2022 WEFTA-Panama Trip Report

Overview:

The team of Tomas Redding, Leo Redmond, Padre Roberto Cumberland, and Tim Wellman were in good communication prior to this trip about the trip itinerary, the status of COVID in Panama, and general risk associated with travel to Panama and to the communities both in terms of spreading or catching COVID while there. The team was also in communication with our in-country partner, Nicolas Arcia for trip logistics and scheduling. All the traveling team members were tested prior to departure (also note that all traveling team members were triple vaxed). Unfortunately, Padre Roberto came up positive and was unable to travel. The other three members: Leo, Tomas and Tim were negative.

We all traveled on Monday January 10th, 2022, to beautiful Panama. Tomas and Tim rented a Toyota HiLux 4x4 at the airport and met Leo at the Hotel California then headed to dinner.

We met with Peace Corps (PC) for dinner to maintain our relationship with the senior staff and the health program manager. We were glad to catch up with our PC friends. PC is expecting a new input of volunteers in July of 2022 if all progresses positively in the current state of the COVID pandemic. The health volunteers will focus more on youth and the prevention of disease through education. We are hopeful that the health program may entertain working on water and sanitation projects at a later date. You can't prevent disease if you do not have adequate community water, sanitation, and hygiene resources (WASH).

At this point there is no WASH component to this new PC health program. The PC senior staff was tasked with finding out what happened to Peace Corps Partnership Program (PCPP) funds that were returned to PC during the COVID evacuation of 2020. There are four PC projects that were cancelled due to the pandemic. The communities are: Alto Mancreek in the Comarca Ngobe-Bugle (CNB), Bajo Algodón – (CNB), Zapote 2 – (CNB), and San Ysidro – Coclé. The community of Buena Vista is also working to finish up small projects the Peace Corps Volunteer (PCV) had started with them before evacuation but did not have funds in process with the PCPP. All of these communities are still struggling to finish their projects without the funds and/or facilitation from the PCV.

This is the first time in a long time that PC has not guided the group on the first week of the trip. The PC team was interested in our trip itinerary and the number of communities we would see, but not as interested in the current water projects and follow-up on previous projects. Prior to arrival the PC team did assist us in acquiring phone numbers for community members and directions to the communities. Tim called all contacts to let them know when the team would arrive. He was not able to get in touch with all the contacts, so in some cases the team just arrived in a community and started talking to whomever was around. We did have WaterSTARs for all of the PC projects, so we knew who was on the water committee and details about the systems. The water committee members were the first people we tried to talk to in each community.

Early Tuesday morning we headed west to Coclé and met Nicolas in Penenome. From Penenome we headed north into the mountains to visit with three communities: Guayabo, El Limon, & La Pedregosa (see water system details below, and the attached photo slide deck). We stayed the night in Penenome and headed out in the morning into the mountains again to visit three more communities: Pagua, Buena Vista, & Santa Cruz. Coclé is a beautiful province with lush forests and productive farms. The people we

met with were all very friendly and happy to update us on the water system, take us up the trail to the supply tanks, and even offer us a small meal. All were very curious about what happened to PC and when volunteers might return.

That evening we drove to Veraguas and stayed the night in Santiago. The next morning, we met with the owner, Carlos Spiegel, and accountant, Iris Arritola, of Spiegel – a hardware and building materials store. Waterlines has been using Spiegel for materials for many years and has maintained an excellent relationship with the staff. Nicolas, Marcial, and Esteban all have use Spiegel for materials when it makes logistical sense to transport materials all the way from Santiago. The owner, Carlos, told us that they now have a store in Penenome and have a supplier out of David. There is a good amount of funds still in the account, so we talked with Nicolas about how to use those funds for upcoming projects where transport costs from Santiago or David could make sense.

From Santiago we drove west to the eastern side of the Comarca Ngobe-Bugle. We stopped in Tole to see Nicolas's family and drink a great cup of home-grown coffee and pick-up his son Cheo. We are all talking with Cheo about the possibility to walk in his father's footsteps and become the next water system expert we can count on for further post-construction follow-up. We saw three Ngobe communities: Las Trancas, Bajo Algodón, & Alto Estrella, by hiking into and around the communities to see the tanks and spring captures.

We left Nicolas in Tole and drove on to stay in Las Lajas on the ocean for the night. There is something very soothing about being able to walk out into the ocean underneath the stars and let your thoughts flow with the waves. Seawater is also very good treatment for those pesky chiggers you pick up along the trail.

The next morning, we traveled back to Tole, picked up Nicolas and Cheo and headed out into the mountains to see three more communities: Quebrada Pava, Zapote 1, & Zapote 2. The Comarca communities were also very glad to meet with us and talk about their water systems. They also expressed their challenges with not having a PC volunteer in the community to assist with logistics. There is always work to be done on these water systems as components age or break. The biggest challenge now facing all of the systems are decreased spring flow rates and growing populations. During the dry season some of the households, based on the hydraulic grade line, always receive water while other households never receive water. This inequity causes strife in the community and effects overall community well-being.

Along the way we had good conversation with Nicolas about what we were going to do to help these systems, especially the ones that were in mid-construction when the PCVs were evacuated. We made a plan to prioritize which systems needed help the most and agreed to work on getting those projects completed and how to provide support. We noted that if Nicolas has his own transportation, he and Cheo could provide technical assistance in a timelier manner and more frequently. In the past, Nicolas has always taken public transportation or walked to the communities. A lot of time was spent in just getting there – even more of a challenge in the wet season.

That evening we had a wonderful dinner with Nicolas's family. Leo and Tim said goodbye. Tomas would stay on a few more days to visit the communities in and around Llano Nopo with Nicolas and complete their own post-construction follow-up.

On Saturday, Leo and Tim had to get their COVID test in order to be ready to fly back to the US on Sunday. While we were in David, we all took the opportunity to meet with Jose Molina, a contractor who worked with PCVs in the past on water projects in the Bocas del Toro province. We are hoping to work with Jose on a few post-construction follow-up projects in Bocas.

Leo and Tim said their goodbyes to Tomas and flew back to Panama City where they would depart back to the states on Sunday.

After the departure of Leo and Tim from Panama, Tomas, Nicolas, and Nicolas' son Cheo spent the last five days of the trip visiting nearby communities in Chiriquí and the Comarca Ngobe Bugle, returning to the Arcia home each night, now a 3-generation household inhabited by about ten people. Each of the communities that we visited had received funding from Waterlines previously, with Nicolas serving as the technician and project manager.

Sunday, January 16th was the annual meeting in Llano Nopo, in which representatives from the water committees of nearby communities are invited to report on the status of their water system. Waterlines/WEFTA has hosted this meeting on the second Sunday of January every year for over twenty years, with the exception of 2021. 12 water committee representatives were present this year, representing 7 communities, a significant uptick in attendance from 2020.

A significant theme that Nicolas and Tomas stressed during the Llano Nopo meeting and in the site visits that followed was the Waterlines "sunset" and the uncertainty of continued funding for water projects. We let people know that no new projects would receive funding as we would be focusing donations solely on already existing systems. As the need for water systems continues to outpace the capacity of Waterlines/WEFTA, we reiterated that the communities that did receive funds moving forward would be those who have shown dedication to the maintenance of their water systems. Our hope is that the uncertainty of receiving funds from WEFTA stimulates greater initiative for the maintenance of water systems and the collection of water usage fees.

The trip always goes so fast, time stands still briefly whether walking through the amazing forests, sitting and talking with community members, or taking photos that capture the moment, the rest of the time really flies by. The days are filled with good conversations and beautiful views. Despite not having solid plans to meet with some of the water committees, people do come out of their homes or farms to greet us and hear what we have to say. There is hope that the communities that need assistance desperately now will get it in the coming months. There is also hope that the water committees will continue to perform their tasks without PCVs there to help guide them. It appears as though the Ministry of Health (MINSA) is taking a more active role in assisting water committees with their duties. In multiple meetings we heard the water committee members mention that MINSA is checking up on them which hopefully keeps the community actively engaged in water system management.

Many of these communities where Waterlines, Peace Corps, and now WEFTA are working are developing at a faster rate than in the past. The Panama government is building roads to communities that have, in the past, been a two hour walk away from the nearest road. As well, with the roadways communities are getting electrical power. Being two main drivers of community development, we are witnessing first-hand these rural communities of the Comarca and Coclé growing with amenities they never imagined. Development combined with lower rainfall rates and longer dry seasons perhaps is the biggest challenge facing water system infrastructure. Communities are growing and water supply is decreasing.

Communities will continue to face the classic challenge of who is in charge of the water system, but now will need increased supply (or alternative supply options such as drilling of groundwater wells or larger regional water supply projects) and storage to weather these challenges.

Recommendations:

It is clear that in the communities we visited who had recently experienced the evacuation of their PCVs were left in a challenging situation. The water projects were in the middle of construction of different elements, yet the PCVs had to return all of the remaining funds to the PC post upon exit. The communities were left without funds to complete the projects, and without the service of the PCV to help guide the logistics of the project. Most notable is the Bajo Algodón project where only the spring capture was complete. The tank is about halfway built. The transmission and distribution systems still require all the materials and community effort to install and bury the whole system.

Communication with water committee personnel or system operators is getting better. More people have a cellphone now with access to cell service. We collected phone numbers where we could and will attempt to stay in touch with community members on project progress or even have better contact prior to the next visit. It is recommended that people on future trips also gather phone numbers of committee members and other people along the way to further facilitate overall contact, updates, and future meetings.

It is our recommendation that we continue to work on these crucial follow-up communities as soon as possible. We are grateful that Nicolas has the time and ability to tackle most of the items, and we are hopeful that Jose Molina will be able to tackle some of the priorities on the Bocas del Toro side. Thus, the priorities are this:

- Nicolas Project Priorities (listed in order of when he will work)
    - Alto Mancreek, Ñokribo, Bocas del Toro side of the CNB: tank construction and small distribution system
    - Cerro Maiz, CNB: new tank and repair/rebuild the spring capture.
    - Quebrada Mina, CNB: Repair bridge that supports distribution line.
    - Llano Majagua, CNB: Construction of new spring capture, installation of new distribution line.
    - Alto Cienega, CNB: Construction of new spring capture, installation of new distribution line.
    - Bajo Algodón, CNB: Assistance with tank finalization and installation of the new distribution system
    - Calante, Ñokribo, CNB: Source and supply assessment, potential improvements based on the assessment.
- Jose Molina Project Priorities
    - Quebrada Pastor, Bocas: Water system renovations including new source capture, supply tank, transmission line repairs, and distribution expansion
    - Bajo Gavilan, Bocas: supply tank improvements
    - Valle Risco, Bocas: supply tank improvements
    - Cerro Brujo, Bocas: supply tank improvements
- Panama RPVCs willing to help on their previous work
    - Patrick Sephton is willing to return to Buena Vista, Coclé to make the necessary repairs and work with the water committee on training for O&M.

- Alex Litofsky is willing to provide engineering assistance to Jose and the community on the Qbda Pastor improvement project.
- David Caley is willing to provide engineering technical assistance on some of the more complex projects including break-pressure tanks.

Other items for future discussion are:

- We continue to observe the difficulty of channeling funds to water projects. Identifying additional avenues to direct funds to projects and local technicians could help move projects along. Our current method works well for getting funds to Nicolas and Spiegel. Western Union is the best route, for now, to channel funds to Jose Molina.
- Continuing the conversation with Cheo and Nicolas about Cheo's involvement with WEFTA.
- Continuing to track Jose Molina's performance and willingness to lead water projects.
- Certain projects that have received funding from Waterlines in the past have not been visited for many years. With the help of Krista, Tomas, and Tim, we plan to better understand which communities have not had sufficient follow up. This process will accompany a transfer of the Waterlines Panama database to that of WEFTA.

Trip Summary/Observations (Tomas)

During the annual meeting in Llano Nopo, and in all of our site visits, Nicolas and I were clear with the water committees about the closing of Waterlines and the lack of certainty about whether communities would receive additional funding from WEFTA and in what timeframe. We made it clear that no new projects would receive funding, and that funding for repairs and extensions would be more limited.

Certain communities were told that they would receive support from Nicolas with WEFTA funding in a specific timeframe, while others were left with some uncertainty as to whether they would receive assistance from WEFTA and when. We reinforced the importance of the involvement of all the beneficiaries of the water system both in paying their monthly usage fees and participating in maintenance, given the possibility of diminished support from Waterlines/WEFTA.

We reiterated that communities that did receive support would be those who have shown a commitment to maintenance of their water systems, have an appointed water committee that gathers regularly, and are paying a monthly usage fee. Hopefully the diminished involvement of Waterlines/WEFTA incentivizes communities to better maintain their systems and to invest more in their water fund for costly repairs or extensions.

As we have observed in past years, the growth of communities has surpassed predictions. New homes are often without water or are taking from an already limited supply. Additionally, households that don't directly receive water are usually more reluctant to pay into a water system that benefits them less directly. Proposals for extensions to water systems to account for new households are common.

Waterlines has left a positive legacy in Panama that continues to bring water to thousands of families. Overall, communities and water committees are engaged in the maintenance of their water systems, both through regular workdays and the collection of usage fees. Committees

report that water users are paying water usage fees with greater consistency. This may result from people in the Comarca having some income that didn't exist in the past. Nonetheless, all of these systems have a lifespan, and some systems that Waterlines installed in years past are reaching the natural end of their life, visible in deteriorating tanks and tomas. Even communities who have been diligent about collecting usage fees find that their fund is insufficient to address these system overhauls.

As we have noted in years past, Nicolas Arcia is aging and increasingly less able to work on water systems. His knowledge and ability to rally communities to complete water systems remains unsurpassed in our experience in Panama, but his ailments make it more difficult from him to perform some of the heavy lifting he has in the past, and to walk to some of the more distant communities. As a result, some of the communities that are inaccessible by road have not been visited in several years. Fortunately, during every visit to Panama we find dirt roads where previously there were only footpaths, and paved roads where previously there were bumpy ones.

The question of Nicolas' successor was frequently discussed on our trip. We see that one of the key factors to the continued success of WEFTA in Panama centers around finding a skilled technician who is willing and able to lead communities in the development of water projects. Two people with potential to serve in this role in some ways have presented themselves. Jose Molina has worked with Nicolas on past project in Bocas del Toro and could potentially work with him in the future on the remaining priorities. Hopefully this time working together will serve to improve the people and connections we have available to work on these renovation projects. Father Robert will speak more with Nicolas about including Jose in more work.

Cheo, Nicolas' son, has presented himself as a potential successor to Nicolas. On this trip, Cheo displayed more knowledge about water systems and initiative in talking to water committees. A few of his strengths that would lend themselves well to working on water projects in Panama:

- An aptitude for working with technologies, like computers and smart phones, that would put him in better communication with WEFTA as well as with communities within Panama.
- He is hard-working, reliable, honest, and motivated by a desire to help others.
- His proximity to Nicolas has allowed him to understand the ins and outs of installing water systems. Nicolas would presumably have an easier time passing his knowledge on to his son rather than someone with whom he doesn't have a rapport.

He is planning on accompanying Nicolas on some of the upcoming Comarca projects and is actively honing his skills and learning from Nicolas. I don't think we can assume that Cheo is going to jump at the possibility of working with WEFTA, and greater conversation with both Cheo and Nico is necessary. I conversed with Cheo about this possibility extensively, and to some degree with Nicolas, and I still don't have a complete understanding as to where they sit with it all currently.

As I mentioned briefly, Cheo has been studying to become a teacher, a path supported by his mother and sisters (Nico's thoughts on the matter are unclear to me). I do know that he is seeking a livelihood that is reliable, well-paying, and allows him to continue to pursue other pursuits.

I think both Cheo and his family would be interested in entertaining a proposal for employment by WEFTA if he and Nicolas had greater certainty around a few questions:

- Could he count on employment by WEFTA for many years into the future?
- How would both he and Nicolas be reimbursed during the next year or two, which might be considered an interim training period?
- How would Cheo be reimbursed working independently from Nicolas?
- What are WEFTA's expectations of Cheo's involvement working on water projects (how many months of the year is he working on projects, performing studies, follow-ups, WEFTA/Waterlines annual visits etc.)?

Last items:

- Nicolas expressed wanting greater reimbursement for the time he spends traveling to project sites, a time-occupying aspect of his job that he has felt underpaid for in the past.
- Father Robert is a celebrity in the Comarca.

Water System/Community Visits:

Date: Tuesday, January 11th, 2022
Location: Guayabo, Coclé (Penonomé District)
Service Population: 42 people/13 homes

Project Details:	
Spring source	3 springs – dry season 28 gallons/person/day, wet season 189 gpcd – low-profile spring-box construction
Transmission Line	1.4 miles with stream crossing
Storage Tank	2 - 660-gallon plastic tank and 120-gallon plastic tank in series (small tank supplies houses directly around the tank site)
Distribution	3,215 feet of pipe with 13 connections - school and church are still on the list for connection.
Project Cost:	
WL contribution	$4,906.08
Community contribution	$4,045.00 (labor & tools)
TOTAL	$8,951.08
Beneficiary	$213

Summary:
The WEFTA team arrived mid-morning after a nice drive from Penenome. The road is in good condition to get to the community. After discussion with some community members, we hiked to the house of the vice-president of the water committee, Eusebio Araya. We were not able to connect with anyone in the community prior to the trip so we were lucky to find the Vice-President nearby. Eusebio sent a kiddo to find the Committee President, Jose Dominguez. We sat down with the two committee members and

discussed the water project status. Eusebio brought out his file on the project which included the original WaterSTAR, and other project details.

The system is functioning well with good supply from the springs, and active participation of the community to perform any necessary operations and maintenance. The water users are paying their $1/month tap fee. They are thinking about adding another supply tank to be able to provide water to the school and church in the next phase of the project. They have their own funds to make this happen. One challenge is the ownership of the land where the springs are located including the small sub-watershed. The documented agreement for the spring area was with the original owner. She has since passed on and the descendants now own the property. They are not willing to accept the original agreement and would like to sell the small plot to the community for $2000. The committee is working with government entities both the Ministry of Health and Ministry of Environment to work out the situation given the previous agreement.

Follow-up:
It will be good to visit again or be in communication via cell phone to see how the spring capture/land tenure issue pans out. The committee seems completely viable and able to carry out the process with the government entities.

Date: Tuesday, January 11th, 2022
Location: El Limon, Coclé (Penonomé District)
Service Population: 239 people/45 homes

Project Details:	
Spring source	2 springs – dry season 27 gallons/person/day, wet season 79 gpcd
Transmission Line	1.1 miles
Storage Tank	6,000-gallon block tank
Distribution	6,800 feet of pipe with 45 connections including the health post, school, and 2 churches.
Project Cost:	
WL contribution	$5,550
Community contribution	$2,750 (labor & tools)
TOTAL	$8,300
Beneficiary	$35

Summary:
The WEFTA team passed through the community of Limon briefly and were able to talk with, Carmen Ibarra, the current water committee treasurer. This was another community we were not able to get in touch with prior to the visit. None the less, arriving at the house of Carmen we were able to talk about the water system and general community items. The water system is functioning well. This system work dates back to 2011 with improvements to the spring captures, transmission line, storage tank, and distribution. The spring captures that Nicolas improved after our visit in 2012 are working well. The committee is planning to capture another spring in the same watershed area. They are currently working with the Ministry of Environment and the Ministry of Health to legally capture the spring for the community. The committee has the funds to proceed with this improvement project. They may reach out to Nicolas for assistance.

Follow-up:
No follow-up necessary. If they reach out to Nicolas to help them with the spring capture, we will talk with him about how and when to program this small project.

Date: Tuesday, January 11th, 2022
Location: La Pedregoza, Coclé (Penonomé District)
Service Population: 264 people/58 homes

Project Details:	
Spring source	3 springs – dry season 32 gallons/person/day, wet season 62 gpcd
Transmission Line	1.25 miles
Storage Tank	5,000-gallon block tank
Distribution	3,850 feet of pipe with 58 connections including school and church.
Project Cost:	
WL contribution	$8,830
Community contribution	$9,150 (labor & tools)
TOTAL	$17,980
Beneficiary	$68

Summary:
The WEFTA team made it up to the community on a newly improved road. We were able to meet with, Jose Dominguez, the current water committee President. This was another community we were not able to get in touch with prior to the visit. We arrived at the house of Jose and talked about the water system and general community items. The water system is functioning well, except for decreased water supply in the springs. There are a couple of theories: climate change and the placement of the wind turbines in the area. Regardless, there are big plans to drill a well with the assistance of Engineers Without Borders (EWB) later in 2022. This system work dates back to 2008 when first completely constructed (source, transmission, storage, & distribution) with engineering technical assistance from the PCV Hable and funding from Waterlines, then with minor improvements to the spring captures and distribution later in 2012 again with funds from Waterlines through the PCPP program.

It was great to connect with Jose and hear about the future plans for system improvements. They have outgrown the supply provided by the 3 springs. They are also suffering from lower spring flows due to less rainfall. On a positive note, however, the community is doing well with agricultural production and close proximity to Penenome for day jobs.

WEFTA has been involved with EWB on the project plans for the latest of system improvements. The EWB chapter based at Northeastern University and will be in touch with us on project updates.

Follow-up:
No follow-up necessary at this point, we will hear how the well drilling project proceeds. Well drilling is an option for other communities we have worked with where spring sources are depleted so we will watch this project in Pedregoza with interest.

Date: Wednesday, January 12th, 2022
Location: Pagua, Coclé (Penonomé District)
Service Population: 500 people/126 homes

Project Details:	
Spring source	1 new stream source to be added to two existing sources. The new source increases the total available supply to dry season 28 gallons/person/day, wet season 35 gpcd
Transmission Line	1.8 miles with stream crossing
Storage Tank	New storage tank of 7,000 gallons – block tank
Distribution	Existing system with additional branches to include the entire community.
Project Cost:	
WL contribution	$7,942.05
Community contribution	$10,220.68 (labor & tools)
TOTAL	$18,162.73
Beneficiary	$36.33

Summary:
WL team arrived in the morning to look for any water committee members we could find. This was a community we could not program a meeting with from phone calls to numbers PC provided. We were directed to the house of the current treasurer, Rafael Nunez. Rafael was happy to greet us and talk about the water system project. This PC project, funded by Waterlines through the PCPP process, was an augmentation project. The funds enabled the addition of a new source, supply tank, and 28 connections that were outside of the original MINSA system. The new source is functioning well in term of supply but is problematic

Follow-up:
No follow-up is necessary at this point.

Date: Wednesday, January 12th, 2022
Location: Buena Vista, Coclé (Penonomé District)
Service Population: 169 people/36 homes

Project Details:	
Spring source	1 spring – dry season 23 gallons/person/day, wet season 64 gpcd – is a low-profile spring-box construction
Transmission Line	2.6 miles with stream crossing
Storage Tank	4,600-gallon block tank
Distribution	4,550 feet of pipe with 36 connections.
Project Cost:	
WL contribution	$7,750
Community contribution	$5,800 (labor & tools)
TOTAL	$13,550
Beneficiary	$80

Summary:
The WEFTA team arrived at noon in Buena Vista. We were able to get in touch with the community water committee president, Abigail Nunez, before the trip so there were water committee members and community members there waiting for us. As noted above, Buena Vista was one of the communities that was done with their PCPP project but were still working with PCV on finalizing break pressure tanks and operation/maintenance training. They were very sad to see the PCV have to leave due to the pandemic evacuation of Peace Corps. In addition, they expressed some challenge with the transmission line.

Because of the hydraulic profile from the spring to the community, the lowest point on the transmission line in the valley down below has very high pressure, the transmission line continues to break at pipe joints in this area. Looking at the design of the transmission line in the WaterSTAR for Buena Vista we saw that the transmission line is all 2" pipe except for the stream crossing at the lowest point in the valley where it necks down to 1.5" pipe. We suggested that the line from the stream crossing back up the hill to the storage tank should continue as 1.5" pipe. This will be a challenge for them to complete, given that the line is buried. It may be possible to fit the 1.5" pipe into the 2" pipe and essentially slide the pip all the way down to the stream crossing. Other than this issue, the community is hopeful for another PCV to help them with further training on the operation and maintenance of the system.

We visited the new tank and saw that it was built well including chlorinator and a perimeter fence. The community is proud of the work completed and the collaboration with Peace Corps.

Follow-up:
It will be important to return to the community next year to see how the project has progressed, how the transmission line worked out, and how well the water committee is managing the O&M of the new system. Tim will try to get in touch with the original PCV who designed and constructed the system with the community to see if he is available to return and fix the issue.

Date: Wednesday, January 12th, 2022
Location: Santa Cruz, Coclé (Penonomé District)
Service Population: 479 people/81 homes

Project Details:	
Spring source	3 spring renovations + I new spring source – dry season 52 gallons/person/day, wet season 163 gpcd
Transmission Line	1200 feet of pipe for the new spring to new storage tank.
Storage Tank	New 6,500-gallon block tank, renovations to existing 2 tanks
Distribution	2,790 feet of pipe with 36 new connections to the existing 45 connections.
Project Cost:	
WL contribution	$6,464
Community contribution	$4,058 (labor & tools)
TOTAL	$10,522
Beneficiary	$22

Summary:
The WEFTA team arrived in Santa Cruz after a short hike up from where we parked. We met with the water committee president, Manuel Guerra, at his house. We sat in the shade and talked about the water project and how the system was functioning. Manuel was very pleased with the project, reminding us that before the PCV showed up many of the houses in the community were left out of a government water project and had to fetch water from small semi-improved springs. The PCV and community members worked together to find springs higher on the mountain and bring the water down to a new storage tank.

This is largely a water system improvement project where existing assets were improved, new sources were captured and transmitted to the main system, and a new storage tank was built to improve overall storage. The system is still working very well and the new spring source has a lot of water. The conversation turned to Peace Corps and whether the community could get another PCV to help them with agricultural improvements.

Follow-up:
No follow-up necessary

Date: Thursday, January 13th, 2022
Location: Las Trancas, CNB (Muna District)
Service Population: 223 people/33 homes

Project Details:	
Spring source	1 spring – dry season 5.5 gallons/person/day, wet season 139 gpcd – existing low-profile spring-box construction
Transmission Line	1,053 feet
Storage Tank	4,500-gallon block tank
Distribution	4,501 feet of pipe with 33 household connections
Project Cost:	
WL contribution	$5,000.00
Community contribution	$7,005.60 (labor & tools)
MINSA contribution	$1,797.10 (materials)
TOTAL	$13,803
Beneficiary	$62

Summary:
The WEFTA team arrived before noon for an informal meeting with the some of the water committee members. We were in touch with the vice-president before, so they know we were coming. The project is complete and functioning. Unfortunately, the spring capture is not sufficient for the total demand of the community. The dry season flows have decreased even from when the project was started a few years ago so there are households that do not receive water. The water committee had just started to rotate who receives water on a schedule so that the houses farthest from the tank would receive water. This dynamic is a challenge in these communities where some people always have water and others don't. Water hoarding and strife is common. The driest months (April and May) will be the true challenge for this community. They had an extremely dry year last year and the spring only gave 1,217 gallons per day during the month of May. During the wet months the spring flows well over 30,000 gallons per day.

We had walked up to the tank on our way into the community and were able to see that the tank was in good condition but the household closest to the tank was letting their pigs bathe in a mud patch beside the tank. We talked to the water committee members about how that could undermine the tank foundation and lead to failure. We also noticed that the chlorinator was not functioning. The water committee president remarked that it was hard to buy the chloring tablets as sometime the store does not have them.

Follow-up: It will be important to return to the community next year to see how the project has progressed and how well the water committee is managing the O&M of the new system and the conservation plan for the dry season.

Date: Thursday, January 13th, 2022
Location: Bajo Algodón, CNB (Muna District)
Service Population: 169 people/34 homes

Project Details:	
Spring source	1 spring – dry season 5 gallons/person/day, wet season 2 gpcd – new low-profile spring-box construction
Transmission Line	1,250 feet
Storage Tank	5,050-gallon block tank (under construction)
Distribution	1,600 feet of pipe with 34 household connections
Project Cost:	
WL contribution	$6,995
Community contribution	$6,336 (labor & tools)
TOTAL	$13,831
Beneficiary	$79

Summary:
The WEFTA team arrived in the afternoon via the beautiful hike from the main road. The community was notified in advance of our arrival and request for a meeting by the PCV who was evacuated. There was a good group of people waiting at the house of the water committee secretary, Eliecer Dolores. The majority of the water committee was in attendance as well as multiple community members. The conversation centered around what the community would do without the funds that were destined for the project before the PCV was evacuated. Before her departure they were able to improve the spring source with the help of Nicolas and start on the construction of the supply tank. Without the funds they have not been able to follow-through on the project. The remaining items are the completion of the supply tank, transmission line from source to the tank, and the distribution system. The community members in attendance were adamant that they can complete this project if the materials can be delivered to the closest road location. We were impressed with the turn-out and number of younger men involved. They all accompanied us to the tank site to review the progress on the tank before the PCV was evacuated.

Follow-up: This community and water system should be assisted as soon as possible to complete the remaining items. Nicolas is close with this community as he worked with the water committee on the spring development and will be the right person to complete the supply tank (in-progress) as it is a challenge to work with old construction and make it perform like it is new.

Date: Thursday, January 9th, 2022
Location: Alto Estrella, CNB (Muna District)
Service Population: 308 people/47 homes

Project Details:	
Spring source	1 spring – dry season 88 gallons/person/day, wet season 100 gpcd – low profile spring-box construction
Transmission Line	528 feet
Storage Tank	3,500-gallon block tank
Distribution	3.3 miles of pipe with 47 household connections
Project Cost:	
WL contribution	$5,000.00
Other PCPP funds	$2,010.46
Local Political Rep	$1,000.00 (materials)
MINSA contribution	$398.65 (transportation)
Community contribution	$1,175 ($25/house connection fee)
Community contribution	$10,829.35 (labor & tools)
TOTAL	$20,413.46
Beneficiary	$66

Summary:
The WEFTA team arrived late afternoon, unfortunately with a flat tire. Tomas and Leo worked on replacing the tire with the spare while Nicolas and Tim set out to find the water committee president, Moises Jabilla. This was a community we notified of our planned arrival, but in conversation with the president he said he was not notified. None the less, Moises was able to accompany us on the hike to see the spring capture and supply tank.

Since our last trip the supply tank is now complete, transmission and distribution lines are buried. The supply tank is well built and has a chlorinator that is functioning. The spring source was captured and protected early in the project. Our recommendations for removing some of the trees adjacent to the spring were not completed. The lower portions of the distribution line are experiencing high pressure and service line leaks or even line breaks. We were informed that the community added additional houses onto the system post finalization of the PCV managed water project. The line breaks and leaks are due to the purchase of low quality PCV piping. In order to add more houses to the existing system, the water committee purchased PCV conduit, not plumbing grade piping. These line breaks cause disruption of water service for other community members. Our advice was to spend more of the water committee's saved funds to resolve the issue.

Follow-up: It is recommended that we follow-up on the newer service line additions and whether the committee was able to purchase and install higher grade water pipe.

Date: Friday, January 14th, 2022
Location: Quebrada Pava, CNB (Mirono District)
Population: 192 people/31 homes

Project Details:

Spring source	2 springs – dry season 16 gallons/person/day, wet season 28 gpcd – will be low profile spring-box construction
Transmission line	2 systems: A- 164 feet, B – 214 feet
Storage Tank	2 tanks: A-2,160 - gallon block tank, B – 450-gallon plastic tanks
Distribution	2 systems: A-6,233 feet with 19 shared tap stands, B- 820 feet of pipe with 5 shared tap stands
Project Cost:	
WL contribution	$5,000.00
Other PCPP funds	$2,102.04
Community contribution	$3,750.00 (labor & meals)
TOTAL	$10,852.04
Beneficiary	$57

Summary:
The WEFTA team was able to drive all the way into the community on rough roads that extend up from the entrance to Cerro Piedra. We had no prior communication with the water committee, so we set to work on finding water committee personnel. Luckily, the end of the road at the top of the community was also close to the house of the new water committee president, Clemente Andrade, who was home.

Quebrada Pava is made up of two sub-communities and thus is served by two distinct water systems but has one water committee as set up by the PCV working in the community. The upper community system is made up of 19 tap stands and the lower community is made up of 5 tap stands, together they serve 192 people. Not every house has their own faucet, instead two houses (typically owned by the same family) will share a common tap. Each system has its own source and tank. Both sources are very low flow during the dry season.

Clemente was able to gather a few other water committee members and household members who worked on the water system construction project. We met to talk about the project then hiked to the supply tank for the upper system and spring source, both of which are functioning well. Nicolas had some feedback for the president regarding the operation and maintenance of the spring capture. The upper community struggles with dry season flows, households have to save water in containers to use when the faucet does not flow.

We continued on to the lower community to talk with the previous water committee president, Felix Montezuma. Felix was working in his farm but was able to stop work to meet with us. Felix is the last connection on the upper system but is also very connected to the lower community. He was able to tell us that the lower system is doing well. They have a good spring capture, water storage, and access to the stream for washing and bathing. His house and faucet, however, at the end of the upper system does not always receive water. They collect water when they can from the system and save it in 7-gallon tanks for household use.

Follow-up:
It is recommended to follow-up with the upper community on the spring capture operation and maintenance items. The low-profile spring capture is meant to be maintained annually to ensure maximum flow.

Date: Friday, January 14th, 2022
Location: Zapote 1&2, CNB (Mirono District)
Population: 444 people/75 homes (Zapote 1: 205 people 43 homes, Zapote 2: 239 people/32 homes)

Project Details:	
Spring source	Zapote 1: Two springs sources that provide water to the upper community with dry season issues in delivery. Nicolas constructed the springs captures as an additional project. Zapote 2: (2018 PCPP project) The PCV and community captured a spring that provides – dry season 11 gallons/person/day, wet season 46 gpcd
Transmission line	Zapote 1: No data available Zapote 2: 2100 feet
Storage Tank	Zapote 1: two tanks (2003 tank is 5,000 gallons, newer MINSA tank is also 5,000) Zapote 2: renovation of the existing 3,000-gallon tank
Distribution	Zapote 1: distribution to 43 homes Zapote 2: 9,565 feet of total pipe serving 32 homes
Project Cost:	
WL contribution	Zapote 1: $3,000 Zapote 2 : $5,000
Community contribution	Zapote 1: 1,100 (estimated) Zapote 2: $3,750.00 (labor & meals)
TOTAL	Zapote 1: $4,100 Zapote 2: $8,750
Beneficiary	Zapote 1: $9 Zapote 2: $36

Summary:
The WEFTA team was able to drive to the community of Zapote and meet with the water committee president and secretary along with community members to talk about their water system issues. The community of Zapote is divided into two sectors of Zapote 1 and Zapote 2. Our intention was to meet with the water committee of Zapote 2. Instead, we spent our time with Zapote 1 and did not have time to get to Zapote 2. We were able to collect information on the Zapote 2 system and their progress, but this project will need follow-up on the next trip.

Zapote 1 is one of the oldest WL/PC systems built in 2003 by PCV Ryan Gross with a donation from WL of $3,000 and community contribution of materials and labor valued at $1,100. PC records were very limited back in 2003, but the project was to capture a spring, build a 5,000-gallon storage tank and provide distribution to 25 homes. The community has grown to 43 homes and have added another spring source and tank. They are still suffering dry season spring flow issues, along with obvious leakage from the original supply tank and distribution.

We spoke with the water committee and community members who attended the meeting about the dry season challenges. Back of the envelope estimations put their current available supply at 60 gallons per household. In the rainy season there is adequate supply for all households. The challenge here like many rural water systems in the Comarca is that some houses receive water based on their location on the hydraulic grade line, and others do not receive water. We then hiked up to the original supply tank built in 2003. The engineered life of a supply tank in Panama is 20 years. We were able to see the life of a

supply tank coming to an end in front of us, just a year too early. There appears to be multiple leaks from the tank wall and foundation. Ultimately, they are losing half of their supply to the leaks in the main tank.

While we were there, we also heard about the remaining water project items needed in Zapote 2. They are another community where the PCV was evacuated and thus the community was left to complete the water project alone. It sounds like they have the materials they need, but they just need to finish the distribution system connections and bury the pipe. They are working on it, but without the PCV direction they will require follow-up as soon as possible.

Follow-up:
Zapote 1: They will need a new water supply tank, the current tank built in 2003 is beyond repair. The community could also be reengaged in operation and maintenance of the system to ensure equitable distribution to all households.
Zapote 2: It is recommended that we follow-up soon to manage the outfall of the PCV evacuation and help the community rally around their new water system.

WEFTA- Panama Trip Report Part Two:

Tomas and Nicolas in and around Llano Nopo & Tole, Comarca Ngobe Bugle

Llano Nopo Annual meeting
Date: Sunday, January 16th, 2022
-Communities present: Llano Nopo, Llano Majagua, Llano Palma, Bajo Gabo, Alto Estrella, Alto Cienega.

Communities that reported at Llano Nopo meeting that we did not visit:

Llano Nopo-
Currently a patchwork of spring fed water systems, funded both by Waterlines and MINSA. The water systems are mostly functioning well, the main issue is the inability of the water committee to collect water usage fees. The beneficiaries of the various water systems have the impression that because MINSA installed a good portion of the aqueduct that they are a public utility that does not have to be paid for. The central issue of the water committee is imparting the need of the water users to develop their own maintenance fund.

Father Robert is planning a follow up visit to Llano Nopo to meet the representatives from the water committee.

Alto Estrella-
Transmission Line- 18 kilometers
Storage Tank- 5000 gallons
Beneficiaries- 96 households
Usage Fee- $1/month

The Alto Estrella aqueduct was funded by MINSA in 2001, stretching 18 kilometers between the spring and the 5000-gallon storage tank. The system currently benefits 96 households, and the

community continues to grow. The representative of the water committee reports that the project is still functioning well. The minor issues with distribution line have been remedied by the water committee.

Bajo Gabo-
This aqueduct was installed by MINSA in 2002 and is quickly deteriorating, with significant leaks in the spring capture and the tank. The water committee is planning to submit a proposal to Nicolas to perform a study. The beneficiaries contribute $.50 a month, though many people are now refusing to pay as they do not receive water for 3-4 months of the year.

Communities Visited:

Llano Majagua-
Date visited: Sunday, January 16th, 2022
Currently there is a well-functioning spring capture, distribution line and tank funded by Waterlines, serving 11 homes.

The current toma does not produce enough water in the summer months to supply the 11 homes currently in the system, nor the 6 homes currently in construction.

The community has identified another spring, measured at 3-4 gallons/minute which they hope to capture with an additional toma that will connect with the nearby already existing distribution lines. Water Committee President Rafael owns the site of the spring source and has formally donated it for the use of the community. The water committee is in place and the community is ready to work. Nicolas plans to begin work here in early 2022.

Llano Palma-
Date visited: Monday, January 17th, 2022
Waterlines donated funds for this system in 2017. We were not able to meet with any members of the water committee, but several relatives of committee members were able to report that the system is functioning well, with water arriving at each household year-round, with a surplus for the new homes that have been constructed since the project was installed. The community seems diligent about maintenance and collecting usage fees.

Alto Cienega-
Date visited: Monday, January 17th, 2022
We met with the treasurer of the water committee, Narciso, who led us on a half hour walk to the spring capture currently in use, and a bit further to a spring that the community hopes to tap for the expansion of their system. Waterlines funded a water system here which remains well-functioning and maintained, though doesn't serve the needs of the growing community for most of the dry season, particularly the houses that are higher in elevation. Currently 7 homes and a chapel are benefitting from the aqueduct.

We did not meet the President of the water committee, Jose Miranda, though Narciso told us that he actually does not live in Alto Cienega nor benefit from the aqueduct and has been given

his post based on family relations. Nicolas stressed that the necessity of electing leadership strictly within the community.

The community has identified a 2 gallon/minute year- round spring that they hope to capture and pipe directly to the homes without the use of a tank. Nicolas hopes to begin work here in late summer of 2022 (around April).

Llano Mira-

Date visited: Monday, January 17th, 2022

Waterlines funded a system here, constructed in 2018-19, which functions well and seems to be well-maintained. We were not able to meet any representatives of the water committee, though the few community members we met seemed to be involved in the maintenance of their system.

Quebrada Mina-

Date visited: Tuesday, January 18th, 2022

The system funded by Waterlines here functions well, though suffered some damage when a tree took out the bridge that was supporting the distribution line over a creek. The water still flows in this location but could suffer more damages if not repaired soon. Beyond this issue the community is engaged with the maintenance and basic repair of the system. The Secretary of the committee took us to several places where the community had just completed a repair of the distribution line.

Nicolas was planning to begin work here in 2020, (we dropped off cement during the Waterlines 2020 visit) but COVID made it impossible for Nico to travel here to support this project. He plans to resume work reconstructing that bridge crossing in early 2022.

Cerro Maiz-

Date visited: Tuesday, January 18th, 2022

A community with a history of Waterlines involvement dating back 25 years, the system which served this village of 60 households is now in need of significant repairs. Nicolas repaired the 5000-gallon tank here 15 years ago, but currently it needs to be replaced. The spring capture is also deteriorating; Nicolas plans to either patch it or replace it as well. Nicolas was also delayed here over 2020-21 due to the pandemic. There are funds in Spiegel that have already been allocated to this project that Nicolas will use when he begins work on this project in early 2022.

It was heart-warming to see how the people of Cerro Maiz hold Waterlines in such high esteem. It is clear how the continued visits of Waterlines volunteers have motivated and encouraged the people here.

Alto Caballero- Barriado Rio Espeso-

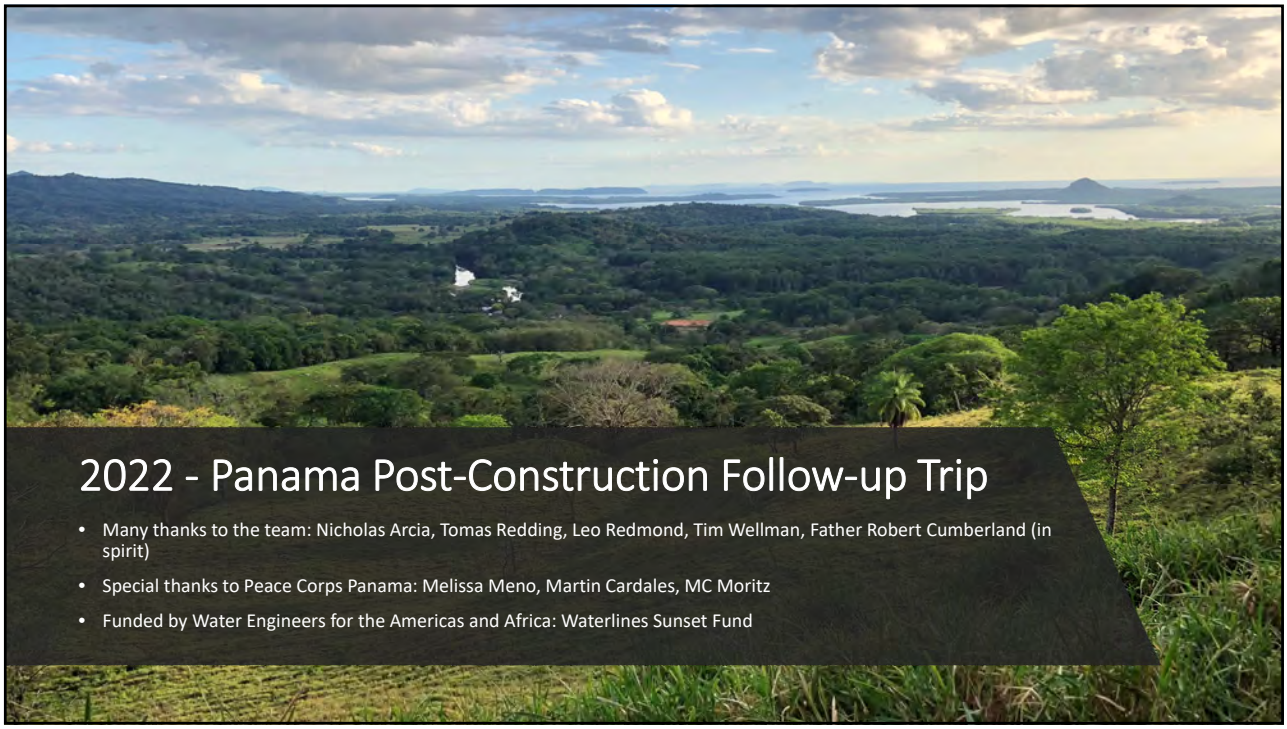
Date visited: Tuesday, January 18th, 2022

The large community of Alto Caballero has a patchwork of water systems, mostly gravity fed with one new electricity powered well, that supply their population of around 1000 households. Waterlines has funded some gravity powered systems and MINSA provided the funding for the well and pump. The well and pump have proven to be costly to run and in need of expensive

repairs just months after their installation, a reminder of why low-cost gravity fed systems are preferable.

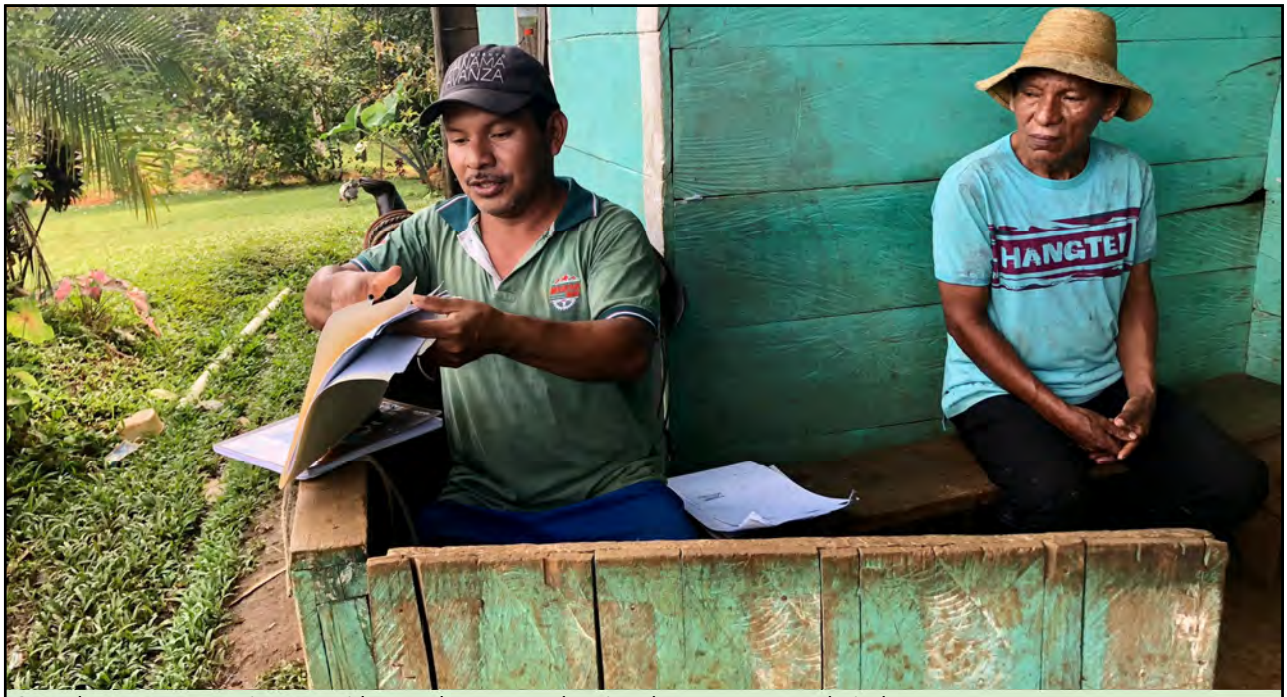
We shared lunch here with Martin, who has held several posts with the water committee over many years. Because of the sprawling nature of the various aqueducts here, Martin had several proposals for extensions and repairs to the systems of greater Alto Caballero.

Of these proposals, Nicolas identified a new toma for Alto Caballero/Barriada Rio Espeso as the most urgent. He is awaiting a proposal from Martin and the water committee of Alto Caballero and plans to perform a study here in late 2022.



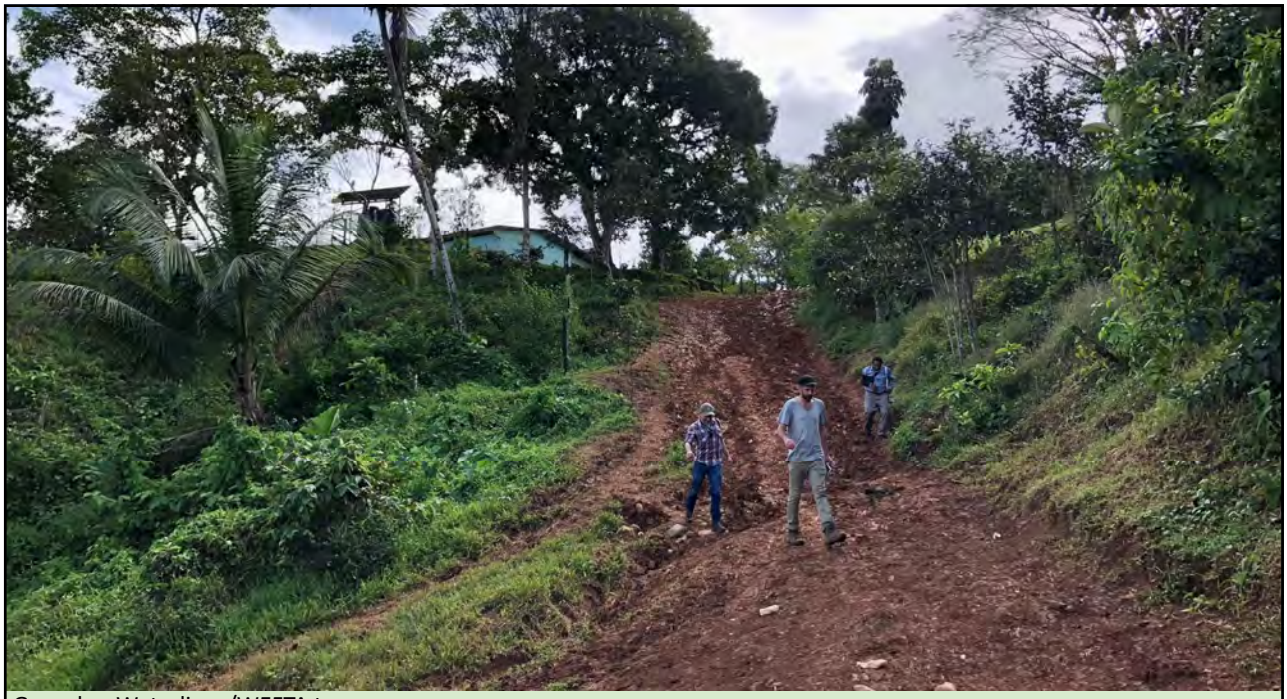
2022 - Panama Post-Construction Follow-up Trip

- Many thanks to the team: Nicholas Arcia, Tomas Redding, Leo Redmond, Tim Wellman, Father Robert Cumberland (in spirit)
- Special thanks to Peace Corps Panama: Melissa Meno, Martin Cardales, MC Moritz
- Funded by Water Engineers for the Americas and Africa: Waterlines Sunset Fund



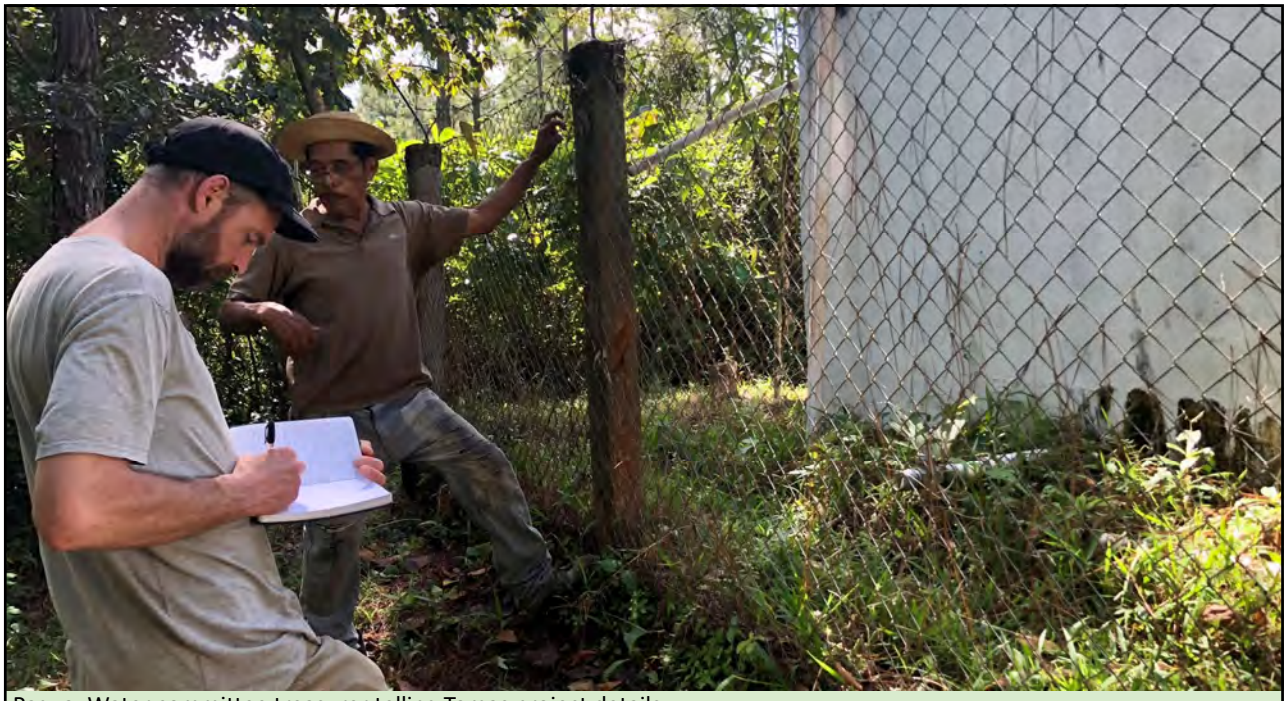
Guayabo: Water committee president and treasurer showing the WEFTA team their documents

Guayabo: Water supply tanks

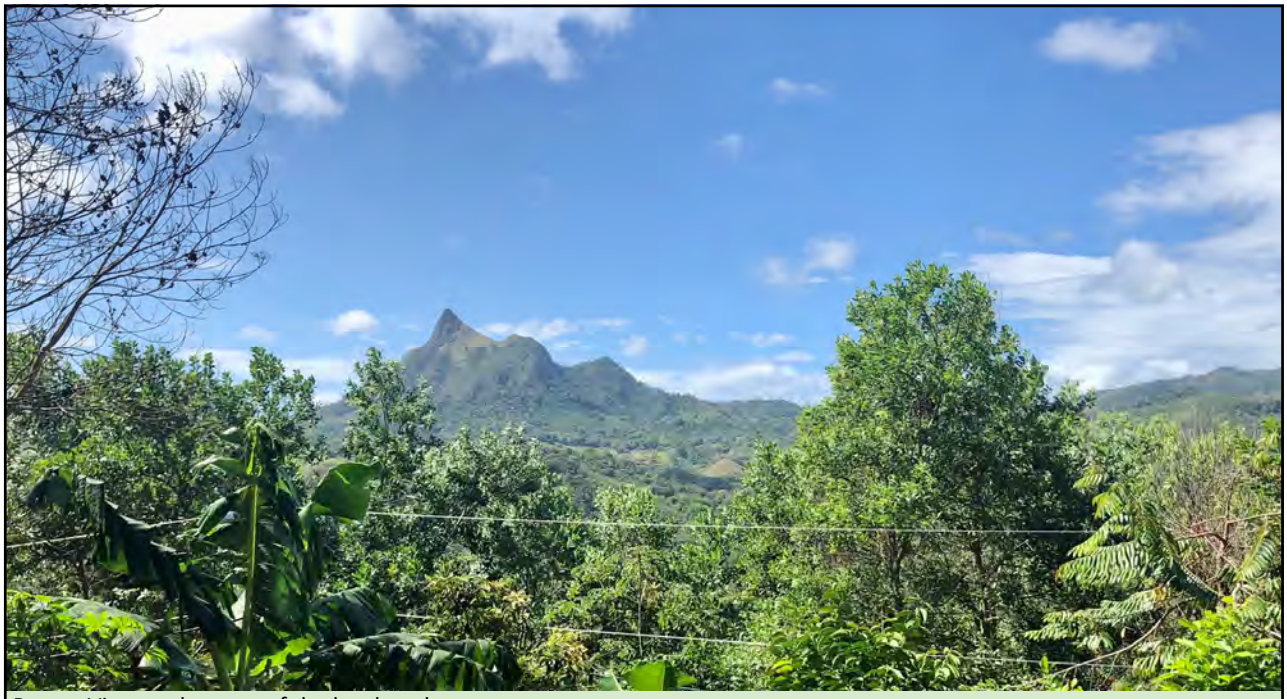


Guayabo: Waterlines/WEFTA team

Pagua: Water committee treasurer showing the team the new water supply tank



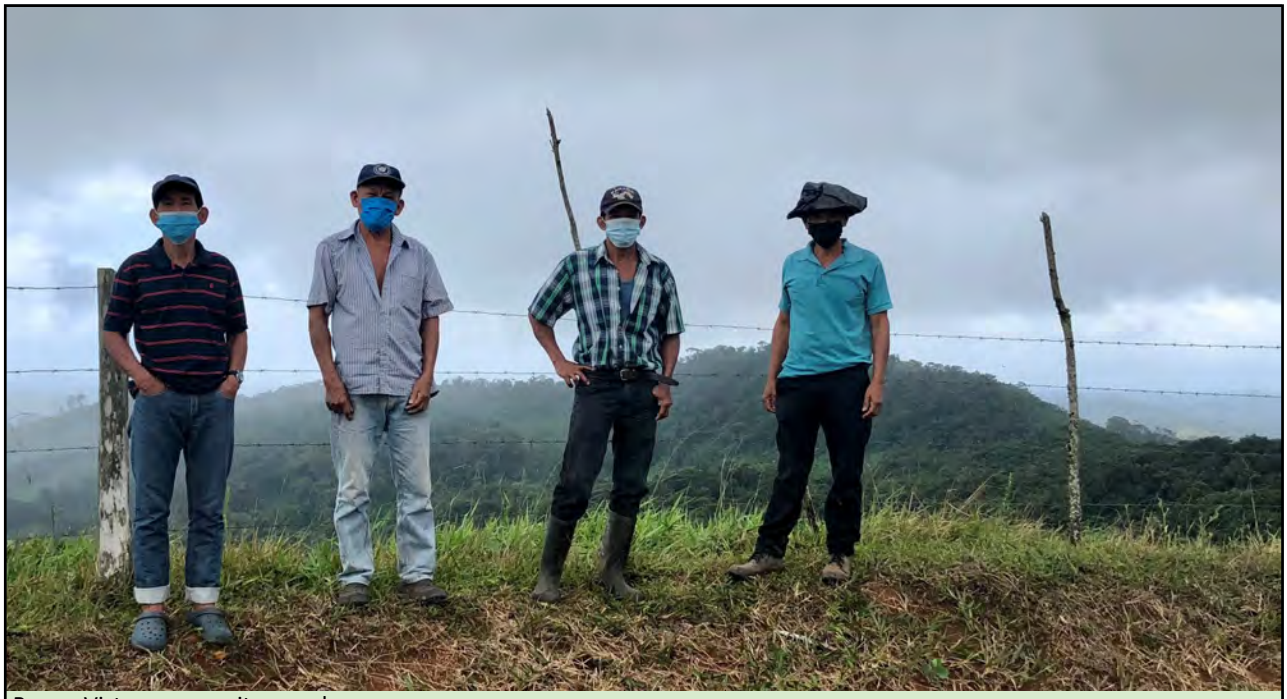
Pagua: Water committee treasurer telling Tomas project details



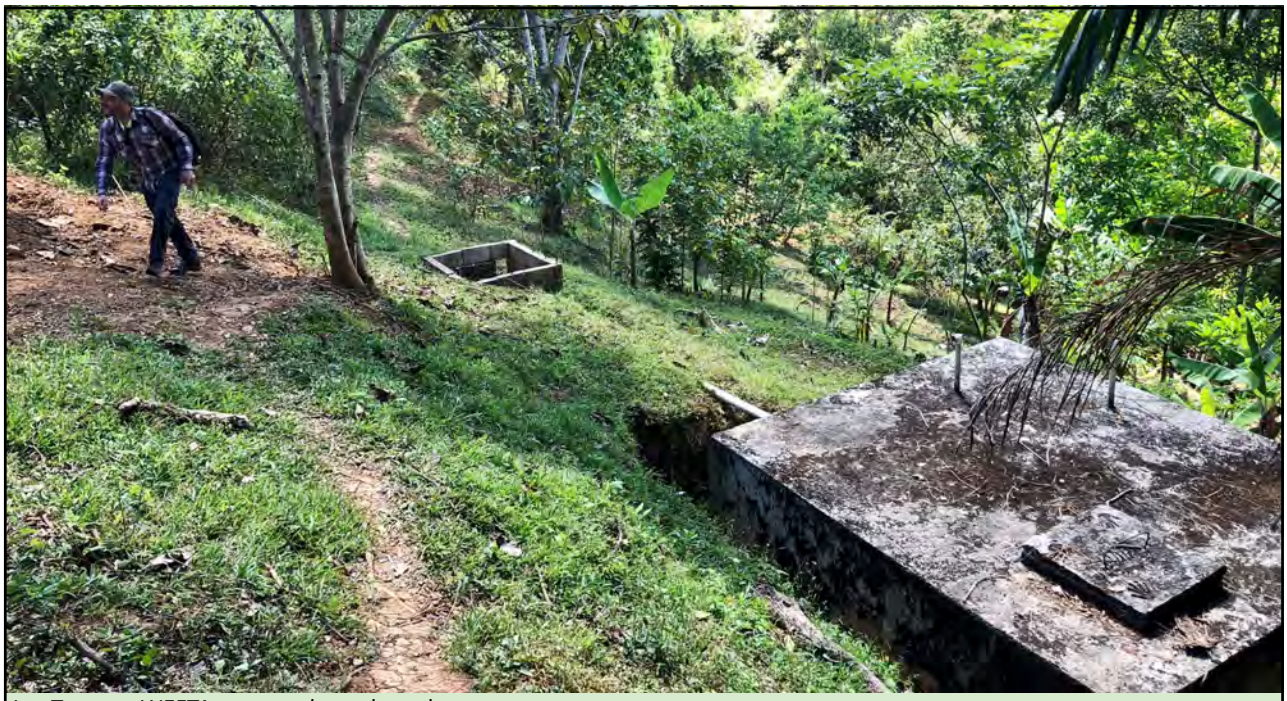
Pagua: View to the west of the local peak.

Buena Vista: meeting with the water committee

Buena Vista: water supply tank

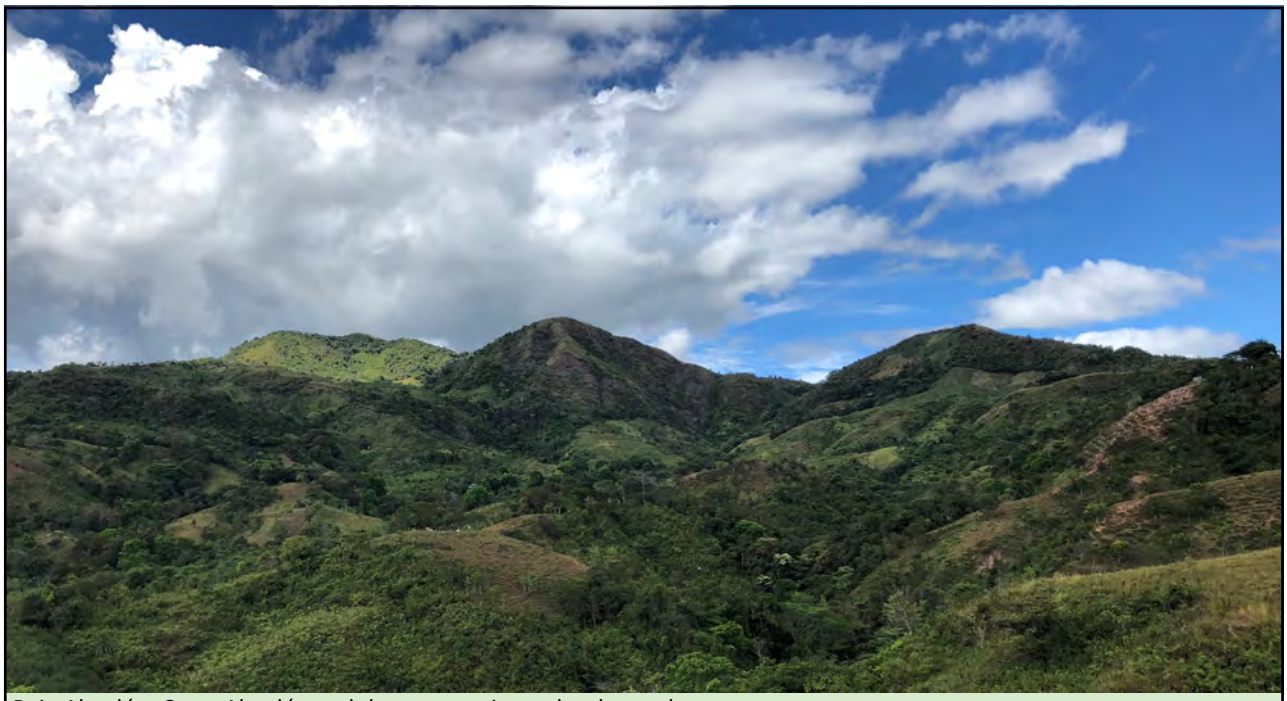


Buena Vista: community members

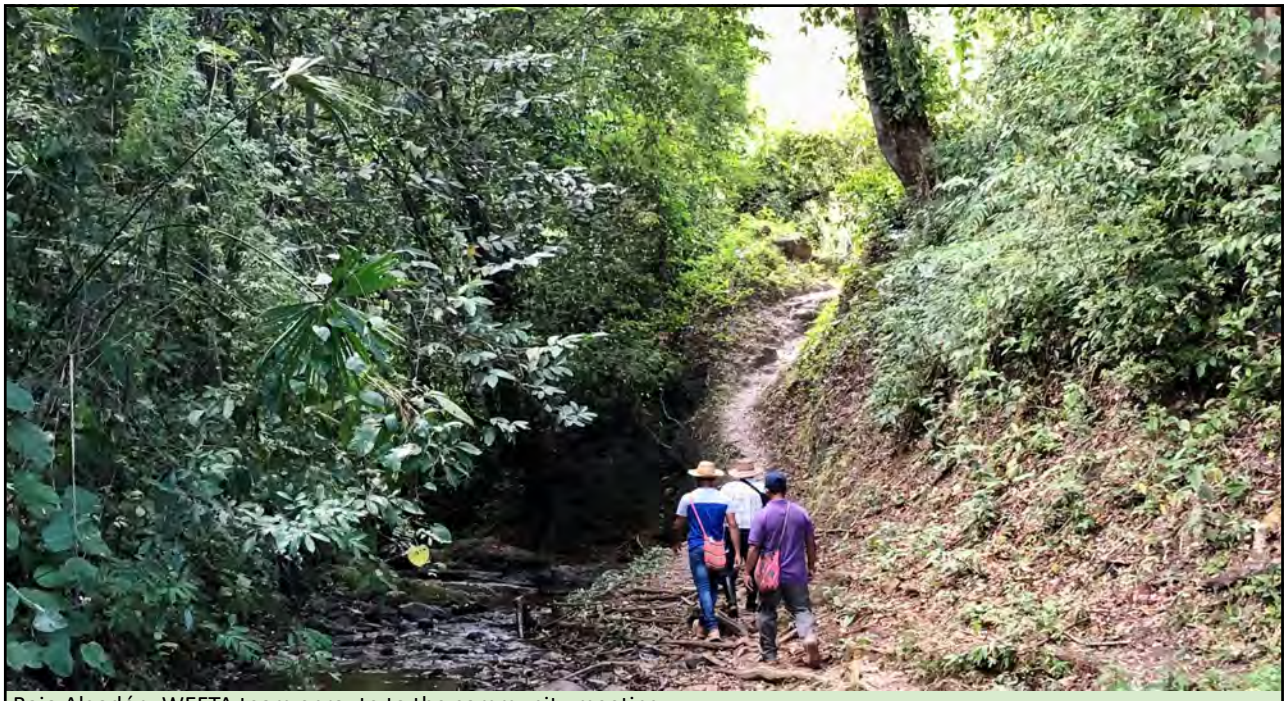


Las Trancas: WEFTA team and supply tank

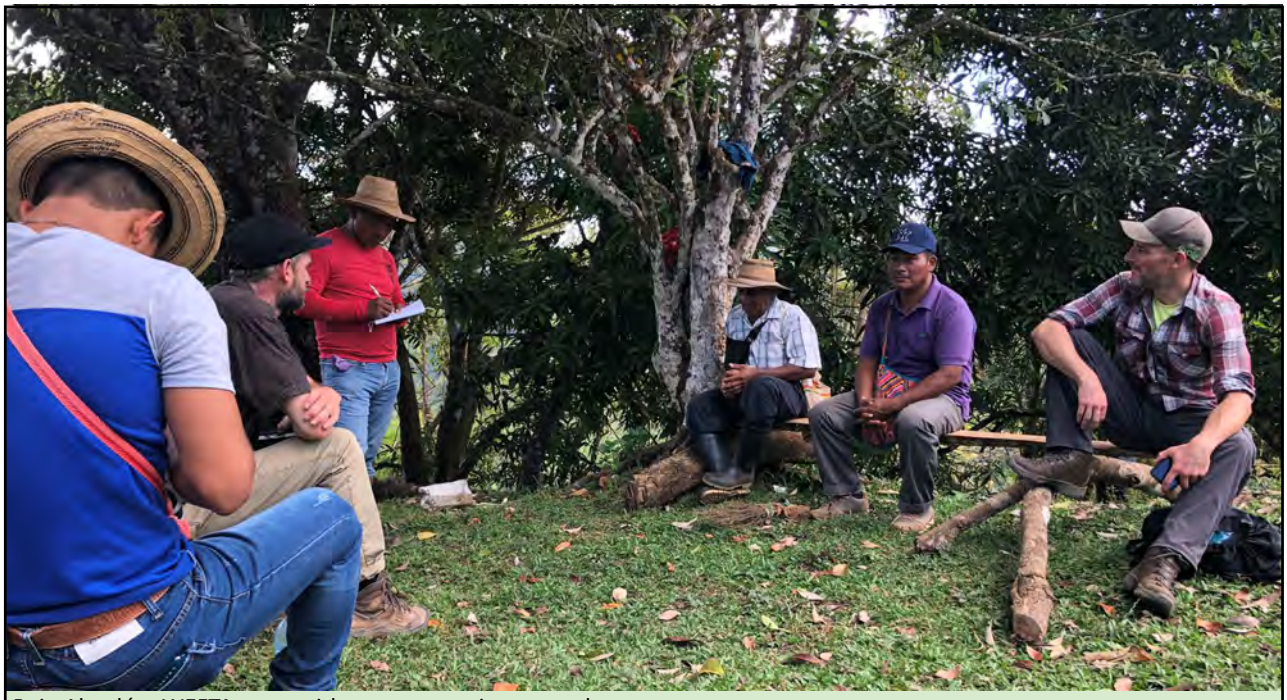
Las Trancas: WEFTA team and water committee members / chlorinator



Bajo Algodón: Cerro Algodón and the community under the peak

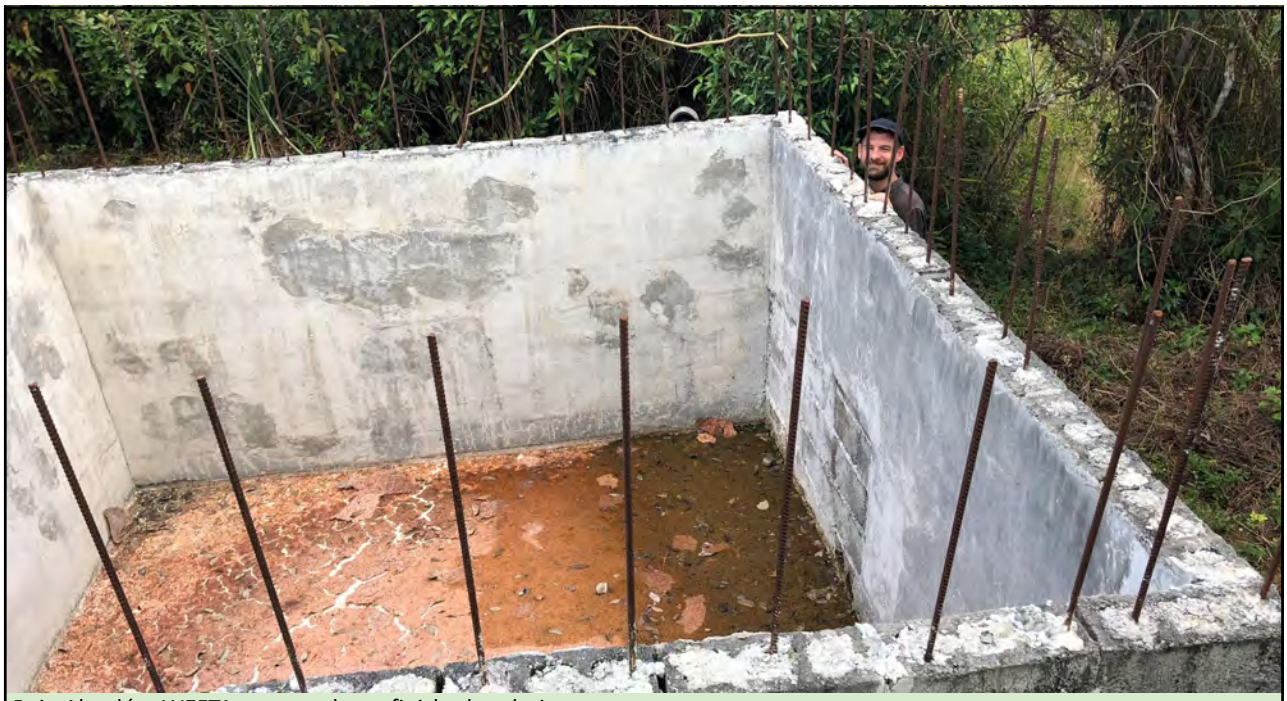


Bajo Algodón: WEFTA team enroute to the community meeting

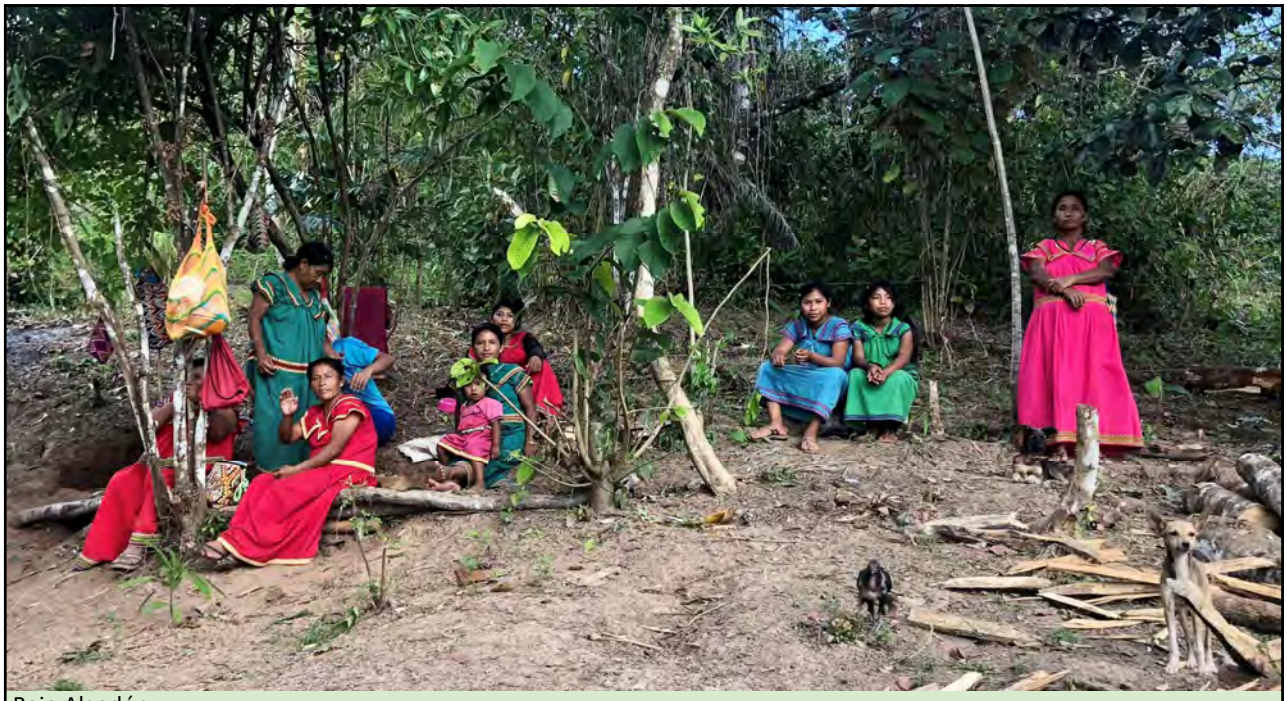


Bajo Algodón: WEFTA team with water committee members

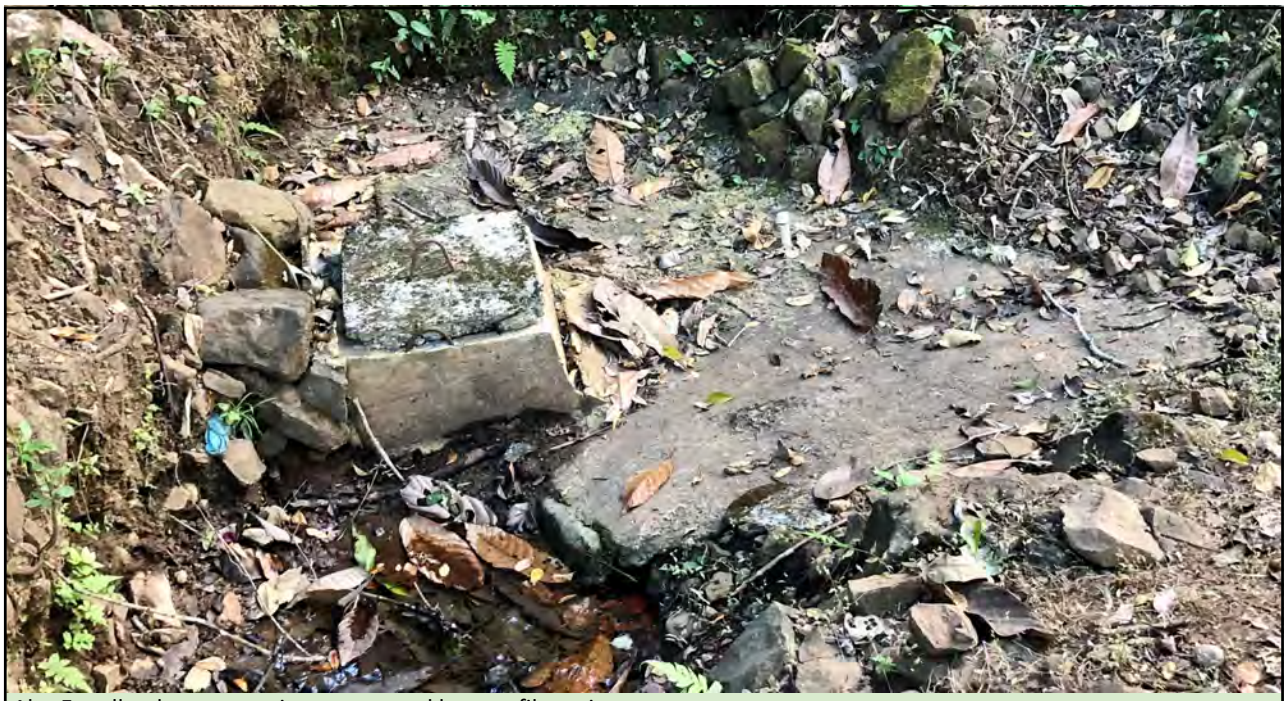
Bajo Algodón: WEFTA team with community and committee members at the tank site



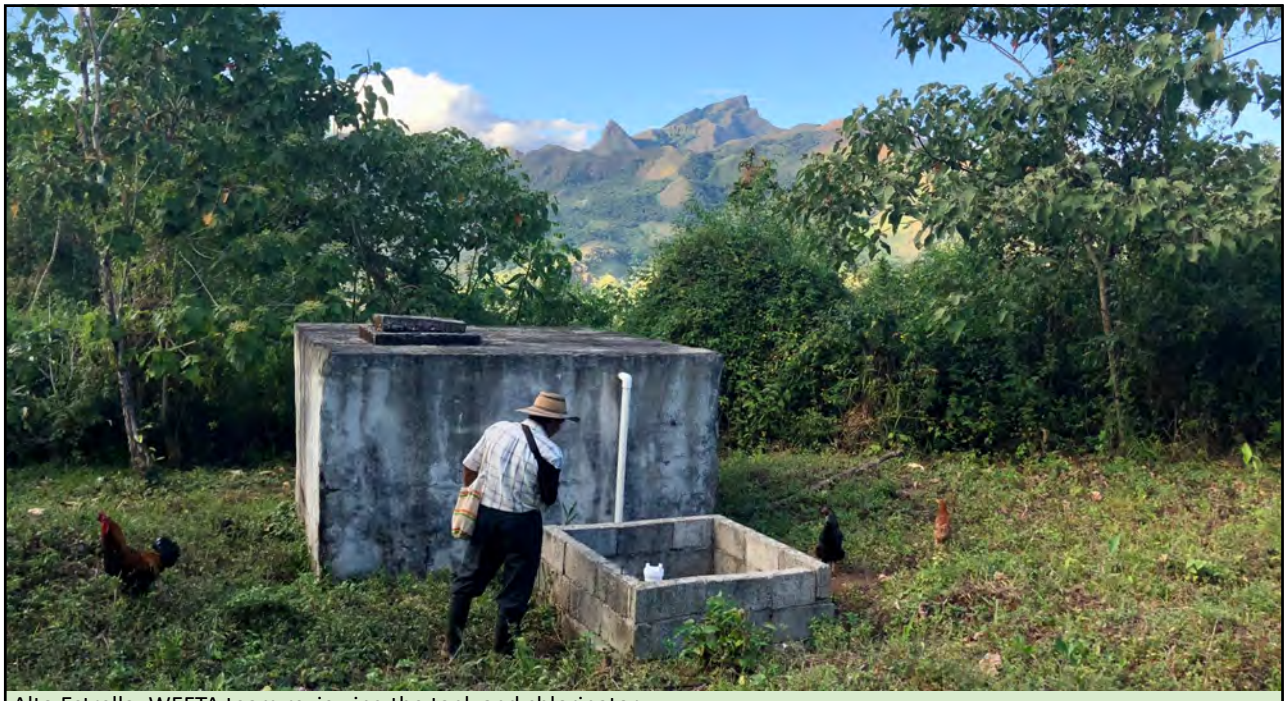
Bajo Algodón: WEFTA team at the unfinished tank site



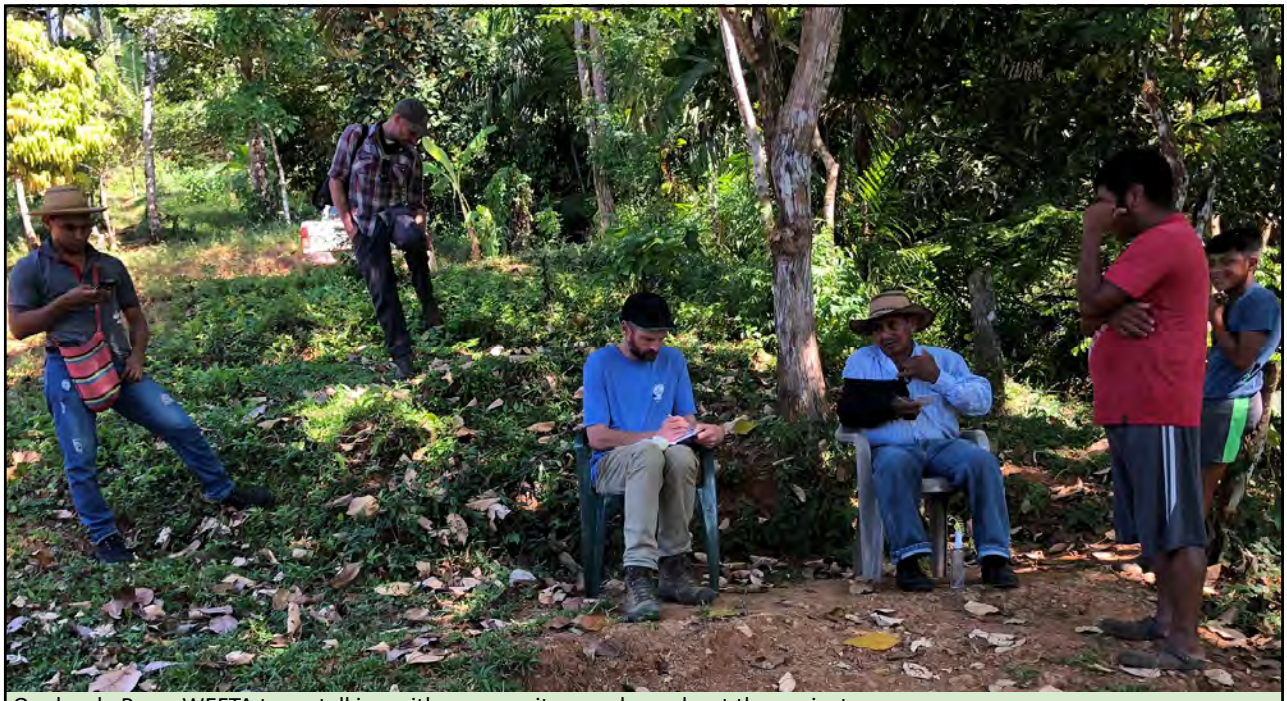
Bajo Algodón



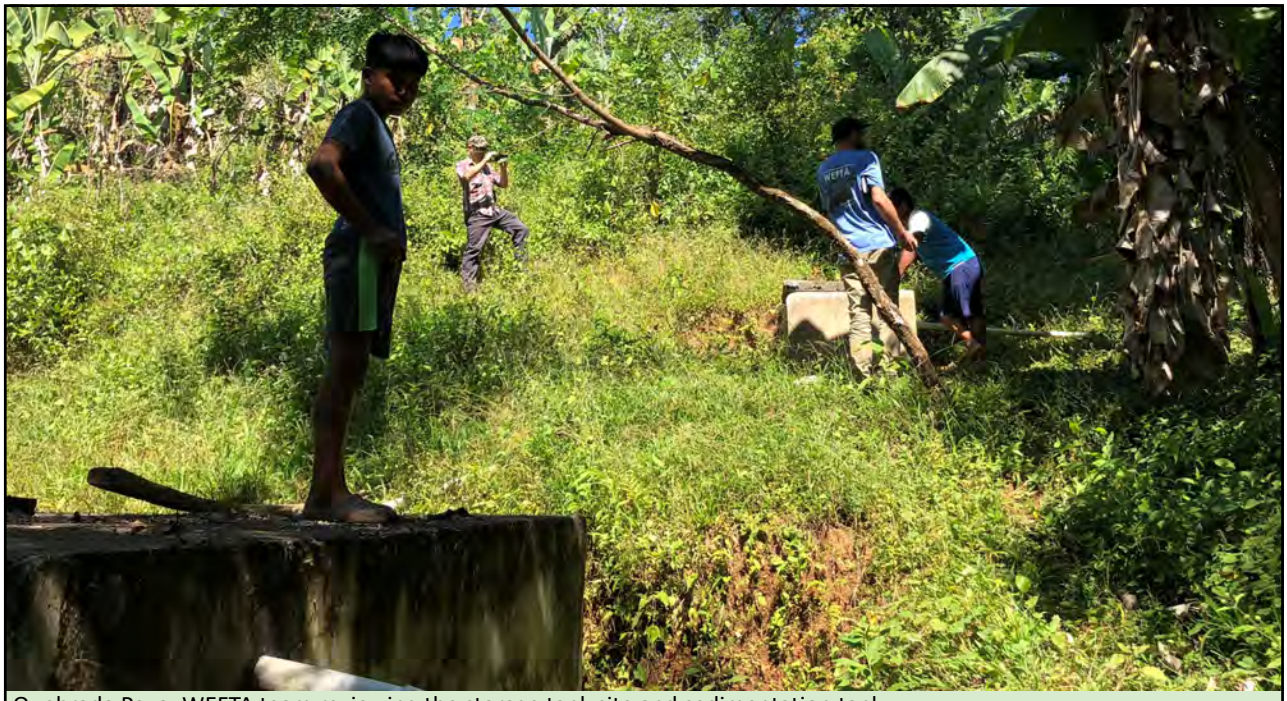
Alto Estrella: the community constructed low-profile spring capture



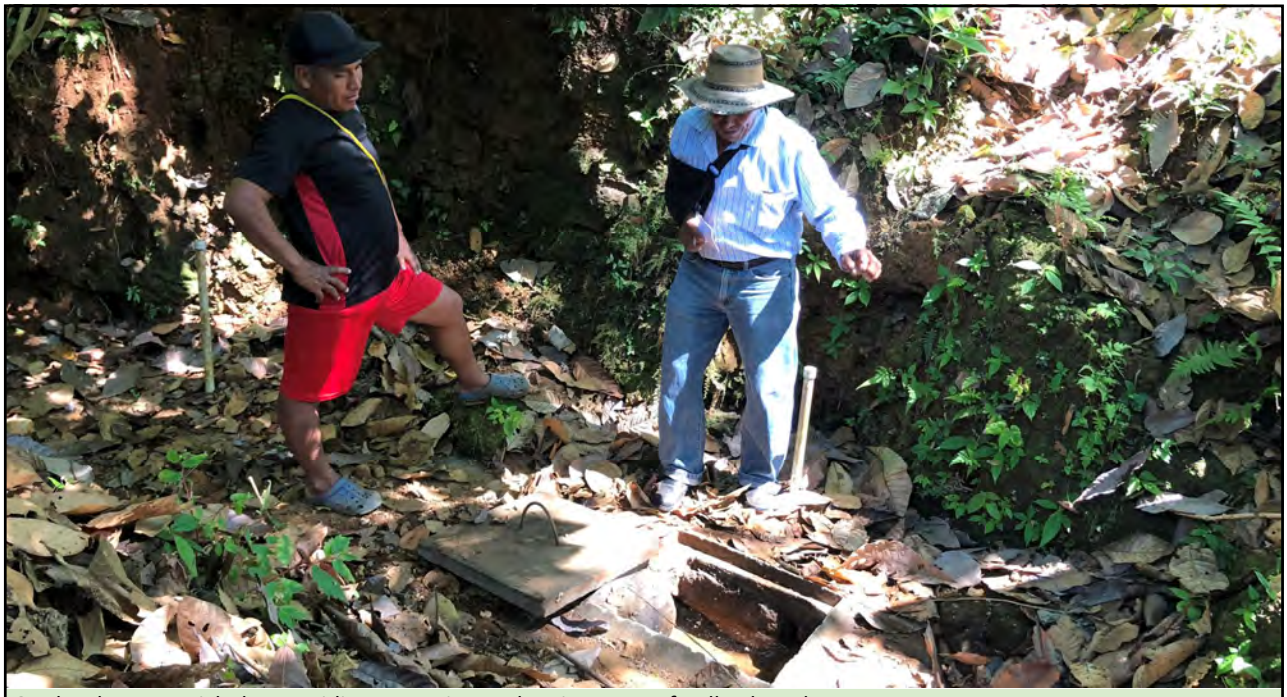
Alto Estrella: WEFTA team reviewing the tank and chlorinator



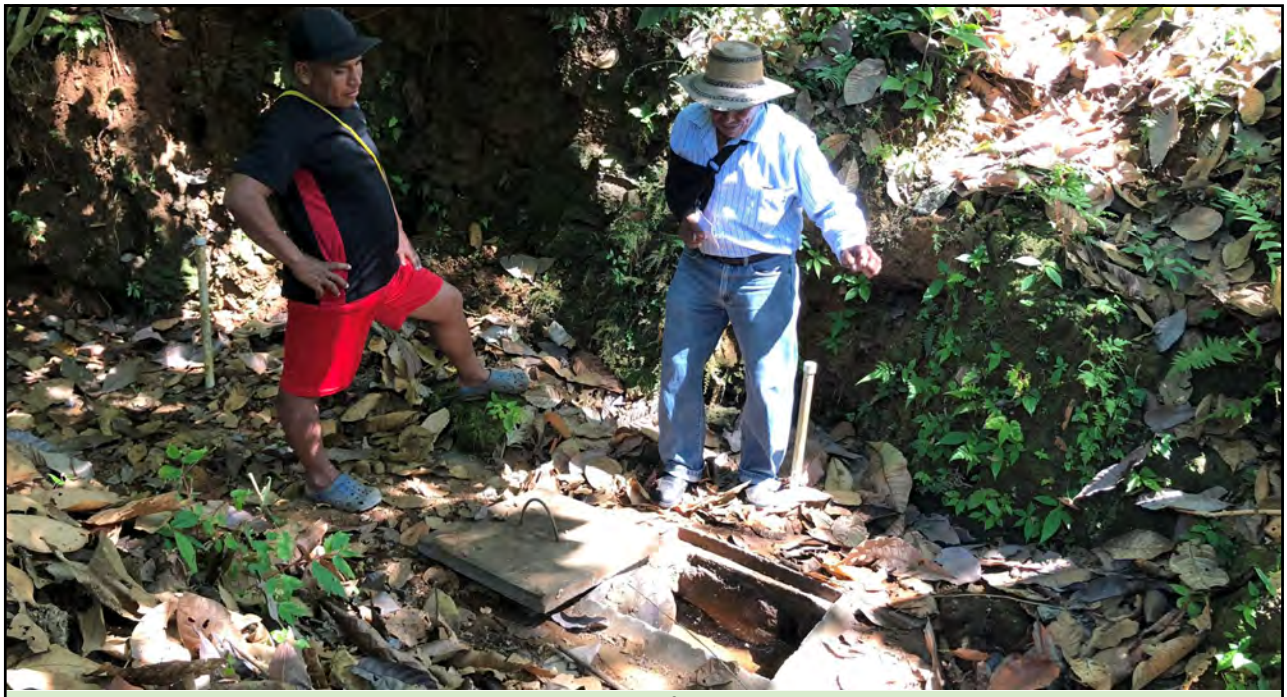
Quebrada Pavo: WEFTA team talking with community members about the project.



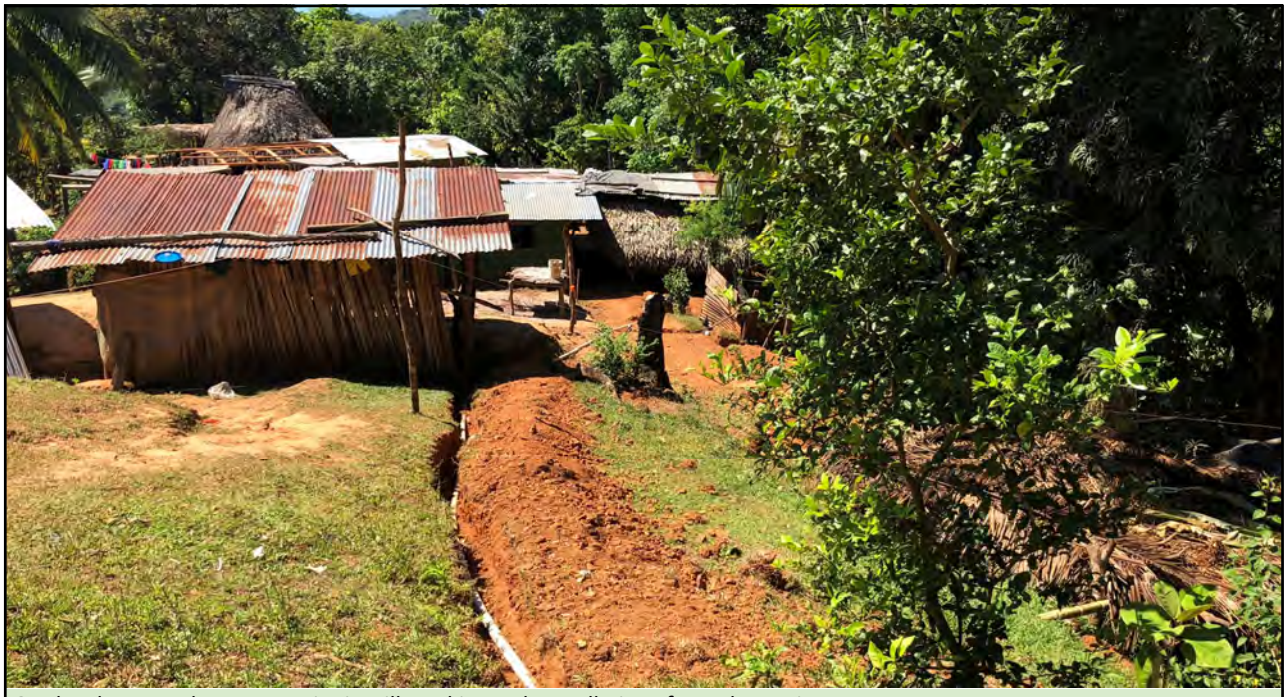
Quebrada Pavo: WEFTA team reviewing the storage tank site and sedimentation tank.



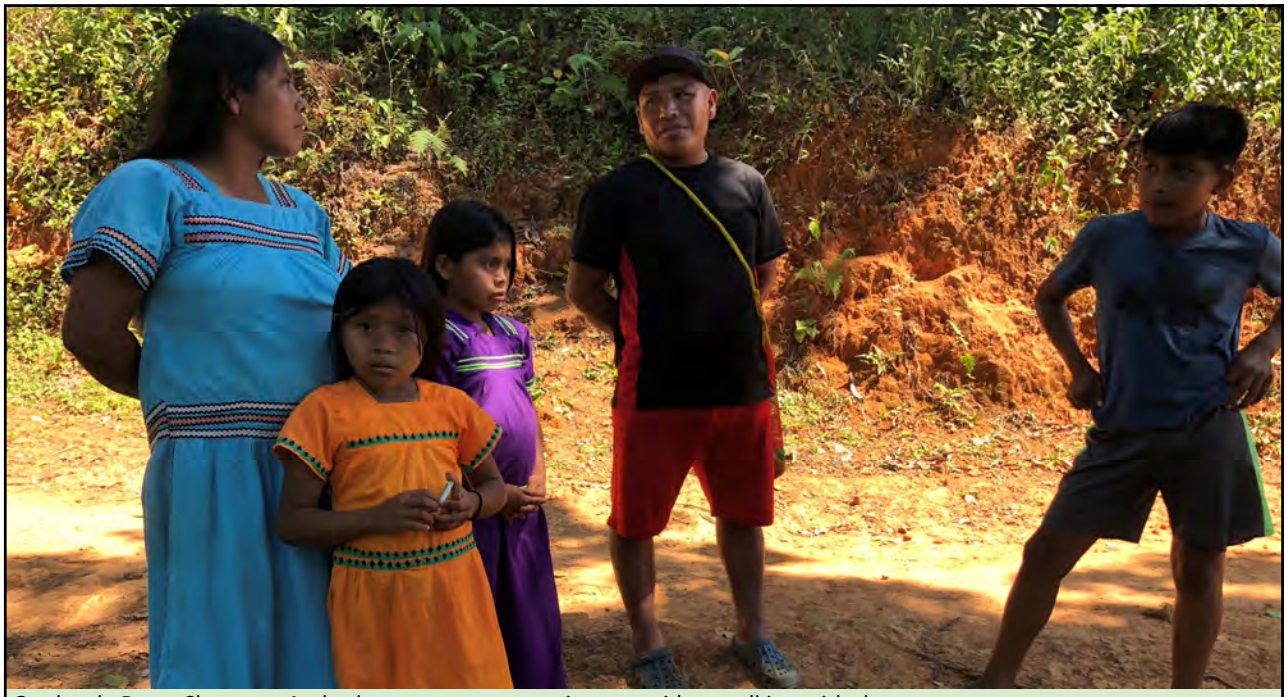
Quebrada Pavo: Nicholas providing operation and maintenance feedback to the current operator.



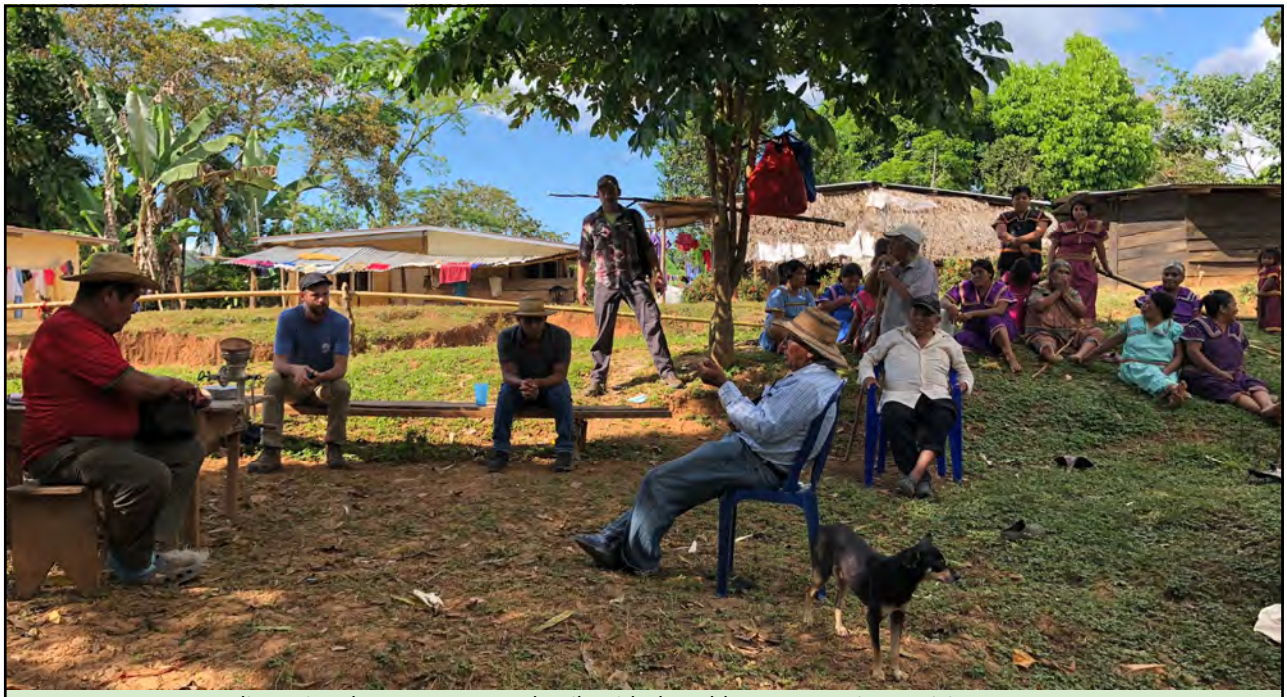
Quebrada Pavo: Nicholas providing operation and maintenance feedback to the current operator.



Quebrada Pavo: the community is still working to bury all pipes from the project.



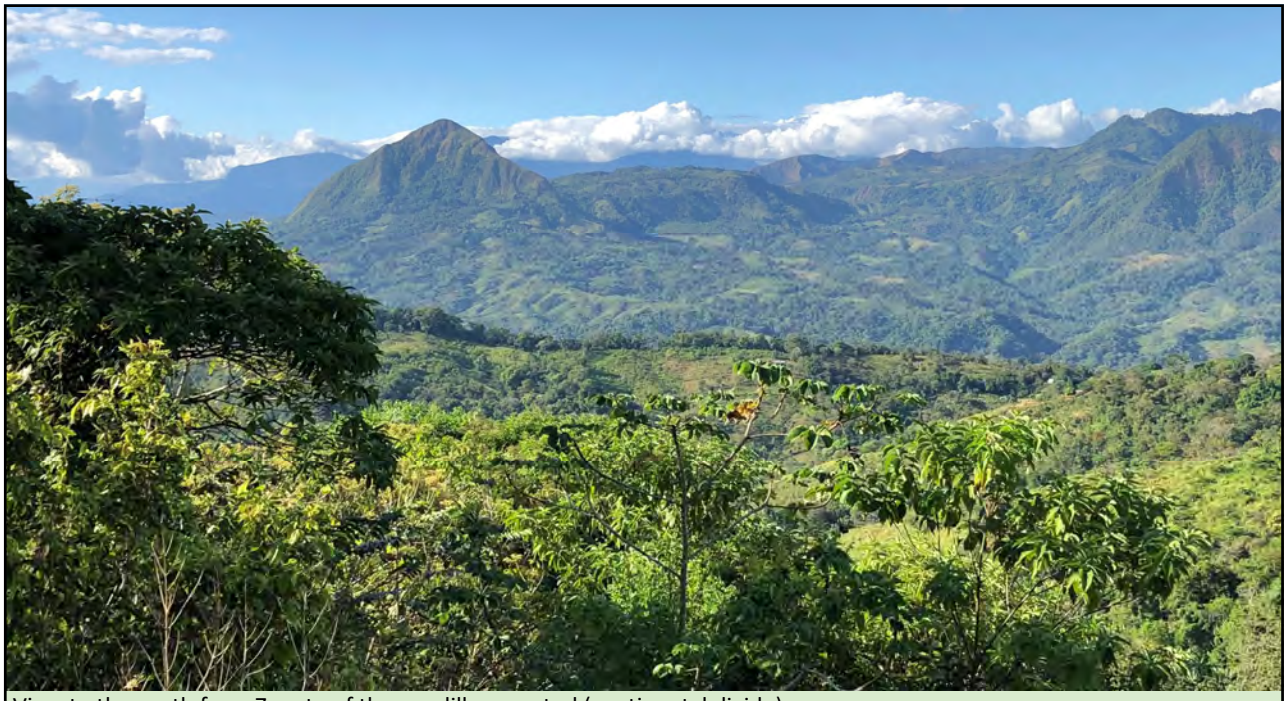
Quebrada Pavo: Clemente Andrade, new water committee president, talking with the water operator.



Zapote: WEFTA team discussing the water system details with the ad-hoc community participants.

Zapote: WEFTA team and community members visiting the leaking supply tank built in 2003.

Zapote: WEFTA team visiting the spring capture site Nicholas built. It is still functioning well.



View to the north from Zapote of the cordillera central (continental divide).