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

**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.

**Problem Statement**

**System 1: Water Distribution**
- Design Components:
  - Spring Box
  - Chlorinator
  - Storage Tank
  - Pressure Break Tank
  - 7 Spigots
  - 2 Clean-out Valves
  - 2 Air-Release Valves

**System 2: Ram Pump**
- Design Components:
  - Servicing 1 Home
  - Spring Box
  - Homemade PVC Ram Pump
  - 55 Gallon Storage Drum

Advantages of using a ram pump:
- No electricity needed
- Can be build 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)

**Design Components:**
- Spring Box
- Chlorinator
- Storage Tank
- Pressure Break Tank

**Schematic of System 2**

**How a Ram Pump Works**

**Cost Estimates and Schedule**

**System 1**
- TOTAL COST: $5,000
- IMPLEMENTATION: 5 week duration

**System 2**
- TOTAL COST: $240
- IMPLEMENTATION: 7 week duration

**System Location Indicated on map of Panama**

**Elevation Profile**

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- Spring Box
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Matthew Adams, Sasha Drumm, Kira Koboski, Juli Mickle

Dr. David Watkins, Dr. Mike Drewyor | Fall 2017