Issues and Responses to Clean Water and Sanitation

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Water Environment Federation®
the water quality people®

Water and Sanitation Facts

- The water & sanitation crisis claims more lives through disease than any war claims through guns
  - 3.6 million people die each year from water borne disease

Water and Sanitation Facts

- Lack of clean water and sanitation are major issues in developing Countries such as
  - Africa,
  - India,
  - Central America (e.g., Haiti, Dominican Republic, Guatemala)
  - South America (e.g. Ecuador, Peru, Bolivia) and
  - Southeast Asia
- Ancient Romans had better access to clean water and sanitation than many people today

Water and Sanitation Facts

- 2.5 billion people (~40% of the world's population) lack access to improved sanitation
  - defined as a sanitation facility that ensures hygienic separation of human excreta from human contact.
- 1.2 billion people who have no facilities at all
- More people in the world have access to cell phones than access to a toilet

Water and Sanitation Facts

- Of the 60 million people added to the world's towns and cities every year, most occupy impoverished slums and shanty-towns without clean water or sanitation facilities
  - 1/10th of global disease due to lack of clean water and sanitation
  - cholera and other diarrheal diseases cause 88% of water and sanitation deaths
  - Other water and sanitation related diseases include Hepatitis A, Hepatitis E, typhoid, trachoma, *Schistosomiasis* and intestinal worms

Impact on Children

- Diarrhea remains the second leading cause of death among children under five globally.
  - about 1.5 million children die each year due to diarrhea.
  - kills more young children than AIDS, malaria and measles combined.
- Providing safe water could reduce incidence of diarrheal disease by an estimated 21% while improved sanitation could reduce diarrheal disease by 37.5%.

Impact on Women

- Women and girls take care of water needs
  - In just one day, more than 200 million hours of women's time is consumed for collecting water for domestic use, often from polluted sources
  - Carry water many miles resulting in back and neck injuries

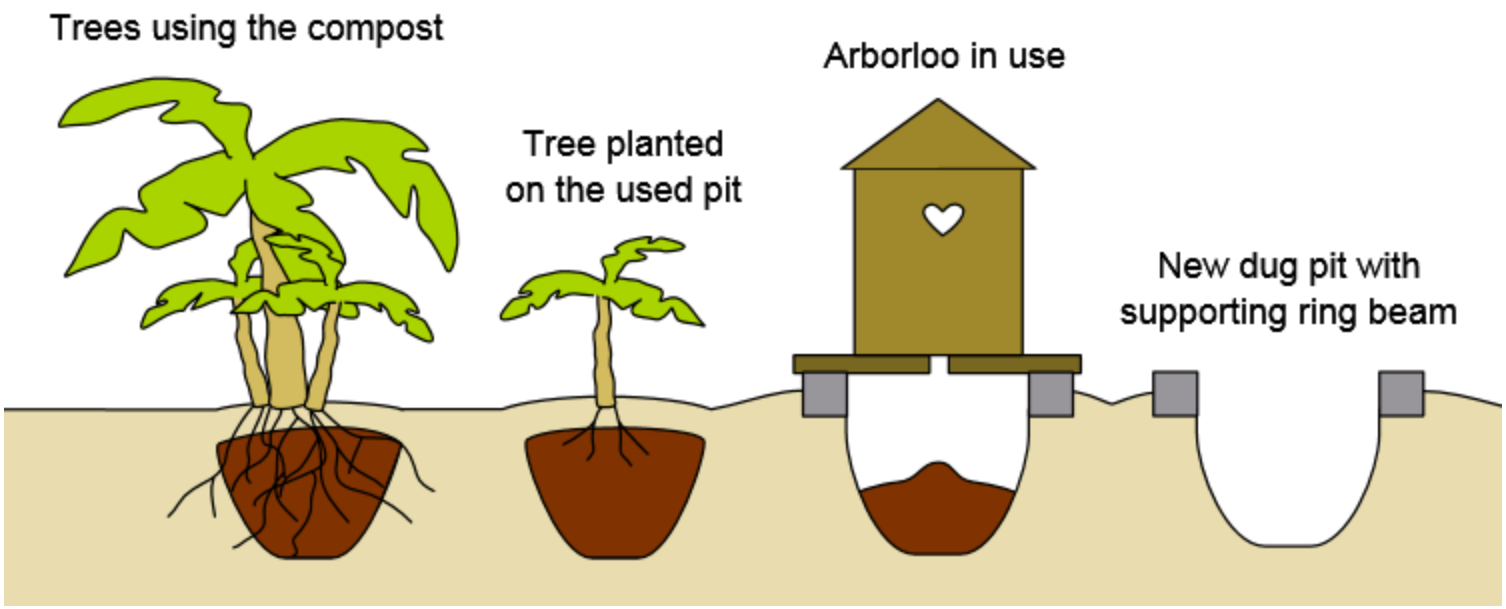
Impact on Women

- Women have more sanitary needs and are more vulnerable
  - Taboos require privacy for women but not men
  - Women must walk into the brush or woods alone
    - Subject to rape and molestation by men
    - Subject to animal attacks and snake bits

What is being done?

- Non-profit organizations are taking lead in many developing countries to bring clean water and sanitation. These include
  - Water for People
  - Wine to Water
  - WaterAid
  - Water.org
  - WHO
  - UNICEF
  - World Bank
  - Others

Arborloos


Trees using the compost
Tree planted
on the used pit
Arborloo in use
New dug pit with
supporting ring beam

What is being done?

- When projects are undertaken
  - Must allow villagers to take ownership of improvements
    - Help build
    - Must maintain systems
    - Develop a funding mechanism for maintenance

Empower Women

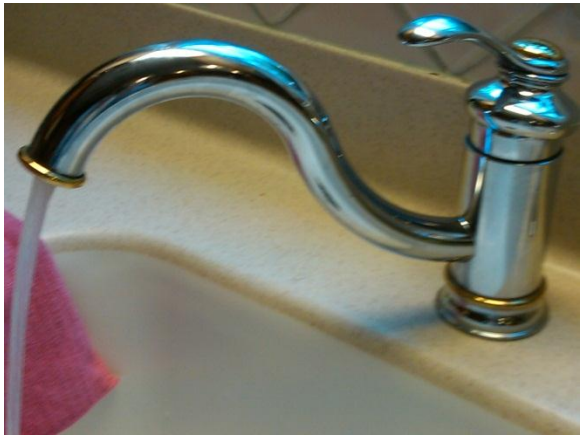
- Educate
  - By providing safe and private sanitation facilities for women and adolescent girls so then can attend school
  - Teach basic hygiene such as hand washing so they can teach their children and others in the village

Empower Women

- Women have a vested interest
- Require women take ownership of projects
  - Design
  - Management
- A study by the International Water and Sanitation Centre (IRC) found that
  - projects that were designed and run with the full participation of women are more sustainable and effective than those that do not.

Contrast

- In developed countries,
  - all people have access to safe water
  - water borne illnesses are very rare
- High water usage
  - Average American uses 378 to 660 liters of water per day
  - In slums of India each person has less than 8 liters available a day
- High water footprint

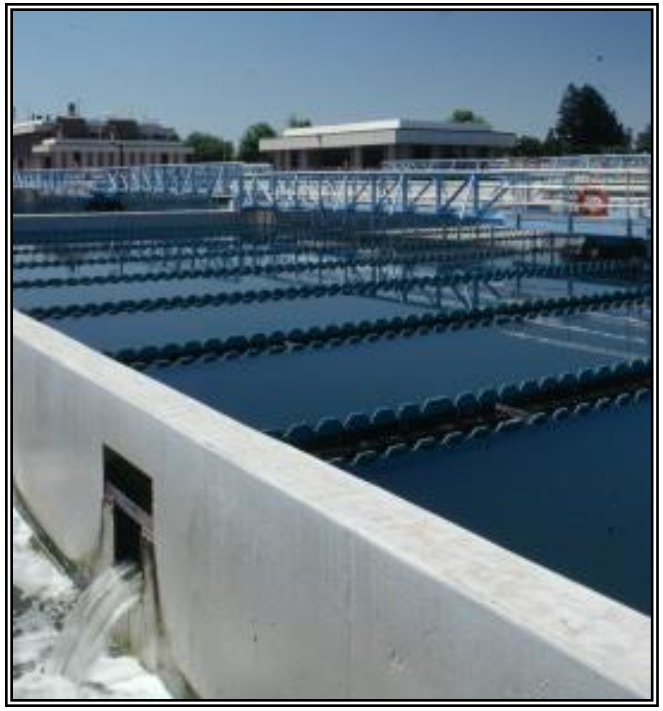


Water Footprint

- Water foot printing looks at the water that is used to produce food, paper, cotton, etc.
- Large amounts of water are required
  - 1600 liters to produce 1 kg of wheat bread
  - 2500 liters to produce 1 kg of rice
  - 15,400 liters to produce 1 kg of beef
  - 1000 liters to produce 1 liter of milk
  - 140 liters for 1 cup of coffee
  - 35 liters for 1 cup of tea

Advanced Level of Wastewater Treatment

- In developed countries, wastewater is treated to high levels
  - Nitrogen and phosphorus are removed to prevent eutrophication
  - Disinfected to a high level
  - Energy and nutrient value is captured
  - Micro contaminants are removed to allow direct water reuse



Water Reuse

- Technology exists and is in use to allow for indirect and direct water reuse.
  - High capital, operation and maintenance costs
- Necessary for areas or countries that have water scarcity
  - For example Singapore

Singapore

- Singapore relies on four water sources:
  - rainfall, collected in reservoirs or water catchment areas (about 20% of supply in 2010),
  - Imported water from Malaysia (about 40% of supply, but will end in the year 2061)
  - Seawater desalination (10% of supply).
  - Reclaimed water (producing NEWater) (30% of supply)

NEWater

- Wastewater Treatment Section
  - grit removal,
  - primary sedimentation,
  - bio-reactors with anoxic and aerobic zones,
  - secondary sedimentation and
  - sludge thickening and drying
- Water Reclamation Section
  - Membrane filtration
  - Reverse Osmosis

Conclusions

- Great differences in availability of clean water and sanitation globally
- From primitive wells to holes in the ground to advance treatment technology
- Without clean water and sanitation, large numbers of people will continue to die
- Simple techniques can improve public health globally

WATER'S WORTH IT