Potable Water Distribution In Rural Paraguay

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Abstract

Deep within the rural communities of Paraguay, the residents of Ygatimi, a small village, obtain the clean water they use for drinking, cooking, and bathing by manually bucketing the water from a local well. Team Flow is faced with the challenge of developing a potable water distribution system that allows the residents of the community easier access to a constant supply of clean water. The proposed solution calls for a gravity driven distribution system, primarily consisting of a water tower, well pump, and a pipe network that leads to each individual dwelling. Strong recommendations will additionally be made with regards to water quality and testing to ensure the water supply is kept clean and free of diseases and pathogens.

Team Flow's distribution network would be linked into six existing smaller community water systems that currently service approximately 250 families. The new system will reach out to encompass a five kilometer radius around a central water tower and would immediately provide water to an additional 250 families. The system would have the potential to supply water to another 500 families in the near future.

This report contains an analysis of numerous components that could be used to construct the system along with an overarching recommendation of which components Team Flow feels when combined, would create the best system.

Background

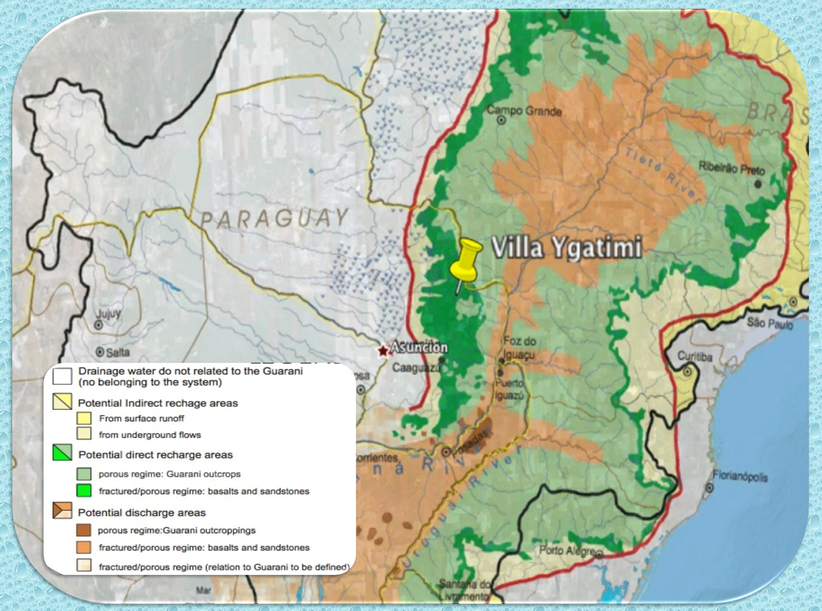
Paraguay is a country located in South America home to many rural communities. The Koe Pora Water Board currently oversees the only six hamlets in Ygatimi that have their own water distribution systems. A hamlet is a small section of a community, many of which together make up the village of Ygatimi. Fortunately, Ygatimi is in a direct recharge zone of the Guarani Aquifer, which is one of the largest aquifers in the world. Ygatimi is located adjacent to the Mbaracayu Forest Nature Reserve. One additional and notable challenge is that each resident of Ygatimi lives on about $2 per day.

Objectives/Requirements

- To provide an over-arching recommendation of the best combination of practices and materials to create and maintain a water distribution system.
- To integrate the existing water networks in an attempt to create redundancy and minimize cost.

Methods/Process

- Determine the size of the required system
- Investigate the local water sources
- Evaluate water consumption within the community
- Determine the water table depth
- Research different types of pumps that could be used
- Consider different possible pipe materials
- Determine if any geographical or topical impediments are present
- Identify possible water contaminates and remediation processes
- Communicate with end user to determine their unique needs and/or desires
- Consult WPI staff for assistance with obtaining previous related works



Recommendations

- Groundwater sourced water system due to ample natural supply
- Gravity powered system to conserve energy
- Water tower placed in a geographically favorable location to provide 40-70 PSI at each tap
- Deep well submersible pump recommended based on aquifer depth
- Utilization of the existing pipe network to minimize cost and installation time
- Implementation of PVC pipe to minimize cost
- Pipes buried six feet underground to avoid disruption from machinery and agricultural traffic
- Monthly tests performed for microbial and industrial diseases common to agricultural regions

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