

# Faecal Sludge Management (FSM)



Inclusive citywide  
sanitation services



Free  
Hanseatic City  
of Bremen



german  
cooperation

DEUTSCHE ZUSAMMENARBEIT

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How do we achieve full sanitation coverage, ensuring every person can enjoy this basic human right?

A white, handwritten signature of Carley Truyens on a blue background.

**Carley Truyens**  
Country Coordinator  
BORDA South Africa



# Welcome to FSM5

On behalf of BORDA, I warmly welcome you to Cape Town for the 5th International Faecal Sludge Management Conference. We have come together to share our ideas, innovations and experiences with the goal of improving the science, policy and practice of FSM – because yesterday's solutions will not meet the needs of the 4.5 billion people who lack access to sustainable sanitation services.

South Africa has seen much progress in sanitation provision during the past several decades, yet a fifth of the population still lacks access to even basic sanitation. How do we achieve full sanitation coverage, ensuring every person can enjoy this basic human right?

As we sit in Cape Town, which only months ago faced the prospect of taps running dry, we question the logic of mixing excreta with our freshwater resources, only to then transport the wastewater, at great expense and energy consumption, to centralised treatment facilities, where we use more energy to treat that water. We are striving for sanitation solutions that protect human health and the environment, provide users with dignity and safety, and produce reusable water, energy and nutrients – all while operating sustainably. This is a tall order, and there is much work to be done.

I look forward to our exchanges on FSM innovations, successes, and failures, and I wish you all a fruitful conference as we collectively work toward improving sanitation for all.

# Our Commitment to FSM

Faecal sludge management (FSM) is a groundbreaking concept with the potential to solve global sanitation challenges. Eight years after the first FSM conference in Durban, it is self-evident that FSM is a rapid, game-changing solution for communities without sewerage systems. It is affordable, reliable, maintainable, and designed for local ownership. And by enabling reuse of valuable resources, it is an essential component of an ecologically oriented circular economy.

BORDA has been advancing FSM from the very beginning: from early projects establishing faecal sludge treatment plants (FSTPs) in Indonesia, to the implementation of India's first town-scale FSM in Devanahalli in 2016, to today's integrated citywide sanitation concepts in Southeast Asia and Southern and Eastern Africa.

FSM is still not the global success story we all hope it can be. However, there is no doubt that FSM offers one of the most promising avenues for achieving SDG 6 by 2030. With this in mind, BORDA is delighted to play a significant and supportive role in the new FSM Alliance formed during FSM5.

To learn more about BORDA's FSM activities, I invite you to browse this booklet and engage with us here at FSM5.

FSM is still not the  
global success story  
we all hope it can be.



*Stefan Reuter*

**Stefan Reuter**  
Managing Director, BORDA

Kigamboni

# Pilot plant, demonstration site & training centre

Dar es Salaam, Tanzania

The Kigamboni Treatment Plant, completed in May 2013 with BORDA funding and municipal council support, was the first BORDA-built faecal sludge treatment plant (FSTP) in Tanzania. Serving 5,500 households, the FSTP is built on private land and operated by a local private pit-emptying service provider.

The plant's safe, effective treatment improves community sanitation and generates reusable by-products: fertiliser that can be sold for additional income, water for the adjacent banana plantation, and biogas for the operator's home.

BORDA's on-site Kigamboni Training Centre offers facilities for practical trainings and hosts demonstration site visits for university students and researchers, representatives of government authorities and public utilities, and key community members.

Lessons learned in Kigamboni have paved the way for BORDA to identify sanitation gaps and improve our approach to FSM in other areas of Dar es Salaam.













Mlalakua

# City sanitation planning for river restoration

Dar es Salaam, Tanzania

The 2013–2016 Mlalakua River Restoration Project, part of the International Water Stewardship Programme, was a multi-stakeholder partnership for bringing the Mlalakua River back to health and preventing its further pollution. The focal point: enabling effective management of liquid and solid waste at the point of generation.

With funding from the German Society for International Cooperation (GIZ) and the Coca-Cola Foundation, BORDA identified and implemented locally appropriate and sustainable wastewater, faecal sludge and solid waste management solutions. These

included implementing and monitoring a faecal sludge treatment plant (FSTP) and greywater management systems, ensuring regular and reliable solid waste collection, and raising awareness for behaviour change.

BORDA solutions in Mlalakua provide improved liquid waste management systems for 35,000 people and solid waste management for 50,000 people. Making this possible: the close collaboration with GIZ, Dar es Salaam Water and Sewerage Authority (DAWASA), the Kinondoni municipal council, and Tanzania People's Defence Forces (TPDF).

# DEWATS for Dar

## An FSM business model

Dar es Salaam, Tanzania

As one of Africa's fastest-growing cities, more than 70% of Dar es Salaam's development is unplanned. Only 9% of the city is covered by sewerage networks.

The 2016–2019 “DEWATS for Dar” project, funded by UK Aid and Tanzania-based Human Development Innovation Fund (HDIF), seeks to solve community sanitation challenges by empowering local entrepreneurs through start-up loans, technology transfer and infrastructure. The model uses locally manufactured latrine emptying tools, simple transportation and decentralised faecal sludge treatment plants (FSTPs).

New BORDA-built FSTPs in Mburahati (at a public football ground near shops) and Wailes (at a school) are the product of extensive community engagement and incorporate lessons learned from the Kigamboni and Mlalakua FSTPs.

In successfully scaling up the model, “DEWATS for Dar” will create direct health, social, environmental and economic benefits up to 80,000 people in unserved communities.





Code of practice

# From national standards to local implementation

Lusaka, Zambia

BORDA is assisting Zambian government bodies, commercial utilities and UK-based nonprofit WSUP in developing a national code of practice for on-site sanitation (OSS) and faecal sludge management (FSM). The first draft will be published in early 2019 and will cover containment, emptying and transportation, treatment, and end use/disposal.

To strengthen local enforcement of these standards, BORDA is supporting the Lusaka City Council in the formulation of OSS/FSM by-laws. To build high-quality, nationally certified capacity in OSS/FSM, BORDA in partnership with Germany-based GFA Consulting under the GIZ Climate Friendly Sanitation Programme has developed a curriculum for training faecal sludge treatment plant (FSTP) operators and managers. This curriculum has been validated by the Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA), who will roll out training in all its national training centres. The “train the trainer” courses are planned to commence in the first half of 2019.

BORDA is also engaged in designing and supervising the construction of four new FSTPs in Lusaka, making BORDA Zambia staff suitably placed to offer high-quality knowledge transfer in local FSTP operations and management.







### **Three Cities Knowledge Exchange (KEx)**

On behalf of the German Society for International Cooperation (GIZ), BORDA facilitated the KEx programme for local authorities, commercial utilities and regulators from Lusaka, Dar es Salaam and Kampala. This capacity-building initiative enables stakeholders to collaborate with each other and make informed decisions on OSS /FSM based on shared knowledge of existing approaches, opportunities and challenges in the three cities.



Stressed water services

# Strengthening FSM dialogues and capacities

Bamako, Mali

Mali's capital city of Bamako is experiencing accelerated growth in a context of political crisis coupled with periods of severe droughts and recent flooding.

This places extreme stress on water services and even more unprecedented pressure on urban sanitation management.

Together with stakeholders from government, the private sector and civil society, BORDA has embarked on initiatives to strengthen dialogue and capacities by enabling knowledge exchange between East and West Africa, engaging with operators in manual and mechanical faecal sludge management (FSM), and providing hands-on technical advice on the implementation of Bamako's first faecal sludge treatment plant (FSTP).

BORDA is actively reaching out to more development partners to join this effort and bring the advantages of FSM to Mali.

Devanahalli

# A proving ground for town-scale FSM

Near Bangalore, India

Across India, urbanising towns struggle with severe public health and environmental problems due to a lack of sanitation. In Devanahalli, the municipality joined forces with BORDA and our partner CDD Society to build a successful FSM system serving the entire town – the first of its kind in India.

An intensive collaboration between locals and experts has led to a holistic, scalable FSM solution that works along the entire sanitation value chain from initial capture to reusable

by-products. Launched in 2016 with funding from the Bill & Melinda Gates Foundation, the Devanahalli project demonstrates effective faecal sludge treatment for towns of 20,000 – 30,000 people. Long-term viability is ensured through smart management approaches to sustainable operations and financing, including a planned fee or tax system to support the treatment plant (FSTP) as a utility.

The success of the Devanahalli FSTP has led to the commissioning of 30 new FSM projects in towns across South Asia.





Devanahalli

## A municipal perspective on FSM

An interview with Mr. M. Murthy, President  
of Devanahalli Town Municipal Corporation

**Have you seen any changes after the installation of the FSTP in Devanahalli in 2016?**

The FSTP was instrumental for our town to achieve Open Defecation Free (ODF) status. 90% of households were toiletless. We have motivated every one of them to utilise the support of Swachh Bharat Mission (SBM), the State Government of Karnataka, and a Corporate Social Responsibility (CSR) intervention to construct a toilet with a pit. Before, women had to spend time in search of outdoor places to relieve themselves. Their dignity and privacy were at stake. After the toilet construction, women feel safer.



**What is the outlook for financing FSTP operations?**

We are covering all FSTP operation and maintenance costs, but need to raise more funds to keep it running. We have not levied taxes or charges on Devanahalli town residents, but there is increased awareness. We will seek public opinion on options for public funding and make provision for that in upcoming annual budgets. Presently residents pay 800-1000 rupees (about 10-12 euros) per desludging. In due course we will be able to offer this service free of charge, pending budget revisions.

**Can you elaborate on the social acceptance?**

Initially, local farmers raised objections to the planned FSTP as they assumed there would be an odour. Through continuous interaction and awareness creation, we were able to convince them of the opposite and they finally gave permission for the plant's construction. After completion of the FSTP, which includes further treatment of dried sludge to a co-compost, the same farmers are demanding to buy the fertiliser since it is not only cheaper but also better.

**How do you see the future of sanitation for all in Devanahalli and beyond?**

We are facing a water problem. It is not only about having access to freshwater but also being able to reuse available water. Installing underground drainage means digging up the roads, which is extremely costly. FSM is a simple alternative. Devanahalli has become famous because of the FSTP. People from all over the world are still coming and getting exposure to it. If every town installs an FSTP to treat their wastewater and faecal sludge through nature-based solutions and starts using the treated wastewater, the demand for scarce freshwater may go down. That will have a positive impact on sanitation and public health.





Liveable Leh

# A public-private partnership for high-altitude FSM

Ladakh, India

Situated more than 3,500 metres high in the Himalayas with a harsh climate (-40°C to 35°C and 7 months of very cold winter), Leh is a popular tourist destination receiving 250,000 visitors per year. Inadequate sanitation infrastructure and services have led to groundwater contamination.

Inspired by the successful town-scale FSM pilot project in Devanahalli, the Leh government in early 2017, the local government identified an urgent need for improved faecal sludge management, yet it lacked the funds and technical expertise to operate FSM services. BORDA facilitated a

partnership with Blue Water Company (BWC), a private provider of turnkey wastewater management solutions, to implement and manage every aspect of FSM for the town.

BWC financed, built and profitably operates the FSTP on town-owned land. The town collects fees from customers, which are in turn paid to BWC for complete FSM service provision. From contract signing to operational faecal sludge management for all residents and hotels: less than 4 months. The result: cleaner water for a more liveable Leh.

As part of a European Union project starting in 2018, BORDA is training Leh government officials to conceptualise Leh as a resilient and liveable city, and is assisting in developing implementation plans to improve environmentally relevant public services.

From pilot project to public utility

## Taking FSM regional

Cities and towns across South Asia

Despite the low cost and simplicity of decentralised faecal sludge management (FSM) systems, success at town scale is not self-evident. On top of prevalent build-neglect-fail cycles of infrastructure development, there is the novelty of FSM. Very often, municipalities simply do not understand how to operate, manage and regulate FSM services.

In South Asia, where BORDA is working to replicate success in Devanahalli, India to 30 more small cities, two lessons are starkly clear:

▶ Inclusive collaboration is key. Effective, sustainable FSM requires overcoming fragmentation of ownership and responsibility through a multi-stakeholder chain approach that involves consumers, service providers and governments.

▶ Ongoing financing is key. FSM operations and maintenance (O&M) costs must be properly estimated and reliably funded over the long term.

Since the private sector can help address both challenges, BORDA is working with municipalities such as Leh in India to develop locally feasible public-private models for FSM service provision. The aim: improving accountability and quality of FSM services while minimising the financial burden on local governments.

Happiness doesn't come from what we get,  
but from what we give.  
Give us yourshit. Be happy.  
#FSM\_Leh+919462454003

LEH: BEAUTIFUL. SUSTAINABLE. RESILIENT.





## Water management in arid regions

# Innovative sanitation solutions

## Azraq, Jordan

The Innovative Sanitation Solutions for Arid Regions (ISSRAR) project, implemented by BORDA and Swiss consultancy seecon with funding from the Swiss Agency for Development & Cooperation (SDC), supports Jordan's National Water Strategy for minimising dependence on non-renewable water sources and maximising water reuse.

In Azraq, an underserved “hotspot” above one of Jordan's largest freshwater aquifers, the project team

spent 10 months consulting with community members. The result: a reuse-oriented, bio-based sanitation solution that integrates wastewater treatment and faecal sludge management (FSM).

After the 2018-2021 build-up of infrastructure and capacity, Azraq will serve as a model for regional scaling-up – saving precious drinking water and recovering water for agriculture across Western Asia.



# Water management in arid regions

## Turning waste into resources

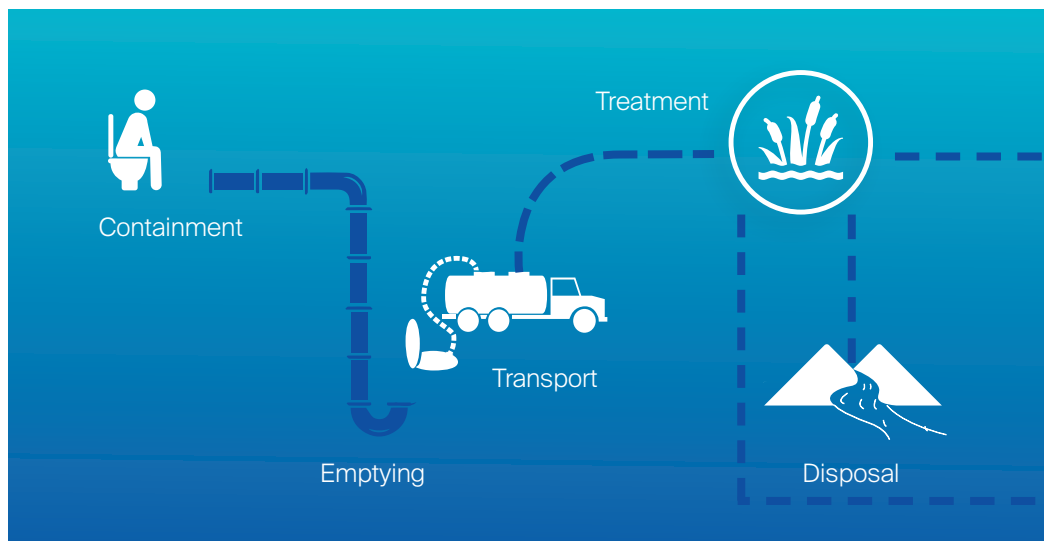
### Azraq, Jordan

In arid regions, conserving freshwater resources for drinking water supply is an ever more pressing issue. To provide greater volumes of water for non-drinking purposes such as irrigation, enhanced water reuse is essential.

Sanitation solutions play a large role in addressing the challenges of water-stressed regions. The ISSRAR project's integrated wastewater treatment and faecal sludge management (FSM) implementation

in Azraq aims to reduce pollution of valuable water resources and provide additional volumes of non-drinking water through increased reuse of treated wastewater.

By ensuring and promoting the reuse of treated wastewater and faecal sludge, BORDA is helping to turn waste streams into physical and financial resource streams – maximising water resource recovery at the community level and contributing to the maintenance of sustainable ecosystems.





Fertiliser



Reuse







# International city alliance

## Promoting integrated sanitation

### Southeast Asia & Jordan

The city alliance People-Sanitation-Cities, established with BORDA's support in 2017, links cities in seven countries to form an international interest group and community of practice dedicated to implementing an integrated sanitation approach to the management of urban waters.

A particular focus: polycentric urban planning processes for cross-sector management of decentralised water, wastewater, solid waste and faecal sludge. The aim: translating New Urban Agenda concepts to locally actionable applications and enabling realisation of the Sustainable Development Goals (SDGs) at the local level.

People-Sanitation-Cities acts as a capacity-building regional knowledge platform and exchange network, communicates the needs of cities and promotes system solutions to national decision makers and regional stakeholders, and contributes to international agenda-setting processes such as the 2018 World Urban Forum in Kuala Lumpur.

- 1 Indonesia – Sleman  
(Head of City Alliance 2018 – 2019)
- 2 Cambodia – Kratie
- 3 Indonesia – Bitung
- 4 Indonesia – South Tangerang
- 5 Jordan – Sahab
- 6 Laos – Luang Namtha
- 7 Myanmar – Yangon
- 8 Philippines – Bauang
- 9 Vietnam – Bac Ninh





## Inclusive city sanitation planning

# A polycentric approach

## Selected cities across Southeast Asia

For long-term impact, faecal sludge management (FSM) should be part of an integrated sanitation approach including water management, infrastructure, operations & maintenance, and capacity-building programmes – all embedded in municipal structures and planning.

The foundation for success: inclusive, multi-level, multi-actor processes. In Southeast Asia, BORDA is engaged in a five-year research project bringing multiple cities together with research institutes to develop polycentric approaches to implementing integrated sanitation solutions.

Funded by the German Federal Ministry of Education and Research (BMBF), project partners are fostering cross-sector and international collaborations, local-level participatory processes that include communities and women, holistic urban design planning processes, and implementations of locally adapted, water-sensitive sanitation solutions.

# Regional regenerative sanitation hub

## **Testing, training & certifying**

### Bangkok, Thailand

The Regenerative Sanitation Hub in Thailand, initiated in 2017 as a collaboration between BORDA and the Asian Institute of Technology (AIT), is a training and demonstration centre dedicated to introducing certified and proven decentralised wastewater treatment technologies to decision makers, manufacturers and practitioners in Southeast Asia.

Germany-based Testing Institute for Wastewater Technology (PIA) provides technical assistance for testing centre operations, while Japan-based National Institute for Environmental Studies (NIES) supports the Hub's efforts to harmonise the development of standards for testing on-site treatment systems.

The Hub engages with local and regional organisations to provide training on quality management for decentralised wastewater treatment systems; improve knowledge about the establishment, operation and maintenance of decentralised sanitation technologies; and promote polycentric sanitation service planning. The Hub also works for wider impact through collaborations with international organisations such as the Bill & Melinda Gates Foundation and UNESCAP (UN Economic and Social Commission for Asia and the Pacific).



# 6 principles of inclusive citywide sanitation

1 Demonstration of political will, accountability, and technical and managerial leadership

2 Equitable sanitation services benefit everyone

3 Human waste is safely managed along the entire sanitation service chain



4

Systems enable resource recovery and reuse

5

Diverse and innovative technologies—sewered and / or non-sewered—are deployed

6

Comprehensive long-term planning fosters innovation, pro-poor financing and improved performance

# People. Innovating. Sanitation.

