
AguaClara
The State of the Planet
Millennium Goals
Monroe Weber-Shirk, Cornell University

Mortality and Morbidity From Unsafe Drinking Water

- 1.7 to 2.2 million persons die from waterborne diseases each year
- Most of the victims are children
- 1 billion episodes of gastroenteritis and other infections are caused by unsafe drinking water each year
- Equivalent to 22 245 passenger Boeing 767-400 crashes per day

Daniele Lantagne, CDC

The Millennium Development Goals

- The Millennium Development Goals are an ambitious agenda for reducing poverty and improving lives that world leaders agreed on at the Millennium Summit in September 2000. For each goal one or more targets have been set, most for 2015, using 1990 as a benchmark:

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Develop a global partnership for development

Goal 7: Ensure environmental sustainability

Targets

9. Halve, by 2015, the proportion of people without sustainable access to safe drinking water

Indicator

25. Proportion of population with sustainable access to an improved water source
26. Proportion of people with access to improved sanitation

To meet this target would require expanding service at the rate of 300,000 per day

How would you define "improved water supply"?

- Quantity
- Quality
- Proximity
- Reliability
- Schedule
- Cost

Definition of "Improved"

- Reasonable access to at least 20 liters per person per day from a source within one kilometer of the user's dwelling from one of these sources
  - household connections
  - public standpipes
  - boreholes
  - protected dug wells
  - protected springs
  - rainwater collection

Ahead of Schedule????

- The world met the 2015 drinking water target (WHO announced March of 2012) claiming that at the end of 2010 89% of the world's population, or 6.1 billion people, used improved drinking water sources.
- The Water Institute at UNC estimates that 1.8 billion people (28% of the global population) used unsafe water in 2010.

The good news

The bad news

Why don't the MDG statistics represent reality?

- Inflated coverage to make each project look good
- Lack of follow up to assess current operational status of infrastructure
- Many organizations NEVER return to the site of a project after the photo of cutting the ribbon!
- Overestimates of how much population growth a system can handle
- National pride

Intermittent Supplies

- It is estimated that over one-third of the urban water supplies in Africa, and in Latin America and the Caribbean, and more than half those in Asia, operate intermittently.
- Why are supplies intermittent? Rolling blackouts
  - Crude form of rationing
  - Lack of meters
  - Leaking system
  - Some sections of the city might never receive water otherwise

Consequences of Intermittent Supplies

- Intermittent water supply is a significant constraint on the availability of water for hygiene
  - And personal hygiene is very important!!!
- Encourages the low-income urban population to turn to alternatives such as water vendors
  - That are expensive and from dubious sources
- Point of Use Storage
  - That create considerable risks of contamination
  - But may be very good idea in some situations (e.g., Potters for Peace)
- Risks of distribution system contamination

Technology isn't the problem

- Former World Health Organization Director-General: Dr Gro Harlem Brundtland speech at Cornell University in 2005
- Loosely paraphrasing…
- We have the technology to solve the world's problems – what is missing is education, institutional capacity, and political will

Policy, Education, Institutions and Engineering

- You can sometimes compensate for poor engineering by providing more inputs
  - Energy – fossil fuels
  - Education
  - Money
  - Management
  - Labor
- You can sometimes reduce this burden on society by improving the technologies
- These factors are multipliers!!!!

Why aren't there better technology choices?

- We have a solution that works for strong economies (conventional water treatment)
- Individual cities can't afford to hire consulting firms to conduct research to develop better technologies
- Each city chooses conservative existing designs
- The same is true for countries in the Global South (they can't afford the R&D to develop better technologies)

Package Plants

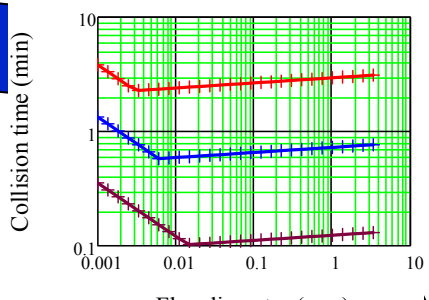
Dominant Design Constraint?

Why do so many people lack access to safe drinking water?

- Is it because resource poor countries
  - are not able to build water treatment plants?
  - lack money to build plants?
  - lack education and do not realize the benefits of the treatment plants?
- "No!" (says Monroe), It's because (prior to AguaClara) there weren't any water treatment plants that were sustainable for small resource poor communities!

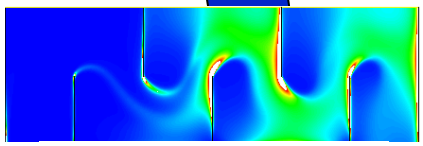
Open Source University-based Research and Development

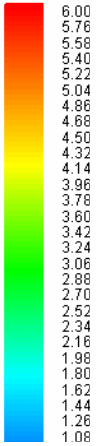
Laboratory Research



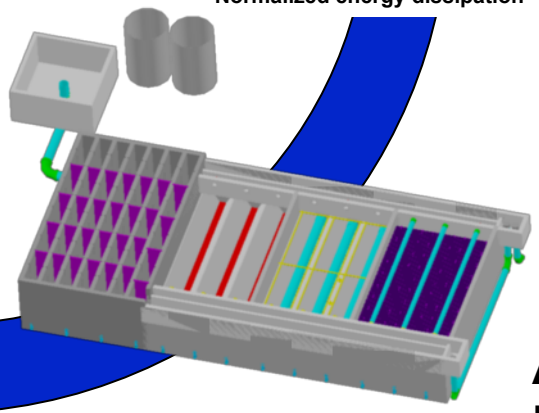
Analytical Modeling

CFD





Automated Design



Full Scale Implementation, Capacity Building, Training, and Empowerment

Evaluation

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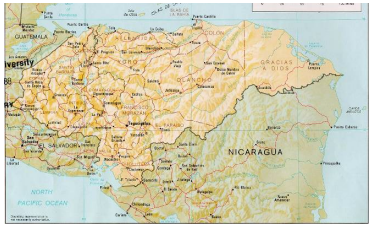
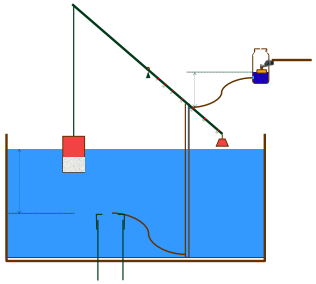
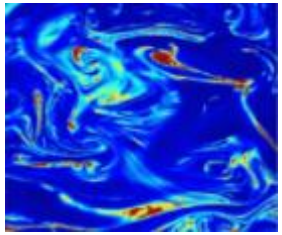
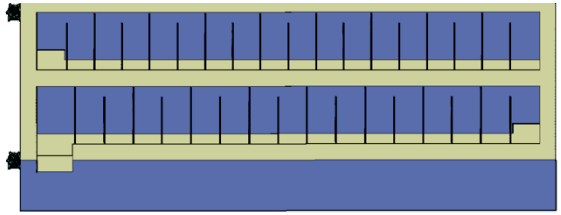




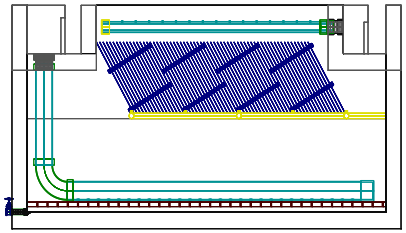
Control and measure flow



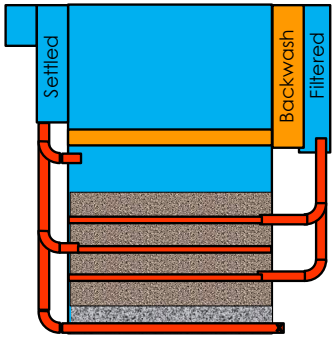
Rapid Mix



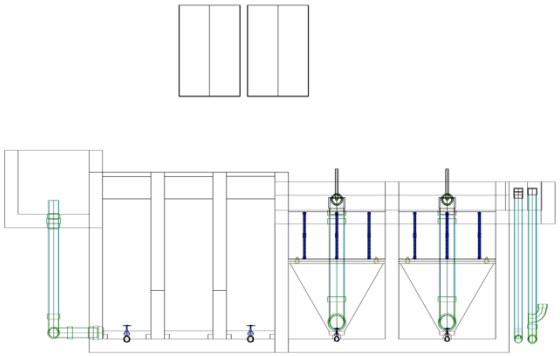
Flocculation



Sedimentation



Filtration



Hydraulics

Disinfection