

AguaClara Reach



**SAFE
WATER 
ON TAP**

An aerial photograph showing two children swimming in a large body of green, rippling water. The child in the upper left is partially submerged, and the child in the lower center is also swimming. The water's surface is textured with small waves and ripples. In the top right corner, a portion of a stone or concrete structure is visible.

Two billion people lack access to clean drinking water around the world,
and **two million** children, women and men die every year due to waterborne disease.

AguaClara Reach is working to change that.

Sustainable Community-Owned Water Treatment

AguaClara Reach transforms lives by enabling communities across the globe to have clean water on tap for life. We train partner organizations to design and deploy non-electric municipal-scale water treatment systems — life-giving technologies that are affordable, disaster-resilient, and can be operated independently by under-served towns and villages. Beginning in 2005, the technologies were developed at Cornell University in collaboration with water and sanitation experts working on the ground, and they undergo ongoing improvement based on new research and lessons learned in the field.

AguaClara technologies are:



Local

built using locally-available materials by local labor



Simple

can be operated by a person with a 6th grade education



Affordable

powered by gravity, minimizing operational costs

Since the inception of the AguaClara program at Cornell Engineering, 14 plants have been built in Honduran towns, serving 65,000 people, and 4 village-scale plants have been built in India, serving 2,000 people. Each of these systems is still being operated and maintained by the communities they serve. These successes are driving calls to launch AguaClara technologies throughout the world. **With donor support, we can increase the capacity of AguaClara Reach to meet these needs, growing from 67,000 to 500,000 people served in 5 years.**

How? We carefully select partners who have demonstrated the ability to mobilize local communities and manage community-based construction projects. These partners undergo a series of courses both in the classroom and in the field so they can independently roll out AguaClara technologies. **Each partner we train gains the capacity to design and build many plants, resulting in an exponential increase in access to safe drinking water on tap.**

A Proven Solution

Dr. Monroe Weber-Shirk, Director of the AguaClara program at Cornell University, worked in Salvadoran refugee camps in Honduras in the early eighties. There, he was led to a simple question: *People in the mountains of Central America have water piped to their houses, but can't drink that water. How can this be remedied?* In 2005, he formed a student-based team at Cornell Engineering to answer this question. The result was the invention of water treatment technologies following three basic rules: they would be simple, locally-based, and non-electric. After 12 years of inspired laboratory research, bold field trials, and continuous construction improvements, there are now more than 65,000 people in 14 Honduran towns served by AguaClara water treatment plants.

In 2013, AguaClara Cornell graduate Maysoon Sharif (B.S. '10, M.Eng '11) founded a social enterprise, AguaClara LLC, to pilot 4 modified AguaClara systems for small, remote villages in India, serving an additional 2,000 people. The enterprise was listed as B Corp's Best for the World Overall in 2015 and 2017. **AguaClara technologies have stood the test of time and thrived in different settings. This is a proven solution with a strong track record.**

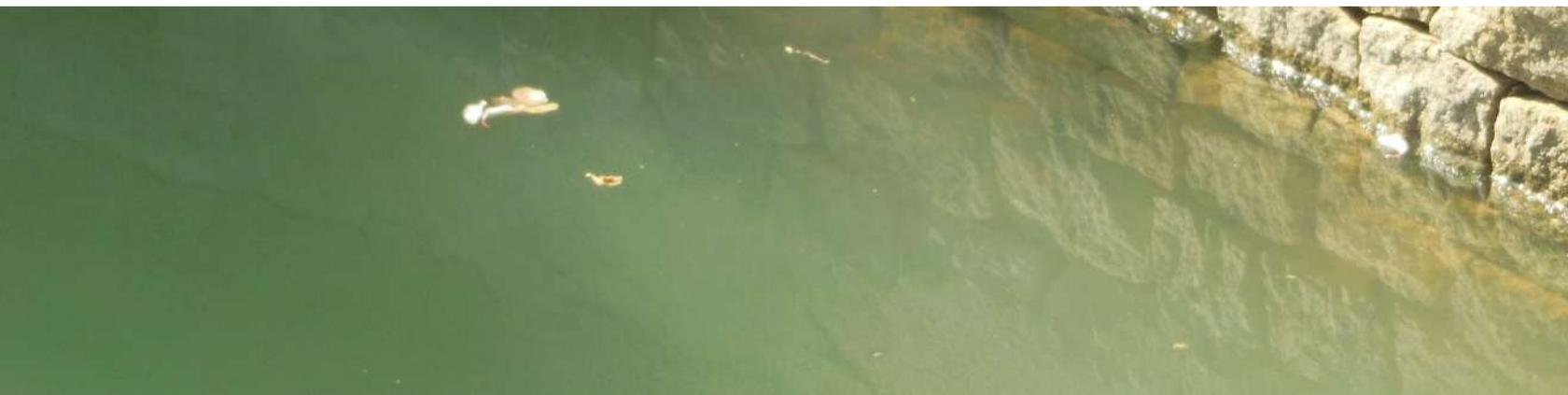
"I've given something good..."

"When my community named me Vice President of the Water Board, I told them I didn't know anything about the role. I come from a very humble family. I'm a farmer, I grow corn, beans, squash, and I have a few cows for milk. I completed school up to the 6th grade. 'Don't worry,' they told me, 'We'll teach you everything you need to know.' Later, when it came time for the President to step down, they nominated me for the role.

"When we were getting ready to build the AguaClara plant here in Alauca, convincing some people that it was a good investment wasn't easy. 'How much money have you invested in being sick?' I asked. 'This is what we want to change, so that you don't suffer.' Now, thank God, man has given us this technology, this plant. I feel very proud that I've given something good to my children. They will have clean water, treated water."

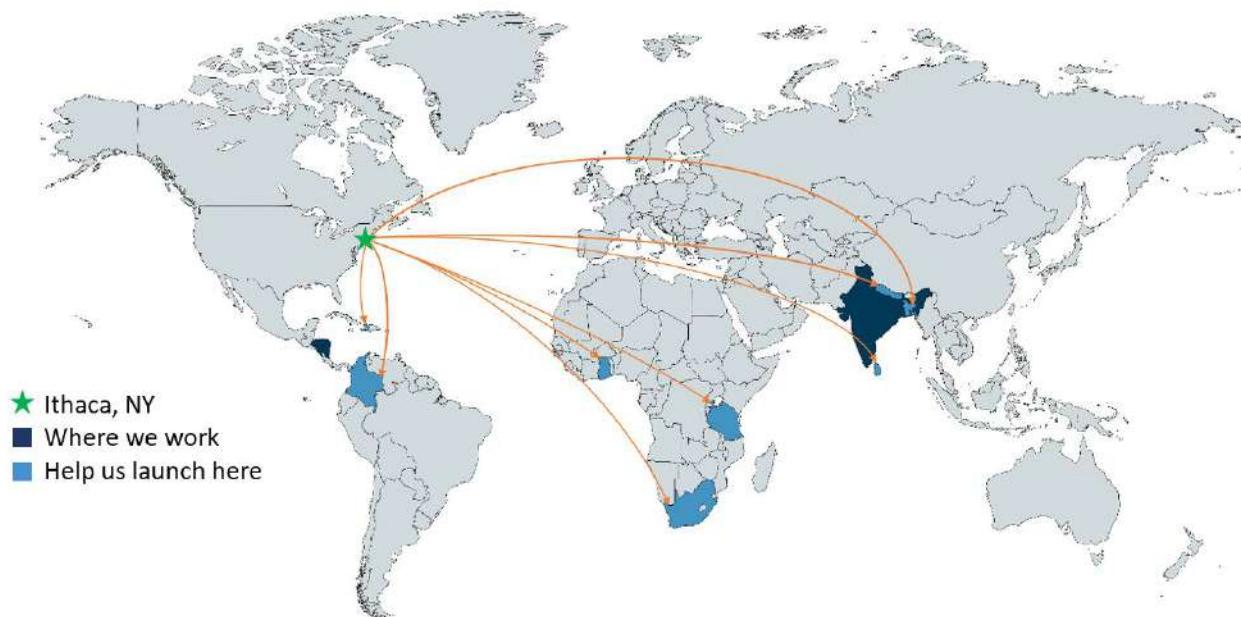
— Antonio Andara Lira

Water Board President, Alauca, Honduras



The Time to Act is Now: The Launch of AguaClara Reach

Our award-winning program and history of successes have resulted in urgent appeals for us to spread our positive impacts, to substantially reduce the startling 40 deaths every ten minutes attributed to waterborne disease.¹ **We now have a unique window of opportunity to rise up to a global need** — a need much larger than what the Cornell student program and a small social enterprise alone can address. To build our capacity to respond to the calls before us, we have established the non-profit organization AguaClara Reach. This new entity is powered by a board of Water and Sanitation and management experts, including key AguaClara founders, and further supported by more than 10 experienced volunteer specialists on our Advisory Council. Through its educational mission, this non-profit can enable our Indian implementation partner to scale our single-village Hydrodoser pilot to 150 village systems in the next 3 years. In Nicaragua, we will be able train partners who, inspired by the success of the Honduras projects, have begun construction on their first AguaClara plant with the intention of undertaking a country-wide program. We also have the potential to work in Bolivia, Haiti, and Colombia. **But first, we are reaching out for donor support to build a strong foundation — and full time team — upon which AguaClara Reach can construct a successful world-wide program.** This funding will enable us to shift from a mode of incremental, one-off projects, to the kind of international scaling necessary to meet the basic human need for clean drinking water on tap.



1. <http://www.who.int/sustainable-development/housing/health-risks/waterborne-disease/en/>

Water — The Source of Life

When safe water supply infrastructure is introduced into communities for the first time, individuals are empowered to pursue endeavors they could not while facing recurring sickness. Adults have more productive working days, and children attend school more often. Women, who bear the burden of collecting water for the household, use the time previously spent on this chore on childcare, helping to reduce infant mortality. Women also use the time saved to participate in leadership roles in the community, giving them more representation in a democratic process that may otherwise not address their needs. The rate at which girls participate in education increases noticeably when they do not have to worry about water collection. The benefits of having clean drinking water ripple through every aspect of life, promoting gender equality, strengthening the earning potential of communities, and enabling individuals to fulfill the future they envision for themselves.

Water is **Women's Empowerment**

Women walk miles every day to collect water for household use, causing young girls to miss school.



Water is **Climate Change**

Water treatment is energy intensive. 25 million tons of greenhouse gases are emitted each year to provide drinking water to Americans alone.



Water is **Peace**

Many communities use stressed, deep groundwaters to eliminate the need for expensive treatment plants. Depletion of scarce resources provokes regional water wars.



Overcoming Barriers to Sustained Drinking Water Supply

Safe water on tap



Tap water service allows girls attend school more often. Having more free time, women take on leadership roles in the community.

Clean energy & Water conservation

AguaClara plants are powered by the cleanest energy: **gravity**.

They waste 80% less water than conventional alternatives.



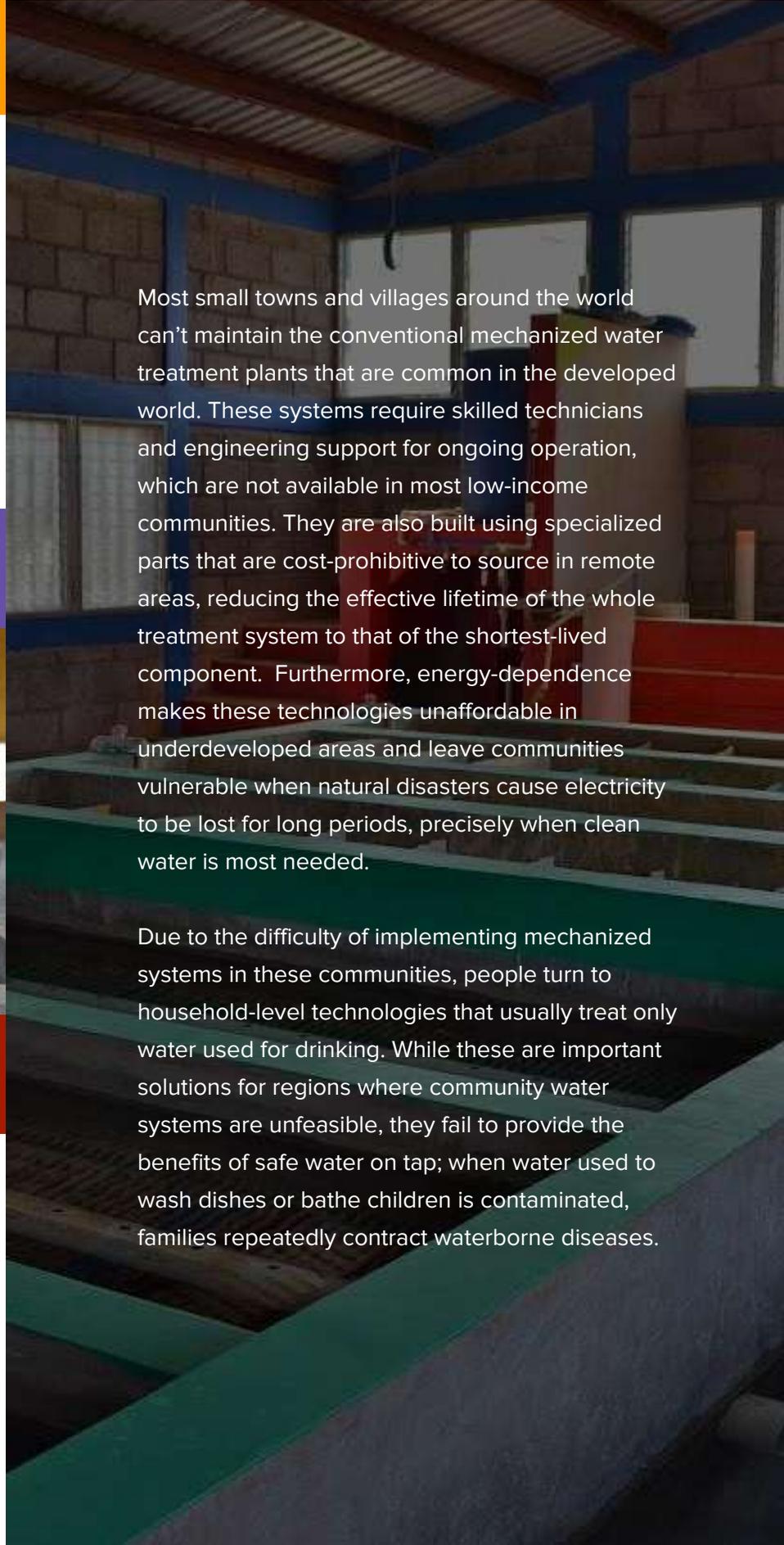
Equitable Resources



AguaClara plants make treating surface water affordable and sustainable where it was not before. The goal of safe drinking water for all is within reach.

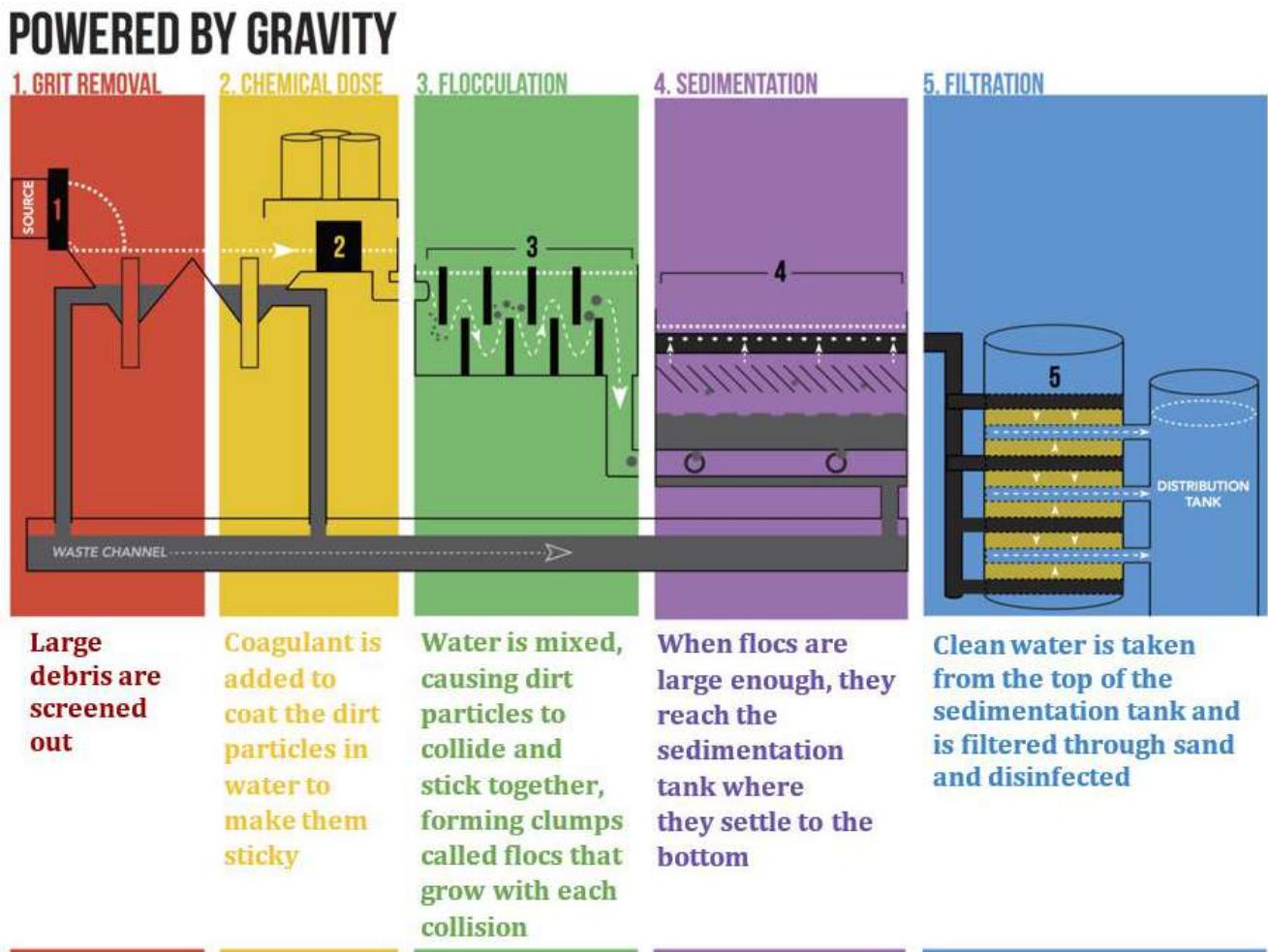
Most small towns and villages around the world can't maintain the conventional mechanized water treatment plants that are common in the developed world. These systems require skilled technicians and engineering support for ongoing operation, which are not available in most low-income communities. They are also built using specialized parts that are cost-prohibitive to source in remote areas, reducing the effective lifetime of the whole treatment system to that of the shortest-lived component. Furthermore, energy-dependence makes these technologies unaffordable in underdeveloped areas and leave communities vulnerable when natural disasters cause electricity to be lost for long periods, precisely when clean water is most needed.

Due to the difficulty of implementing mechanized systems in these communities, people turn to household-level technologies that usually treat only water used for drinking. While these are important solutions for regions where community water systems are unfeasible, they fail to provide the benefits of safe water on tap; when water used to wash dishes or bathe children is contaminated, families repeatedly contract waterborne diseases.



An Improved Solution

AguaClara technologies treat surface water, like that from a river or stream, and shallow groundwater, like that from a dug well. The systems treat water for turbidity (particles that cause water to be cloudy) and disease-causing pathogens, and they range in size to serve communities between 300 and 100,000 people. AguaClara plants cost half as much to build and one third as much to operate as a conventional mechanized plant and can treat very dirty water (up to 1000 NTU of turbidity). They utilize various combinations of conventional processes, which, through research and development at Cornell, have been re-engineered to be more affordable, higher performing, simpler to operate, and long lasting.



The AguaClara Difference

AguaClara technologies are the only 100% non-electric municipal-scale water treatment solutions that are sustainable in under-served communities. The systems are long-lasting because:

- They are built, and can be repaired, locally.
- They use locally-available materials such as cement, PVC pipe, and sand.
- Designs are modular, making it easy to remove parts for maintenance or repair.
- Operation and maintenance is simple enough to be carried out by a local operator.
- Water is safe: it meets World Health Organization standards for drinking water quality.
- Operation and maintenance are affordable, even where people earn less than \$2 per day.



Innovations

AguaClara technologies include three key innovations, developed at Cornell, that make them uniquely sustainable for communities with limited resources:



Hydrodoser

A chemical dose controller that automatically turns on and off and automatically adjusts to fluctuations in raw water flow rate without electronics, sensors, or pumps.



Optimized Floc-Sed

Unique geometries allow for floc blanket formation in the self-cleaning sedimentation tank, producing water that meets World Health Organization standards for turbidity prior to filtration.



Stacked Rapid Sand Filter

Uses 80% less area to build and 80% less water to backwash than a rapid sand filter. Backwash is achieved — without pumps or clearwells — by opening and closing a 1/2-inch valve.

Easier to Operate, Higher Performing

- All tanks are open so the operators have visual feedback of system performance, allowing them to develop intuition for operation.
- The processes are fast, facilitating rapid response to sudden changes in raw water quality and minimizing water waste.
- They use simple hydraulic controls to minimize both operational requirements and use of parts that need replacement.
- They have unique tank designs that allow them to be self-cleaning.

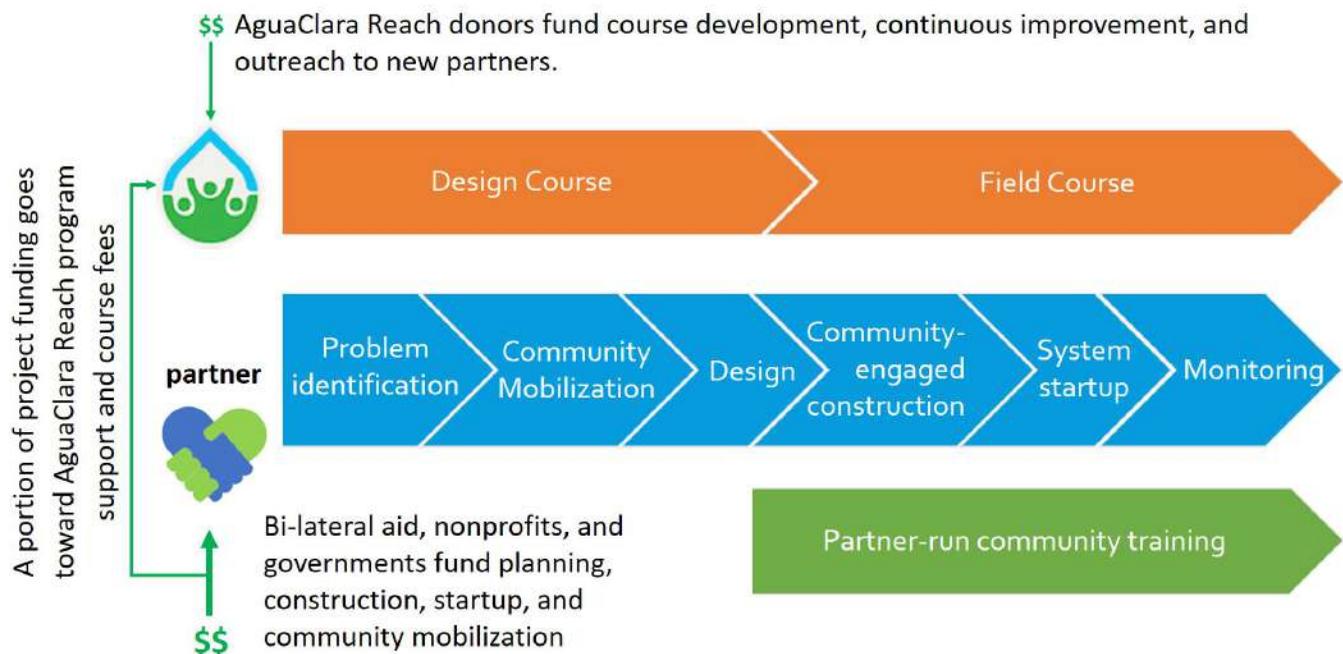
Building Sustainability: The Implementation Process

Our implementation model is based on the empowerment of local stakeholders to not only design and build AguaClara technologies, but also to maintain them independently for decades at a time. Partners undergo rigorous training courses that span from the problem identification stage, where the required technology mix is determined, to the civil design phase. Once construction commences, partners take a field-based construction course meant to teach the skills necessary to take them through to the monitoring period and beyond. During this time, the partner is preparing the community to take ownership of the system through structured training.



Building Sustainability: Education for Lifelong Service

Individuals in our partner organization receive accreditation for taking design and field courses, and systems implemented by accredited professionals are eligible for certification by AguaClara Reach. Instruction is geared to the experience level of the partner, and course fees become a smaller proportion of overall project costs as partners gain expertise. The highest level courses are focused on continuing education, which is required to maintain accreditation, ensuring the partners have the knowledge to implement the latest advances in AguaClara technology.



Partners act as project managers and take primary responsibility for finding funding for their project. Construction costs are typically covered by the local government, bi-lateral aid, and other nonprofits, and may include funding from private donors. Course fees cover a portion of AguaClara Reach's course development and training costs. Donors cover the remaining training cost and also support general program development, such as piloting new systems, commencing new country programs, and design upgrades based on research by the Cornell Engineering student program.



Community Ownership

Once a system is handed over to the community, consumers pay an affordable tariff to their local, democratically-elected Water Boards to run the system. The Water Boards are responsible for purchasing consumables and paying the operator. For just \$1-5 per household per month, each person can receive 100 liters of water per day, while also enabling the Water Board to save for basic repairs in the future. In this way, we are training our local partners and communities to provide safe water to all, not just for a day or a year, but for a lifetime.

The partner works to create community buy-in for the water project, then commences construction with community labor.



We train partners through a series of courses in the classroom and in the field, enabling them to deploy our open-source technologies widely and independently.

A Water Board is democratically elected by the community to manage the system. They collect tariffs to pay for the local operator's salary and consumables, and save for basic repairs.

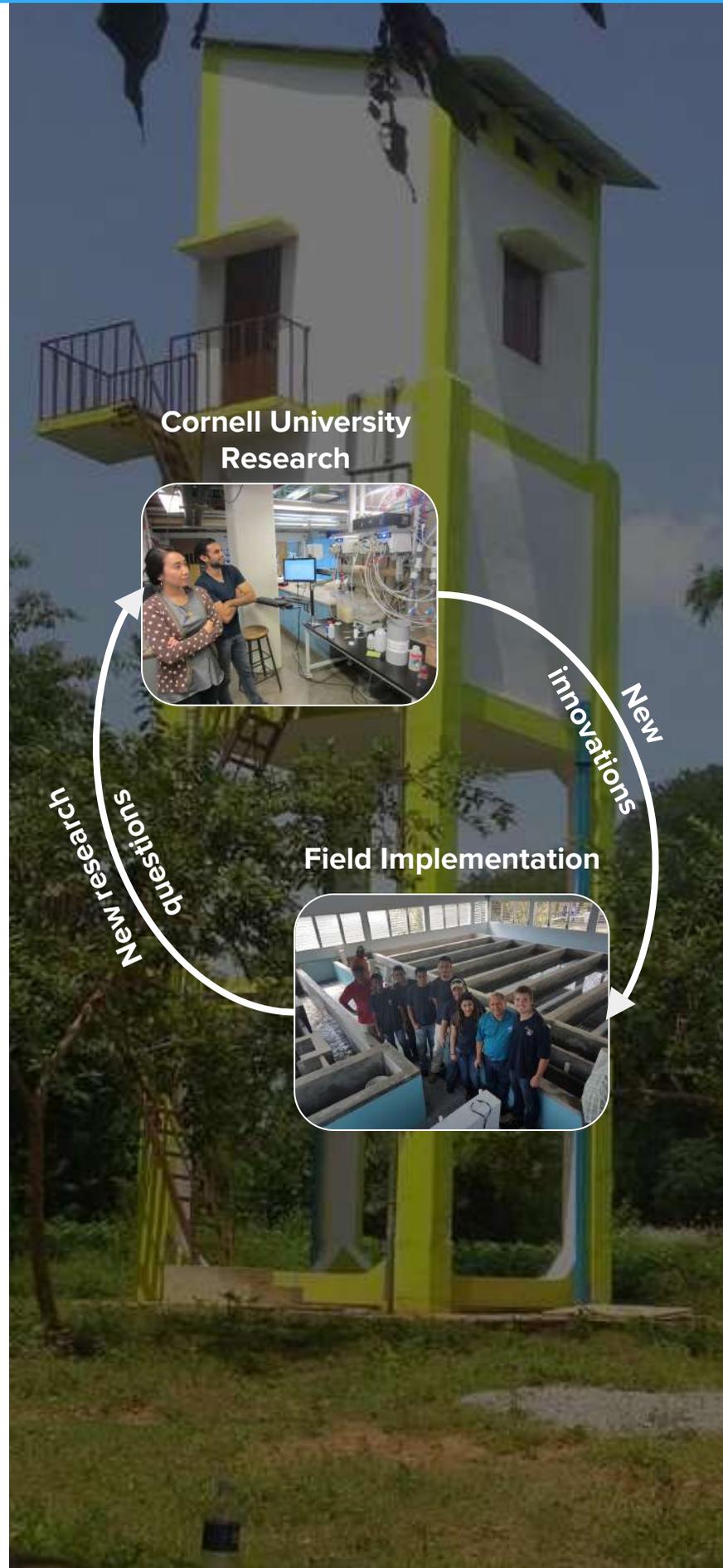
Partners are a source of long-term technical support for the community.



Ongoing Research: Stretching our Borders

Water quality problems are complex and varied around the world and require a multitude of innovative solutions. While our re-invention of conventional technologies has made them widely-applicable in underdeveloped areas, we work ceaselessly to identify the most pressing needs encountered in the field and share that knowledge with Cornell University to drive further research and development.

Still, there are problems beyond turbidity and pathogenic contamination that need to be solved to reach the two billion under-served. The Cornell Engineering student program continues to create non-electric technologies that treat other contaminants, such as arsenic and fluoride. Sustainable wastewater treatment solutions are another major area of technology development which will enable us to holistically address the factors that impact the health of a community. With ongoing research, made open-source by Cornell, we continually work increase the number of people potentially benefitted by AguaClara technology.



Help us Reach our Next Community



San Matías, Honduras
January 2016
3,800 people served



San Nicolás, Honduras
April 2014
6,000 people served



Gufu Village, India
August 2013
500 people served



Ronhe Village, India
August 2013
500 people served



La Concordia, Nicaragua
Under construction
3,000 people to be served

Help us Reach our Next Community



When Several Drops Become an Ocean

"I used to boil the water for hours and it would still be dirty." As a cook, Doña Reina now saves times and worry by receiving clean water directly into her home from the AguaClara plant in Tamara. "Now the water is pure; I know I am serving people healthy, clean food." Doña Reina says that the water treatment plant has attracted new residents, which helps her business. "We have cleaner water than the capital," she proclaims with pride.

AguaClara technologies have profoundly transformed the communities they serve. In one town in Honduras, the health center did not originally keep records of incidence of waterborne disease because there were far too many to keep track of. After our system was commissioned, the health of the community improved dramatically, and the health centers began keeping records of the now manageable numbers. In a village in India, community members voted to subsidize the \$1 per household per month water tariff so the elderly and widows would not have to pay. Furthermore, the men and women who participate in the construction of the systems gain additional employable skills and go on to work on related construction projects in neighboring communities. The benefits of having clean drinking water on tap cascade into every aspect of life, enabling communities to not only survive but thrive.



Donors, Awards, Partners, and Networks

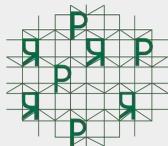
CornellEngineering



Gram Vikas 



AUTODESK.
ENTREPRENEUR IMPACT PARTNER



Board of Directors



John Finn, P.E., President of the Board, has over 30 years of experience in senior management of leading engineering firms. He has spent 2 years as leader of a relief and development program in Cambodia, and is an expert in new enterprise development and team leadership.



Dr. Mark Hurwitz, Secretary of the Board, has over 30 years of experience in new product development for the filtration and separations industry including management of development teams across multiple continents. He is now an Adjunct Professor of Chemical Engineering at Cornell University.



May Sharif, Executive Director and Treasurer of the Board, first joined the AguaClara program as a student at Cornell University in 2009. She worked for two and a half years in India to pilot AguaClara's filtration and disinfection technologies in 4 villages.



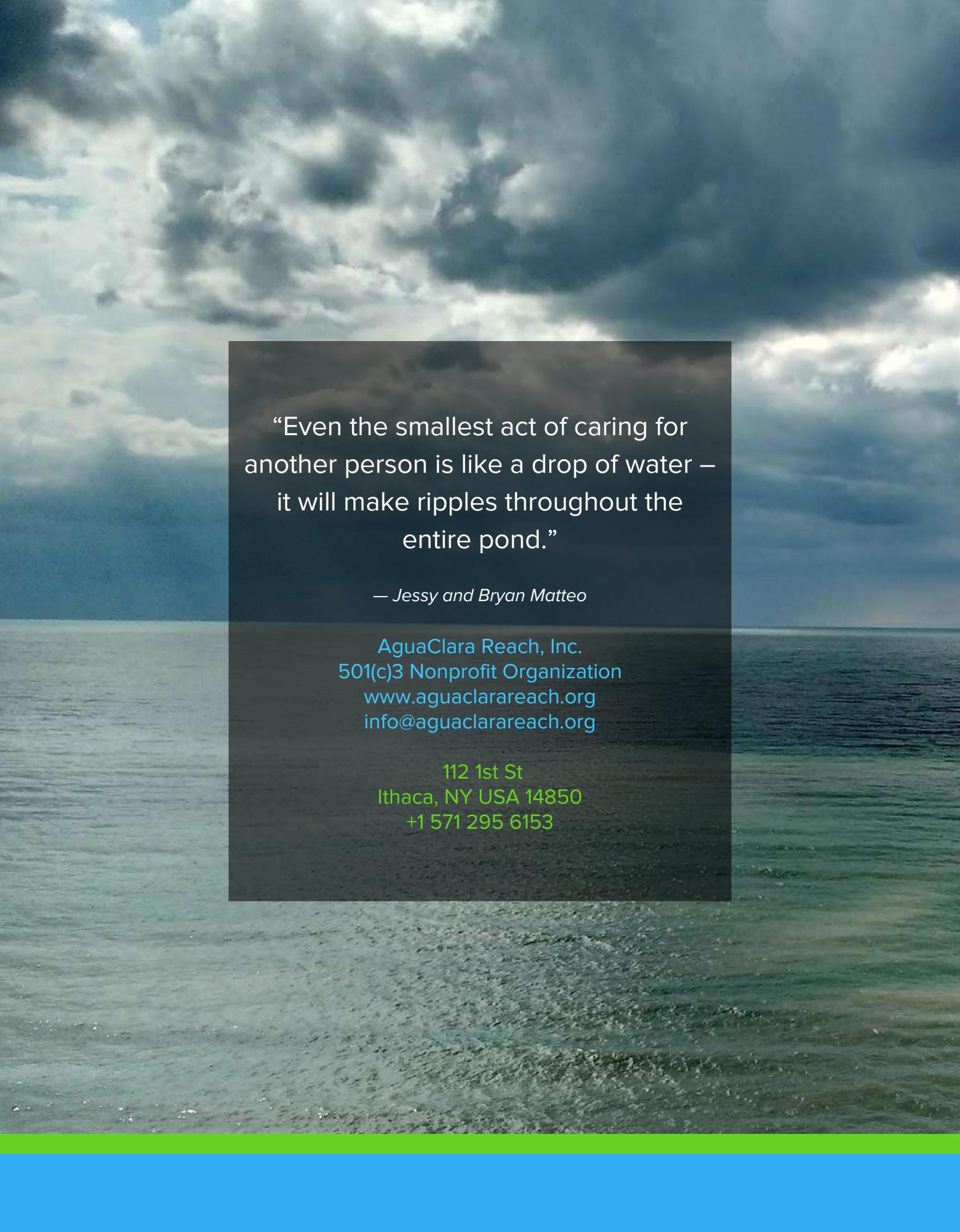
Dr. Monroe Weber-Shirk founded the AguaClara program at Cornell Engineering in 2005. He continues to run the Cornell program, directing over 70 undergraduates and graduates in research and technology development.



David Tipping is a senior international water, environment and sustainable development specialist with over 30 years of experience across multiple industries and sectors, including United Nations appointments. He is currently Senior Executive Officer / Senior Projects Manager for the Australian Government.



Daniel Smith is an environmental engineer who has worked on water, sanitation, and hygiene programs in Latin America and Africa, including over three years with AguaClara in Honduras. He is now a PhD student at Stanford University studying determinants of economic demand for safe water in Bangladesh and Africa.



“Even the smallest act of caring for
another person is like a drop of water –
it will make ripples throughout the
entire pond.”

— *Jessy and Bryan Matteo*

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