

Household Alternatives for Water and Sanitation in Remote and Rural Areas

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THANK YOU!

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Water and sanitation is a worldwide challenge

Water

SERVICE LEVEL	DEFINITION
SAFELY MANAGED	Drinking water from an improved water source that is located on premises, available when needed and free from faecal and chemical contamination
BASIC	Drinking water from an improved source, provided within 30 minutes for at least 20 minutes per week, including storage
LIMITED	Drinking water from an improved source for which collection time exceeds 30 minutes for a round trip, including storage
UNIMPROVED	Drinking water from an unprotected dug well or unprotected spring
Surface water	Drinking water directly from a river, dam, lake pond, stream, canal or floodplain canal

Note: Improved sources include piped water, community or household, protected dug wells, protected springs, boreholes, and packaged or delivered water.

Sanitation

SERVICE LEVEL	DEFINITION
SAFELY MANAGED	Use of improved facilities that are not shared with other households and whose excreta are safely disposed of in a hygienic manner and free from pollution
BASIC	Use of improved facilities that are not shared with other households
LIMITED	Use of improved facilities shared between two or more households
UNIMPROVED	Use of pit latrines without a slab or platform, hanging latrines or bucket latrines
Open defecation	Exposure of human faeces in fields, forests, bushes, or open areas

Note: Improved facilities include flush pour flush to piped sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, composting toilets or pit latrines with slabs.

Hygiene

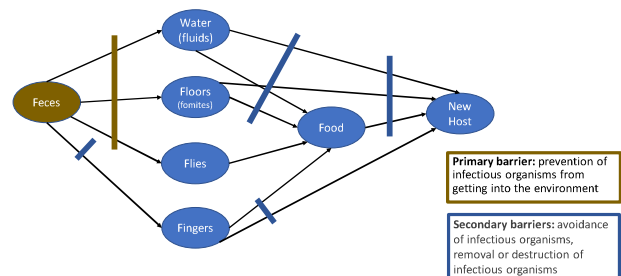
SERVICE LEVEL	DEFINITION
BASIC	Availability of a handwashing facility on premises with soap and water
LIMITED	Availability of a handwashing facility on premises without soap and water
NO FACILITY	No handwashing facility on premises

Note: Handwashing facilities may be fixed or mobile and include a sink with tap water, basins with taps, rope taps, and jugs or bottles designated for handwashing. Soap includes bar soap, liquid soap, powder detergent, and soapy water but does not include ash, soil, sand or other handwashing agents.

World Health Organization Joint Monitoring Program. "Progress on Drinking Water, Sanitation and Hygiene," 2017.

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Water and sanitation improves health and wellbeing



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Urban and rural areas have different challenges

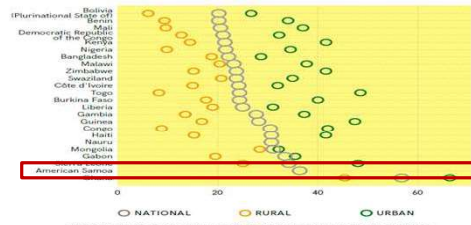


Fig. 21

Proportion of population using limited (shared) sanitation services, national, urban, and rural, 2015. Note: American Samoa and Nauru do not have rural populations.

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Urban and rural areas have different challenges

9 out of 10 people using sewer connections lived in urban areas in 2015

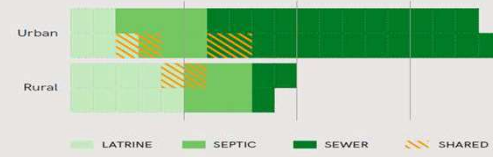


Fig. 22

Population using different types of improved sanitation facilities, urban and rural, 2015 (each block represents 100 million people)

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Remote communities have added challenges



- Remote locations
- Few roads
- Disconnected
- Transportation and shipping challenges
- Expensive
- Far from US attention
- Big and cold

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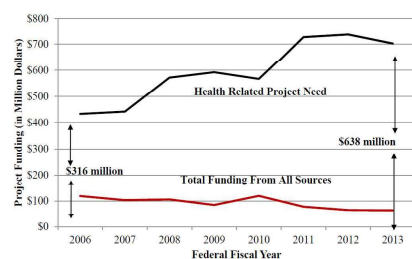


Photo credit:

1. Polartrec.com – Hollis Yenna
2. Alaska Tour Guides

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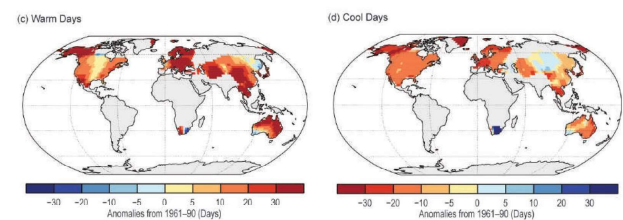
Funding is not available for high-cost infrastructure



Health-related funding gaps for the State of Alaska: Griffith and Black, 2014

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Climate change has a growing impact on infrastructure, especially in vulnerable areas



Munden, Jessica, Derek S. Arndt, Ahko Sánchez-Lugo, Ted A. Scambos, Carl J. Schreck II, Sharon Stammerjohn, Kate M. Willett, Howard J. Ploegh, Robert J. Dixon, and Nadine Gutzler. "State of the Climate in 2014." *Full. Amer. Meteor. Soc.* 93, no. 8 (2012): 1334-1376.

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WASH – Service Level Definitions

Water

SERVICE LEVEL	DEFINITION
SAFELY MANAGED	Drinking water from an improved water source that is located on premises, available when needed and free from faecal and chemical contamination
BASIC	Drinking water from an improved source, provided at least 20 litres per person per day for a round trip, including pouring
LIMITED	Drinking water from an improved source for which collection time exceeds 30 minutes for a round trip, including pouring
UNIMPROVED	Drinking water from an unimproved dug well or unprotected spring
NO FACILITY	Drinking water directly from a river, dam, lake, pond, stream, canal or irrigation canal

Note: Improved sources are those that are protected from surface contamination by faecal matter, and are not open to the public. Improved sources are those that are protected from surface contamination by faecal matter, and are not open to the public. Improved sources are those that are protected from surface contamination by faecal matter, and are not open to the public.

Sanitation

SERVICE LEVEL	DEFINITION
SAFELY MANAGED	Use of improved facilities that are not shared with other households and have access to safely disposed of in a hygienic manner
BASIC	Use of improved facilities that are not shared with other households
LIMITED	Use of improved facilities shared between two or more households
UNIMPROVED	Use of pit latrines without a slab or platform, hanging latrines or open defecation
NO FACILITY	Open defecation in fields, forests, bushes, open spaces or other locations

Note: Improved facilities are those that are protected from surface contamination by faecal matter, and are not open to the public. Improved facilities are those that are protected from surface contamination by faecal matter, and are not open to the public.

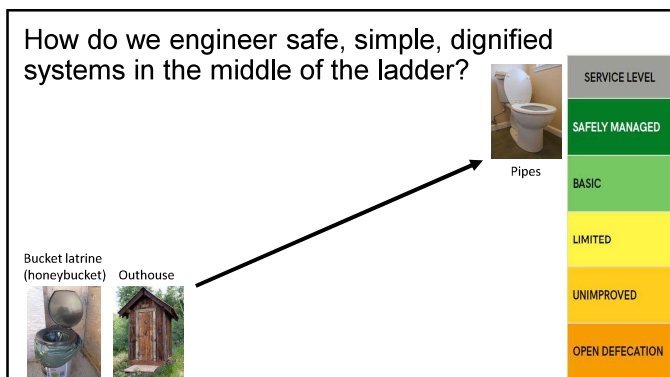
Hygiene

SERVICE LEVEL	DEFINITION
BASIC	Availability of a handwashing facility on premises with soap and water
LIMITED	Availability of a handwashing facility on premises without soap and water
NO FACILITY	No handwashing facility on premises

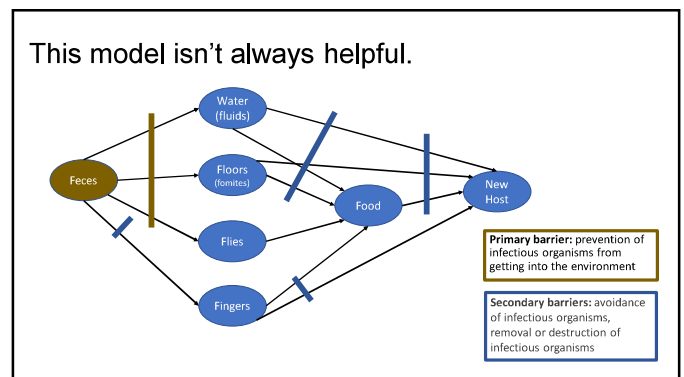
Note: Handwashing facilities may be fixed or mobile and include a sink with running water, basins with soap, sponges, and/or cloths designed for handwashing. Soap includes bar soap, liquid soap, powder detergent, and biodegradable soap. Soap does not include ash, sand, or other handwashing agents.

World Health Organization Joint Monitoring Program. "Progress on Drinking Water, Sanitation and Hygiene," 2017.

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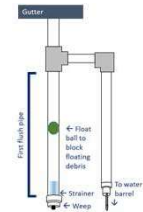


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Rainwater conclusions



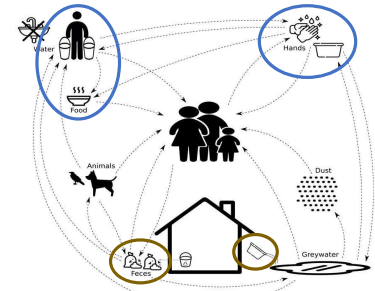
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2. Mid-tech

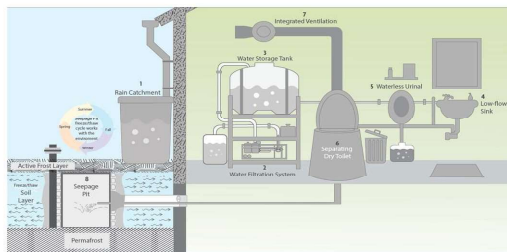
Primary barrier: prevention of infectious organisms from getting into the environment

Secondary barriers: avoidance of infectious organisms, removal or destruction of infectious organisms



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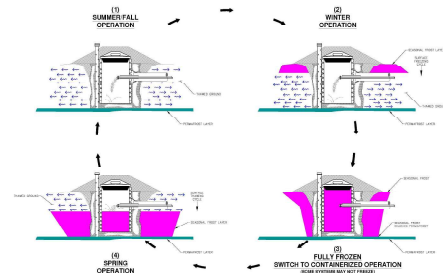
2. Portable Alternative Sanitation System



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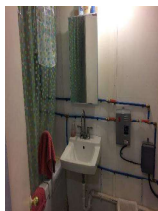
Systems must be adapted to the local environment



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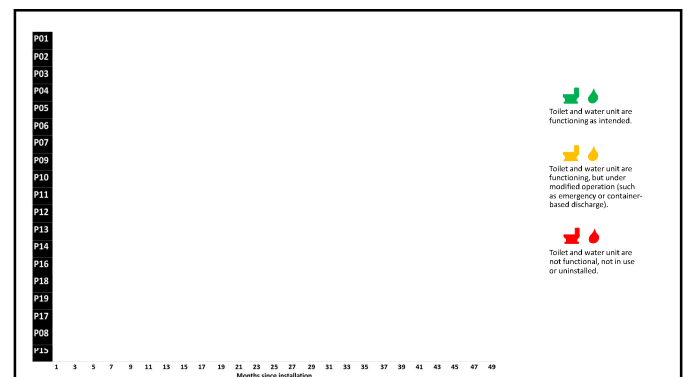
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Portable Alternative Sanitation System



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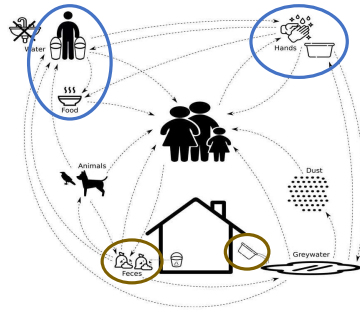


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2. High-tech

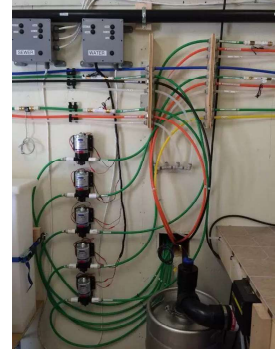
Primary barrier: prevention of infectious organisms from getting into the environment

Secondary barriers: avoidance of infectious organisms, removal or destruction of infectious organisms



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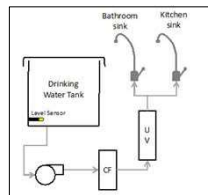
"Potable" reuse: Water fit-for-purpose



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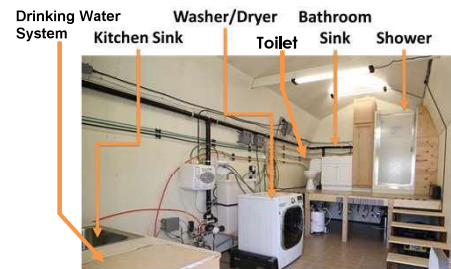
Three different systems:

- Toilet system
- Drinking water system
- Wash water system



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Each household reuse system produced 60 gallons of "wash water" per treatment cycle



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The wash water treatment system was in a shipping container next to the demo house

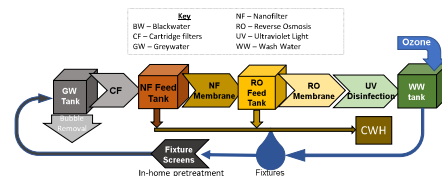


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Wash water system requires a lot of maintenance from homeowners

Weekly:

- Haul in 30 gal fresh water
- Haul out 30 gal concentrated waste
- Use 420 gal of wash water
- Monthly filter and membrane changes

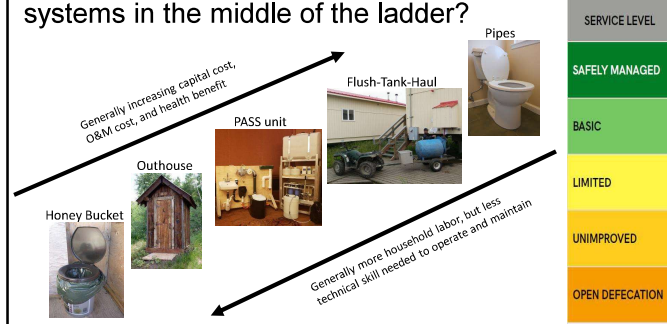


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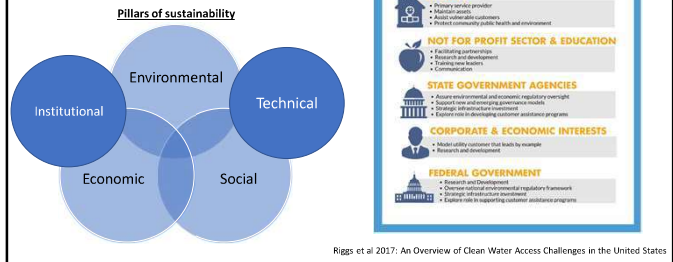
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How do we engineer safe, simple, dignified systems in the middle of the ladder?



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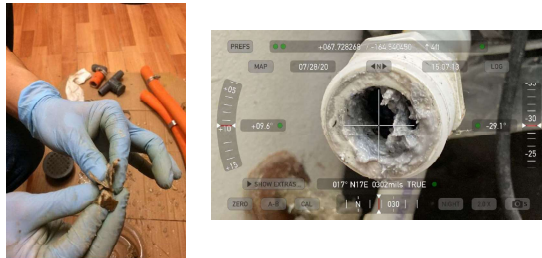
Technology alone is not sufficient for success



Riggs et al 2017: An Overview of Clean Water Access Challenges in the United States

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Homeowners need to be actively engaged with their water and sanitation systems



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Systems need to address priorities and assure dignity



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Good technology does not necessarily change behavior



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Changing human behavior is challenging!

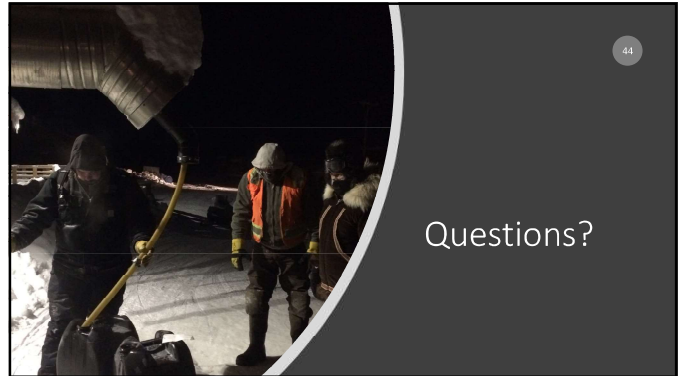


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We can take multiple approaches to assist with solutions, but we must consider the big picture



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Questions?

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