FAQ

How do AguaClara technologies make water safe to drink?
AguaClara technologies in plain English

Why is AguaClara at Cornell a program rather than a project?
Unlike a project, the AguaClara program has no ending date. The program includes multiple basic and applied research projects as well as an ongoing design team. The complexity of treating surface waters, the multiple processes that must be coupled, and the need to invent new systems that meet the criteria of sustainability provide the impetus for a long term program where extensive expertise can be acquired through multiple iterations of the innovation cycle. The scope, duration, and complex nature of the challenge we are working to solve qualifies AguaClara as a program rather than a project.
See our AguaClara at Cornell University - A White Paper describing the AguaClara program at Cornell.

What inspired you to begin working on water issues?
I think the ideals of sustainability were core values for me since childhood. Perhaps I was inspired by the energy crisis of the 70's. I was interested in alternative energy sources as a teenager and built a windmill that generated electricity while I was in high school. My passion shifted to water while I was in Honduras working with Salvadoran refugees from 1982 to 1983. It was obvious that water is a critical need and that contaminated water is a source of a lot of suffering. I, of course, experienced the agony of waterborne disease while I was in Honduras.

The specific challenge of treating surface waters came up in a conversation with Jacobo Nuñez in January of 2004. He asked what we could do about the muddy water that they were piping to rural communities. By that time I had a Ph.D. in environmental engineering, but I realized that I still didn't know enough to answer Jacobo's question. I knew how to treat surface waters in the United States and I realized that a different strategy would be required for communities in Honduras.

How long did it take to develop the technology?
We've been working on developing the technologies since 2005. There are two key ideas here. First, all the versions of the technologies that we have tested produce clean water. Second, we are evolving the technologies very rapidly and will continue to improve performance and lower the costs in the coming years. One of our insights was that the fastest way to evolve the technology was to engage directly with an implementation partner, Agua Para el Pueblo so that we can see the advantages and disadvantages of each of our design changes.

What were the main obstacles in development?

- * A major challenge continues to be funding. It is possible to find donors who are willing to support bricks and mortar, but it is very difficult to find support for the research, innovation, and design work that is required to develop new high performing and sustainable technologies.
- * The number of innovations required to create a sustainable technology was daunting.The number of innovations required to create a sustainable technology was daunting.
- The project size is larger than for point of use water treatment and* The project size is larger than for point of use water treatment and so the risk of failure during innovation were larger.
- The technology development required and continues to require many years of Research, Invention, Design, and full scale implementation with partner organizations. The scale of the program and the required partner network is beyond the capabilities of most university project teams. We were fortunate to have connections with a partner organization that was willing to take the risks to try new technologies and new approaches.

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If the first experiments with water treatment technology were in the 1800's why has it taken so long for a sustainable form of water treatment to reach Central America?
I think there were many events that prevented the evolution of water treatment plants. Here is a list...

- Electricity was new and exciting in the early decades of the 1900's and so engineers were delighted to use electricity for water treatment.
- Regulations and design standards are based on empiricism rather than good science. These regulations make any further improvements in water treatment plant designs very difficult to implement.
- There has been very little research on optimizing the overall processes of surface water treatment.
- Environmental Engineers have assumed that because water treatment technologies are well over 100 years old, that there isn't much new to learn.
- There is a common conception that if water is dirty, that you should filter it. That myth is widespread even among engineers. The truth is that filters are good at taking clean water and making it cleaner. If the water is really turbid, then filters are useless. We had the insight that if the water is dirty, then the only technologies that work well are flocculation and sedimentation, and that if those processes are operated well, that the water is clean enough for disinfection to be effective. Our willingness to eliminate filters made it possible to create a low cost, sustainable solution for drinking water treatment.

What are your hopes for the future?
I dream big. It is those dreams and the dreams of the many members of the AguaClara team that have guided the AguaClara project. I knew from living in Honduras that the need for drinking water treatment was everywhere and that if we were serious about addressing this problem we had to create a solution that could scale up. Early on I estimated that the need for resilient, low cost, sustainable surface water treatment for municipalities was in excess of 100,000,000 people. Or put another way, if we want to address this problem over a 10 year period someone needs to be building 3 AguaClara water treatment plants EVERY day. We needed to develop the capability to design the water treatment plants using an automated software package so that a relatively small team of Cornell engineers could effectively design multiple water treatment plants rapidly. And we needed to do the research to develop the optimal design constraints. My dreams are

- to continue to improve the technologies, to provide a global online design service at no charge
- to find someone who is interesting in sponsoring the research and design work that is necessary to continue to improve the technologies
- to develop a mechanism to provide technical support to a growing number of implementation partners
- to provide the best educational opportunities to students.
- And of course, the real dream... is to make it possible for millions of families to have safe water to drink, clean (and safe) dishes to eat from, and clean (and safe) food to eat.