



# Small-scale wastewater treatment technologies for challenging environments

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**WASH**  
FUTURES



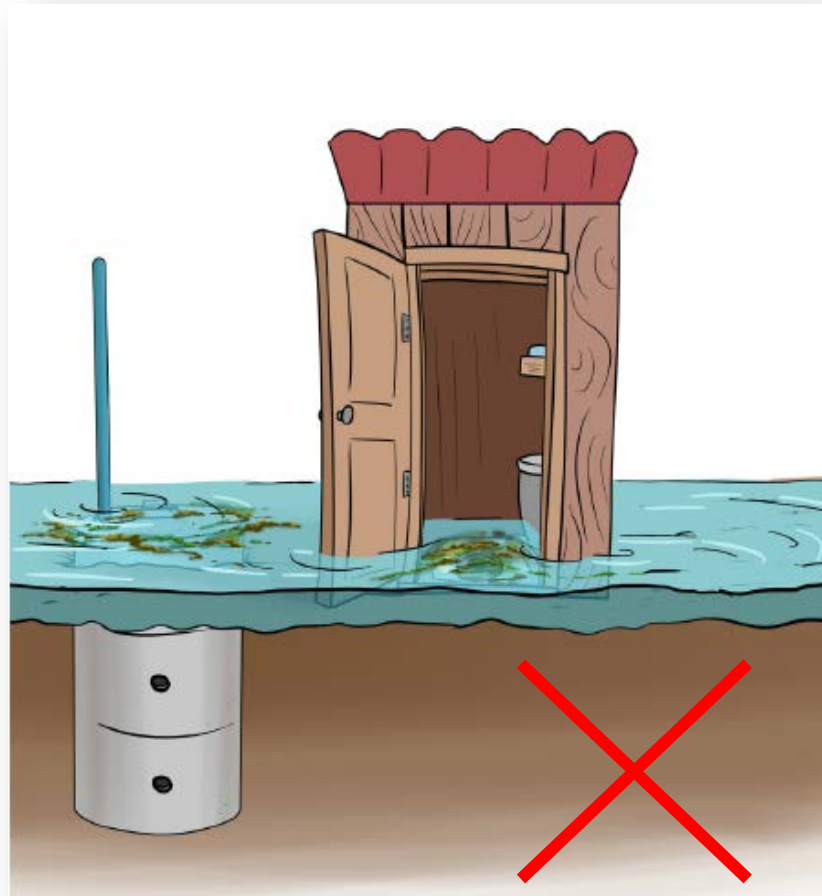
Water, Sanitation & Hygiene Conference 2018

Collaboration for Universal WASH

#WASHFutures18

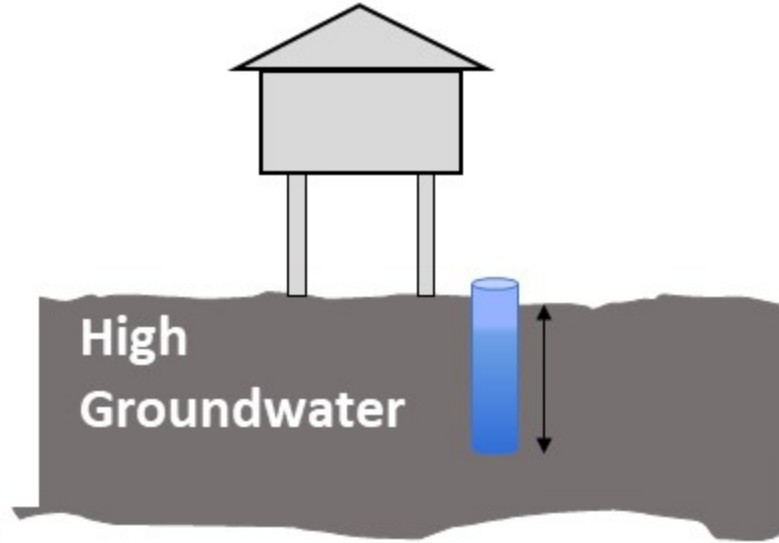
# Pit Latrines in Challenging Environments

Globally  
1.77 billion  
people use  
pit latrines.

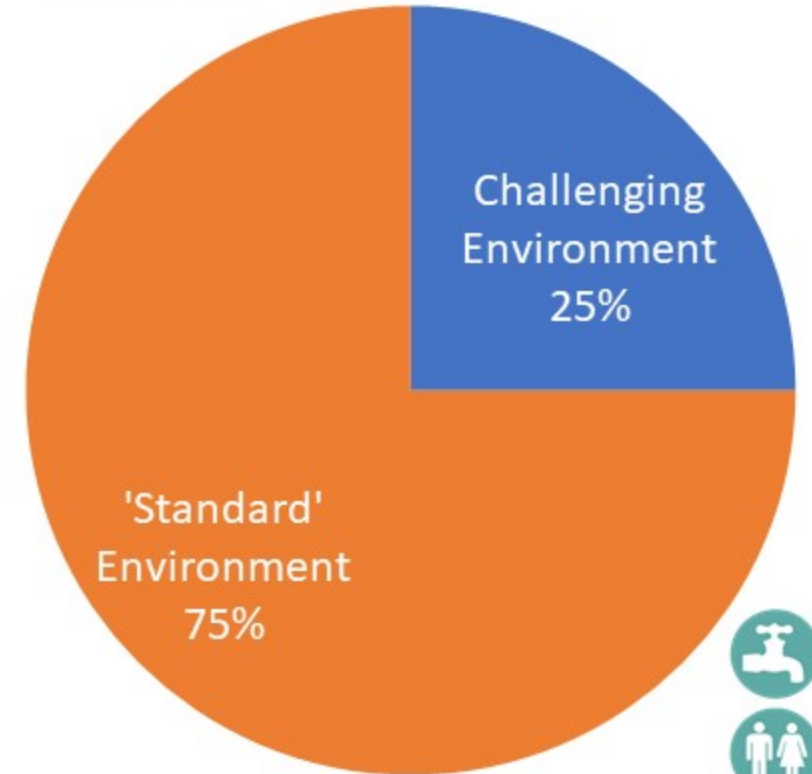


Conventional pit latrines pose high risk of fecal contamination of groundwater & surface water.

# Challenging Environments in Cambodia



Cambodia



Also challenging are drought prone, riverine, coastal & mountainous areas.





# Sanitation in Challenging Environments

Wide range of barriers to overcome to reach everyone in challenging environments:

- Cost
- Expectations
- Migration
- Maintenance
- Social, Cultural & Political



*Discussing how a bio-digester toilet system works with a local household & mason*





# Handy Pod by Wetlands Work!



*Larger HandyPod system, complete with final-stage hyacinth pond, at a floating school*



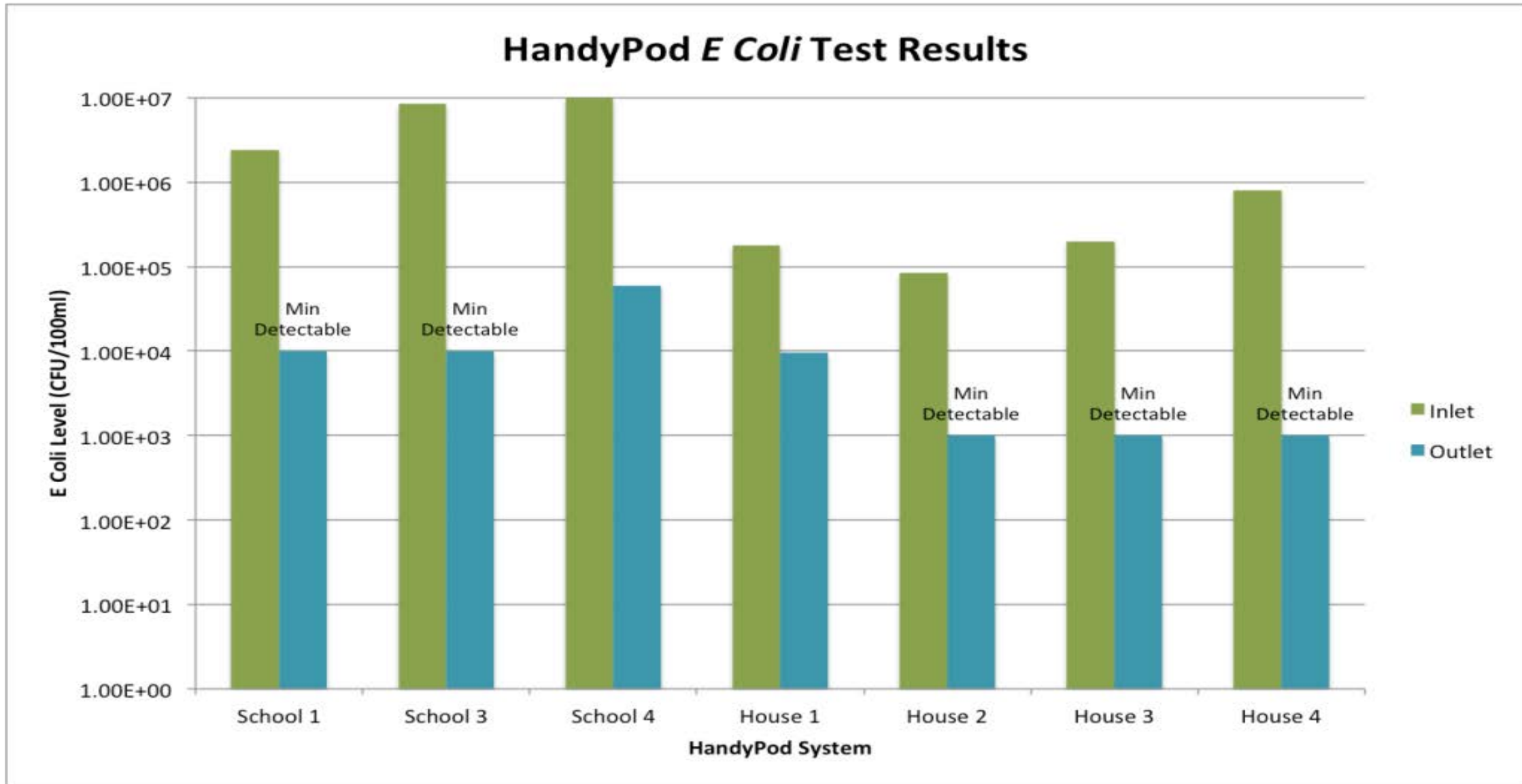
*Household sized HandyPod systems on seasonally floating household adapted for dry and wet season*

Designed for floating and severely flood affected communities

Multiple rounds of prototyping & testing.

Built from locally available materials.

# Handy Pod – Test Results



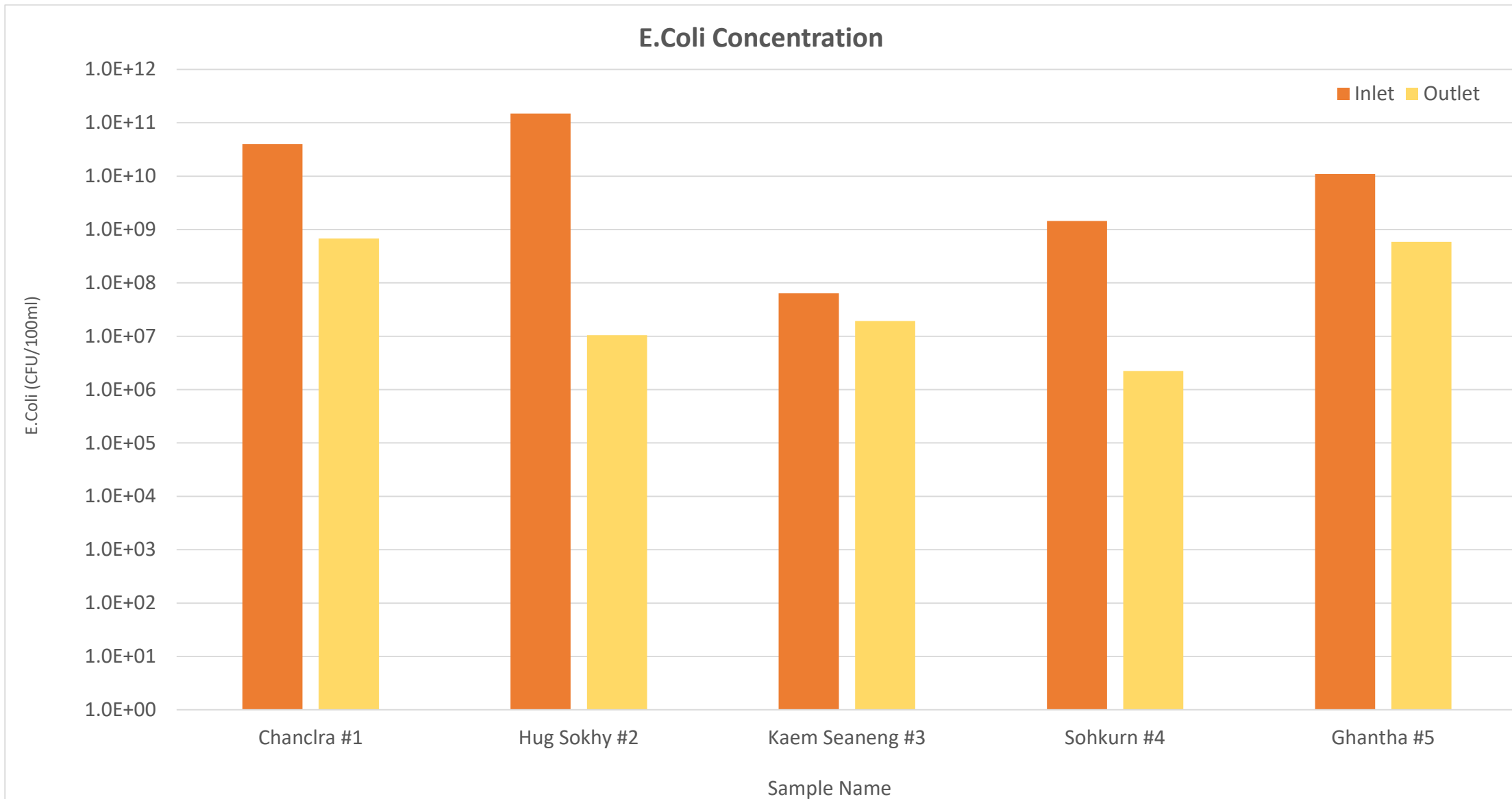


# ATEC\* Biodigester by EWB and Live & Learn

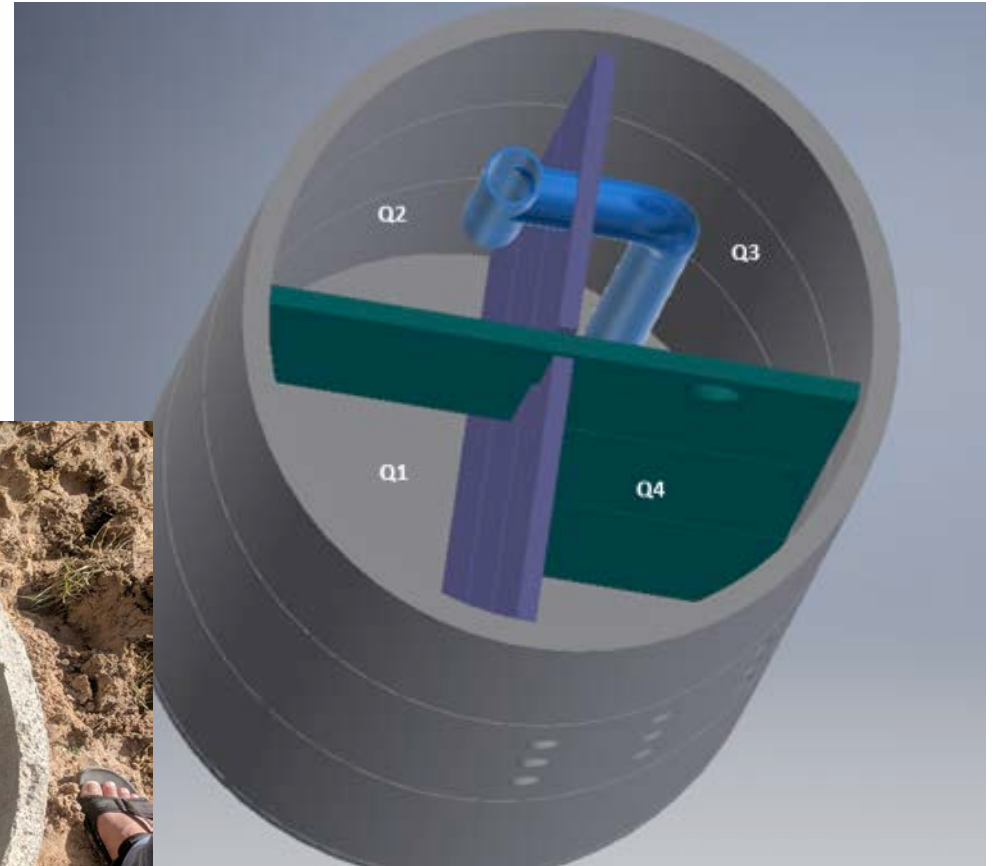




# ATEC\* Biodigester – Test Results



# 3C Pit Latrine by EWB and iDE



# Technology Comparison

Technology	Cost*	Challenging Environment	Treatment Efficiency ( <i>preliminary results</i> )	Comments
Pour Flush Pit Latrine	US\$50	Not appropriate	N/A - effluent can travel directly into soil or ground/ surface waters	Moderate cost, well known, and easily accessible.
3C Pit	US\$90	<ul style="list-style-type: none"> <li>• High groundwater (primary)</li> <li>• Flood-prone (secondary)</li> </ul>	2 log reduction (based on similar designs)	Custom concrete moulds for design cost ~\$210 per set. Requires additional care & attention in construction.
Handy-Pod	US\$150	<ul style="list-style-type: none"> <li>• Floating</li> <li>• Flood-prone</li> </ul>	2 log reduction	Product designed & developed adapted to amphibious conditions
ATEC* Biodigester	US\$680	<ul style="list-style-type: none"> <li>• Flood-prone</li> <li>• High groundwater</li> </ul>	1-2 log reduction	Significant capital outlay offset by removal of cooking fuel costs. Requires two cows.

\*excluding super-structure)



# Conclusions



- Pit latrines are not suitable everywhere.
- 100% sanitation requires scalable, appropriate designs for all situations.
- Solutions for challenging environments require significant investment in R&D, supply chains and education programs.
- Knowledge sharing and collaboration are vital.

# Acknowledgements



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- Wetlands Work!
- ATEC\* Biodigesters
- Khmer Community Development (KCD)
- International Development Enterprises (iDE)
- Rainwater Cambodia

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**100% WASH access requires a commitment to innovation and collaboration. Doing things differently is the only way.**

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Contact myself, Heidi Michael or the in-field SCE team to collaborate or find out more about any of these technologies.

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