Wastewater Standards 【Water Pollution Prevention Act】 Nationwide uniform standards
- ・Stricter regulation on Wastewater Standards
  ・Regulations on business operators 【Water Pollution Prevention Act】 Notification, measuring and recording of wastewater, on-site inspection → Penalties, improvement orders and other administrative guidances
- ・Investments, human resource developments, etc. for pollution prevention

Domestic Wastewater Measures

- ・Sewerage System Establishment 【Sewerage Law】
- ・Installation of Johkasou 【Johkasou Act】 etc.

National Government

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

Sharing Responsibility

Local Government

- Treatment Master plan and its implementation
- Ordinance
- Construction, Operation and Management of sewerage facilities
- Advice and guidance on Johkasou operation and maintenance

2. Legal Framework of Johkasou in Japan

■ History of Johkasou Act

Year	Item
1960 to around 1980	With increasing population of flush toilet, rapid installation of Tandoku (old type) Johkasou to treat black water only
1983	Johkasou Act enacted (legislation introduced by a Diet member, came into force in 1985)
2000	Amendment: New installation of Tandoku-shori (old type) Johkasou was prohibited
2005	Amendment: Stricter water quality management systems introduced
2019	Amendment: ➢ Strengthening the authority of prefectural governors for conversion from Tandoku Johkasou (old type) to Gappei Johkasou (current type) ➢ Clarification for proceeding Johkasou installation as a public works ➢ Others

■ Purpose of Johkasou Act

- ✓ Promotion of domestic wastewater (both black and gray water) treatment by Johkasou for conservation of water quality in public water area
- ✓ Preservation of the living environment
- ✓ Improvement of public health

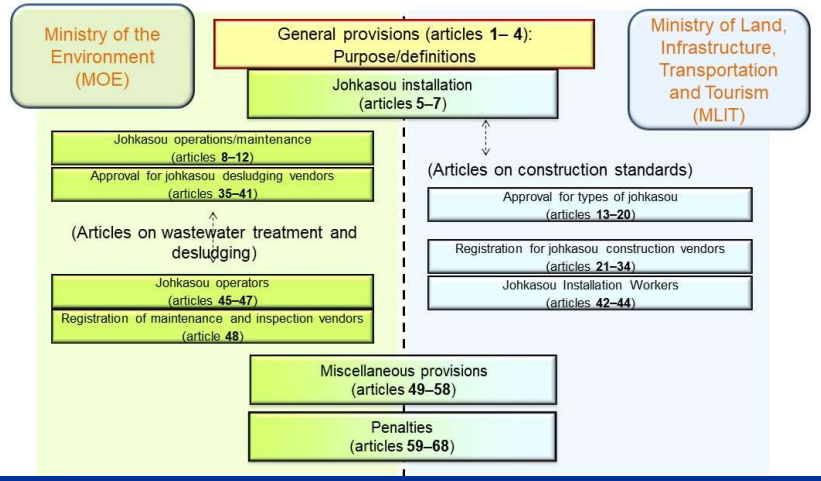
2. Legal Framework of Johkasou in Japan

■ **Structure of Johkasou Act**

1) Johkasou's manufacture and sales
2) Johkasou's notification of installation
3) Johkasou's installation and certification system of installation engineer
4) Johkasou's report of start date to use
5) Johkasou's operation
6) Johkasou's water quality inspection after installation
7) Johkasou's maintenance and certification system of maintenance engineer
8) Johkasou's desludge (Cleaning)
9) Johkasou's periodical check
10) Penalties for violating the Johkasou Act

2. Legal Framework of Johkasou in Japan

■ **Outline of each article from 1 (one) to 68 (sixty eight) and its jurisdiction in Johkasou Act**

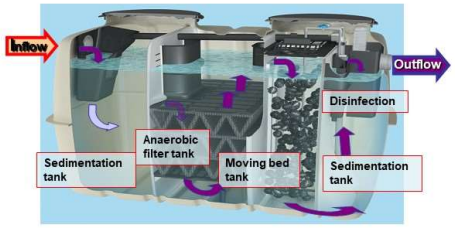


2. Legal Framework of Johkasou in Japan

■ **Approval process for types of Johkasou (Johkasou Act, Article 13)**

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

Performance Evaluation Test → Approval by the Minister of Land, Infrastructure,Transport and Tourism → Model Approval by Johkasou Act → Put into Market ← **Performance Ensured**



Sample of Performance Evaluation Type Johkasou

- ✓ Johkasou's Performance Evaluation System
- ✓ Detail of Johkasou's Performance Evaluation System

https://www.bcj.or.jp/upload/rating/bizunit/hyoutei/joushi_hyoukahouhou.pdf

2. Legal Framework of Johkasou in Japan

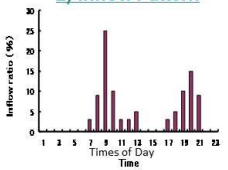
■ **Example of contents in Johkasou's Performance Evaluation System**

1) **Performance Criteria**

Applicant (Johkasou manufacture) chooses the application value for test criteria in below

BOD [20, 15, 10, 5], **T-N** [20, 15, 10, 5], **T-P** [2,1,0.5,0.1]
SS [20, 15, 10, 5], **n-Hex** [20, 10, 5, 3], **COD** [30, 15, 10]

2) Inflow Pattern



3) Type of Performance Evaluation Test

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

4) Other Test

Test Method	Duration (weeks)	No. of unit	Evaluation Points
Maintenance evaluation test	-	Over 1	Ease of Maintenance
Sludge test	Breeding + over 12 wks	Over 1	Sludge

Note: In order to obtain approval, several tests are implemented in combination in the above tables.

2. Legal Framework of Johkasou in Japan

■ **Johkasou Installation Procedure and related Article of Johkasou Act**

Installation notification (Article 5)

(Certify under the Building Standards Act when necessary)

Construction (Article 6)

- Johkasou contractor must register with the prefectural governor (Article 21)
- Johkasou contractor must dispatch the certified installation technician on each office (Article 29)

(Can issue administrative recommendations when necessary)

Post-installation legal inspections (Article 7)

Discontinuance notification (Article 11-2)

2. Legal Framework of Johkasou in Japan

■ **JIS A3302-2000 Estimation of population for wastewater purifier of buildings**

1 P.E. = 200L/day, 40g BOD/day

Example

- General household
  【Equation】If total floor area A (m^2) ≦130m^2 , Johkasou capacity (P.E.) shall be 5 P.E.
- Hotel with a wedding hall
  【Equation】Johkasou capacity (P.E.) = 0.15 x (total floor area A (m^2))
- Large hospitals with commercial kitchens or laundry facilities and more than 300 beds
  【Equation】Johkasou capacity (P.E.) = 11.43 x (number of beds B - 300) + 2,400

Large categories	Detail categories (Equations)	Large categories	Detail categories (Equations)
1. A place where people gather	Theater, etc. (3)	7. Parking	Highway rest area, etc. (7)
2. Residence	Apartment, etc. (6)	8. School	Library, etc. (3)
3. Hotel	Motel, etc. (4)	9. Office	Office with canteen, etc. (2)
4. Medical facility	Clinic, etc. (5)	10. Work facility	Laboratory, etc. (2)
5. Store	Restaurant, etc. (6)	11.Others	Public toilet, etc. (6)
6. Amusement facilities	Disco, etc. (13)		

Total 11 large categories, 57 equations

2. Legal Framework of Johkasou in Japan

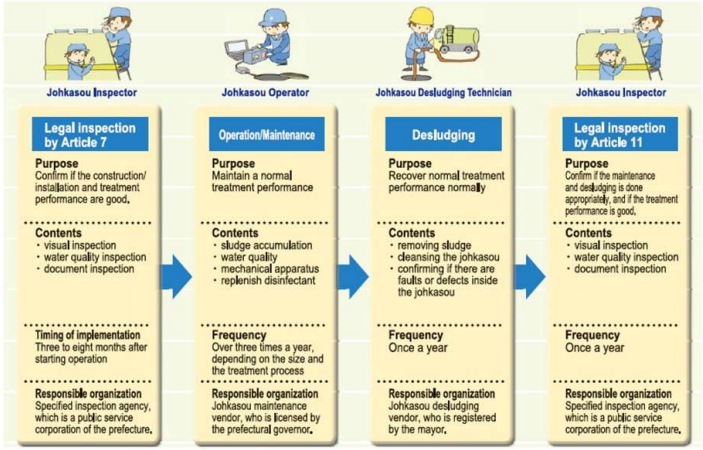
- Post-installation water quality inspection (Article 7)

Inspection category	Inspection items	
Visual inspection	・Installation status	・Usage status
	・Operational status	・Foul odors
	・Water flow	・Use of disinfectant
	・Mosquitoes, flies, etc.	
Water quality inspection	・Hydrogen ion concentration	・Chlorine ion concentration
	・Sludge settling ratio	・Residual chlorine concentration
	・Transparency	・Biochemical oxygen demand
	・Dissolved oxygen	
Document inspection	・Pre-usage maintenance inspection record	

➢ Because essential johkasou functions cannot be confirmed without actually using the equipment, inspections are carried out once those functions are generally up and running. Inspections focus on whether the johkasou is performing the expected treatment functions with the aim of rectifying any deficiencies as soon as possible.

2. Legal Framework of Johkasou in Japan

■ **Inspections and Maintenance**



MOEJ "Night Soil Treatment and Decentralized Wastewater Treatment System in Japan"

2. Legal Framework of Johkasou in Japan

■ **Johkasou corporate registration process**

National qualifications

Prefecture — Registration → Instructions, advice, recommendations, etc.

Johkasou construction company

【Certified Johkasou Installation Worker】
Person certified to supervise Johkasou construction

MLIT Ministry of Land, Infrastructure, Transport and Tourism

Municipality — Approval → Instructions, advice, recommendations, etc.

Johkasou desludging company

Prefecture or other — Registration → Instructions, advice, recommendations, etc.

Johkasou maintenance inspection company

【Certified Johkasou Operator】
Person certified to supervise Johkasou maintenance inspections

Ministry of the Environment
Government of Japan

2. Legal Framework of Johkasou in Japan

National johkasou qualifications

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

2. Legal Framework of Johkasou in Japan

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

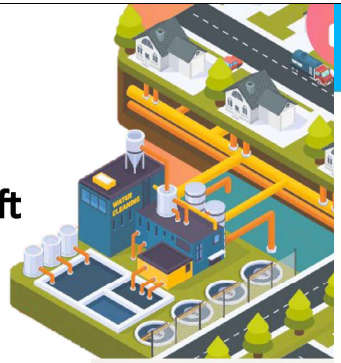
- Johkasou technicians should acquire extensive knowledge on not only wastewater treatment/johkasou, but also water environment conservation and public health.
- Curriculums for johkasou operator and johkasou installation worker are as shown below.

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

7) インドテランガナ州における分散型汚水管理にかかる条例案の紹介（Onsite Wastewater Treatment and Recycling Regulations –2023 –Draft）

Towards Net Water Neutral Built Environment in Telangana

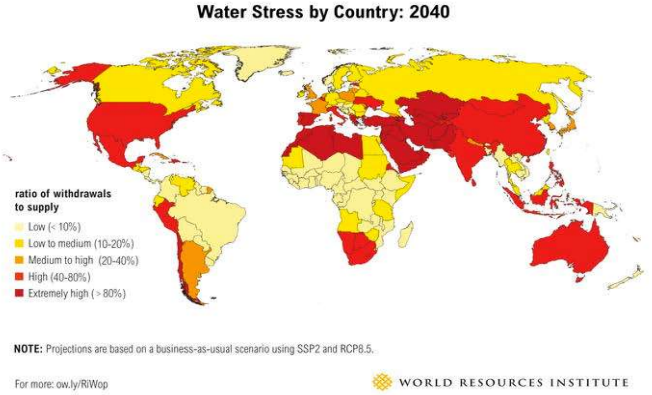
Onsite Wastewater Treatment and Recycling Regulations – 2023 – Draft



V. Srinivas Chary, Director, ASCI & CEO, WASH Innovation Hub, India

Presentation at 11th International Conference on Decentralized Wastewater Treatment in Asia, Ministry of Environment, Government of Japan, 28th October, 2023

Global Water Scenario - Increasing demand Vs decreasing availability

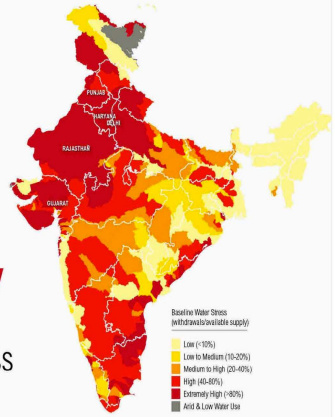


Globally, India is ranked as the 13th most water-stressed country.

India Water Scenario - Increasing demand Vs decreasing availability

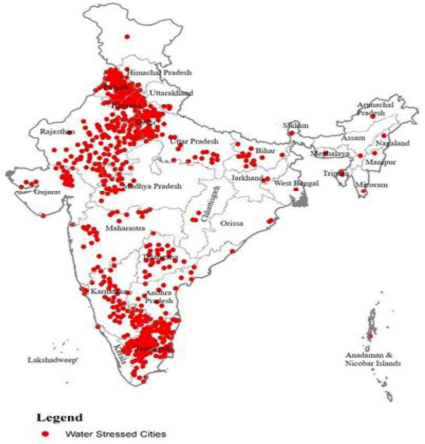
Extreme stress on groundwater - Limited availability of alternate sources

54% of India Faces **High** to **Extremely High** Water Stress



Water Scenario – Urban India

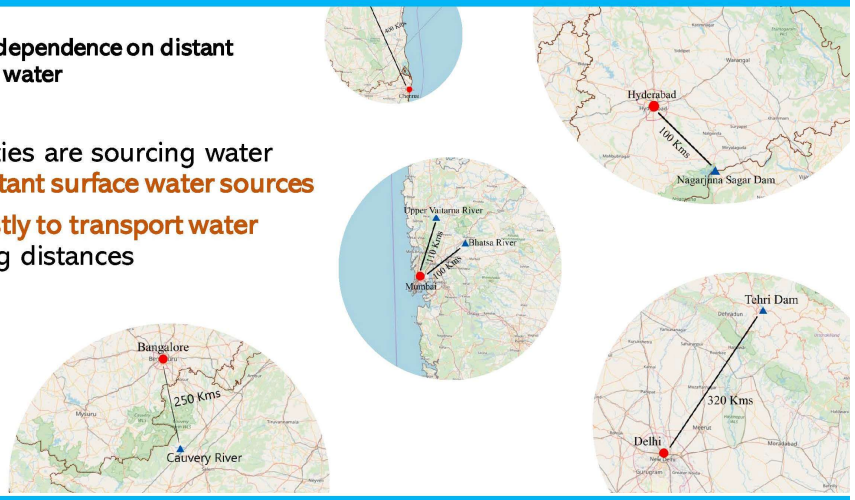
- 21 cities will run out of groundwater by 2030, affecting around 100 million people (NITI Aayog)
- 40 per cent of India's population will have no access to drinking water by 2030.



Urban Water Scenario - India

Increasing dependence on distant sources of water

- Large cities are sourcing water from **distant surface water sources**
- Very **costly to transport water** over long distances



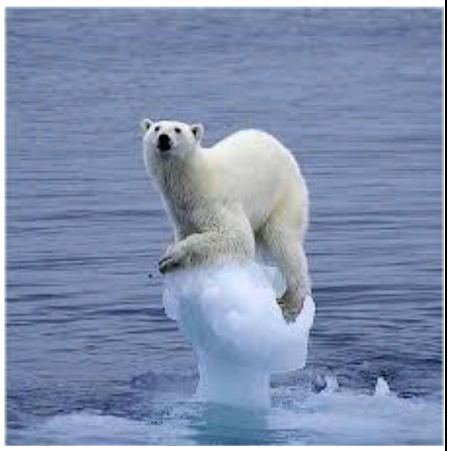
Circularity & Treated Water Reuse

- A transition from the linear model to a circular one for efficient water use and to minimise the losses.
- Circularity focuses on reducing water use and consumption and promotes **Reuse**, **Recycling, Restoration**, and **Recovery** of water resources.
- Telangana State (Youngest State in India) introduced circularity in wastewater to reduce water stress and improve environmental quality
- Hyderabad, the state capital, pilot

Reusing Waste Water to Support Circular Economy

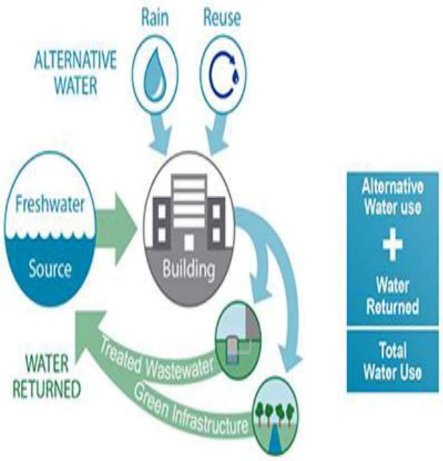
Climate Change will compound the water stress

- Cities can be significantly impacted by climate change – hence, adapting to climate change and building resilient communities to withstand its impacts - is the need of the hour.
- Cities significantly contribute to greenhouse gas emissions and can help mitigate climate change.
- Cities have to explore environmentally sustainable and resilient solutions to climate change.



Net Zero Water Definition

- Telangana State envisioned to promote circularity in wastewater
- City level recycling and reuse policy – 2023 (Draft)
- Building level recycling policy – 2023 – Draft
- Towards net zero water built environment
- Inspired by the Jhokasou Act of Japan

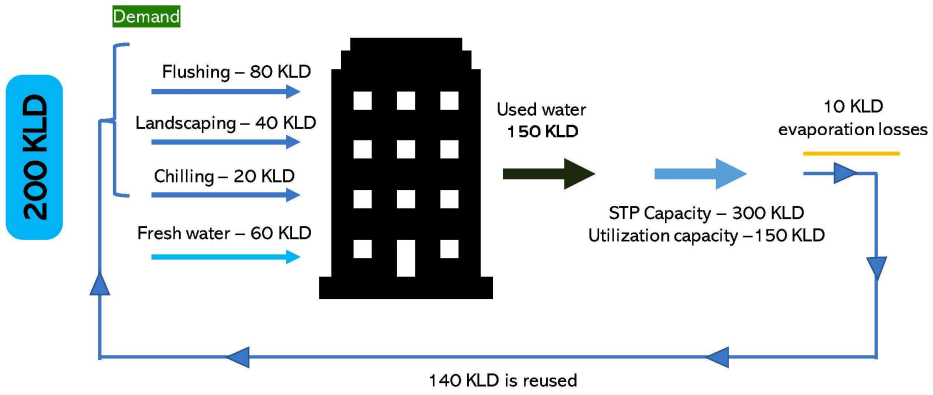


Case 1 –Raheja Towers 12C, Mindspace, Hyderabad

At a glance	
Category	Commercial
Total area covered by the establishment	5.5 lakh sq.feet
No. of Occupants	Designed for 5000+ (3 shifts) Currently 40% occupied
Year of establishment	October 2022
STP Capacity	300 KL
Fresh water consumption	60KLD Supplied by HMWSSB @Rs.162 per KL
Used water generated	150 KLD
Utilization capacity of the STP	50%
Current status of STP	Functional
STP technology	Membrane Bioreactor (MBR)
Capital cost	1.2 Cr
O&M cost	1.4 Lakh per month
Reclaimed water capacity	140 KLD
Utilization of treated water	Flushing, Chilling & gardening

WATER BALANCE

Water demand is estimated to 200 KLD at 40% occupancy (2000+ occupants for 3 shifts)

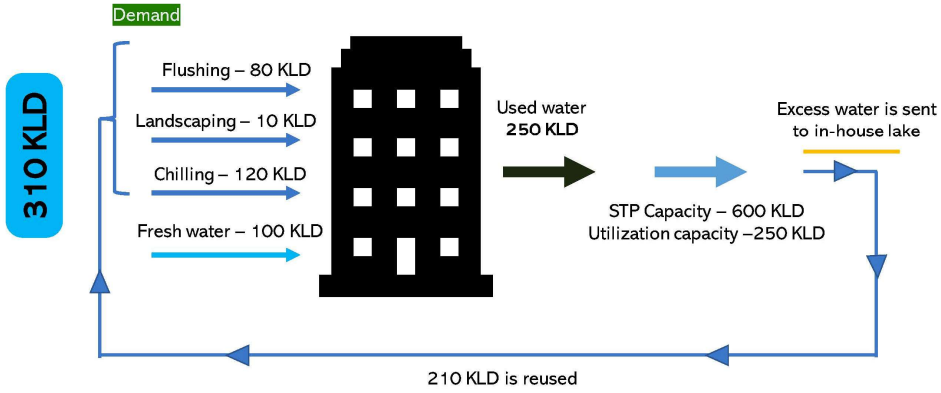


Case 2 – World Trade Centre, Bangalore

At a glance	
Category	Commercial
Total area covered by the establishment	Appox. 2 acres
No. of Occupants	50% (about 4000)
Year of establishment	2010
STP Capacity	600 KLD
Fresh water consumption	100 KLD @ Rs. 85 per KL
Used water generated	250 KLD
Utilization capacity of the STP	250 KLD
Current status of STP	Functional
STP technology	MBBR
Capital cost	
O&M cost	2 lakhs
Reclaimed water capacity	85% (210 KLD)
Utilization of treated water	Chilling, Flushing & Gardening

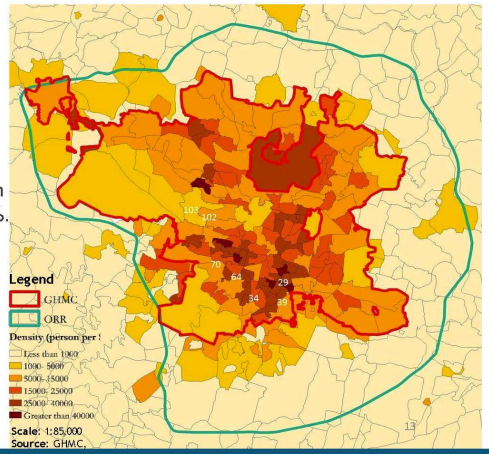
WATER BALANCE

Water demand is estimated to 310 KLD at 50% occupancy (4000+ occupants)



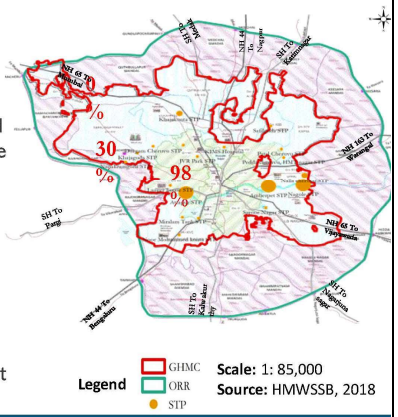
Preamble

- Hyderabad is among the most densely populated cities in India. The core area is saturated, and the growth is experienced in the peripheral areas.
- While the average population growth rate of GHMC during 2001-2011 was around 27 %, the growth in the peripheral areas is at a much higher rate of 63%.
- The city is growing outwards towards the outer ring road (ORR) and beyond.
- The current population in 1650 sq.km area comprising GHMC, areas till ORR and 1 km outside ORR is estimated to be close to be **~1 crore.**



Preamble

- Hyderabad city has an underground sewerage network covering ~50% of GHMC (the core area having a coverage of 98% and the rest of the GHMC area having a coverage of 30%).
- The area between GHMC and ORR does not have an organised sewerage network; hence, all the households depend on onsite sanitation systems (OSS), namely septic tanks or twin pit toilets.
- The high-rise residential buildings and commercial and institutional establishments depend on decentralized onsite private sewage treatment plants for the treatment and disposal of waste.
- The estimate indicates that over 1200 private STPs of different capacities are present in HUA.



Onsite Sewage Treatment Plants – Situation Assessment

- Dysfunctional or sub-optimally functional Onsite Wastewater Treatment Systems (OWTS).
- Absence of a system to validate STP designs
- Absence of technology standardisation
- Lack of professional O&M arrangements, unskilled operators
- Lack of proper reporting and documentation
- Reuse standards for treated wastewater and biosolids – not notified
- Weak database
- **Absence of a regulatory framework for effective designing, implementing, and monitoring of onsite wastewater treatment systems**

Intent of the Regulation

- Promote water-neutral buildings
- Encourage circular economy in used water management
- Protect water bodies through effective wastewater treatment
- Reduce water footprint
- Promote climate resilience
- Encourage innovative solutions and transformative technologies

Title, Objective and Applicability of the Regulations

- Title: Onsite Wastewater (Used Water) Treatment and Recycling Regulations - 2023
- Objective: To achieve net water-neutral buildings by promoting on-site wastewater treatment & recycling and through effective monitoring.
- Applicability: New and existing buildings within the Outer Ring Road (ORR) area

Coverage:

1. In the case of new construction for all buildings belonging to the following categories, shall mandatorily install an Onsite wastewater treatment system (OWTS).

(a) Residential buildings having 25 and above households or residential buildings having 5000 Sq. m and above built-up area, whichever is lower;
(b) Commercial buildings having 5000 Sq.m and above built-up area;
(c) Educational establishments/Institutions having 5000 Sq.m and above built-up area;
(d) Hostel establishment having 5000 Sq.m and above built-up area;
(e) Healthcare facilities having 25 and above beds or having 5000 Sq.m and above built-up area, whichever is less;
(f) All Gated communities and townships, irrespective of the area

Coverage

2. In the case of old/existing buildings for all buildings belonging to the following categories, it is mandatory to install an Onsite Wastewater treatment system (OWTS) within a span of two years from the date these regulations come into effect

(a) Residential buildings having 25 and above households or residential buildings having 5000 Sq. m and above built-up area, whichever is lower;
(b) Commercial buildings having 5000 Sq.m and above built-up area;
(c) Educational establishments/Institutions having 5000 Sq.m and above built-up area;
(d) Hostel establishment having 5000 Sq.m and above built-up area;
(e) Healthcare facilities having 25 and above beds or having 5000 Sq.m and above built-up area, whichever is less;
(f) All Gated* communities and townships, irrespective of the area

Coverage

3. For all buildings not belonging to the above categories, all Wastewater outlets shall be connected to the municipal sewer system. Where no municipal sewer system exists within a distance of 50 m, either a well-designed OWTS or an onsite sanitation system conforming to IS 2470 requirements shall be provided within the plot area

Extent of Recycling (from the date of notification of this regulations)

1. Recycling of treated water, complying with the standards notified, shall be mandatory for non-potable uses such as gardening, lawn maintenance, flushing, floor cleaning etc.
2. Dual Plumbing System

a) Dual plumbing system for the recycling of treated water for non-potable use shall be mandatory for all new establishments/constructions where OWTS is mandatory.

b) Dual plumbing system for the recycling of treated water for non-potable use shall be installed/retrofitted wherever viable in existing buildings where OWTS is mandatory.

c) For existing/legacy buildings where installation of a dual plumbing system is not viable, recycling of treated water shall be encouraged for other non-potable uses such as landscaping and floor cleaning and construction activity in and outside the premises.

3. In cases where 100% recycling of treated wastewater is not possible within the premises, excess treated wastewater shall be traded for non-potable uses as per the norms given by the competent authority.

Monitoring

Monitoring shall span across the lifespan of the OWTS and can be divided into three categories:

1. **Pre-establishment**
2. **During the establishment**
3. **Post-establishment**

Monitoring

DESIGN REQUIREMENTS:

1. **OWTSs shall be designed using the Best Available Technologies and Transformative Technologies approved by the competent authority.**
2. **OWTSs shall be located in such a way that all units of the OWTS are freely accessible for maintenance and inspection activities.**
3. **All buildings with installed OWTSs are required to have a separate electric sub-meter for the OWTS unit.**
4. **All installed OWTSs are required to install sensor-based inflow and outflow meters for real-time monitoring**
5. **All installed OWTSs are required to install sensors at the outlet of the OWTS to monitor the following parameters: pH, DO, TDS and Residual Chlorine.**
6. **All buildings with installed OWTSs and a connection to a sewer line shall install a flowmeter on the pipe that lets Wastewater from the building into the main sewers at the sewer connection.**

Monitoring

ENFORCEMENT BEFORE CONSENT FOR ESTABLISHMENT

a) Competent authority shall empanel third-party agencies (TPA) for design validation and implementation.
b) Competent authority shall charge a licensing fee to third-party agencies. Licenses shall be renewed every year.
c) Incorporating submission of plan detailing the location and design of OWTS and certificate of approval from competent authority into the building license approval and certificate of establishment granting process.

ENFORCEMENT BEFORE CONSENT FOR OPERATION

a) Competent Authority shall physically inspect the DSTP or on-site treatment system for all buildings to ensure all requirements detailed in section 6 are met before issuing an occupancy certificate or certificate for operation.

Monitoring

ENFORCEMENT AFTER OPERATION

a) Competent authority shall empanel operation and maintenance agencies with credible competencies for undertaking O&M operations.
b) O&M agencies shall engage a reputed laboratory with appropriate accreditation, such as NABL/ISO/DSIR.
c) Competent authority shall charge a licensing fee to the O&M agencies. Licenses shall be renewed every year.
d) Self-Monitoring
    a) O&M agency/personnel shall keep a log of daily monitoring data.
    b) O&M agency/personnel shall get a detailed analysis of influent and effluent parameters according to CPHEEO guidelines done through the engaged laboratory.
    c) O&M agency/personnel shall upload laboratory analysis and daily log to the online monitoring platform (OMP) every 3 months.
e) Statutory monitoring: Competent authorities shall monitor the performance of all OWTSs through onsite inspection every year.

Monitoring

STANDARDS

a) Standards for release into the sewerage network, a surface water body or land.

NO.	Parameter	Limits
1.	pH	6.5-8.5
2.	Total Suspended Solids (TSS)	< 20 mg/l
3.	COD	< 50 mg/l
4.	BOD (5 day)	< 10 mg/l
5.	Total Nitrogen	< 10 mg/l
6.	Ammoniacal Nitrogen	< 5 mg/l
7.	Faecal Coliform	<100 MPN/100 ml

Source: NGT order 2019 (M.A. No. 1792/2018, M.A. No. 1793/2018, I.A. No. 150/2019 & I.A. No. 151/2019)

Monitoring

b) Standard for Recycling

NO.	Parameter	Limits for Landscaping	Limits for other uses
1.	pH	6.5-8.5	6-9
2.	Total Suspended Solids (TSS)	< 20 mg/l	< 10 mg/l
3.	COD	< 50 mg/l	< 20 mg/l
4.	BOD (3 day)	< 10 mg/l	< 10 mg/l
5.	Total Nitrogen	< 10 mg/l	< 10 mg/l
6.	Ammoniacal Nitrogen	< 5 mg/l	<5 mg/l
7.	Dissolved Phosphorus as P	< 1 mg/l	< 1 mg/l
8.	Faecal Coliform	< 100 MPN/100 ml	<10 MPN/100 ml
9.	Residual Chlorine	1 ppm	1 ppm

Source: NGT order 2019 (M.A. No. 1792/2018, M.A. No. 1793/2018, I.A. No. 150/2019 & I.A. No. 151/2019); Jordanian Standards (JS1767:2008), CPHEEO manual Part A: Engineering Chapter 7: Recycling and Reuse of Sewage; WHO : Overview of greywater management Health considerations (2006)

Monitoring

STANDARDS

c) Standards for Biosolids: Standards for USEPA Biosolids Class A

Parameter	Limits
Arsenic (As)	20 mg/kg dry weight
Cadmium (Cd)	1 mg/kg dry weight
Chromium (Cr)	100 mg/kg dry weight
Copper (Cu)	100 mg/kg dry weight
Lead (Pb)	150 mg/kg dry weight
Mercury (Hg)	1 mg/kg dry weight
Nickel (Ni)	60 mg/kg dry weight
Selenium (Se)	5 mg/kg dry weight
Zinc (Zn)	200 mg/kg dry weight

Parameter	Limits
Escherichia coli	<100 CFU/gm
Salmonella Sp.	Not Detected (CFU/4gm)
Total Coliforms	<100 MPN/gm
Faecal Coliforms	<1,000 MPN/gm
Helminth ova (*Ascaris* sp. and *Taenia* sp.)	< 1 cell per 4 grams of total dry solids
Enteric Viruses	< 1 PFU per 4 grams of total dry solids

Source: USEPA part 503 Biosolids Rule

Incentives and penalties

Incentives:

a) Reducing the water footprint and recycling used water is a key incentive for the builder.
b) Further recycling treated wastewater will reduce freshwater usage, bringing savings to the owner as they would move to a lower tariff slab
c) Competent authority shall issue a recognition system similar to the Energy Efficiency Star Rating System.

Penalties:

a) Penalty for failing to establish OWTSs:
   a) If a residential establishment fails to install OWTS within the stipulated time, the competent authority shall withdraw the establishment's free water ration, double the water tariff and charge a fine of Rs 1,00,000/month till the OWTS is installed.
   b) If establishments of other categories fail to install OWTS within the stipulated time, the competent authority shall double their water tariff and charge a fine of Rs 2,00,000/month till the OWTS is installed.
b) Penalty for failing to submit self-monitoring data or to meet effluent standards:
   a) If a residential establishment fails to submit self-monitoring data for three consecutive cycles or fails to meet notified effluent standards during monitoring, the competent authority shall withdraw the establishment's free water ration, double their water tariff and charge a fine of Rs 10,000/month till the compliance is achieved.
   b) If establishments of other categories fail to submit self-monitoring data for three consecutive cycles or fail to meet notified effluent standards during monitoring, the competent authority shall double their water tariff and charge a fine of Rs 20000/month till the compliance is achieved.

Safety

- Provision of a 'DANGER' sign board near the OWTS.
- Provision of "not fit for drinking" sign in both Telegu and English at the taps where treated wastewater flows.
- Maintaining a minimum of two sets of protective gear in working conditions at all times.
- Displaying the "Caution – Danger" sign whenever there is a maintenance activity.
- Ensuring maintenance personnel wear all protective equipment, including a portable oxygen cylinder with a mask, during maintenance activities.
- Ensuring at least two additional individuals are supervising the maintenance activity from the outside at a distance from which they can immediately evacuate the person inside if such a situation arises.
- All desludging and maintenance operations shall strictly follow the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013

Data Management

- Development of **Online-Monitoring Platform (OMP),** including a dashboard for periodic monitoring and reporting
- Continuous data exchange amongst different competent authorities

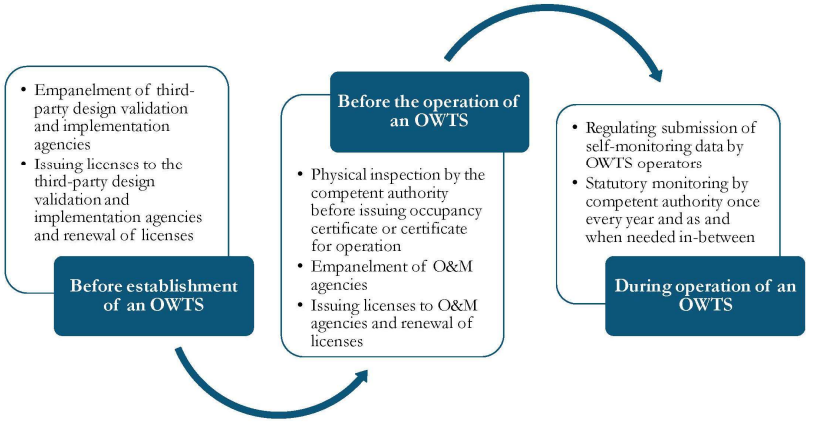
Regulators: Roles and Responsibilities

Competent Authority	Responsibilities
GHMC	• Shall ensure all requirements detailed in the regulation are met before issuing a building licence for buildings within the ORR area • Shall communicate all relevant data with HMWSSB
ULB	• Shall ensure all requirements detailed in the regulation are met before issuing a building licence within their jurisdiction • Shall communicate all relevant data with HMWSSB
HMWSSB	• Shall empanel third-party agencies for design validation and implementation • Shall empanel third-party operation and maintenance agencies • Shall curate a list of the Best Available Technologies and approved Transformative Technologies for the design of OWTSs • Shall ensure all requirements detailed in the regulation are met before issuing a CFE and CFO for OWTSs in buildings with a built-up area of less than 20,000 sq. m within the ORR area • Shall perform a yearly physical statutory inspection of OWTSs for building with a built-up area of less than 20,000 sq.m within the ORR area • Shall engage a third-party knowledge partner to perform an audit of all OWTSs within the ORR area as and when needed • Shall develop a centralised Online Monitoring Platform (OMP) • Shal establish a separate cell at the HMWSSB office to monitor this activity • Shall ensure all operators of OWTSs are uploading self-monitoring data in a timely manner • Shall develop a virtual water trade framework • Shall enforce penalties and incentives on OWTSs for buildings with built-up areas less than 20,000 sq.m within the ORR area
TSPCB	• Shall ensure all requirements detailed in the regulation are met before issuing a CFE and CFO for OWTSs for buildings with a built-up area of more than 20,000 sq. m as per EIA • Shall perform a yearly physical statutory inspection of OWTSs for building with a built-up of more than 20,000 sq.m • Shall enforce penalties and incentives on OWTSs for buildings with built-up of more than 20,000 sq.m • Shall communicate all relevant data with HMWSSB

HMWSSB: Responsibilities

- Shall empanel third-party agencies for design validation and implementation
- Shall empanel third-party operation and maintenance agencies
- Shall curate a list of the Best Available Technologies and approved Transformative Technologies for the design of OWTSs
- Shall ensure all requirements detailed in the regulation are met before issuing a CFE and CFO for OWTSs in buildings with a built-up area of less than 20,000 sq. m within the ORR area
- Shall perform a yearly physical statutory inspection of OWTSs for building with a built-up area of less than 20,000 sq.m within the ORR area
- Shall engage a third-party knowledge partner to perform an audit of all OWTSs within the ORR area as and when needed
- Shall develop a centralised Online Monitoring Platform (OMP)
- Shal establish a separate cell at the HMWSSB office to monitor this activity
- Shall ensure all operators of OWTSs are uploading self-monitoring data in a timely manner
- Shall develop a virtual water trade framework.
- Shall enforce penalties and incentives on OWTSs for buildings with built-up areas less than 20,000 sq.m within the ORR area

Monitoring flowchart: HMWSSB responsibility



7.1.3. 参加登録時のアンケート調査結果

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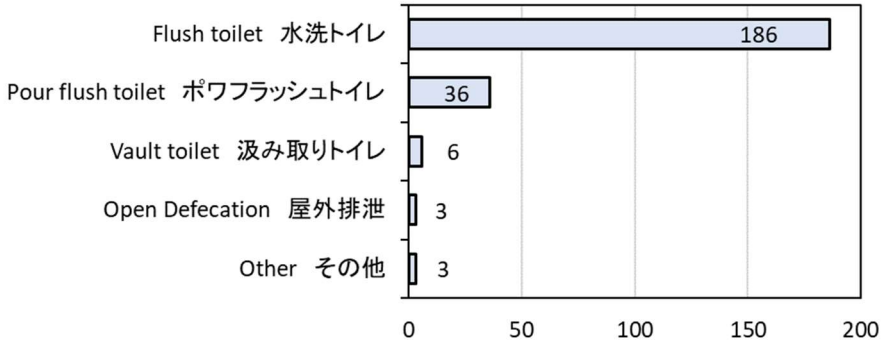
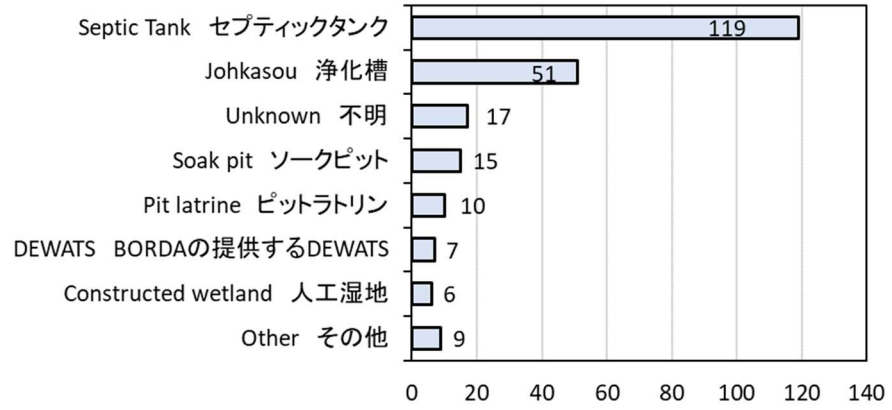
<tr><td>NO</td><td>71</td></tr>
<tr><td>合計</td><td>234</td></tr>
</table>
</td></tr>
<tr><td>Q2 あなたの国で最も普及しているトイレは何ですか？</td><td> 
</td></tr>
<tr><td>Q3 上記でその他と回答された場合、それは何ですか？</td><td>N/A：2
Septic tanks and pit latrines</td></tr>
<tr><td>Q4 あなたの国で最も普及している分散型汚水処理施設は何ですか？</td><td> 
</td></tr>
</table>

Q5 上記質問でその他と回答された場合、それは何ですか？

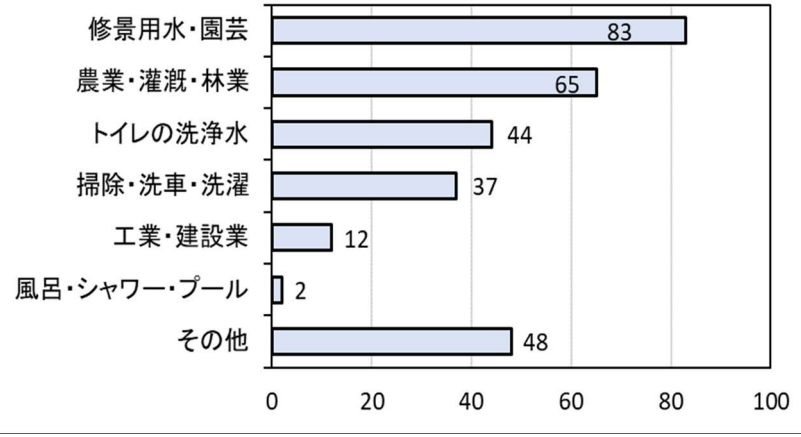
MBR	1
oxidation lagoons	1
UASB SBR	1
CASP	1
無回答	3
N/A	2
合計	9

Q6 分散型汚水処理施設の処理水を飲料水以外の生活用水として再利用したいと思いますか？

選択肢	回答数
YES	198
NO	36
合計	234

Q7 上記質問で YES と回答された場合、どのような用途に再利用したいですか？理由も併せてお答えください。

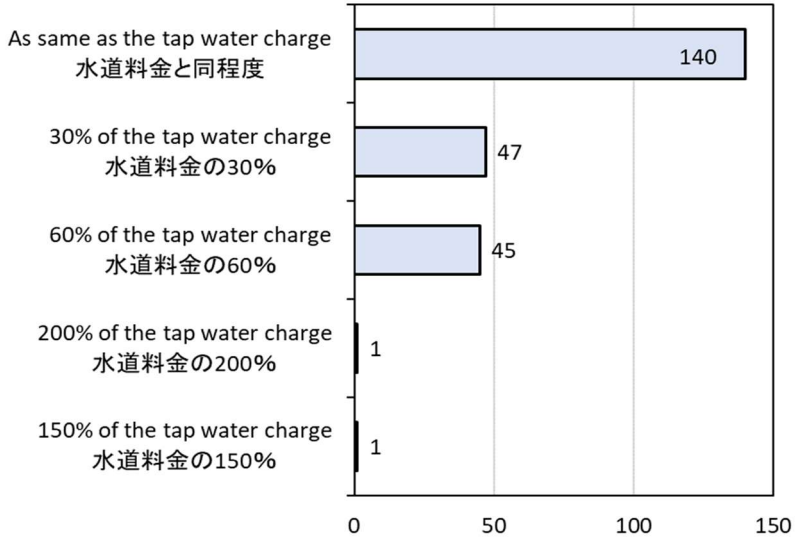
Q7 では、Q6 にて YES と回答した 198 件の自由記述式回答を、①農業・灌漑・林業、②修景用水・園芸、③工業・建設業、④掃除・洗車・洗濯、⑤トイレの洗浄水、⑥風呂・シャワー・プール、⑦その他、の 7 つに分類した。なお、「その他」と回答した内容としては、地下水の再生、融雪、漁業、冷却水、非常用の貯水といった記載があった他、「飲料水以外の用途であれば可能」という記述も見られた。



Q8 分散型汚水処理施設の処理水を飲料水として再利用したいと思いますか？

選択肢	回答数
YES	59
NO	175
合計	234

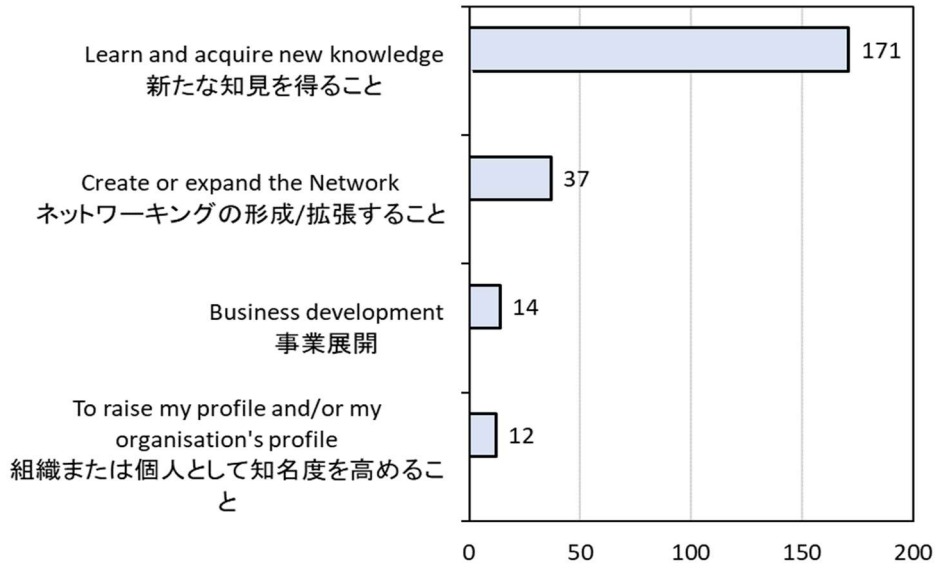
Q9 分散型汚水処理施設の処理水を飲料水以外の生活用水として再利用する際、いくらまでなら支払うことができますか？

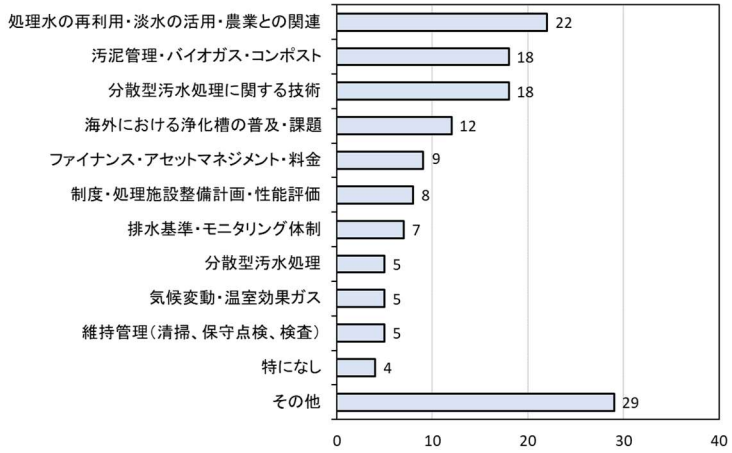


Q10 これまでアジアにおける分散型汚水処理に関するワークショップに参加したことはありますか？

選択肢	回答数
First time 初めて	152
1-2 times 1-2 回参加したことがある	59
3-4 times 3-4 回参加したことがある	16
More than 5 times 5 回以上参加している	7
合計	234

Q11 ワークショップへ参加した主な目的はなんですか？

	
Q12 もし次回（第 12 回）も Workshop 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？	120 件の回答があり、以下のような①～⑫のキーワードで分類した。 ① 処理水の再利用・淡水の活用・農業との関連 ② 汚泥管理・バイオガス・コンポスト ③ 分散型汚水処理に関する技術 ④ 海外における浄化槽の普及・課題 ⑤ ファイナンス・アセットマネジメント・料金 ⑥ 制度・処理施設整備計画・性能評価 ⑦ 排水基準・モニタリング体制 ⑧ 分散型汚水処理 ⑨ 気候変動・温室効果ガス ⑩ 維持管理（清掃、保守点検、検査） ⑪ 特になし ⑫ その他


処理水の再利用・淡水の活用・農業との関連
22
汚泥管理・バイオガス・コンポスト
18
分散型汚水処理に関する技術
18
海外における浄化槽の普及・課題
12
ファイナンス・アセットマネジメント・料金
9
制度・処理施設整備計画・性能評価
8
排水基準・モニタリング体制
7
分散型汚水処理
5
気候変動・温室効果ガス
5
維持管理（清掃、保守点検、検査）
5
特になし
4
その他
29
0
10
20
30
40

7.1.4. ワークショップ開催中に行われた質疑応答

No.	質問内容 / Question	回答者 / Answerer	回答内容 / Answer
1.	浄化槽はどのくらいの頻度で清掃する必要があるか。 How often should the Johkasou be cleaned?	株式会社ダイキアクシスインド法人 和座 良太 氏 Mr. Rio Waza Managing Director, Daiki Axis India PVT. LTD.	浄化槽のルール及び当社の経験から以下２通りの清掃方法を推奨している。 ①　必要に応じて、閉塞防止・異物除去のためのバースクリーンの清掃 ②　6 か月に 1 度の汚泥の除去 設計上、6 か月以上の汚泥堆積は可能だが、日本の規制に沿って実施するよう、海外ではマニュアル等によって周知している。 Based on the rules for Johkasou and our experience, we recommend the following two cleaning and desludging methods. ① To clean the bar screen to prevent blockage and remove foreign matter, if necessary. ② To desludge once every 6 months Although the design allows sludge to accumulate for more than six months, we propose manuals and other documents to ensure that the process is carried out in accordance with Japanese regulations even in the overseas countries.
2.	浄化槽は洪水が発生しやすい地域でも使用できるか。 Can Johkasou be used in flood-prone areas?	株式会社ダイキアクシスインド法人 和座 良太 氏 Mr. Rio Waza Managing Director, Daiki Axis India PVT. LTD.	洪水のみならず地下水面が高い場所にも設置が可能なように、浄化槽本体に加えて基礎工事における重量等を計算している。当社として独自に、浄化槽が浮上しないような施工の一般的要領書を作成し、施工ルールを定めている。それによって洪水、大雨、その他高水位の地域における浄化槽の設置を可能にしている。 In addition to the Johkasou itself, the weight of the foundation work is calculated so that it can be installed not only in flood areas but also in areas with high groundwater levels. Our company has created our own general instructions for construction that will prevent the Johkasou from floating, and has established construction rules. This makes it possible to install septic tanks in areas subject to flooding, heavy rain, and other high-water levels.
3.	浄化槽は気温が低い環境下でも機能するか。 Can Johkasou function even in low temperature environments?	株式会社ダイキアクシスインド法人 和座 良太 氏 Mr. Rio Waza Managing Director, Daiki Axis India PVT. LTD.	日本にも気温が低い地域があるが、微生物の活動が活発ではなくなるため、基本的にはそういった地域への無条件での設置は推奨していない。 気温が低い地域では地上ではなく地中に設置することによって保温性を高めたり、もしくは地上・地中どちらにおいても断熱材をタンク周りに設置して保温性を高めたりする。このように、浄化槽そのものを変更するのではなく、設置環境を変更する、という代替案をご提案する。例として、富士山の 5 合目に浄化槽を設置している。氷点下になる冬は閉山するが、その間も微生物が活動可能なように工夫されている。国内外で同様の案件を実行している。 Although there are regions in Japan with low temperatures, we generally do not recommend installing the Johkasou in such regions without any countermeasures, because microorganisms will not be active.

No.	質問内容 / Question	回答者 / Answerer	回答内容 / Answer
			In regions with low temperatures, heat retention can be improved by installing the Johkasou underground rather than above ground, or by installing insulation material around the Johkasou both above ground and underground. In this way, instead of changing the Johkasou itself, we are proposing an alternative that involves changing the installation environment. For example, a Johkasou has been installed at the 5th station of Mt. Fuji. Mt. Fuji is closed during the winter and temperatures drop below freezing, but Johkasou is installed with measures to allow microorganisms to remain active during this period. Similar projects are being carried out both domestically and internationally.
4.	使用している次亜塩素酸カルシウムは顆粒か。それとも錠剤か。 Is the calcium hypochlorite you are using granules? Or maybe a tablet?	株式会社ダイキアクシスインド法人 和座 良太 氏 Mr. Rio Waza Managing Director, Daiki Axis India PVT. LTD.	錠剤を利用している。インドでは浄化槽そのものには次亜塩素酸カルシウムは必須ではないが、現場によっては顧客より「水質をより良くしたい」との要望がある。1,000 件中 20 件程度使用している。浄化槽の一次処理ではなく三次処理として次亜塩素酸カルシウムを使用することは可能である。 We are using tablet type. In India, calcium hypochlorite is not necessary for Johkasou for disinfection, however at some sites there are requests from customers to improve water quality. And, approximately 20 out of 1,000 cases of Johkasou use calcium hypochlorite. Calcium hypochlorite is used as a tertiary treatment rather than a primary treatment in Johkasou.
5.	処理水を酒製造用の米の栽培に使用する場合の窒素濃度はどうなるか。 What happens to the nitrogen concentration when treated water is used to grow rice for sake production?	秋田工業高等専門学校 増田 周平 氏 Dr. Shuhei Masuda Associate Professor, Civil Engineering and Architecture, Department of Creative Systems Engineering, National Institute of Technology Akita College	実験で使用した下水処理水の窒素とリンの濃度は、窒素がおよそ 15~20 mg/L、リンがおよそ 1~2 mg/L である。バランスで見ると窒素が非常に多い。窒素が多いと窒素がタンパク質として米に入っていきやすくなるため、米に含まれるタンパク質が多くなる。それをうまくコントロールしてタンパク質が上がりすぎないように処理水を使用するというのが技術開発の基本的なポイントとなる。 The nitrogen and phosphorus concentrations of the treated water used in this experiment were approximately 15 to 20 mg/L for nitrogen and 1 to 2 mg/L for phosphorus. In terms of balance, it has a very high amount of nitrogen. If there is a lot of nitrogen, it will be easier for the nitrogen to be uptake by rice as protein, so the protein content in the rice will increase. The basic point of technological development is to properly control and use treated water to prevent the protein contents ratio of rice from rising too high.
6.	処理水の再利用の際、病原菌の心配はあるか。	秋田工業高等専門学校 増田 周平 氏 Dr. Shuhei Masuda Associate Professor, Civil	最後に塩素消毒したものを灌漑している。自治体や業者が定期的に大腸菌の測定を実施しているが、基本的に大腸菌は検出されないため、心配ないと考えている。 Effluent is disinfected by chlorinated and then used for irrigation. Local governments and businesses regularly carry out E. coli measurements, but E. coli is generally not detected, so I don't think there is anything to worry about.

No.	質問内容 / Question	回答者 / Answerer	回答内容 / Answer
		Engineering and Architecture, Department of Creative Systems Engineering, National Institute of Technology Akita College	
7.	排水から窒素とリンを除去するか。それとも農業用水として利用するのは可能か。	秋田県立大学名誉教授 尾﨑 保夫 氏 Dr. Yasuo Ozaki Professor Emeritus, Akita Prefectural University	浄化槽処理水の窒素、リンを除去するか、窒素・リンを含んだ処理水を農業用水として利用するかは、処理水放流先の土地利用等よって決めれば良いと考えている。放流先の近くに水田、畑、果樹園等があれば農業用水としての利用が、ＳＤＧｓに適合した処理水の有効利用法であるので、地域の実情に合った活用法を検討頂きたい。水稲の灌漑水として利用する際には、過剰に処理水を供給すると病害虫の発生や米の品質低下を引き起こすおそれがあるので、水稲の栽培マニュアル等を参考に供給する必要がある。 （私は、果樹園に処理水の地下点滴灌漑システムを設計したことがあるが、肥料をやらなくても、みかん、ハッサク、オリーブなどが収穫できている。なお、BGF 水路(Biogeofilter ditch)は、処理水を野菜などの礫耕栽培液として利用し、作物生産と水質浄化の両立を図るために研究・開発した資源循環型の浄化システムである。） I think that whether to remove nitrogen and phosphorus or to use effluent with containing nitrogen and phosphorus as agricultural way directly, effluent from Johkasou should be decided based on the land use to which the treated water is discharged. If there are rice paddies, fields, orchards, etc. near by the discharge destination, using the effluent for agricultural purposes is an effective way that complies with the SDGs, so please consider ways to use it that suit the local circumstances. When using the effluent for irrigation of rice, it is necessary to refer to rice cultivation manuals, etc., as excessive supply of effluent may cause the occurrence of pests and diseases and deterioration of rice quality. (I have installed an underground drip irrigation system using Johkasou effluent in my orchard, and I have been able to harvest mandarin oranges, hassaku, and olives without using fertilizers. The BGF waterway (Biogeofilter ditch) is a resource recycling purification system that was researched and developed to achieve both crop production and water purification by using treated water as gravel cultivation solution for vegetables and other crops.)
8.	洪水が地面や排水管より上に来た場合、洪水が浄化槽に流入するリスクはあるか。	株式会社ダイキアクシスインド法人 和座 良太 氏 Mr. Rio Waza	マンホールのタイプによる。通常のマンホールと止水のマンホールがある。マンホールより水位が高くなった場合、通常のマンホールだと槽内に洪水の水が流入する可能性がある。 It will depend on the type of manhole. There are regular manholes and water sealed manholes. If the water level rises above the manhole, flood water may flow into the Johkasou using a normal manhole.

No.	質問内容 / Question	回答者 / Answerer	回答内容 / Answer
	Is there a risk that flood water will enter the Johkasou if it comes above the ground or drain pipes?	Managing Director, Daiki Axis India PVT. LTD.	
9.	I would like to know about OPEX and CAPEX of water reuse from Johkasou.	株式会社ダイキアクシスインド法人 和座 良太 氏 Mr. Rio Waza Managing Director, Daiki Axis India PVT. LTD.	当方の発表資料のスライド 11 において、浄化槽の CAPEX は、インドで一般的な既設の下水処理施設（STP）の CAPEX と比較して、最大 10~15%高いことがわかる。しかし、Total cost の差はグラフのブレークポイントで示されているが、1 年足らずで逆転している。これは処理容量 10 m^3/day、50 m^3/day、100 m^3/day においても同様の傾向がみられた。 OPEX については、浄化槽の最も大きな利点であると思われるが、既設の STP と比較し、浄化槽の内部の処理工程において、基本的にポンプは必要ない。重力を利用して槽内の水が循環されるからである。この電力消費量の差によって、例えば、50 m^3/day の場合、一般的な STP の OPEX の方が浄化槽の OPEX より 1 年でおよそ 330,000 ルピー高くなる。 Slide 11 of my presentation shows that the CAPEX of Johkasou is up to 10-15% higher than that of existing sewage treatment plants (STPs), which are popular in India. However, the difference in total cost, indicated by the breakpoint in the graph, reversed in less than a year. Similar trends were observed for treatment capacities of 10 m^3/day, 50 m^3/day, and 100 m^3/day. Regarding OPEX, this seems to be the biggest advantage of Johkasou compared to existing STPs, pumps are basically not required in the treatment process inside the Johkasou. This is because the water in the tank is circulated using gravity. Due to this difference in power consumption, for example, at 50 m^3/day, the OPEX of a typical STP will be approximately 330,000 rupees more expensive per year than the OPEX of a Johkasou.
10.	日本国内で関西国際空港以外に処理水を利用している空港はご存じか。また、関西国際空港の事例を海外に適用する可能性はあると思われるか。 Do you know of any other airports in Japan that reuse treated water other than Kansai International Airport?	関西エアポート株式会社 彦谷 茂幸 氏 Mr. Shigeyuki Hikotani General Manager, Special Equipment Department, Kansai Airports	発表内容にあったように、関西国際空港では、空港が運営する処理場で処理した水を再利用している。一方、同じく当社が運営する神戸空港では、空港のすぐそばに自治体が運営している下水処理場があり、その処理水を空港で再利用している。 当社が運営していない他の国内の空港においても、自治体等から処理水を供給してもらい運用しているという事例がある。 海外展開については、ミャンマーの空港は空港内に処理施設を持っていたと認識している。処理水をそのまま放流していると思われるが、その処理水の用途を分岐させ、ビル内に循環させる仕組みを構築できれば、海外の他の空港でも処理水の再利用の展開は可能であると考えている。 As stated in the presentation, Kansai International Airport reuses the effluent at a treatment plant operated by the airport. On the other hand, at Kobe Airport, which is also operated by our company, there is a sewage treatment plant operated by the local government right next to the airport, and that's treated water is reused at the airport.

No.	質問内容 / Question	回答者 / Answerer	回答内容 / Answer
	Also, do you think there is a possibility that the example of Kansai International Airport could be applied overseas?		There are cases where other domestic airports, that are not operated by our company, to reuse the effluent supplied by local governments. Regarding overseas expansion, I understand that an airport in Myanmar had a treatment facility to reuse the effluent within the airport. It seems that the treated water is being discharged as is in many cases. However, if a system can be installed to separate the treated water according to the uses and circulate within the building, it might be possible to reuse of the treated water even at the overseas airports.
11.	テランガナ州におけるプロジェクトの実行に関する課題、特に既存の建物における最大の課題は何か。 What are the biggest challenges on project implementation in Telangana, especially related the existing buildings?	インド行政官大学（ASCI） スリニヴァス チャーリー ヴェダラ氏 Prof. Srinivas Chary Vedala, Chief Executive Officer at WASH Innovation Hub & Professor, Administrative Staff College of India (ASCI)	我々はこれまで多くの建設業者、デベロッパー、居住者と話し合いをしてきた。そしてコンセンサスを得る過程において、2 年間の移行期間が必要と判断した。このため条例案において、既設建築物の STP の更新に 2 年間の猶予を持たせている。 全ての建物は、駐車場、またはそれに近い開放された一定の広さの土地を備えている。何故なら建築基準で一定の広さの土地を確保するよう規定されているからである。浄化槽であれ、一般的な分散型汚水処理施設であれ、下水処理施設（STP）の設置のために、開放された土地、駐車場または駐車場の下にスペースを確保することになる。実際、和座氏の発表にあったように、多くの浄化槽は駐車場や庭の下に埋設されている。 また、土木工事も必要になるが、理論上そして経験上、既設の建築物において土木工事を行って STP を導入することは可能である。よって既設の建築物における STP の更新は可能である。建設会社へのコンサルティングを通し、こういった先行事例や、地域の要求事項、利用可能な空きスペースについて調査しこの条例案を作成した。そして、条例案では、STP の更新完了に 2 年間の猶予を持たせている。一方、新築の建築物では即時に行われるべきである。 We have been in discussions with many builders, developers and residents. In the process of reaching consensus, it was determined that a two-year transition period was necessary. For this reason, the proposed ordinance provides a two-year grace period for updating the STP of existing buildings. All buildings have a parking lot or a substantial open space adjacent to it. This is because the building code stipulate that a certain amount of land must be secured. Whether Johkasou or Whether other conventional wastewater treatment plant (STP), it will be installed under ground, and the space will be secured at the open land, in parking lots or under parking lots. In fact, as shown in the presentation from Mr. Waza, many Johkasous are installed under parking lots or under the gardens. Civil engineering work will also be required, but theoretically and from experience it is possible to introduce STP by performing civil engineering work on existing buildings. Therefore, it is possible to update STP even in existing buildings We developed this proposed ordinance through the consultation with construction companies, and through the investigation on good practices, local requirements, and available space. Thus, the proposed ordinance also provides a two-year grace period to complete the STP renewal. On the other hand, if it is a newly constructed building, it should be done immediately.

7.1.5. ワークショップ終了時の参加者からのフィードバック

1) 設問 1～6

No	設問１）第 11 回ワークショップの内容は、ご期待に沿うものでしたか？1-10 で評価してください(最大１０・最低１)	設問２）上記質問で、なぜそのように評価しましたか？	設問３）今回のワークショップの時間配分はいかがでしたか？	設問４）上記質問でその他と回答された場合、具体的に教えてください。	設問５）最も興味を持った発表はどれでしたか？	設問６）上記質問で、その発表を選んだ理由は何ですか？
1	9	Some presentations (A2, A3, and B1) were particularly interesting.	Moderate ちょうどよい		A-2: Recycling of treated water by Johkasou, by Mr. Shigeyuki Hikotani	It was interesting to learn technologies and issues associated with reclaimed water.
2	8	秋田などの事例、インドの取り組みなど、興味深く拝聴しました。	Other その他	発表はもう少しレベルを高めること、質疑応答が不十分であったことなど時間との兼ね合いを予め、精査しておかれると良いでしょう。	B-2: Onsite Wastewater Treatment and Recycling Regulations –2023 – Draft, by Prof. Srinivas Chary Vedala	インドにおける国状と、理想とする期待とのギャップが余りに大きいので驚かされました。
3	10	Great Learning	Moderate ちょうどよい		B-2: Onsite Wastewater Treatment and Recycling Regulations –2023 – Draft, by Prof. Srinivas Chary Vedala	Great onsite Wastewater Treatment and Recycling knowledge shared.
4	9	Very informative especially the topic talked about treated effluent reused.	Moderate ちょうどよい		Keynote: Water in Circular Economy and Resilience (WICER), by Ms. Midori Makino	To at larger scale on world bank policy towards water circulars economy
5	9	I got information on new technology for waste management from Japan	Short 短い		A-4: Advanced treatment of domestic wastewater using a combination of Johkasou and simple BGF - Examination of production and safety of vegetables and fruits - by Dr. Yasuo Ozaki	It matches well with my expectations
6	8	I am willing to learn treatment method of Johkasou.	Moderate ちょうどよい		B-2: Onsite Wastewater Treatment and Recycling Regulations –2023 – Draft, by Prof. Srinivas Chary Vedala	very clear...loud... and understandable
7	10	Awesome in topics & online system.	Moderate ちょうどよい		B-1: Mechanisms of Johkasou Act, by Mr. Ryoma Sato	I am regulation & policy maker, so I interested in this topic.
8	9	NA	Moderate ちょうどよい		B-2: Onsite Wastewater Treatment and Recycling Regulations –2023 – Draft, by Prof. Srinivas Chary Vedala	It was more related to policy in the context of India
9	8	The connection was not smooth, an internet glitch was a hindrance	Short 短い		A-2: Recycling of treated water by Johkasou, by Mr. Shigeyuki Hikotani	new knowledge about the activities of this company

No	設問１）第 11 回ワークショップの内容は、ご期待に沿うものでしたか？1-10 で評価してください(最大１０・最低１)	設問２）上記質問で、なぜそのように評価しましたか？	設問３）今回のワークショップの時間配分はいかがでしたか？	設問４）上記質問でその他と回答された場合、具体的に教えてください。	設問５）最も興味を持った発表はどれでしたか？	設問６）上記質問で、その発表を選んだ理由は何ですか？
10	8	特にインドの事例は大変勉強になりました。また、日本の実例もわかり、大変参考になりました。	Long 長い		B-2: Onsite Wastewater Treatment and Recycling Regulations –2023 – Draft, by Prof. Srinivas Chary Vedala	インドの実例であったから。
11	9	Understand the concepts of Johkasau	Moderate ちょうどよい		A-2: Recycling of treated water by Johkasou, by Mr. Shigeyuki Hikotani	Understood the technique to its core
12	7	分散型汚水処理の様々な分野の発表を聞くことが出来たため。	Long 長い	インド、アメリカなどの時差を考慮した時間帯であったことはわかるが、終わるのが少し遅いと感じたため。	A-3: Social implementation research on cultivation of rice suitable for sake brewing by effluent from large scale Johkasou - Eco-friendly sake “Sui Shigen” is newly relea- by Dr. Shuhei Masuda	処理水の再利用(特に農業利用）は、今後より進めていく分野の一つと認識しているため。
13	7	汚水処理と水再利用の分野において、研究所や企業や金融機関の関係者が参加して様々な情報を勉強しました。	Moderate ちょうどよい		A-3: Social implementation research on cultivation of rice suitable for sake brewing by effluent from large scale Johkasou - Eco-friendly sake “Sui Shigen” is newly relea- by Dr. Shuhei Masuda	浄化槽で処理した水を現場で使うのは凄くいい応用と思っております。
14	6	I wanted to have more grounding and context to understand the whole seminar. It was good.	Moderate ちょうどよい		A-1: Overseas examples: Utilization of effluent from Johkasou , by Mr. Rio Waza	It was so interesting to know about India's sanitation situation.
15	7	'-	Moderate ちょうどよい		A-4: Advanced treatment of domestic wastewater using a combination of Johkasou and simple BGF - Examination of production and safety of vegetables and fruits - by Dr. Yasuo Ozaki	'-
16	10	It was a new area for me, first time watching the circular economy proceeding. I am much interested in the waste water reuse	Moderate ちょうどよい		A-2: Recycling of treated water by Johkasou, by Mr. Shigeyuki Hikotani	It was most excited to see in our country
17	8	The webinar was informative and well planned	Moderate ちょうどよい		A-1: Overseas examples: Utilization of effluent from Johkasou , by Mr. Rio Waza	very well presented

No	設問１）第 11 回ワークショップの内容は、ご期待に沿うものでしたか？1-10 で評価してください(最大１０・最低１)	設問２）上記質問で、なぜそのように評価しましたか？	設問３）今回のワークショップの時間配分はいかがでしたか？	設問４）上記質問でその他と回答された場合、具体的に教えてください。	設問５）最も興味を持った発表はどれでしたか？	設問６）上記質問で、その発表を選んだ理由は何ですか？
18	8	The workshop is good, but need more publication to get more participant from another country	Short 短い		A-2: Recycling of treated water by Johkasou, by Mr. Shigeyuki Hikotani	In my country, the effluent from domestic wastewater treatment, like Johkasou, directly to the river. potential to recycle treated water will give another benefit to people in my country.
19	10	Very insightful presentations about the Johkasau technology and its implementation	Long 長い		B-2: Onsite Wastewater Treatment and Recycling Regulations –2023 – Draft, by Prof. Srinivas Chary Vedala	The presentation highlighted on Circularity and treated water reuse leasing to water neutrality
20	8	The presentation content was acknowledged way before during my master's program. However, acquired practical knowledge and advanced technology working towards water-related issues.	Moderate ちょうどよい		Keynote: Water in Circular Economy and Resilience (WICER), by Ms. Midori Makino	Broad understanding of how to use circularity in the water sector.
21	5	インドに関する情報は得られたが、処理水の再利用に関する新しい知見が得られなかったため。	Long 長い		B-2: Onsite Wastewater Treatment and Recycling Regulations –2023 – Draft, by Prof. Srinivas Chary Vedala	インドの水事情を知ることができた。
22	8	自身の知りたい情報が講演されたため。	Moderate ちょうどよい		A-2: Recycling of treated water by Johkasou, by Mr. Shigeyuki Hikotani	最大規模の浄化槽について、汚水処理の実態とリサイクル率に関する情報が入手できたため。
23	8	It was informative	Long 長い		B-2: Onsite Wastewater Treatment and Recycling Regulations –2023 – Draft, by Prof. Srinivas Chary Vedala	The content was informative.
24	7	各発表者の topic は異なっていましたが、処理水の再利用からは逸脱しておらず、ワークショップとしてとてもまとまっていたと思います。	Moderate ちょうどよい		A-1: Overseas examples: Utilization of effluent from Johkasou , by Mr. Rio Waza	プレゼンの構成や時間配分が少し微妙で少し分かりにくかったのですが、インドにおける再生水利用についてアンケート結果等については、とても興味深く、内容としてはとても面白かったです。
25	9	It has increased my knowledge on the wastewater treatment.	Moderate ちょうどよい		A-4: Advanced treatment of domestic wastewater using a combination of Johkasou and simple BGF - Examination of	Recyling of treated effluent to cultivation of vegetables

No	設問１）第 11 回ワークショップの内容は、ご期待に沿うものでしたか？1-10 で評価してください(最大１０・最低１)	設問２）上記質問で、なぜそのように評価しましたか？	設問３）今回のワークショップの時間配分はいかがでしたか？	設問４）上記質問でその他と回答された場合、具体的に教えてください。	設問５）最も興味を持った発表はどれでしたか？	設問６）上記質問で、その発表を選んだ理由は何ですか？
					production and safety of vegetables and fruits - by Dr. Yasuo Ozaki	
26	8	浄化槽を取り巻く環境や有効利用についての知見が深まった	Moderate ちょうどよい		B-1: Mechanisms of Johkasou Act, by Mr. Ryoma Sato	浄化槽に関する基礎的な知見が得られたため
27	8	Overall good	Moderate ちょうどよい		B-2: Onsite Wastewater Treatment and Recycling Regulations –2023 – Draft, by Prof. Srinivas Chary Vedala	No
28	10	I learned a lot about water reuse in Japan and India, it was really interesting.	Long 長い		A-2: Recycling of treated water by Johkasou, by Mr. Shigeyuki Hikotani	gave a nice overview of the johkasou, made the base understanding for the concept that all other presentations also used
29	10	Because the webinar was really interesting and informative.	Moderate ちょうどよい		B-1: Mechanisms of Johkasou Act, by Mr. Ryoma Sato	Because the presentation was interesting and learn many new things
30	8	Workshop was very informative	Moderate ちょうどよい		A-2: Recycling of treated water by Johkasou, by Mr. Shigeyuki Hikotani	This is great case to be shared with developing countries
31	10	最後のインドの発表が非常に情熱的でよかったです。	Long 長い		B-2: Onsite Wastewater Treatment and Recycling Regulations –2023 – Draft, by Prof. Srinivas Chary Vedala	インドの状況が興味深かったです
32	6	情報収集には有益だと感じました。	Long 長い		Keynote: Water in Circular Economy and Resilience (WICER), by Ms. Midori Makino	全体の話題をされており、聞きやすかったです。
	8.28					

2) 設問 7～11

No.	設問７）分散型汚水処理施設の処理水の再利用についてどの程度理解が深まりましたか？1-10 で評価してください（最大１０、最低１）	設問８）なぜそのように評価しましたか？	設問９）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？	設問 10）もし次回（第 12 回）も Workshop 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？	設問 11）このワークショップを改善するにはどうすれば良いと思いますか？
1	7	In addition to the technologies presented, it would have been more interesting if consumers' perception toward using reclaimed water in the agricultural production was presented in somewhere.	No	No	
2	2	農業その他での再利用は自然系を含むサイクルとなり、土壌などのチョキ的な変質などに関する視点が不足しているように思われた。この点を詰めていかれると良いでしょう。	世銀において、WICER 関連の予算の allocation はどのように決められていくのか。現状では予算規模はどの程度となっているのか、その配布の priority はどうやって決められているのか？	浄化槽、その他の分散型処理、半自然系の処理（土壌浄化、酸化池、湿原の利用など）に関して、新たな視野での検討を加えてもらえると面白く、途上国においては重要であると思われる。	発表に関して、お互いの内容を予め交換し合うなどで、議論がかみ合うようにされては如何でしょうか？
3	8	As per my understanding			
4	9	Great sharing from KIX airport and India reuse project	To cover on reuse of treated sludge from decentralize domestic wwtp	Green technology, alternative financing, tariff setting	
5	6	effluent is often not known and its reuse is completely absent	Could you put together all presentations in one shared drive ?	Training technicians on utilisation of Johksou technology	Pprovide more examples for Africa
6	5	i earned an overview	*please little bit interpret treatment method	Please little bit explaine on the treatment method of Johkasou	Are there any other methods can be used to treat decentralized WW?
7	5	My work related to regulation & Policy framework, so my technical knowledge on this matter is a few.	No Idea.	Possibly, Air quality or Air Emission from industries and vehicles should be in the next workshop.	Totally, awesome as mentioned above.
8	8	NA	NA	NA	NA
9	3	I want to study more other designs and methods	good luck and further success	I wish further open seminars on this topic	It is advisable to attract workers from these enterprises
10	6	途中退席などもありながらの聴講であったこと、事前勉強不足から。		具体的に日本の優れているポイント、日本でチャレンジしていること、成功事例及び、インドにおける問題点（今回と別の視点から）	個人的には、1 日に長時間セミナー参加が難しいので、1.5 時間くらいのものを数多く開催していただく、或いは後日録画の共有をしていただけると大変ありがたいです。

No.	設問７）分散型汚水処理施設の処理水の再利用についてどの程度理解が深まりましたか？1-10 で評価してください（最大１０、最低１）	設問８）なぜそのように評価しましたか？	設問９）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？	設問 10）もし次回（第 12 回）も Workshop 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？	設問 11）このワークショップを改善するにはどうすれば良いと思いますか？
11	9	It was informative and knowledgeable	No	Biosolids treatment and management	Inclusion of some videos for better understanding
12	7	資料のボリュームが大きく、一度の発表で全てを理解できなかったため。	ワークショップの企画、運営担当者さま、お疲れさまでした。	海外における浄化槽汚泥の処分方法について。	特に思いつきません。
13	7	下水道を利用できない所に分散型汚水処理施設を設置し、水を綺麗にしてから河川に流すという目的を分かりました。放流した水は建築物用水や植物栽培用水として使用することもわかりました。			
14	7	There was supposed to a robust history lecture on the evolution of Johkasou for more clearance.			
15	7	'-	'-	No	'-
16	9	so intresting			
17	8	Very informative sessions	nil	nil	include more sessions
18	7	I need more information, how to convince the community of its potential to the utilization of the effluent	We need not only a sort of meeting; if possible, the workshop have time to follow up.		May be language barrier, the commitee can provide another language interpretation, not only Japannese and English
19	10	The presentations highlighted the Johkasau technology, its efficiency in wastewater treatment and policies implemented for treated water reuse with examples	Well organised workshop. Duration was bit longer (about 3hrs) which could be conducted with short breaks	Various options on Sludge management and alternatives to reuse the treated biosolids	
20	9	From the speaker's presentations, I got acknowledged about it.	We need more examples of cities that have incorporated Circularity in the Water Sector and attained social, economic, and environmental benefits. This can create great global attention.	How to recharge groundwater in cities? Problem statement: Percolation/infiltration of water has reduced due to the concrete jungles (cities).	Mention to the questions from the participants at the end of each presentation, so that we can understand how much participants had acquired from the workshop.
21	5	特に新しい知見は得られなかった。			

No.	設問７）分散型汚水処理施設の処理水の再利用についてどの程度理解が深まりましたか？1-10 で評価してください（最大１０、最低１）	設問８）なぜそのように評価しましたか？	設問９）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？	設問 10）もし次回（第 12 回）も Workshop 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？	設問 11）このワークショップを改善するにはどうすれば良いと思いますか？
22	8	処理水再利用の有効性が高いことが理解でき、トイレ洗浄水以外に農業利用の価値が高いことが知り得たため。	様々国の実態を知りたい。紹介された国が少なかったと思います。	個別処理が導入された施設における処理状況（水質、運転状況、トラブル事例等）や個別処理を導入したことによる経済性や効率性について、種々の国の状況を知りたい。 個別処理を導入したことによる水環境や生活環境の変化なども知りたいです。	
23	10	The webinar was informative		Direct and Indirect potable reuse and the standards for that	
24	6	浄化槽処理水の再利用について知る機会がなかったのですが、今回色々なキーワードを知ることができたので、自分でも調べてみたいと思います。	5 番目の発表の関空の浄化槽に関する話も面白かったです(行政やメーカーだけではなく、実際の浄化槽を保有している団体の視点から、メリットもデメリットもとても分かりやすくまとめられていました。)。		もし可能であれば、現地視察等も行うとさらに面白くなるかと思います。
25	5	I need to learn more on this.	I shall be thankful if you could inform future events to me.		I like present pattern of workshop and would like to participate physically.
26	7	重要さを理解いたしました。			
27	6	Overall good			
28	6	I have already a understanding of the topic but now also in te Japanese/Indian context			
29	6	I just have herd about the decentralized domestic Wastewater treatment before the webinar, this was the first time that I learn it. So I think now I have somewhat good knowledge on it.	All the presentations were really good and interesting		
30	9	The workshop comprehensively touched upon important aspects.	N/A	Would be great to show more examples/case studies from private sector in Japan.	N/A
31	10	インドの状況が良く分かりました		アジア以外の地域	
32	7	以前より理解はありました。			時間配分にメリハリをつけて頂ければ幸いです。
	7				

7.1.6. 参加登録時及び終了時のアンケート調査で受け付けた質問に対する回答

No.	Organization, Job Title 質問者組織名・職種名	Country 質問者参加国	Questions 質問内容	Answerer 回答者	Answer 回答
1.	JNK Environmental Research & Cosulting Co., Ltd Consultant JNK エンバイロンメンタルリサーチ&コンサルティング コンサルタント	Vietnam ベトナム	How about the maintenance and operation cost for Johkasou in Vietnam? ベトナムにおける浄化槽に係る維持管理費用はどのようになっているのか。	MOEJ 日本国環境省	The O&M cost highly relies on labor's cost, type and size of a Johkasou, additional equipment, treatment technologies and so on which are applied to, so that the cost varies widely. In addition, there is few data on the O&M in other countries. Therefore it is difficult to estimate the general O&M cost in Vietnam. 維持管理費用は人件費に大きく依存しており、また、追加の設備、適用される処理技術等によっても大きく変動する。加えて他国での維持管理費用に係るデータも乏しい。従って、一般的な維持管理費用の見積もりは不可能であることをご理解いただきたい。
2.	BizSolutions 360 Chief Engineer ビズソリューション 360 チーフエンジニア	Nepal ネパール	Are there any examples of using wastewater for hydroponic? 排水の水耕栽培への利用例は他にあるか。	MOEJ 日本国環境省	Please refer the presentation from Prof. Yasuo Ozaki (A-4). The case introduced in his presentation does not directly mention on the hydroponic, however, BGF ditch (Biogeofilter ditch) system seems to be informative for your question. 尾﨑保夫氏の発表資料(A-4)をご参照いただきたい。尾﨑氏の発表にて紹介された事例では、水耕栽培に関して直接的には言及していない。しかしながら、BGF 水路(Biogeofilter ditch)システムは質問に対して参考になると思われる。
3.	Research Institute for Human Settlements (RIHS), Ministry of Public Works and Housing Researcher 公共事業・公営住宅省 人間居住研究所 研究員	Indonesia インドネシア	How to reuse fecal sludge from decentralized wastewater? 分散型排水処理によって生じた糞便の汚泥をどのように再利用するのか。	MOEJ 日本国環境省	In case of Japan, collected Johkasou sludge and night soil are treated at the night soil treatment plant owned by municipalities. Part of the treated sludge from the night soil treatment plant is utilized for compost. Or, treated sludge is used as the material of cement at the private cement company. 日本の事例では、収集された浄化槽の汚泥及びし尿は、地方自治体が所有している汚泥処理施設にて処理される。 汚泥処理施設にて処理された汚泥の一部は堆肥として活用される。もしくは、民間のセメント会社にてセメントの材料として使用される。
4.	Department of Water Supply and Sewerage Management, Ministry of Water Supply Senior Engineer 給水省上下水道局 シニアエンジニア	Nepal ネパール	What is the technological option for the development of DEWATS in developing countries like Nepal where requires resources for designing, construction and	MOEJ 日本国環境省	With respect to the Johkasou system, for example, it does not work without appropriate installation work, and O&M, as well as the other advanced decentralized wastewater treatment plants. As can be referred in the presentation from Mr. Ryoma Sato (B-1), technical guidelines and/or regulations on the designing, construction, and O&M provided by authorized body or government will strongly contribute to manage the decentralized wastewater treatment system well.

No.	Organization, Job Title 質問者組織名・職種名	Country 質問者参加国	Questions 質問内容	Answerer 回答者	Answer 回答
			successful operation and management of the system to achieve the sustainability of the service? ネパールのような発展途上国では、サービスの持続可能性を達成するためにシステムの設計、構築、運用と管理を成功させるためのリソースを必要とするが、DEWATS を開発するための技術的オプションは何か。		浄化槽システムに関し、例えば、他の進化した分散型処理施設と同様に、浄化槽は適切な設置工事及び維持管理無くしては機能しない。 佐藤亮真氏の発表資料(B-1)でも参照できるとおり、認定機関もしくは政府によって規定された設計、工事、維持管理に係る技術指針及び技術面の規制は、分散型排水処理システムの良好な運営にかなり貢献するだろう。
5.	NJS Engineers India Pvt Ltd Director 株式会社 NJS インド法人 部長	India インド	Is a Johkasou suitable for cold temperature? 浄化槽は低い気温に適しているか。	MOEJ 日本国環境省	In Japan, we use Johkasou are even at Hokkaido prefecture (Japan) where the annual average temperature is around 5-10℃, and they are installed underground lower than the freezing depth. Their burying depth is usually deeper than the cases installed in warm areas. 日本では、年間平均気温が 5-10℃である北海道でさえも浄化槽を使用しており、その浄化槽は凍結深度を考慮して地中に埋設されている。 そして、その深度は温暖な地域の一般的な設置事例よりも深い
6.	University of Tokyo Professor 東京大学 教授	Japan 日本	How is WICER-related budget allocation determined at the World Bank? What is the current budget size and how is its priority determined? 世界銀行では、WICER に関連する予算の割り当てはどのように決められているのか。	Ms. Makino Midori, World Bank 世界銀行 牧野 緑 氏	While we are spending on average around $100,000 -150,000 annually in technical assistance to task teams that are supporting the client countries, the activities vary from raising awareness of WICER, to preparation work of projects that include elements of WICER. The allocation of resources is made primarily on on-demand basis and involves countries and clients where the World Bank already have on-going water sector dialogue. クライアントの国を支援するタスクチームへの技術面の手助けとして年に平均 100,000 -150,000 ドルを費やしているが、その活動は WICER への認識の向上、WICER の要素を含むプロジェクトの準備業務まで多岐にわたる。財源の割り当ては主として要望に沿って行われ、それには既に世界銀行が水分野の対話を行っている国やクライアントも関与する。

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			また、最近の予算規模及び決定する際の優先事項は何か。		
7.	Administrative Staff College of India Senior Research Associate – Consultant インド行政官大学, コンサルタント	India インド	How to recharge groundwater in cities? Problem statement: Percolation/infiltration of water has reduced due to the concrete jungles (cities). どのように市中の地下水を再び満たすのか。 問題の状況： 水のろ過/浸透はコンクリートジャングル（シティ）によって減少している。	Prof. Srinivas Chary Vedala, ASCI インド行政官大学（ASCI） スリニヴァス チャーリー ヴェダラ 氏	Groundwater recharging is mandatory for industries, residential & commercial buildings, individual houses, etc. However, implementation is not robust. Some NGOs, civil society organisations, and corporates (as corporate social responsibility) are taking up groundwater recharging. The impact is felt but not at scale. Several citizens are interested in GW recharging/rain water harvesting. However, they need technical assistance to take up the work. ハイデラバード市において地下水の涵養は、産業、住宅および商業用建物、個人住宅などに義務付けられているが、確実に実施されているわけではない。 一部の NGO、市民社会団体、企業は（企業の社会的責任の一環として）地下水の涵養に取り組んでいる。 一定の効果はあるようだが、十分な規模ではない。地下水の涵養及び雨水利用に対し市民は関心を持っているが、この取り組みには技術的な支援が必要である。