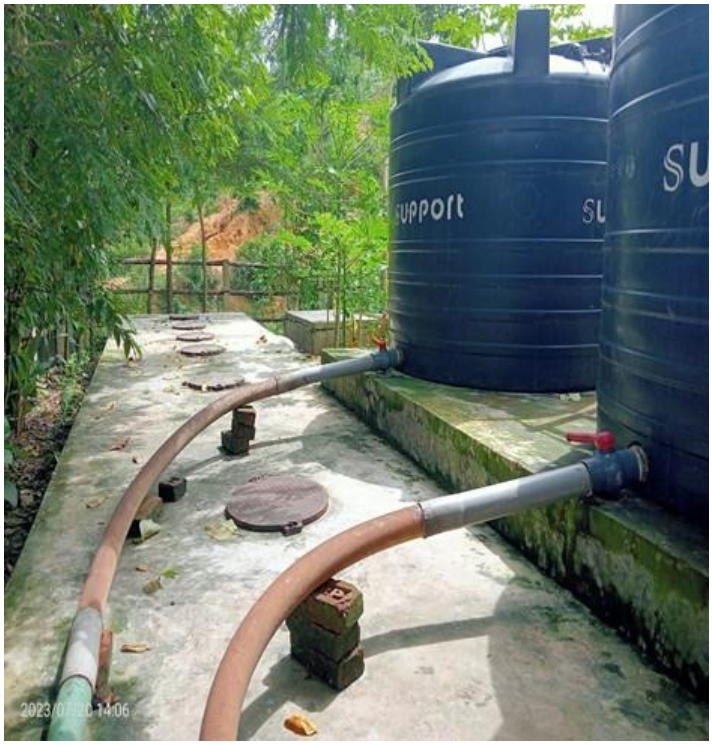
Anaerobic Baffled Reactor



09 October 2023

Organisation that implemented the case study

CARITAS Bangladesh

Geographic location

Camp 17
Cox's Bazar -
Bangladesh

Main treatment objectives

BOD / COD Reduction
Compost production

Nutrient reduction
Pathogen reduction
Solid/liquid separation
TSS and TDS reduction

Technologies employed

Activated sludge
Screen
Planted drying beds
Sand filter
Polishing pond
Lime treatment
Anaerobic baffled reactor
Disinfection
Constructed wetland
Burial pits
Anaerobic filter

Source of sludge

Pour flush toilet
Dry toilet
Septic tank not connected by greywater
Flush toilet
Lined pit latrines
Lined Pit or tank connected by greywater
Public toilets
Unlined pit latrines
Urine diverting dry toilet

Final outputs

Effluent
Sludge

Time construction and commissioning

Opex per real input flow

18.34 USD/m^3

Required space

56.00 m^2/m^3 of design input flow

Design input flow

10.00 m^2/day

Local constraints

No permission to dig/install underground infrastructure.
No permission to build a permanent structure
No connection to the water network
Landslide
High water table

Skills level

Communitarian operation
Design and Engineering Specialist
FSM specialist for construction
FSM specialist for operation and maintenance
Local contractor for construction
Local NGO for operation and maintenance

Resources needed for operation

Chemicals
Engine

Real input flow

10.00 m^3/day

Description of the emergency context

Currently, there are 929,606 Rohingya refugees residing in 33 congested camps that have been officially designated by the Government of Bangladesh. This population surge occurred as a result of the extreme violence outbreak in Myanmar's Rakhine State on August 25, 2017, which led to an estimated 687,000 Rohingya refugees crossing the border into Cox's Bazar, Bangladesh. The Rohingya refugees have repeatedly sought refuge in Bangladesh due to ongoing persecution. Previous significant influxes occurred following acts of violence in Rakhine State in 1978, 1992, 2012, and once again in 2016. However, the largest and most rapid refugee influx from Myanmar into Bangladesh began in August 2017.

Operating within highly congested settings, such as the Rohingya camps, WASH actors face numerous challenges in implementing effective faecal sludge treatment processes that can efficiently remove pathogens. These challenges primarily stem from space limitations, which impose constraints on the inclusion of appropriate, safe, and sustainable processes for

treatment.

Description of the treatment process

Collection Chamber:
The sludge from toilets is emptied into the collection chamber using motorized equipment such as robin pump.The inlet chamber has a capacity of 10000 liters. Sludge inlet process regulated by a gate valve.

Up-flow Filtration Chamber:
There is a concrete structure with 6 segments/chambers,where consists up-flow filtration prcoess actually. The chambers are interconnected in a baffled system, with up-flow movement trapping solid sludge at the bottom while allowing liquid to rise through the filter media to the next chamber.

Constructed Wetland:
The constructed wetland/fitration bed is a shallow trench lined with waterproof tarpaulin. It contains stone beds and kolaboti plants. With a capacity of at least 6 m3, it allows effluent to pass through. Microbial content in the effluent forms gelatin, while plant roots reduce pathogenic organisms. The effluent has a maximum retention time of 5 days .
Drying bed:
The solid sludge need to cut after 25-30 days from ABR and these are stored in drying bed for treatment purpose.We usually using hydrate lime for disinfection purpose during drying solid sludge.

Assessment & design (feasibility)

Actually, This anaerobic baffled reactor is designed by Ngo forum for public health.Now,it is operated by Caritas Bangladesh.

Construction

This anaerobic baffled reactor is constructed by Ngo Forum for public health and now, it is operated by Caritas Bangladesh.

Operation and maintenance

Collection: The sludge from toilets is emptied into the intermediate sludge tank using motorized equipment such as a Robin pump. Workers use PPE(Personal Protective Equipment) during sludge collection. Transportation: There are using 8 nos intermediate sludge tanks(capacity-5000 liters/tank) for sludge storage from the latrine's pit and sludge transferring purposes. Emptied sludge is transferred into the Fecal sludge treatment site/Aneraobic baffled reactor through a tank-to-tank transferring process by using a pump. Inlet Chamber:
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Lessons learned

1. All data must be preserved.
2. Chemical parameter should be tested and analysed.
3. ABR FSM was found to be environment friendly and there is acceptance from the community people as no odour is found in the surroundings

Strengths

1. Closely monitoring Anaerobic Baffled Reactor technology with Technical staffs. 2. All relevant records are updated.
3. Assigned skilled operators for functioning technologies.
4. Well-maintained WASH sector guidelines regarding fecal sludge management.
5. Strongly maintained personal protective equipment during fecal sludge management activities.

Weaknesses

1. Lack of wastewater testing kit. 2. Shortage of land at the Sludge treatment site.

Image Gallery

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