

# AguaClara and Sustainability

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### Introduction

The AguaClara team at Cornell University conducts laboratory research to create robust technologies for drinking water treatment that will be both ecologically and economically sustainable. The AguaClara program applies an economy-of-scale to community development by incorporating the algorithms derived in our labs into a free [design tool](#) that allows users to receive customized plant designs from our servers at zero marginal cost to either of us. The plants we design are gravity-powered and appropriate for both resource-poor communities and for forward-thinking communities everywhere.

### The Challenge and the AguaClara Niche

Diarrheal diseases, mostly from unclean water, claim the lives of approximately 5000 children throughout the world every day. Drinking untreated water and using it for bathing are major causes of waterborne disease. When coupled with basic sanitation, access to sufficient safe drinking water reduces this toll dramatically (UNICEF, 2005).

Many municipal water treatment plants in the Global South have been based on conventional technologies designed for use by wealthy nations. They are not sustainable when operated away from their normal supply chains, trained technicians, and capital investments, and it is common to see these plants sitting unused or broken in cities with unsafe water. In the communities that are capable of maintaining the complex machinery and computer systems in these plants, there is often a massive debt between the utility and the electric company.

AguaClara technology is an innovative way to bring economy of scale to water treatment, while maintaining simplicity of design that can be sustained by resource-poor communities. The AguaClara plants require no electricity and both construction and repairs can be completed with local materials and labor. Plant designs are robust and scaled to meet the projected need in each community for years to come. The project also provides sustainable designs for towns that were previously considered too small for community based water treatment.

The one-time construction and capacity-building cost for an AguaClara plant is \$15 to \$30 per person served, with annual fees for operation and maintenance amounting to approximately \$2 per person.

### Global Demand for AguaClara Technology

We have been unable to find any databases that have sufficient detail to characterize the global demand for the AguaClara technology. We can create a very rough estimate based on a few assumptions. The demand for robust, energy efficient, water treatment technology is based on a combination of the large unmet demand for safe drinking water, the increased demand due to population growth and urbanization, and the need to replace aging infrastructure.

A conservative estimate of the unmet demand for safe drinking water is that globally, [884 million people](#) are currently without access to improved water supply and an additional number of those with improved water supply do not have access to safe water. Improved water is defined by the [World Health Organization](#) as household connections, public standpipes, boreholes, protected dug wells, protected springs, and rainwater collections. Unimproved water sources are unprotected springs, unprotected wells, vendor-provided water, tanker truck-provided water, and bottled water. Inclusion of household connections in the list of improved water sources without regard for the source of that water has led to a gross overestimation of the number of people who have access to safe water. Given these definitions, untreated surface waters that are piped to homes count as an improved water supply and thus are classified as safe for the purposes of the millennium development goals.

To create a very rough estimate of the global demand for the AguaClara technology, we make the following assumptions:

- 2 billion people lack access to safe water.
- 25% live in communities between 1000 and 50,000 (as is the case in Honduras).
- 25% of communities use surface water sources.

Thus 125 million people need AguaClara water treatment plants. If we further assume that our goal is to meet this demand in 10 years and that there are an average of 12,000 people per water treatment plant, we obtain an estimate of 1000 plants per year! This estimate does not include population growth or the need to replace aging infrastructure.



View of the water source used by 5400 people in the town of Moroceli, Honduras. This water may be occasionally chlorinated, but chlorine does not make turbid water safe. In Honduras over 25% of the population live in towns with populations between 1000 and 50,000. Most of these communities use untreated surface water sources that are often extremely turbid during the rainy season. These water sources are classified as improved by the World Health Organization.