

PROJECT PORTFOLIO



ENGINEERS WITHOUT BORDERS USA
University of Houston Chapter

What Is EWB?

Engineers Without Borders USA (EWB) is a non-profit organization that aids communities to meet their basic human needs and solve global challenges through engineering projects. EWB harnesses the power of professional and student volunteers to complete low-tech, high-impact, and sustainable projects in developing countries across the globe.

“Improving the lives of the 5 billion people whose main concern is to stay alive by the end of each day on our planet is no longer an option for engineers; it is an obligation.”

- Dr. Bernard Amadei, EWB-USA Founder

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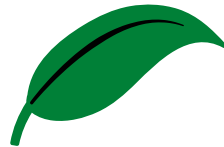
01/



THE SCHOOL HOUSE PROJECT

In August 2009, EWB-UH sent a team of engineering students along with a Professional Engineer to Telpochapa, a small community in the San Francisco Libre municipality of Nicaragua. This project consisted of designing a schoolhouse for this community's children and raising all necessary funds to implement their design. This schoolhouse has since been completed.





THE LEAF ELIMINATOR PROJECT

EWB-UH collaborated closely with the Houston Professional Chapter's Peru Team. They installed rainwater harvesting systems in several towns and are in the process of implementing more in other communities. EWB-UH led the design of the leaf eliminator portion of the system. The main parameters taken into consideration were that it had to be between certain dimensions and be easily reproduced by material available to these communities in order to be

a sustainable system. The leaf eliminator successfully removes debris from entering the water system and retains almost 100% of the water harvested. This project was completed in mid-September 2019.



ABOUT THE PROJECT

The inhabitants of the village of Mariscal Castilla in the Amazon River Basin of northern Peru did not have access to a source of clean drinking water. They were drinking raw river water that they retrieved every day from the Ucayali/Amazon Rivers. The Leaf Eliminator provided an engineering design that created a reliable and fully sustainable source of clean, year-round, drinking water for 100% of the 105 villagers in 21 households.

The rainwater collection system included refurbishing the existing gutters on the community building. The gutters allowed rainwater to free flow to three, 2,500 liter (660.43 gallon) tanks that are located behind the community building and the school. The slope of the gutters eliminated low spots and allow leaves, twigs and roof dust to wash to the tank area.

Once the water is collected from the roof, it runs from the gutters to the collection system below. The Leaf Eliminator is fitted at the end of the gutter system. As a result, the device allows the rain water to run through the system while separating leaves and large debris from the usable water stream with minimum water loss.



IN CONCLUSION

The leaf eliminator designed by EWB-UH has successfully been implemented in Mariscall Castilla and will be incorporated in the other communities with the same rainwater harvesting system throughout Peru.

The 105 permanent members of the community are directly benefiting from the project by

1. Having healthier adults and children that are less frequently getting sick from river water.
2. Obtaining extensive educational experiences on effective hand washing and hygiene practices and their importance in their family's health thus helping to motivate whole households to invest in such practices.

These factors have acted as a motivator and incentive for the community members to focus on additional hygienic practices. In conclusion, the primary benefactors are permanent community members (105), visiting teachers (2), visitors (up to 20 per week, representing 20 households at 4.2 members/household) for a total of 191 beneficiaries per week.

This number was calculated by team members visiting the site to carry out surveys with community members. Members of our local NGO partner Amazon Promise have visited the village on multiple occasions to conduct surveys with similar findings.



03/



THE WATER DISTRIBUTION PROJECT

Currently, EWB-UH is working with Valle Valerio, another small community in Nicaragua, on a project to redesign and improve their wells, water pumps, storage capacity, and distribution system. We have established community contacts, specific community needs, and community demographics. The next phase of the project is to conduct an assessment trip to the community itself to gather survey data, logistics research, and design input.



ABOUT THE PROJECT



Access to fresh drinking water is a human right. Within the Jinotega region of Nicaragua, the community Valle Valerio lacks sufficient drinking water throughout the year. That is about 620 men, women, and children who do not have reliable access to water. The current water system in the community is well beyond its useful lifetime. Some families have to walk 2 miles to a river for water. Additionally, the quality of the water accessible has high levels of nitrates and fecal coliform. High nitrate levels can cause infants to become seriously ill with blue-baby syndrome. The University of Houston chapter aims to fix that.

The University of Houston Chapter plans to build an entirely new storage tank that will be located in a more accessible and centralized location, repair the existing electric submersible well pump, enlarge the distribution network to service an additional 300 people with water, and treat the water source to ensure the quality standards. The chapter will collaborate with the community as well as the in-country Engineers Without Borders office to complete this project. This open line of communication serves to maintain trust between the chapter and the community as well as making sure the design is tended to directly fit the community's needs.



The project was originally adopted by the chapter in 2015, but due to political turmoil, travel was suspended for two years, preventing the chapter from traveling to the community to complete the starting assessment trip. During this time, the University of Houston chapter has been able to remotely obtain basic field data and water quality tests through collaboration with the in-country EWB staff. This data allowed the chapter to keep moving forward with design plans.



Valle Valerio currently has an infrastructure that is capable of withstanding the system that the chapter would like to implement. The community has an existing water distribution system that includes a well, an electrical water pump, a storage tank, and basic distributino piping that services a few locations across the community. The final goal is to construct a new tank on community land, expand the distribution network, and replace the electrical pump.



EVERY DROP COUNTS

The water tank that is currently providing the community with water has been built on private property, making it difficult for the community to maintain and use. This storage tank, when accessible, is often out of water, forcing the community to use the river as their primary water source.

Constructing a new, larger storage tank on community-owned land will allow the community to easily maintain the tank while granting constant access to clean water. Expanding the distribution network will bring clean water to 300 people who previously had none at all. Filtering the water will increase water quality, and replacing the electrical pump will ensure the longevity of the system.

All together, this project has the potential to provide approximately 900 people with constant access to clean water using a simple and sustainable system.



THE PLUME PROJECT

In many rural communities in Peru, there are no latrines. Instead, the members generally use the practice of open defecation. This opens a host of potential health problems. The Peru Team of the Central Houston Engineers Without Borders Chapter hopes to help with this by installing low-tech pour-flush toilets with a basic leach field. However, these communities are prone to flooding for a large portion of the year, presenting the potential issue of the waste material following the water back to the surface.

As this problem is suspected, this project aims to find experts in wastewater systems and water flow that can help model a simulation of this situation. If it is found that this will be a problem with the implementation of pour flush toilets, this project will aim to find potential solutions to this problem. The University of Houston Chapter has adopted this project from the professional chapter and will work alongside them to complete this project.



THE LIGHT PROJECT

The Peru Team of the Central Houston Chapter, works closely alongside several rural communities throughout Peru, and through this work, have identified a common need: a reliable light source. These communities do not have electricity, so their only light source after the sunset are homemade kerosene lamps that are unsafe for their health and the environment. They desire an alternative that would allow the children to study at night and allow the women and children to safely use the restroom in the dark.

The University of Houston chapter aims to solve this problem by finding and implementing a distribution chain that will carry a light source from suppliers to the various communities at a low cost. The first step will be determining which light source will best suit the communities' needs and desires within their affordability range. The chapter will then aim to set up a sustainable continuous distribution network that will reach several communities in rural Peru, potentially affecting several hundreds of people.