



BORDA



Decentralized Wastewater
Treatment Solutions



CBS – Community Based Sanitation

A promising concept to improve
livelihoods and sanitation infrastructure
in poor urban areas

and

DEWATS – Decentralized Wastewater Treatment System

Demand-based technical solutions
to reduce water-pollution by small and medium enterprises and settlements

Overview & Challenge

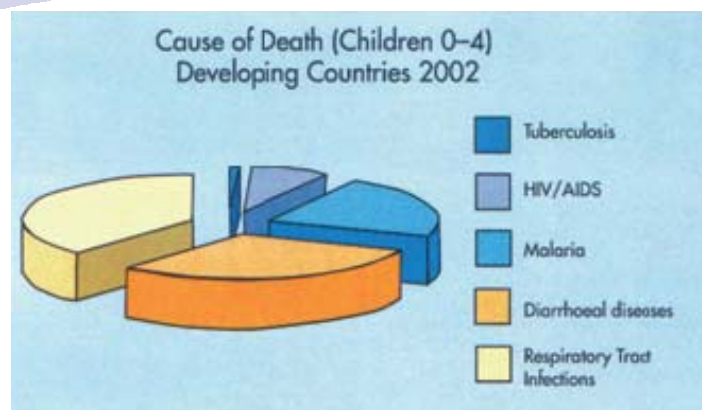
Increased urbanization and industrialization has significantly reduced the quality of life for millions of people who live in peri-urban and low-income settlements within cities. Lack of basic sanitation infrastructure endangers public health and natural resources, resulting in enormous loss of life and also of public/private investment.

The DEWATS framework is tailored to improve sanitation conditions in densely populated urban areas and to provide reliable low-cost sanitation and wastewater treatment solutions.

Project implementation depends on the active cooperation of communities, governments, NGOs and the private sector.

Smart and proven technical options are synthesized with capacity building measures and technical expertise to mainstream DEWATS & CBS as a viable sewage & sanitation option in areas where neither individual on-site systems, nor centralized sewerage systems, can fulfill the need of stakeholders for basic sanitation.

The demand for reliable, efficient and low-cost wastewater treatment systems is increasing worldwide 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.



Cause of death among young children and potential economic benefit from meeting the sanitation MDG
Source: B. Evans, Securing Sanitation, SIWI 2004



A Demand Based Solution

DEWATS CBS – Community Based Sanitation

New infrastructure development projects usually provide sanitation services for up to 60-70% of the urban population, residing in strategic residential areas.

DEWAT schemes aim to improve the health and environment of low-income communities in densely populated areas which are usually located in the inner-city or at the fringe of industrialized zones.

The DEWATS-CBS approach is an alternative option that fills the significant “gap” between inappropriate on-site sanitation (e.g. absorption pits) and the shortcomings of sewerage collection and treatment systems.

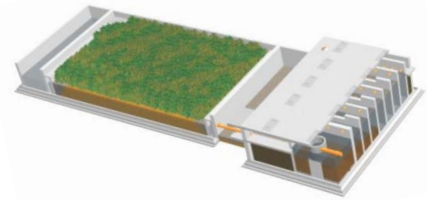
Within the CBS approach communities are able to make their own informed demands. They are educated about the connection between sanitation, hygiene and disease and are encouraged to organize the operation and maintenance of sanitation infrastructure.

CBS projects are highly demand-driven and rely on active participation and contributions from target communities and municipalities. Specific mechanisms have been developed for planning and budgeting in order to make CBS compatible with administrative requirements of governments.

Sanitation is planned, designed and constructed for and together with the community according to local requirements and abilities.

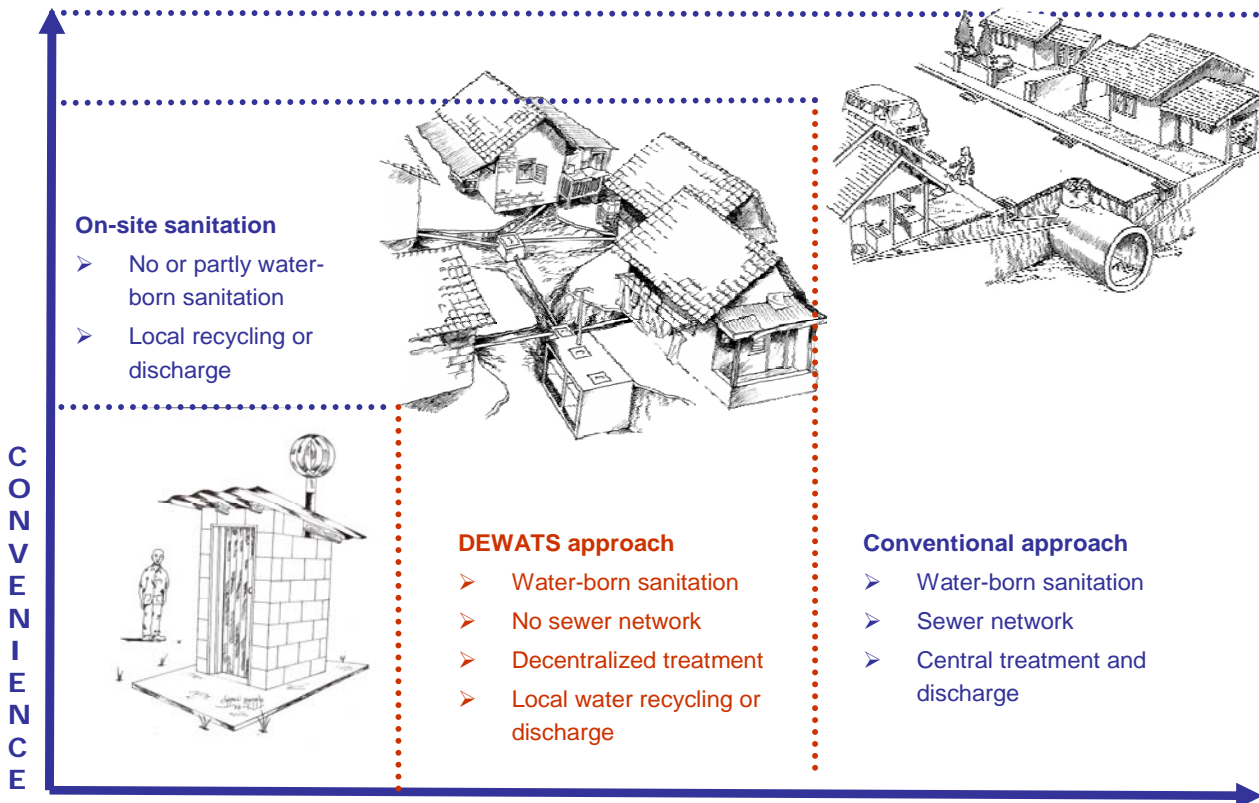


Community Sanitation Center



DEWATS plant

DEWATS fills the Sanitation Gap



On-site sanitation

- No or partly water-born sanitation
- Local recycling or discharge

DEWATS approach

- Water-born sanitation
- No sewer network
- Decentralized treatment
- Local water recycling or discharge

Conventional approach

- Water-born sanitation
- Sewer network
- Central treatment and discharge

Costs & share of urban sanitation coverage

CBS Framework and Principles

Successful CBS projects and programs are based on a multi-stakeholder approach, e.g. a planning implementation and management framework in which responsibilities and tasks are shared in a systematic manner between different CBS stakeholders such as communities, Government department, NGOs, international donors, etc. Two main CBS implementation and management schemes can be distinguished:

“Provider managed CBS Scheme”

Primary investment costs for sanitation infrastructure are financed by public or private development agencies; technical implementation is facilitated by a qualified technical agency (public, private, NGO) and a service provider agency, generally a qualified NGO, is responsible for all operation and maintenance tasks.

“Community-managed CBS Scheme”

Investment costs are also financed by public or private development agencies, however, technical implementation relies on the active participation of residents and community self-help organizations are responsible for managing of sanitation facilities. Both schemes have been successfully demonstrated and are equally valid alternatives. The choice of either scheme, should be based on the preferences of communities and key stakeholders at municipality level. Within both schemes, contributions of user-fees are essential to cover operation & maintenance costs.

Demand-Responsive Approach (DRA)

CBS initiatives and partnership are established in regions where stakeholders at different levels are willing to promote, finance and manage CBS infrastructure. Participating communities should be free of conflict between residents.

- **Participatory planning:** Participatory project planning must achieve equity within the community regarding access to new sanitation infrastructure.
- **Informed Choice:** Sustainable CBS systems reflect the preferences of stakeholders.

Through the informed choices approach, communities and municipalities are informed about the benefits and disadvantages of different options before decisions are made.

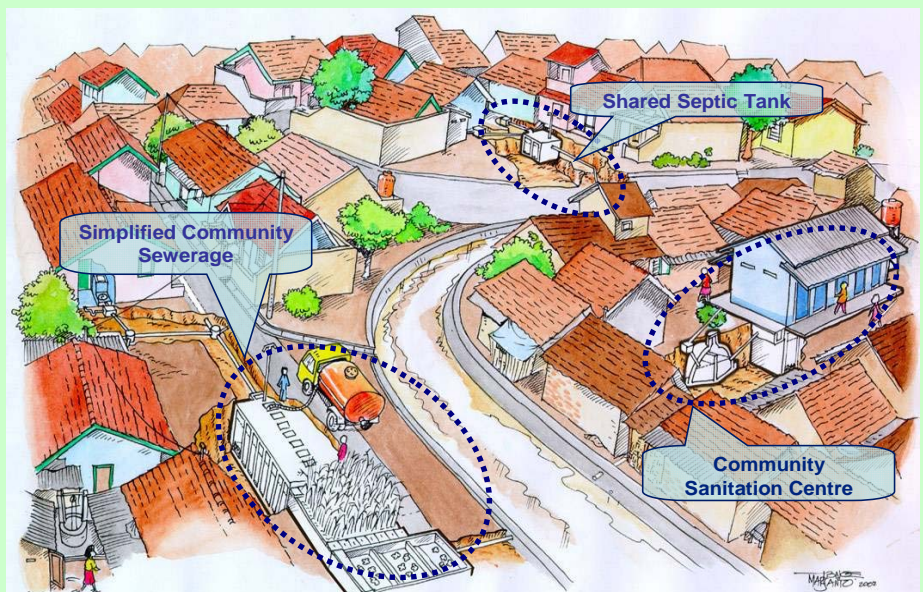
- **Professional Design and Workmanship:** Functioning and long-lasting sanitation infrastructure depends on professional technical design and high-quality craftsmanship.
- **Operation and Maintenance:** Costs for operation and maintenance of sanitation infrastructure should be fully covered by communities/users.

Favorite CBS Systems

Analysis of numerous implementations in Asia and Africa has shown that three types of water-based CBS Systems or combinations are preferred by communities.

- **Simplified sewerage systems for settlements**
Low-diameter sewerage system that collects and discharges household-wastewater from houses of one settlement into low-maintenance wastewater treatment plants (1).

- **Shared septic tank system**
A number of houses are connected to one septic tank (2). System (1) and (2) are appropriate for smaller and larger poor areas where houses are privately owned and households are willing to invest to upgrade sanitation hardware.
- **Community Sanitation Centre**
Consist of public water points, toilets, bathrooms and laundry areas. Most appropriate in settlements where majority of residents live in rented accommodation and where space is limited for in-house sanitary hardware.



Technical Options – Informed Choice

CBS Components

Selection of CBS-systems and its components depends on existing requirements and capabilities of implementing communities. The basic CBS system consists of a toilet component, a collection component, a treatment component and a disposal/re-use component. The main CBS-components are shown in the selection-tree below.

Selection Criteria for Technical Options

Capacity: Are components suitable for individual households and/or neighborhoods with up to 1000 inhabitants?

Self-help Compatibility: Can communities effectively assist during construction and implementation? During which phases of implementation are experts required?

Operation & Maintenance: Can routine operation and maintenance activities be carried out by members of the community or is expert help required?

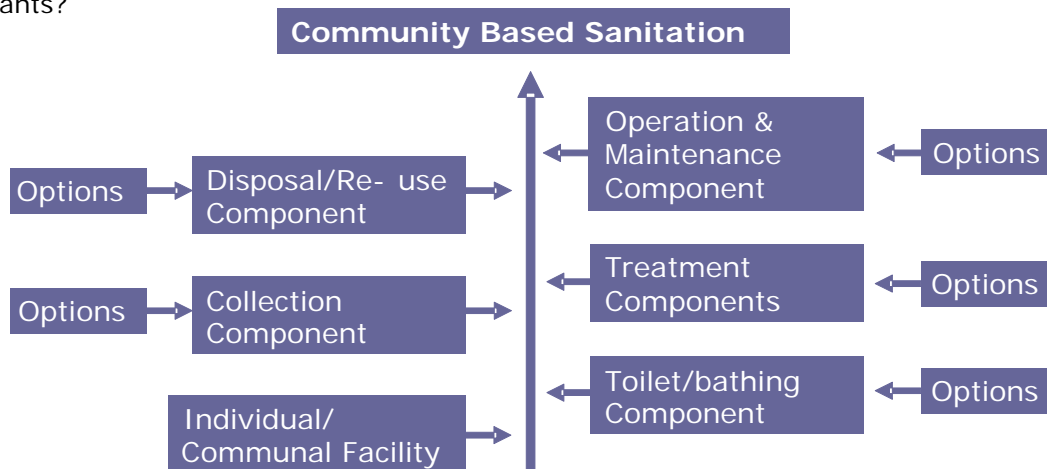
Costs: Are anticipated investments and costs for operation and maintenance compatible with existing financial resources?

Replication Potential: Can sanitation experts of municipalities replicate/ disseminate preferred technical options independently?

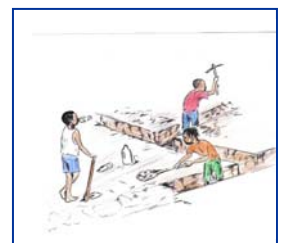
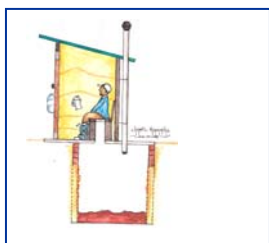
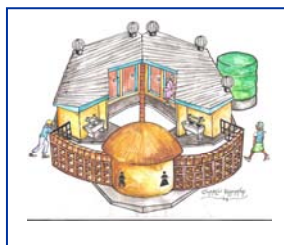
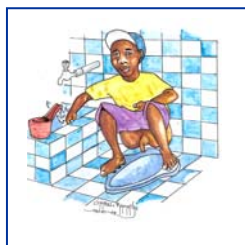
Reliability: Can problem-free functioning and operation of technical option be guaranteed.

Convenience: How far do technical options match preferences of communities regarding "convenience"?

Treatment Efficiency: What environmental discharge standards must be met?



Informed Choice Selection Tree



DEWATS – Decentralized Wastewater Treatment System

DEWATS is a technical approach - not just a technology package.

DEWATS applications are based on low maintenance principles as most important parts of the system work without technical energy inputs and cannot be switched off intentionally. DEWATS applications are state-of-the-art technology at affordable prices because all the materials used for construction are available locally.

BORDA and its partner organizations have been developing reliable and cost-efficient wastewater treatment systems, which efficiently treat non-toxic organic wastewater according to legal environmental standards, since 1994.

Successful efforts to standardize main components of the DEWATS approach, such as a 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 thousands of stakeholders from the private sector, governments and NGOs have been trained by the BORDA-network to facilitate dissemination, implementation and maintenance of DEWATS-CBS.



DEWATS Principles

- Simplification of sewer networks and application of solid-free sewer
- Low-maintenance and no energy and no chemicals required
- Construction uses labour and material available locally.
- Generation of biogas for cooking and heating and generation of water and nutrients for irrigation in agriculture and food-gardens
- Application of DEWATS quality management system, a comprehensive system of standardized planning and implementation procedures, quality standards and control, capacity building and performance monitoring

DEWATS Application

Individual households, settlements, institutions, hospitals, schools and small and medium sized enterprises (SME) for the treatment of domestic and organic industrial wastewater.

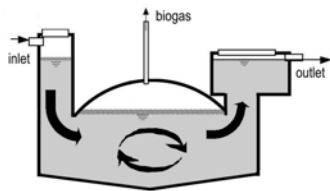
DEWATS applications are based on three basic technical treatment modules which are combined according to demand:

(1) Primary treatment:

(2) Secondary anaerobic treatment:

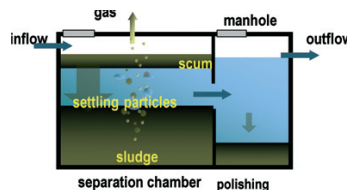
(3) Tertiary aerobic treatment:

sedimentation and floatation → Biogas Digester or Septic Tank
 anaerobic baffled upstream reactor or anaerobic filter → ABR/AF
 sub-surface flow filters → PGF



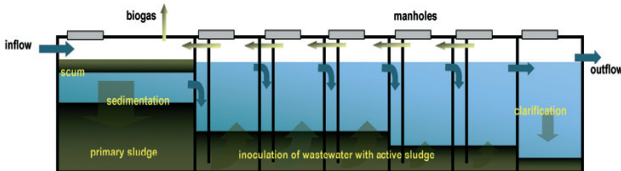
BIOGAS DIGESTER

- Airtight plastered fixed-dome plant
- Enable collection and utilization of biogas



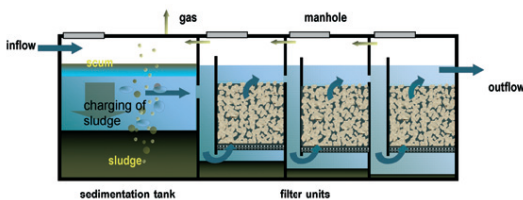
BASIC SEPTIC TANK

- Sedimentation tank
- Sludge stabilization



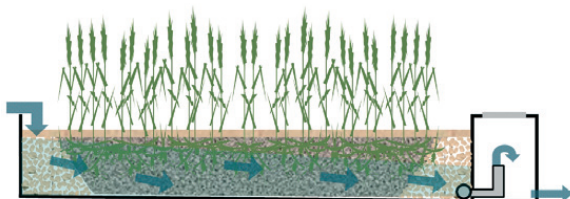
ANAEROBIC BAFFLED UP-FLOW REACTOR (ABR)

- Incoming wastewater directed to pass through active bacteria sludge in each baffled chamber
- Integrated settler prevents larger solids entering the baffled section



ANAEROBIC FILTER (AF)

Incoming wastewater directed to pass through active bacteria located on filter-material surface



PLANTED GRAVEL FILTER (PGF)

Provides aerobic treatment of pre-treated wastewater



Dissemination

Ensuring sustainable long-term dissemination of appropriate wastewater treatment infrastructure requires more than simply focusing on technical aspects. The approach for implementing DEWATS projects includes not just the construction of hardware but a comprehensive set of integrated measures such as:

Information seminars and workshops to introduce DEWATS to key-stakeholders

These are vital to ensure continued support for the program at a 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 with similar professional experience.

Technical training

Long-term DEWATS experts facilitate comprehensive training programs for qualified staff of partner organizations and take on a supervisory role during initial technical implementation.

Project planning

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

Project implementation

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

Technical support and monitoring

Staff members 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 guaranteed to fulfill specified discharge standards. Effluent tests are conducted at regular intervals.

BNS Partner Network in SADC Region



University of Kwazulu Natal (Pollution Research) South Africa



Environmental Engineering & Pollution Control Organization Tanzania



Water and Sanitation Association of Zambia, Zambia

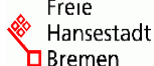


Technologies for Economic Development Lesotho

CBS Donors & Sponsors



German Federal Ministry for Economic Cooperation and Development (BMZ)



Free Hanseatic City of Bremen (LafEZ)



Commission of the European Union (CEU)



Water and Sanitation Program SEA (The World Bank)



Australian Agency for International Development (AusAID)

DEWATS Service Packages

- o School Based Sanitation
- o Community Based Sanitation
- o Emergency Sanitation
- o Sanitation for Hospitals & Hotels
- o Sanitation for Agro-Industry
- o Sanitation for Prisons
- o Sanitation for Real Estates
- o Sanitation Mapping
- o Municipal Sludge Treatment Plant
- o Health Impact Assessment & Hygiene Education
- o Capacity Development
- o Standardisation
- o Research & Development

DEWATS – Decentralized Wastewater Treatment Solutions

Developed & disseminated by BORDA and over 20 BORDA BNS Network Partners in South and South East Asia & Southern Africa



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