ENGINEERS WITHOUT BORDERS USA

Princeton University Chapter

Dominican Republic Program
2017 Implementation Trip

Water Supply in El Cajuil

The Dominican Republic program within Princeton University's chapter of Engineers Without Borders officially began in Summer 2015. During a short pre-assessment trip, a group of students traveled to the northwestern area of the community and identified El Cajuil, a rural community of roughly 130 households, as our partner community. They had been experiencing water scarcity for several years as their water distribution system, implemented by an NGO nearly three decades ago, no longer was adequate for their growing population. In the subsequent year, the team worked at Princeton to draft documentation and prepare for an assessment trip to better understand the issues of the community. That trip, which occurred during Summer 2016, included components such as community surveying, meetings with the community Water Committee and government, GPS mapping of the existing water system, water source exploration, and water quality testing. Distribution inefficiencies were identified as a major problem leading to the inconsistencies in the delivery of water that El Cajuil experienced during this trip. Other problems identified included a lack of a mechanism to control water flowing into the primary storage tank (Tank 1), fecal coliform bacteria in the water, and finally, in the lower portion of the community, observations showing a significant amount of water leaving from the secondary storage tank (Tank 2).

Therefore, an implementation trip was planned for Summer 2017 to install solutions to remedy these problems and improve the supply of water for El Cajuil. Five Princeton undergraduates and a professional mentor traveled to the Dominican Republic for over 3 weeks to bring the engineering designs and plans to life. During this trip, a float valve assembly was installed at the inlet to the primary storage tank to prevent water from overflowing during periods of plentiful water and allow it to collect in the reservoir instead. This is particularly important because the community has had problems in the past with consistent access to water. When water is available, members of the community would have more than enough if less was wasted. By increasing the amount of water stored in the system, the community will waste much less water, hopefully alleviating some of the scarcity of water in periods of less rain.

Water meters were installed to provide the team and the community with a more comprehensive idea of water usage in the community. These readings helped us identify an unknown connection between our community's water system and the system of a neighboring town. By separating them, we prevented valuable water from bypassing the houses in our community. The water meters also allow the community to monitor their system and ensure that specific members of the community are not using an excess of water. They give the community more knowledge of the current state of their water system, allowing them to become more knowledgeable with how their system operates. This increased community knowledge of the system will make future implementation trips more productive.

Finally, the foundations of a disinfection system were put in. We attempted to put in a locally sourced chlorination system, but there was too much variance with the chlorination levels with the system's setup to allow it to stay in operation during the year. We decided to learn from our attempts and implement a more feasible chlorination system in the future for the community that will be safer and more effective than the one we originally intended on using. These

implementations will improve the quality of water that the members in the community are receiving and set the foundation for future projects to ensure water scarcity will no longer be an issue.

We worked in El Cajuil for three and a half weeks, and nearly all of our implementation goals were met. From what we've seen, one of the biggest issues was securing the appropriate parts for our implementation, as many of them required trips to cities more or less an hour away, not to mention the limited availability of parts in country. This was particularly troublesome for a couple instances where the system was in need of more repair than anticipated. This led to us running out of materials or unexpectedly needing a certain part, requiring us to make another trip to the hardware store. Nonetheless, we bought all of our equipment in the Dominican Republic to ensure that any parts required for repairs would be available to the community in-country. Of course we planned these types of challenges into our schedule as well as our budget, and were happy to have fully completed all planned aspects of our project within budget, with the notable exception of the chlorination system.

Some of the issues we faced had difficult social aspects as well. Many houses had individual tanks that they would fill when water was available, which quickly depleted the community's storage tanks. While the water supply is inconsistent, this is the only way for these households to ensure consistent water. However, these individuals tanks are less safe, since they can be a breeding ground for mosquitos and allow chlorine to evaporate, and make the water distribution system less reliable. Going forward, these are issues that will need to be addressed with an even stronger community engagement and education component.

During this trip we collected information for the projects and improvements that we would like to implement going forward. One goal going forward will be to find a chlorination system that will be able to consistently provide adequate chlorination. We would like to continue improving the water distribution by looping the system, which would involve constructing an additional transmission line to complete a loop. Although we found significant water loss from the Loma de Cabrera connection and suspect additional leaks, we also found that water supply is a larger problem than initially thought. With the data collected with the water meters, we found that the water use was larger than expected.

We were inspired by the community's dedication to improving their water system. We look forward to working with them in the future as we continue to ensure each household as a reliable supply of clean water.

Selected Photos