CHALLENGES AND GOOD PRACTICE OF DECENTRALIZED WASTEWATER TREATMENT IN INDONESIA

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MINISTRY OF PUBLIC WORKS AND HOUSING
DIRECTORATE GENERAL OF HUMAN SETTLEMENTS
The Scale of The Challenge

50 of 1000 babies died of diarrhea

140,000 tons of feces per day is polluting waterbody

75 % of the rivers are heavily polluted

1 mg/L BOD5 increases water production cost of IDR 9.17/m3

The potential economic loss reaches USD 6.3 billion per annum (2.3% of GDP)
2019 Universal Access

WASTEWATER SERVICE

100%

Urban 100%

Rural 100%

Off-site System: 15%
On-Site System: 85%

On-Site System: 100%
CURRENT CONDITIONS AND FUTURE TARGETS

IMPROVED SANITATION

BASIC SANITATION

WITHOUT ACCESS

On-site System with Regular Desludging

Off-site System

1% Off-site System

On-site System without Regular Desludging

85 IMPROVED SANITATION

Basic Sanitation

No Access

15 BASIC SANITATION

Open Defecation

31.1 WITHOUT ACCESS

6.9 BASIC SANITATION

61.8 IMPROVED SANITATION

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

2015 2019
SANITATION DEVELOPMENT SCHEME

URBAN/RURAL - DENSITY

URBAN

LOW DENSITY

HIGH DENSITY

RURAL

LOW DENSITY

HIGH DENSITY

WASTEWATER SYSTEM

On-site system

Off-site system (communal, decentralized, city scale)

Latrines Septic tanks (basic Sanitation)

Community Lead to Total Sanitation ((CLTS))

On-site

Communal Off site
 MANAGEMENT APPROACH

**Approach**
- **Community Based**
- **Institutional Based**

**Level**
- **Neighborhood**
- **City Wide**
- **Regional/ National**

**Demand Responsive Approach**

- **Metropolitan & Large City**
  - Off-site system

- **Medium & Small City**
  - Integrated on-site and off-site systems with focus on Septage Treatment Management

- **Old City**
  - Shallow/smaller bore sewer or small scale sewerage integrated to municipal sewage system to support revitalization

- **New City**
  - Small sewerage system for Low Cost Housing area
  - Encourage sewerage development for new town

**Inter city/ interregional development of wastewater infrastructure to protect watershed**

**Clean River Program (PROKASIH) or similar program**

1. Pro-Poor
2. Slum area

1. Rural
   - CLTS -> on-site
2. Urban Slums
   - Sanimas -> small scale off-site

1. Metropolitan & Large City
   - Off-site system

2. Slum area
   - Metropolitan & Large City
   - Off-site system

3. Medium & Small City
   - Integrated on-site and off-site systems with focus on Septage Treatment Management

4. Old City
   - Shallow/small bore sewer or small scale sewerage integrated to municipal sewage system to support revitalization

5. New City
   - Small sewerage system for Low Cost Housing area
   - Encourage sewerage development for new town
WHAT DO WE DO?

Develop:

- **On-site System**
  - Individual Septic Tank
  - Communal Septic Tank
  - Septage Transport Vehicle
  - Septage Treatment Plant

- **Off-site System**
  - City Scale
  - Small Scale
  - Specific Area

Encourage:

1. Campaign, Education, and Promotion
2. Advocacy to Local Governments
3. Management Technical Assistance
4. Updating City Sanitation Strategies
5. Cross Sectoral Synchronization
6. Human Resources Development
## Estimation of Infrastructures Needed for Universal Access

<table>
<thead>
<tr>
<th>Off Site System</th>
<th>On Site System</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target by 2019:</strong> 2 million Household</td>
<td><strong>Target by 2019:</strong> 20 million Household</td>
</tr>
</tbody>
</table>

- **House Connection Construction in 13 existing city scale WWTP (exclude MSMHP and MSMIP):** 150,000 HC
- **House Connection Construction in City Scale WWTP (Jambi, Pekanbaru, Makassar, DKI Jakarta, Medan, Yogyakarta):** 150,000 HC
- **Small Scale WWTP Construction:** 2,400 unit (@200 – 1000 HC): 1,2 million HC
- **Community based WWTP Construction:** 5,000 unit (@100 HC): 500 ribu HC

- **Septage Treatment Plant Construction:** 337 kab./kota
- **Septage transport vehicle supporting:** 337 unit
- **Septic tank construction:** 10 juta HH
- **Public Toilet Construction (Communal septic tank):** 50,000 unit (@50 KK): 2.5 million HH
- **Latrine (Basic Sanitation):** 7.5 million HH
OFF SITE SYSTEM

Off Site System (City Scale)

- WWTP, Pumping Station, Main Trunk: Central Government
- Land, Lateral Pipe, House Inlet, OM: Local Government
- House Connection: Household/Local Government
<table>
<thead>
<tr>
<th>No</th>
<th>City</th>
<th>Units</th>
<th>System</th>
<th>Capacity (CMD)</th>
<th>Idle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Medan</td>
<td>1</td>
<td>UASB</td>
<td>10,000</td>
<td>43,5%</td>
</tr>
<tr>
<td>2</td>
<td>Parapat</td>
<td>1</td>
<td>Aerated Ponds</td>
<td>2000</td>
<td>94,25%</td>
</tr>
<tr>
<td>3</td>
<td>Batam</td>
<td>1</td>
<td>Oxidation Ditch</td>
<td>2,852</td>
<td>97,37%</td>
</tr>
<tr>
<td>4</td>
<td>Jakarta Zone 0</td>
<td>1</td>
<td>MBBR</td>
<td>38,880</td>
<td>98,19%</td>
</tr>
<tr>
<td>5</td>
<td>Tangerang</td>
<td>1</td>
<td>Aerated Ponds</td>
<td>2,800</td>
<td>94,74%</td>
</tr>
<tr>
<td>6</td>
<td>Bandung</td>
<td>1</td>
<td>Lagoons</td>
<td>80,835</td>
<td>0%</td>
</tr>
<tr>
<td>7</td>
<td>Cirebon</td>
<td>4</td>
<td>Lagoons</td>
<td>20,500</td>
<td>53%</td>
</tr>
<tr>
<td>8</td>
<td>Surakarta</td>
<td>3</td>
<td>Biofilter &amp; Lagoons</td>
<td>14,000</td>
<td>56,38%</td>
</tr>
<tr>
<td>9</td>
<td>DI Yogyakarta</td>
<td>1</td>
<td>Aerated Ponds</td>
<td>15,500</td>
<td>64,5%</td>
</tr>
<tr>
<td>10</td>
<td>Denpasar &amp; Badung</td>
<td>1</td>
<td>Aerated Ponds</td>
<td>51,000</td>
<td>37,2%</td>
</tr>
</tbody>
</table>
BIG QUESTIONS: HOW TO UTILIZE THE IDLE CAPACITY???

<table>
<thead>
<tr>
<th>City</th>
<th>Idle Capacity</th>
<th>Used Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manado</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>Banjarmasin</td>
<td>85,55%</td>
<td></td>
</tr>
<tr>
<td>Balikpapan</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Denpasar &amp; Badung</td>
<td>37,20%</td>
<td></td>
</tr>
<tr>
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<td>64,50%</td>
<td></td>
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<tr>
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<td>0%</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>Jakarta Zone 0</td>
<td>98,19%</td>
<td></td>
</tr>
<tr>
<td>Batam</td>
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<td></td>
</tr>
<tr>
<td>Parapat</td>
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<td></td>
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<tr>
<td>Medan</td>
<td>43,50%</td>
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</tbody>
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Problems: Low Awareness of the Households Owners, Low Budget for house connections from Local Government, No law enforcement
Decentralized Systems as an Intermediate Step and Bridge to Centralized Sewerage*

Source: Adapted from BORDA (2005), Blackett & Perez (2006) and Utomo (2012)

*) DEWATS Study, WSP 2012
Decentralized System in Indonesia

- Communal Septic Tank – Septage Treatment Plant
- Communal Scale Off-site System
- Small Scale Off-site System

Ministry of Public Works and Housing through its Research and Development Board has also assessed and certified several decentralized treatments.
Communal Septik Tank – Septage Treatment Plant

Since the 90s, 170 Septage Treatment Plants have been developed throughout Indonesia

- Communal Septic Tanks serve: < 10 HCs
- Managed by communities
- To be transported to Septage Treatment Plants
Communal Scale Off-site System

Since 2006, out of the ± 13000 community based sanitation infrastructures, 2700 of them are Communal Scale Off Site System.

- Anaerobic Treatment
- Number of House Connections: 11–200 HCs
- Planned, Constructed, and Managed by communities with supervision from Local Governments
Since 2006, 197 Small Scale Wastewater Systems have been developed throughout Indonesia.

- Anaerobic Treatment
- Number of House Connections: 201–4,000 HCs
- Managed by Institution under Local Governments (LGs)
- Additional: 34 Small Scale Off-site Systems funded through Hibah from Australia (managed by LGs)
ON SITE SYSTEM

PUBLIC TOILET

IPAL Komunal

INDIVIDUAL SEPTIC TANK

SEPAGE TREATMENT PLANT

SEPAGE TRANSPORT VEHICLE

FUNDING

- **Septic Tank Construction**: Household
- **Desludging**: Household
- **Transport Vehicle**: Local Government
- **Septage Treatment Plant Construction**: Local Government and Central Government
SEPTAGE MANAGEMENT SYSTEM

For Onsite & Small scale sewerage, beside expanding the access we are now also focusing on IMPROVING the QUALITY of SEPTAGE MANAGEMENT.

Wastewater Treatment:
- Individual Septic Tank
- Comunal Septic Tank
- Small Scale Sewerage

On Call Basis Desludging / Regular Desludging

Septage Treatment Plant
Only 170 out of 517 cities/regencies owned STP
Issues and Challenges

- Majority of Septic Tanks are in low quality → limited input to Septage Treatment Plant
- Limited **land availability** for Small Scale Off-site System in slum urban area
- Low priority on sanitation **investment** (both at government and community levels)
- Stronger **regulation** and **enforcement** are needed
- Many **community management structures** do not function as assumed
GOOD PRACTICE OF DECENTRALIZED WASTEWATER TREATMENT IN INDONESIA (Community Based Sanitation)

Location:
Jl. Kasturi RT 1, RW 1, Desa Benteng, Kecamatan Pangaron, Kab. Banjar, Provinsi Kalsel
Community Based Sanitation
Combination System of Communal Off Site System and MCK++
Di Kel. Pamoyanan, Kec. Bogor Selatan
Built in 2012

Combination System of Communal Off Site System and MCK++
di Kel. Katulampa, Kec. Bogor Timur
Built in 2012
Community Based Sanitation
“SANIMAS” Photographs
Community Based Sanitation “SANIMAS” Photographs
Inovative WWTP
Inovative
WWTP

Tokoh kartun
Inovative WWTP

IPAL BATIK
Inovative WWTP
TERIMA KASIH

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