



BORDA

DEWATS- Decentralized Wastewater Treatment Systems



Demand-based technical solutions to reduce water-pollution by small and medium enterprises and settlements in densely populated areas

About DEWATS

DEWATS stands for “Decentralized Wastewater Treatment Systems”. DEWATS is rather a technical approach than merely a technology package.

DEWATS applications are based on the principle of low-maintenance since most important parts of the system work without technical energy inputs and cannot be switched off intentionally.

DEWATS applications provide state-of-the-art-technology at affordable prices because all of the materials used for construction are locally available.

- DEWATS applications provide treatment for both, domestic and industrial sources
- DEWATS applications provide treatment for organic wastewater flows from 1-1000 m³ per day
- DEWATS applications are reliable, long lasting and tolerant towards inflow fluctuation
- DEWATS applications do not need sophisticated maintenance

Without considering facilities for necessary chemical pre-treatment of wastewater from industries, DEWATS applications are based on four basic technical treatment

modules which are combined according to demand:

- Primary treatment: sedimentation and floatation
- Secondary anaerobic treatment in fixed-bed reactors: baffled upstream reactors or anaerobic filters
- Tertiary aerobic treatment in sub-surface flow filters
- Tertiary aerobic treatment in polishing ponds

DEWATS applications are designed and dimensioned in such a way that treated water meets requirements stipulated in environmental laws and regulations.

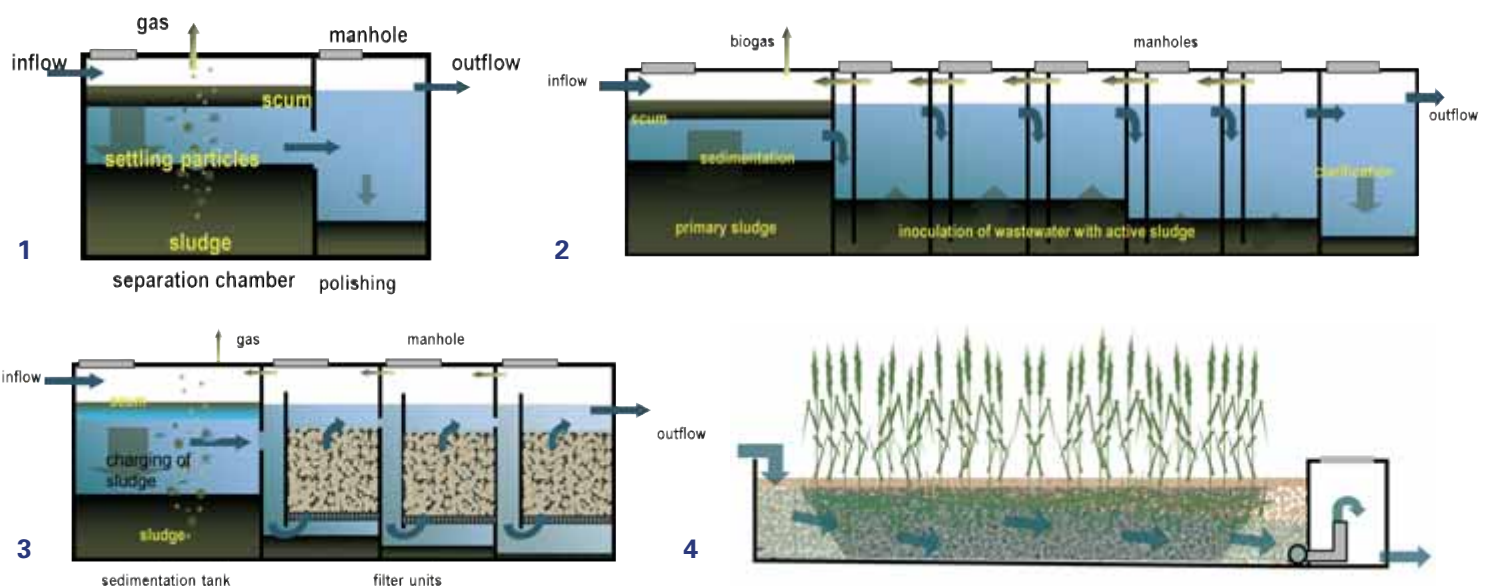
Appropriate Wastewater Treatment for SMEs

Advantages of DEWATS technology:

- Providing treatment for domestic and industrial wastewater
- Low primary investment costs as no imports are needed
- Efficient treatment of daily wastewater flows up to 1000m³
- Modular design of all components
- Tolerant towards inflow fluctuations
- Reliable and long-lasting construction design
- Expensive and sophisticated maintenance not required
- Low maintenance costs

Hence

DEWATS technology is an effective, efficient and affordable wastewater treatment solution for small and medium sized enterprises (SME).



The Challenge

The demand for reliable, efficient and low-cost wastewater treatment systems is increasing world wide especially in densely populated urban regions where adequate wastewater treatment systems do not exist and uncontrolled discharge of wastewater endangers environmental health and water resources.

Many Governments have passed new environmental regulations stipulating that dischargers of wastewater such as small and medium enterprises and housing estates will be held responsible for wastewater pollution and must therefore treat wastewater adequately on-site before it is discharged into the environment.

Main DEWATS-modules for physical and biological wastewater treatment:

1. Settler
2. Anaerobic Baffled Reactor
3. Anaerobic Filter
4. Planted Gravel Filter

Common Wastewater Problems within Small and Medium Enterprises



Many SME are not able to pay high investment and maintenance costs required for sophisticated wastewater treatment system.



Maintenance of sophisticated wastewater treatment systems require high-skilled personnel.



Due to lack of investment capital and technical knowledge SME often adapt non-effective low-cost „solutions“.



Wastewater discharged by SME often does not meet environmental standards.

Demand

For many small and medium enterprises and housing estates, conventional wastewater treatment systems are technically sophisticated and costly, often require high energy inputs for operation and rely on sophisticated maintenance services to ensure continuous operation.

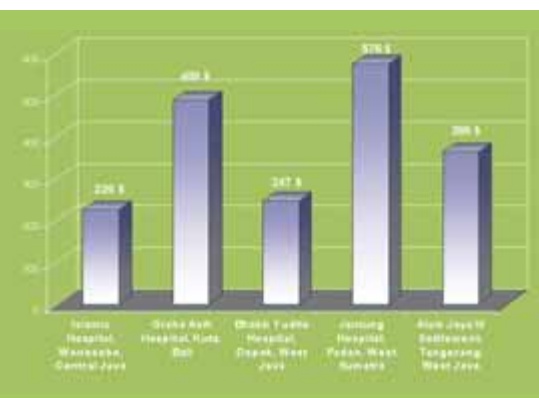
In most cases, such requirements are unsuitable for SME.

For these potential clients, BORDA and its network of partner organisations started in 1994 to develop reliable and cost-efficient wastewater treatment systems which could efficiently treat non-toxic organic wastewater according to legal environmental standards.

Successful efforts to standardize main components of the DEWATS approach, such as multi-stakeholder approach, modular design of

systems, project planning, implementation and quality control has resulted in a significant increase of implementation capacity and dissemination of technical know-how.

Today, more than 1000 stakeholders from the private sector, governments and NGOs have been trained by the BORDA-Network to facilitate dissemination, implementation and maintenance of DEWATS



DEWATS ensures state of the art treatment results at affordable cost, low maintenance and limited space requirements

system resulting in the sustainable operation of more than 250 DEWATS plants. The success of DEWATS has fostered cooperations with numerous government departments, municipalities and international donor agencies to increase capacities and technical implementations.

Dissemination

To assure sustainable dissemination of appropriate wastewater treatment infrastructure in the long-term, a mere focus on technical aspects has proven insufficient. The approach for implementation of DEWATS projects includes not simply the construction of hardware but a whole comprehensive set of integrated measures such as:

Information seminars and workshops to introduce DEWATS to key-stakeholders

Early information of key-stakeholders is vital to ensure continuous support for programme on macro-level.

Co-financing of demonstration projects

Financial support during the start-up phase of a demonstration project enhances the achievement of desired results and impacts.

Sector specific information-seminars

An early focus on specific priority-sectors supports an exchange of ideas between experts and potential clients that have similar professional experiences.

Technical training

Long-term DEWATS experts facilitate comprehensive training programmes for qualified staff of partner organisations and take on a supervisory role during first technical implementations.

Project planning

Project planning includes technical feasibility studies, detailed engineering designs and cost-estimates.

Project implementation

Service provision depends on preferences of clients and network-partners and may include supervision of construction, contractor services or turn-key operation. To ensure high quality standards, major tasks are always carried out by qualified experts.

Technical support and monitoring

Staff responsible for operation and maintenance of DEWATS plants are adequately trained by technical experts during the first year of operation.

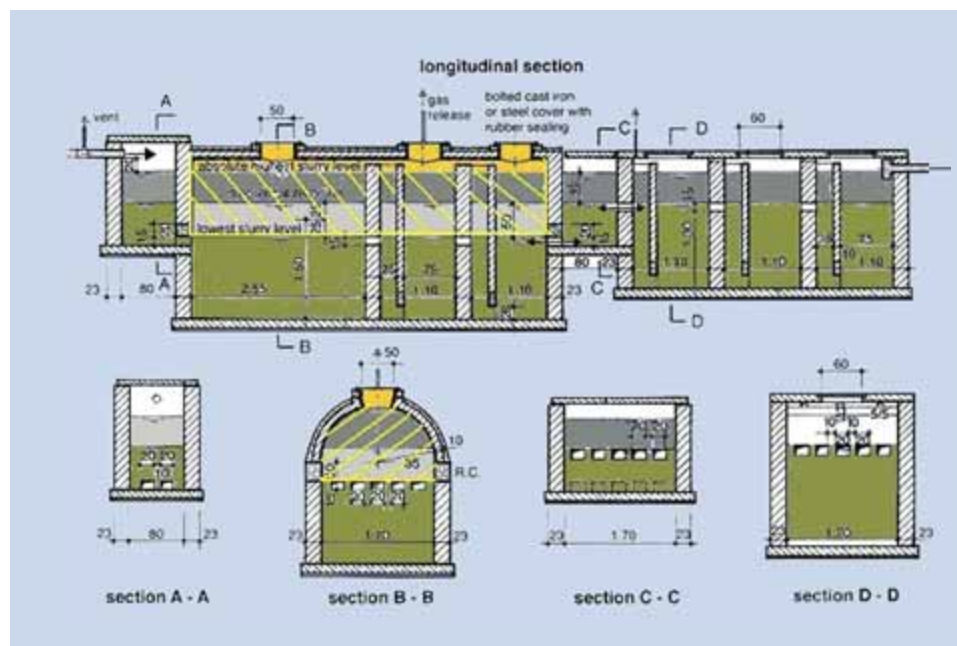
Quality Control

All DEWATS systems constructed are designed and have a guarantee to fulfill specified discharge standards. Effluent tests are conducted at regular intervals.

Research & Development

Continuous efforts are made by members of the DEWATS partner-network to improve efficiency and effectiveness of treatment systems.

Dome shaped anaerobic baffled reactor for biogas recovery



Good Practices

DEWATS for Hospitals

Characteristics:

- 250 beds with outpatient department
- untreated wastewater discharge into nearby stream
- complaints of neighboring communities
- limited funds
- limited technical skills of staff
- sufficient space

Technical Solution:

- Treatment system for 150 m³ wastewater/day
- Sedimentation + anaerobic filter + horizontal sandfilter + purification pond
- Pumping chamber after anaerobic filter
- Total construction cost: \$ 50.0000
- Training of maintenance staff and 1 year guarantee



DEWATS for Agroindustries

Characteristics:

- More than 100 cattle slaughtered per day
- Extreme fluctuation of wastewater composition
- extremely high organic load
- limited space for construction near stream
- unreliable responsibility and maintenance

Technical Solution:

Separation of wastewater components:

- De-watering, sedimentation & floatation

Treatment system components:

- Screening
- Sedimentation
- Composting
- fully-mixed digestion in biogas reactor
- Anaerobic filter



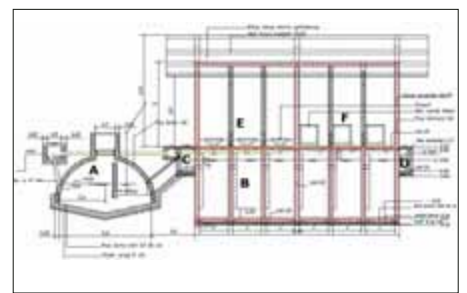
DEWATS for Communities

Characteristics:

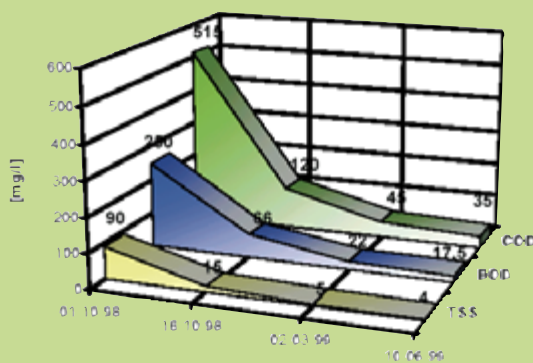
- Open waste water lagoon within community
- 6 public toilets/6 bathrooms for 500 people
- Unwillingness of landlords to upgrade sanitation infrastructure
- Willingness to provide lagoon space
- Willingness of people to pay for use of proper sanitation infrastructure
- People willing to manage sanitation infrastructure

Technical Solution:

- Fully mixed digester (fixed-dome biogas plant)
- Baffled reactor
- Landscaping
- rehabilitation of WW ditches
- MOU between NGO and CBO regarding maintenance of Sanitation/DEWATS infrastructure



Laboratory Test Results



Effluent Quality during first months of DEWATS operation

DEWATS Treatment Efficiency

No	Parameter	Unit	Analytical-Results Inlet	Outlet	Reduction [%]
1	Temp.	°C	27	27	–
2	pH	–	7,6	7,3	4 %
3	BOD 5	mg/l	290	53,6	83 %
4	COD	mg/l	590	84	86 %
5	Phosphate	mg/l	18,33	3,67	80 %
6	TSS	mg/l	172	84	51 %
7	Ammonia	mg/l	0,19	0,07	63 %

Source: Graha Asih Hospital Bali, Anaerobic Filter + Horizontal Sandfilter + Purification Pond

Benefits of DEWATS

- Establishing of multi-stakeholder networks to combat water pollution
- Building up implementation capacity on various levels
- Providing treatment for both, domestic and industrial wastewater at affordable price
- Fulfillment of discharge standards and environmental laws
- Wastewater pollution reduced by up to 90%
- Providing treatment for wastewater flows up to 1000 m³ / day
- Reliable and long lasting applications
- Tolerant towards inflow and load fluctuation
- Materials/ inputs used for construction are locally available
- Minimal maintenance and long de-sludging intervals



- Low operation and maintenance costs
- Resource efficiency and non dependence on energy
- Resource recovery through wastewater re-use and biogas generation

DEWATS Partner Network

SANTREN, Southern African Network for Training and Research on the ENvironment

Bali Fokus
Denpasar/Indonesia

B.E.S.T., Bina Ekonomi Sosial Terpadu
Tangerang & Surabaya/Indonesia

DEWATS - LPTP
Yogyakarta/Indonesia

PCWS, Philippine Center for Water and Sanitation, Manila/Philippines

FEDINA, Foundation for Educational Innovations in Asia, Bangalore/India

GSS, Grama Swaraj Samithi,
Bangalore/India

EXNORA International (EXcellent NOvel and RADical ideas), Chennai/India

RLHP, Rural Health & Literacy Programme, Mysore/India

IYIW, Indian Institute of Youth Welfare, Nagpur/India

Vietnam Institute for Water Resources Research, Hanoi/Vietnam

Zhejiang University of Technology
Hangzhou/P.R. China

DEWATS Donors & Sponsors



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Water and Sanitation Program SEA (The World Bank)



BORDA

Bremen Overseas Research and Development Association

BORDA Head Office Germany

fon: + 49 (0) 421 – 137 18
e-mail: office@borda.de
www.borda.de

BORDA Office Indonesia

fon: + 62 (0) 274 – 88 82 73
e-mail: borda@idola.net.id

FEDINA-BORDA DEWATS

Coordination Office India

fon: + 91 (0) 80 – 25 43 17 72/3
e-mail : borda-india@dishnetdsl.net

BORDA Project Office Vietnam

fon: + 84 (0) 4 – 762 95 80
e-mail: office@borda.org.vn