Lessons Learned in Fecal Sludge Management: Experiences from the Philippines

David Robbins

October 29, 2012
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 m³ 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 m³ 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
## 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% of the homes are likely to participate.
4. From the survey data, what percentage of homes have septic tanks? 75% of homes have septic tanks.
5. From the survey, of the homes that have septic tanks, what percentage of the tanks are desludgable? 75% 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 desludging 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*

<table>
<thead>
<tr>
<th>Working days per month</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working days per year</td>
<td>297</td>
</tr>
</tbody>
</table>

1,233 cubic meters per month
14,796 cubic meters per year

**Users input data from the Rapid Technical Assessment into the spreadsheet. Outputs include volume, trucks, O&M, and revenue Projections**
### Planning Model – Collection Program

The spreadsheet helps determine the optimal number and size of trucks.
## Planning Model – Tariff

### Projections

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

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8</th>
<th>Year 9</th>
<th>Year 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homes</td>
<td>22,000</td>
<td>23,100</td>
<td>24,255</td>
<td>25,468</td>
<td>26,741</td>
<td>28,078</td>
<td>29,482</td>
<td>30,956</td>
<td>32,504</td>
</tr>
<tr>
<td>Commer</td>
<td>3,500</td>
<td>3,570</td>
<td>3,641</td>
<td>3,714</td>
<td>3,789</td>
<td>3,864</td>
<td>3,942</td>
<td>4,020</td>
<td>4,101</td>
</tr>
<tr>
<td>Flow</td>
<td>71</td>
<td>74</td>
<td>77</td>
<td>79</td>
<td>82</td>
<td>86</td>
<td>89</td>
<td>92</td>
<td>96</td>
</tr>
<tr>
<td>Income - Res</td>
<td>1,584,000</td>
<td>1,663,200</td>
<td>1,746,360</td>
<td>1,833,678</td>
<td>1,925,362</td>
<td>2,012,630</td>
<td>2,122,711</td>
<td>2,228,847</td>
<td>2,340,289</td>
</tr>
<tr>
<td>Income - Com</td>
<td>210,000</td>
<td>214,200</td>
<td>218,484</td>
<td>222,854</td>
<td>227,311</td>
<td>231,857</td>
<td>236,494</td>
<td>241,224</td>
<td>246,048</td>
</tr>
<tr>
<td>Total Income</td>
<td>1,794,000</td>
<td>1,877,400</td>
<td>1,964,844</td>
<td>2,056,532</td>
<td>2,152,673</td>
<td>2,253,487</td>
<td>2,359,206</td>
<td>2,470,071</td>
<td>2,586,338</td>
</tr>
<tr>
<td>Expenses</td>
<td>16,765,474</td>
<td>17,794,707</td>
<td>18,946,408</td>
<td>20,235,424</td>
<td>21,678,426</td>
<td>23,294,138</td>
<td>25,103,593</td>
<td>27,130,420</td>
<td>21,484,123</td>
</tr>
<tr>
<td>Residual (cumulative)</td>
<td>4,762,526</td>
<td>9,496,619</td>
<td>14,128,339</td>
<td>18,571,295</td>
<td>22,724,941</td>
<td>26,472,647</td>
<td>29,679,521</td>
<td>32,189,954</td>
<td>41,741,885</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Tank (liters)</th>
<th>Septic Tank Pumping Frequency in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Household Size—Number of Occupants</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2,000</td>
<td>5.8</td>
</tr>
<tr>
<td>4,000</td>
<td>12.4</td>
</tr>
<tr>
<td>6,000</td>
<td>18.9</td>
</tr>
<tr>
<td>8,000</td>
<td>25.4</td>
</tr>
</tbody>
</table>

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

Clean Neighborhood, Healthy Family
Empty your septic tank every 5 years

Emptying your septic tank keeps your neighborhood and water clean and your family healthy. It is affordable and easy. Besides, isn’t your family worth it?

The City of San Fernando has a new program to empty septic tanks every 5 years. To pay for this service and other wastewater projects, a Wastewater Management Fee will be added onto the Real Property Tax bill for each residential house and each commercial building.

For more information about this program, call the City Environment and Natural Resources Office at 888-6901 loc 110.
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!

David Robbins

October 29, 2012