# *Constructing Rural Village Water Systems in Central America: Experiential Learning 101*

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# Talk Organization

- Water projects in developing countries
- Panama Project – Epera Indians
  Description, Accomplishments, & Shortcomings
- Honduras Projects - students
  Description, Accomplishments, & Shortcomings
- Concluding Remarks

# Some Facts

"Over 1 billion people lack access to clean drinking water and almost 2.4 billion people lack access to any kind of improved sanitation services." - World Health Organization, 2000.

"Every 8 seconds a child dies of a water-related disease." – WHO, 1996, Fact Sheet 112.

# Millennium Development Goals

- By 2015, reduce by 50% the number of people who do not have access to safe drinking water or sanitation

- Requires that each day until 2015, must provide safe drinking water to about 250,000 people and sanitary facilities to about 500,000 people

# Developing Countries I

- Appropriate technology
- Community involvement of ***all (women, children!)***
- Sustainability
- Communications/Logistics
- Land ownership/access; water rights

# Developing Countries II

- Don’t make promises you can’t keep
- Cultural / religious / social sensitivity – need to acknowledge and honor
- *Tranquilo, por favor* – serenity now!
- *Sustainability*

# Panama Project

- Train Epera Indians (Comarca No. 2 – 10,000 people) to drill and complete wells, build, and install hand pumps
- Use of LS-100 drilling rig (www.lonestarbit.com)
- Provide on-site instruction, multiple trips

# Project Background

- Conducted under the auspices of Lifewater International
- Invited by Epera Indians of Panama's S. Darien Province
- Survey trip in March 1999 and "shopping trip" in January 2000
- 2-week training trip in May 2000
- Cost: about $30,000


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# Southern Darien – looking west

# *The Team*

- **Michael Campana (hydrologist) - team leader, driller, pump installer**
- **Loring Green (geologist) - lead trainer, mechanic, stockbroker**
- **Bob Jarrett (engineer) - trainer, mechanic, medic**
- **Craig Woodring (engineer)-trainer**

# Loring Green Instructing on the LS-100

# Drilling the Well

# Examining Cuttings

# Installing the Gravel Pack

# Finished!

# Accomplishments

- Trained 6-man team
- Team drilled three wells: two producers (c. 25 gpm) and one dry hole (< 1 gpm)
- Team installed one submersible and one hand pump
- Provided one LS-100, mud pump, 500 feet of 4” ID PVC, drilling mud, 3 hand pumps, cement, submersible pump, tools

# Shortcomings

- Poor USA-Panama communications with locals; made coordination and planning difficult
- No follow-up – future trips were canceled because of dangerous conditions (Colombian civil war)
- Lost touch with team after training

# Honduras Projects

- From 2001-2005, I conducted the required summer field course for U of NM Master of Water Resources students in Honduras. Spent 3 weeks in country each June.
- We worked with *Hondureños* Alex del Cid Vásquez, Rolando López, SANAA, and local villagers to build gravity-flow water systems (dam-storage tank-piping) to provide a tap to each home.

# Honduras Projects - more

- Constructed systems in 5 villages: Miramar, Nueva Vida, Nueva Florida, Santa Teresa, Santa Cruz
- Number of villagers: 2,000
- Number of students in five years: 70.
- Fundraising: yours truly
- How did the program start? Serendipity

**Alex del Cid Vásquez, “el jefe de agua”**

# Nueva Florida


**Located in the Sierra de Omoa…a rugged mountain range ~20 km NW of San Pedro Sula**

**Population: ~308**

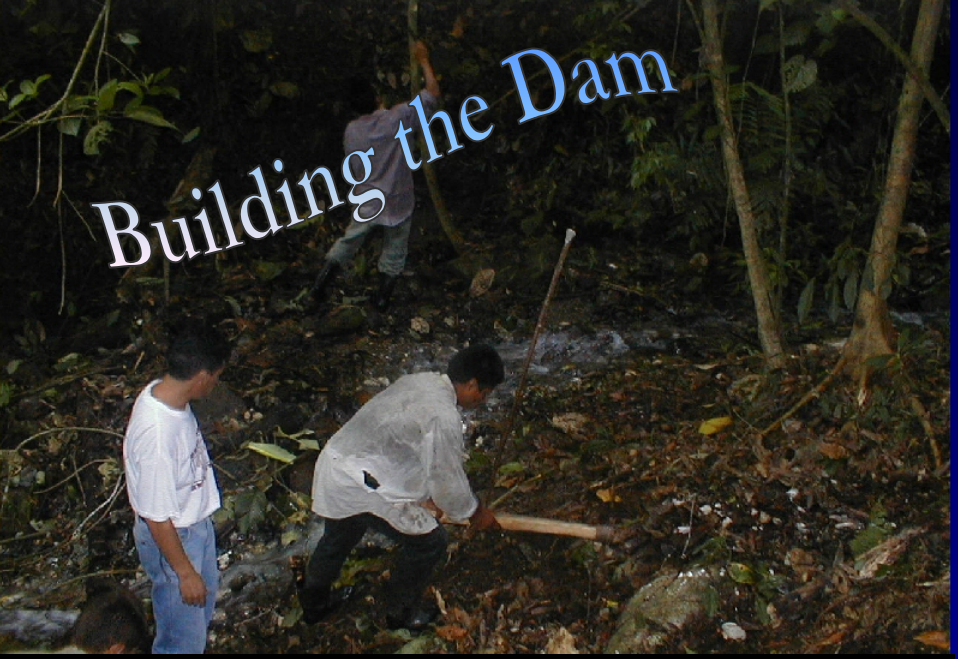
**Elevation: 650 m AMSL**

**Climate: Very warm and humid year-round with an average rainfall of 245 cm (~96 inches). Distinct wet, dry seasons.**

# Building the Dam

- A dam site was cleared above the village at ~800 m above sea level, near a spring with an average flow of 100 gallons per minute
- A local mason was hired to build the forms and work with the concrete
- Using only a chainsaw and machete, forms were hand-hewn on site using timber
- Sand from the streambed along with nearly 30 bags (1.5 tons) of cement were used
- It took 6 days to build the dam and then 14 days for the concrete to cure.

# Building the Dam

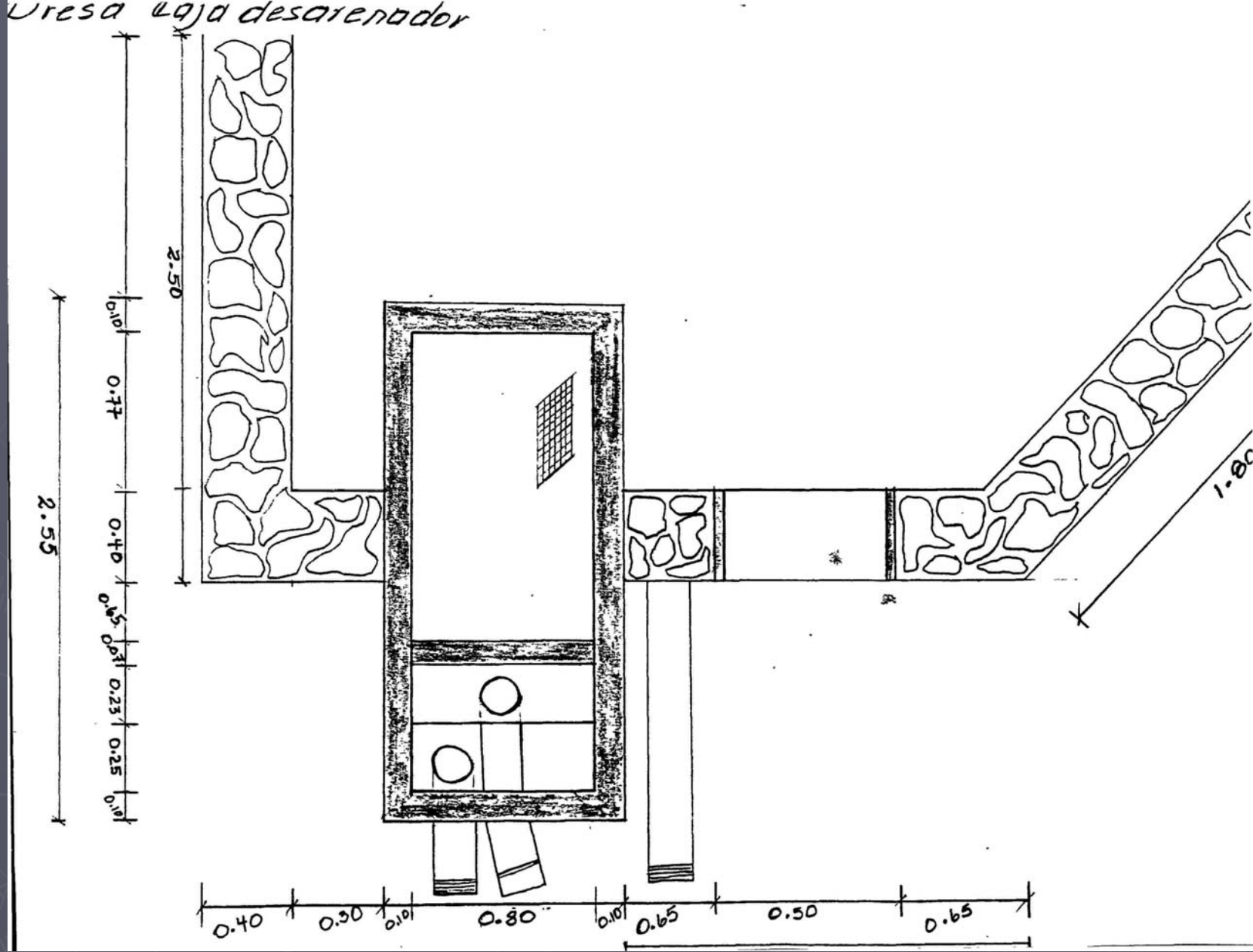


Villagers clearing and leveling the site

Cindy, Kerry, Alex, Michael & Michele work on stream channel

Our favorite pastime…rearranging rock!

Cindy and Manuel (mason) building rebar reinforcement cages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# Dam plans

# Tank Site & Distribution

- We leveled a site above the village for a 5000 gallon water tank and dug a pit for the tank platform
- After the tank site was cleared, 1½ inch diameter galvanized iron (GI) pipe was laid between the dam and the tank site
- The pipe was provided by SANAA, the Honduran government agency responsible for rural water supply
- The head of rural water for SANAA's northern division inspected the dam and pipeline and was impressed

# The Tank Site

Now that's a lot of cement!

Matt, Amy and Michele work to level the site

Side trip to the sugar cane press

The water tank will look similar to this one at Nueva Vida

# Pipe cutting and threading

Signing the agreement with Ing. Denis Gutierrez of SANAA, Alex del Cid, Michael and village leaders

The final night at Nueva Florida

# Some Facts

- The total cost of the project was 187, 383 lempiras or just under $12,000 U.S.
- 44 domestic connections with an average of 7 persons per house
- Water use is ~35 gallons per person per day
- ½ inch GI tubing and control valves were installed to permit an efficient and regulated quantity of water to each household
- System was completed in fall 2003

# Accomplishments

- Helped build five gravity-flow potable water systems serving about 2,000 people
- Provided instruction in sanitation
- Cross-cultural, life-changing (for some) experience for over 70 students
- Empowered women – can do other things besides “gathering water”; girls can go to school
- Gringos can be “good neighbors”
- Led to student thesis, project work

# Shortcomings

- No follow-up – SANAA "dropped the ball"
- Need continued training, support
- Sustainability
- Change in social dynamics of villages? Is this good?

# It's obvious…

***Clean water, sanitation, and good health go hand-in-hand , ergo…***

***water professionals have great power to "do good" in the developing world.***

# Says who?

***"I really envy you guys. You have the power to keep people from getting sick. By the time I'm called in, it's invariably too late."***

***--A medical doctor, talking to some water professionals.***

***Thank you!***

**Michael E. Campana**

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WaterWired blog:

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