Water Filtration Using Biofilms

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Our Grand Challenge: Lack of access to clean water in Third World countries
Our Solution: Affordable water filter made from natural and accessible resources

Why Biofilms?

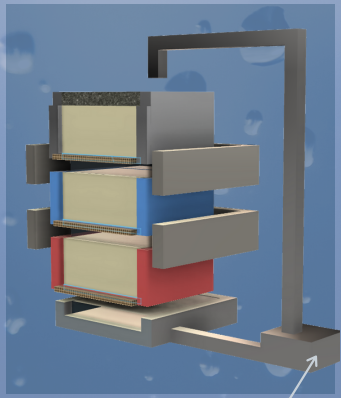
Biofilms develop within 2-3 weeks of constantly running water through filters. They are highly effective in removing turbidity and pathogens such as E. coli & other bacteria, viruses, and the heavy metals present in contaminated freshwater. The diverse microbial communities thriving in this layer interact with trapped E. coli pathogens through oxidation reactions and filter them out of the contaminated water after just one cycle, producing drinkable water.

Our Impact

Slow sand filtration can prevent the transmission of water-borne illnesses in many developing countries thanks to its simplicity, reliability, and affordability. This design may someday lead to a low-maintenance filtration technology that meets the clean water demands of such countries.

The Facts

- **85 million people** worldwide don't have access to clean water.
- **Thousands of gastrointestinal diseases** are caused by exposures to polluted waters.
- Effective waters can cost **thousands of dollars**, which can be a challenge to those living in poverty.



Circulation pump: Recirculates water to encourage biofilm growth. Will not be necessary after growth.

Estimated Cost: $370

Biofilm layer: Forms on the top layer from biological activity. Breaks down different nutrients and trapped pathogens in the wastewater.

Top Layer: Fine sand. Removes most solid particles. Most biological activities occur in this layer. Fine size encourages growth of biofilm.

Middle Layer: Medium-sized sand that further acts like a sieve to prevent large particles from going down. Helps aerate.

Cheese cloth: Filters out microparticles.

Bottom layer: Gravel that further acts like a sieve to prevent large particles from going down. Helps aerate.

Funnel coupling: Drips water into bucket to either be recycled (for biofilm growth) or tested to determine drinking water quality.