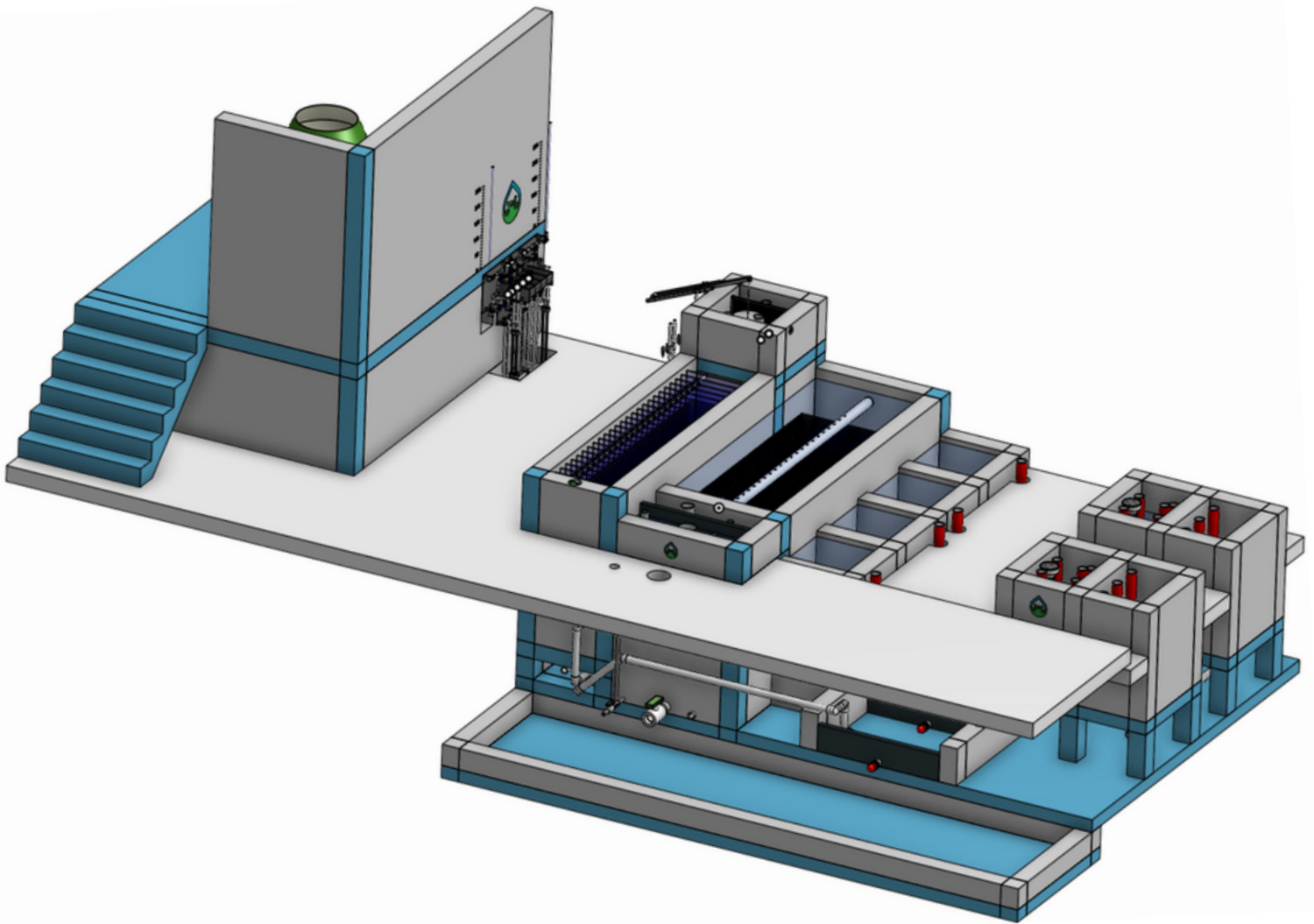


WATER WE DOING?

An AguaClara Newsletter



A full AguaClara plant designed and modeled using the AguaClara Infrastructure Design Engine (AIDE) in Onshape.



LETTER FROM THE EDITOR

Hello AguaClara members, supporters, family, and friends,

We are excited to present you with the 2022 AguaClara Newsletter. In this edition, you will learn all about what we've been up to this past year, from how we've progressed our smart design to create full scale plants, to newly completed partner projects and research updates.

Thank to you to all the contributors for helping to make this newsletter.

Thank you for being a drop in the AguaClara bucket.

With love,
Zoe Maisel
AguaClara Reach Board President

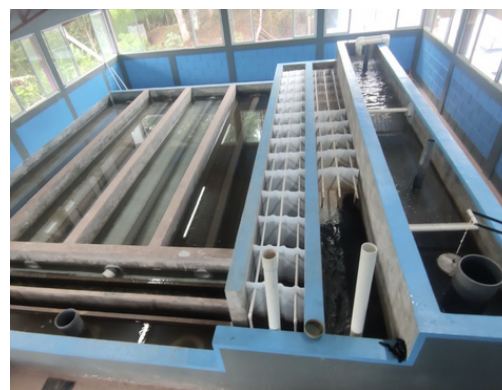
TABLE OF CONTENTS

New Projects with Agua Para el Pueblo	3
New Filter Design	4
AguaClara Infrastructure Design Engine Progress	5
New Partner Development	6
Research Team Spotlight	7
Research, Invent, Design, Empower	8
Volunteers	9
Welcome to the Board of Directors	10
ACR Donor Thank You's	11

NEW PROJECTS WITH AGUA PARA EL PUEBLO (APP)

New 24 L/s Plant in Waslala, Nicaragua

We have continued to work closely with Agua Para el Pueblo (APP) as we look forward to new projects. APP finished the Waslala, Nicaragua project a few months ago. Waslala is the largest plant built in Nicaragua to date with a capacity of 24 L/s and is the first AguaClara plant that contains a unit process, the entrance tank, that was designed using the AguaClara Infrastructure Design Engine (AIDE).



The AguaClara Waslala plant replaces a rapid sand filtration system that was abandoned because the water source is much too turbid to be appropriate for direct filtration.

New 10 L/s Plant in Divina Providencia, Honduras



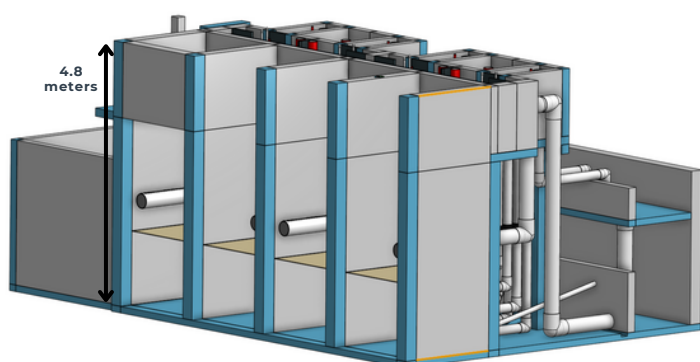
The Divina Providencia water treatment plant is nearing completion! It is located in the valley north of Tegucigalpa and is just a few hundred meters up the hill from the Cuatro Comunidades AguaClara plant. Like the Waslala plant, the Divina Providencia plant replaces an abandoned filtration system that was unable to treat the turbid water source.

The Divina Providencia plant is built inside one of the previous filter boxes, illustrating again the advantage of the AguaClara high rate treatment processes that are more compact and that can reliably treat a wide range of raw water contamination. Divina Providencia joins Tamara, Cuatro Comunidades, Las Moras, and Campo Verde to become the 5th AguaClara plant in the Amarateca valley, a 30 minute drive north of Tegucigalpa.

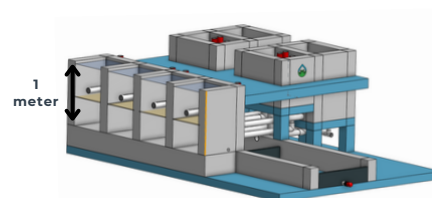
NEW FILTER DESIGN

The design for a new 3 L/s plant in Santa Rosita, Honduras can be used for other filter projects.

APP is exploring a potential project to build an AguaClara plant for a hospital in the Amarateca valley. The required flow rate is 3 L/s which is smaller than any of the AguaClara built-in-place plants that APP has constructed. We've been working with APP to invent a new, shallow, open, Stacked Rapid Sand filter (StaRS) and to complete a scalable design for plants in the flow range from 3 - 12 L/s. This will add to our previously created 16 - 100 L/s design range capabilities. Creating this filter has illustrated the power of the AguaClara Infrastructure Design Engine to iterate and refine designs.



Existing OStaRS filter for 80 L/s plant



New OStaRS filter for 3 L/s plant

There are several Honduran communities who have AguaClara plants that were built before we had the Stacked Rapid Sand filters. Two of those communities, Marcala and Atima, have been in conversation with APP about potential projects to add filters to their AguaClara plants. Our original open StaRS filter would be a great fit for the Marcala plant given the flow rate of about 55 L/s. The Atima plant flow is only 12 L/s and it isn't possible to build a pair of open StaRS filters for that flow rate. APP engineers were excited to realize that the new shallow StaRS filter could be the solution for Atima.

AGUACLARA INFRASTRUCTURE DESIGN ENGINE (AIDE) PROGRESS

The power of AIDE is that a back of the envelope calculation can now be replaced with work done directly in AIDE, as it is relatively simple, minimally time-consuming, and gives us access to an exact solution very early on.

This year, we've been adding to our part database, which AIDE uses to select and draw the correct parts for our designs. We now have 243 pipes and 445 fittings included in our database, in addition to parts such as hose clamps, cables, walls, polycarbonate sheets, and fasteners.

The development of our parts database is not an exclusively internal process. We've been in frequent communication with our colleagues at Agua Para el Pueblo (APP) and they've been providing valuable feedback on how the presentation of information could work best for them.

AIDE provides fast and accurate designs with specific parts and cost estimates.

The APP team also wanted the ability to expose certain parts of the 3D model in layers, such as showing only the concrete or plastic parts, or focusing on a single unit process.

v Plant summary		
Description	Cost USD/(L/s)	Total Cost (USD)
Plant Total	5468.187	16404.56
Unassigned parts Total	898.29	2694.87
chem Total	683.277	2049.83
clarifier Total	1223.373	3670.12
et Total	372.673	1118.02
filter Total	1787.033	5361.1
floc Total	503.54	1510.62

Because our designs are now created in Onshape and APP views our final designs in AutoCAD, this layering is not automatically applied. However, we created a simple process to add the requested layers to our designs in AutoCAD, and shared this process with APP so they could use it as needed.

NEW PARTNER DEVELOPMENT

ACR is preparing to scale-up partnership development by establishing a partnership model framework and cost model for our services.

As we pursue our strategic plan of enabling more communities to have safe water on tap we are in the early stages of building connections with more implementation partners. While creating the AguaClara Infrastructure Design Engine enables us to provide a valuable design service to partners, we also need to establish the terms of the partnership so that expectations are reasonably clear from the beginning. The ACR project committee has created a draft memorandum of understanding defining our proposed partnership model. They have also created a cost model for ACR services of designs and technical support. Those documents will provide a roadmap as we grow the AguaClara network.

Term Services Memorandum of Understanding (MOU)

1. Define responsibilities for ACR and Implementation Partners (IPs).
2. Provide partnership agreements that will be maintained for 3 year terms.
3. Ensure continued data-sharing and collaboration between organizations.

Cost Model Attachment for MOU

1. Create a transparent fee structure for ACR services that will provide sustainable funding streams through projects.
2. Establish capacity-based design fees proportional to plant treatment capacity, and hourly fees for ongoing technical support.

We are in the process of getting feedback from our existing partners and legal advisors. We plan to share the MOU and Cost Models on our website soon, so stay tuned!

RESEARCH TEAM SPOTLIGHT

AguaClara Cornell (ACC) students were busy this summer continuing important research with the Cornell Water Filtration Plant (CWFP). The ACC pilot plant subteam focused on two main tasks for the AguaClara pilot plant that is currently located in the CWFP.

The 0.5 L/s AguaClara Pilot Plant at the Cornell Water Filtration Plant (CWFP) is allowing students to test ACR technology with real source water and compare to CWFP's existing systems.

The first task for the students was to restart operation and improve the LabVIEW application that controls plant operation. The team ran the plant for a few hours at a time and identified and fixed problems with the turbidimeters, pumps, and control logic. The second task was to measure *E. coli* and total coliform concentrations in the raw water and in the filtered water. The presence of *E. coli* and total coliforms were tested using bioanalytics and CBTs (Compartment Bag Tests). Preliminary results confirm significant removal of *E. coli* through the pilot plant.



Students at the CWFP with ACR's Dr. Monroe Weber-Shirk, Cornell's Dr. Ruth Richardson, and CWFP's Kevin Sarmiento reviewing the pilot plant control system.



The next steps are to test and refine the algorithms for automated coagulant dosing based on the AguaClara Hydraulic Flocculation Model. We're grateful to our partners at the CWFP for all of their support and look forward to more innovations with them.

(Left) Pilot plant clarifier made of corrugated pipe (left) and stacked rapid sand filter (right).

RESEARCH, INVENT, DESIGN, EMPOWER (RIDE)

Safe Water on Tap Course at Ohio State University

ACR's Dr. Monroe Weber-Shirk taught the first course of Safe Water on Tap (SWoT) at Ohio State University during the spring semester of 2022. Monroe and Teaching Assistant Clare O'Connor taught the course using Onshape, the AIDE tool, and the AguaClara textbook. The 17 students who took the class gave positive feedback about the course and Monroe plans to teach it again in Spring 2023.

Safe Water on Tap

🏠 // ABOUT US // SAFE WATER ON TAP

FABENG 5260.02

This problem-centered design course focuses on major water quality challenges both nationally and internationally. Human and context-driven design principles are applied to drinking water contaminants with global public health impact. We develop design algorithms from first principles whenever possible and explore novel solutions. Prereq: 2110, CivilEn 3130, CBE 2420, or MechEng 3503; and Engr 1221 or CSE 1222; or permission of instructor. Not open to students with credit for CivilEn 5610.02. Cross-listed in CivilEn 5610.02.

Walk for Water in New York City



ACR hosted a Walk for Water in New York City in honor of Clean Water International's Worldwide Water for Water Day. Over 30 people attended the event and participated in small group workshops and activities included a water bucket carry. Members of other local water organizations presented on their work.

Spring Research Conference

This year, RIDE hosted its inaugural Spring Research Conference, an event celebrating and recognizing all of the hard work done in the research and technology world of the AguaClara community. We brought together several technology and research experts to explain what they have been doing and hear their latest discoveries and developments. Presenters included Kevin Sarmiento, Cornell M.Eng graduate and employee of the Cornell Water Filtration Plant (CWFP), who spoke about his work using turbidity sensors and automated dosing systems to better track and treat fluctuations in influent turbidity. Andrew Pennock, PhD Candidate of Environmental Engineering at NJIT, explained his research on optimized flocculator geometry. ACR's Dr. Monroe Weber-Shirk and Izumi Matsuda presented developments with AIDE to create parameterized design for a water treatment plant.

VOLUNTEERS

AguaClara Reach relies on our passionate, creative, and dedicated volunteer network.

As we head into our 10th year committed to bringing safe drinking water on tap for all, we reflect on the incredible contributions made by volunteers over the years.

10 years ago, John Finn, Dan Smith, Maysoon Sharif, Monroe Weber Shirk, and Blixxy Taetzch formed AguaClara LLC to bring AguaClara Technology to communities in Honduras and India. Thank you all for your ten years of service.

In 2017, we established AguaClara Reach as a nonprofit organization. In the same year, Carol Serna and Subhani Katugampala spearheaded the installation of AguaClara Hydrodosers in India in collaboration with Gram Vikas. Thank you for your five years of service with ACR.

Again, it is through the generosity of our volunteers that ACR has a growing network of implementation partners and research partners. Together, we can continue to invent better water treatment technologies so that more communities can afford both to obtain and to maintain safe water on tap.

If you are interested in volunteering with ACR, please contact us at volunteer@aguacларareach.org. Stay engaged by connecting with us on social media!

Serena (she/hers)
ACR Volunteer Manager

Student Graduate Spotlights



Alice Zhao, she/hers
AguaClara Cornell

Research IT, Monday Night Class chair, Team Lead, Professional Development and Outreach chair.

"Many of us came together in support and belief of AguaClara's mission, and along the way, we ourselves have formed a community who've only served to inspire each other every day and beyond, which is what I am most grateful for."



Gaby Sibel, she/hers
AguaClara Cornell

Wastewater Teams Research Advisor, Monday Night Class chair, Team Lead.

"AguaClara was definitely a formative experience for my college career and really allowed me to take part in a group that I could lead and incorporate my own ideas into."

WELCOME TO THE AGUACLARA REACH BOARD OF DIRECTORS

Karen Swetland-Johnson, PhD



Karen has been involved with AguaClara since 2009, when she began her doctoral research at Cornell University. She focused on optimizing the coagulation and flocculation processes in AguaClara plants. She was also involved in early efforts to start the nonprofit arm of the organization that later became AguaClara Reach. Karen's formal education includes a bachelor's degree in Civil Engineering and a master's in Environmental Engineering from Vanderbilt University, and a doctorate in Environmental Engineering from Cornell. Karen currently works at the U.S. Environmental Protection Agency (EPA) in the hazardous waste program.

Anna Doyle, EIT

Anna Doyle graduated from Cornell University in 2017 with her Bachelor of Science and Master of Engineering in Environmental Engineering. She was involved with the AguaClara Program at Cornell from 2015 to 2017 as both a Student Researcher and Research Advisor, and has been volunteering with AguaClara Reach since late 2020 when she joined the textbook committee. After graduating, Anna served as an Environmental Education Volunteer in Mexico with the Peace Corps for two years. She currently works as an Engineer for the Division of Water Rights in southern Utah.



Jillian Whiting, EIT



Jillian Whiting has her B.S (2019) and M.Eng. (2020) in Environmental Engineering from Cornell University. As a member of AguaClara Cornell, she was a Team Lead, Research Advisor, and researcher in both water and wastewater treatment. Jillian currently holds an Engineer in Training certification and works as a Water Resource Engineer for AECOM in Massachusetts. She began volunteering with ACR in the Fall of 2020 as a member of the RIDE committee.

Thank you to our major donors!
Duane Stiller and Info Design Group (IDG)

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Please consider donating to support our critical work.

We rely on generous donors like you to advance our mission of safe water on tap for all!

Donations are accepted

through our website at
www.aguaclarareach.org/

by mail at
407 College Ave. Suite 230
Ithaca, NY 14850