

## RAMBLINGS - WATER SYSTEMS & MORE SHAMANISM

At the farm behind the rest house, we built a 7m x 2.5m x 1m water tank as a reservoir to accumulate slow running municipal water. See the first 6 photos. The 6th photo shows workman starting to put the water-proofing coating and do the painting job.



The float valve that shuts off when full.

But even before that, I took a dip.

Completed tank almost full, with netting.



The 20 newly planted tree seedlings of mangosteen, lanzones, rambutan are the first recipients of water from a drip-irrigation system. Two hoses are ranged out to the trees, and a hole bored (via soldering iron) drips water to each tree. Saves on labor.



But the 18 rows of veggie plots with similar perforated hoses had to have a pressure source: an economical small 1/3 hp pump, with valving to feed 1 or 2 rows at a time, squirting water for 10 minutes for each set. However, with the pump put off, the same effect can be achieved over a number of hours of slow dripping by gravity. It's just a matter of fine tuning the system.

Naturally, our water bill went up. And with the drought and many more trees and veggies, it might become prohibitive. Municipal water is expensive; the more you use, the higher the unit cost. Fortunately, aside from writing up ramblings like this, I also love making interactive spreadsheets. The one below concludes that it is cheaper to dig a well, based on a number of reasonable assumptions. In my last rambling, I denigrated a water douser's suggestions. This time, we went to no less than 3 well-drillers.

**WORKSHEET for Digging a Well versus Using Municipal Water for Azagra Farm - Enter data on BLUE cells, note resulting RED cells**

Monthly usage, cu mtrs --> **210**

Water District Data		
	Water Rates	Cost
Minimum	P139.15	P139.15
11-20 cu	P15.30	P153.00
21-30 cu	P17.60	P176.00
31-40 cu	P21.10	P211.00
41-50 cu	P26.40	P264.00
51 and up	P34.30	P5,488.00

Deep Well Pump Data	
eqvt gals/mon usage -->	55,461
gals/day -->	1,849
req'd hrs run/day -->	12.32
kwh/day -->	6.97
kwh/month -->	209
cost per kwh -->	<b>P 7.50</b>
pump hp -->	0.75
overall pump gpm cap -->	2.50
gph cap -->	150.00
Elec'l pumping cost -->	<b>P1,569</b>
unit cost/cu -->	P7.47

Capitalized Cost Data	
Capital cost -->	P45,000
amortized years -->	10
amortized months -->	120
monthly cost -->	<b>P375</b>
Labor cost dig well -->	<b>P22,500</b>
Materials casing, pipes -->	<b>P12,500</b>
Pump & accessories -->	<b>P10,000</b>
Total deep well cost -->	<b>P45,000</b>
Using Hazen-Williams eq:	24.39 <- circ gpm
130 <- smoothness factor, 120-150	29.2 Pd, psi
1.049 <- ID dia inch. See table below.	67.4 Pd in ft head
10.3 <- eductor eff %. Adjust such that purchased pump hp	
90 <- depth well, ft	and/or kw matches data below:
Effective total pumping cost -->	<b>P1,944</b>
unit cost/cu -->	P9.26
	0.75 calc'd pump hp
	0.57 calc'd pump kw

Monthly cost difference between Nawasa & deepwell --> **P4,487**  
 Payback in months based on capitalized costs --> **10.0**

**Graph Data Variables:**

Base **0** cubic meters per month  
 Increment **25** cubic meters

Cubic Mtrs per month	Water District		Elec'l + capital cost	
	Total cost	Cost/cu	Total cost	Cost/cu
0	P139		P375	
25	P380	P15.21	P562	P22.47
50	P943	P18.86	P749	P14.97
75	P1,801	P24.01	P935	P12.47
100	P2,658	P26.58	P1,122	P11.22
125	P3,516	P28.13	P1,309	P10.47
150	P4,373	P29.15	P1,496	P9.97
175	P5,231	P29.89	P1,683	P9.62
200	P6,088	P30.44	P1,869	P9.35
225	P6,946	P30.87	P2,056	P9.14



Nom dia	ID sch 40 Bl or GI
1/2	0.622
3/4	0.824
1	1.049
1-1/4	1.380
1-1/2	1.610
2	2.067
2-1/2	2.489
3	3.068
4	4.026
5	5.047
6	6.065

The first driller had an exorbitant quote of P120,000 package deal. The next guy seemed unsure; he would use manual labor on weekends and it would take a month. We settled for a loquacious fellow named Pitong who recently retired from the city gov't as a well driller. He had all the equipment, and the deal was we would pay a minimum amount for startup and he would then dig up to 80 feet, but if he hits no water, then the deal is off. Only after there is water will he proceed in sinking the casings and rest of the piping which we are to purchase. Since he had dug a well nearby, he was pretty sure about his proposal. Left photo below shows the equipment being unloaded. Mid photo shows a photogenic Pitong, not surprising since he also used to be the



town photographer. The right photo above shows the equipment being assembled by his men. Later, I learned that the guy in orange also is a water douser and he had performed the ritual (I wasn't around then) with a guava branch that located where they were to dig! Not only that, but they also insisted on the chicken blood sacrifice rite. Last photo shows the poor chicken with our shaman doing the last rite.



I felt like Joe Rosenthal at Mt Suribachi when taking this photo of raising the pole. And this wasn't staged.

The assembled drilling rig.

In a few days, I will know if we will have well water, shamanism notwithstanding.

Danny Gil, 7 March 2010