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A man with a beard and mustache, wearing a blue tank top, is working on a wooden structure. He is holding a black chain that is attached to a white container. The background is a bright blue sky. The image has a dark blue overlay.

CONFRONTING CRISIS

annual report



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MISSION | To improve human health and community well-being through adequate and affordable access to clean water.





Dear Friends of Caminos de Agua,

As COVID-19 began to ravage the world in early 2020, we braced ourselves here in Central Mexico, knowing the virus would impact the rural communities where we work much more acutely. Many of these communities only receive water for a few hours once or twice a week. For far too many, that means there is no consistent water access to meet the hygiene requirements necessary to control the spread of the virus. As a result, doing work in these communities immediately became riskier – requiring much more preparation, care, and expense.

So, like the rest of the world, we were forced to change our plans this year. We pivoted early on in the pandemic and refocused our efforts to try and prepare communities most at risk, specifically those with limited water resources. We saw a gap in the COVID-19 educational materials, which are largely based on the central assumption of having consistent access to clean water. So, we started developing new materials and strategies to help communities combat the virus with their limited and inconsistent water supplies.

We also worked hard to expand water access, focusing on communities like El Fraile, whose well went completely dry over a year ago – leaving the entire community without any regular water access. We partnered with 26 other communities in similar situations. And, by the end of the year, we launched our most ambitious, and massive, project to date with our most important organizational partners including INANA, United Communities for Water and Life (CUVAPAS), Pozo Ademado Community Services (SECOPA), and the San Cayetano Community Center. Together, we built, or broke ground on, 106 large-scale rainwater harvesting systems by year's end – making 2020 the most impactful year in our history.

COVID-19 greatly limited the number of technical interns we could bring on, whom we have historically relied upon to advance the development of our water solutions. Despite this set-back in personnel,

our in-house technical staff continued to work with unparalleled passion, tenacity, and productivity. Thanks to them, by the end of 2020, and after more than five years and tens of thousands of hours invested in the lab and in the field, we brought our **first, full-scale, Groundwater Treatment System** online. This groundbreaking treatment plant is scalable to community population and contamination levels and can remove arsenic and fluoride from entire community water supplies far more quickly, efficiently, and inexpensively than other alternatives – making it an important solution for our watershed and well beyond.

We are elated and extremely thankful to bring on the *Gonzalo Río Arronte Foundation* who is responsible for funding the majority of *Agua y Salud* – the largest project in our existence. We are also very thankful to the *Municipal Department of Environment & Sustainability* of San Miguel de Allende who helped directly fund and facilitate some of our most important projects this year. But most of all, we are incredibly grateful to our *hundreds of individual supporters*. When the pandemic first hit, we were worried about simply surviving as an organization. But as we saw the need for clean water access increasing, we reached out to our network of supporters, and they stepped-up like never before.

On behalf of the entire Caminos de Agua team, including our greater network of advisors, volunteers, and our community, organizational, and academic partners who are so critical to realizing our mission, we genuinely want to thank all of you for helping expand water access to so many in 2020 – when it was needed most. We can't do it without you.

Saludos,

Dylan Terrell, *Founder and Executive Director*

THE SCOPE OF OUR CRISIS

The Upper Río Laja Watershed stretches across seven municipalities in northern Guanajuato State in Central Mexico and is a microcosm example that illustrates many of the extremely complex water quality and scarcity challenges facing Mexico, as well as many other parts of the world, today. Almost all of the water consumed in this region comes from a large underground reservoir known as the Upper Río Laja Aquifer, which serves more than 680,000 residents across several thousand distinct communities, rural and urban alike.

Our aquifer is declining at an alarming rate, from 2-3 meters per year – some of the most overexploited groundwater in the world. The primary culprit is industrial-scale agriculture, which uses close to 85% of our water supply to grow produce for export to the U.S. and other foreign markets. As a result, community wells are drilled hundreds of meters deep to reach the water table. Every year, more community wells dry up and, in some cases, literally collapse in on themselves. We have seen first hand how an entire rural community's water supply can go dry overnight, leaving hundreds of families without any water access.

Further complicating the issue, the water that does remain is often contaminated with arsenic and fluoride – up to 22 times the World Health Organization recommendation for arsenic and more than 12 times the recommendation for fluoride. These extremely hard-to-remove contaminants are closely linked to dental fluorosis, crippling skeletal fluorosis, chronic kidney disease, cognitive development and learning disabilities in children, skin disease, and even various cancers. Entire generations are being plagued with the negative impacts of arsenic and fluoride in their drinking water, and, worst of all, the most acutely impacted are children as their bodies absorb these contaminants at a much higher rate.

This is a serious public health crisis for our region and beyond. Roughly, **2.2 billion people – or more than a quarter of the entire global population – lack access to clean water.** Upwards of 300 million people, with an estimated 21 million in Mexico alone, suffer from excessive levels of arsenic and fluoride in their water supplies, with few appropriate solutions available to remove these problematic contaminants. The accompanying social and economic impacts of this crisis are almost impossible to overstate. Innovative, low-cost solutions are desperately needed to address both the social needs of at risk communities who are disproportionately affected by these modern water issues, as well as the increasingly complex technical water challenges we are now facing in the 21st century.



Upper Rio Laja Watershed

San Miguel de Allende

Guanajuato



AREA
6,840 km²



POPULATION
~680,000 people



OVER EXTRACTION
Decline in water table by 2-3m (~ 6-10 feet) annually



WATER USAGE
83% agricultural (mostly for export), 15% residential, 2% industrial



WATER CONTAMINATION
Arsenic and fluoride levels greatly exceed Mexican and international standards



HEALTH IMPACTS
Dental & skeletal fluorosis, developmental issues in children, kidney disease, cancer



2020 HIGHLIGHTS



27 RURAL COMMUNITIES

Partnering with rural communities to expand access to clean water and sanitation through rainwater harvesting systems, composting toilets, water filters, and our new Groundwater Treatment System to remove arsenic and fluoride from community wells.



57 WORKSHOPS

Extensive week-long technical trainings to build rainwater harvesting and sanitation systems, developing video workshops to adapt to our new reality, on-going community education, virtual workshops for universities, and building capacity of 22 local schools and area NGOs through our



917,200 LITERS

106 large-scale rainwater harvesting systems, with 59 completed and 47 started by year's end, storing nearly 1 million liters of clean water.



ON THE GROUND

Given the challenge of fighting the spread of COVID-19 with limited water, this past year we worked exclusively with communities struggling with extreme water scarcity issues to expand their access. Additionally, we developed educational materials and strategies for water-stressed communities to meet the hygiene standards needed to limit the spread of the virus.

We developed a new series of video workshops focusing on practical strategies to combat coronavirus for communities with limited water resources, which cover topics such as: how to make hand sanitizer out of ingredients found in most homes, how to build an emergency rainwater harvesting system to increase water availability, and, perhaps the most useful, how to build a homemade, foot-operated “tippy-tap” hand-washing station, which allows 30 people to effectively wash their hands with just one gallon of water.

We used social media and cell phone networks to get these tools out to local communities, and we then received significant financial support from the municipal government of San Miguel de Allende to print our manuals, workbooks, and other materials, as well as create USBs loaded with our video workshops and other useful information. We worked hard to provide these materials, as well as extensive training on how to use them, to community schools and other area NGOs – 22 institutions in total who work closely with at-risk communities.

Most importantly, we continued to work to expand water access to those who most needed it. Learn more about those projects on the next page.



AGUSTÍN GONZÁLEZ

A young group of students from SABES high school in the community of Agustín González led an alliance with key partners and managed to expand a small school project into a large-scale effort to increase awareness on the water issues in their community while also expanding access to clean water.

In 2019, after learning about the toxic levels of arsenic and fluoride in their drinking water, the students connected with Caminos to build a rainwater harvesting system at the school. Through this process, they became passionate about bringing their newfound knowledge to families and friends to help evade the health impacts of arsenic and fluoride on younger generations.

Through an innovative process of collaboration that included the students and their teachers, the leadership at the Municipal Department of Environment and Sustainability, Caminos de Agua providing overall coordination and training, and funds being provided by the private sector through UBSA – a sustainable real estate development firm – we were able to build 20 more large-scale rainwater harvesting systems in homes throughout impacted communities in the region.

EL FRAILE

This small community, located in the heart of large-scale export agricultural production, consists of 132 families made up mostly of construction workers and farmers. In 2019, like so many others in the area, their well completely dried up and collapsed, and with it went their only source of drinking water.

In order to deal with this problem, the water authority sends a water truck every 8 days so that the community members can fill up their buckets and water tanks. Not only was that water contaminated with arsenic and fluoride, but it was also never enough, especially during a global pandemic when water is desperately needed to fight the spread of the virus.

This year, with the incredible support of donors from around the world, we raised enough funds to install 25 large-scale rainwater harvesting systems together with the community as well as provide dozens of water filters to make the rainwater potable. As part of the project, families of El Fraile participated in a series of six educational workshops to learn about regional water issues as well as the construction, use, and maintenance of their rainwater system.

WATER & HEALTH

This year, we launched by far the most ambitious project in our nearly 10-year existence. Primarily funded by the largest grant in Caminos' history – from the Gonzalo Rio Arronte Foundation – the *Agua y Salud* (Water & Health) project involves constructing no less than 330 rainwater harvesting systems and 30 composting toilets over the next three years in 30 different communities. This project also includes the installation of nearly 700 water filters, the monitoring of 20 wells, and an intensive education program for community leaders that utilizes a unique methodology called “narrative practices.”

The municipal government is providing additional financial support to the project, and a network of grassroots organizations, NGOs, and the local communities themselves are providing substantial in-kind support to bring this project to fruition.

By the end of 2020, we had broken ground on more than 50 rainwater harvesting systems and 15 composting toilets in 12 rural communities. This project will be transformational – preventing the risk of illnesses and economic devastation for more than 3,150 people directly as well as an additional 15,000 more indirectly.



CREATING SOLUTIONS WHERE NONE EXIST

Caminos de Agua is a unique organization in that we are both an environmental social service agency that has nearly ten years of experience successfully engaging with communities to mitigate their water issues, and a technology-based non-profit, developing and providing innovative low-tech engineering solutions to complex water challenges. We design, prove, and continue to monitor our solutions in the real world, instead of solely under laboratory conditions, to assure that they actually work, and continue to work, for real people.

We rely heavily on volunteer interns and technical fellows to realize this work, but with the pandemic raging and limiting global travel, our normally bustling lab was reduced to only our in-house technical staff for the majority of the year. With that, we largely targeted our focus to bring our most important development online – the Groundwater Treatment System (GTS).

For years, we have relied on rainwater harvesting systems as our primary technology to create access to clean water. While still crucial to our work, rainwater systems also have limitations, specifically in that the building process is labor-intensive and time consuming with a high initial cost. With arsenic and fluoride as core drivers of our water crisis, and with no other solutions besides rainwater being available and appropriate, we committed ourselves five years ago to delivering a cost-effective, and scalable, solution that could remove these contaminants on a community-wide scale – helping get the next generation off of arsenic and fluoride contaminated drinking water. Learn how GTS can change the reality of the water crisis in our region, as well as our other important tech projects in 2020, on the following page.



ARSENIC QUANTIFICATION

Detecting arsenic in the field is, unfortunately, extremely difficult. Low-cost methods that can provide consistent reliability simply do not exist. This is of major concern as arsenic is becoming a more widespread public health crisis around the globe, largely impacting low-income communities who cannot afford costly lab testing. In 2019, we published an academic article with North Carolina State University that illustrated the lack of effectiveness, and consequent risk, of current arsenic field detection methods for our regional water supplies.

This year, we began working in earnest with arsenic experts and others to develop new software, and adapt low-cost hardware based on an electrochemical potentiostat method, to create a reliable arsenic detection method that costs potentially less than USD \$200. We were grateful to have the support of Dr. Jay Bullen from Imperial College of London who worked tirelessly with us on the ground at our lab in Mexico to help develop this new low-cost arsenic detection method in 2020. We look forward to furthering the development in 2021.

GROUNDWATER TREATMENT

Over the last five years, our technology development team has invested tens of thousands of hours – literally working around the clock and sleeping in the lab at critical moments – to bring our Groundwater Treatment System (GTS) to life. We have built, and proven, multiple functional prototypes over the years. We created numerous design improvements and methods to increase efficiency, and we even produce our own filtration media for removing fluoride right here in San Miguel de Allende.

Our first community-scale GTS treatment plant went live at the end of 2020 and will soon begin producing arsenic and fluoride free drinking water for the rural community of Los Ricos.

For roughly the same initial cost of only one rainwater harvesting (that would only serve 1-2 families), a GTS can be installed to provide clean drinking water to potentially dozens of families. In this way, GTS can change the paradigm for water treatment in our region and beyond by delivering an effective and appropriate solution to entire communities at risk – quicker and more affordably.

AGUADAPT

In 2019, Aguadapt, our ceramic water filter design that removes biological pathogens, can be attached to any container, and can even be adapted to eliminate regionally-relevant chemical contaminants (like arsenic and fluoride) – was named the winner of the prestigious Innovation Showcase Award from the American Society of Mechanical Engineers (ASME) in Washington D.C.

The pandemic slowed the progress of Aguadapt's development in 2020 as we switched gears to direct all the resources we could towards communities with limited water resources. However, we did continue to work closely with our ceramics partner to improve the design and production of the filter – making it more robust, consistent, and effective. We distributed the initial production run to partners around the country, specifically in Chiapas, Mexico where we will be piloting 700 Aguadapts in community homes.

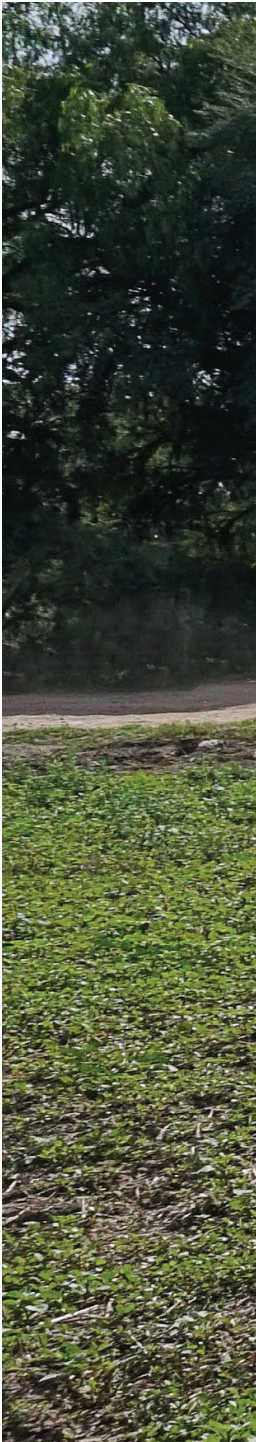
Moving forward, we plan to begin producing a new production prototype in 2021 and begin small-scale production. We envision Aguadapt making a substantial difference

MOVING AHEAD

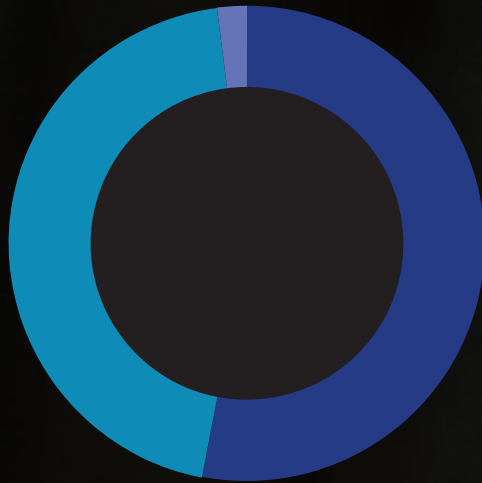
This year, we launched our most far-reaching project to date, *Agua y Salud*, which will expand our reach to thousands of new people by 2024. The implications of *Agua y Salud* go far beyond the next few years though. This project has brought on new and important partners, such as the Gonzalo Río Arronte Foundation – the most important private foundation supporting water initiatives in Mexico – which has elevated Caminos to another level, allowing us to leverage new sources of funding as well as develop important new collaborations moving forward. *Agua y Salud* is just the beginning of a new phase that will allow us to make a far greater impact in our watershed and beyond.

We will also continue to develop, and adapt, solutions to the complex water contamination and scarcity issues facing communities in our region, greater Mexico, and even around the globe. We are working hard to begin replicating our *Groundwater Treatment System* to help get future generations off of arsenic and fluoride contaminated groundwater. We are also scaling up production of our *Aguadapt* water filters for wider distribution by 2022. *Aguadapt* can greatly impact water supplies for several groups that are largely underserved by traditional markets – namely low-income communities as well as those displaced by disaster. While we seek aggressive affordability in the development of our technologies, we have created a model where they can be sold, unsubsidized, to those most in need – helping generate a more sustainable income stream for the organization while simultaneously increasing clean water access well beyond our regional borders.

Our work in monitoring the problem and creating solutions, educational programming, and community-implementation models, is incredibly important to help solve the underlying issues, but we are also committed to addressing the root causes of the water crisis. We will continue to partner, and build networks, with other NGOs and grassroots organizations, affected communities, academic institutions, businesses, and governments to create multi-dimensional programs and coherent water policies to both heal and then safeguard our finite water resources





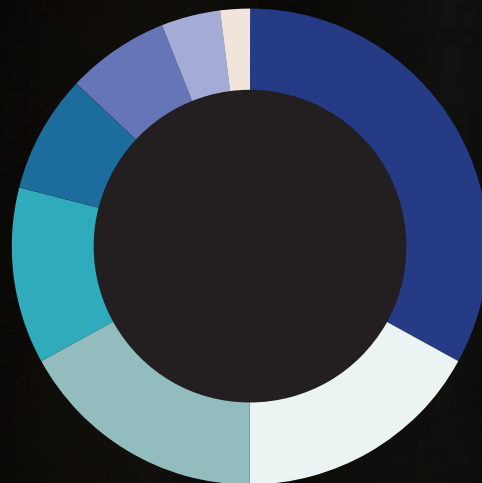


IN 2020, WE RAISED

USD \$339,645

Total consolidated revenue in the past fiscal year

- Institutional support [53%]
- Individual contributions [45%]
- Products & services [2%]



IN 2020, WE INVESTED

USD \$291,283

Total expenses in the past fiscal year

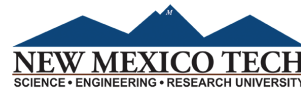
- Rainwater harvesting [33%]
- Research & development [17%]
- Education [17%]
- General operations [12%]
- Ceramic filters [8%]
- Sanitation [8%]
- Water quality monitoring [4%]
- Public policy & network building [2%]



OUR PARTNERS



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Along with our institutional supporters, Caminos de Agua is truly grateful to our 376 individual contributors in 2020 who make our work possible, including our major givers this year:

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Chip & Lucy Swab
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