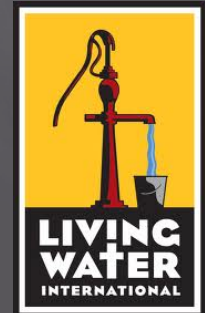


# SUSTAINABLE CLEAN WATER IN RURAL GUATEMALA

Troy Meinen

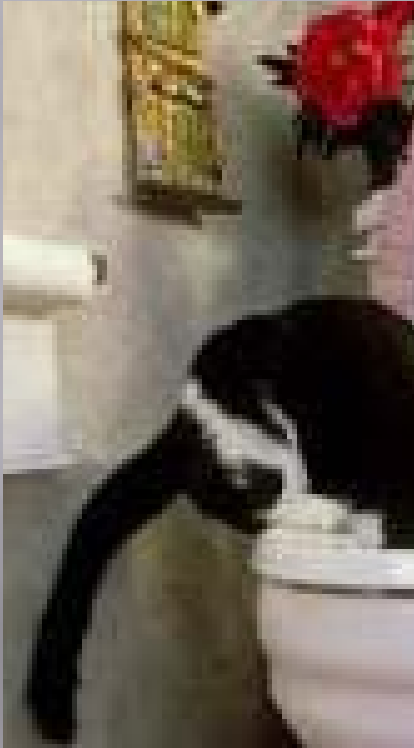
Thanks to more than 80  
friends and family and  
Living Water International



# Where Do You Get Drinking Water



# Where Do You Get Drinking Water



# Where Do You Get Drinking Water



# Where Do You Get Drinking Water





Google earth

# Troche Trece

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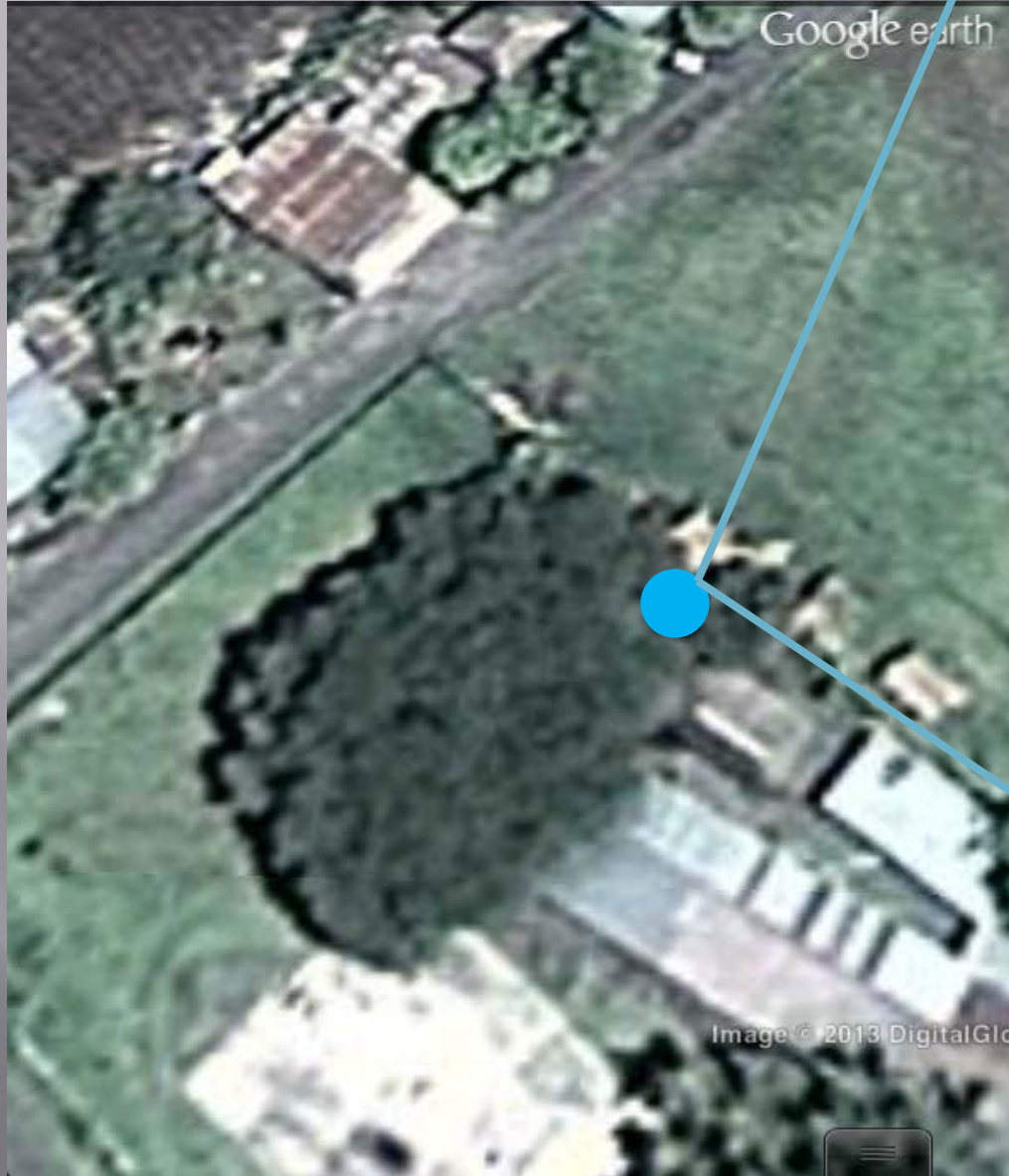


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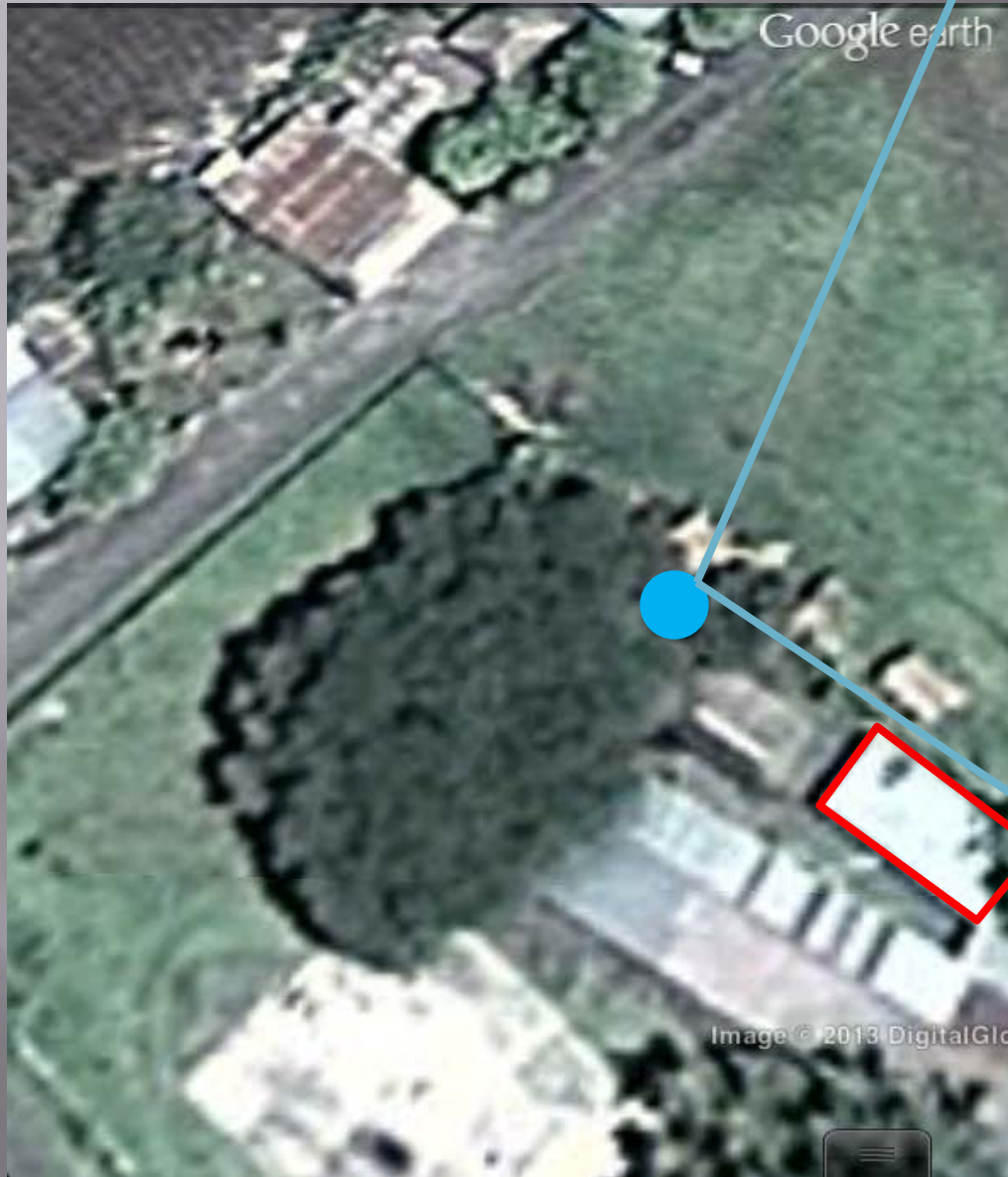
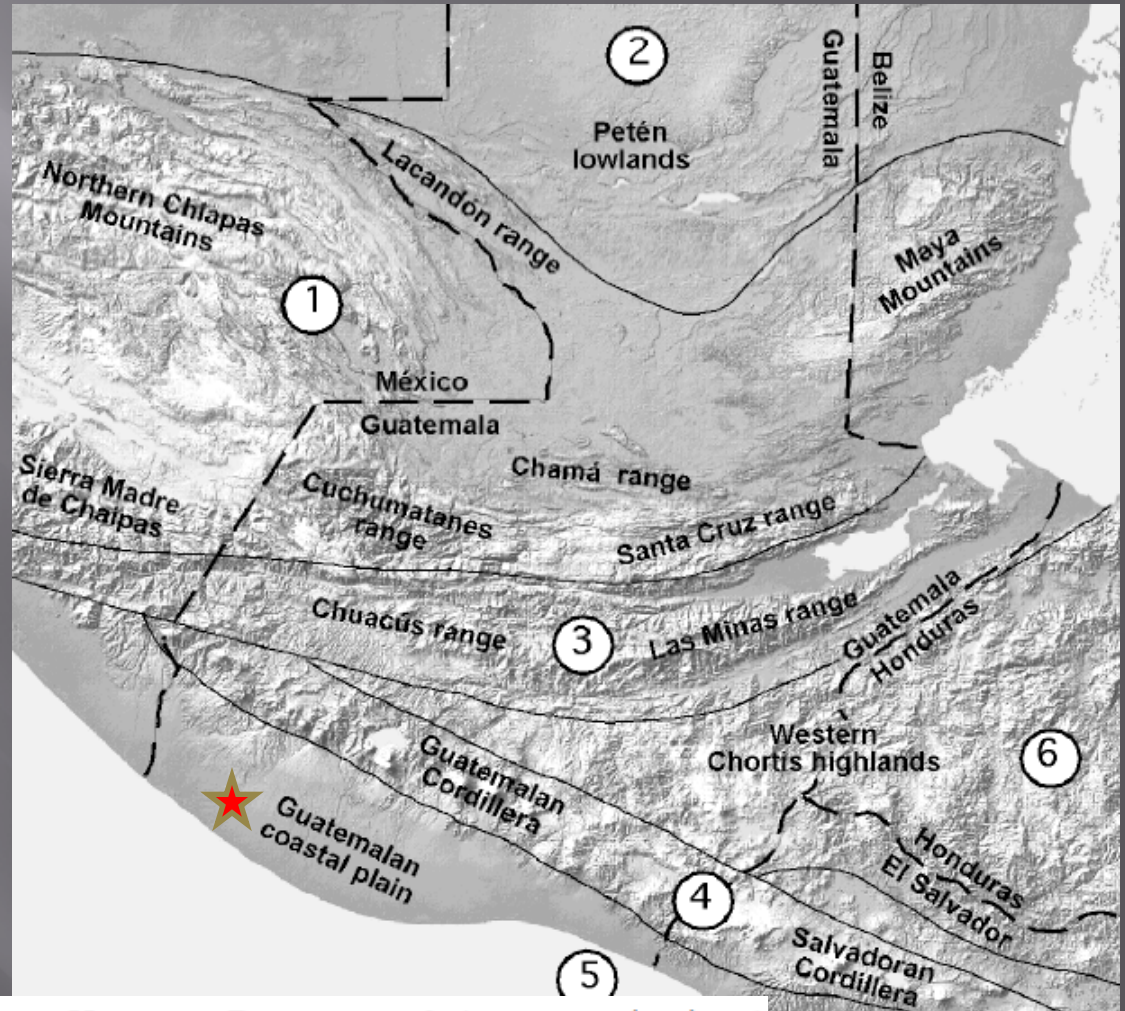


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# Nueva Concepcion, Pacific Coastal Plain, Guatemala



# Physiography and Geological Setting



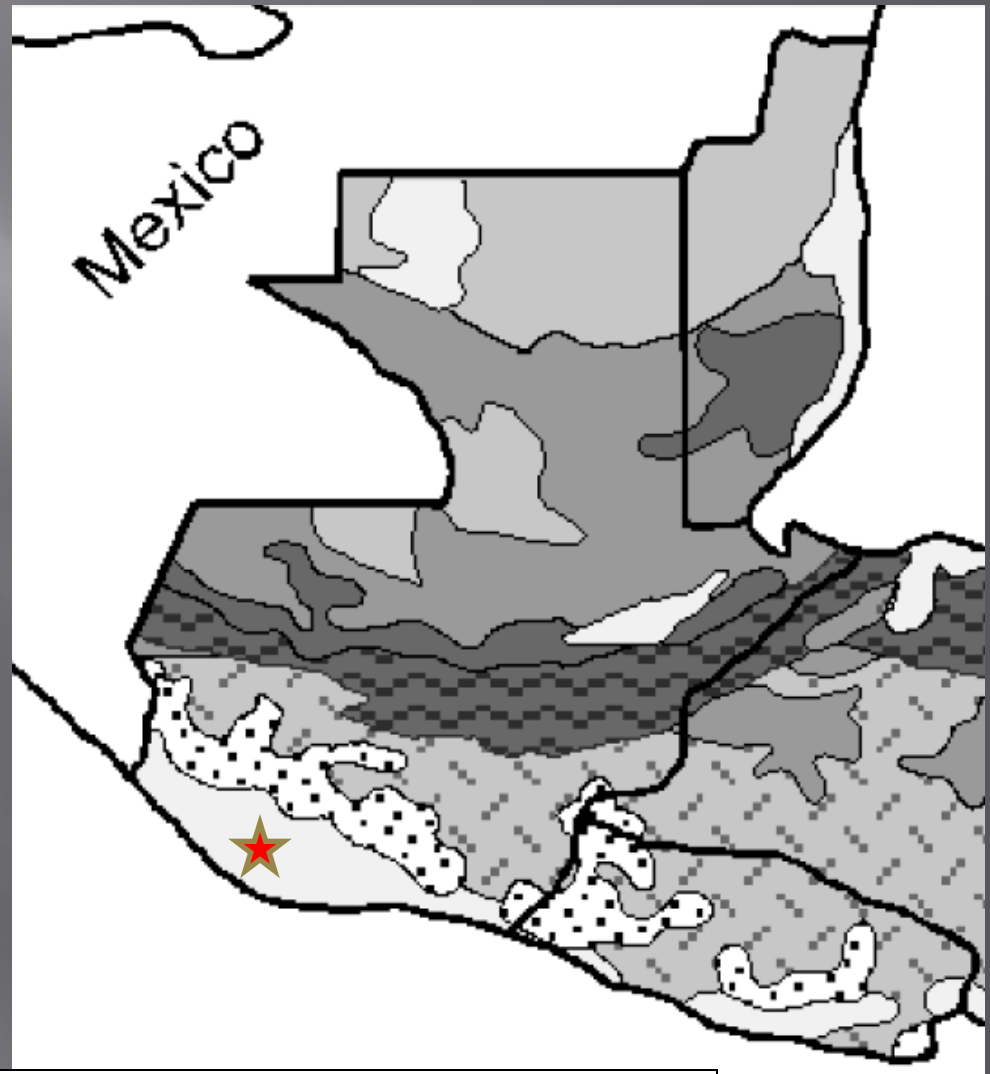
Quaternary sediments



Quaternary volcanic rocks



Tertiary volcanic rocks





- ▣ Quaternary volcanoclastic sands and gravels
- ▣ Pumaceous ash falls and lahars

- ▣ Occasional welded tuffs and basaltic flows
- ▣ Thick, rich soil with high porosity and permeability



# Physiography and Geological Setting

- ▣ Common Hand Dug Well Depth is 15 ft
- ▣ Common Depth for Latrine Pit is 15 ft

0	Coarse Black Sand
15	Clay
30	Coarse Black Sand with Gravel
45	Clay
60	Pumice
75	Pumice
90	Pumice
105	Coarse Black Sand
120	Clay
135	Coarse Black Sand
150	Gravel with Coarse Black Sand



0	Coarse Black Sand
15	Clay
30	Coarse Black Sand with Gravel
45	Clay
60	Pumice
75	Pumice
90	Pumice
105	Coarse Black Sand
120	Clay
135	Coarse Black Sand
150	Gravel with Coarse Black Sand

# Sustainable Right Sized Drilling Techniques



- ▣ LS 300 manufactured by Lone Star Drills
- ▣ Trailer mounted with hydraulics powered by a diesel engine
- ▣ portable mud pump for mud circulation
- ▣ collapsible drilling mast fitted with a chain drive and hydraulic rotary motor

# LS-300 Lone Star Drills

## LS300T+

Mast	Rotary	Trailer	Dimensions	Weights	Mud Pump	Controls	Hydraulic Power Source	Drill Stem
Pull Back- 5,000 lbs. at 2,500 PSI	665 ft. lbs. Max Torque at 2,500 PSI	7,000 lb. Rated Tandem Axle	Overall Length: 190 in.	Operating Weight: 4,750 lbs. Average	13 HP Gas Engine or 10 HP Diesel Engine	Rotary – 4 way Detented Valve	20 HP Honda Gas – 10 GPM, 3,000 PSI	2 in. ID x 5 ft. long, N80 Mayhew Jr. Oil Field Quality Tapered Thread Tool Joints
Push Down – 5,000 lbs. at 2,500 PSI	95 RPM at 10GPM	5 ft. x 10 ft. Open Grating Bed	Overall Width: 82 in.		190 ft. Max Head	Draw-works – 4 way Spring Centered Valve	19 HP Kohler Diesel – 10 GPM, 3,000 PSI	Joints with Breakout Lugs
78 in. Travel	2 in. Full Flow Side Inlet Swivel	Surge Brakes	Transport Height: 70 in.		200 GPM Max Flow	Bypass Flow Control on Draw- works Push Down	3 Gal. Hydraulic Reservoir	Step Drag Bits & Reamers – 4 in. to 7 in. dia.
6 in. by 3 in. steel tubing		Leveling Jacks (3)	Operating Height: 130 in.		2 in. Discharge	Circuit Provides Adjustable Weight on Bit	4 Gal. Fuel Tank	
#80 chain		Pipe Racks (2)			2 in. Suction	Pressure Gauge – 0-3,000 PSI	Built-in Heat Exchanger and Cooling Fan	
		2 in. Ball Coupler					12-volt Battery with Electric Start	
		Spare Tire						



- ▣ Lead driller and assistant driller are in-country individuals trained in operation of the rig and familiar with local geology
- ▣ Drilling “crew” comprised of volunteer team members
- ▣ Team members rotate thru assignments
- ▣ Community residents often pitch in to help

# Sustainable Right Sized Drilling Techniques



- ▣ Pilot hole to verify local geology and look for transmissive zones beneath an aquitard



- ▣ Ream hole to TD for well
- ▣ Install well







- ▣ Living Water asks the local community leaders to provide for well pad materials and construction and mid-day meals for the volunteer team



- ▣ This leads to local sense of ownership and pride in the well









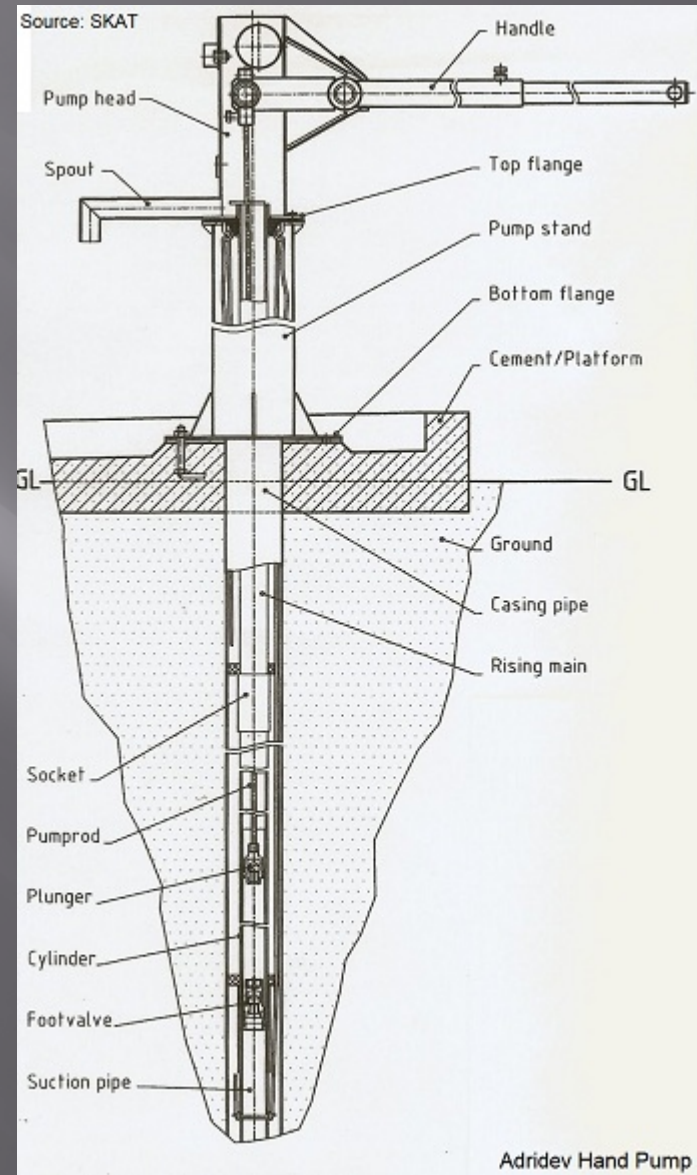
# Sustainable Right Sized Pump



- ❑ Village-level operation and maintenance hand operated pump developed by the Rural Water Supply Network of the Swiss Resource Centre and Consultancies for Development (SKAT)
- ❑ Low-maintenance simple lift pump
- ❑ PVC, Brass, and Stainless construction
- ❑ Entire pump operation parts can be replaced without removing drop pipe

# Sustainable Right Sized Pump

- ▣ Designed to lift water from 30 to 140 feet
- ▣ Flow rate of 300 gal per hour



# Sustainable Right Sized Pump





# Hygiene: Helping Local Residents Keep Clean Water Sustainable



# Hygiene: Helping Local Residents Keep Clean Water Sustainable

- ▣ Tour the local community to better understand the challenges in a particular community
- ▣ Female team volunteers lead by a trained hygiene expert hold hygiene classes





03/29/2008 19:43

# Hygiene: Helping Local Residents Keep Clean Water Sustainable

- ▣ Keeping the Well Clean
- ▣ Use of clean containers for the well water
- ▣ Hand washing
- ▣ Recognizing symptoms of common diseases and how to prevent spread



# To Finish: Helping Local Residents Keep Clean Water FUN



# To Finish: Helping Local Residents Keep Clean Water FUN

