TO SEAL OR NOT TO SEAL

SIMPLIFYING BANGLADESH'S LATRINE PIT DEBATE THROUGH THE FILTO INNOVATION

PROOFS
PROFITABLE OPPORTUNITIES FOR FOOD SECURITY

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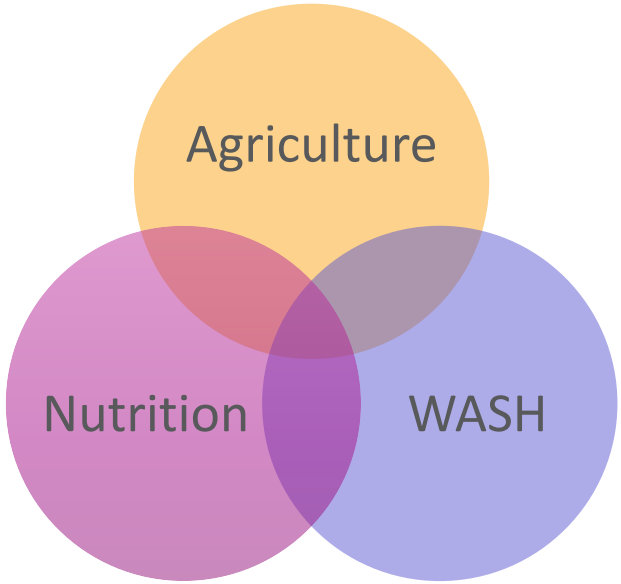
PROOFS

PROFITABLE OPPORTUNITIES FOR FOOD SECURITY



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ICCO COOPERATION

iDE

BoP INNOVATION CENTER

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Funded By

Kingdom of the Netherlands

iDE

- Founded in 1982
- Currently has 12 country programs in Asia, Africa, and Latin America
- Delivered more than 250 projects in market and private sector developed valued at over $150 million in over 20 countries worldwide
- Funding from more than 90 donors, including USAID, the Bill and Melinda Gates Foundation, DFID, CIDA, and the World Bank
- Recipient of over 10 international development and design awards since 2004
- Employs over 500 staff worldwide

- Mission to create income and livelihood opportunities for poor rural households.
- iDE delivers Market Systems Development through:
  - Technology commercialization
  - Institutional commercialization
  - Product design and innovation
- Focused on:
  - Agricultural Markets
  - Food Security & Nutrition
  - Water, Sanitation & Hygiene (WaSH)
  - Technology & Innovation

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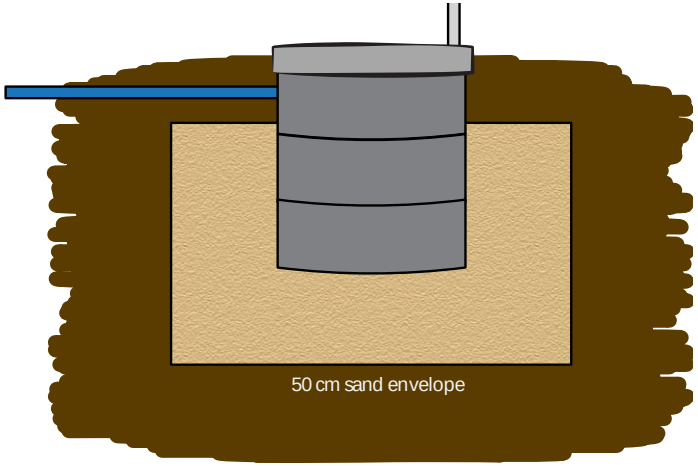
BANGLADESH IS NOT IN THE HANDBOOK

- High groundwater
- Monsoon flooding
- High population density
- Small land size
- Extensive shallow groundwater and pondwater use

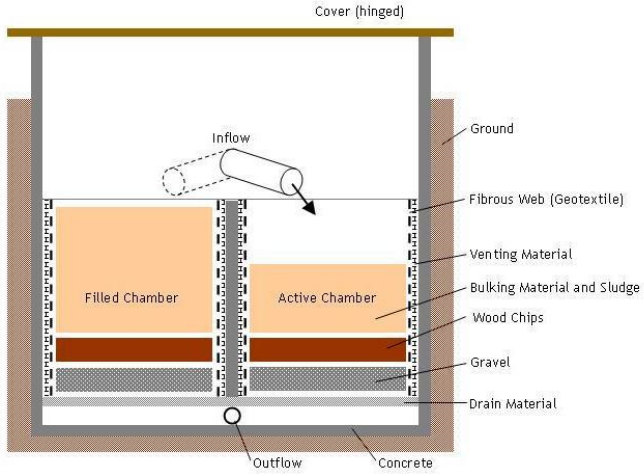
- Majority of peri-urban and rural households use pit latrines, but 41% of tubewells are contaminated (Luby et al. 2008)

BACKGROUND

SAND-ENVELOPED PITS



COMPOSTING FILTER LATRINES



Source: STAUFFER (2010) adapted from LACK (2006)

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= FilTo

Filtering Toilet

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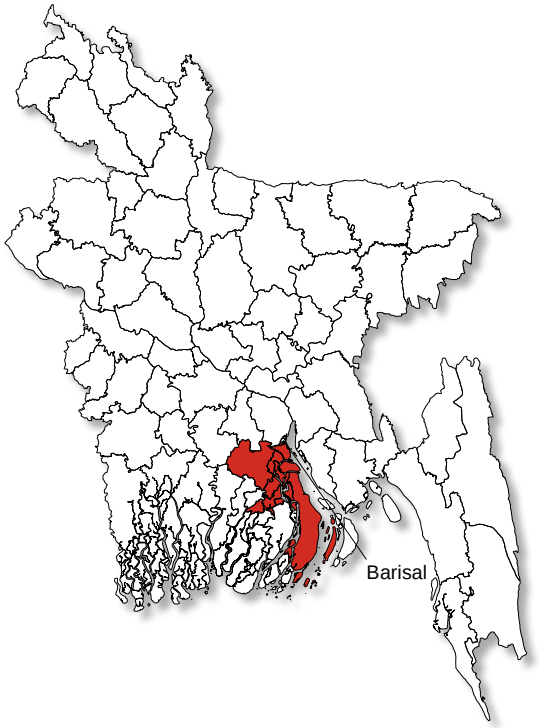
PILOT DETAILS



- WHO: PROOFS project
- WHAT: 5 test installations + control pit
- WHERE: Bakerganj, Barisal, Bangladesh
- WHEN: May – December 2014
- WHY: To prototype and test the Filto Latrine pit in high groundwater loamy areas of Bangladesh for bacteria reduction in infiltration effluent

- Total Coliform Count / 100mL of the pit effluent

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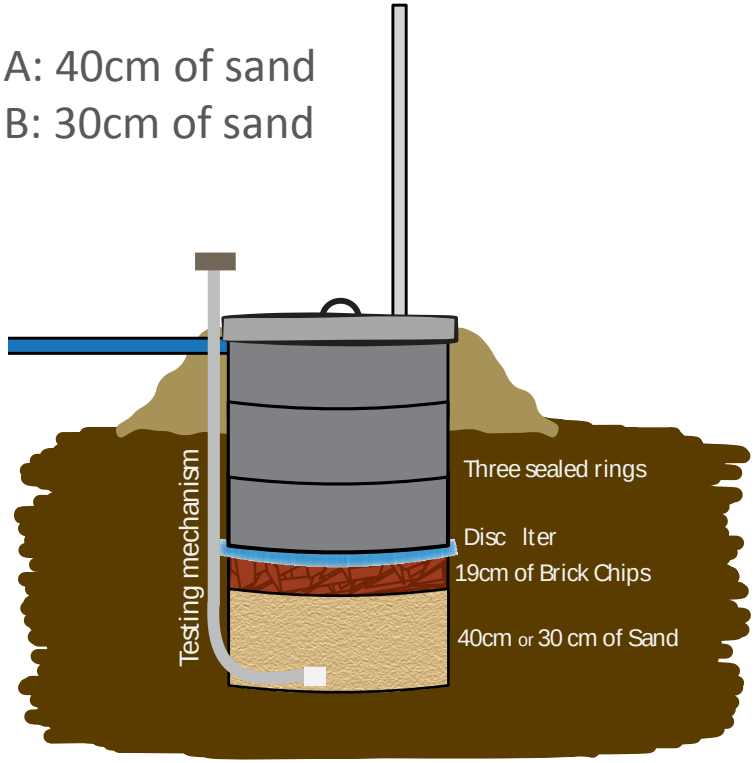
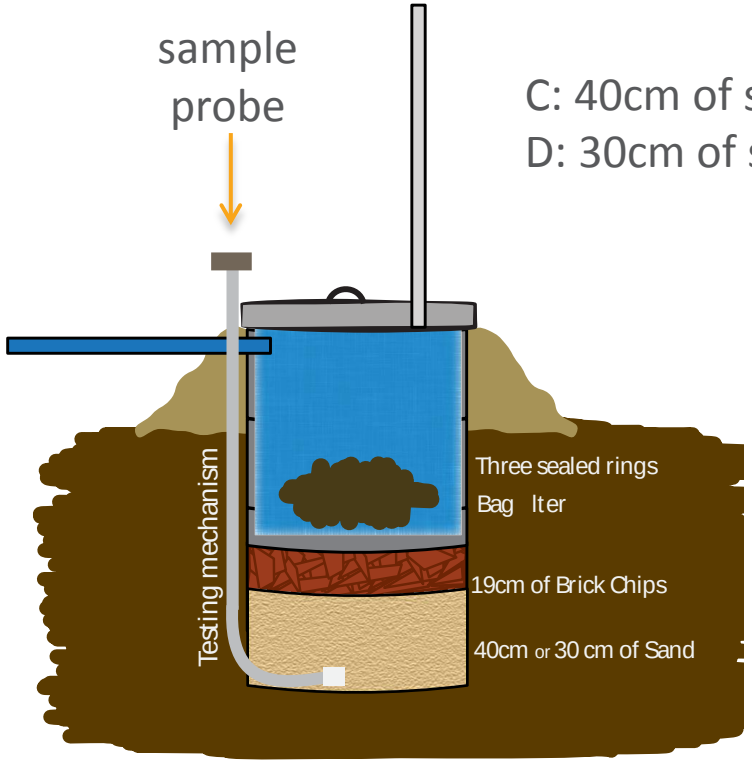
FILTO LATRINE PITS

A: 40cm of sand
B: 30cm of sand



sample probe

C: 40cm of sand
D: 30cm of sand



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FILTO LATRINE PITS

B

C

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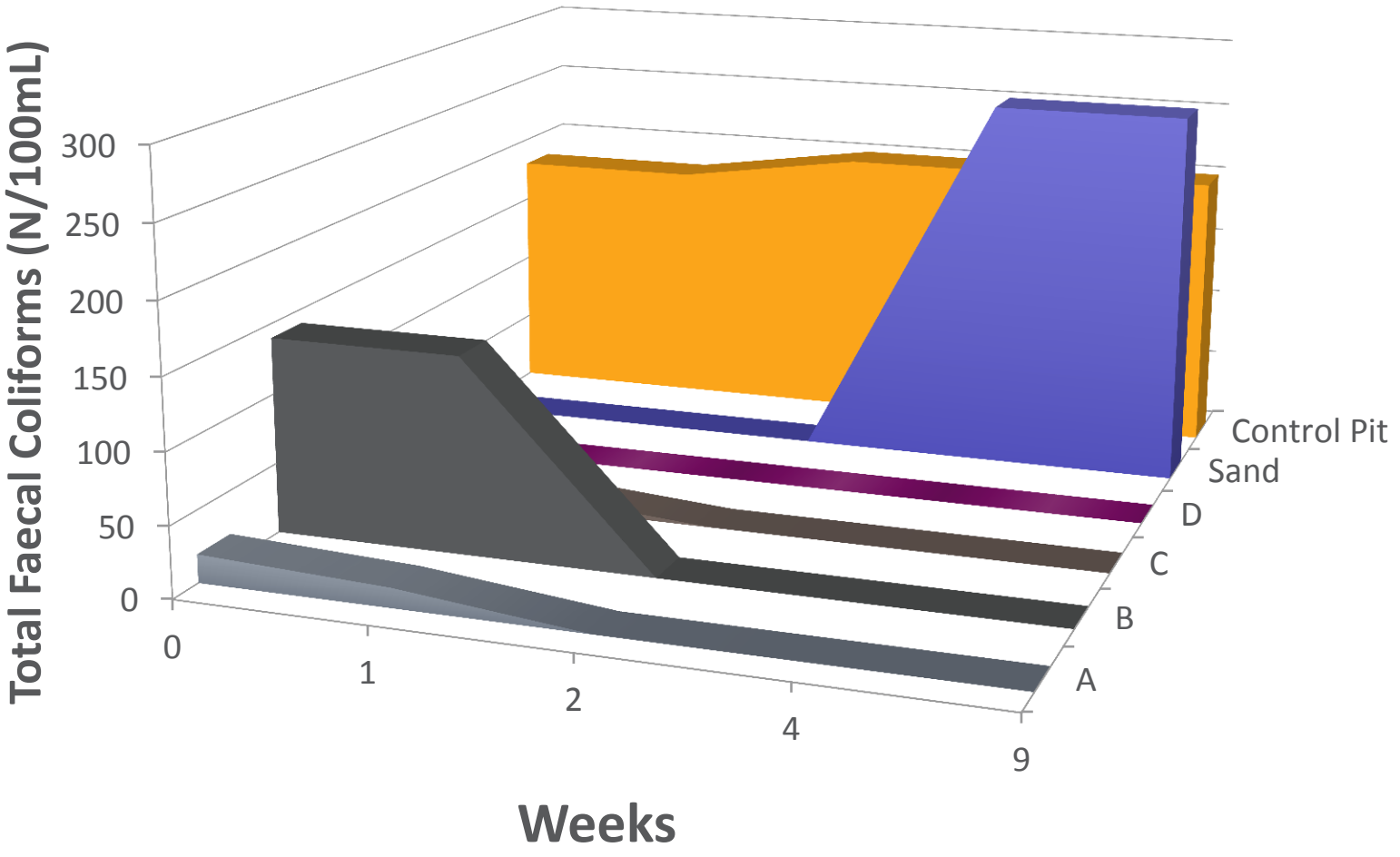
COMPLETE INSTALLATION

PRE-MONSOON



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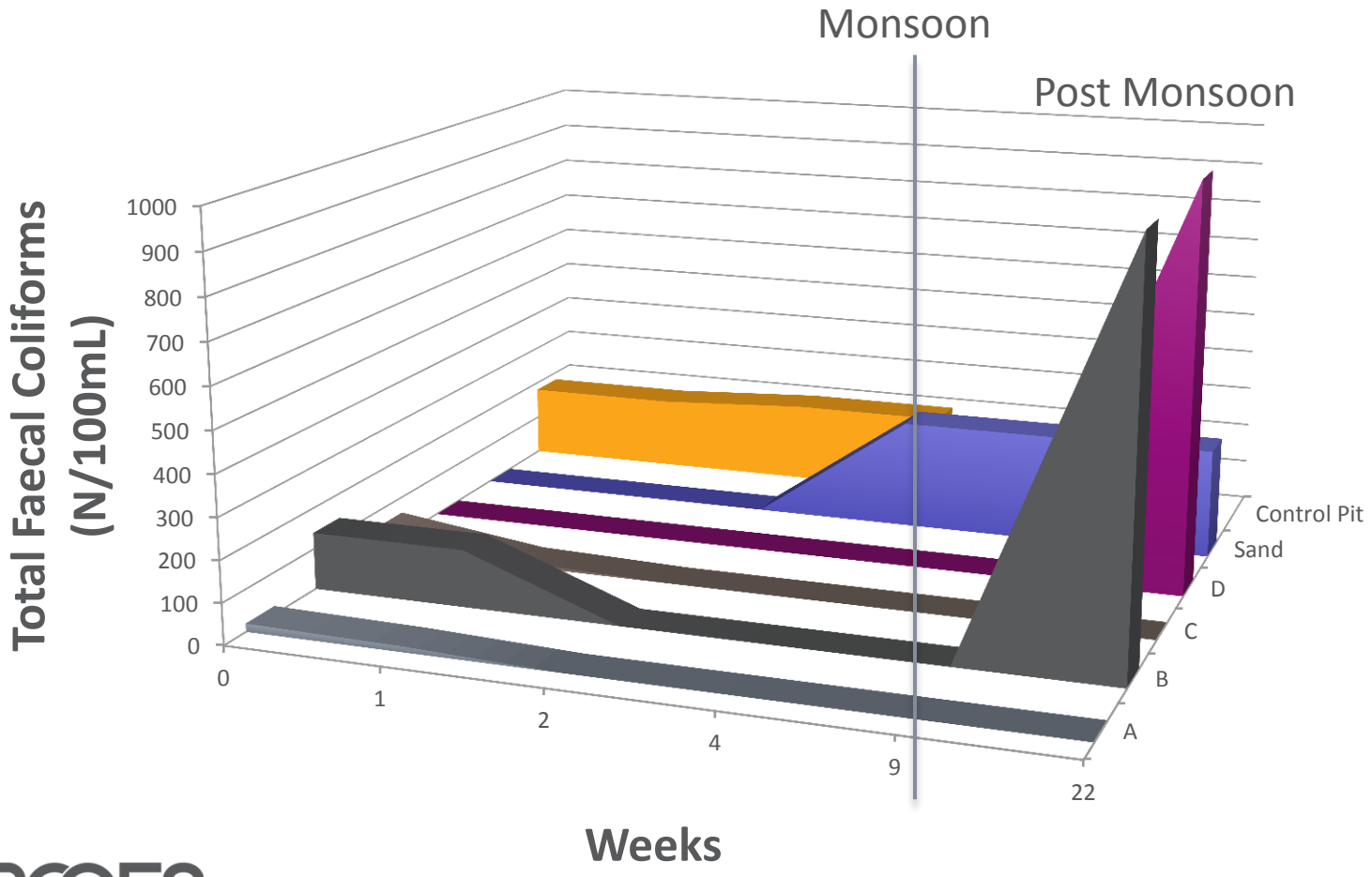
PRE-MONSOON CONCLUSIONS

1. Bacteria counts drop to zero during the dry season and thorough the monsoon in FilTo pits

1. Simplified disk filters work just as well as the bag filters
   - Cheaper, no need for sewing

2. Filter mesh is required as the sand alone does not work

JUST AFTER THE MONSOON



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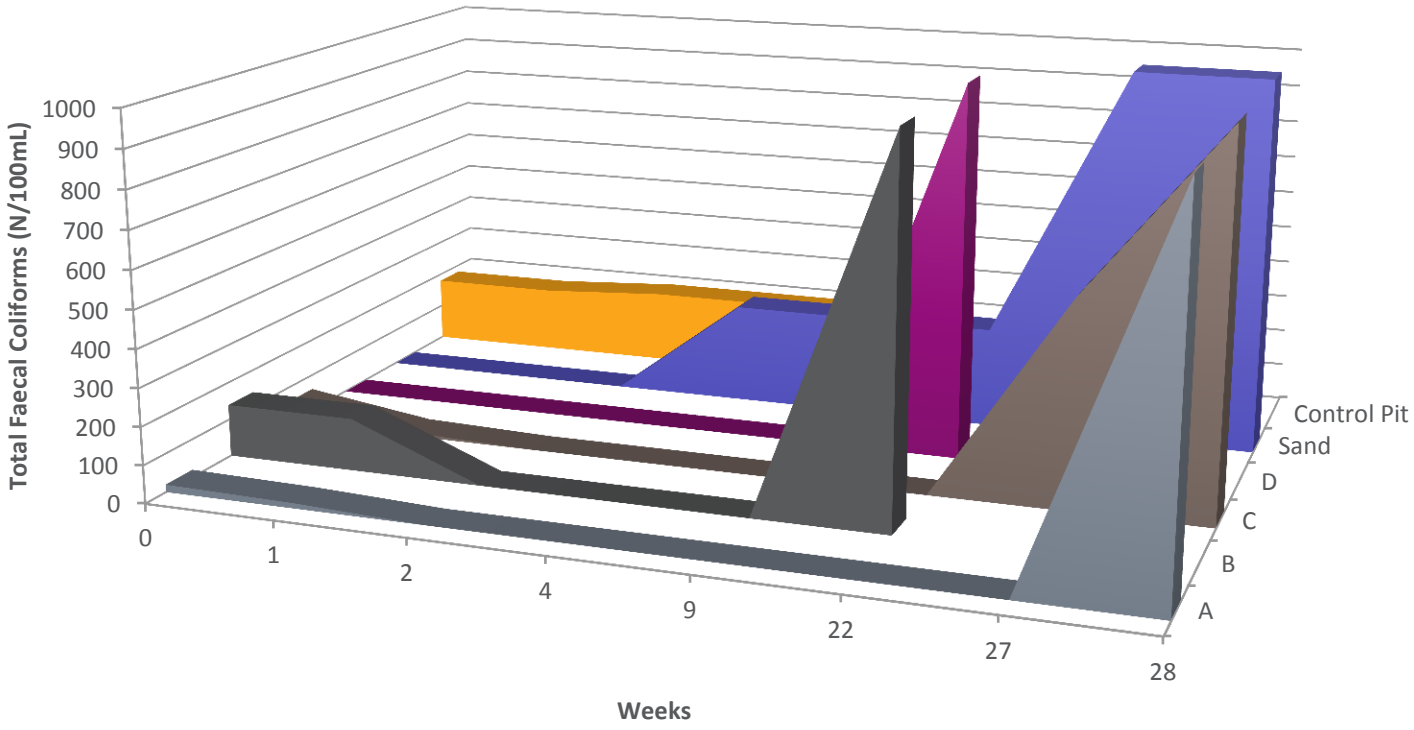
POST-MONSOON



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POST-MONSOON FINDINGS

1. After the monsoon recedes bacteria counts become erratic and often increase rapidly
2. The control pit *appears* better than the FilTo pits after the monsoon

CHANNELING HYPOTHESIS

Faecal sludge is ‘channeling’ through the loamy soil straight into the water, right past the sampling probe

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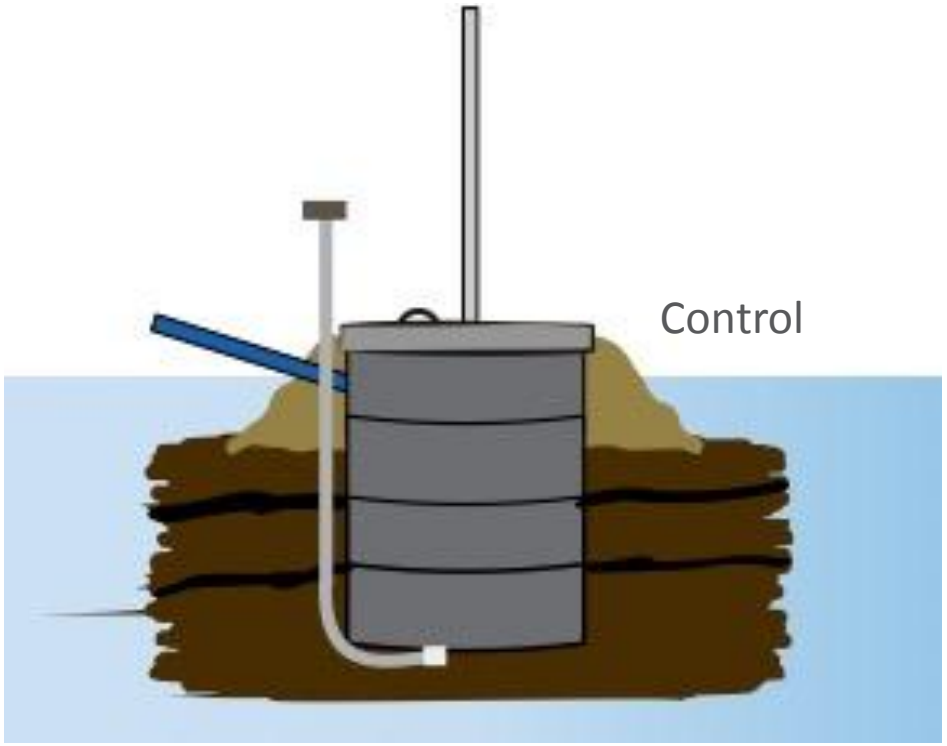
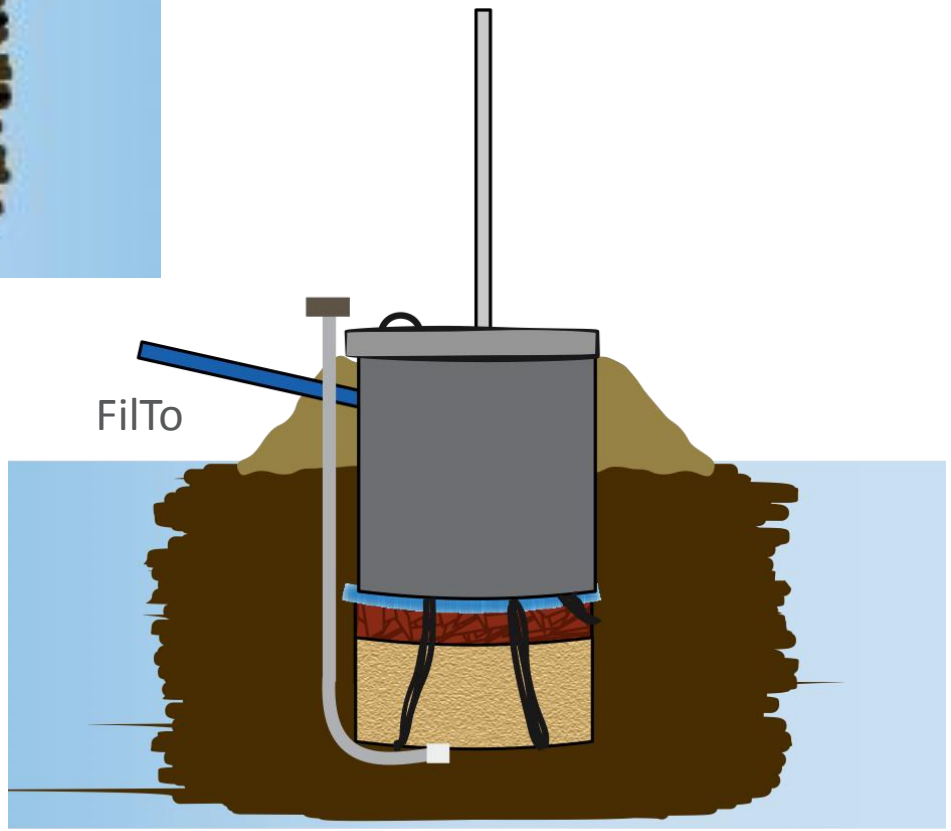
CHANNELING

Control



FilTo



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CONCLUSIONS

1. FilTo pits could work well during the dry season and in areas which will not flood during the monsoon, but have high groundwater and groundwater use for drinking (Northern Bangladesh)
2. Sand-enveloped pits may not be as effective in reducing contamination as have been assumed in literature
3. Further research is required to:
   - Stop channeling in FilTo installations
   - Track if the erratic behavior reverses during the dry season

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THANK YOU

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DATA

Prototype Modality		Total Faecal Coliforms (N/100mL)								
	Date	May 14	May 21	May 27	June 9	July 14		Oct 13	Nov 17	Nov 23
	Weeks	0	1	2	4	9		22	27	28
A	Simplified	20	14	0	0	0		0	B	∞
B	Simplified+	140	B	0	0	0	MONSOON	∞	B	B
C	Archetype	60	10	0	B	B		0	550	∞
D	Archetype-	0	B	0	B	0		∞	B	B
	Sand	n/a	n/a	0	270	A		A	∞	∞
	Control Pit	180	A	200	B	B		0	0	B

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	Date	May 14	May 21	May 27	June 9	July 14		Oct 13	Nov 17	Nov 23
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A	Simplified	20	14	0	0	0		0	B	∞
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C	Archetype	60	10	0	B	B		0	550	∞
D	Archetype-	0	B	0	B	0		∞	B	B
	Sand	n/a	n/a	0	270	A		A	∞	∞
	Control Pit	180	A	200	B	B		0	0	B

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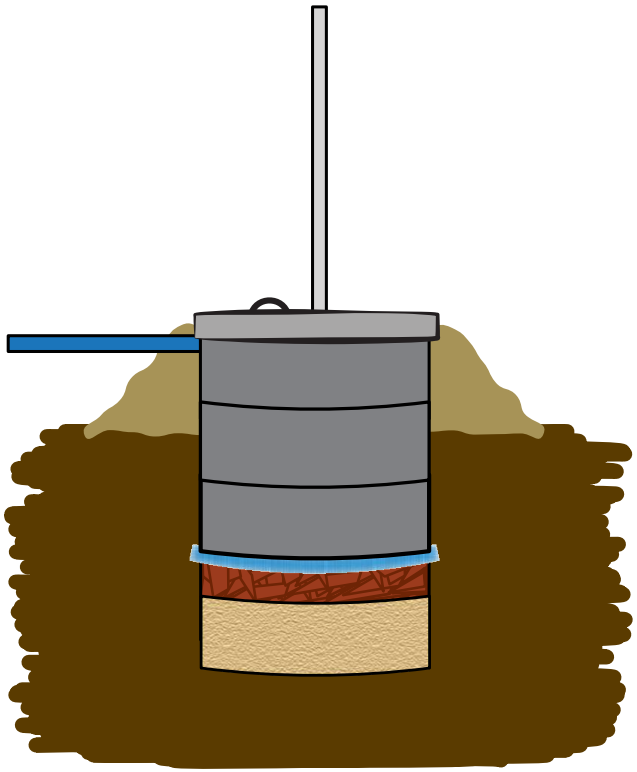
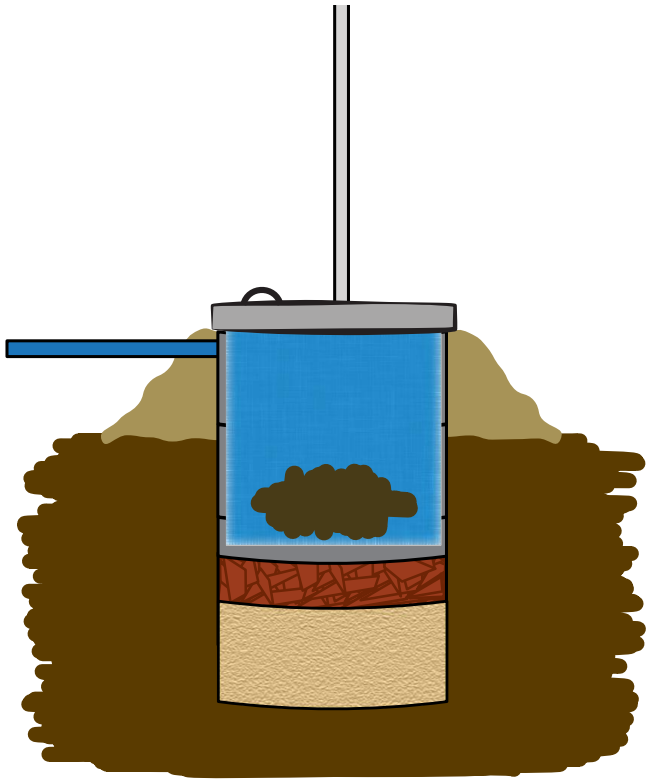
FILTO LATRINE PITS





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FINGERLING NET MESH FILTER

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PRE-MONSOON DATA

Prototype Modality		Total Faecal Coliforms (N/100mL)				
		May 14	May 21	May 27	June 9	July 14
		Pre-Installation	1	2	4	9
A	Simplified	20	14	0	0	0
B	Simplified+	140	B	0	0	0
C	Archetype	60	10	0	B	B
D	Archetype-	0	B	0	B	0
	Sand	n/a	n/a	0	270	A
	Control Pit	180	A	200	B	B

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PROTOTYPES

	Prototype Modality	Filter Type	Sand (cm)	Users	Number of Rings	Pit Depth (cm)	Brick Chips (cm)
A	Simplified	Disk	30	5	3	140	19
B	Simplified+	Disk	40	3	3	140	19
C	Archetype	Bag	40	5	3	140	19
D	Archetype-	Bag	30	4	3	140	19
	Sand	None	50	9	3	140	19
	Control Pit	None	None	8	4	140	19

DESIGN CRITERIA

1. Effective in high seasonal groundwater areas
2. Effective at forcing leaching with reduced contamination
3. Cheaper than but similar to the dominant five-ring pits
4. Effective at de-watering sludge for improved compost quality and speed
5. Less than 1.4 meters deep
6. Low user maintenance
7. Requiring less land than traditional twin-pit latrines

SAMPLING PROBE

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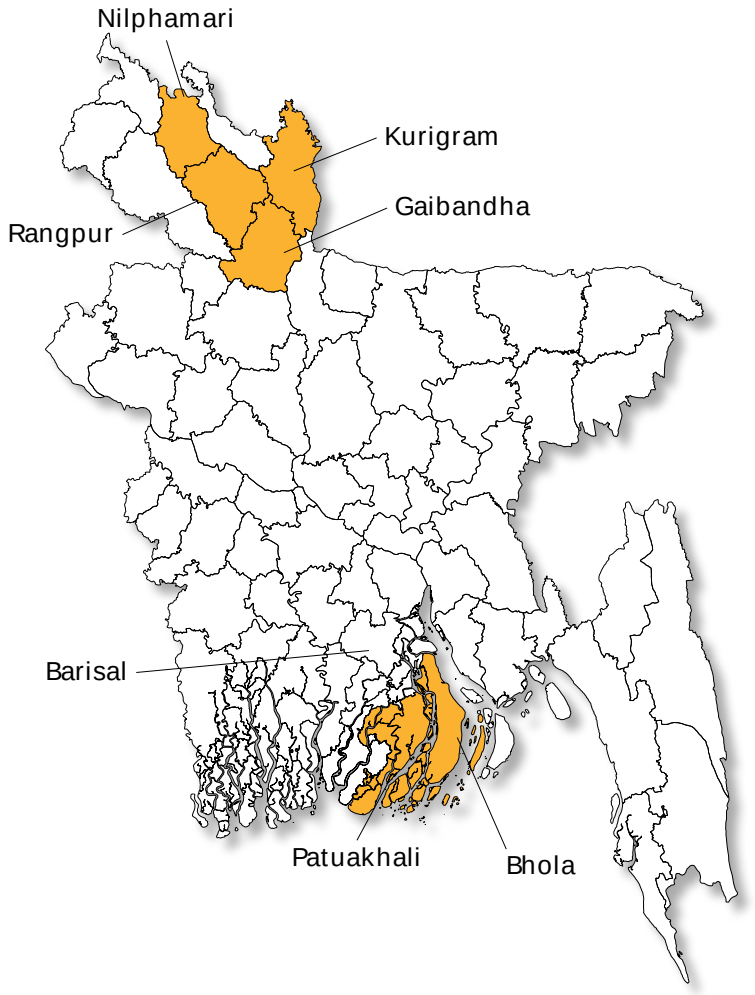
PROOFS Districts



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PILOT CHALLENGES

- Laboratory sampling was difficult due to power outages and road flooding
- Unable to access many of the sampling sites because the roads flooded
- “Dry-pits”- Not enough liquid in the sampling probe to actually test the water