**THE PROBLEM**

Trujillo, Honduras is a city on the northern coast of Honduras. The main water source for the eastern half of the city is a river, the Rio Negro. This river was dammed to create a reservoir. From this reservoir is a distribution pipeline that travels a total of 12 miles. Unfortunately, Honduras is prone to having dry and wet seasons throughout the year that can cause water shortages. In recent years, these shortages have been causing the amount of water supplied from the distribution pipe to be inadequate. Overall, the system is insufficient for the number of people who depend on it and must be supplemented to become a sustainable one.

**THE PROJECT**

This problem was brought to our attention by an American connection with a residence in Trujillo, Richard Machen. Our team, a group of seniors in the College of Engineering, began to look at different alternatives to provide water to either the pipeline or the people directly. An excel model was created of the distribution pipe to measure the pressure along the pipeline and evaluate possible solutions. The flow chart below shows some of the team’s thoughts as we went through the design process.

The table to the right shows the model of the distribution pipeline as it travels along the coast. The flow rate was determined by the estimated usage per person per day. This flow rate along with elevation measurements, length measurements, and pipe details allow us to calculate pressure along the pipeline. There is great uncertainty in the usage/population data. Further field data is needed to sufficiently fix the water problem.

![Pressure Drop Over Cumulative Pipe Length](image)

The graph to the left illustrates the possible water conservation benefits during both rainy and dry seasons. The data in this graph is from the pressure calculated by the model above.

**SUSTAINABILITY**

In relation to sustainability, the project has always had both natural and social systems at the forefront of the work that has been done throughout the year. A strong concern through the design process was the water rights to the pipeline and the social tension the ineffective pipeline had caused. Water trucks in the city were being used to pipe water from the river and then selling it to the people. This was difficult for the people making low incomes to purchase the water as well as take extra time to walk in line and travel to distribution centers. Overall, our system will hopefully bring some balance to the economy and social lives of all the people in Trujillo.

In addition, the natural systems were always being considered as the team went through the design process. The proposed system needed to be great at providing the water necessary, yet also not harm any of the surrounding ecosystems or habitats. Water conservation proved to be a viable option. It is both economically and environmentally feasible. A groundwater well is also being considered. Considering the water abundance in the city of Trujillo and country of Honduras, aquifer depletion is negligible.

**Discussion**

As we look to solve the water problem for the area, different solutions are being considered in coordination with Mr. Machen. One such option is adding water meters to the existing water taps to monitor usage and more accurately depict the flow along the pipeline and reduce usage. Another option would be to design a groundwater system, as already discussed above. Our team hopes to have something implemented from our work so that the water problem can be solved for years to come.

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