

An Assessment of Water Technology: Using Ghana As A Case Study



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Agenda

- Challenge
- Existing water conditions in Ghana
- Current water filtration technology
- Evaluation Tool Criteria
- Recommendations

The Challenge

- How do you systematically determine what is the best technology to use in a particular scenario?

Existing Water Conditions in Ghana



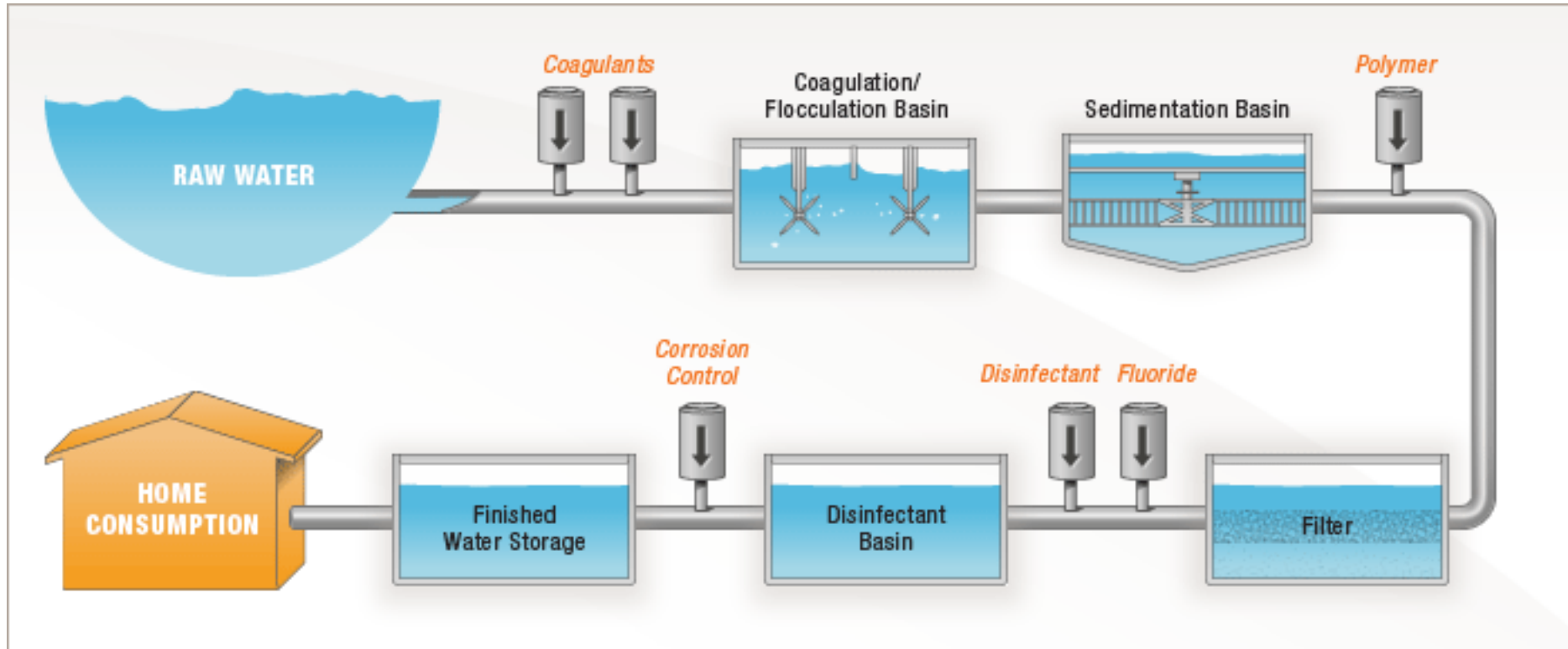
Source:
<http://www.worldatlas.com/webimage/countrys/africa/gh.htm>

Existing Water Conditions



Current On- Site Water Options

Water treatment plant



Ground water wells



Source:
<http://thewaterproject.org/digging-wells-in-africa-and-india-how-it-works.asp>

Source: <http://www.rehfeld.com/africa/>

Personal Water Options

Water satchet



Source:
<http://www.waterbusiness.com/business-opportunities/pouch-bagged-water/>

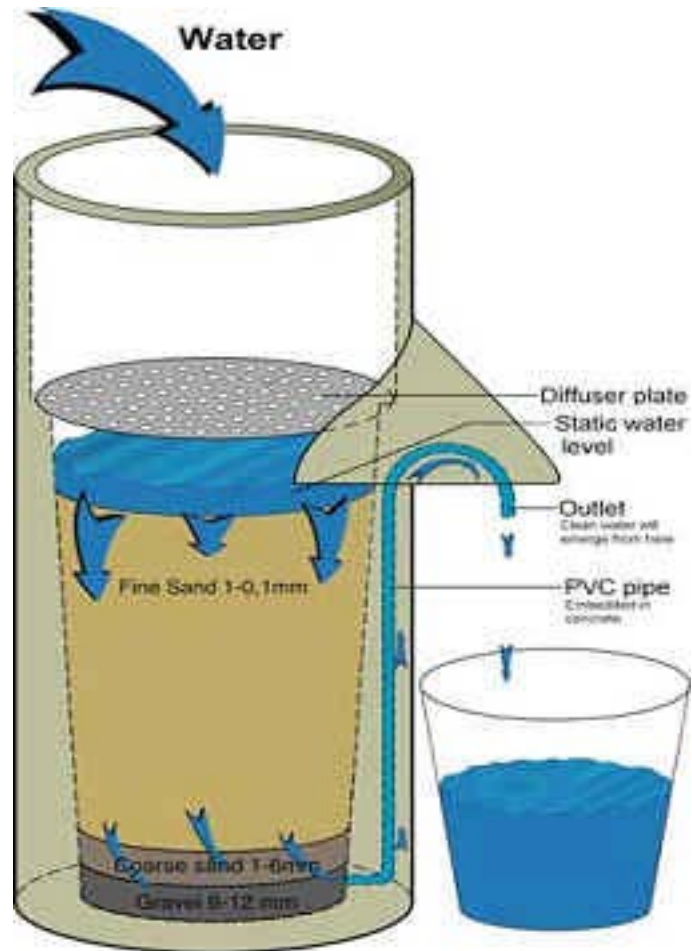
Kosim filter



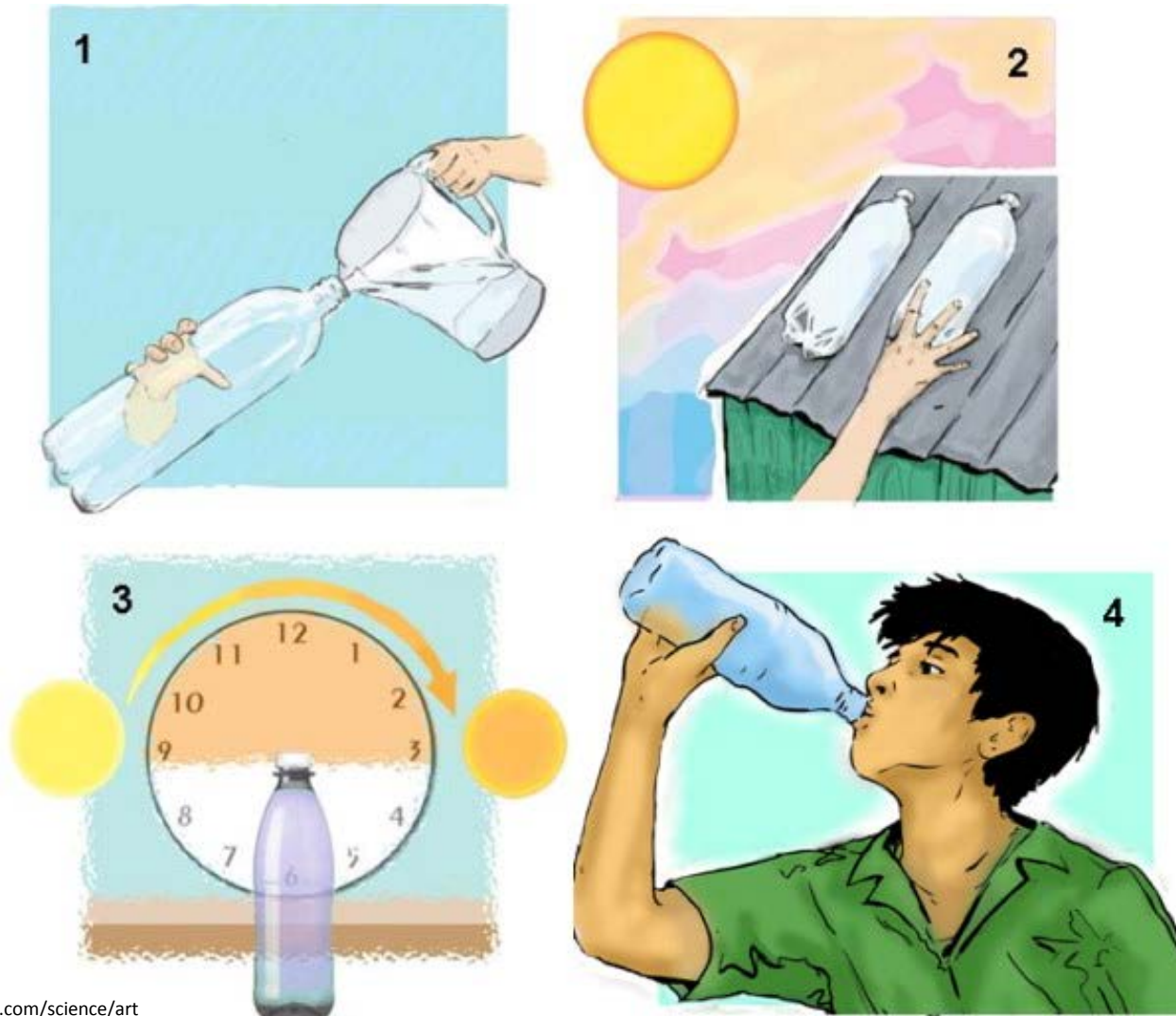
Lifestraw®



Slow sand filter



Solar water disinfection (SODIS)



Criteria

- 1. Effectiveness**
- 2. Cost**
- 3. Energy Consumption**
- 4. Environmental Impacts**
- 5. Waste generated**

Decision Tool & Findings

Table 1. Assessment of Personal and On-Site Water Technologies

Treatment technologies	Capital Cost ^a	Operating cost (per liter) ^b	Effectiveness ^c	Energy Consumption ^d	Environmental Impacts ^e	Waste Generated ^f	Advantages	Disadvantages
Bottled water	\$0	\$1	High	Manufacturing, transportation	Low	Plastic bottles	Individual use	Temporary solution, possibly delaying long term solution, potential supply problem
Ceramic clay pot “kosim”	\$14	\$0	High	None	Low	Exhausted sorbents	Low cost, on-site alternative, potentially useful for families or groups.	Variable quality of locally-made filters, Viruses, no residual protection, recontamination, maintenance
Groundwater Well ^g	Highly variable and site specific	\$0	High	None after drilling	Low	None	Potential long-term solution	Maintenance and management required, easily contamination
LifeStraw®	\$0	0.015	High	None	Low	Litter	Contains no chemicals, portable	Limited to 1600 liters; one-person only; recurring cost; may delay long term solution
Cloth filter	\$5-10	\$0	Low	None	Low	None	Individual use or household level, affordable	Microbe removal varies by pore size

^a Capital cost of \$0 is colored green, moderate range is yellow, high is orange, and significant expenses are coded red. These judgments was made based upon capital cost to per capita income of individuals in developing countries

^b Same as above

^c High effectiveness is colored green.

^d No energy consumption is colored green

^e Low environmental impacts are colored green.

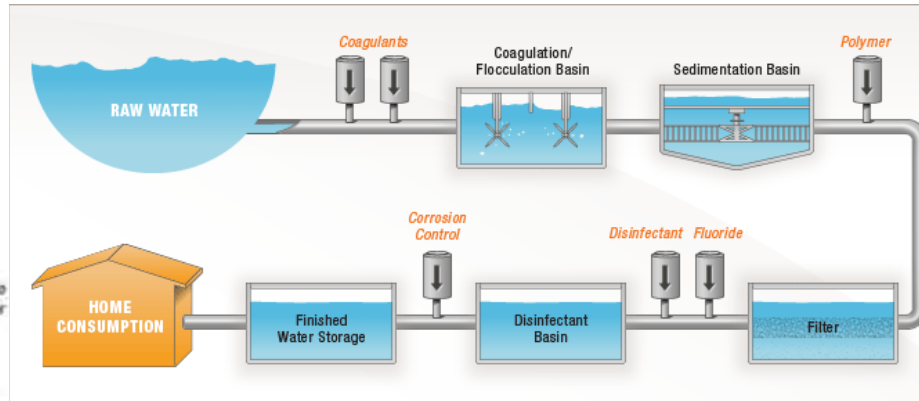
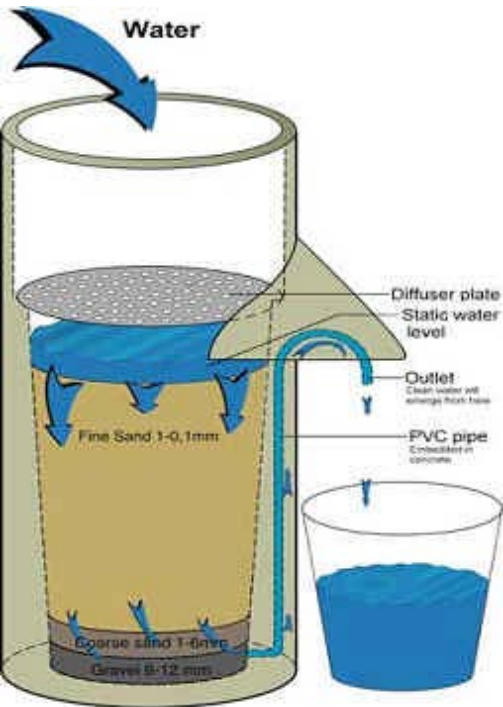
^f No waste is colored green.

^g 30-50 feet

Decision Tool & Findings

Slow sand filter	\$16-25	\$0	High	Pump, vents, and drain	Low	None	Simple to use, Small scale and community level.	Requires technical knowledge and training; Constant maintenance
Solar water disinfection (UV) (size)	\$0	\$1	Moderate, Function of sunlight, cloud cover	None	Low	Litter	Low cost, no energy required, on site	Leaching of bottle material, regrowth of bacteria, toxic chemicals still in the water; training
Water satchel	\$0	\$0.008	High	Manufacturing and transportation	Plastic waste, litter	Plastic bags	Individual use	Temporary solution, possibly delaying long term solution, potential supply problem
Water treatment plant	\$7,000-\$40,000	Depends on cost for broken parts	High	Significant	Land required, potential pollution	Water treatment plant sludge	Long term water supply, May lead to economic growth, improved health	Requires capital investment, dedicated land, good quality source water, and competent management with training.

A Variety of Solutions



Source: <http://earthesy.com/lifestraw>

Source: <http://web.mit.edu/newsoffice/2010/itw-home-water-0429.html>

Source: http://www.denverwater.org/docs/assets/CC04FEB8-BCDF-1B42-D517C0E37D363E65/DW_WaterTreatmentProcess_Final1.gif

Source: <http://www.reuk.co.uk/Sand-Filters-for-Greywater.htm>

Source: <http://thewaterproject.org/digging-wells-in-africa-and-india-how-it-works.asp>

Solutions

- Invest in on-site water treatment facilities
- Develop partnerships with agencies, NGOs, and private organizations

Questions?

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