LESSONS LEARNED IN FAECAL-SLUDGE MANAGEMENT: EXPERIENCES FROM THE PHILIPPINES

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ABSTRACT

In July, 2012, site investigations and interviews were performed to evaluate four faecal-sludge management (FSM) programs in the Philippines. The purpose was to report on lessons learned and best practices for cities wishing to implement their own projects under the new National Sewerage and Septage Management Program (NSSMP), which became law in June 2012. These programs offer very different approaches to undertaking FSM. The findings are as follows:

1. A national program that increases the capacity of local officials, and that promotes FSM may help to enable the coordination, promotion, and replication of FSM programs nationwide.
2. Estimating the volume of sludge produced is difficult, but can be successfully accomplished through site visits and surveys organized within the framework of rapid technical assessments.
3. Determining the frequency of septic tank or pit emptying needs should be evidence based—either by considering volume and usage statistics or by physical inspection—rather than based on arbitrary decisions.
4. Maximizing customer participation through an enabling environment that includes adherence to a bottom-up planning process, ongoing promotions campaigns, and incentives is critical for meaningful impact of FSM programs.
5. A sustainable, fair, and scalable tariff schedule needs to be implemented to ensure that the business plan is financially viable.
6. Implementers need to be realistic about cost recovery when planning biosolids management schemes.

Examples of how different institutional arrangements between public- and private-sector entities can lead to successful programs, as well as biosolids management realities from the four case studies are also presented. Finally, the article discusses ongoing research programs into sustainable FSM that maybe utilized as references for new FSM program development.

Keywords: BIOSOLIDS, FAECAL SLUDGE, MARKETING, SANITATION, SEPTAGE, USER FEE

INTRODUCTION

In July 2012, a team from RTI International, with assistance and guidance from Eawag/Sandec,[1] deployed to the Philippines to evaluate four faecal-sludge management (FSM) programs with the goal of reporting on best practices and lessons learned. FSM includes the collection, transport, reuse, and disposal of septic tank

[1] Department of Water and Sanitation in Developing Countries (Sandec) at the Swiss Federal Institute of Aquatic Sciences and Technology (Eawag).

sludge and is seen as a starting point for cities interested in improving sanitation. The four cases—(1) Dumaguete City, (2) San Fernando City, (3) Maynilad Water for the West Zone of Metro Manila, and (4) Manila Water for the East Zone of Metro Manila—were chosen to highlight their different approaches to implementing FSM (Table 1). The information gathered provides insight into how other cities in developing countries can utilize best practices to achieve sustainable FSM programs.

Table 1. Four case studies—Philippines septage management projects at a glance

Location	Institutional Arrangement	Septage Treatment Technology	Tariffs and Fees	Source Flow	SpTP Capacity (m^3/day)	Daily Flow as % of Capacity (2012)
1. Dumaguete City	Public-sector partnership between local government unit and water district	Non-mechanized—sewage lagoons and wetland cells	2 pesos per cubic meter of water consumed	Septage only[1]	80	40%–60%
2. San Fernando City, La Union	Public-private partnership	Partially mechanized—anaerobic baffled reactor followed by aeration tank and treatment lagoons	Tariff based on flat tax of property owners	Septage only*	60	No Data
3. Maynilad Water–Dagat-dagatan SpTP	Private company in concession agreement with national government	Mechanized dewatering with lagoons and wetlands for treatment	Tariff based on flat 20% of water bill	Combined septage and sewerage**	250	85%
4. Manila Water South SpTP	Private company in concession agreement with national government	Mechanized dewatering with activated sludge for treatment	Tariff based on flat 20% of water bill	Combined septage and sewerage[2]	814	40%–50%

SpTP = septage treatment plant

* Septic tank effluent is discharged directly in the environment.

** Septic tank effluent is collected and transported in the sewer and treated at the combined treatment plant.

THE NATIONAL SEWERAGE AND SEPTAGE MANAGEMENT PROGRAM

In the Philippines, groundwater contamination from the indiscriminate discharge of septic tank effluent as well as limited FSM programs continues to place populations at risk from outbreaks of waterborne disease, even though the country is on track to meet its Millennium Development Goals (National Statistical Coordination Board, Philippines 2012). As an example of this risk, the region of Bicol experienced a cholera outbreak in July 2012 that reached epidemic levels. There were over 3,000 confirmed cases and over 30 deaths from drinking water that was contaminated by human waste (Loterte 2012). The national government of the Philippines considers centralized sewer systems, FSM, and hybrid combinations to be viable solutions to address these issues. Even though some cities have implemented FSM to combat critical environmental health issues, wide-scale replication has not occurred.

In June 2012, in a ground-breaking move for sanitation, the Philippine government approved the National Sewerage and Septage Management Program (NSSMP). For the first time in Southeast Asia, a national government is pursuing an agenda to drive wide-scale sanitation improvement through the implementation of sewerage and FSM projects. The NSSMP will provide up to a 40 percent cost share to local cities and municipalities to implement sewerage projects. It will also launch a national program to promote FSM and the values associated with regular septic tank cleaning.

According to the US Agency for International Development (USAID)-funded Rapid Assessment of Septage Management in Asia (AECOM International Development, Inc. & Eawag/Sandec 2010), many local municipalities lack the capacity and political will necessary to design and implement FSM. To address this,

the NSSMP will also provide technical assistance and targeted outreach and training to motivate and build the capacity of local officials to undertake FSM programs. While no national government cost share is to be applied to FSM projects, these programs can generally be designed, operated, and maintained at a significantly lower cost, with operation and maintenance expenses spread among the municipality, private companies, and end-users through fees (tariffs) (Dodane, Mbéguéré, Sow, & Strande 2012). It is hoped that the NSSMP will have a major impact in sanitation improvement in the Philippines; not only by generating interest, but by providing the tools and resources that local governments need to implement these programs with local resources.

PLANNING CONSIDERATIONS FOR FSM PROGRAMS

Determining the volume of faecal sludge a community generates, and how much of that volume can be collected and transported to a treatment facility, is critical information needed to accurately size all aspects of the program. Program implementers can perform rapid technical assessments to determine the number of septic tanks in the coverage area; how many of these tanks can be accessed by the pumping crews; the average tank volume; and the mix of residential, commercial, and institutional sources. In San Fernando City, master plumbers were organized and trained to conduct septic tank evaluations and surveys. Accompanied by Community Health Officers, they were deployed into neighbourhoods to gather data. During the site visits, teams also conducted interviews to gather information on sanitation conditions and key motivators that could be used to encourage participation in the program. In just three days, enough information was collected to drive the technical aspects of the program.

“Collecting accurate data at the start of the process is very important,” stated Sally Medrano, senior environmental management specialist in the City of San Fernando, who helped lead the rapid technical assessment in her city. “Our rapid assessment provided our septage management planning committee with useful statistics on the current sanitation situation, which allowed it to make appropriate sizing decisions for our facility.”

Desludging frequency also plays an important role in sizing the collection and transport infrastructure. The Dumaguete city FSM program design was based on a 5-day work week, with septic tanks being emptied every five years, resulting in a design flow of 60 m^3 per day requiring seven trucks. If a 6-day work week and emptying schedule of every six years were selected, the daily design flow would be 42 m^3. For maximum impact, programs should be designed to meet the specific needs of the community, either based on average tank volume and usage data (Table 2), or on an “as-needed” basis determined through actual physical inspection, and not on arbitrary decisions.

Table 2. Septic tank pumping frequency in years

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. The table shows that the optimal desludging frequency Is a function of tank volume and the number of users.

THE POWER OF THE BOTTOM-UP PLANNING AND IMPLEMENTATION PROCESS

FSM program success is a function of how many home and building owners participate in the program. Maximizing customer participation can be achieved through promotions, incentives, and coordination between the desludgers and the community leaders. In each of the four cases studied, even though customers are paying waste management tariffs, they do not always take advantage of the septage pumping service. Although this can be because of inaccessibility of the septic tank, Mr. Bonnie Ty, program manager for sanitation and sewer network maintenance at Manila Water, suggests that lack of customer interest is a bigger factor. "Many people simply don't want to go to the trouble of lifting their septic tank lid for the company's trucks," Mr. Ty stated. This also appears to be the case in some service areas of Maynilad Water and Manila Water, where participation rates are as low as 50 percent.

The Manila Water service area consists of several independent cities within Manila. One of these cities, Marikina City, has been led by an executive team that is passionate about improving sanitation. Marikina City utilizes a combination of a local FSM ordinance and an ongoing promotion campaign that provides window stickers for participating customers (see Figure 1). Community pride is a strong motivator, and Marikina City's participation rate is 95 percent. The program was developed through an evidence-based promotion campaign initiated early in the process, which linked participation in the desludging program with improving environmental conditions in the much-loved Marikina River. Coupling the promotion campaign with close coordination of desludging activities between the desludger (Manila Water) and local officials, as well as enforcement of the ordinance, has fostered high participation rates.

Figure 1. Marikina City's Nasipsip Na! The program gives window stickers as rewards for desludging compliance—the program promotes the septic tank desludging through community pride.

Engaging the community through a stakeholder-driven, bottom-up planning process to encourage customer participation is shown to be effective. In both Dumaguete City and San Fernando City, technical working groups lead the program decision making. These groups prepared promotional materials targeting awareness-raising and acceptance of a new desludging fee. Local governments or service providers in each of the four cases used promotion efforts to encourage program participation. These included multi-media outreach; sanitation events like water, sanitation, and hygiene programs in schools; and discussions of program benefits at regular city-run meetings. There is strong evidence that ongoing promotions help maintain both willingness to pay for septage management and willingness to participate in the program. When the promotion campaigns ceased in Dumaguete in 2011, participation plummeted to an all-time low of 40 percent.

INSTITUTIONAL ARRANGEMENTS TO ENHANCE FSM CAPACITY

Institutional arrangements refer to the mechanisms by which different government and nongovernmental agencies and private-sector organizations can work together to achieve sustainable FSM. In Dumaguete City, a partnership between the City and water district was formed; the water district was responsible for septage collection, transport, and billing, and the City was responsible for faecal-sludge treatment and reuse. In this case, there was no role for the private sector at all because the treatment facility was constructed and is now operated by City staff, and the trucks are operated by water district crews. In contrast, in San Fernando City, the private sector was involved in the FSM program from the beginning. The treatment facility was constructed through an open tendering process, and the City contracts with private companies to collect and transport sludge. Manila Water represents a good example of a third model, where a private company has entered into a concession agreement with the national government.

BUSINESS MODELS – THE ECONOMICS OF FSM

FSM programs can be partially or fully sustained by tariffs and the potential value from the sale of treatment residuals. In each of the four case studies, a tariff system is used to cover program costs. In Dumaguete City, the tariff is 2 pesos (0.05 USD) per cubic meter of water consumed. Households use an average of 15 m^3 a month, resulting in a monthly fee of 30 pesos (0.60 USD), which is perceived as affordable. Maynilad Water and Manila Water have a 20 percent tariff added to the monthly water bill to cover both FSM and sewerage. In San Fernando City, however, where the water district only serves 25 percent of residents, a fee is collected along with the property tax, with each building owner paying equivalent fees. The Dumaguete system of a graduated fee according to water consumption appears to be the most equitable. Under this system, poorer people who consume less water pay less for sanitation services. This system also encourages water conservation because reducing water consumption has a direct impact on fees paid.

Considerable costs can be incurred when transporting and disposing of biosolids. One way to offset this cost, and provide for resource recovery, is the use of biosolids in agriculture, which is being carried out in each of the four cities. However, the actual value based on local market demand, and acceptance needs to be determined as part of the business planning process. Resource recovery and beneficial use of biosolids alone does not guarantee a profit. None of the cities studied currently generates a profit from their biosolids. In Dumaguete City, biosolids are given away or used by the city for growing seedlings, and with Manila Water, biosolids management accounts for as much as 38 percent of the total operating expenses. These costs could be alleviated by promoting the benefit of this valuable resource to farmers. Sandec is currently conducting research on ways to fill this gap through other end uses, including enhancement of sludge dryness for use as a fuel, anaerobic codigestion, and identification of new markets and innovative business models for sludge products.

CONCLUSIONS

Observations from the ongoing experiences of FSM programs in the Philippines offer many valuable insights and lessons learned for the global issue of FSM for sanitation improvement. It remains to be seen how national-level support will energize wide-scale implementation of FSM programs in the Philippines. However, it is clear that as local governments pursue FSM programs, stakeholders and customers need to participate in the process to help ensure that programs succeed. An important conclusion to take away from these case studies is that local governments have the ability to develop and manage FSM programs, but that there is no single “right” way to design and implement them. Rather, the strategies adopted should always depend on the specific local circumstances of the city. Nevertheless, local project implementers can replicate best practices and avoid pitfalls from studying the lessons learned from the growing number of existing programs.

CURRENT FAECAL-SLUDGE MANAGEMENT RESEARCH COLLABORATIONS

- Sandec’s Faecal Management Enterprises (FaME) in Uganda, Ghana, and Senegal, funded through the European Union Water Initiative Research Area Network (EUWI ERA-net) SPLASH program
- Sandec’s Resource Recovery and Reuse (R3) in Latin America, Asia, and Africa, funded through the Swiss Agency for Development and Cooperation (SDC)
- Sandec’s Partnership for Urban Resource Recovery (PURR) in Vietnam, funded by the Swiss State Secretariat for Economic Affairs (SECO)
- RTI’s continuing work on developing toolkits for local FSM implementers: www.watsanexp.ning.com

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