



Engineers Without Borders – USA Princeton University Chapter

October 07, 2014

Dear Mr. Dan Marcus and the Princeton Class of 1995:

As the Princeton University Chapter of Engineers Without Borders – USA celebrates the 10th anniversary of its establishment (in Fall 2004), we have a successful summer to reflect on and a promising year to look forward to. From July to September 2014, our Peru and Kenya programs – both at different stages of project development – sent teams of undergraduate students and professional engineering mentors abroad to implement their respective sustainable engineering projects. These project teams would not have been able to travel and to positively and sustainably impact two developing communities without the generous support of the Class of 1995 Summer Service Fund, and for this we are grateful.

Our Peru program – our oldest program – sent a team to La Pitajaya, Samne, Peru for six weeks to implement a gravity-fed potable water distribution system for La Pitajaya Baja and to monitor the distribution system constructed in La Pitajaya Alta in summer 2013. The team plans to travel this coming summer to assess for a new project in the area.

Our Kenya program – our newest program – sent a team on a four-week implementation trip to implement a rainwater catchment and treatment system in Muchebe, Kuria District, Kenya. The team plans to return to Muchebe in January 2015 to assess for a new project to be implemented in summer 2015.

Our Sierra Leone program did not travel this summer due to the Ebola outbreak. However, EWB-Princeton remains committed to the community of Dorma and plans to implement the designed project (a solar-powered water pump) once the situation improves.

Our on-campus initiatives have taken off as well this fall, most notably with the fifth year of our Sustainable Engineering and Development Scholars Program. We are excited to share this new academic year with our new and returning members and to engage them in both our international programs and our on-campus activities.

We thank you for your generous support of EWB-Princeton's initiatives. We look forward to sharing updates of our upcoming year's initiatives, and in the meantime, please find attached summer trip reports from our Peru and Kenya programs.

Best regards,

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Engineers Without Borders – Princeton University Program in La Pitajaya, Samne, Peru *Summer 2014 Implementation Trip Report*

Acknowledgements

On behalf of the members of the Engineers Without Borders (EWB) Princeton University Peru Program and the greater EWB-Princeton membership, we would like to thank the following organizations and individuals for their generous financial, technical, and administrative support of our program:

- The Princeton Environmental Institute
- The Keller Center for Innovation in Engineering Education at Princeton University
- Mr. James Leitner and Professor Tracy Higgins '86
- The Waters Foundation, in coordination with the EWB-USA Project Grants Program
- The Princeton University Fred Fox Class of 1939 Fund
- The Princeton University Class of 1978 Foundation Fund
- The Princeton University Class of 1995 Summer Service Fund
- The Paul E. Sigmund Scholars Fund of the Princeton University Program in Latin American Studies

Thanks to this support, we have had the opportunity to bring water to the community of La Pitajaya Baja and with continued support, we look forward to closing out this project and opening up a new one in the region of La Libertad, Peru. In the meantime, we are pleased to share the results of our summer 2014 trip.

Trip Overview

On August 25th at 4:32 pm, shouts of joy echoed throughout the mountainside as we connected the final tap stand to the water system. We did it! After six weeks of working as a team – no, as a *family* – with the community members of La Pitajaya; after an entire academic year of completing the hydraulic gradeline calculations, drawing the diagrams, and preparing all the documentations required for implementation; after many trips up and down the mountain taking distance, elevation, and GPS data, we finished the water system for the community of La Pitajaya! As of that moment on August 25th 2014, every house in La Pitajaya has flowing potable water.



The first connected tapstand in La Pitajaya Baja!

Peru Program Overview

Our project, Potable Water for La Pitajaya, was opened in 2011 when the community of La Pitajaya approached EWB-Princeton, asking if we could help provide them potable water. At that time, the community was drinking from the Rio Moche, a river heavily polluted with mining waste, parasites, fecal matter, and bacteria. Seeing the enthusiasm of this community for this project, and their desire for clean drinking water, we decided to partner with them and turn this dream of clean water into a reality. We are definitely one of the luckiest teams out there, to have found such a wonderful community – a community as driven, capable, and hard-working as this one.



Trenching the 3.5 km long pipeline



A group photo to celebrate yet another milestone – we've connected Alberto's tapstand.

This summer, six Princeton undergraduate students – Corrie Kavanaugh (MAE '17), Josh Umansky-Castro (MAE '17), Hana Ku (ORF '17), William Guiracoche (MAE '17), Kasturi Shah (PHY '16), and Amanda Li (EEB '16) – along with two technical mentors (Dan Wright and Nol Perreira) traveled to Samne, Peru between July 25th and September 5th to implement a gravity-fed potable water system for the community of La Pitajaya Baja. Due to differences in elevation and distance, the community of La Pitajaya has been divided into two parts, La Pitajaya Alta (the upper part of the community) and La Pitajaya Baja (the lower part of the community). During the summers of 2012 and 2013, we completed the implementation of the water system for La Pitajaya Alta, bringing clean water to everyone in the upper part of the community. This summer, we started and completed the implementation of the water system for La Pitajaya Baja, accomplishing our goal of helping provide all of La Pitajaya with clean, flowing water.

Accomplishments of the Summer 2014 Trip

This summer, we began and completed the implementation of the entire water system for La Pitajaya Baja. This included constructing the source capture, the spring box, and two reservoir tank foundations, installing two 2500L reservoir tanks, as well as trenching and laying out a 3.5 km-long pipeline. In addition to completing the Baja water system, we also did maintenance work on the Alta system, which included installing an additional reservoir tank for greater system storage capacity, connecting two additional houses to the system, and ensuring



Carrying the materials up the mountain

that all components were functioning as efficiently as possible. Our summer consisted of trips into Trujillo to purchase material; working with the masons in constructing the concrete structures necessary for the system; working alongside the community members to trench the system, lay the pipe, and carry the material; and just having a wonderful experience with everyone in the community, who are like family to us now.



A finished tapstand

Future Work

Having completed the Pitajaya water system this past summer, we will be working to close out the project (which includes monitoring the previously-implemented projects) in addition to assessing for a new one. We have many contacts in the area, including our community members, our masons in the Otuzco municipality, the ex-mayor of Samne, and local Peace Corps Volunteers. Our potential project possibilities range from latrines to bio-mass stoves to water systems to bridges – the possibilities are endless! Thank you so much for your support of our project. We really could not have done this without your generosity.



Engineers Without Borders – Princeton University Program in Muchebe, Kuria District, Kenya *Summer 2014 Implementation Trip Report*

Acknowledgements

On behalf of the members of the Engineers Without Borders (EWB) Princeton University Kenya Program and the greater EWB-Princeton membership, we would like to thank the following organizations and individuals for their generous financial, technical, and administrative support of our program:

- The Princeton Institute for International and Regional Studies
- The Princeton Environmental Institute
- The Keller Center for Innovation in Engineering Education at Princeton University
- Mr. James Leitner and Professor Tracy Higgins '86
- Ms. Mary T. McKay '84
- The Princeton University Office of International Programs
- The Princeton University Program in African Studies
- The Princeton University Fred Fox Class of 1939 Fund
- The Princeton University Class of 1978 Foundation Fund
- The Princeton University Class of 1995 Summer Service Fund

Thanks to this support, we have had the opportunity to bring clean, potable drinking water to the primary school in Muchebe Village, Kenya. With continued support, we look forward to bringing water and improving sanitation in Muchebe in the summer of 2015. In the meantime, we are pleased to share the results of our summer 2014 trip.

Trip Overview

A group of four Princeton students – Devansh Gupta '17, Brendan Hung '17, Jessica Luo '15, and Sofia Suarez '16 – traveled to Muchebe Village, Kenya with professional engineering mentor Donald Moris, PE from August 8th to September 6th on an official EWB-USA implementation trip. The goal of this trip was to expand the current rainwater catchment system at Muchebe Primary School to increase the community's clean water storage capacity. By the end of the trip, the team successfully increased the storage capacity of the community by 47,500 liters.



Team photo. From left to right: Boniface (a local skilled laborer), Brendan Hung, Sofia Suarez, Mrs. Paul (Head Teacher of the primary school), Devansh Gupta, Jessica Luo.

Program Overview

The Kenya Program began when Professor Mahiri Mwita, of the Princeton Swahili department, approached EWB-Princeton with an idea for a project in Kuria district in western Kenya, where he grew up. Kuria has a population of about 500,000, and many communities lack access to basic resources such as year-round access to clean water and sanitation. After traveling to Kuria district in August 2013, we formed a partnership with Muchebe Village to address these needs. The team has since travelled to Muchebe twice – once in January 2014 to conduct an assessment for potential projects and once in August 2014 when we successfully implemented a rainwater catchment system at Muchebe Primary School.

Goals for the Summer 2014 Implementation Trip

During the summer 2014 implementation trip, we sought:

- To increase the storage capacity of the existing rainwater catchment system at Muchebe Primary School;
- To teach the community how to properly operate and maintain the system; and
- To educate the community on waterborne illnesses and proper sanitation practices.

Trip Accomplishments

The team successfully increased the storage capacity of Muchebe Primary's existing rainwater catchment system. However, the implementation was not without several challenges. Our design for the expanded rainwater catchment system involved digging a pit to lower the large storage tanks for clean water and trenching for underground piping between the tanks and the gutters that collect rain. Unfortunately, there were several large rocks that blocked the areas where we



needed to excavate. As a result, team members learned how to think on the spot and adapt to unexpected situations. In this case, we were able to change the shape and arrangements of the tanks in the tank cluster to avoid hitting any rocks. Furthermore, team members were able to learn how construction projects work in Kenya as all labor and components were locally-sourced.

For the community component of the trip we educated the community on sanitation and maintenance of the newly-installed rainwater catchment system. With the help of Standard 8 (a class year in Muchebe Primary School), we developed a sanitation skit that was performed for the community and the school. Following the skit, with the assistance of doctors from the nearby dispensary, we educated the community on how to ensure proper sanitation. Due to time constraints we were unable to conduct all the lesson plans we had prepared, but we were able to consolidate all the material into our presentations. In future trips, we hope to continue educating the community on waterborne illnesses and proper sanitation.

Future Work

Moving forward, the Kenya Team will begin assessment for our next project in Muchebe. Now that we have an established presence in the Muchebe community and have successfully completed our first water project, our team feels ready to take on a project much larger in scale for the village in order to provide a broader-reaching solution for their water and sanitation concerns. We are considering two possibilities for our next project in the village: drilling a well or constructing another rainwater



Students of Muchebe Primary School perform a skit about sanitation during the community meeting.

catchment system along with a network of latrines. Each project has its benefits, and over the course of the next year we will work diligently to determine which will provide the most relief to the people of Muchebe. We plan to travel on an assessment trip in January 2015 to collect data for the project we choose. We will then spend the rest of the 2014-2015 academic year planning the details of the design, to be implemented in summer 2015.

In addition to choosing our next project for Muchebe, the Kenya Team will continue to monitor the system implemented this summer to ensure that the rainwater catchment system at Muchebe Primary School is collecting and storing the water as expected, and we will make any adjustments needed upon our return to Muchebe in January 2015. The sustainability of our project continues to be the primary focus of our team. We are fully committed to fostering a sense of ownership of the rainwater catchment system by the community and to encouraging community members to take the responsibility to operate and maintain the system. Having set up appropriate structures for the maintenance of the system over the summer, we are fully confident that the Muchebe community will be good stewards of their expanded water system.