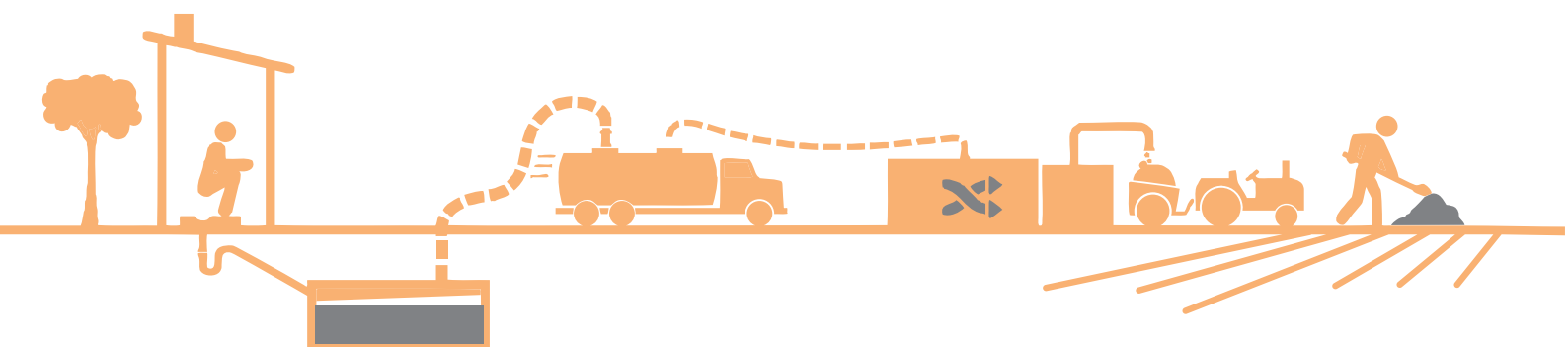




FSM  **convention**
BANGLADESH | 2016

Workshop
Proceedings



Faecal Sludge Management Network

The Bangladesh Faecal Sludge Management Network (FSMN) is a common and collective platform for the sector actors to generate ideas, share views, influence policy and practice, and raise a collective voice to meet the challenges of sanitation sector. The Network engages WASH stakeholders across civil society, the private sector, academia and the government, including Department of Environment, Department of Agriculture Extension, Sustainable and Renewable Energy Development Authority; relevant taskforces, networks and associations including National Sanitation Secretariat, National Forum for Water and Sanitation, Fertilizers' Association, etc.; and diverse actors such as corporations, microfinance institutions, etc.

Vision

Ensuring a safe and sustainable faecal sludge management system in Bangladesh for improved public health and living environment for all by 2030.

Mission

To act as a knowledge and advocacy platform where FSM is an intermediary solution for influencing policy and changes in practice for access to adequate, equitable and improved sanitation.

Objectives

The FSMN has the following major objectives:

- To work in a collaborative learning approach with all stakeholders to capture evidence, communicate knowledge and facilitate sector capacity building.
- To engage and provide strategic guidance to the FSM stakeholders for advancing appropriate technologies and approaches for safe and sustainable management of faecal sludge.

Introduction

Bangladesh has achieved the remarkable feat of near-elimination of open defecation. However, the country faces formidable challenges in the coming years in moving up the sanitation ladder. The rapid increase in sanitation coverage over the past two decades has relied heavily on on-site sanitation, with little capacity to deal with the volumes of sludge that eventually collect. This leads to leakages into the environment where septic tanks and pits are operating beyond capacity, or environmental pollution from dumping of faecal sludge into open water bodies following manual emptying.

There is therefore a pressing need to develop proper faecal sludge management (FSM) systems alongside on-site sanitation that will enable proper containment, emptying, transport, treatment and disposal – along with market development of treated products where available. Given the growing interest in FSM from policy circles, local government and non-governmental actors, Bangladesh Faecal Sludge Management Network (FSM Network) organised the first ever Faecal Sludge Management Convention at LGED Auditorium, Agargaon, Dhaka, on December 08, 2016. The key objective of FSM Convention 2016 was to enable cross-learning and sharing on FSM initiatives within Bangladesh, and define upcoming strategic priorities to ensure environmentally safe FSM practices.

The Convention also allowed the opportunity to:

- Take stock of current initiatives in FSM in Bangladesh
- Identify and agree on priority actions in order to support development of National Action Plan, complying with relevant national strategies and SDG 6.2 target.
- Raise awareness on the importance of FSM among a wider body of stakeholders

Over 196 participants from central and local government, non-governmental organisations (NGOs), research and academic institutions, the private sector and development partners attended the Convention to share their views on the state and future of FSM in Bangladesh.

FSM convention Session Plan

Session 1: 9:30 - 11:00

Inauguration

09:30	Welcome speech
09:35	Presentation FSM Context
09:50	Key note presentation on Institutional Regulatory Framework
10:05	Open Discussion
10:40	Speech by Special Guest
10:50	Speech by Chief Guest
11:00	Tea break

Session 3: 2:00-3:30

Business approach of FSM

02:00	Learning/sharing on business/commercialisation aspects of FSM
02:40	Discussion and recommendations on legal aspects; costing and pricing; need for patronizing/subsidizing FSM by state parties

Session 2: 11:30-1:00

Technological innovation in FSM services and value chain

11:30	Gallery walk (Poster presentation)
12:00	Synthesis presentation
12:10	Panel and open discussion including Chair person's remarks
01:00	Lunch break

Session 4: 4:00-5:00

Closing

04:00	Summary findings and recommendations presentation and discussion
04:15	Panel Discussion
04:50	Speech by Chief Guest





◀ Session 1: Inauguration Session

The inauguration session was chaired by Ms. Hasin Jahan, Country Director of Practical Action Bangladesh. Ms. Jahan highlighted the role of sound management of human waste in public health, and introduced the FSM Network to the audience as a collaborative platform working to that end. This was followed by a presentation by Professor Dr. M Ashraf Ali, Director of International Training Network at the Bangladesh University of Engineering and Technology (ITN- BUET), titled “Faecal Sludge Management (FSM): Bangladesh Scenario”. Dr. Ashraf set the background to the day’s discussions, laying out the challenges of FSM in the absence of proper emptying and disposal systems. However, he also noted that initiatives are underway, with a number of development partners and organisations piloting mechanical desludging and faecal waste composting. He drew attention to the role of importance of FSM in attaining Global Goal 6, particularly indicators 6.2 (safely managed sanitation services) and 6.3 (improvement of water quality).

This was followed by a presentation by Dr. Md. Mujibur Rahman, Professor, Civil Engineering Department, BUET, on “Faecal Sludge Management in Bangladesh: Institutional and Regulatory Framework”. Dr. Rahman explained the background and content of the Institutional and Regulatory Framework (IRF) for FSM, which aims to assign responsibility of FSM to specific institutions based on existing laws, policies and strategies; ensure stakeholders coordination; and facilitate environmental, financial and social sustainability. He informed the audience that the Framework has been approved by the National Forum for Water Supply and Sanitation, and only remains to be translated in Bangla. While the Ministry of Local Government, Rural Development and Cooperatives (MoLGRD&C) is the lead agency for the IRF, in coordination with other ministries, local government is to play a major role in implementation, including City Corporations, Pourshovas, and Union Parishads.

Following the welcome address and paper presentations, the participants engaged in open discussion on various aspects of FSM, including appropriate technology and practice, roles and responsibilities of different stakeholders, monitoring, partnership and coordination, and funding and cost-effectiveness. These points are summarised below:

Implementation and compliance

- Involvement of government authorities such as Dept. of Public Health and Engineering (DPHE) is key to the success of technical projects.
- Land for disposal and treatment sites is a major hurdle.
- Role of housing societies in big cities in ensuring FSM
- Role for environmental policing in ensuring compliance

Funding and cost-effectiveness

- Sound cost benefit analysis and investor mapping is needed to make FSM viable.
- Need for government and donor support at initial stage to support implementation.

Awareness and capacity building

- Need to raise awareness amongst potential end users of the treatment by-products (compost, etc.).
- Need to ensure occupational health and safety standards throughout the FSM process

The session ended with speeches from the Special Guest and Chief Guest. Mrs. Martine von Hoogstraten, Deputy Head of Mission, Head Economic Affairs and Development Cooperation, Embassy of the Kingdom of the Netherlands, mentioned the role of Bangladesh in pioneering global movements in immunisation, microfinance and sanitation, and expressed her hope that it would play a similar role in tackling the challenge of FSM. A S M Mahbubul Alam, Director General (Monitoring, Inspection & Evaluation Wing) and Additional Secretary, Local Government Division, followed with his speech as Chief Guest, where he acknowledged that many FSM-focused initiatives are already underway, and their lessons should be incorporated in the master plans of cities and municipalities. However, he also urged the participants to remember the rural population, and how FSM can be implemented in the rural context. He ended by assuring participants of his full support in implementing the IRF.

The millions of people who have been benefited by the end of open defecation will once more face the deadly threat of contamination, ill-health and persistent diseases unless we ensure that faecal waste has no chance of re-entering the environment

Mrs. Martine von Hoogstraten





◀ Session 2: Technological innovation in FSM services and value chain

The second session of the day, moderated by Mr. Abdus Shaheen, Country Programme Manager, Water and Sanitation for the Urban Poor (WSUP), was designed to share technological innovations in FSM, particularly with municipality/town authorities to consider FSM in their town planning. The first part of the session was a gallery walk of nine posters on various FSM initiatives (see Appendix I) undertaken by NGOs, government and local government, following which there was a synthesis of the poster session by Professor Dr. Muhammed Alamgir, Vice-Chancellor, Khulna University of Engineering & Technology (KUET), and panel discussion.

The panel included Dr. A.W. Ragib Hasan, Additional Director, Planning and Project Implementation Wing, and Dr. Sultan Ahmed, Director (Natural Resource Management) Department of Environment. Dr. Hasan and Dr. Ahmed provided their views on the various initiatives displayed, and took questions from the floor.

Dr. Ahmed opined that an FSM Guideline should be in place, with government permission obtained, and all parties should be made accountable to the Guideline. He pointed out the scope for learning from neighbouring countries, and suggested Sewage Treatment Plants (STPs) for every 500 households.

Dr. Hasan emphasised the need for further research across all aspects of FSM. He informed participants that the government is in the process of formulating regulation on organic fertiliser, which will be useful for promoting composting from FSM once finalised. He pointed out that many farmers are already moving towards organic compost, and suggested community radio as a way of further promoting this message.

A number of other important points were made by the panelists and the panelists in the course of the discussion:

- Need to include FSM in different educational curricula.
- Lack of coordination between ministries said to be responsible for FSM
- Potential of involving 25,000 Department of Agriculture Extension (DAE) staff working throughout the country in promoting FSM and organic composting
- Sustainable FSM will require public-private partnership

Professor Dr. M. Feroze Ahmed, Vice-Chancellor, Stamford University, offered his speech in conclusion as the Session Chair. Professor Feroze mentioned that six papers on faecal sludge treatment have already been handed to the Prime Minister for consideration. He urged immediate action on FSM, citing Bangladesh's role as a hub of innovation and creativity in finding solutions that can lead all of South Asia.



◀ Session 3: Business approach of FSM

The third session, chaired by Mr. Naquib bin Mahmud, Division Chief, General Economic Division, Planning Commission, and moderated by Mr. Tanvir Chowdhury, Sanitation Business Adviser, SNV Netherlands Development Organisation, dealt with business approach / commercialisation aspect of faecal sludge management. Subject experts from NGOs, research organisations and trade and corporate bodies, shared their experiences, summarised below:

Sanitation services chain and integrated sanitation planning

WSUP has worked with Dhaka Water Supply and Sewerage Authority (DWASA) and private organisations to develop an entrepreneurship business approach called SWEEP. Faecal sludge is collected from septic tanks from residences in Dhaka using Vacutug. WSUP's economic analysis indicates 26% of profit has accrued in the past 18 months from this collection system, and the project will provide the basis for implementation of a similar business approach in Chittagong.

SNV's work in Khulna City Corporation provides the important experience of engagement of local government institutions (LGIs) and their role in an FSM campaign. Through SNV's initiatives, City Corporation and general people have been made more aware about FSM, and a sanitation tax has been fixed for the municipality.

FSM end products and commercial marketing:

Many of the speakers emphasised the benefits of organic fertilisers. However, it was widely acknowledged that organic fertilisers are not able to compete with chemical fertiliser.

Commercial enterprises such as ACI Limited who are entering this area reported on the potential of organic fertilisers - ACI has produced and supplied 10,000 Mt organic fertiliser since 2010 till date. The Fertiliser Association also mentioned expansion of scope, citing that while there were only three licensed agencies in late '90s producing organic fertiliser, there are 40 now. However, many are inactive, facing challenges such as lengthy licensing processes and insufficient demand.

Experiences from Practical Action Bangladesh and WaterAid Bangladesh confirm that end products of FSM can become commercially viable for reuse. Practical Action has established two treatment plants in Faridpur and Satkhira. WaterAid has been working with Sakhipur Municipality and partner BASA on a co-composting plant that is a year into operation.

The importance and challenges of promoting use of organic fertilisers was a recurring theme. Practical Action has also developed a software to identify the usability of organic fertilisers, and is conducting a promotional campaign side-by-side. WaterAid is also working with the Department of Agriculture Extension of Sakhipur Upazila at the field level to facilitate the use of the soil conditioner produced from the co-composting plant.

Following the discussants' session, an open discussion was held where a number of important points were raised:

- Making FSM sustainable requires capturing the lessons learned through operational experience by the City Corporation/pouroshova/upazila, based on sound planning, honouring ground compulsions, involving community people, and drawing on business approaches within the purview of, and with strict compliance to, the proposed IRF
- Partnership of WASA with City Corporation as well as public-private partnership was suggested as an effective modality for FSM projects
- Context-specific local technology should be preferred and utilised in FSM projects
- Availability of land for construction of treatment plant is a serious constraint for FSM
- Commercial viability of organic fertilisers and soil conditioners from FSM requires demand to higher quality organic fertilisers and soil conditioners; as well as proper pricing

Session Chair Mr. Naquib Bin Mahbub concluded the session by noting that currently, proper management of faecal sludge and turning it into resources like organic fertiliser can still be an expensive matter. Managing this within a comparatively lower cost might will make FSM more viable and sustainable, and this is where support from the government and development partner ought to be well-utilised. Alongside, the Agriculture Extension Department can support popularising the faecal sludge-turned fertiliser amongst farmers through field demonstrations.

Discussants:

Dr. Ranjit Sen

Senior Scientific Officer, Soil Science Division, Bangladesh Agricultural Research Institute (BARI)

Mr. Bashir Ahmed

Business Director, ACI Limited

Mr. Omar Faruk

Member, Fertilizer Association

Mr. Habibur Rahman

Sanitation Lead, Water & Sanitation for the Urban Poor (WSUP)

Mr. Shahidul Islam

Governance Advisor, SNV Netherlands Development Organization

Mr. Uttam Kumar Saha

Head, Energy & Urban Services Programme, Practical Action Bangladesh

Mr. Sumon Kanti Nath

Programme Officer-Engineer, WaterAid Bangladesh





◀ Session 4: Closing Session

In this session, Dr Md. Khairul Islam, Country Director, WaterAid Bangladesh, reflected on the summary findings and recommendations. He emphasised that faecal sludge represents a massive environmental hazard, but a number of inspiring initiatives and context-specific pilot measures are underway. Dr. Islam also noted that the FSM Network and Convention provided opportunities to bring together different stakeholders, including the private sector, on a common platform to drive the sector forward. He urged for the experiences shared in the day's proceedings to be taken as collective action points and advocacy agenda in the coming days.

The synthesis presentation was followed by speeches from panelists including Mr. A.K.M. Shahid Uddin, Chief Engineer, Dhaka WASA; Ms. Elma Morsheda, Senior Project Officer, Asian Development Bank; Mr. Ashekur Rahman, Urban Programme Analyst, UNDP; and Ms. Farmin Ahsan Khan, Project Analyst, The World Bank.

Mr. Shahid Uddin of Dhaka WASA noted that due to the complexities and lack of funding for sewerage systems, WASA directly linked sewerage lines with Buriganga and Turag rivers. However, as Ms. Khan from the World Bank discussed, the World Bank is currently working on FSM and sewerage in Dhaka city, and is interested to work with WASA on these issues. The representatives from ADB and UNDP shared their plans regarding incorporating FSM in their projects. Participants were informed that ADB's Urban Development Plan already includes FSM as one of its components, and the organisation is planning a pilot project on FSM to be initiated in Jessore involving private operators.

Md. Wali Ullah, Chief Engineer, DPHE, then gave his speech as the Chief Guest. Mr. Wali Ullah commended the FSM Convention as a timely step, and noted that the presence of government, local government and development partner representatives indicated of importance and commitment all concerned were attaching to FSM. He also noted that FSM is now a vital component of the 7th Five Year Plan, and integral to SDG 6. He recognised the need for further investment in this regard, and emphasised the need to develop working business models. He reiterated previous speakers' suggestion regarding inclusion of FSM in the master plans currently being designed for municipalities, and in university curricula.

Dr. Islam then concluded the session and the Convention with his sincere thanks to the participants, guests, presenters and panellists, as well as the Network members and organising team. He expressed his hope for further opportunities to come together for learning and sharing in the future.



◀ Network Priorities Going Forward

- Immediate approval of the Institutional and Regulatory framework (IRF) for faecal sludge management and attributing it the same status as a legal instrument
- Advocating with the government for operationalisation of the IRF at field level
- Promoting health and safety and professionalisation of various actors engaged in FSM, especially sludge emptiers
- Inclusion of FSM in course curricula of technical institutes/universities
- Accounting for the environmental benefits of FSM, including the elimination of environmental pollution and public health risk, which would yield returns that are much higher than the physical benefits counted
- Encouraging multi-stakeholder participation on the issue of FSM, including relevant government line agencies, academia, private sector and civil society
- Initiatives to increase experience sharing and enhance synergy amongst FSM Network members and beyond

Appendix I: Poster Presentation

Department of Public Health and Engineering (DPHE)

Implementation of Faecal Sludge Treatment Plant (Reed Bed System) in Lakshmipur Pourashava by Department of Public Health Engineering (DPHE)



Study Area:

Lakshmipur Pourashava
Area: 3.5 Sq. Km
Fringe area: 16 sq. km
Population: 1,22,572



Reason of Selection:

- Public demand and awareness,
- Support of the Pourashava providing land for plant construction
- Availability of manpower for operation and maintenance.
- The core area of the Pourashava are normally developed, having concrete building and sanitary latrine with septic tank.

Existing Faecal Sludge Disposal Practice

- Usually on-site sanitation practice in Pourashavas.
- Domestic wastewater pre-treated in septic tanks.
- Effluent is collected in soakage pits.
- Manual process for emptying sludge from septic tanks.
- Sludge disposed in drains, dug holes, or open land without any treatment.
- Limited arrangements of centralized sludge collection, treatment and disposal of sludge.

Earlier Sanitation Situation in Lakshmipur Pourashava



Open drain

Discharge in waterbody



Overflow of septic pit

Conventional Faecal Sludge Treatment System



Process flow diagram



Septic Tank

Conveyance



Sludge Drying Bed



Treated Water
Co-Composting

Raw Water Quality

Parameter	Unit	Standard	Observed	Compliance
pH	-	6.5 - 8.5	7.5	Yes
Total Hardness	mg/l	500	150	Yes
Calcium Hardness	mg/l	200	60	Yes
Magnesium Hardness	mg/l	300	90	Yes
Total Solids	mg/l	500	150	Yes
Total Suspended Solids	mg/l	50	15	Yes
Total Dissolved Solids	mg/l	450	135	Yes
Chloride	mg/l	250	75	Yes
Sulfate	mg/l	250	75	Yes

Treated Water Quality (Dry Season)

Parameter	Unit	Standard	Observed	Compliance
pH	-	6.5 - 8.5	7.5	Yes
Total Hardness	mg/l	500	150	Yes
Calcium Hardness	mg/l	200	60	Yes
Magnesium Hardness	mg/l	300	90	Yes
Total Solids	mg/l	500	150	Yes
Total Suspended Solids	mg/l	50	15	Yes
Total Dissolved Solids	mg/l	450	135	Yes
Chloride	mg/l	250	75	Yes
Sulfate	mg/l	250	75	Yes

Treated Water Quality (Wet Season)

Parameter	Unit	Standard	Observed	Compliance
pH	-	6.5 - 8.5	7.5	Yes
Total Hardness	mg/l	500	150	Yes
Calcium Hardness	mg/l	200	60	Yes
Magnesium Hardness	mg/l	300	90	Yes
Total Solids	mg/l	500	150	Yes
Total Suspended Solids	mg/l	50	15	Yes
Total Dissolved Solids	mg/l	450	135	Yes
Chloride	mg/l	250	75	Yes
Sulfate	mg/l	250	75	Yes

Service Charge Collection

- Charge imposed- 1000 BDT per 2m³ Sludge
- Cost for operation- 1200.00 BDT per week (Approximate)
- Service charge collection- 6000.00 BDT per week (Approximate)

Operation and Maintenance

- Desludging starts from March 2013
- Operating vacutug collection size - 2m³ Volume
- Desludging frequency- 2 septic tank in 1 week (2 separate days with 2-3 days rest)
- 3 persons working for operation and revenue collection
- All the persons are Pourashava employee

Concept Implementation of Faecal Sludge Treatment Plant

- Transportation of septic tank water and sludge through vacutug
- Conveyed to the sludge drying bed
- Treated water would be discharged in agricultural land or sewer or water bodies
- Co-composting of the solid digested portion would produce fertilizer for agricultural use.

Implementation of Faecal Sludge Treatment Plant in Lakshmipur

- Vacutugs for sludge collection and sludge transportation (Nos. 3, Capacity 2m³ and 0.70m³)
- Conventional sludge drying beds
- Impermeable beds of gravel, sand and planted vegetation
- Area of treatment plant at Lakshmipur Pourashava is 780 m²
- Two sludge drying beds for alternative use, each bed consisted of 144 m² area.
- Designed life: 5-7 years
- Septic tank emptying interval 2-3 days per week.



Growth of Reed bed in three months

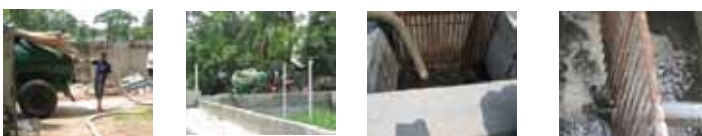
Key findings

Advantages

- Easy to operate
- BOD, COD, TSS, FC removal efficiency is more than 95%
- No odor problem
- Aesthetically acceptable
- Dried sludge can be composted and used as fertilizer
- Sludge volume reduction is excellent
- Can be built with local materials

Disadvantages

- Operation challenges during heavy rain and flood
- Manual labor is required to remove dried sludge from beds
- Low cost disinfectant will be needed for coliform reduction
- Pourashava will have to give special attention for operation and maintenance.
- Unavailability and cost issue in land acquisition.



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Public Private Partnerships for Sustainable Sludge Management Services in Faridpur and Satkhira



Features



Low Cost Appropriate Technology



Submersible Pump
Investment: 50,000 tk
Capacity: 65-80 litres of sludge per minute (1.5hp)



Transport
Investment: 300,000 tk
Capacity: 1200 litres in a single trip (10hp)
Fuel Consumption: 10KM/litre



Modified Gulper
Investment: 8,000 tk
Capacity: 4,000 litres of sludge per hour



Business Model



Magnitude
(of the plant in Faridpur)

Area
1.5 Acres

Coverage
City Wide | 0.2M People

Capacity
24m³ Per Day



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PRACTICAL ACTION
Technology challenging poverty



CAPACITY FOR COMPLIANCE



Compliance to the Bangladesh National Building Code (BNBC) for sanitation facilities in Khulna, Bangladesh

Findings

- Overlapping roles amongst local authorities have led to lack of enforcement and implementation of sanitation guidelines as per the BNBC
- The vast majority of urban buildings are not in compliance with BNBC rules, as direct connections can be found in most urban systems
- Because of higher density and optimizing scarce space, owners do not leave any space for construction of soak pits
- Masons lack the capacity to understand the design and alter the components of septic tanks to suit the site condition and connect the outlet to the nearest drains

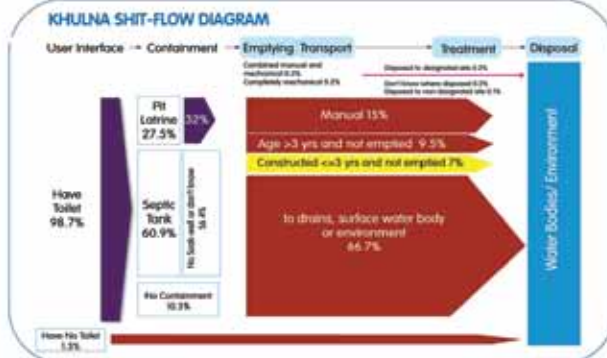
Way forward

- Modify workflow
- Develop capacity of regulatory organisations & professionals to enforce & comply
- Develop building inspection modality
- Awareness campaign on compliance

Suggested workflow



KHULNA SHIT-FLOW DIAGRAM



The Bangladesh National Building Code (BNBC) is the leading document for details on sanitary requirements in buildings



Demonstration of Pro-poor Market-based Solutions for Faecal Sludge Management in Urban Centres of Southern Bangladesh



This project is funded by the Bill & Melinda Gates Foundation and the UK Department of International Development



INTEGRATED MUNICIPAL INFORMATION SYSTEM FOR FSM IN KHULNA



ABOUT KHULNA

- **Population:** 1.5 Million,
- **Growth Rate:** 2.78%
- **Sanitation Coverage:** 98.7% (32% Improved Sanitation; 10% No containment)
- **Urbanization Rate:** 33.5% (including 2 other Municipalities in Khulna District)
- **City administration levels:** 31 Wards
- **Roles in urban sanitation:** Onsite - Khulna City Corporation; Sewer - Khulna Water Supply and Sewerage Authority
- **Service Providers:** KCC, Community Development Committees, Private sector and Individual Emptiers

OBJECTIVE OF INTERVENTION

Develop an Integrated Municipal Information System (IMIS) to support authorities in planning, decision making, service delivery and monitoring of FSM services.

MAIN ACTIVITIES

- Conduct Baseline Survey
- Collect / analyse relevant GIS-based information from different institutions and identify gaps
- Develop a data structure and methodology for collection of the additional GIS data
- Update existing GIS data with field verification (Roads, Drains, Buildings and Slums)
- Conduct city-wide containment survey using GIS integrating with the base map
- Development of Customer Database System for FSM services and link with IMIS
- Integrate build footprint (Containment) with holding number and Municipal Tax ID
- Final data cleaning and verification in field
- Design / develop / implement IMIS

WHAT IS IMIS-FSM?

- IMIS is an Integrated GIS-based Municipal Information System developed for FSM in Khulna
- IMIS is a distributed system powered by Web GIS, enabling city authorities to integrate municipal functions
- IMIS enables information-based decision making and planning in line with the SMART City initiative
- The system maintains the GIS-based Database of Khulna City that is capable of providing city-level data such as: administrative boundaries; municipal infrastructure (roads, drainage networks); building infrastructure by use, structure type & FSM type; locations, containments (type, status, no. of users, etc.); city land use; slums; holding tax data; certified emptier; enlisted masons; etc.



IMIS FRAMEWORK



RESULTS / PROGRESS

- Completed the field survey and prepared first level of updated version of GIS Database of KCC, comprising the data layers of topography, land use, roads, drainage, building foot-prints, location of containments, major landmarks, place names, slums identified by UPPR project.
- Conceptual framework of IMIS discussed and agreed with KCC
- Functional requirement analysis of IMIS focusing on FSM and main stream the system within KCC's business process is in progress.

LESSONS LEARNED

- Under Digital Bangladesh initiatives GIS-based Master Plans are being developed for all Urban towns but due to lack of ownership and capacity in LGIs these are not being utilised for regular planning.
- LGI-level data are available sporadically hence with minimum additional resource a strong information base can be developed with less effort.
- Initial sharing and coordination among different institutions for integration of available data is very challenging.
- Visualisation of issues helps decision makers prioritise interventions.

KHULNA SHIT-FLOW DIAGRAM



INTEGRATION OF FSM

The overall survey and system has been designed keeping containment in the centre, so any plan, financing and/or business models developed have sufficient basic data and information for FSM services. The GIS-based data is already established and in the process of finalising will be able to provide spatial and non-spatial information for future planning and decision making.



Demonstration of Pro-poor Market-based Solutions for Faecal Sludge Management in Urban Centres of Southern Bangladesh



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OCCUPATIONAL HEALTH AND SAFETY
ALONG THE SANITATION VALUE CHAIN



Household sanitation in urban areas consists predominantly of on-site technologies (i.e. septic tanks and pits), which require regular emptying. The majority are emptied manually, with very few being emptied mechanically.

The FSM baseline survey in Khulna City (2014) shows that 82% of households used manual emptying services, 17% used a combined method, while only 1% used fully mechanical emptying services. In some cities an incipient emptying service is being set-up, but without observing basic health & safety standards this will be a health risk in itself.

The current operational processes that are involved expose emptiers to hazardous working conditions. The high risk of fatal accidents, injuries and work-related diseases in this occupation should be minimised urgently to ensure health & safety to the workers and their families, who lack financial and social safeguards.



Responsibilities for OSH



Why occupational health & safety?

- **Sustainable sanitation services**
Healthy emptiers provide regular sanitation services to households and institutions
- **Public health**
Awareness about risks of coming into contact with sludge and preventing accidents
- **Active Septage Spillage Protocol**
Ensuring health & environmental safety of emptiers & households
- **Safe resource recovery**
Addressing safety issues in resource recovery (e.g. use of kerosene, flocculants)

Immediate awareness campaigns & a culture of safety can minimise OHS issues

- Consumers are mostly unaware of any sanctions pertaining to emptying, and neither consumers nor sweepers themselves are concerned about sweepers' health & safety
- Emptying manually and mechanically, as well as transporting and disposing of faecal sludge are serious health & safety concerns
- The majority of emptiers in Bangladesh work without personal protective equipment (such as gloves, masks or boots), and do not take safety precautions while emptying tanks or pits
- Working at night and drinking alcohol on the job are also factors that may increase the chances of emptiers getting injured or having an accident



Work without personal protective equipment



Source: Prothomalo, 11 November, 2013

31 emptiers died in 10 months

Negligence, accident or murder?



Demonstration of Pro-poor Market-based Solutions for Faecal Sludge Management in Urban Centres of Southern Bangladesh



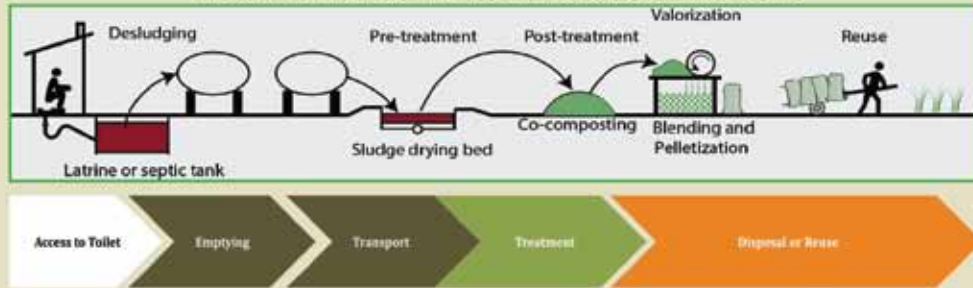
This project is funded by the Bill & Melinda Gates Foundation and the UK Department of International Development



VALUE AT THE END OF THE SANITATION VALUE CHAIN



FLOW DIAGRAM OF EFFECTIVE LONG-TERM MANAGEMENT OF FAECAL SLUDGE TO REDUCE PUBLIC HEALTH RISKS AND ENCOURAGE THE RECOVERY OF VALUABLE RESOURCES



A Research on End of the Sanitation Value Chain as a Product Pelletized Compost in the Rural Context

Pre-treatment options of faecal sludge



Post-treatment: co-composting of dried FS



Major Observation

- Lack of reliable methods for pit emptying
- Mechanical equipment and PPE are important components for pit emptying services
- Sand beds - an easy and effective method for pre-treatment of faecal sludge dewatering and drying
- Sand beds make an important contribution to pathogen inactivation
- Stabilization of FS composting processes, in the pre-treatment units are able to reduce moisture content up to 90%
- Faecal Sludge co-composting by making the use of local organic wastes/materials
- A significantly better performance was observed for enriched faecal sludge compost compared to any other treatment in terms of the dry weight of crop produced

8 December 2016 | LGED Auditorium



Dushtha Shasthya Kendra (DSK)

Proper Fecal Sludge Management
Avoid Public Health Hazard
and Environment Risk



Proper Fecal Sludge Management- Avoid Public Health Hazard and Environment Risk

Vacutug Machine & Biofil Toilet



Vacutug Machine cleans the septic tank quick, effective, hygienic and healthier manner. It will access to toilet systems, capture & storage of fecal sludge and transport to the treatment plant.



Biofil Toilet Digester is an innovative on-site waste water treatment option that offers integrated treatment of sewage in a manner that poses minimal risk to the environment and public health and the opportunity of sustainable economic returns on natural biological treatment of waste in the long term.

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Water and Sanitation for Urban Poor (WSUP)

Trialling Sanitation Solutions to address Citywide Faecal Sludge Management



Only 20% of Dhaka's population is connected with DWASA's sewerage system
Urgent need to develop sustainable and safely managed sanitation facilities



FSM Service in Accessible Areas

Public Private Partnership in FSM

- Challenge:**
- 80% of Dhaka's population dependent on on-site sanitation
 - No institution formally responsible for FSM
- Response:**
- WSUP and DWASA are supporting a new FSM enterprise in Dhaka - SWEET
 - WSUP identified the entrepreneurs and provided training in business and financial planning
 - DWASA agreed to take ownership of two vacuugs provided by UNICEF



FSM Service in Hard to Reach Areas

FSM in Hard-to-Reach Areas

- Challenge:**
- SWEET cannot access all customers living in LICs due to access paths which are too narrow for vacuugs
- Response:**
- WSUP supported small-scale entrepreneurs to provide emptying services using specialised equipment: gulleys, mud pumps, diaphragm pumps
 - Sludge receives initial treatment in a newly constructed transfer station before being transported to the drying bed or DWASA disposal point



Bringing FSM in Inaccessible Areas

Small Bore Sewer Systems for LICs

- Challenges:**
- LIC residents struggle to obtain land for septic tank construction
 - Vacuug (vacuum tanker) access to LICs is difficult due to narrow access paths
 - Soak pit is not suitable due to the low permeability of soil
- Response:**
- 30 small bore sewer systems with Settler, Anaerobic Baffle Reactor (ABR) and Anaerobic Filter (AF)
 - Settler constructed next to road for ease of vacuug access
 - ABR and AF ensures quality of effluent meets national standards



SWEET: Roles and Responsibilities

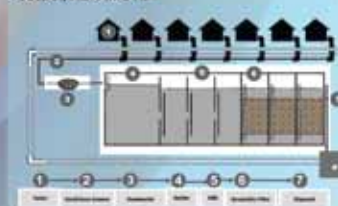
Role	Responsibility
Regular Operation	Entrepreneur
Inspect (order) Maintenance	
Bookings Demand	
Intelligent (order) Maintenance	Utility
Mass Marketing	
Regulation	
Reducing and Increasing Fuel Disposal and Treatment	

Performance to Date

- Over the last three years (2014-2016):
- 1500 m³ septic sludge emptied from community latrine
 - Serving 90,000 people in LICs
 - Revenue earned USD 11,500
 - USD 1,400 invested by each of the entrepreneur



Conceptual Model of SBS System with Settler, ABR and AF



Performance to Date



Behaviour Change Messaging

- Challenge:**
- Census of Dhaka's communal toilets revealed a large number in poor condition, made worse by inadequate user maintenance
 - Trash disposal into latrines can block the outflow pipes, rendering the toilets non-functional
- Response:**
- Behaviour change messages developed through formative research, consultation with end-users
 - Low-cost, replicable signage displayed inside and immediately outside latrines
 - Key target behaviours included:
 - Not disposing of solid waste in the latrine and
 - Using an appropriate amount of water to flush after each use.



Lessons Learned

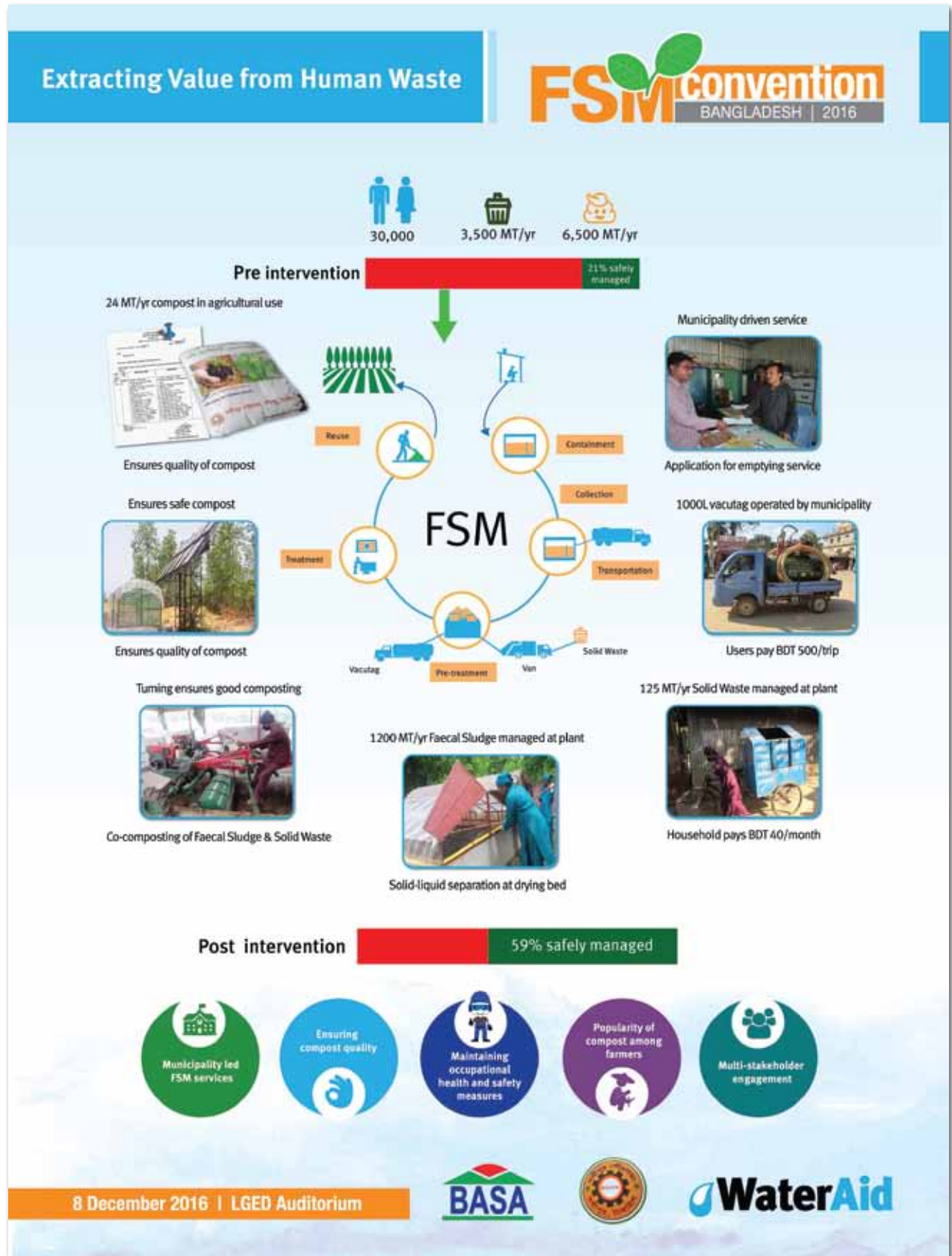
- A menu of solutions tailored to the local context is needed to serve urban LICs in Dhaka and elsewhere (there is no one-size-fits-all)
- Experimentation, iteration and 'learning by doing' are integral to the process
- PPPs could reduce risk on private sector involvement in FSM service delivery, and potentially catalyze the market to provide safer and more sustainable services



WSUP is a not-for-profit company that helps transform cities to benefit the millions who lack access to water and sanitation. We were created in 2005 as a response to the unprecedented urban expansion that has left cities unable to provide basic services, such as access to a toilet or drinking water, to low-income communities. We are based in the UK with offices in seven countries in sub-Saharan Africa and Asia. Since inception we have helped over 10 million people access better water and sanitation services.

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◀ Appendix II: Media Coverage



Links:

Prothom Alo <http://www.prothom-alo.com/bangladesh/article/1036351/>

Ittefaq <http://www.ittefaq.com.bd/capital/2016/12/08/94949.html>

Bangladesh Sangbad Sangstha <http://www.bssnews.net/newsDetails.php?cat=0&id=626458&date=2016-12-08>


BD Reports <http://www.bdreports24.com/fsm-convention-explores-new-horizon-development/>

Green Watch BD <http://greenwatchbd.com/faecal-sludge-management-convention-held/>

News Today http://newstoday.com.bd/index.php?option=details&news_id=2459366&date=2016-12-09

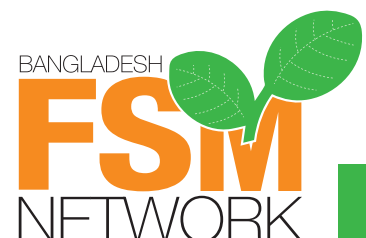
FSM Stakeholders

- Chittagong WASA
- Department of Public Health Engineering (DPHE)
- Dhaka WASA
- Khulna WASA
- Local Government Engineering Department (LGED)
- Public Works Department (PWD)
- Chittagong City Corporation
- Dhaka North City Corporation (DNCC)
- Dhaka South City Corporation (DSCC)
- Khulna City Corporation
- Rajshahi City Corporation
- Bangladesh Municipal Development Fund (BMDF)
- Faridpur Municipality
- Municipal Association of Bangladesh (MAB)
- Jhenaidah Municipality
- Kushtia Municipality
- Saidpur Municipality
- Shakhipur Municipality
- Shatkhira Municipality
- Chittagong University of Engineering and Technology (CUET)
- ITN-BUET
- Khulna University
- Khulna University of Engineering and Technology (KUET)
- Rajshahi University of Engineering and Technology (RUET)
- Stamford University
- DevConsultants Limited
- Faruq Fertilizers Ltd.
- MATI Organics Ltd.
- MAWTS Institute of Technology Engineering & Technological Services
- Mazim Agro Industries Ltd.
- RASH Agro Enterprise
- Bangladesh Association for Social Advancement (BASA)
- Bangladesh Biogas Development Foundation (BBDF)
- BRAC
- Bangladesh Urban Forum
- Bangladesh WASH Alliance
- Development Organisation of the Rural Poor (DORP)
- Dushtha Shasthya Kendra (DSK)
- NGO Forum for Public Health
- PRISM Bangladesh Foundation
- SKS Foundation
- SLOPB
- Society for People's Action in Change and Equity (SPACE)
- Uttaran
- Village Education Resource Center (VERC)
- Concern Worldwide
- HABITAT Council Bangladesh
- ICCO Cooperation
- Max Foundation
- Plan International Bangladesh
- Practical Action Bangladesh
- SNV Netherlands Development Organisation
- Waste Concern
- WaterAid Bangladesh
- Water & Sanitation for the Urban Poor (WSUP)

To join us please visit:  /fsmnbd

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BANGLADESH
FSM
NETWORK

A common platform for the organisations and practitioners
working in Faecal Sludge Management in Bangladesh

