D-Lab Development  
2009.10.19  

Water Treatment  
w/ Susan Mercott

Water Rich - Safe Water  
Water Poor - Unsafe Water  
More than a billion people

Billion Number - people who lack access to improved water supply  
- Public taps, tube wells, boreholes, protected wells & springs, rainwater harvesting  
- Unimproved water  
  - All surface waters (rivers, streams, dams, lakes, ponds, canals, irrigation channels) unprotected dug well & springs, tanker trucks and carts, vended water

Tanker trucks and vended water, because they are in nether realm of not knowing where the source of the water is. As described by the United Nations

Access to an improved water supply

IS IMPROVED WATER SAFE WATER?

4 Water Qualities:  
- Microbial - Can Kill you quick  
- Chemical - Can Kill you slow  
- Physical/Aesthetic  
- Radionuclides

Microbial is the biggest problem around the world  
Chemical second biggest problem  
Arsenic is a large contributor

Conventional Water Treatment Plant:  
- Source of surface water 2 sedimentation 2 coagulation 2 sludge 2 filtration 2 chlorine 2 communities  
Out by Frog Pond used to be this kind of system

Non-piped water supply  
- Watershed 2 human/animal distribution system 2 home  
Problem with possible contamination

64% of Women collect the water  
And are primary caretakers of people who get sick with water borne diseases

Infectious Disease and its effect on children  
Not addressed?  
- Been around for a while  
- Not going to infect people in developed countries  
- Hard to identify the cause
Small Scale Water Treatment (household)
Not Brita Filter (aesthetic/physical treatment mostly)
“Luxury Water”
Mega systems won’t work in rural area
Cost too much money
Government infrastructure/willingness
Access to energy for system (electricity)
Deer Island Waste Water Treatment Near Logan airport
$4billion for 2.5 million people
Engineers hadn’t thought of how to scale for different environment or materials
P&G gotten into household treatment water market
Pur - “treatment plant in a packet” (EXPENSIVE)
Coagulant (pheric sulfate) + Chlorine (calcium chloride powder)
Open and put in 10L bucket, rapid mix, let settle
Chlorine contacts water for 30min, then safe to drink
Does it work in any water?
The particular combination P&G has is often perfect
There is no perfect though, not a one size fits all

Safe Storage
Important aspect of water treatment
Water getting contaminated while in storage is a big problem
Disinfection
Boiling, Sodis, Household chlorination
Particle Removal Technologies
Cloth Filter - equivalent to sari filter
1 micron mesh, effective against guinea worm and cholera
Ceramic Filter
Lifestraw - not that effective, clogs
Iodine based resin, okay for short term use
Not safe for longterm use
Water Ionizers - more of a first world product

Combined Systems
Chemical Removal Systems

Get an email a day from someone around the world with an idea to save the world. Maybe that’s true. Has come to realize that there is no silver bullet, high tech or low tech, it is getting it implemented that is the challenge.

Safe Storage Products
Standard size can go hand in hand with disinfection (ie chlorine dosing)

Partial Removal

Pure Home Water
Started with the idea of providing safe household drinking water
Had been working on multiple technologies for a while
Now focusing one direction to encompass goal
Offer range of products in Ghana to see what they liked
1. Reach people most in need
2. Be self-sustaining

Takes a lot of capacity to test whether water is safe or not
Check List vs Water Testing Laboratory
Reasoning behind Improved vs unimproved water source category
Improving the supply is one way (slightly indirect)
towards safe water

Having particles in the water, protects microbes from chemical (ie chlorine) treatment
Microbes can hide in particles

For Dissemination, Focused on Ceramic Filter Pot
- Staff could do many products poorly or one product well
The ceramic filter was their best product, so focused on that

Manufacturing to bring the cost down
Local manufacturing to reach $1/day people
Current manufacture is outside Accra
12 hours to get to Tamale
Transportation can damage ceramic filters
Local manufacturing to have greater control over supply chain
Quality control