Lessons Learned in Fecal Sludge Management: Experiences from the Philippines

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RTI INTERNATIONAL

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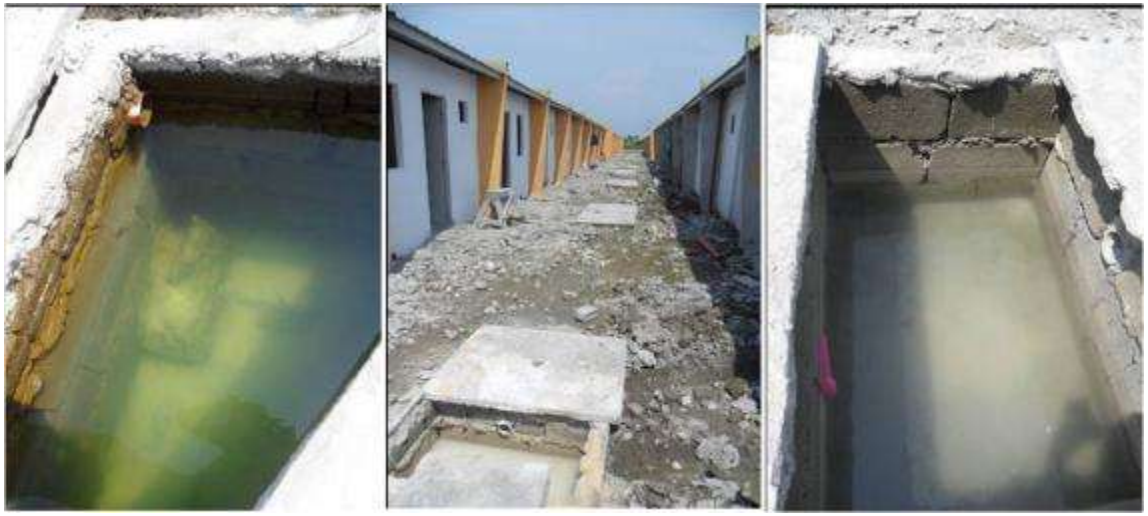
Septic tanks in the Philippines

State of the practice:



- Mandated in the Clean Water Act and Code on Sanitation
- Continue to be incorporated into sewerage projects
- There exists a big desludging service industry with no where to take the sludge.

National Sewerage and Septage Management Program of the Philippines (NSSMP)

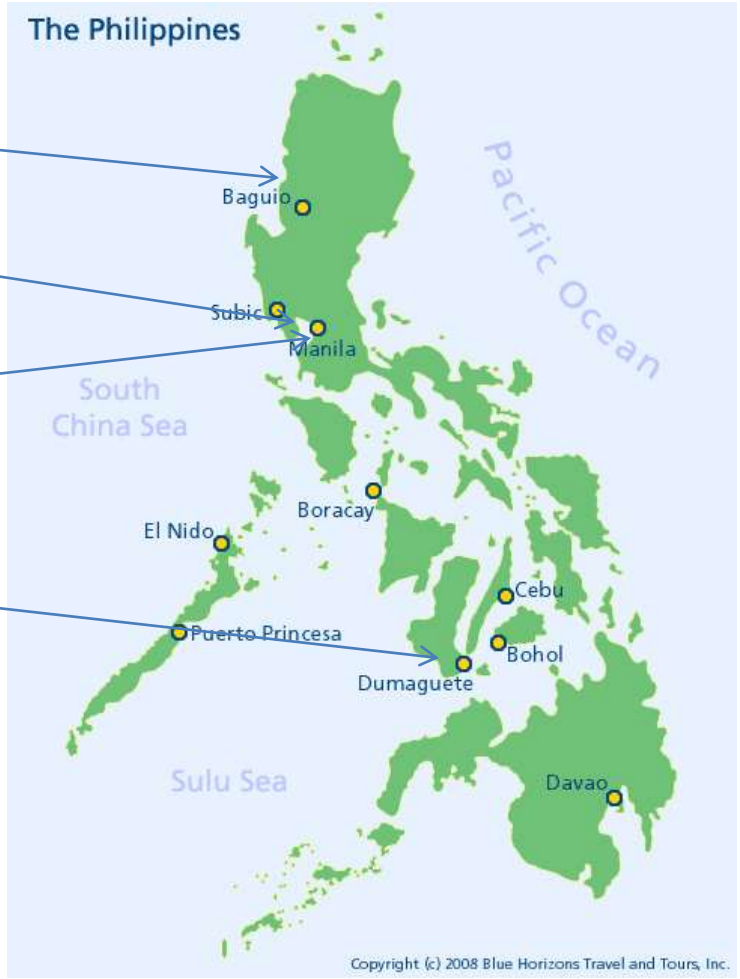
- Mandated by the Clean Water Act
- Provides up to a 40% cost share for sewerage programs
- Provides technical assistance, capacity building and promotions for septage management
- Targets highly urbanized cities and municipalities
- 76 projects serving 10 million people by 2020

San Fernando City

Manila Water - South Septage

Maynilad Water - Dagat dagatan

Dumaguete City



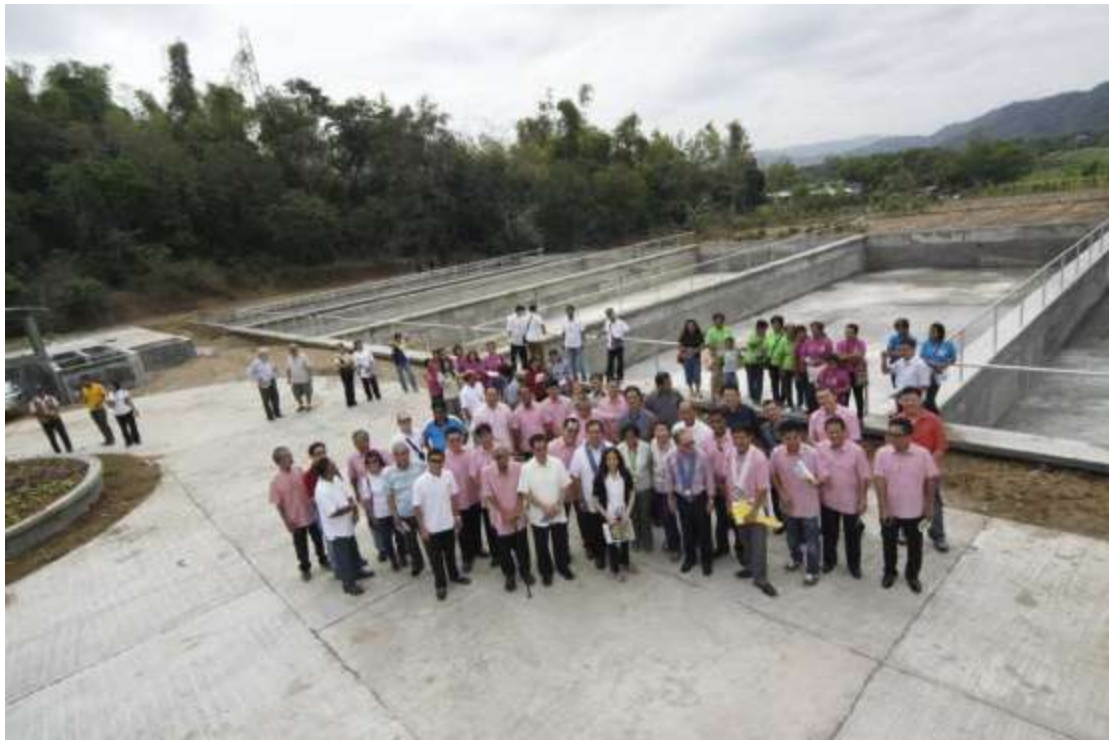
San Fernando City

- 60 m^3 per day

- Public Private Partnership

- ABR, SBR, Lagoon

- Tariff based on flat property tax add on



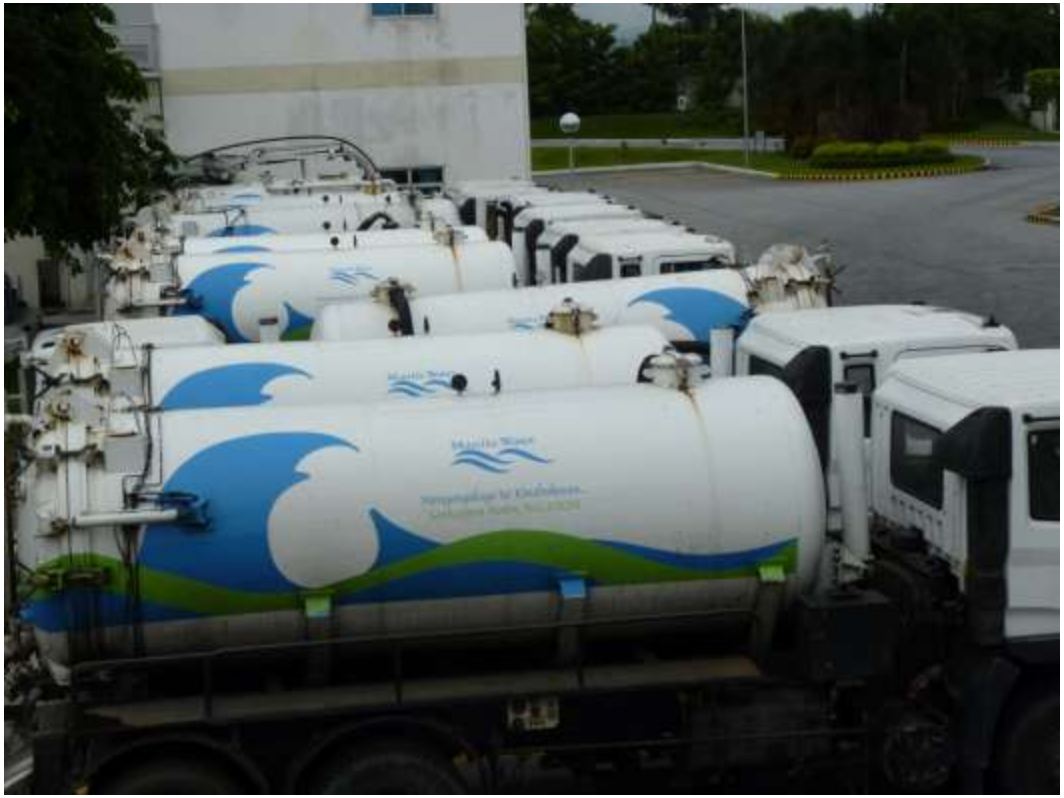
Manila Water

- 814 m^3 per day

- A mix of subcontracted service providers (collection) and in house staff (operations)

- Chemical conditioning, screw press, activated sludge, disinfection

-Tariff based on 20% add on of water bill



Maynilad Water

- 250 m^3 per day

- A mix of subcontracted service providers (collection) and in house staff (operations)

- Chemical conditioning, screw press, lagoon

- Fee based on 20% add on of water bill

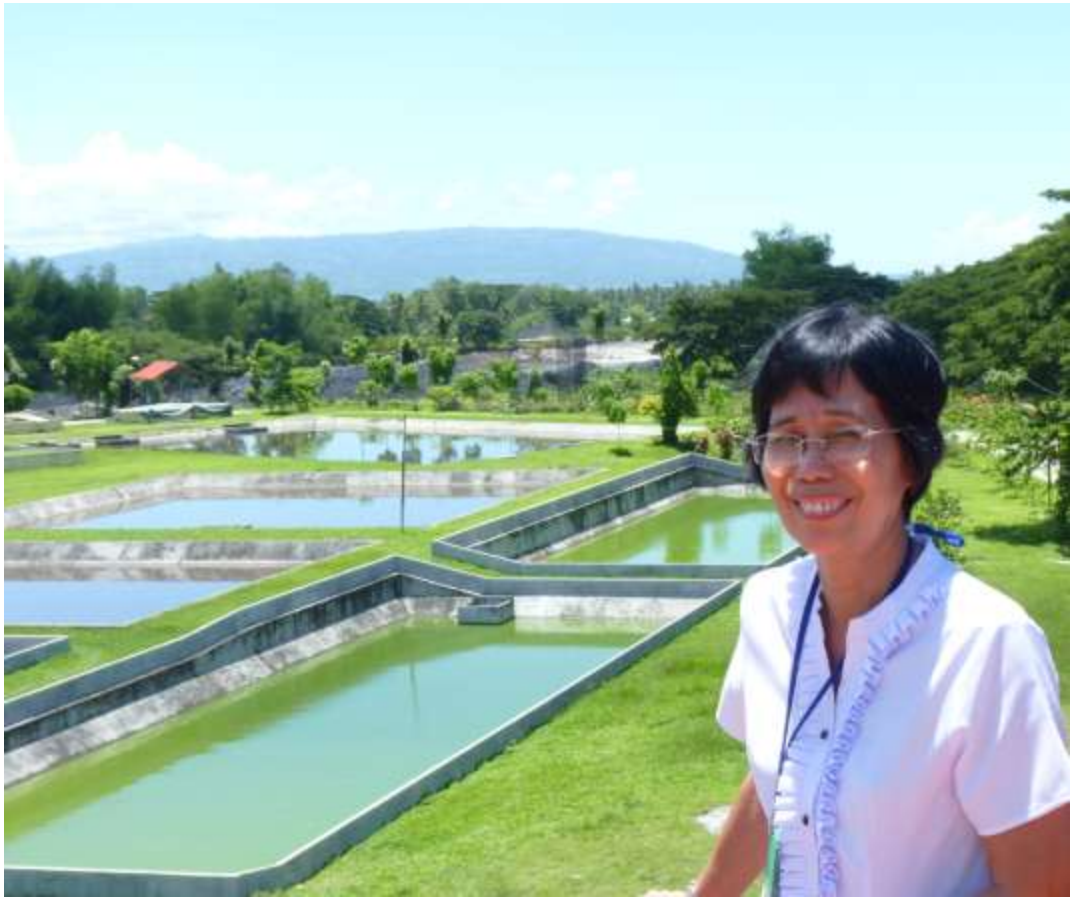
Dumaguete City

- 80 m^3 per day

- Anaerobic and facultative lagoons, constructed wetlands and polishing pond.

- Partnership between City and Water District

- Fee based on volume of water consumed.



Sharing Best Practices and lessons Learned

- Project planning
- Institutional arrangements
- Technology considerations
- Financial arrangements
- Promotions
- Operations

Planning Process

Key Inputs

- Identify baseline conditions
- Host stakeholder meeting
- Select Technical Working Group
- Perform Rapid Technical Assessment

Community health workers employed to conduct surveys

Rapid Technical Assessment– Perfected in San Fernando

Site Inspectors Training – Class of 2010

- Trained plumbers in site investigation techniques.
- Paired them with health workers for survey.
- Performed evaluations and surveys in each community.
- Completed in 3 days

Plumbing contractors are trained and then perform assessment

Planning Model – The Dumaguete City Experience

What is the Design Flow of your Septage Treatment Facility??

Instructions *Type in the information in the yellow boxes below. Find the calculated values for your septage for your program in the blue box at the bottom of the page*

1 How many households are there in the coverage area?	22,000	homes
2 How many commercial/institutional establishments are in the coverage area	3,500	businesses/institutional users
3 What is your compliance target? As a percentage of the homes in the target area, what percentage do you think will participate?	70%	per cent of the homes are likely to participate.
4 From the survey data, what per cent of homes have septic tanks?	75%	per cent of homes have septic tanks.
5 From the survey, of the homes that have septic tanks, what is the percent of the tanks that are desludgable?	75%	per cent of the septic tanks are desludgable.
6 From the survey, what is the average volume of residential septic tanks in the target community?	4.5	cubic meters
7 From the survey, what is the average volume of commercial/institutional septic tanks in the target community?	10	Cubic meters
8 Septic tanks should be desludged every 3 to 5 years. What is the target desluding frequency for your program?	5	years
9 How many days a week will your program operate?	6	days per week

Answer: **The design flow of your septage treatment facility is** **50** **cubic meters per day***

1,233 **cubic meters per month**

14,796 **cubic meters per year**

Working days per month	25
Working days per year	297

Users input data from the Rapid Technical Assessment into the spreadsheet. Outputs include volume, trucks, O&M, and revenue Projections

Planning Model – Collection Program

Capacity of the truck*	2.5	cubic meters
Number of Loads Per Day per Truck (Fill in the yellow boxes to estimate loads per day)		
Estimated drive time to the home or business	0.5	hours
Estimated time to pump the tank	0.5	hours
Estimated drive time from collection site to treatment plant	0.5	hours
Estimated unloading time at the treatment facility	0.5	hours
Estimated drive time to the next home or business	0.5	hours
Hours of operation per day	10	hours
Number of loads per day per truck	4	
Efficiency of trucking operation	0.85	***
Adjusted loads per day per truck	3.4	
Answer: Number of trucks needed:	**6**	**trucks****

The spreadsheet helps determine the optimal number and size of trucks

Planning Model – Tariff

Projections

Current septage tariff per cubic meter of water	3	Pesos									
										Average monthly cost per residential user	72 Pesos
										Average monthly cost per commercial user	60 Pesos
Community Growth Rate - residential	5%										
Community Growth Rate - Commercial/Institutional	2%										
Adjusted overall growth rate	3.8%										
Annual Inflation rate	9%										
Daily flow at year 0	71	cubic meters									

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Number of homes	22,000	23,100	24,255	25,468	26,741	28,078	29,482	30,956	32,504	34,129
Number of commercial/institutional	3,500	3,570	3,641	3,714	3,789	3,864	3,942	4,020	4,101	4,183
Daily flow (cubic meters per day)	71	74	77	79	82	86	89	92	96	99
Monthly Income - Residential	1,584,000	1,663,200	1,746,360	1,833,678	1,925,362	2,021,630	2,122,711	2,228,847	2,340,289	2,457,304
Monthly Income - Commercial	210,000	214,200	218,484	222,854	227,311	231,857	236,494	241,224	246,048	250,969
Total monthly income	1,794,000	1,877,400	1,964,844	2,056,532	2,152,673	2,253,487	2,359,206	2,470,071	2,586,338	2,708,273
Total Annual income	21,528,000	22,528,800	23,578,128	24,678,380	25,832,072	27,041,844	28,310,467	29,640,853	31,036,055	32,499,280
Total residual (annual)	4,762,526	4,734,093	4,631,720	4,442,956	4,153,646	3,747,706	3,206,875	2,510,432	9,551,931	8,470,651
Collection expenses	6,107,328	6,889,861	7,772,661	8,768,574	9,892,093	11,159,569	12,589,447	14,202,536	16,022,310	18,075,252
Operation expense subject to inflation	2,741,100	2,987,799	3,256,701	3,549,804	3,869,286	4,217,522	4,597,099	5,010,838	5,461,813	5,953,377
Fixed Operations Expenses	7,917,047	7,917,047	7,917,047	7,917,047	7,917,047	7,917,047	7,917,047	7,917,047	0	0
total Expenses	16,765,474	17,794,707	18,946,408	20,235,424	21,678,426	23,294,138	25,103,593	27,130,420	21,484,123	24,028,629
Total Residual (cumulative)	4,762,526	9,496,619	14,128,339	18,571,295	22,724,941	26,472,647	29,679,521	32,189,954	41,741,885	50,212,536

Download at: www.watsanexp.ning.com/page/septage-management

Lessons Learned - Planning

1. Locating facilities can be contentious – NIMBY. Resulted in 6 years delay for Dumaguete;
2. Political realities – Change in leadership can change priorities;
3. Obtaining baseline data through rapid assessments is critical;
4. Desludging frequency – periodic desludging vs. desludging when needed.

Lessons Learned - Planning

Septic Tank Pumping Frequency in Years						
	Household Size—Number of Occupants					
	1	2	3	4	5	6
Tank (liters)	Septic Tank Pumping Frequency in Years					
2,000	5.8	2.6	1.5	1	0.7	0.4
4,000	12.4	5.9	3.7	2.6	2	1.5
6,000	18.9	9.1	5.9	4.2	3.3	2.6
8,000	25.4	12.4	8	5.9	4.3	3.7

Source: 1988. Mancl, Karen. Septic Tank Maintenance, Publication AEX-740, Ohio Cooperative Extension Service.

Institutional Arrangements

Dumaguete City

- Partnership between Water District and City
- City constructed the system by administration
- WD purchased the trucks and hired drivers
    - City responsible for treatment, disposal, reuse
    - WD responsible for collection program
- Finances are “ring fenced” and revenue split evenly

San Fernando City

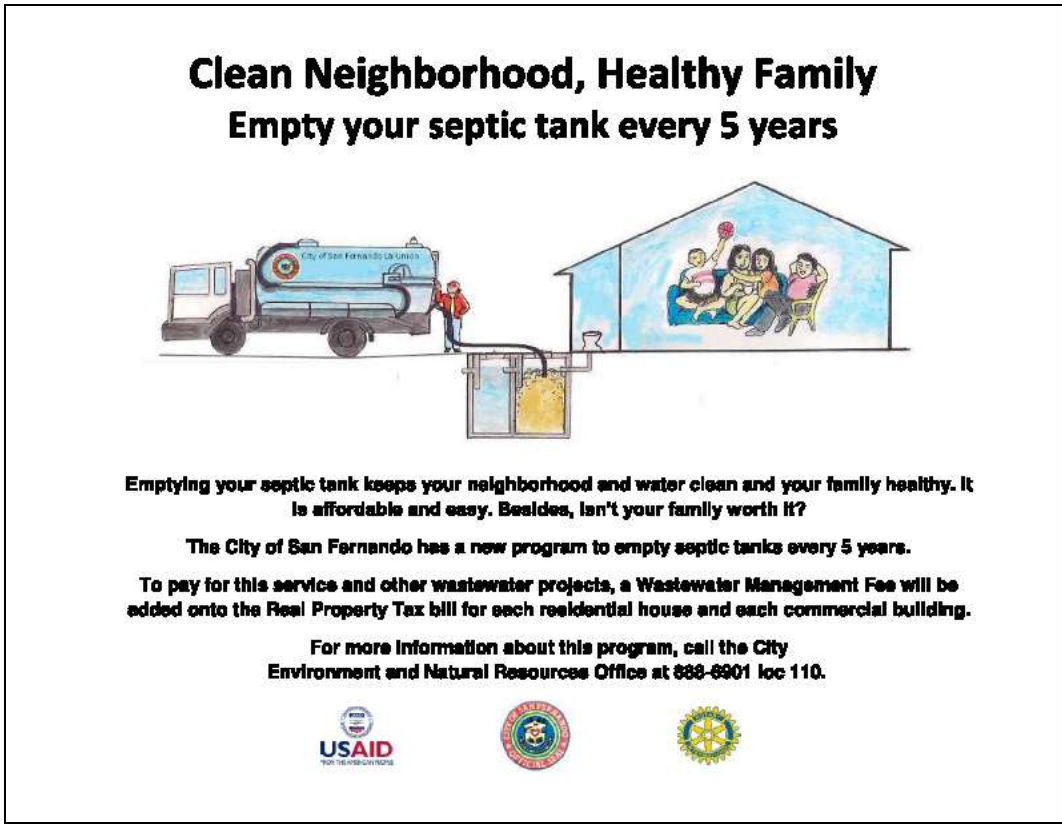
- Public Private Partnership
- City let contracts for construction
- Contracting out to different pumping companies
- Water District not involved at all

Lessons Learned - Institutional Arrangements

1. Determining the best institutional arrangements depends upon:
   - Relationships between City and Water District
   - Skill level of in-house construction department
   - Presence of robust private sector service base
2. Available funds
   - Significant cost savings when activities performed in house
3. Consider input from Stakeholders

Promotions

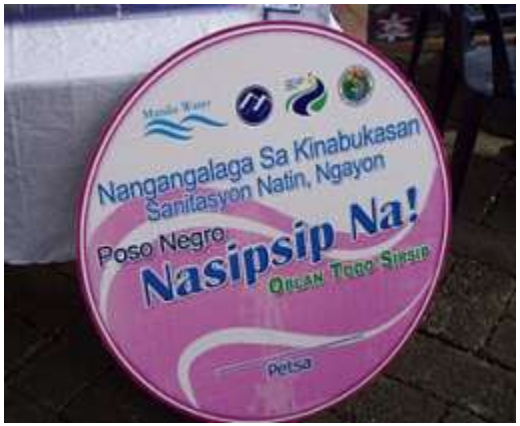
- Evidence based – address needs, wants, desires
- Timing promotions activities with desludging
- Multi media outreach
- Pretest – test - adjust

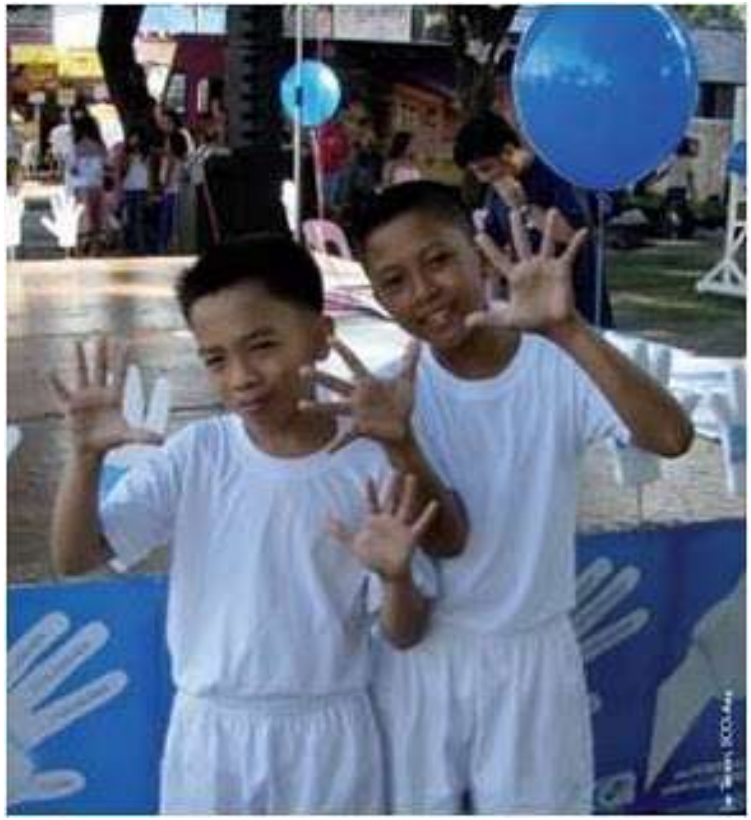


Lessons Learned - Promotions

- Continual outreach – when Dumaguete stopped outreach, compliance dropped to 40%;
- Rewards for compliance;
- Penalties for non-compliance that are real and enforced.

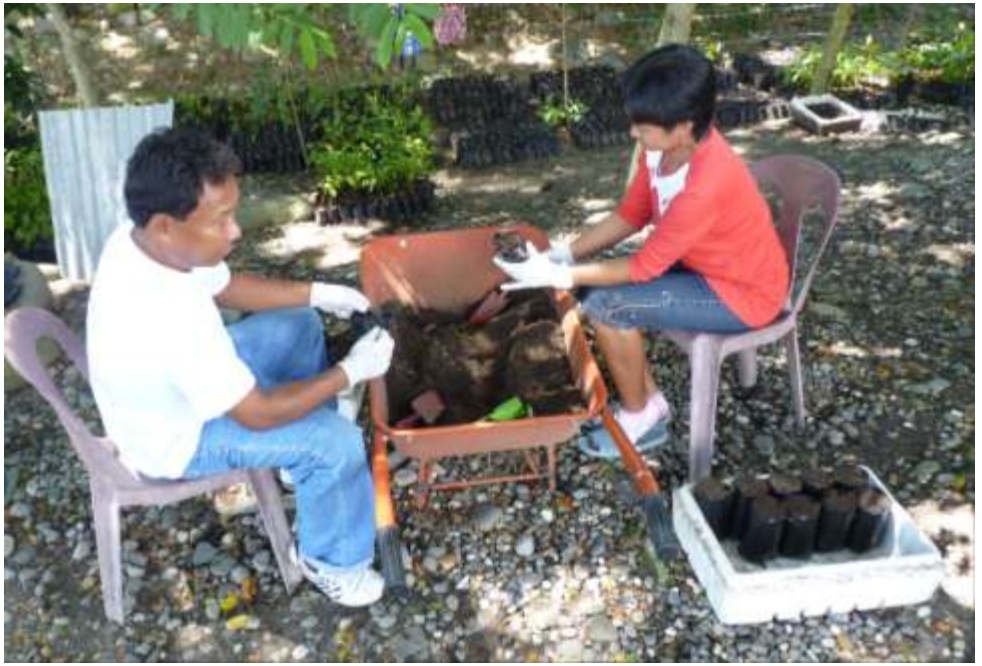
Continued & Coordinated outreach in Marikina City results in 95% compliance.





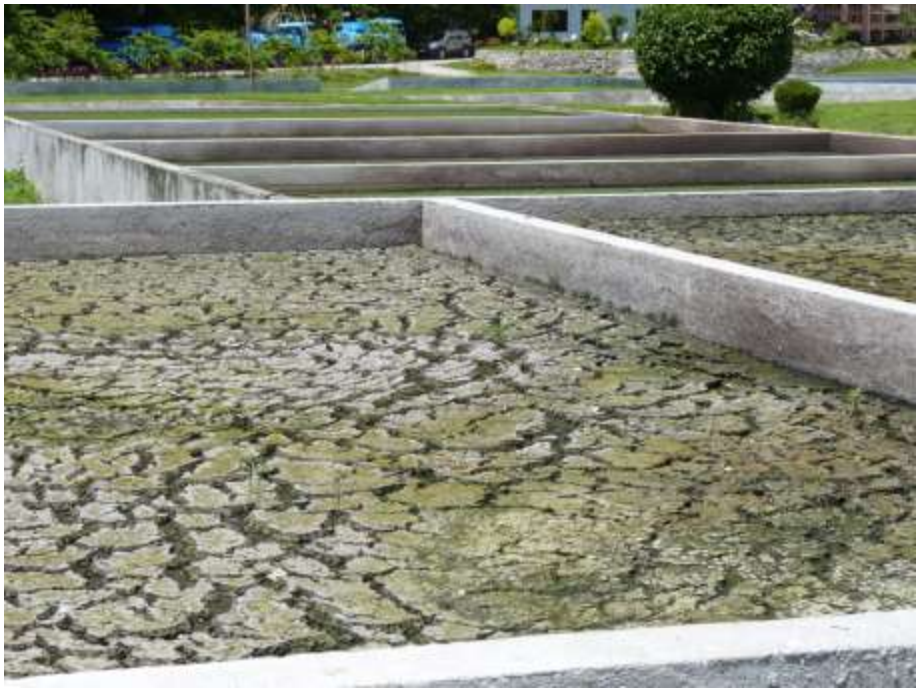
Biosolids

- Dumaguete - 50% of biosolids are reused;
- Little interest in use by farmers. So far only 1 taker;
- Manila Water – 38% of OPEX for biosolids disposal;
- Maynilad: Selling biosolids at cost to 3rd party Class A producer.



Biosolids

Lesson Learned – The potential is there to improve realization of biosolids values. Promotions activities targeting farmers can help increase willingness to use, pay.



- Producer – ensure high quality consistent product
- Simplify ease of pick up – free loading
- Application information for end users
  - How much material per hectare
  - When to apply
  - On what crops
  - Safeguards

Tariffs

Lesson Learned – Pro poor options may be best to garner program support

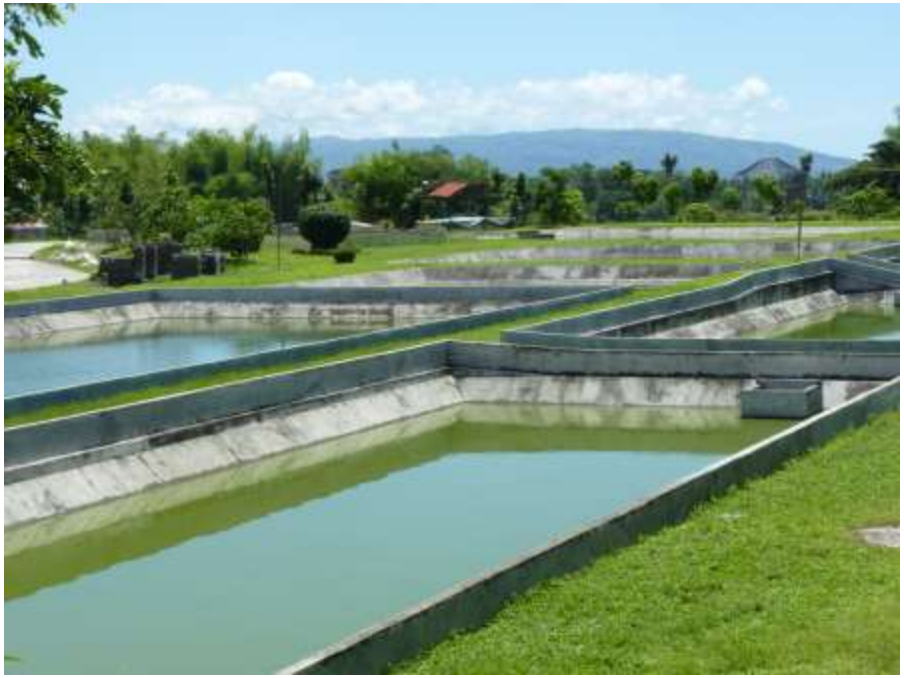
Dumaguete City Tariff Structure

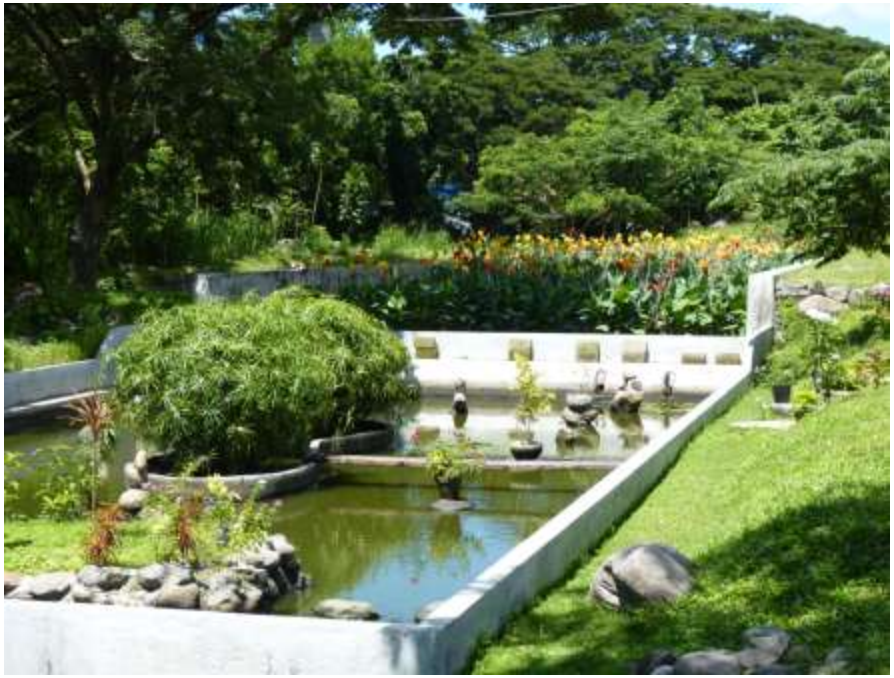
- 2 peso per cubic meter of water consumed
- Average annual tariff at 15 cubic meters /month = Php 1800 ($45)
- Compared to cost of desludging before program = Php 4,500 ($112)

Rate structure codified into septage management ordinance

Technology

Lesson Learned – When possible, keep it simple





Thank You!

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