

100 Projects for Peace: Final Report - Summer 2007

Title: Pumping Station to Provide Water for El Porvenir, Nicaragua

School: Bucknell University

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Project Summary

“Water for El Porvenir” began as a mechanical engineering senior design project created by four Bucknell University students, Adam Donato, Julie Jakoboski, Rob Gradoville, and Laura Roberts. The project’s goal was to increase the water supply to the approximately 40 families living in the mountain-top coffee cooperative and community of El Porvenir, Nicaragua.

Currently, a tractor – the community’s only motorized vehicle – is used to haul water from a well at the bottom of the mountain, providing two gallons of water per person per day during the six month-long dry season. (For comparison, the US per capita daily water usage is almost 100 gallons.) Besides supplying what is clearly an insufficient quantity of water, hauling by tractor wastes time and fuel.

The student engineers designed a water pumping system that will carry water up the mountain through a two-mile-long pipeline and specialized pump/motor combination in a small pump house at the bottom and deposit it in large storage tanks already at the top. Electricity from the grid, which will need to be extended to the site of the pump house, will power the pump and motor. Two trips to El Porvenir in January and March helped the team come to their final decision on design and location of the pumping system. The goal for the summer of 2007 was to complete the pump house and install the pump and motor within.

Though it began as a student mechanical engineering project, “Water for El Porvenir” also employed the varied skills of Meghan Feller ‘07, a civil engineering student; Ashley Curry ‘08, our Spanish translator; Saskia Madlener ‘08, a writing advisor; Ryo Sueda ‘09, as our cultural barrier breaker; and George Waltman, the director of the Bucknell Project Development Lab, our trusty father figure, technical expert, and tractor repairman. We also received help from professors and advisors, Professor Charles Kim and Professor Mike Toole, Janice Butler of the Bucknell Service Learning Department, and other individuals around campus.

With the help of the 100 Projects for Peace grant, the first step of this pumping project was completed by students this past June over a three week period. With the project now officially under way, others are helping to raise funds and resources, which will carry the project to completion. The NGO, Project Gettysburg-Leon, is hoping to raise \$15,000 by January. A construction company in North Carolina will hopefully provide technical resources and some funds. The Brigade has gotten pledges of \$3,000 specifically for the waterline project, which will be forwarded to El Porvenir when they are paid to Bucknell. All of this money will go towards large costs associated with extension of the electrical grid and installation of the long pipeline. There is also a possibility of extending electricity up to the community at the same time that the pipe is laid, though this element of the project is in its preliminary stages. A local expert on rural development in Nicaragua may be able to supervise the project from now until its completion. In addition, annual Bucknell Brigade trips to Nicaragua will allow for communications with the El Porvenir community to ensure the completion of this project.

Project Results

Our project was a success. We designed an appropriate pumping system; completed construction of the pumping station, a 6’ x 6’ pump house, pump, motor, and associated parts;

and have a plan in place to guarantee that the community of El Porvenir will get a supply of water during the dry season in the future.

This group of book-taught gringos gained admiration for the resourceful, tractor-driving coffee cooperative of El Porvenir. Due to the lack of modern construction tools and equipment, we took longer than expected, but compensated with help from resourcefulness of the local community. We improvised when concrete materials ran low by using the local pumice stone, which we dug from the side of the mountain. We were forced to use electric drills as hand drills when batteries ran low, due to the lack of grid electricity. We came to understand the burden of having a single temperamental tractor for a whole community and were forced to gather stones and equipment when it was available, not necessarily when it was convenient for us. We also came to respect the resolve needed to work in heat and sun hotter and brighter than we were accustomed to.

We communicated using broken Spanish and hand motions. We played kick-ball, *fútbol*, and tag and felt like wimps as small, barefooted children ran circles around us. We slept in hammocks, waking to the sunrise in the most beautiful view we have ever seen. We washed our clothes on rocks. We took bucket showers. We ate gallo pinto. We ate beans and rice. We ate rice and beans. We had the luxury of using their only mechanical means of transportation, "El Tractor" every day. We sweat, a lot. We checked the outhouse for scorpions, snakes and lizards.

And we developed an attachment to the amazing, resilient, resourceful, friendly, welcoming community of El Porvenir. We gained an appreciation for what they have to deal with on a day-to-day basis. We had written in numerous class reports about the trials of a limited water supply and the water requirement for daily life. But in El Porvenir, we learned what it's like to last the dry season with so little water. People who think climbing, no, running, up the mountain to El Porvenir is a piece of cake said, "it's hard, very hard." And we heard what they thought of having running water up at El Porvenir. "A dream," they said, "just a dream."

Implications

We had known, written in reports repeatedly, that two gallons of water per day is not enough to drink, shower, wash clothes, and cook. But living in El Porvenir taught us that two gallons of water is not enough. This level of understanding is the basis for peace. We are immensely grateful to have been shown this intimate view of how most of the world lives, and know it will affect the way we go about the rest of our lives.

The obvious benefits of the completion of this project include an increased water supply during the dry season. This will increase the quality of life for the community by allowing clean water for drinking, cooking, bathing, cleaning, laundry, and other daily uses. Proper hydration and improved hygiene will ultimately lead to noticeable improvements in the community's health. In addition, time and resources previously allocated to hauling water from the base of the mountain will be put to better use in the community.

We hope to provide the community with enough technical skills and materials to build and maintain this sustainable water system. Their full involvement will create a sense of ownership within the community. As we hoped, the completion of this pumping station has served as a catalyst for the construction of the larger project, and for that we, and the people of El Porvenir, have Kathryn Wasserman Davis to thank. When all is said and done, the people of El Porvenir will each get up to twenty gallons of water per person per day at a fraction of what they used to spend on gasoline for their tractor. The completion of this pumping station has helped us work towards a peaceful relationship between emerging engineers and the world in which we live, and on a more basic level, between people.