AguaClara
Enclosed Stacked Rapid Sand Filter

AguaClara Technology

The AguaClara engineering project team at Cornell University researches, innovates, and designs municipal water treatment technologies. AguaClara technologies are gravity-powered, electricity free, made with locally sourced materials, and scalable for communities throughout the world.

Enclosed Stacked Rapid Sand Filter (EStaRS) Objectives

Transform ground or settled water into drinking water that meets World Health Organization standards
Deliver clean water on tap for villages ranging from 250-5000 people
Empower local communities to construct, operate, govern, and maintain their technology
Utilize locally sourced materials and gravity-powered, electricity free technology
Be an affordable and sustainable drinking water solution for the long term

Applications

1 EStaRS Filters are a low cost solution for direct filtration in groundwater up to 5 NTU. These systems utilize a chemical dose controller and can be implemented in parallel to scale over a wide range of flow rates.

2 EStaRS filters may also be used in surface water applications as the last "polishing" step of an AguaClara flocculation and sedimentation treatment plant.

Innovative Geometry

EStaRS Filters contain six layers of sand capable of filtering out the smallest particles remaining in the water.

The stacked geometry is similar to six traditional sand filters, but requires 1/6 of the space, and also allows for backwash without electricity.

The flow injection and extraction system allows water to enter and leave the filter independent of sand. The injection system is composed of pipes with orifices and vertical wings, and the extraction system utilizes slotted pipes.

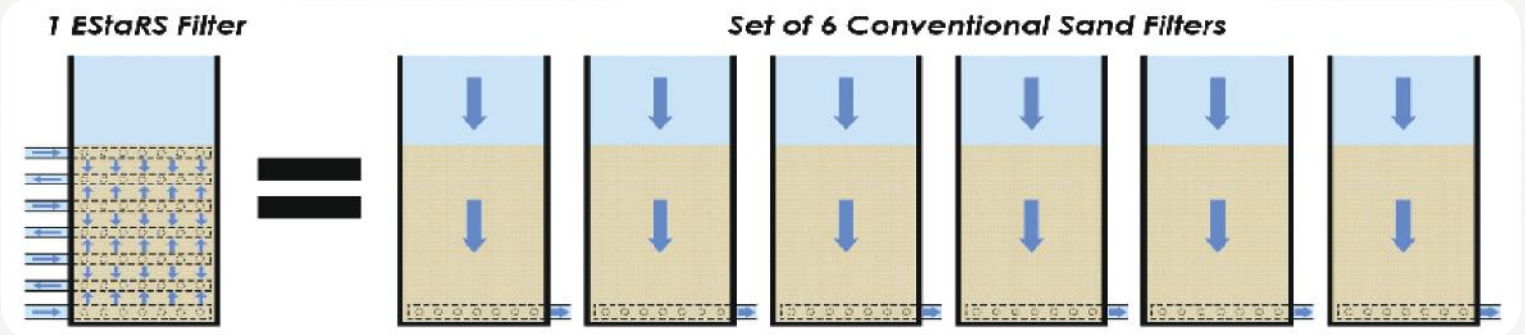
Current Implementation

India

Six EStaRS filters have been built to operate in two communities in the state of Jharkhand. These filters are operated by local communities, and treat water for approximately 1,000 people. AguaClara LLC designed and implemented these filters in partnership with PRADAN and Tata Cornell.

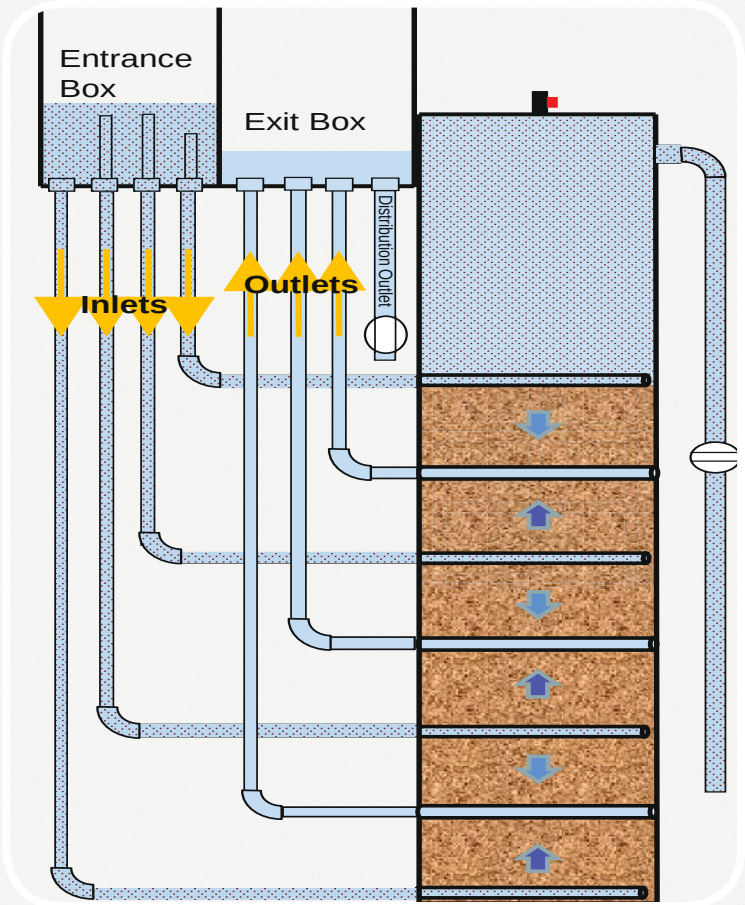
Honduras

EStaRS Filters have also been designed for small communities in Honduras to function as the last stage of an AguaClara treatment plant.



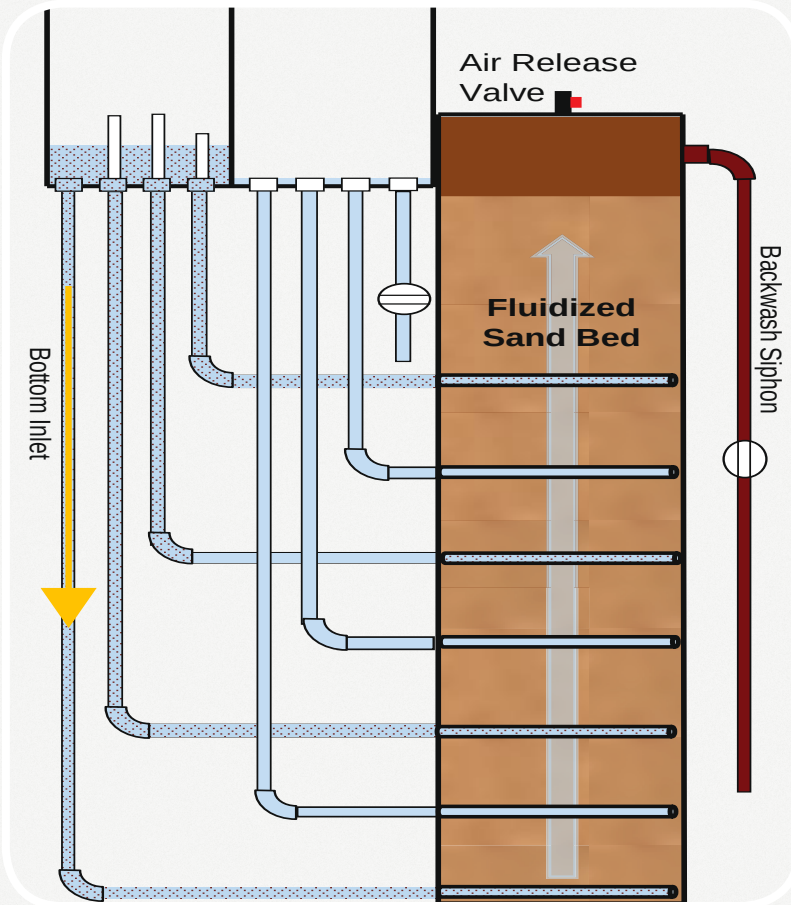
EStaRS Technology

Backwash Without Electricity



Forward Filtration

1. Dirty water is mixed with coagulant and enters four inlets
2. Dirty water is filtered as it travels both upwards and downwards through six sand bed layers
3. Clean water exits three outlets, is disinfected, and then sent to a distribution system



Gravity Powered Backwash

1. The backwash siphon valve is opened by a plant operator to send all water through the bottom inlet
2. The high velocity of water through the bottom inlet fluidizes the sand bed
3. Concentrated sludge flows upwards through open sand pores and out the backwash siphon

Implementation Philosophy

EStaRS Filter designs are transferred from the AguaClara Design Tool to **local implementation partners** who help take a robust design and see it through community operation.

Local plant operators are thoroughly trained to operate and maintain EStaRS technology for long term sustainability.

Community engagement programs focus on best water, sanitation, and health practices to empower individuals to **take ownership of their technology**.

AguaClara Implementation Strategy