Institution: University of Florida; **Student participants:** Kathleen Kirsch, Trace Rohlwing; **Title:** Irrigation Channel Improvement Project in Aripalca, Bolivia; **Dates of project:** May 5-May 26, 2014; **Country:** Bolivia

Introduction

Engineers Without Borders (EWB) is an international humanitarian organization that implements engineering projects to improve the quality of life for people in developing countries. The University of Florida chapter established the Bolivia Team to work with a community in Aripalca, Bolivia to design and implement appropriate and low-cost sustainable engineering solutions. Each chapter under EWB-USA makes a minimum five-year commitment to a partnering community. Our mission is to improve the quality of life in the agricultural town of Aripalca by providing the 420 community members with a reliable water supply for crop irrigation. The EWB Bolivia Team is comprised of 16 undergraduate students from a variety of engineering disciplines, including two United World College students. The team has partnered with Engineers in Action (EIA), a non-governmental organization, to launch this project and has developed connections with local engineering students in the closest major city, Potosi, to aid our project efforts. We also maintain close contact with several graduate student advisors from interdisciplinary backgrounds. During the past two summers we have undertaken trips to Bolivia to assess and receive feedback about the needs of the community and collect the necessary data for the project design. In May 2014, we plan on traveling to Aripalca to implement our irrigation channel improvement project.

Background

The community of Aripalca, Bolivia is located 150 km south of the city of Potosi, one of the highest habitable areas in the world. The 120 families that reside in Aripalca rely on agriculture to support themselves throughout the year. They grow fruits, vegetables, and raise their own livestock. The community has a communal piece of land that they use to grow crops they sell to nearby cities. The income gained from those crop sales is used to pay for small community projects.

The team first met with the community in August 2012 after the final implementation trip for another program in the nearby town of Cachitambo, Bolivia. The EIA engineer working with us mentioned another community in the area, Aripalca, which was in need of a clean and consistent water supply for drinking and agriculture. The community was interested in partnering with EWB so the team met with the President of the Rotary club in the city of Potosi, Dr. Marcos Ortega, who is a resident of Aripalca. The team traveled to the community for a few days before returning to the United States. While there, the people of Aripalca gave us a warm welcome and offered the team homes to stay in and food during the visit. They showed us around the town and took the team to a stream they use as a water source where we took water samples to be analyzed for contaminants such as bacteria, nutrients and metals at the local laboratory in Potosi.

In May of 2013 the team went on an assessment trip of Aripalca. During the assessment trip, the team carried out a water audit and a “Sondeo” interview. The water audit consisted of assessing water sources, water uses, and water quality. Water quality tests were taken, flow rates and stream profiles determined, and water consumption volumes collected. A Sondeo is a rapid rural appraisal approach that combines elements of formal surveys, interviews and participant observation to gain insights into different community issues. We held conversations with members of 25 households, and using our observations, prepared a report that highlights the community’s most pressing water-use concerns. These methods strengthened our relationship with the community and allowed the team to gather data and information about their needs and priorities ultimately to design the irrigation channel improvement project.

Project

This project will repair and improve the most critical sections of the irrigation channel in Aripalca. By communicating with a diverse selection of the local community through the Sondeo assessment, EWB-UF determined that improving the efficiency of the irrigation system used for the local farmland is the primary community concern. There is significant water lost from unrepaired cracks and holes due to deterioration and rockslides. As the community practices subsistence farming and sells crops, an improvement in water supply for irrigation will improve the quality of life for all.

During our assessment the team calculated that 96% of the original water entering the channel is lost during its transport. The community is located in a mountainous region of Bolivia, and landslides have caused severe unrepaired damage over the years. The channel is 1.65 miles long and approximately half of the channel is concrete and the other half is soil. To reduce water loss at the most damaged points in the channel, we will rebuild the collapsed soil walls and repair cracks in the concrete using a local concrete mix. The goal for the implementation trip is to repair the most critical points within the canal system based on calculations from assessment data that determined where the greatest amount of water is lost.

This project will improve the quality of life in the community for years to come. Existing conditions continue to deteriorate in the town, as the damaged sections remain unrepaired. As the community relies on this irrigation channel to produce crops for consumption and for sale, the repairs to the system are of the utmost importance. The inefficiency of the channel system was voiced community wide as a primary concern. The people of Aripalca have been very receptive to the project and team thus far, providing lodging and offering to aid in the transport of materials. Currently 35 community members have volunteered to help with the construction of this project. We are confident that this project will be successfully implemented. Our designs undergo a vigorous multistep review process by the Engineers Without Borders National Organization, including submission of technical design papers and a presentation to professional engineers. Additionally, a faculty member oversees our team and will travel with us to implement this project.

A strong sense of obligation to the community interests exists in Aripalca, with the people frequently working together on town improvement projects. The community members currently work together to maintain the irrigation channel when debris from rainstorms clog water passages, but it is difficult to afford the materials and expertise to repair the holes and cracks in the channel. Therefore to ensure project longevity, the team will also educate the people of Aripalca on the building process to enable them to make future repairs or expansions to the channel, and use locally available materials for construction. In addition, during the dry season the community members living upstream have greater access to water than community members living downstream, causing tension within the community. Our solution will improve water access to the people living farther downstream, enhancing community peace and stabilization during the dry season.

The Bolivia team will work with the Aripalca community to improve their irrigation channel to increase their water to grow crops for consumption and sale. This project will increase the health of the community, improve the relationships among community members, and increase their community income so they have the economic ability to develop sustainable solutions to other community needs. Since our designs are affordable, appropriate and effective solutions, we hope that our project may be a model for agricultural communities in other parts of the world. We thank you for your time and consideration of this project.