

Gravity-Fed & Ram Pump Water Distribution Systems in Cerro Gallina, Panama

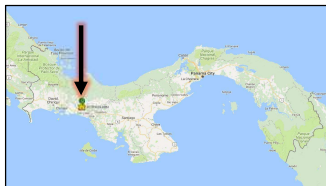
Background

Community Location:

- Cerro Gallina
- Mountainous region of south-western Panama
- Within the state of Chiriquí

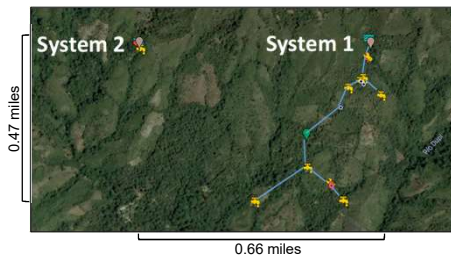
The community includes:

- Ngöbe indigenous group, the larger subgroup of the Ngöbe-Buglé Comarca
- 5 neighborhoods and 42 houses, 39 of which are occupied all year.



Site Location Indicated on map of Panama

- Spring sources are left open to the air, which is a common way for water to be contaminated.
- While the government plans to implement a water system in the neighborhood of Bajo Conejo, they only included six of the seven homes.
- There is no current explanation for the reasoning to leave out the seventh family.
- A single system is not applicable for the entire community due to its elevation change and expanse.
- One small system could be used by single families to overcome steep slopes to nearby springs.



Problem Statement

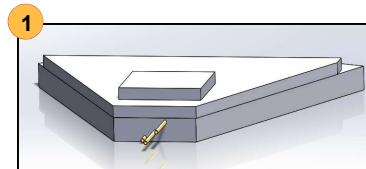
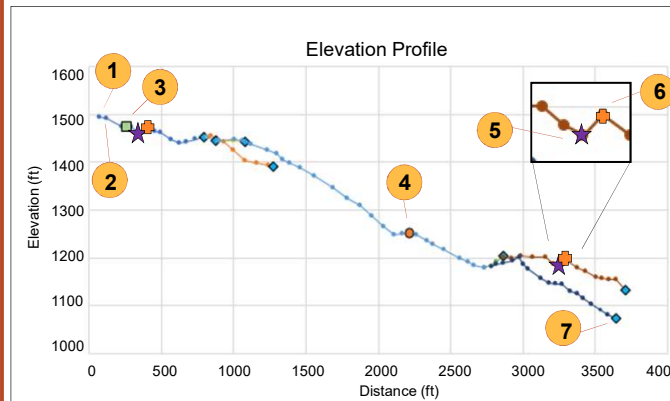
System 1: Design a system to allow for clean drinking water to flow by gravity from a spring to 7 homes. It must be within the government's budget of \$12500.

System 2: Design a pump system for families that are high above the spring source.

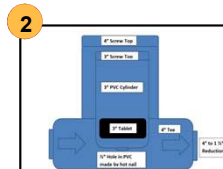
System 1: Water Distribution

Design Components:

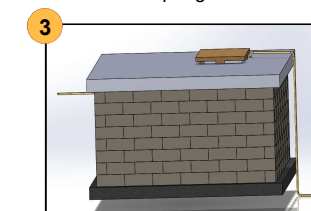
- Spring Box
- Chlorinator
- Storage Tank
- Pressure Break Tank
- 7 Spigots
- 2 Clean-out Valves
- 2 Air-Release Valves



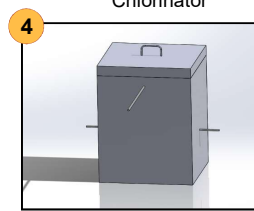
Spring Box



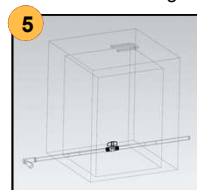
Chlorinator



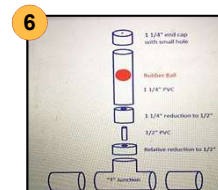
Storage Tank



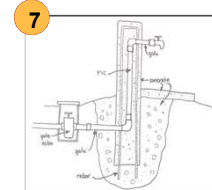
Pressure Break Tank



Clean-Out Valve



Air Release Valve

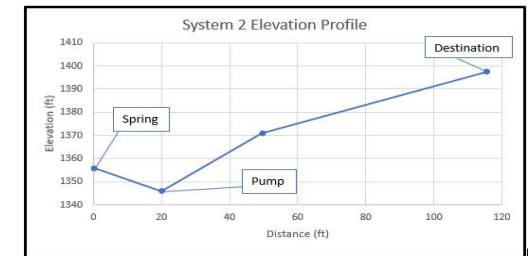


Spigot

System 2: Ram Pump

Design Components

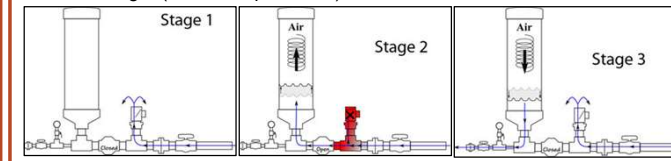
- Servicing 1 Home
- Spring Box
- Homemade PVC Ram Pump
- 55 Gallon Storage Drum



Schematic of System 2

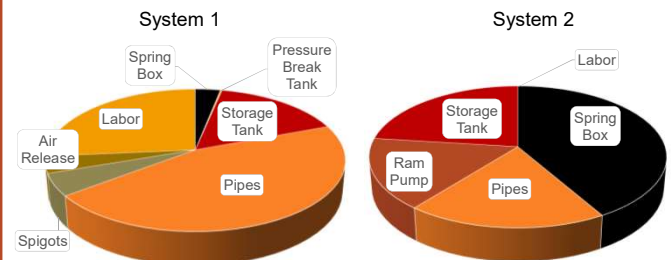
Advantages of using a ram pump

- No electricity needed
- Can be built with common supplies from a hardware store
- Is inexpensive which allows it to be funded by a single family
- Converts water velocity to pressure to propel water up at a 1:7 advantage. (ex: 1ft drop = 7ft lift)



How a Ram Pump Works

Cost Estimates and Schedule



TOTAL COST: \$5,000
IMPLEMENTATION: 5 week duration

TOTAL COST: \$240
IMPLEMENTATION: 7 week duration