




ESC-BORDA CAMBODIA

**4th International Workshop and 8th Annual Meeting
Water Environment Partnership in Asia (WEPA)**

**Decentralized Wastewater Treatment
Systems (DEWATS) in Cambodia**

Presented by: Nuth Makara (Technical Coordinator)
18-19.Feb.2013





Youtube Links: www.youtube.com/watch?v=QbD52wUQvRE
www.youtube.com/watch?v=hcrf115vvul (websites: www.borda-sea.org and www.escambodia.org)

ENVIRONMENTAL SANITATION CAMBODIA
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ESC-BORDA CAMBODIA




Bremen Overseas Research and Development Association (BORDA)

- Founded in 1977, Bremen Germany
- Works in 3 regions – SEA, SA, Sth Africa
- Supported directly by the German Government (BMZ)
- Established in Cambodia in 2008
- Objective - To improve public health, hygiene and living conditions in urban/peri-urban low-income areas
- Focus on promotion of Decentralized Wastewater Treatment Systems (DEWATS) for SME, public institutions & communities
- Cambodian Partner Organization: Environmental Sanitation Cambodia (ESC)


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Regional Cooperation Project

Sustainable Management of Natural Resources in South-East Asia (SEA)



Cooperation Office
Regional Office

Indonesia (Bali Fokus, BEST, LPTP)
since 1997, 900 DEWATS projects
CBS, SME, SBS, Public Institutions


Philippines (BNS-Inc)
since 2006, 20 DEWATS projects
CBS, SME, Public Institutions

Vietnam (VWAR)
since 2006, 12 DEWATS projects
CBS, SME, Public Institutions

Cambodia (ESC)
since 2008, 13 DEWATS projects
SBS, SME, Public Institutions

Laos (LIRE)
since 2008, 7 DEWATS project
CBS, SBS, Public Institutions

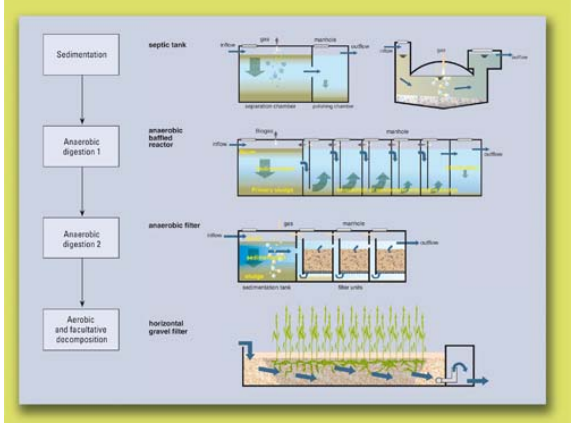
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The DEWATS system

- Sedimentation
(25% to 40% pollution reduction)
- Anaerobic digestion-1st (ABR)
(65% to 75% pollution reduction)
- Anaerobic digestion-2nd (AF)
(75% to 90% pollution reduction)
- Aerobic and Facultative decomposition (HGF)
- Aerobic Pond



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Types and Sources of Wastewater



Types of wastewater DEWATS can treat:

- Domestic wastewater;
Schools, Hospitals, Communities, hotels, orphanages, temples.....
- Organic Industrial wastewater;
Food factories, Slaughter houses, Animal farms, Tofu, markets.....
- DEWATS can treat mixed gray-water and black-water
- DEWATS can treat only black-water with Biogas option
- DEWATS does not treat rain/stormwater

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Type and Source of Wastewater



- DEWATS pipelines (collection systems):
 - PVC pipes (8.5 dia. 60cm/100cm/150cm
 - Shallow installation depth 20cm to 150cm
 - In Cambodia pipeline slope is from 0.5% to 1% (Effluent pump an option)
 - Manhole installed every 12m of pipeline and at turning points


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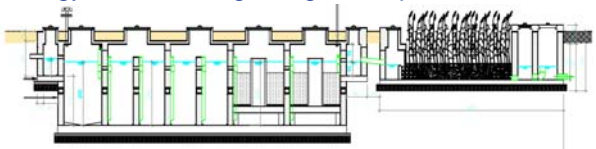



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DEWATS - Key Benefits

- Treats 1 to 1000 m³ of organic wastewater per day, domestic or industrial, reducing pollution by up to 90%
- Low primary investment and minimal operational/maintenance costs
- Reliable, modular and sustainable design built with local materials
- Minimal land requirements
- No external energy inputs required and can produce energy from the biogas digester option




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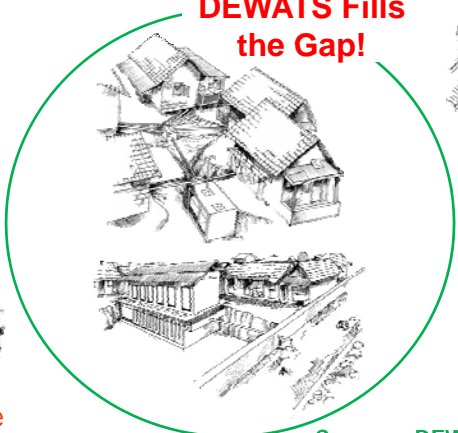
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The DEWATS Option

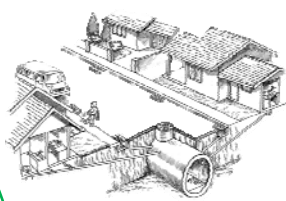


Common on-site
Sanitation Systems

DEWATS Fills
the Gap!




Common DEWATS-options



Conventional
centralized
&
high costs systems

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Cost Overview (construction and operation)

School Based Sanitation (SBS)



Treatment Capacity:
5m³/day (WW)

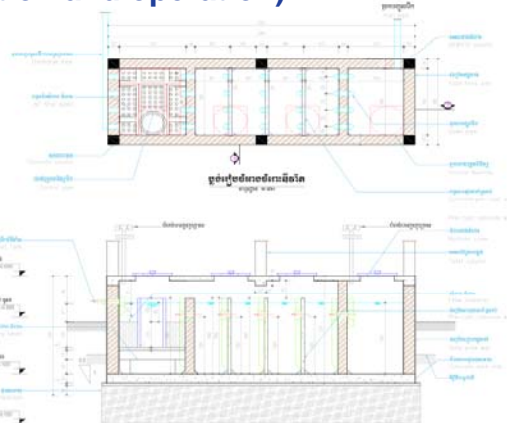
Users: 835 students & teacher

Cost: US\$14,000 (OAV/Borda)
(DEWATS: US\$5,000 /Pipeline: US\$1,000)

Operation Cost: US\$72/mth


Year: 2011



COD_{in} = 500mg/L COD_{out} = 91mg/L
BOD_{in} = 270mg/L BOD_{out} = 42mg/L

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Cost Overview (construction and operation) cont.

Hospital Project (SME)


Treatment Capacity:
40m³/day (WW)

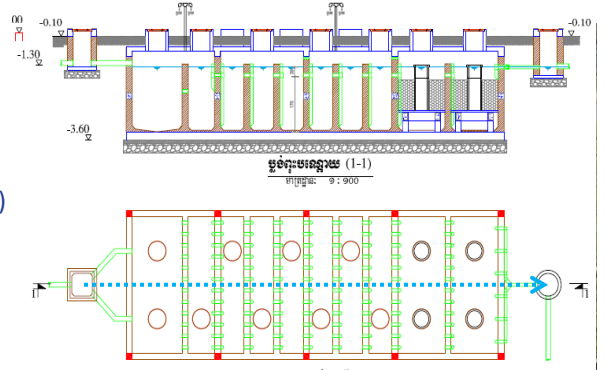
Users: 600 patents & staffs

Cost: US\$105,000 (Lien AID)
(DEWATS: US\$26,000 /Pipeline: US\$13,000)

Operation Cost: NA

Year: 2011





COD_{in} = 750mg/L COD_{out} = 88mg/L
BOD_{in} = 500mg/L BOD_{out} = 42mg/L

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Management and Institutional Aspects

ESC-BORDA Services


ESC-BORDA provides comprehensive DEWATS services:

1. DEWATS Promotion
2. DEWATS Planning
3. DEWATS Design
4. DEWATS Construction Supervision
5. DEWATS Training & Monitoring









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Management and Institutional Aspects (cont.)

O&M – SBS Example

- **Estimated O&M costs (BK School)**
 - \$62 / mth daily O&M costs (soap, water, electricity, towels, cleaning materials etc)
 - \$10 / mth hardware repairs/maintenance
 - Total = \$72 x 12 mths = \$864/year
 - **Total per person (834) / per mth = 345 riel/mth**
- **Funding Sources:**
 - Bicycle parking
 - PB (Government Budget)
 - School shops
 - Growing/Selling vegetables
 - Parents

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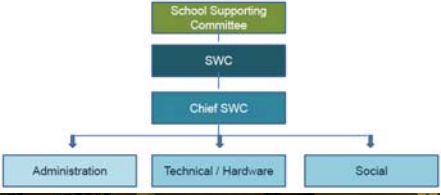
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Management and Institutional Aspects

(cont.)

O&M – SBS Example

- School WASH Committee (SWC)
- In-charge of O&M:
 - Supervision
 - Implementation
 - Scheduling
 - Budgeting





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Management and Institutional Aspects

(cont.)

O&M – SBS Example

DEWATS O&M Checklist School Based Sanitation Cambodia





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Monitoring & Evaluation

- **When do we do it?**
6 months, 12 months, 24 months
(after start operation)
- **What do we do?**
Facilities/DEWATS structure checking,
Inflow, outflow wastewater flowing in pipeline
- **Wastewater Sampling**
(min. 2 times per project)



National Effluent Quality Standards:
(Sub-decree on Water Pollution Control – No:27 ANRK.BK, 1999)
Public Water Area & Sewer: COD <100, BOD <80



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Monitoring & Evaluation

(cont.)

- **Sampling Activities**
 - Inlet of DEWATS taking sample
 - Outlet of DEWATS taking sample
 - Temperature measurement of Wastewater inside DEWATS system
 - Wastewater level measurement inside DEWATS Plant
 - Sludge measurement in DEWATS Plant





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THANK YOU FOR YOUR ATTENTION!

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Youtube Links: www.youtube.com/watch?v=QbD52wUQyRE

www.youtube.com/watch?v=hcrf115vvul (websites: www.borda-sea.org and www.escambodia.org)