

# Challenges and good practice of decentralized wastewater management in Asia

## (Challenge 1) Septic tank is still a prevailing form of wastewater management in many Asian countries

Septic tank coverage rate in selected Asian countries

Country	Year	Area	Coverage Rate (%)
Viet Nam	2008	National Average	41
		Urban Area	79
		Rural Area	26
Malaysia	2010	National Average	21
Indonesia	2011	National Average	60
		Jakarta	93
Philippines	2010	Manila	71

(Source : WEPA Outlook on Water Environmental Management in Asia 2015)

## (Challenge 2) Septic tank is not functioning as an effective wastewater treatment system

Actual effluent water quality of household septic tanks in DKI Jakarta (Source: JICA)

(Effluent standard of household septic tank in DKI Jakarta : BOD75mg/l, COD100 mg/l)

	Volume (m <sup>3</sup> )	Usage (persons)	Effluent water quality		Remarks
			BOD	COD	
			mg/l	mg/l	
Black water only type 1	6.0	15	145	421	Desludged once a year.
Black water only type 2	2.2	4	231	622	Desludged twice a year.
Black water only type 3	2.9	4	217	544	Never desludged.
Black & Grey type – 1	7.4	4	206	419	Not desludged (4 years)
Black & Grey type – 2	10.0	40	162	367	Not desludged (3 years)
Black & Grey type – 3	10.0	18	213	401	Not desludged (3 years)

(Challenge 3) In many Asian countries, more stringent effluent standard is applied for commercial buildings

(Case of DKI Jakarta)

- In Jakarta, there are about 4,000 commercial buildings (office buildings, hotels/condos, shopping malls, etc.) which produces 25% of total wastewater generated in the area.
- In 2005, effluent standard for commercial buildings were tightened to BOD: 50mg/l, COD<sub>cr</sub>: 80mg/l, which was not achievable by septic tanks. Therefore, many commercial buildings have replaced septic tanks by Individual Treatment Plants (ITPs - mostly aerobic system such as Packaged Wastewater Treatment Plant (PAWTP - Johkasou in Japan).
- In DKI Jakarta, effluent water quality of ITPs are periodically monitored by Environmental Management Agency (BPLHD) of Jakarta.

(Challenge 4) Many countries lack maintenance system for decentralized wastewater management

What is required for Households' Septic Tanks?

- Regular desludging system

What is required for Commercial buildings' ITPs?

- Regular desludging system
- System to support the operation and maintenance of ITPs

## Remarkable Effect of Frequent Desludging of Septic Tank

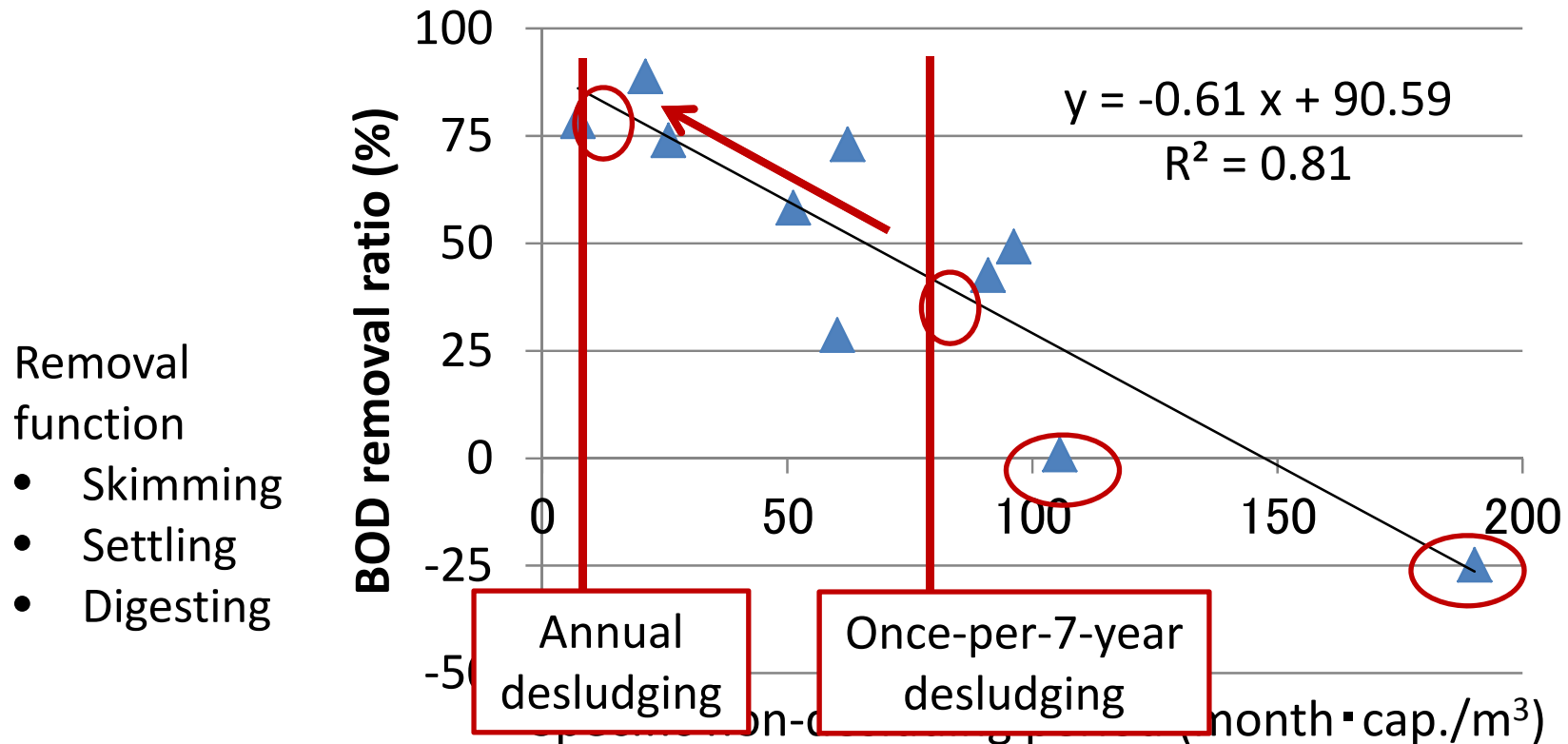


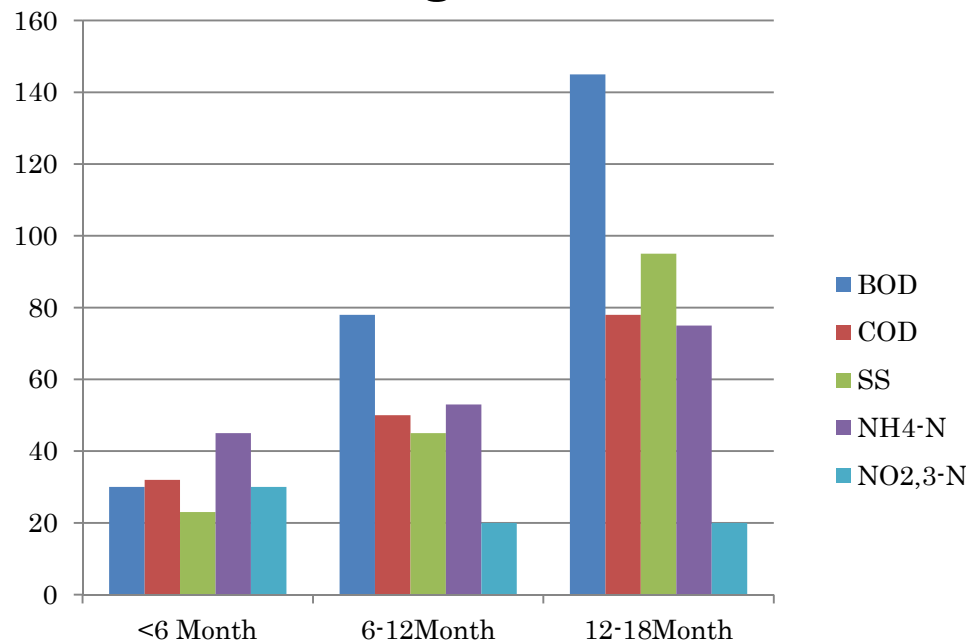
Fig. BOD removal ratio (%) and BOD discharged excluding the effect of dilution (g/L); calculations were based on 12,000 mg-BOD/L, 6,000 mg-Cl⁻/L at excretion

- **Long non-desludging period even increase pollution**
- **Annual desludging could remove 71% of BOD load compared to current conditions**

(Source: 'Better septic tank management: challenges and remarkable effects' by Assistant Prof. Harada, Kyoto University)

## What happens, if PAWTP (Johkasou) is not regularly desludged ?

**A research, conducted in 1984 for 70 PAWTPs (black water only type) in Japan, revealed that 24.6% of them had not been desludged for more than 1 year, and their average effluent water quality (BOD) was worse than the ones which had been desludged with less than 1 year intervals.**



(Note) PAWTP (black water only type) was an old type Johkasou. Its standard effluent quality was BOD 90 mg/l. Its new installation was banned in Japan since 2001.

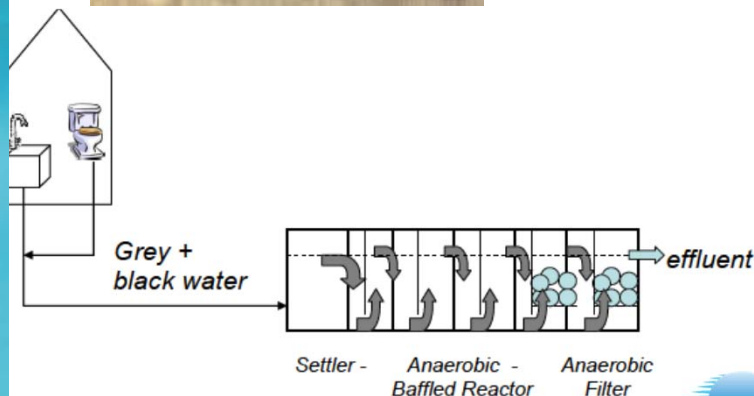
# How to respond to these challenges?

Challenges	Responses
Prevailing inferior DEWATS (septic tanks)	<ul style="list-style-type: none"> <li>- Encourage technology development</li> <li>- Create a Performance Evaluation System for DEWATS</li> <li>- Eliminate septic tanks by connecting to sewerage system</li> </ul>
Bad performance of septic tanks	<ul style="list-style-type: none"> <li>- Establish Regular Desludging System</li> </ul>
ITPs for commercial buildings	<ul style="list-style-type: none"> <li>- Establishment of Regular Desludging System would also help improve performance of ITPs</li> <li>- Establish Standard for Maintenance for ITPs</li> </ul>
Lack of proper maintenance of DEWATS	<ul style="list-style-type: none"> <li>- Create Sanitation Service Chain</li> <li>- Create Qualification System for maintenance workers</li> </ul>



# (Good practice 1) Technology development

## BORDA DEWATS (SANIMAS)



- No electricity use (Anaerobic system)
- Effluent water quality can be close to BOD 50mg/l, if it is properly maintained (incl. regularly desludged) by a good operator, which fulfils the effluent standard for community plants in Indonesia, but does not fulfil the corresponding standard in neighboring countries.

## (Good practice 2) Technology development

Anaerobic + Aerobic (RBC\*) Treatment  
(APEX & Yayasan Dian Desa)

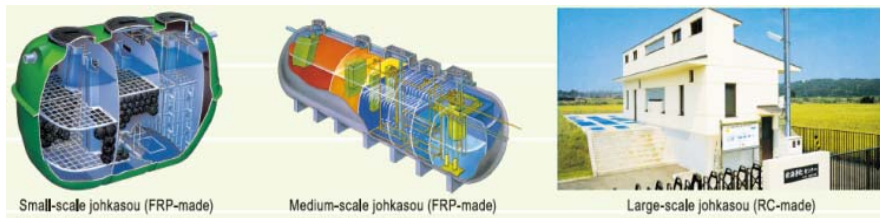
\*Rotating Biological Contactors



- Easy operation and energy saving aerobic treatment: Electricity consumption is 1/3 of Packaged Aerated Wastewater Treatment Plant (PAWTP – Johkasou in Japan).
- High effluent water quality: BOD 30mg/l, which is good because of aerobic system.
- Space saving: require only 1/3 area compared with ordinary anaerobic process.

# (Good practice 3) Technology development

## Packaged Aerated Wastewater Treatment Plant (PAWTP – Johkasou in Japan)



(Source: Ministry of Environment 'Night Soil Treatment and Decentralized Wastewater Treatment in Japan')

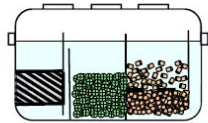
- Aerobic. Required electric power is 40W per household of 5 family members.
- Mechanical maintenance by a professional maintenance vendor is required.
- Sludge must be removed once a year (household type).
- Effluent water quality is equal to a modern WWTP (BOD: less than 20 mg/l. Nitrogen removal. Disinfection.).

## (Good Practice 4) Performance Examination System for PAWTP (Johkasou) in Japan

Authorization of  
a new product  
(PAWTP)

Temperature  
controlled  
examination lab.

Develop a new product



1. Take a performance test

2. Get a certification  
issued by Minister\*

3. Type conformity  
certification (optional)

4. Type approval (required  
for factories manufacturing  
the product)

Supply the new product



\*MILT: Ministry of Land, Infrastructure, Transport and Tourism

## (Good Practice 5) Guidance, Manual for Septage Management

Recently, many countries have issued guideline, manual, etc. on Septage Management, the core of which is Establishment of Regular Desludging System.

- India: MOUD's Advisory Note on Septage Management in Indian Cities (January, 2013)
- Philippines: National Sewerage and Septage Management Program – Program Operation Manual (March, 2013)
- Indonesia is promoting Septage Management by the inclusion of provisions for sludge treatment facilities in Mid-term Development Plan for 2015-2019.



## (Good Practices 6) Example of Septage Management in Asian cities

(City level)

- Philippines – Metro Manila, Dumaguete
- Vietnam – Haiphong
- Indonesia – Solo, Balikpapan, Tabanan, Tegal, Jakarta, Bandung (Pilot stage)
- India – Mizoram State (Pilot stage)

(National level)

- Malaysia
- Japan

## (Good Practice 7) Septage Management in Metro Manila - Manila Water Company (MWCI) -

- Under the Concession Agreement, MWCI is given full responsibility on operating, maintaining and managing the water supply and sewerage system in the East Zone of Metro Manila.
- MWCI employs a three-pronged approach in addressing wastewater management. As the first step, MWCI is building interceptor sewer systems to intercept the wastewater discharged from septic tanks to drains before discharged to rivers, and to convey it to the WWTPs, and providing septage management service in the areas that are currently non-sewered.
- All customers pay 20% environmental charge from the basic waster charge which can be used for MWCI's investment and O/M of sewerage system and septage management system.



(Source: ADB CASE STUDY NOTES  
'Cleaning Up the Business of Septage  
Management')

## (Good Practice 8) Septage Management in Dumaguete City (The Philippines)

- The first government financed septage management system in The Philippines which is a model for other cities in the country.
- In 2006, the Ordinance for Septage Management was passed by the City Council.
- The Dumaguete City Water District desludges septic tanks of residences, business establishments and institutions and transports the septage to the treatment plant.
- The City Government operates the septage treatment plant.
- The Dumaguete City Water District collects the septage “user fee” as an add-on to the monthly water bills.
- The regular emptying program had been operating for 2 years but has recently shifted back to on-demand operation.



(Source: UNEP Local Government-Financed Citywide Septage Management System, World Bank: Septage Management Pilots and Capacity Building in Indonesia)



## (Good practice 9) Septage Management in Haiphong City (Vietnam)

- The Haiphong Sanitation and Sewerage Company (SADCo) have divided the cities into regions, where one region is emptied in a year and then they move to the next region in the next year.
- For faster emptying of septic tanks special type of access covers are provided.
- The citizens are provided free septic tank emptying service once every three years and in lieu of this a tax of around 15% of the water bill (as a part of water bill) is levied on the properties.

(Source: PAS 'Faecal Sludge and Sullage Management in Urban Maharashtra' Policy Brief)

Worker installing plastic cover to the access hole after emptying septage in Haiphong City

(Source: WEPA 'URBAN DOMESTIC WASTEWATER MANAGEMENT IN VIETNAM')

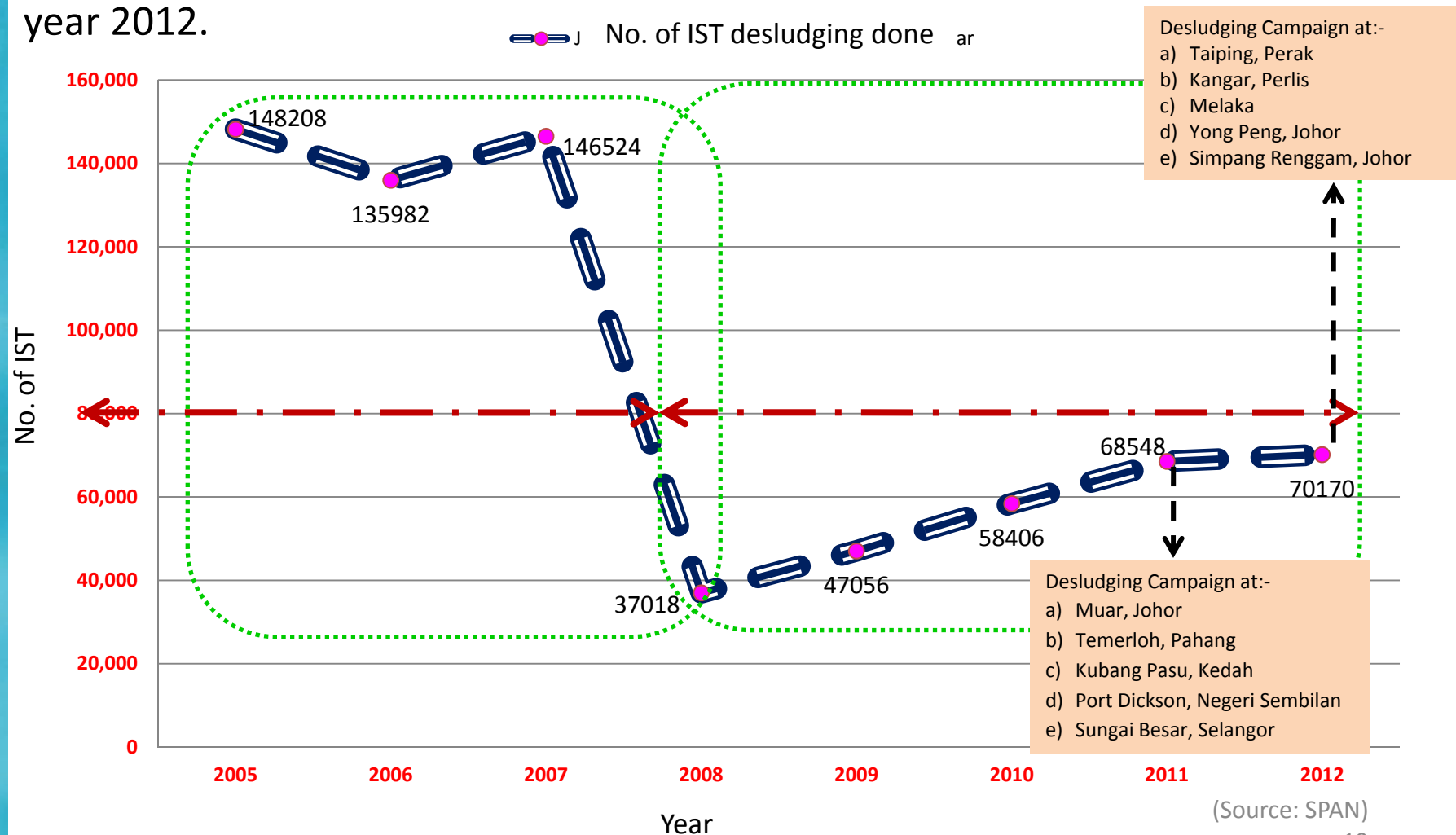


## (Good practice 10) Septage Management in Malaysia

- In 1994, Indah Water Konsortium (IWK) was created as the private concessionaire who was responsible for O/M of all sewerage facilities and septage management.
- Desludging coverage ratio increased from 1% to 12% (1999), but due to poor collection recovery, IWK was taken over by the Government, through the Minister of Finance Incorporated in year 2000.
- In 2006, Water Service Industry Act was formed and liberalization was introduced where the owner, management body or tenant is responsible
- Desludging services was opened to IWK or Permit E holders
- The number of desludged septic tanks had substantially decreased in 2008.

## (Good practice 10) Septage Management in Malaysia (continue)

In order to reverse such trend, desludging campaigns are being organized to incite septic tank owners/users to desludge within the legal interval. The number of desludged septic tanks has increased gradually from year 2008 till year 2012.



## (Good Practice 11) Septage Management in Japan

- In Japan, PAWTPs (black water only type) had been widely diffused since 1960s. In 1970s – 1980s, water pollution of rivers and oceans had become a big issue. Particularly, the cause of eutrophication occurred in lakes and inland bays was attributed to the poor performance and maintenance of PAWTPs (black water only type).
- In 1983, PAWTP (Johkasou) Act was promulgated. Since then, the maintenance of PAWTPs in Japan has improved and eutrophication of lakes and inland bays in Japan has stopped.

Pictures 1 & 2: Desludging operation of P with a 4 ton vacuum truck (most often used type in Japan)



## (Good Practice 11) Septage Management in Japan (Continue)

### Main points in the PAWTP Act (1983) (1)

Item	What does the PAWTP Act stipulate?
(1) Manufacturing and Installation of PAWTPs	The PAWTP (black + gray water type) is the standard on-site wastewater treatment facility in Japan. PAWTPs shall meet the technical standards for effluent water quality and the structural standards prescribed in the Building Standard Law.
(2) Maintenance of PAWTPs	The owner of a PAWTP is designated as the 'PAWTP Manager' who is legally responsible for the maintenance of the PAWTP. The PAWTP Manager shall make the PAWTP receive inspection, maintenance and desludging. The PAWTP Manager can outsource the work related to PAWTP management to a PAWTP vendor and/or a PAWTP desludging vendor.
(3) Desludging of PAWTPs	The PAWTP Manager shall ensure that the PAWTP receives desludging service once a year.
(4) Inspection of PAWTPs	The PAWTP Manager shall make the PAWTP receive an inspection for its water quality annually by the Specified Inspection Agency.

## (Good Practice 11) Septage Management in Japan (Continue)

### Main points in the PAWTP Act (1983) (2)

Item	What does the PAWTP Act stipulate?
(5) Desludging Business	A corporate body that intends to join the PAWTP desludging business shall get the approval from the mayor of the municipality for a limited period. The applicants need to conform to the standards for approval stipulated in the PAWTP Law.
(6) Maintenance Business	A corporate body that intends to join the PAWTP maintenance business shall register to the municipality concerned. The PAWTP maintenance vendor shall assign its staff qualified as 'PAWTP Operator' who has passed a national examination or completed a training course conducted by a designated training agency, to the PAWTP maintenance work.



## (Good Practice 11) Septage Management in Japan (Continue)

### Number of people engaged in the Septage Management Business

#### People with qualification (Number of registrants)

#### Number of vendors

PAWTP Operators	72,521	Operation and maintenance	Specified inspection agencies	65	PAWTP inspection and water quality examination
PAWTP Installation Workers	83,205	Installation/Construction	PAWTP manufacturers	27	Research, development and manufacture
PAWTP Technical Supervisors	26,658	Management of PAWTP with 501 PE or more	PAWTP maintenance vendors	12,871	Operation and maintenance
PAWTP Desludging Technicians	15,117	Desludging	PAWTP desludging vendors	5,375	Desludging
PAWTP Inspectors	1,210		PAWTP installation vendors	33,593	Installation/construction
Total	198,711				

(Source: Ministry of Environment 'Night Soil Treatment and Decentralized Wastewater Treatment in Japan')

## Lessons learnt

- Any on-site wastewater treatment facility becomes pollution source without proper Septage Management.
- In order to do Septage Management, you must be real serious. It is a highly political issue.
- In Septage Management, without proper regulation, nobody does the right thing.
- In Septage Management, the people who do the actual work are the most important. Regulate them. Formalize them. Respect them.
- Septage Management will create a lot of job opportunities. It is good for the economy at national and local levels.



Thank you for your attention !

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