Clean Water for Pinalito

Pinalito, Dominican Republic – January 2013 Assessment Trip

Harvard College Engineers Without Borders

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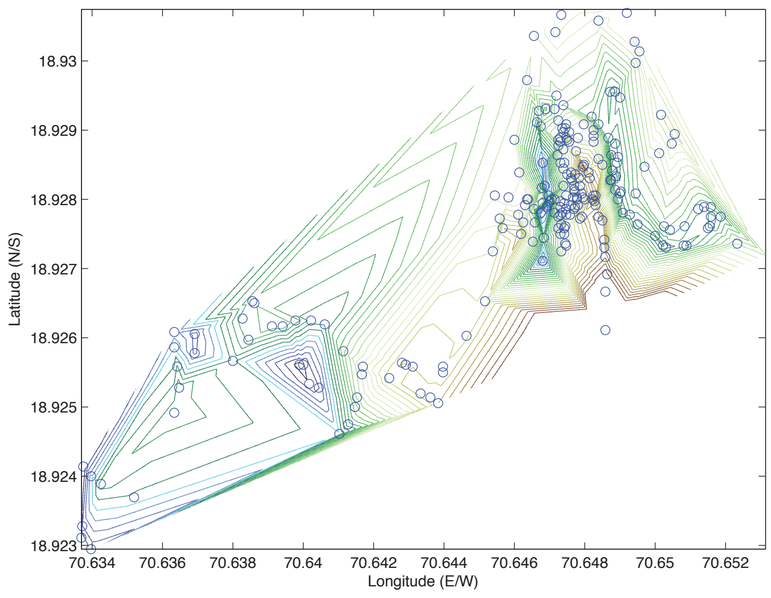
Existing Water System

Previously, the water system ran on a two-pump system. A submersible pump drew water from the well to a cistern at the surface and an above ground pump provided enough head for water to cross a valley between the cistern (located on the grounds of the Pinalito school) and the community homes. When we arrived, the bottom pump was non-operational and there was no top pump installed. We found that the bottom pump was submerged in mud due to improper installation. The well casing had allowed mud to seep into the well, jeopardizing any future function of the well. These findings determined that the existing well must be decommissioned.

Top: The control box and connections for missing top pump
Bottom: View of the well

Land Surveying

Using an eye-level and Global Positioning Systems, we collected elevation data throughout Pinalito to build a topographic map. We surveyed along existing pipelines, at each building, and along roads and essential terrain divides. This data will give us better, more precise mapping abilities and allow for a proper hydrogeological analysis of the land.



Topographic map of the Pinalito area

Water Usage & Health Data

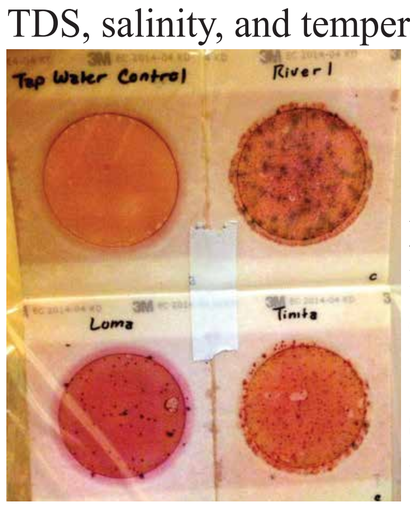
Biosand water filter in the local clinic

To assess the water needs of the community, we interviewed all community members and collected aggregate health data from the local clinic. This data will be essential for monitoring the project in the long term and assessing project sustainability. Household interviews revealed that most people know to avoid drinking river water and instead get their drinking water from tinitas (see available water sources & water quality) or piped spring water. Almost all those interviewed said that collecting water is either difficult or very difficult. Common health symptoms included stomach aches, abdominal pain, fever, vomiting, and diarrhea. Many community members expressed great interest in better access to clean water.

Available Water Sources & Water Quality

We studied water from a number of available sources including the river, tinitas (riverside pools of water that use sandbags to filter river water), and several different natural springs. The water was tested for flow rate, turbidity, bacteria, arsenic, pH, phosphates, nitrates/nitrites, hardness, total/free chlorine, alkalinity, conductivity, TDS, salinity, and temperature.

Gathering water from a tinita



Bacteria tests show river water with the most bacteria and Loma water (spring source) the least.

Water testing revealed that the river is replete with E. coli and fecal coliform bacteria. The water was slightly turbid, low levels of arsenic were present, and there were high levels of nitrates and phosphates. The tinitas seemed to filter out E. coli and nitrates, and the spring water had even fewer bacteria colonies.

Education

We taught a school lesson on water contamination at three different schools to children ages six through thirteen. The lesson focused on discussing the different local water sources, the presence of bacteria in the water, and how these bacteria lead to sickness. The students participated in a water-testing activity and saw first-hand which water sources are cleanest. We also held a community water forum to discuss water sanitation methods.

A young school boy performing a water experiment

Future of the Project

Three Potential Solutions

-Dig a well near the river

-Dig a well uphill from the river

-Pipe water from a faraway spring

Considerations

There are a number of considerations that will need to be carefully studied while designing a water system. We must consider the community's needs and desires and the overall feasibility and sustainability of the proposed system. The likelihood of finding clean water is also an important factor. All these factors will be considered throughout the design and implementation process.

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