FSM Project: Component 4

Improved treatment, disposal and re-use of Fecal sludge

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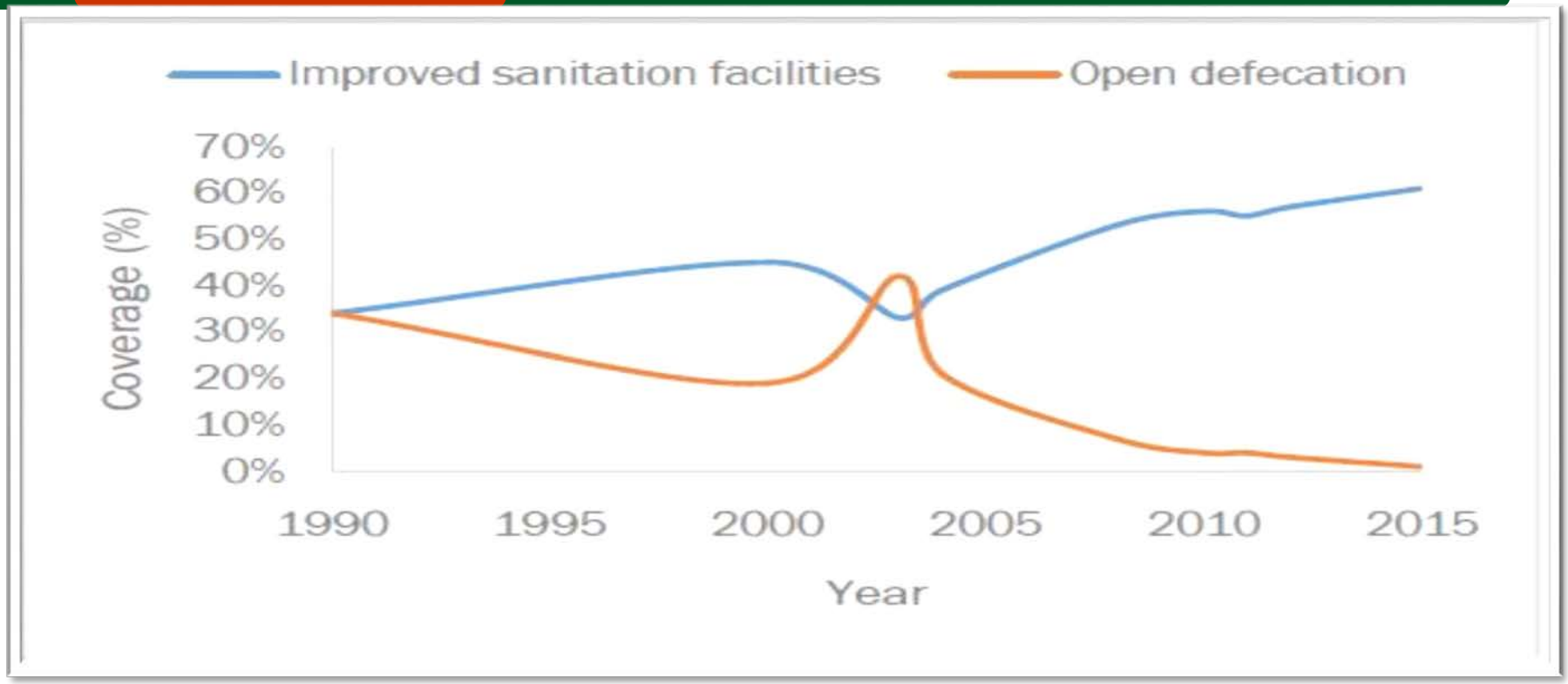
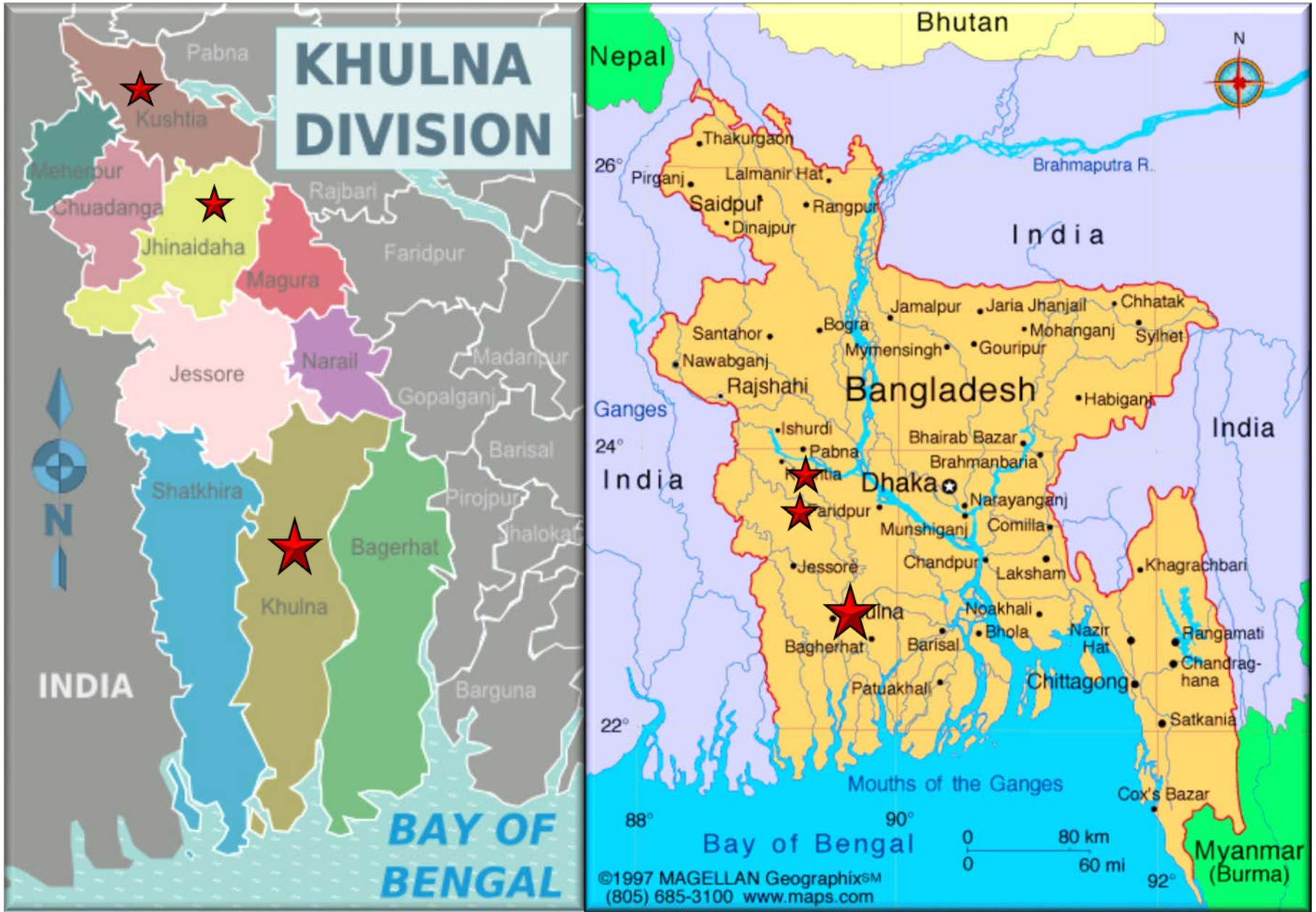
Bangladesh

Bangladesh Sanitation Coverage since 1990



- Open defecation has been reduced to only 1% in 2015 from 42% in 2003

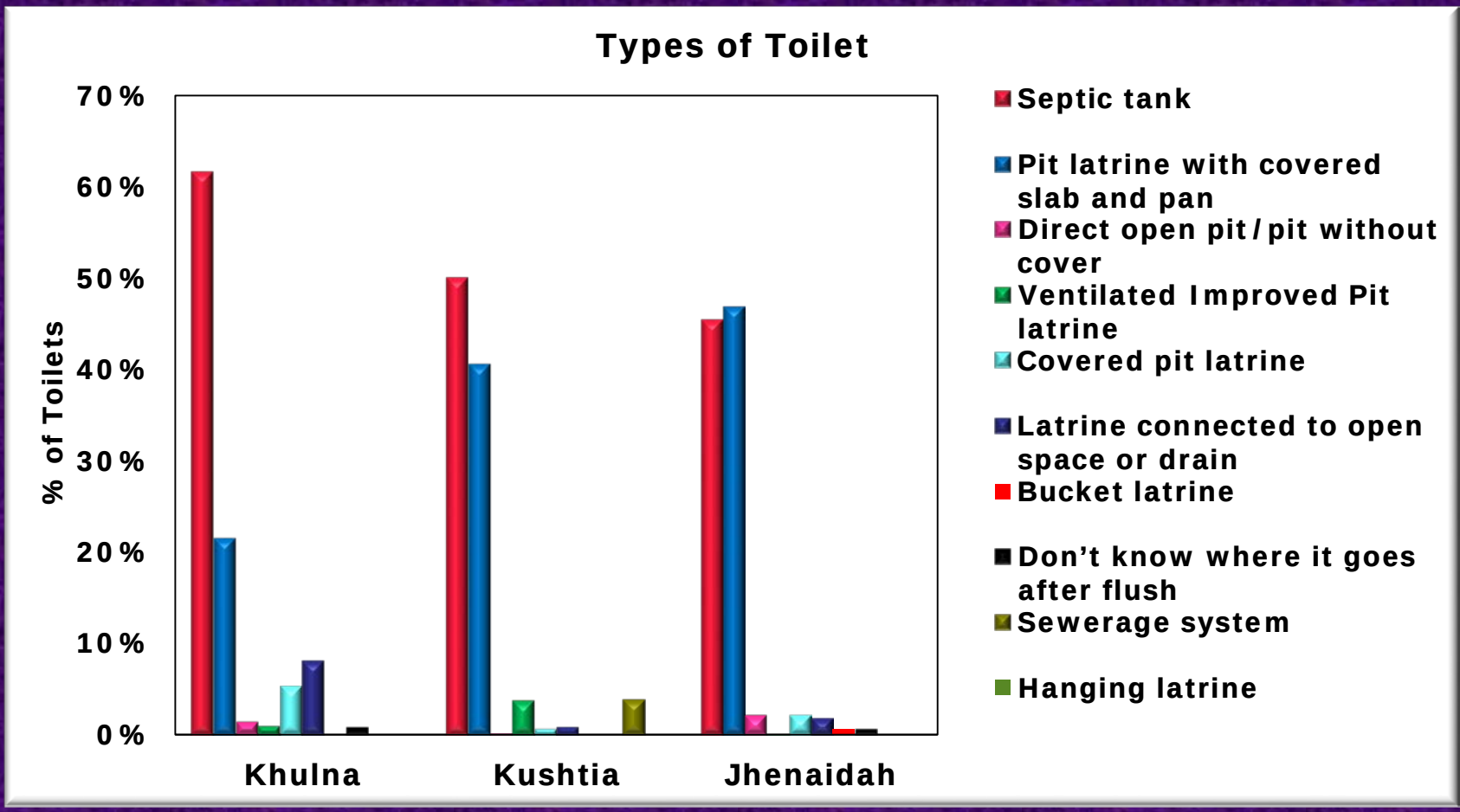
Project Area



Basic Information of Project Areas (Three Municipalities)

Item of Information	Khulna City Corporation	Kushtia Municipality	Jhenaidah Municipality
Year of Establishment	6 August 1990 (City)	1 April,1869	11-03-1958
Area, km^2	45.65	42.79	32.42
Population	15,00,689	3,75,149	1,57,822
Population Density per km^2	67,994.	8,037	4,868
No of wards	31	21	09
No of Holding	66,257	31,707	13,530
Solid Waste Generation and Disposal per day	450 Metric Tons (average)	25-30	Not Available
Total length of drains (km)	642.18	260	Not Available

Types of Toilets in Study Areas



FSM Related National Policies in Bangladesh

- Bangladesh National Building Code 2011
  - **Standards of Septic Tank; Emptying Frequency; etc.**
- National Strategy for Water Supply and Sanitation, 2014
  - **Strategy 5: Establish fecal sludge management**
  - **Institutional and Regulatory Framework (IRF)** for Fecal Sludge Management (FSM) in Bangladesh (draft), 2015. The framework will guide the activities related to FSM throughout the country.

Design of Fecal Treatment Plant (FTP)

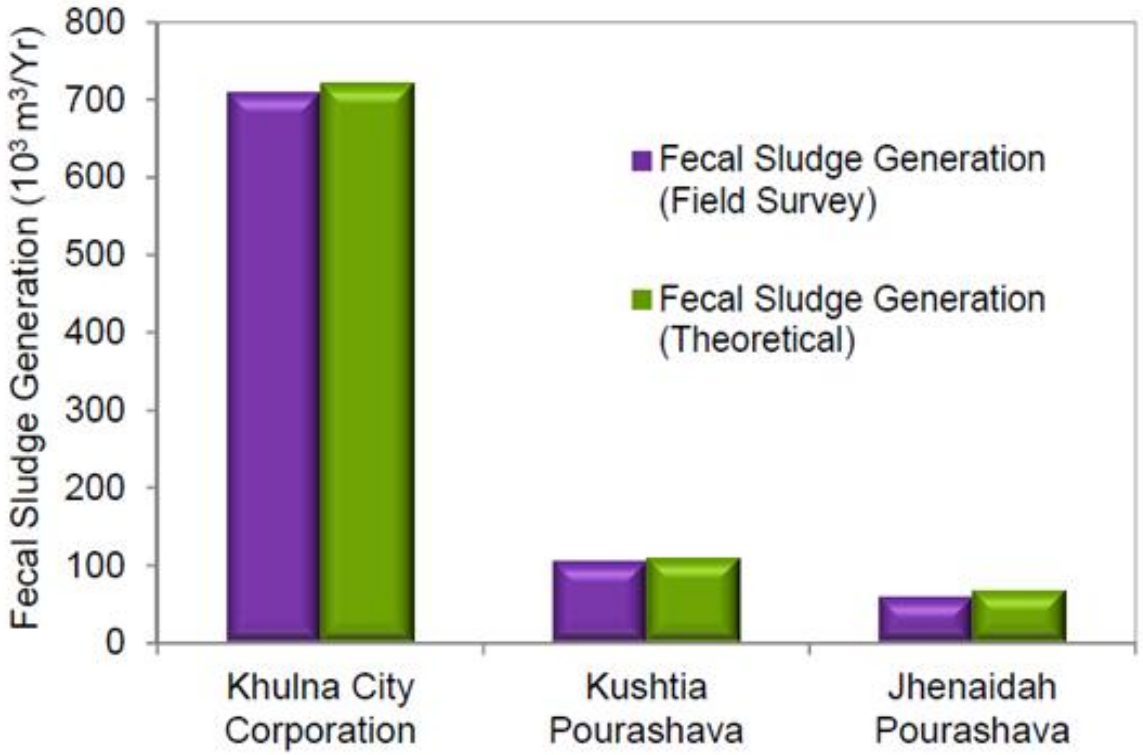
Engagement of KUET, Bangladesh & AIT, Thailand

Major secondary information

- Demographic data
- Household economic activity and poverty data
- Access to services (water, sanitation, electricity)
- Data on other types of premises (schools, Govt./Public places, etc.)
- Government plans and strategies to address issues related to sanitation
- Existing government regulations related to sanitation
- Relevant maps

Design of Fecal Treatment Plant (FTP)

- **Calculation of Total Volume of Fecal Sludge generation/Demand Analysis**



Faecal sludge generation (annually) in Khulna, Khushtia and Jhenaidah municipalities

Design of Fecal Treatment Plant (FTP)

Laboratory training on Fecal Sludge Analysis

FSM PROGRAMME PARTNERS

Design of Fecal Treatment Plant (FTP)

Sludge Characterization

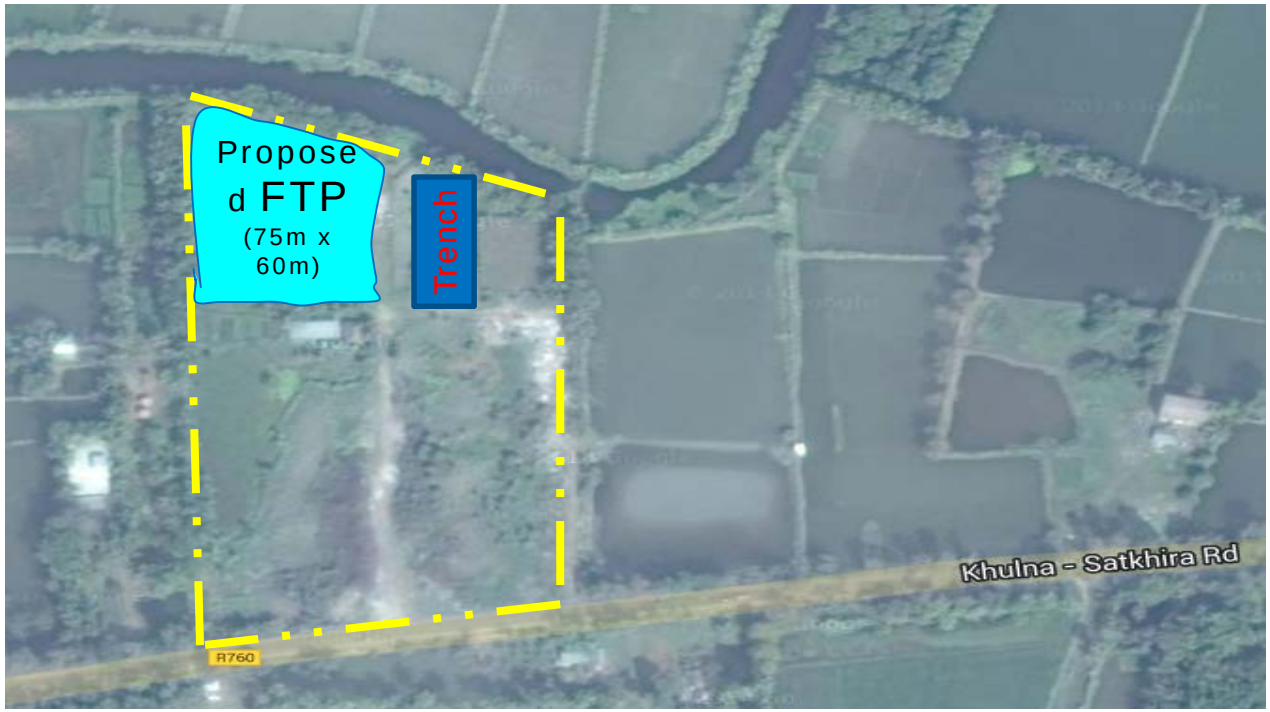
Parameters:

1. pH, 2.BOD, 3.COD, 4.TS, 5.TSS, 6.TVS, 7.VSS, 8.TC, 9.E.Coli, 10.Sludge Volume Index (SVI), 11.Fe, 12.NO3, 13.PO4, 14.EC, 15.Temperature, 16.Total Alkalinity

- BOD found 800-1600 mg/L
- Total Solids 3-6%

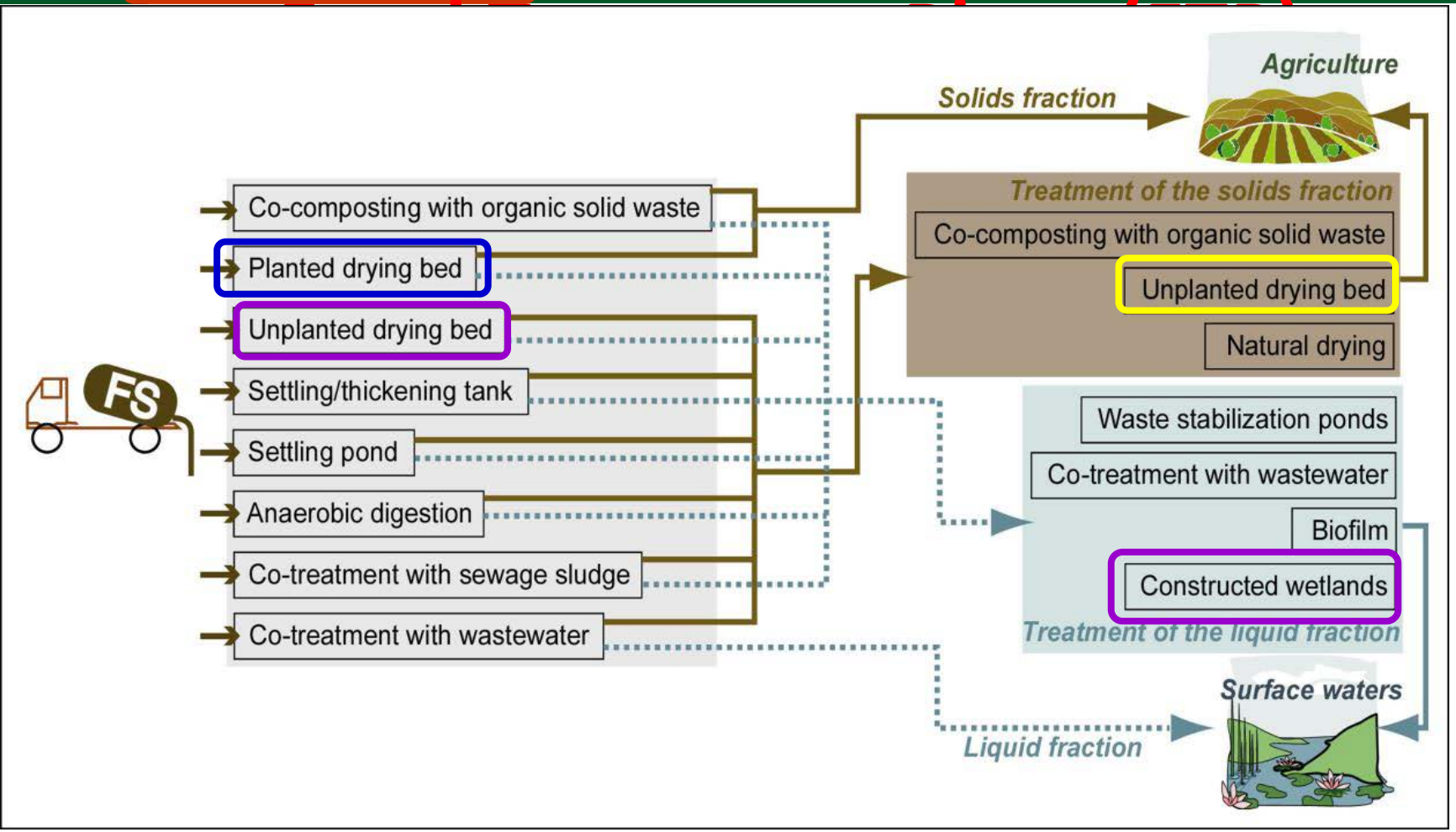
Design of Fecal Treatment Plant (FTP)

Land (Landfill) Allocation from KCC for FSM



FSM PROGRAMME PARTNERS

Design of Fecal Treatment Plant (FTP)



Design of Fecal Treatment Plant (FTP)

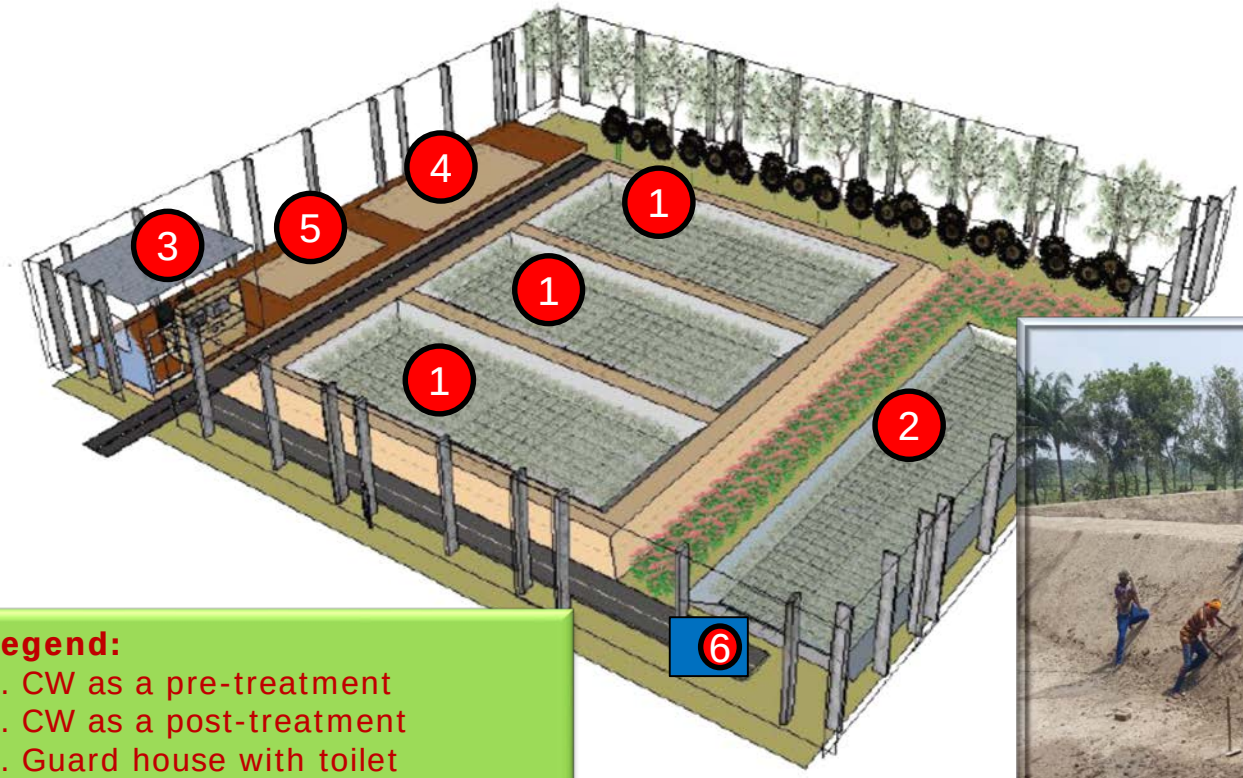
Description	CW+CW	Drying bed + CW	Anaerobic digester + drying bed
Configuration	3 CW units for FS 1 CW unit for Percolate	8 drying beds for FS 1 CW unit for Percolate	20 tanks for FS 10 drying beds for liquid
Capacity	300 m3/day or 109,500 m3/yr (15% of Total)	120 m3/day or 54,750 m3/yr (7% of Total)	62 m3/day or 22,630 m3/yr (3% of Total)
Concerns	No disturbing for old landfill	No disturbing for old landfill	Disturbing by excavation
Lifetime	> 20 years	> 20 years	> 20 years
Cost	Tk. 1 Crore	Tk. 3 Crore	Tk. 5 Crore
O & M	Harvest plant every 3 months (1 Person Tk.	Harvest sludge every week (2 Persons Tk. 20000/month)	Harvest sludge every 20 days (2 Persons Tk.

Design of Fecal Treatment Plant (FTP)

Option-1: (CW+CW) was recommended as short term FTP for KCC from Technical Team

Option-1: (CW+CW) was accepted from KCC Council as short term FTP

FTP for KCC under construction



Legend:

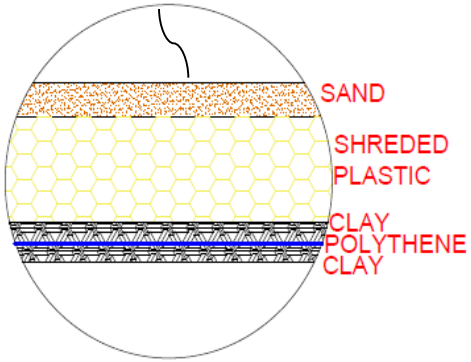
1. CW as a pre-treatment
2. CW as a post-treatment
3. Guard house with toilet
4. Cleaning area for truck
5. Area for harvested plant, sludge
6. Drying Bed

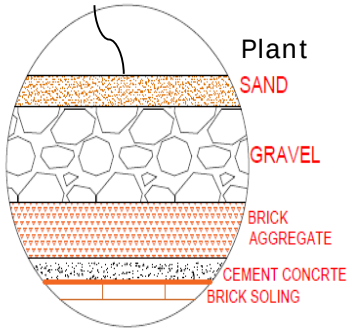
FTP for KCC under construction

Existing FTP of Jhenaidah Municipality

- Constructed Wetland constructed in 2012 by DPHE
- Under-utilised
- No Percolate treatment

Upgrading FTP of Jhenaidah Municipality





FTP of Kushtia Municipality

Drying Bed with Coco-Peat Filter and Compost Plant at Kushtia Municipality

O&M

Feeding of Khulna FTP (option-1) (Capacity 30-180 m3/day on average)

Loading	Day1	Day2	Day3	Day4	Day5	Day6	Day7
CW1	30						30
CW2		30					
CW3			30				
CW4				30			
CW5					30		
CW6						30	
DB (1-6)	Feeding and keep 15 days for drying						

Feeding of Jhenaidah FTP (option-1) (Capacity 35 m3/day on average

Loading	Day1	Day2	Day3	Day4	Day5	Day6	Day7
CW1	15	15		15	15		15
CW2		15	15		15	15	
CW3			15	15		15	15
CW4				15	15		15
CW5					15	15	
DB1	5						
DB2		5					
DB3			5				
PCW1							
PCW2							

Action Research on Re-Use

- Cabbage
- Cauliflower
- Pumpkin
- Okra

Use of Co-compost of Kushtia in Agriculture (BARI), Jessore

- **Results not yet published**

Action Research on Re-Use

Legal Review on FS use in Aquaculture (FMRT, KU)

Use of Co-compost of Kushtia in Aquaculture in Laboratory aquarium (Left) and in Pond (FMRT, KU)

- **Results not yet published**

Long Term Plan and Implementation

- Long Term Investment Plan: Discussion started with ADB (KWASA has started feasibility study on Sewerage Treatment Plant funded by ADB)
- Informed choice on long term options
- Finance & Management Model
- Financial & Technical Capacity building

Thank you very much for your kind attention