Towards a circular economy transition

through safe collection, treatment & resource recovery of wastewater and fecal sludge

T2D3

Japan Sanitation Consortium
APWF KNOWLEDGEHUB

OFFICE NATIONAL DE L'ASSAINISSEMENT DU SÉNÉGAL

SNV IMPACT THAT MATTERS

Moderator - Presentations

WATER FOR SHARED PROSPERITY

Dr. Pierre Flamand

Japan Sanitation Consortium (JSC)

Pierre is the Manager of International Affairs at JSC, the Asia-Pacific Water Forum's Knowledge Hub for sanitation.

He has 20 years of experience in sanitation, with particular focus on fecal sludge management. Since joining JSC in 2009, he has been involved in sanitation projects in Viet Nam, Malaysia and Bhutan. He is the co-author of *'Sanitation and Sustainable Development in Japan'* (ADB 2016) and *'Accountability Mechanisms for Inclusive City-Level Public Services in Asia'* (ADBI 2023).

Since 2015, he has been involved in Working Groups of ISO/TC 224 as an expert representing Japan for the development of several international standards.

Pierre holds a doctoral degree in regional development studies. He is a visiting researcher and lecturer at Toyo University in Japan.

Session Program

WATER FOR SHARED PROSPERITY

Activity	Speaker/Panelist
Opening Remarks	**Dr. (Mr.) Pierre Flamand**; Manager – International Affairs; Japan Sanitation Consortium (JSC)
Keynote Speech: **Standardization of wastewater treatment systems**	**Dr. (Mr.) Yoshitaka Ebie**; Manager of International Coordination Office, Planning Division, National Institute for Environmental Studies (NIES); Advisor for Water Environment Partnership in Asia (WEPA)
Presentation 1: **Wastewater and faecal sludge recycling, energy and nutrient recovery - towards a circular economy**	**Mr. Hezekiah Pireh**; Water and Sanitation Team Leader; Urban Basic Services Section; Urban Practices Branch; Global Solutions Division; United Nations Human Settlements Programme, UN-Habitat
Presentation 2: **Fecal Sludge Management in Emergency Settings**	**Mr. Safwatul Haque Niloy**; Team Leader - Public Health Engineering; OXFAM Bangladesh
Presentation 3: **Fecal Sludge Compost Production from a 24-Hour Composting Machine**	**Mr. Supriyanto**; Head of Wastewater Operator; Public Works and Spatial Office, Tasikmalaya City, Indonesia
Panel Discussion	Moderator: **Ms. Saniya Niska**; WASH SDG Programme Manager; Interim Water Sector Leader; SNV Panelists: – **Ms. Rouguiyatou Ba**; Association des Jeunes Professionnels de l'Eau et de l'Assainissement du Sénégal (AJPEAS) – **Prof. (Mr.) V. Srinivas Chary**; Director of the Centre for Environment, Urban Governance, and Infrastructure Development; Administrative Staff College of India (ASCI) – **Ms. Mélodie Boissel**; Head of Mediterranean basin and knowledge production, pS-Eau – **Mr. Shu Nishi**; Director for Sewerage International Affairs and Engineering Office; Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan
Questions from the audience	
Closing Remarks	**Dr. (Mr.) Papa Samba Diop**; Governor, World Water Council; Technical Advisor, National Sanitation Office of Senegal (ONAS) - OK

Keynote Speaker

Dr. Yoshitaka Ebie

National Institute for Environmental Studies (NIES)
Water Environment Partnership in Asia (WEPA)

Dr. Yoshitaka Ebie is a Chief Senior Researcher in Material Cycles Division at National Institute for Environmental Studies (NIES), Japan. His research fields are wastewater treatment, greenhouse gas emissions and disaster waste management.

He is one of the authors of IPCC Guidelines for National Greenhouse Gas Inventories. He is also involved in ISO TC224/WG8 for on-site domestic wastewater services.

Dr. Ebie holds a doctoral degree in Agriculture from the University of Tsukuba, having focused for his research on: ‘*Nitrifying bacterial ecology in biological nitrogen removal processes*’.

Standardization of wastewater treatment systems

Dr. Yoshitaka Ebie

National Institute for Environmental Studies, Japan

A Key Message towards a circular economy transition through safe collection, treatment and resource recovery of wastewater and fecal sludge.

- Standardization of wastewater treatment systems in National, Regional or International level
  - Necessity
  - Difficulty

Structure

Performance evaluation

O&M

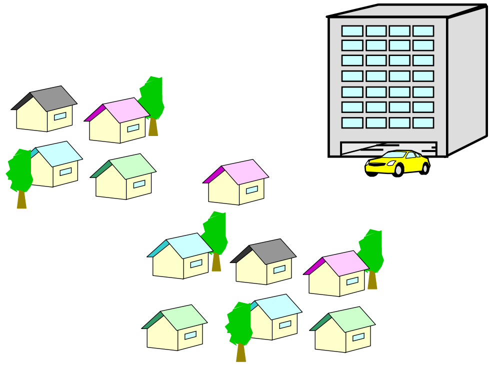
Building permission

Pollution load per capita

On-site and off-site

On-site/decentralized

- Individual (ex. 1 HH; 5 PE)
- Communal (ex. 2-10HH; 10-50 PE)



Off-site

- Settlement scale: ex. 50～20,000 PE
- City scale: ex. >20,000 PE

5 things we need to consider for dissemination of appropriate wastewater treatment technologies

1. Effluent standards
2. Structure standards and/or standardized performance evaluation
3. Standardized O&M and monitoring
4. Standardized Sludge collection, treatment and disposal
5. Standardized license for technicians and/or service providers

Regulation has been updated

- Ministry of Environment and Forestry has issued new effluent standard for domestic wastewater (2016).
- This new and stringent regulation for domestic wastewater is a major step forward to improve water environment.

Parameters	Unit	Old Regulation	New Regulation
pH	-	6-9	6-9
BOD	mg/L	100	**30**
COD	mg/L	-	100
TSS	mg/L	100	30
Oil and Grease	mg/L	10	5
Ammonia	mg/L	-	**10**
Total Coliform	N/100 mL	-	**3,000**
Discharge	L/person/day	-	100

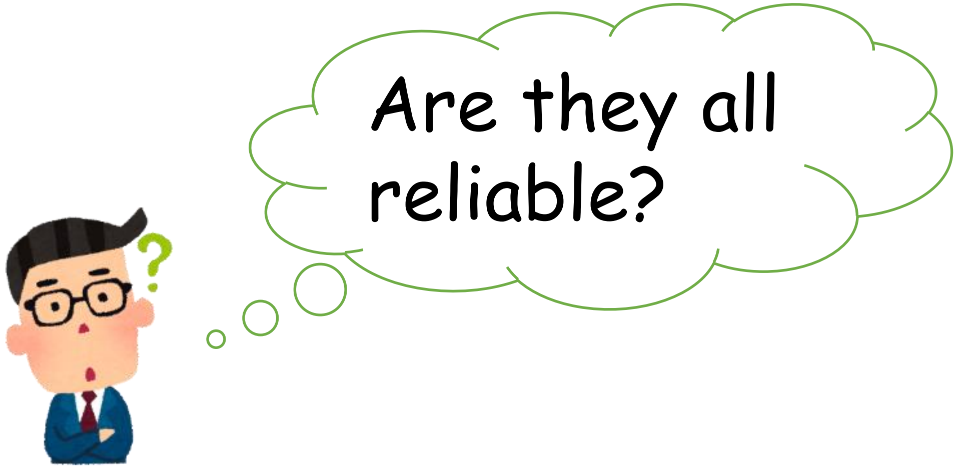
On-site/decentralized domestic wastewater treatment facilities

Septic tank

Biofil

IPAL

septic tank?



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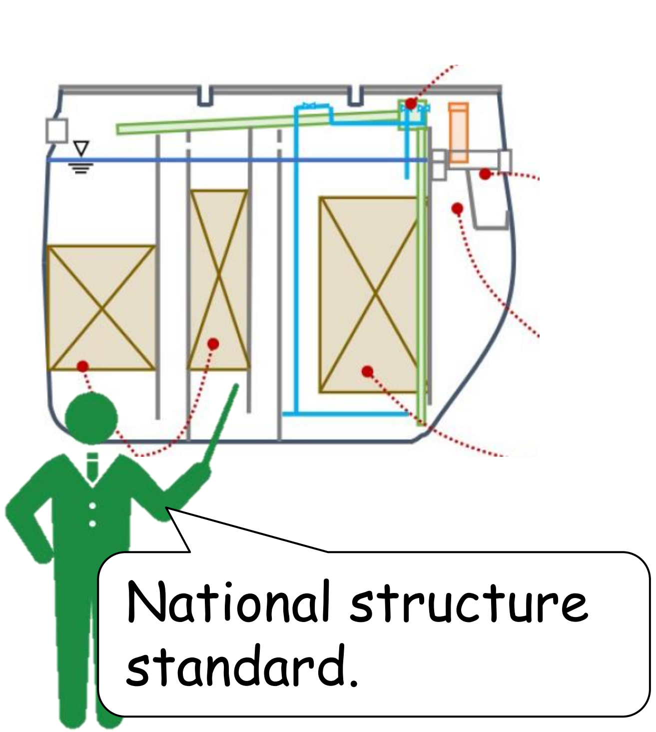
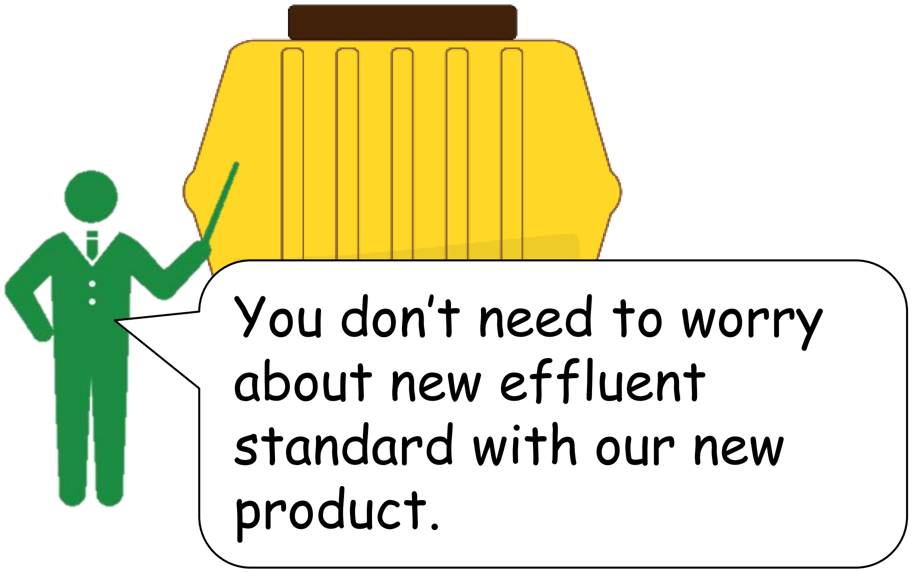
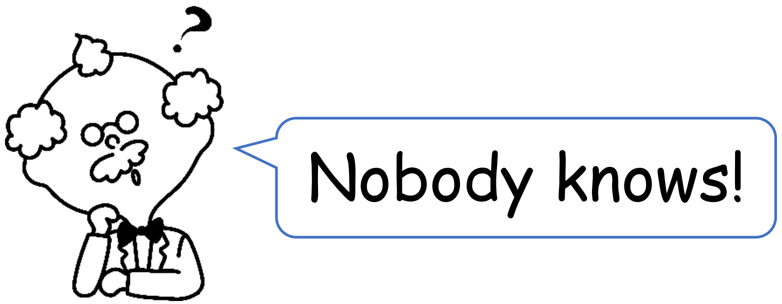
Compliance to the regulation may not be ensured







→ We need a standardized performance testing method and reliable certification system

Major standards in the world

European Standard (EN)
EN12566-3: Small wastewater treatment systems for up to 50 PE

The United States
NSF/ANSI Standard 40: Residential Wastewater Treatment Systems

Australia
AS/NZS 1546 Part 3: Aerated wastewater treatment systems

Japan
Performance testing method for Johkasou

Advantages

- If you have no standard, it would be chaos.
- If you have different local standards in different area of your country, manufacturers need to have different kind of products for each area.
  - This must exert upward pressure on price.
- If we standardize these local standards, we can make a big market within the area sharing the same standard.

5 things we need to consider for dissemination of appropriate wastewater treatment technologies

1. Effluent standards
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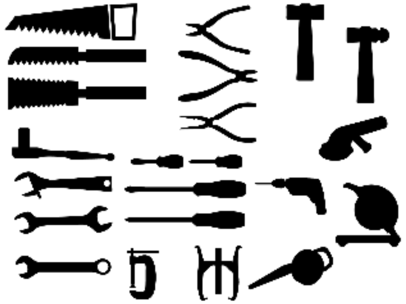
- If you have standardized structure or performance evaluation, O&M procedures and frequency could also be standardized.

Otherwise, you must learn many O&M procedures for every single site and prepare many kinds of tools.



5 things we need to consider for dissemination of appropriate wastewater treatment technologies

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4. Standardized sludge collection, treatment and disposal
5. Standardized license for technicians and/or service providers

- Regular desludging is closely related with the standardization of treatment facilities.
  - Japanese law requires annual desludging, then manufacturers design the capacity of the sludge storage tank with this condition.
- Desludging procedures also rely on the standard of the treatment facility.
  - Manhole size, desludging port size, depth, etc.

5 things we need to consider for dissemination of appropriate wastewater treatment technologies

1. Effluent standards
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Construction Operation Desludging

National vocational qualification
(Registration to the prefecture)

Private qualification
(Approval from the municipality)

- Civil engineering, microbiology, mechanical engineering, etc.
- Quality control of services

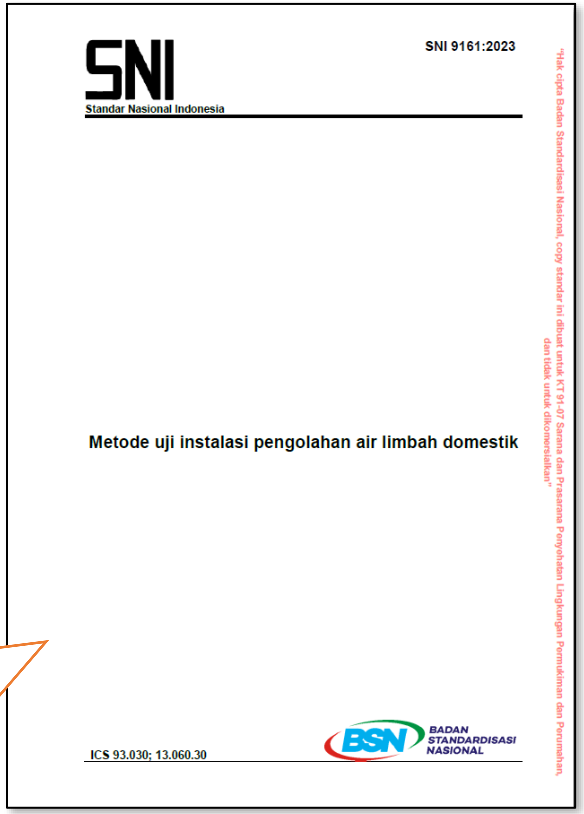
Platform for the standardization

. . .

Stakeholders Meeting

Industry-academia-government collaboration

SNI 9161:2023
Standardized testing method of domestic wastewater treatment plant in Indonesia


SNI
Standar Nasional Indonesia

SNI 9161:2023

Metode uji instalasi pengolahan air limbah domestik

ICS 93.030; 13.060.30

BSN BADAN STANDARDISASI NASIONAL

"Hak cipta Badan Standardisasi Nasional, copy standar ini dibuat untuk KT 91-07 Sarana dan Prasarana Penyehatan Lingkungan Permukiman dan Perumahan, dan tidak untuk dikomersialkan"

Water Environment Partnership in Asia

WEPA is an initiative **proposed by the Ministry of the Environment, Japan (MOEJ) in 2003** at the Third World Water Forum

- The first phase started in 2004, following **a five-year cycle**;
- The objective is to **improve water environmental governance** in Asia with full support of MOEJ;
- WEPA currently consists of the following **13 countries in Asia**.

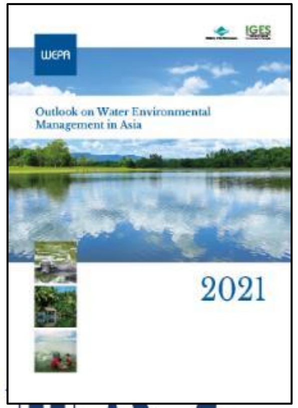
1. Cambodia
2. China
3. Indonesia
4. Japan
5. Lao PDR
6. Malaysia
7. Myanmar
8. Nepal
9. Philippines
10. Republic of Korea
11. Sri Lanka
12. Thailand
13. Viet Nam

Sharing knowledge and experiences

WATER FOR SHARED PROSPERITY

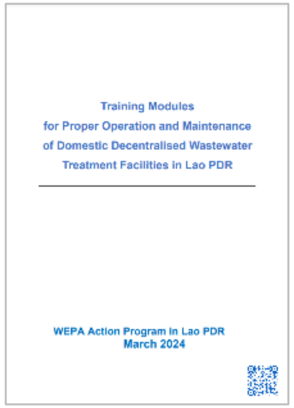
WEPA database www. wepa-db.net

Annual meeting



Publication

WEPA Outlook on Water Environmental Management in Asia



Action program


Terima kasih

Speaker

Mr. Hezekiah Pireh

UN-Habitat

Mr. Hezekiah Pireh leads the water and sanitation team at UN-Habitat. He has over 25 years of experience in water and sanitation governance, policy and institutional capacity development support and citizen engagement.

He is managing several of UN-Habitat's water and sanitation projects in Africa and Asia and has extensive experience in formulating and implementing strategies for effective involvement of city-level stakeholders, including the urban poor and vulnerable groups, in the management of water and sanitation services.

Over the years, he has helped to strengthen operational structures of local governments and other service providers by creating a governance framework favourable for stakeholder engagement and partnership building in pro-poor basic service provision.

10TH WORLD WATER FORUM
WATER FOR SHARED PROSPERITY

18 - 24 May 2024 | Bali, Indonesia

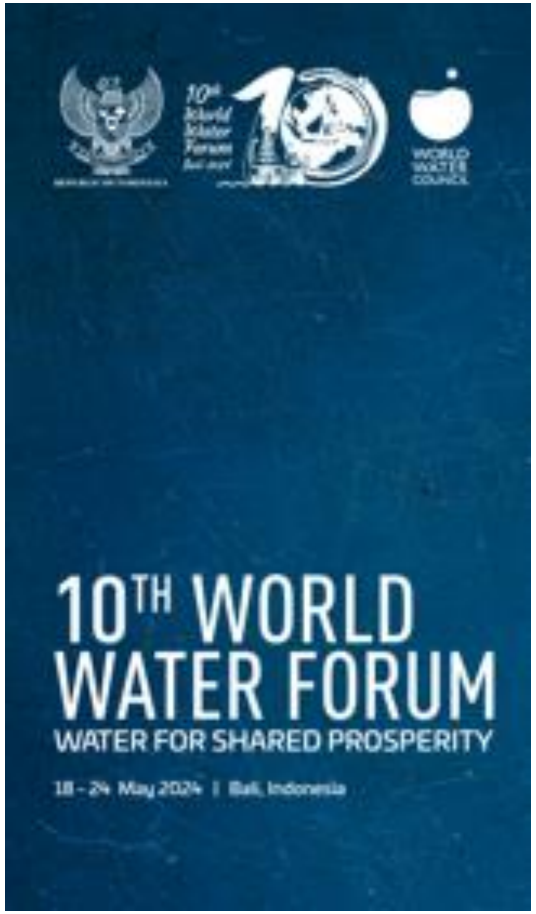
T2D3

Towards a circular economy transition through safe collection, treatment and resource recovery of wastewater and fecal sludge

Wastewater and faecal sludge recycling, energy and nutrient recovery - towards a circular economy

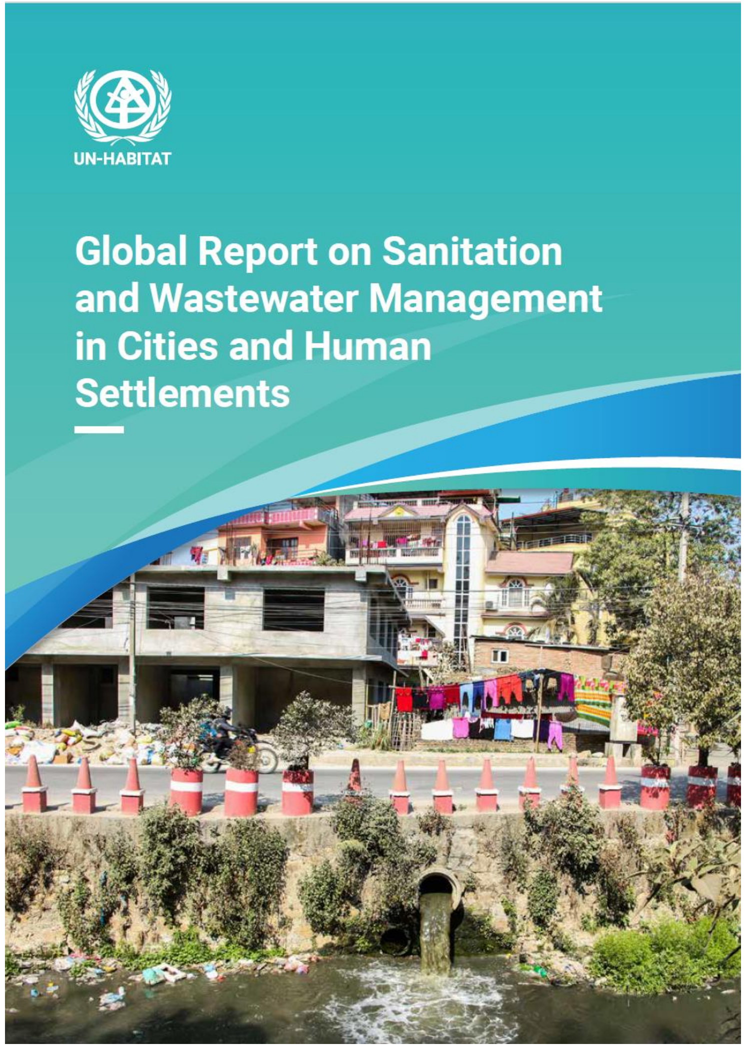
Hezekiah Pireh
WASH Team Leader
UN-Habitat

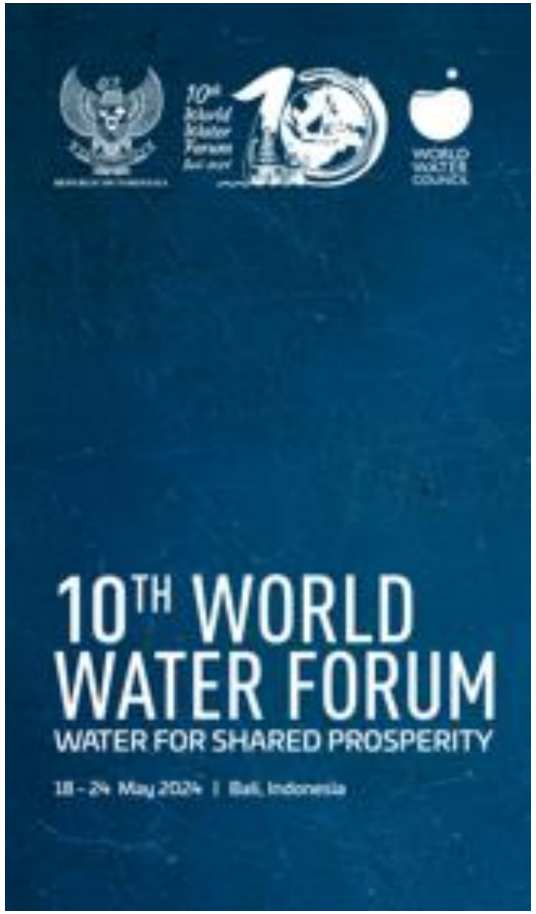
Wastewater and faecal sludge recycling, energy and nutrient recovery – Interesting times for wastewater management!



- Alleviate the global water crisis through wastewater reuse.
- A shift in focus from pollutant removal to resource recovery and reuse.
- Circular economy for wastewater and faecal sludge.
- Policy and institutional arrangements to support the reuse of wastewater and feacal sludge.

[Global Report on Sanitation and Wastewater Management in Cities and Human Settlements | UN-Habitat (unhabitat.org)]



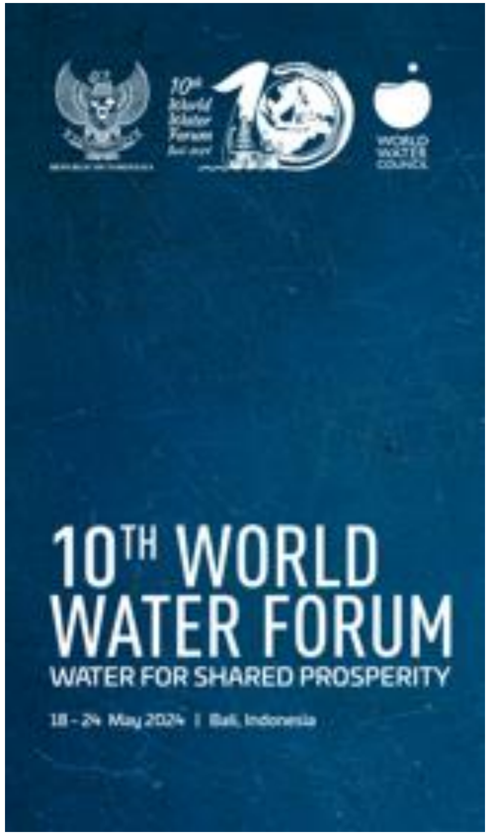


Wastewater and faecal sludge by-products resource recovery

Wastewater and feacal sludge treatment by-products

- Treated water
  - Cooling plants
  - Industrial processes
  - Recreational use
  - Irrigation
  - Drinking water
  - Replenishing aquifers
- Sludge
  - Nutrient rich biosolids
  - Biogas for energy
  - Carbon credits
- Nutrient-rich

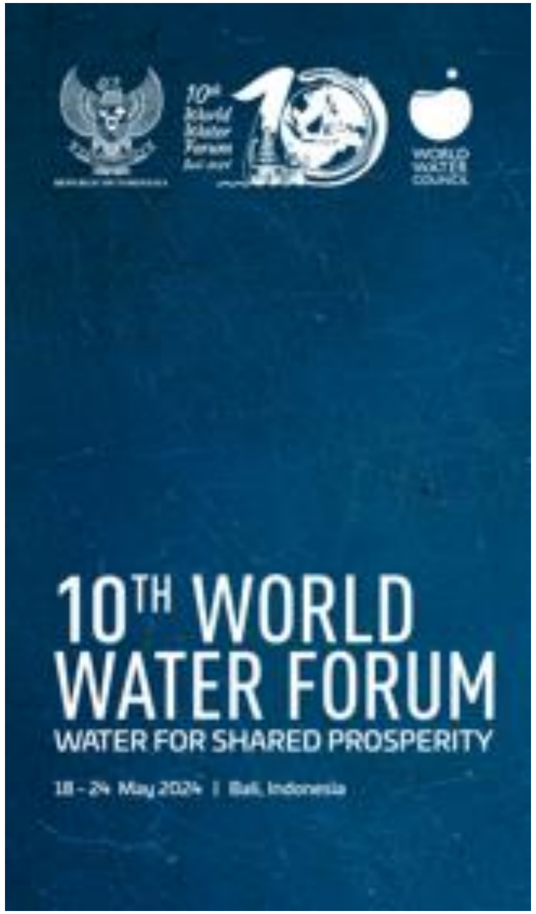
Source: *Global Report on Sanitation and Wastewater Management in Cities and Human Settlements | UN-Habitat (unhabitat.org)*



Hamburg Wasser recovers phosphorus from sludge ash produced by its wastewater treatment plants


View of Hamburg waste water treatment plant © Hamburg Wasser

Policy and institutional arrangements to support the reuse of wastewater in Hanoi, Vietnam



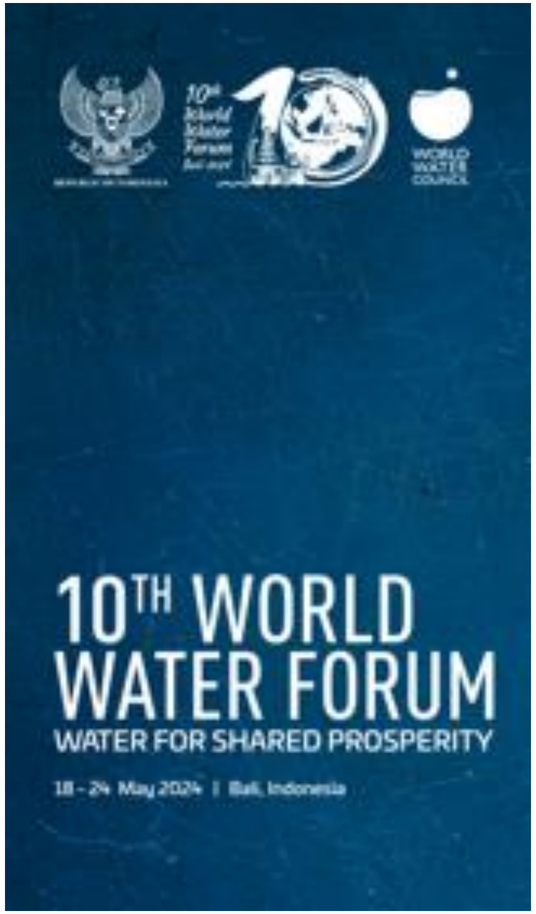
Policies and legislation

- Decision No 1930/QD-TTg dated November 20, 2009, on urban drainage and wastewater.
- Article 72 of the Law on Environmental Protection 2020.
- The Law on Water Resources (LOWR, 2012).

Institutional arrangements

- Hanoi Sewerage and Drainage Company (HSDC).
- Department of Rural and Agricultural Development (DARD) of Hanoi City.


Yen Nghia pumping station in Hanoi - https://vinadicme.com

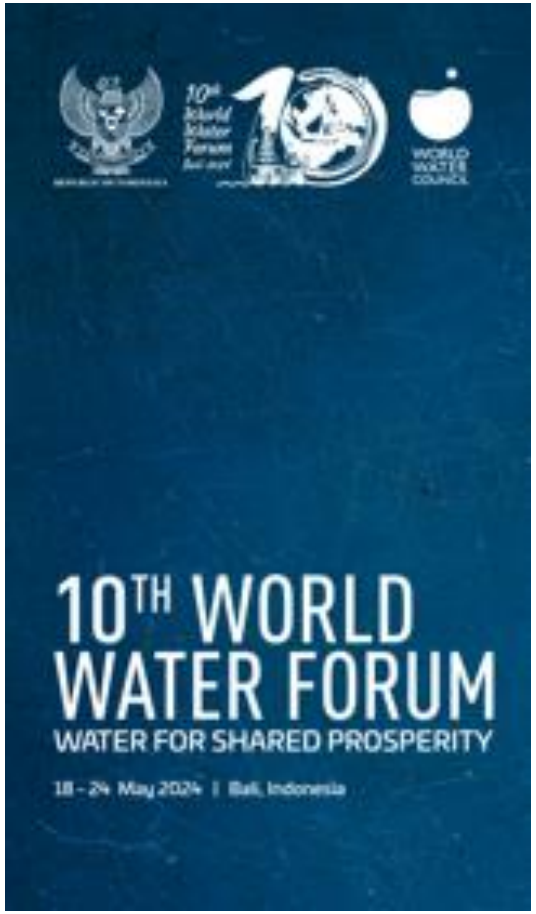


Advances in using wastewater as a source of potable water

Location	Year implemented	Treatment Processes	Effluent end use
Windhoek, Namibia	1969	PAC → Pre-ozonation → Coagulation/Flocculation → DAF → Rapid Sand Filtration → Ozonation → BAC Filtration → GAC Filtration → UF → Chlorination	Blended with raw water prior to drinking water treatment
Beaufort West, South Africa	2011	Sand Filtration → UF → RO → UV/AOP → Chlorination	Blended with raw water prior to drinking water treatment
Big Spring, Texas, USA	2013	MF → RO → UV/AOP → Conventional Treatment	Blended with raw water prior to drinking water treatment
Village of Cloudcroft, New Mexico, USA	2016	MBR → RO → UV/AOP → Storage → UF → UV → GAC → Chlorination	Blended with raw water prior to drinking water treatment

BAC: biological activated carbon; MF: micro-filtration; DAF: dissolved air flotation; GAC: granular activated carbon; PAC: powdered activated carbon; RO: reverse osmosis;

Fully leveraging the potential of treated wastewater requires safeguards and the development and enforcement of standards.



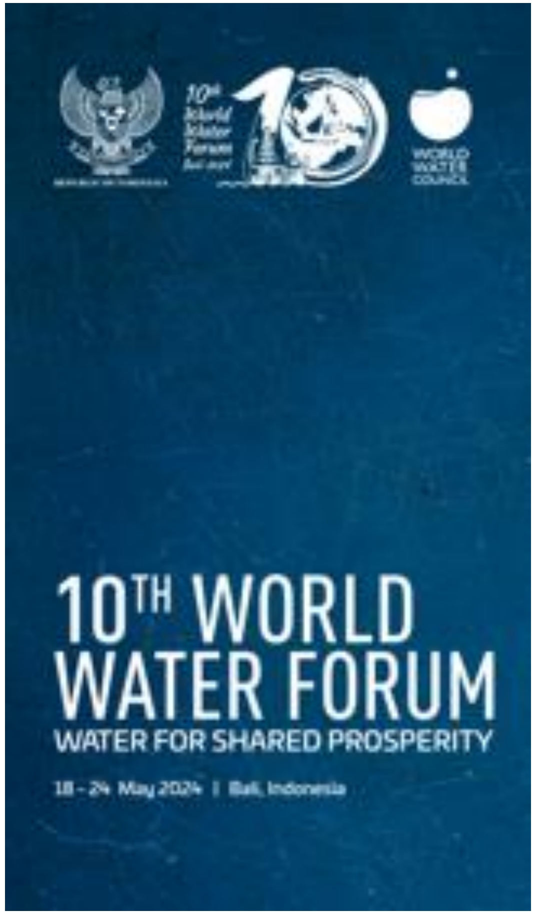
Faecal sludge: towards a circular sanitation economy

CBS provider	Containment	Treatment process	Reuse products	Service costs to user per year
SOIL	Portable seated	Aerobic composting: static pile then windrow turning, with sugarcane bagasse co-waste at start of process	Compost branded as Konpos Lakay, sold at USD 280/t.	USD 36
Sanergy	Fixed squat	Aerobic composting with a variety of agricultural/ organic co-waste materials.	Evergrow compost sold at USD 400/	USD 63*
		BSFL digestion of faeces.	Pure Protein animal feed, under development.	
Clean Team	Portable seated	Municipal treatment plant	None	USD 106
Sanivation	Portable or fixed seated	Pasteurisation	Solid fuel briquettes	NA
Loowatt	Portable seated	Anaerobic digestion	Electricity, fertilizer	NA

Note: BSFL = black soldier fly larvae
** Estimated based on a family of two adults and three children, each making one paid visit per day*
Source: adapted from World Bank, 2019; Mackinnon 2019

According to the CBSA, during 2021-2022, their members served over 190,588 people, sold 4,431 CBS toilets, serviced over 10,874 CBS toilets, removed over 18,207 tons of sludge, and provided over 531 jobs, operating over nine countries and 26 municipalities.

Recommendations and enabling factors for safe wastewater and feacal sludge reuse



- **Opting for relevant technologies**, which allow valorization, and providing capital support to developing these technologies;
- **Legal and regulatory instruments** that set standards for valorization and licensing for the production and sale of byproducts such as compost and biogas;
- **Institutional arrangements** to ensure the fair allocation of resources, especially for farming purposes;
- **Incentives** that contribute to market building for by-products; for example, the provision of subsidies for faecal based (organic) compost; or support with community/end-user engagements to promote by-products.
- **Strong environmental monitoring and controls** to mitigate risk.

Enablers:

- Invest in further **research and innovation** on wastewater and faecal sludge management.
- Support **peer-to-peer learning** and **south-south collaboration**.

10TH WORLD WATER FORUM

WATER FOR SHARED PROSPERITY

Thank You

UN-HABITAT

The United Nations Human Settlements Programme

UN-Habitat

Speaker

Mr. Safwatul Haque Niloy

OXFAM

Mr. Safwatul Haque Niloy is serving as the WASH Coordinator at OXFAM in Bangladesh.

He is a Civil Engineer with 7 years of experience in addressing rapid onset and post-emergency crises to enhance WASH response in refugee settings.

He specializes in water facilities, fecal sludge management, solid waste management, waste to energy projects and climate-resilient WASH facilities in both emergency and development contexts.

Towards a circular economy transition through safe collection, treatment and resource recovery of wastewater and fecal sludge

Fecal Sludge Management in Emergency Settings

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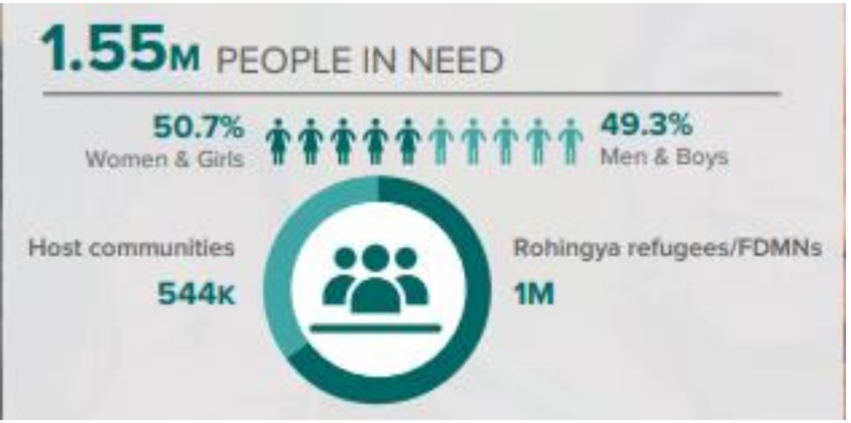
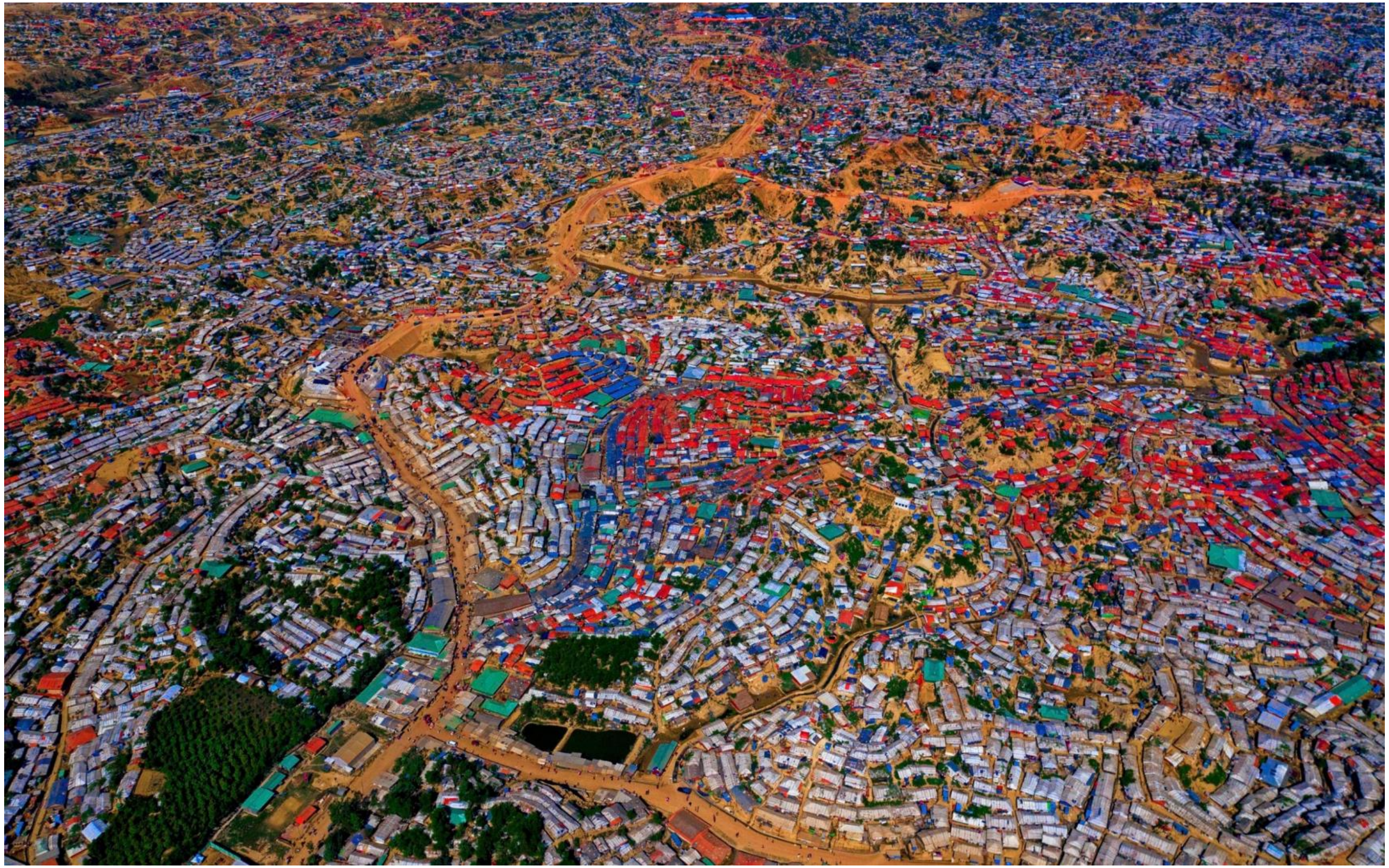
PRESENTATION BRIEF

- **Session number:** T2D3
- **Name of presenter:** Safwatul Haque Niloy
- **Institution:** OXFAM in Bangladesh

Key phrases:

- Water security and fecal sludge management are intricately connected.
- Contextualized and Innovative solution is required to deal with Emergencies
- Resource recovery remains a challenge, highlighting the absence of enabling policies, social acceptance and positive ecosystems.





50,000 latrines

1000 m³/day of sludge produced Everyday,26% increased in Rainy season

160+ operational FSTP

OXFAM

WATER FOR SHARED PROSPERITY

Initial phase, water source contamination from poor sanitation

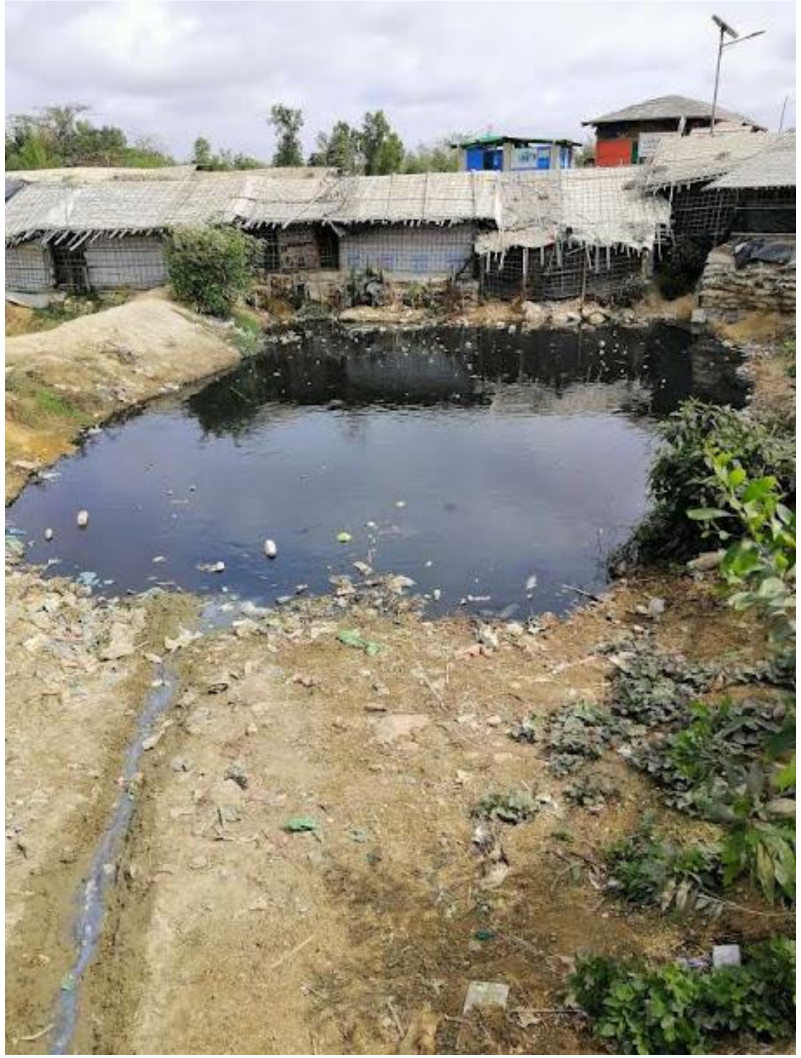
Pit latrines, Septic tanks

Worm Based Toilets

OXFAM

DUE TO HIGH USER NUMBER, LATRINE PIT GETS FILLED QUICKLY .

If not emptied , Sludge will overflow to drains , shelters posing serious public health risks



OXFAM

WATER FOR SHARED PROSPERITY

Fecal Sludge Transportation

Manual Transportation

Discouraged & not acceptable, as unsanitary and undignified conditions pose significant health risks to sanitation workers."

Transportation with Vacutug

Disadvantages

- Accessibility
- Capacity
- Suction lift

Intermediate Fecal Sludge Transfer Network ,IFSTN

WATER FOR SHARED PROSPERITY

Three centralized Fecal Sludge Treatment Plant serving more than 350,000 refugees

FSTP 1 , Capacity 180m3/ day

FSTP 2 , Capacity 180m3/ day

FSTP 3 , Capacity 120m3/ day

OXFAM

Resource Recovery,
Yet to scaled and successful

Biogas to Electricity Generation

Biosolid/ Co Compost as organic conditioner

OXFAM

THANK YOU

For any further queries please contact
Email :Sniloy@oxfam.org.uk

Speaker

Mr. Supriyanto

Tasikmalaya City, Indonesia

Supriyanto is the Head of Wastewater Operator in Tasikmalaya City, West Java, Indonesia. He holds a bachelor's degree in civil engineering and has been pursuing his career with the Tasikmalaya City Government.

He leads the utility in managing on-site and off-site sanitation services in the city and has been part of the city's effort towards Open Defecation Free status and safely managed sanitation.

FECAL SLUDGE COMPOST PRODUCTION FROM A 24-HOUR COMPOSTING MACHINE

STUDY CASE IN TREATMENT PLANT IN TASIKMALAYA CITY, WEST JAVA, INDONESIA

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PRESENTATION BRIEF

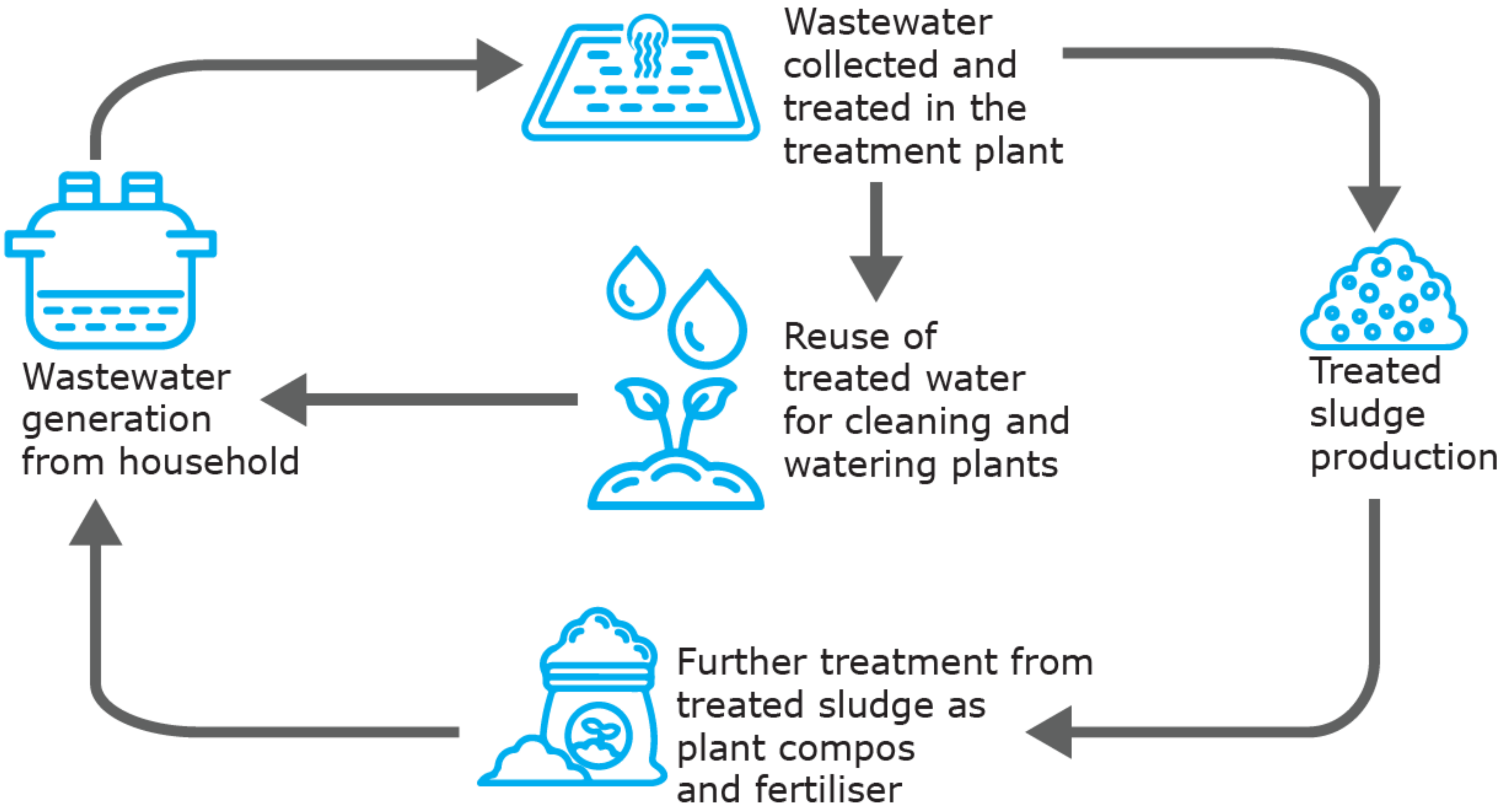
- Session number: T2D3
- Name of presenter: Supriyanto
- Institution: Wastewater Operator from Tasikmalaya City, Indonesia
- Key phrases:
  - Reuse initiatives
  - Fecal sludge compost
  - compost qualified for ornamental flower and food crops

BACKGROUND

- Tasikmalaya City in West Java has a population of 716.160 inhabitants with density of 3.930 inhabitants per sq km. The annual growth rate is 0,81%
- Rapid growth and high population causes significant increase of wastewater generation. While in 2023, Tasikmalaya City has 15% safe sanitation access and 71% basic sanitation access
- Singkup Fecal Sludge Treatment Plant (FSTP) established in 2014 has designed capacity of 38 m3/day which only covers 12% of total city's population, with idle capacity of 68%
- Each month, the FSTP generates 950 kg which allow sludge accumulation to the point it will not fit into available space at FSTP. While expanding the area require high capital expenditure
- Reuse practice as an alternative ways to reduce feacal slugde volume and it has a potential economic benefits

APPROACH

Ecological Sanitation approach by empirical research, a collaboration between Tasikmalaya City Government and SNV



METHODOLOGY

1. Preparing the treated sludge from Sludge Drying Bed (SDB)
2. Mechanised composting process in 24-hr composting machine
3. Compost production
4. Generates several compost type using different mixture for comparison (with soil, cow dung, food waste, dry leaves) – research process
5. Test on ornamental flower and food crop (soybean, palm oil)
6. Plant measurement against research indicator (height, number of leaves, number of flower)

METHODOLOGY

Mixture composition for visual and laboratory test

A0	A1	A2	A3	A4	A5	A6	A7
Soil only (as blanko)	Fresh feacal sludge	Feacal slugde compost only	Feacal sludge compost + cocopeat	Feacal sludge compost + cabbage waste	Feacal slugde compost + cow dung	Feacal sludge compost + dry leaves	Feacal sludge compost + kitchen waste

RESULT

- Visual observations from plant testing found that plants grown in compost from sludge produced in the 24-hr composting machine had taller stems, more leaves, and more flowers
- The laboratory result from faecal sludge compost has met the criteria from Indonesian Agriculture Law for organic compost (Kepmentan 261/KPTS/SR-310/M/4/2019)
- E.coli bacteria were not found in the produced compost

No	Parameter	Standar mutu	Satuan	P0 LT tidak diproses	P1 LT diproses	P2 LT + cocopeat	P3 LT + K. sapi	P4 LT + L. Kol	P5 Lt + L. Daun	P6 LT + L. Dapur
1	C-organik	Min 15 %	%	36,04	31,44	31,47	5,00	5,00	10	10
2	C/N	< 25		12,15	13,37	12,64	1,25	1,66	2,50	3,33
3	Kadar Air	10-25 %	%	29,39	33,07	36,41	15,34	32,80	11,73	53,60
4	Hara Makro									
	N	Min 2	%	2,94	2,35	2,49	4,00	3,00	4,00	3,00
	P2O5	Min 2	%	0,91	1,63	1,84	2,10	2,00	2,00	2, 00
	K2O	Min 2	%	0,45	1,35	1,49	< 1	2,10	2,00	< 1
5	Hara Mikro									
	Fe total	Maks 15.000	ppm	8807,74	6936,42	8054,11	12844,81	11115,64	13890,90	8648,15
	Fe tersedia	Maks 500	ppm	7,19	8,56	7,08	11,64	11,76	7,99	9,05
	Zn	Maks 5.000	ppm	533,33	89,88	98,09	243,61	819,00	1022,97	624,56
6	pH	4-9		6,78	8,68	8,04	6,51	6,31	5,80	5,88
7	Mikroorganisme									
	E. coli	< 1 x 102	MPN/gram	Negatif	Negatif	Negatif	Negatif	Negatif	Negatif	Negatif
	Salmonella sp	< 1 x 102	MPN/gram	Negatif	Negatif	Negatif	Negatif	Positif	Negatif	Negatif
	Shigella	< 1 x 102	MPN/gram	Negatif	Negatif	Negatif	Negatif	Negatif	Negatif	Negatif
	Telur helmin		MPN/gram	Negatif	Negatif	Negatif	Negatif	Negatif	Negatif	Negatif
8	Logam Berat									
	As	Maks 10	ppm	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	Hg	Maks 1	ppm	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	Pb	Maks 50	ppm	36,22	15,48	22,43	43,45	53,08	55,94	46,48
	Cd	Maks 2	ppm	1,26	0,79	1,61	3,42	4,34	4,68	3,40
	Cr	Maks 180	ppm	9,32	8,84	27,76	23,46	20,12	25,40	9,45
	Ni	Maks 50	ppm	6,35	4,28	5,26	14,84	12,77	19,97	9,70
9	Bahan ikutan (plastik, kaca, kerikil)	Maks 2	%	0,00	0,00	0,00	0,00	0,00	0,00	0,00

COST ESTIMATION

Cost estimation for 1 cycle compost production: 25 kg compost

No	Item	Unit Cost (IDR)	Quantity	Total Cost (IDR
1.	Manhour	80.000	2 person	160.000
2.	Electricity	115.000	1 cycle	115.000
3.	Packaging	2.000	25 Pcs	50.000
4.	Labelling	500	25 Pcs	12.500
5.	Transportation cost	20.000	1 cycle	20.000
	TOTAL (Rp)			357.500

Equivalent to EUR 20,58 per cycle

LESSON LEARNED

- Producing organic compost from treated fecal sludge is feasible, provided attention is paid to laboratory test that ensure the standard nutrient content is met and that no harmful pathogens are present, aligned with existing regulation
- A legal wastewater institutional framework that permits business generation need to be in place
- Suitable areas inside FSTPs need to be included during construction planning to give space for reuse practice
- Further market research need to be conducted to assess the level of demand for using organic compost derived from faecal sludge for domestic use

THANK YOU

Moderator – Panel Discussion

WATER FOR SHARED PROSPERITY

Ms. Saniya Niska

SNV

Saniya is SNV Indonesia's Water Sector Lead and Programme Manager.

She holds master's degree in environmental engineering and has strong interest in GEDSI mainstreaming in Water Sector.

She is SNV Indonesia's reference person for Gender, Menstrual Hygiene Management, Universal Design of WASH facilities, Inclusion of Children with Disabilities and WASH in Schools. Represents SNV in national and international multi-stakeholders' platforms and research groups.

Panelists

Ms. Rouguiyatou Ba
Association des Jeunes Professionnels de l'Eau et de l'Assainissement du Sénégal (AJPEAS)

Mr. Shi Nishi
Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Japan

Ms. Mélodie Boissel
pS-Eau, France

Prof. V. Srinivas Chary
Administrative Staff College of India (ASCI)

Questions from the audience

Closing Remarks

Dr. Papa Samba Diop

National Sanitation Office of Senegal (ONAS)

Dr. Papa Samba Diop is a Governor at the World Water Council since 2022 and technical advisor at ONAS, building on 33 years of professional experience accumulated in taxes and domains and in the water sector.

Doctor in economics and management and MBA from Paris Dauphine/Panthéon Sorbonne University and engineer in civil engineering (expert in water and sanitation), he has more than 30 years in urban hydraulics and sanitation, areas where he has developed various skills.

Furthermore, his functions as President of the Scientific and Technical Council (CST) of the African Water and Sanitation Association (AAEA) have allowed him to have a broad view of the situation of water and sanitation in Africa.

THANK YOU