The Biosand Filter

Addressing turbidity, stagnant water, and storage

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Northern Uganda

- 45% suffer from severe poverty
- Conflict – Idi Amin & Lord's Resistance Army
- Population displacement
- Socioeconomic disruption
- One rainy season
- Drought affected

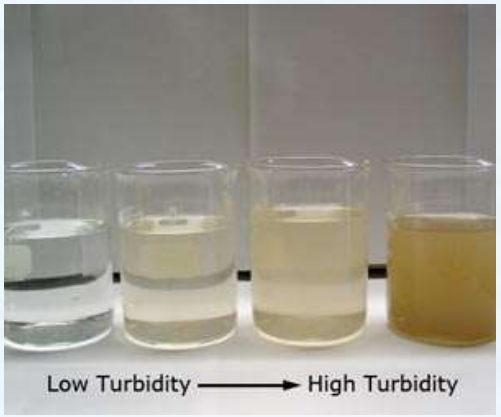
Water Supply

- ~60% have access to safe water
- Government has goal of 77% in rural areas by 2015
- Burden of collecting water placed on women and children
- Diarrheal deaths = 19% of Infant Mortality

Malaria

- Number one killer of children in Uganda
- 70,000-100,000 child deaths annually
- Extreme impact on social and economic development
- $300 Million US spent each year on malaria related treatment
- Environmental management of aquatic habitats

Biosand Filter and Turbid Waters



- Turbidity is the cloudiness or haziness of a fluid caused by suspended solids
- Northern Ugandan communities have access to turbid waters
- Mosquito breeding sites are often in these stagnant turbid waters
- Turbid waters not recommended for use with Biosand filters

Proposal

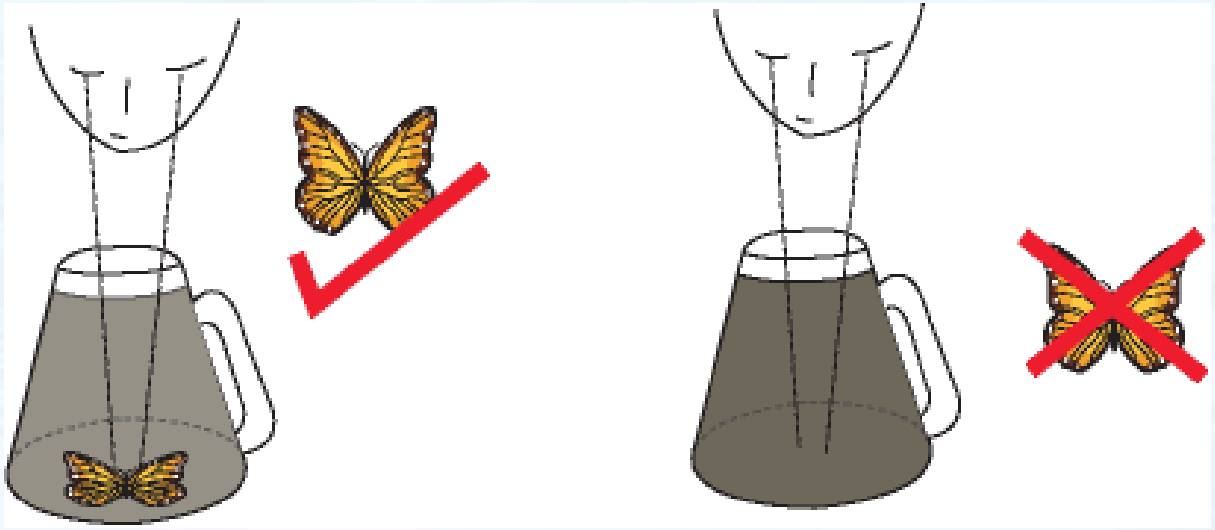
- Education on seeking out water sources/mosquito breeding sites
- An easy way to measure turbidity
- An easy way to decrease amount of suspended solids in water before filtration
- Proper storage/containers for purified water to decrease risk of contamination

Process- Collection

- Sources; -rainwater
- Deep & shallow groundwater
- rivers & lakes and other

- 5L jug with picture provided

Process- Turbidity test



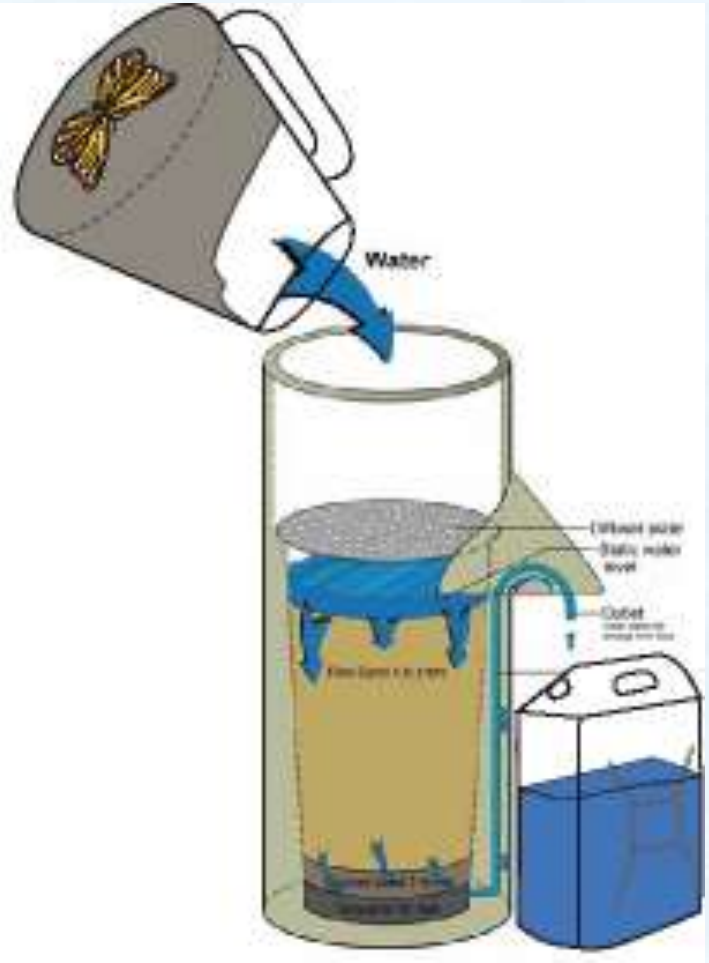
- Water turbidity
  < 50 NTU

Water turbidity
> 50 NTU

Process- Turbidity management

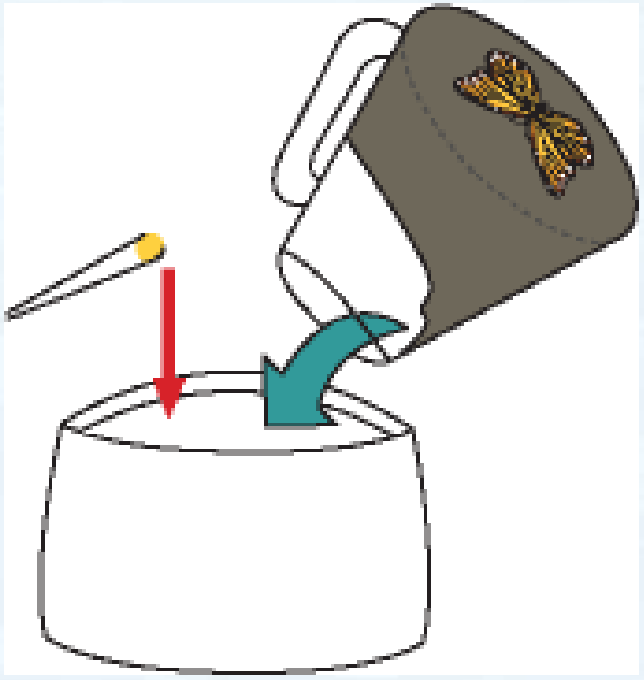
- Water turbidity

  < 50 NTU



Process- Turbidity management

- Water turbidity > 50 NTU
- Sedimentation pre-treatment
- Add 2 x 100mg aluminum sulphate



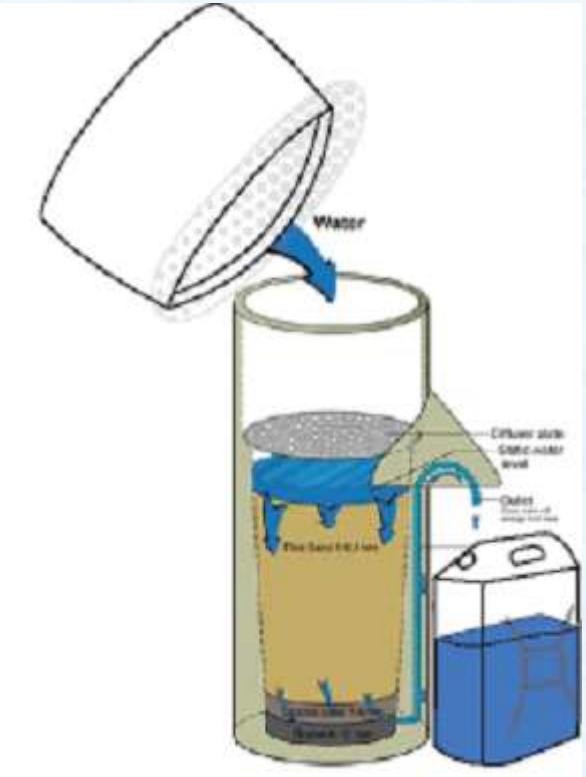
Why sedimentation?

- Coagulation ↓ load on Biosand filter.
- ↓ turbidity

- Aluminum sulphate
  - Very soluble coagulant
  - High acidic condition
  - Used for 20+ years

Process- Turbidity management

- After 15min
- Strain into Biosand filter
- Dispose of sediments



Products

- 3 5L (12inches high) clear jugs for contaminated water collection for each community. These jugs will have an image of choice on the bottom.
- 1 50Kg plastic drums of (1000 mg) aluminum sulphate tablets for sedimentation treatment.
- 2 metal tongs for handling the aluminum sulphate tablets.
- 1 Biosand filter for a community of approximately 15 households.
- 1 32L plastic container with lid for sedimentation treatment. Including a line to indicate the 30L mark.
- 1 strainer
- 20L high density polyethylene jerry cans (filtered water storage containers)

Limitations

- **Size of Biosand filter** (3ft x 1ft)
    - Filtration capacity
    - Delivery rate
- **Small size** of plastic **containers**
    - 30L sedimentation container
    - Storage 20L (max 2 days)
    - Collection
- **Containers with lids** not sealed
- Final water purity **depends on initial contamination**

Cost Evaluation

Products to provide	Price	Quantity	Total
*5L Jug**	$1.00	3	$3.00
50kg aluminum sulphate	$11.00	1	$11.00
*Metal tongs**	$1.50	2	$3.00
Biosand filter	$20.00	1	$20.00
*32L plastic container**	$4.50	1	$4.50
*20L high density polyethylene jerry cans**	$3.00	15	$45.00
*Strainer**	$0.50	1	$0.50
Total for 1 Biosand filter (about 15 families)			$87.00

**The prices are estimated cost based on Amazon prices and wholesale prices on alibaba.com*

ICIS prices aluminum sulphate at $214 US per ton

Center for Affordable Water and Sanitation Technology.

Safety and Regulations

- FDA – turbidity important
- FDA – aluminium sulphate is SAFE
- 25% concentration within CAWST standards.
- Residual aluminium sulphate 0.05ppm
  - Below WHO guidelines for 0.2ppm
  - Removed from Biosand filtration

Critical Control points

- Visual test turbidity test
- Sedimentation for high turbid waters
- Aluminium sulphate tablets
- Tongs to handle the aluminium sulphate
- Sedimentation followed by slow sand
- Sedimentation in a separate container
- Strainer used to pour the pre-treated water
- Lid on top of the filter
- bottles with lids for collection

Education

Transfer of knowledge

Experts → Educators → Community

= Success of this project

A small workshop will be given during the initiation of the Biosand filters into a community

Malaria

Mosquito breeding sites

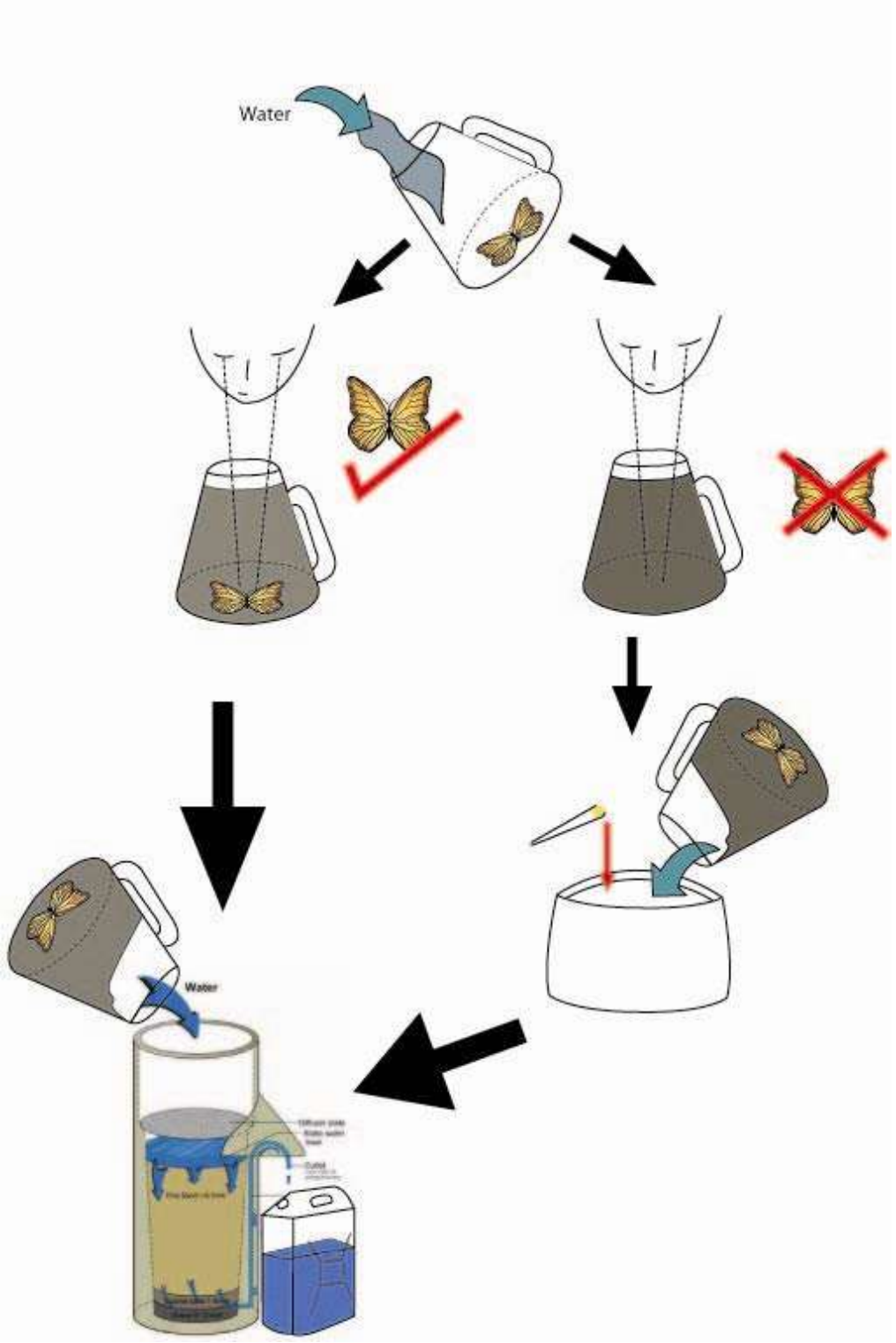
Safety

Turbidity

Water Collection

Storage

Treatment


Water
Water

Impact

Immediate: Increased availability of clean and safe water originally collected from dirty stagnant sources, those that are likely breeding grounds for mosquitoes.

Intermediate: Decreased rate of diarrhea and other water borne illnesses.

Long-term: Reduction in deaths related to diarrhea/water borne diseases as well as a decreased prevalence of malaria in the area. Increased work capacity and growth in the area due to the decreased prevalence of illness and death.

Feasibility

- Economic Feasibility
- Easy to produce/source
- Little upkeep
- Low potential for harm
- Easy to distribute/set up

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Thank-you!