

FSM

INNOVATION

City-Wide Fecal Sludge Management
Programs in the Philippines

DAVID ROBBINS

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EXECUTIVE SUMMARY

The concept of organized, city-wide septage management programs in the Philippines was introduced in the 2004 Clean Water Act (CWA). The metro Manila region and Dumaguete City were both early adopters and developed functional programs. In addition to the requirement that cities establish septage management programs, the CWA mandated the development of a National Sewerage and Septage Management Plan (NSSPM) as a mechanism for scaling up, with a focus on highly urbanized cities. Problems with the NSSMP roll out coupled with issues related to the cost share mechanism, and the limited capacity of the implementing agencies translated into little action, and no funds dispersed to date. Recognizing this, the national government is working to fix the problems while also supporting local government units (LGUs) to improve sanitation through technical assistance from the Department of the Interior and Local Government. Combined efforts are poised to usher in an era of progress in improving sanitation. The current focus is on enabling septage management at the local level, either through local government management as a municipal service, or water district led programs that provide septic tank pumping services to water customers, or a combination of the two.

This case study provides examples of two septage management programs that illustrate two different approaches. The greater metropolitan area of Manila is an example of water utility run service that uses a concessionaire service delivery model in a city of over 15 million. Dumaguete City provides a more “typical” example of cities and municipalities in the Philippines. Its septage management program was initiated in 2008, and has developed into a program that is co-owned and managed by the Dumaguete City Water District (the utility) and the local government. It demonstrates how a city of 130,000 can provide sustainable septage management services to its citizens for an average tariff of less than USD 1.00 per family per month. The Dumaguete program

represents a model that can be replicated throughout the Philippines, while the concessionaire model from metro Manila may be replicable in other mega cities around Asia and beyond.

CONTEXT

The Philippines has a total population of 103,570,000, as of May 2017.¹ It is a middle-income country with a gross domestic product of USD 2,819 per capita and an annual growth rate of around 6.5 percent.² Despite achieving some progress as measured by the Millennium Development Goals, limited access to safe drinking water and sanitation remains both a burden to the economy and to public health.

According to the National Sewerage and Septage Management Plan, an estimated 55 people die each day in the Philippines due to poor sanitation, the estimated cost of which was approximately 1.5 percent of GDP in 2005. While there have been improvements in access to basic sanitation since then, only 10 percent of the population currently has access to sewerage.³ In 2015, 78 percent of urban households had access to improved sanitation, up from 69 percent in 1990 (Table 1), while 59 percent have piped water to their premises (up from 43 percent in 1990).⁴ One out of every three children suffers from childhood stunting (33.4 percent), which is an indicator of poor nutrition and inadequate sanitation, and has a direct correlation to poverty.⁵ 12 Million children in the Philippines and Indonesia are affected – three quarters of the affected children in all of South East Asia.⁶

Estimated coverage 2015 update				
Year	Improved	Shared	Other unimproved	Open defecation
1990	69%	17%	7%	7%
1995	71%	17%	5%	7%
2000	72%	17%	5%	6%
2005	74%	18%	3%	5%
2010	76%	18%	2%	4%
2015	78%	19%	0%	3%

Table 1: Urban sanitation access in the Philippines



Figure 1: Percentage of female headed households over time

The urban population in the Philippines makes up 44 percent of the total, with an annual growth rate of 1.32 percent.⁷ Government services are not keeping up with demand of the country's poor and extremely poor urban residents living in underserved slums or unserved informal settlements. Approximately 26.3 percent of the Philippine population lives below the poverty line, with 12.1 percent living in extreme poverty.

The impacts of poverty on men and women are often disproportionate. There is a rapidly increasing trend in the percentage of female headed households (Figure 1), often assumed to be more vulnerable than male headed households.⁸ Evidence from Chance (1997) suggests however that by examining the intra and extra-household characteristics, a more accurate picture of economic vulnerability can be formed. Indeed, women often attain high status and stature in Philippine households and work environments.

A POSITIVE CORRELATION EXISTS BETWEEN INVESTMENTS IN SANITATION AND SPECIFIC BENEFITS TO WOMEN

Traditionally, in poor families, women and girls often have the responsibility for securing water for drinking, bathing and cooking. Therefore, when sanitation improvements are made, they provide more benefits to women, as less time will be taken to collecting water and caring for the sick. While these benefits are difficult to monetize, a positive correlation exists between investments in sanitation and specific benefits to women.⁹

The 1991 Local Government Act ushered in an era of decentralization in the Philippines, where local government units (LGUs) were transformed into self-reliant and relatively autonomous communities. Unfortunately, decentralization did little to improve sanitation. While the statistics on poor sanitation are alarming, there is room for hope as the national government becomes more engaged at the local level around this issue. As the National Sewerage and Septage Management Plan is strengthened and capacities at the national and local governments increase, it is expected that more local governments will begin to act to reduce the amount of fecal waste that ends up in the environment. Their tool for achieving this change will be through organized septage management programs.

SEPTAGE MANAGEMENT SERVICES

Historically, septic tanks in the Philippines were designed with two chambers: a digestive chamber and a leaching chamber. After passing through the digestive chamber, the effluent leaches into the soils through the open bottom of the second chamber. In urban settings, septic tanks were typically constructed underneath buildings to minimize space requirements. Leaching chambers were often connected to the drainage ditch to minimize the need for desludging. This applied in both metro Manila and Dumaguete, and persists today to some extent. Septic tanks are the main on-site method of sanitation, with 70 percent of the general population connected to one, and 85 percent of urban residents using this technology.¹⁰ Updated building codes require triple compartment septic tanks, and that septic tanks be fully sealed on the bottom and no connection to the drainage system.

CUSTOMERS PAY FOR THE SERVICE THROUGH AN ENVIRONMENTAL FEE OF 20 PERCENT OF THEIR WATER BILL, WHICH COVERS ONE DESLUDGING EVERY 5–7 YEARS

When septic tanks required desludging, local desludging firms (Malabanan) were contracted with to excavate the waste. Today, many Malabanan firms still operate and where there are no septage treatment facilities, waste is often discharged in to open fields, drainage ditches or surface waters. In locations with formal desludging programs and treatment facilities, Malabanan firms work in conjunction with local programs through public-private-partnerships or as independent contractors that engage directly with their customers.

In Metro Manila, water and sanitation services are provided by two concessionaires; Manila Water Company (MWC), which operates in the Eastern Zone, and Maynilad Water Services, Inc. (MWSI), which operates in the Western Zone (see Figure 2).¹¹ Both companies operate under a concession agreement with the Metropolitan Waterworks and Sewerage System (MWSS), which was formed as a governmental organization in 1971, and privatized in 1997 as a result of the Water Crisis Act (Republic Act 8041). Both MWC and MWSI are responsible for providing piped water service, sewerage, and septage management services for a combined population of 15 million people, which includes the metro Manila area along with some outlying cities and municipalities. They achieve the desludging mandate using a combined fleet of almost 200 desludging trucks and five mechanized fecal sludge treatment plants, including a new MWC waste to energy septage treatment plant that came on line in 2017.

Operations are carried out by a mix of subcontracted service providers and staff. Tariffs are set to achieve full cost recovery plus a profit set by law. Currently, scheduled desludging services are provided for some customers (MWSI estimate is 30 percent), while on-demand services are available for all customers. The companies plan to be able to provide scheduled septic tank desludging services for all customers by 2037.

Metro Manila includes 16 cities and municipalities. LGUs work together with the concessionaires as key stakeholders, performing promotional activities, and traffic control during desludging. Customers pay for

the service through an environmental fee of 20 percent of their water bill, which covers one desludging every 5–7 years.

In contrast, Dumaguete City's septic tank desludging services are provided through a program jointly managed by the city government (LGU) and Dumaguete City Water District (DCWD). DCWD maintains and operates a fleet of eight desludging vehicles while the LGU maintains and operates the septage treatment plant. The treatment plant uses waste stabilization pond technology and was designed with an operational capacity of 85 cubic meters of septage per day (Figure 4). Tariffs are collected to cover the operational costs (OPEX) while achieving full cost recovery for the capital expenditures (CAPEX) within 5 to 7 years. The system has been in operation since 2010 and reached its full cost recovery targets in 2016. The program initially started as a scheduled

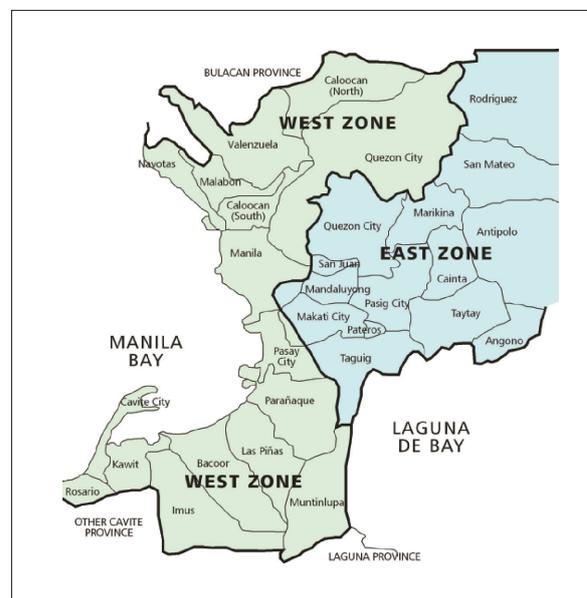


Figure 2: MWSS service coverage map. The East Zone is under the management of Manila Water Company, and the West Zone is managed by Maynilad Water Services, Inc. Image courtesy of Asian Development Bank.



Figure 3: Waste Stabilization Ponds at the Dumaguete City Septage Treatment plant. Josephine Antonio, Chief Urban Planner at the time of construction.



Figure 4: The septage treatment plant at Mactan Island Cebu. Owned and operated by EnviroKonsult Equipment & Services Inc. Desludging and treatment services are procured through a 5-year partnership agreement with Metro Cebu Water District.

desludging service, with trucks going house-to-house throughout the city on a five-year cycle. Participation was voluntary, but since households were paying for the service through their monthly water bills, the percentage of participating households was initially high. It is believed that the promotions campaign, initially launched to coincide with the initiation of city-wide services drove this initial success. However, following a drop in the participation rate about two years later, it was no longer economically feasible to continue the scheduled desludging model. Today, the program operates strictly as a demand based service.

There are theoretical advantages to scheduled desludging, including economies of scale and greater septic tank and program efficiency. In practice, these were not adequately demonstrated in Dumaguete City in part due to a lack of real-time data. When the demand-based model started, the opportunities for demonstrating these advantages were lost. However, the current on-demand program in Dumaguete City is still effective as a clear majority of septic tank owners use the service, calling to request that their tanks be desludged within their 5-year cycle.

The Dumaguete City septage management program is regulated through a local ordinance passed in 2008. The ordinance provides the local regulatory framework for septic tank construction, desludging frequency, and the tariff, which can be adjusted from time to time to cover the cost of the services. Initially, the tariff was set at PHP 2.00 (USD 0.05) per cubic meter of water consumed, which resulted in an average bill of PHP

48.00 (USD 1.00) per household per month. This is where the rate remains today. According to the Water District general manager, the funds from the tariffs are also used to improve conditions in the community that hosts the treatment plant, including a health center, improved roads, and a local scholarship fund, all of which were negotiated during the initial stages of the program. The Dumaguete Septage Management program continues to provide services to customers and is keeping up with demand, with most customers receiving the service within 24 hours of the department receiving the call.

THE CITY COUNCIL BEGAN TO DISCUSS REDUCING THE TARIFF, REFLECTING THE FACT THAT CAPITAL COSTS FOR THE TREATMENT PLANT AND TRUCKS HAVE BEEN FULLY RECOVERED

FSM IN NATIONAL AND CITY URBAN SANITATION POLICY

Septic tanks and septage are referred to in several national laws in the Philippines, including the Clean Water Act (CWA), the National Building Code of the Philippines, Revised National Plumbing Code, Code on Sanitation, and the Subdivision and Condominium

Laws. The CWA and the National Sewerage and Septage Management Plan define national septage management policy. It was the introduction of the CWA that initially had the greatest impact in prompting some local governments to act. To date, there are seven new septage treatment plants in the Southern Philippines with more on the way. At least seven water districts are in different stages of septage management project planning/development, including Dumaguete, Metro Cebu, Cabanatuan, Baliwag, San Pablo, Davao, and Zamboanga. Also, the private sector is starting to invest in septage management with fully functional systems in Bay Laguna (a cluster facility serving four neighboring municipalities), the two cities in Mactan Island, Cebu (Figure 4). As of May 2017, a further 61 municipalities have begun developing local ordinances to start the process of implementing septage management programs.

TO DATE, THERE ARE SEVEN NEW SEPTAGE TREATMENT PLANTS IN THE SOUTHERN PHILIPPINES WITH MORE ON THE WAY

The main influencing legislation and policies on septage management are:

The Clean Water Act is the defining legislation that provides direction to local governments in implementing septage management programs.¹²

The CWA requires: first that the government establish a National Sewerage and Septage Management Plan to oversee the scaling up of septage management throughout the country. Second, that each LGU shall appropriate the land required to install the treatment system, and to levy taxes to pay for the service.

The NSSMP is part of the National Sustainable Sanitation Plan (NSSP) and Philippine Sustainable Sanitation Roadmap (PSSR), which are broader, overarching frameworks that include the full spectrum of sanitation challenges.¹³ The NSSMP focuses on the larger infrastructure projects that LGUs will implement to manage wastewater and septage in urbanized areas in the Philippines. The plan provides cost sharing for sewerage programs, in which the national government funds up to 50 percent of the total cost of the program. For septage programs, the NSSMP provides technical support and support for **feasibility studies**.

Local ordinances on septage management. Local governments, and to some extent, local water districts

are encouraged to promote septic tank desludging and effective management of fecal sludge. At the local government level, ordinances on sanitation, and specifically on septage management are implemented to “prevent and control water pollution and to promote health and ensure a balanced ecology.”¹⁴ To promote this, a model local ordinance was created by the Department of Interior and Local Government (DILG) to help facilitate uptake. The model ordinance includes sections on:

- Scope and application (the types of buildings the ordinance applies to);
- Principles of sewerage and septage management;
- Proper sewage treatment and disposal systems (typically on-site septic tanks and leach fields, including their design, construction and operation);
- Desludging requirements, including the collection, transportation and treatment of septage; and,
- Penalties for non-compliance.

Although there are other laws, policies and implementing rules and regulations that set the stage for modern septage management, perhaps most significant for scaling up septage management in the Metro Manila area was the 2008 Supreme Court ruling, which directed 13 government agencies to clean up, rehabilitate and preserve Manila Bay within 10 years of the ruling.¹⁵ Progress to date includes the cleaning up of the Pasig River, a major tributary into Manila Bay, as well as a push by the Laguna Lake Development Authority (LLDA) to promote septage management for all of the cities and municipalities within the watershed. The Laguna Lake watershed is home to over 18 million people and serves as an important water source for the region.¹⁶ The current intervention is to help local governments within the watershed to implement their own local ordinances on septage management as the initial step in establishing city-wide programs.

The regulator for septage management services in the Philippines The Department of Environment and Natural Resources (DENR) and the Philippines Department of Health (DOH) are national agencies with a regulatory role for new septage management programs. While the DENR, DOH and the Department of Public Works and Highways in theory have regulatory power over local governments in requiring compliance with the CWA and other national laws, these powers have not been used to date.

OVERVIEW OF PROGRESS

In Manila, the story of water and sanitation service provision dates to 1873 (see Figure 5) with the founding of the Manila Waterworks Authority, but it was not

Treatment plant	Company	Sewerage	Septage
		cubic meters per day	cubic meters per day with 16 hours operation per day
Dagat Dagatan	MWSI	13,000	450
Project 7	MWSI	2,400	240
Pamplona Las Pinas	MWSI	None	500
North septage treatment	MWC	None	586
South septage treatment	MWC	None	814 – Waste to energy plant is combined with the South STP

Table 2: Septage treatment plants in the Metro Manila area

until 2002 that septage management began in earnest. A loan from the World Bank, the Manila Second Sewerage Project (USD 35 million), enabled the construction of the Dagat Dagatan septage treatment facility, which has a current septage treatment capacity of 450 cubic meters of septage per day (based on a 16 hour per day operating period). A follow-up loan, the Manila Third Sewerage Project (US 64 million) in 2005 paved the way for the construction of two more septage treatment plants: Manila Water’s North Septage Treatment Plant in the north east of their coverage area, with a capacity of 586 cubic meters per day, and the South Septage Treatment Plant, which has a total septage capacity of 814 cubic meters of septage per day (Table 1).

More recently, MWSI constructed its own 350 cubic meters per day septage treatment plant in Las Pinas. The Dagat Dagatan plant together with the facility in Quezon City enables MWSI to provide on-demand desludging services to all its customers.

Figure 5 shows key events in septage management development in the Philippines.

In Dumaguete City, 2006 was a pivotal year, when City Ordinance 18, Series 2006 was adopted by the city council, thereby establishing the Septage Management System. The ordinance:

- Requires that all homes and buildings have an approved excreta disposal system (septic tank or other approved structure);
- Prohibits discharge of septage anywhere other than the city-owned and operated licensed treatment facility;
- Provides model septic tank design criteria;
- Provides permit requirements for new construction;
- Requires that septic tanks should be desludged every 3–5 years, or when 1/3 full of sludge;
- Requires the creation of a City Septage Management Authority (CSMA) to oversee the program;

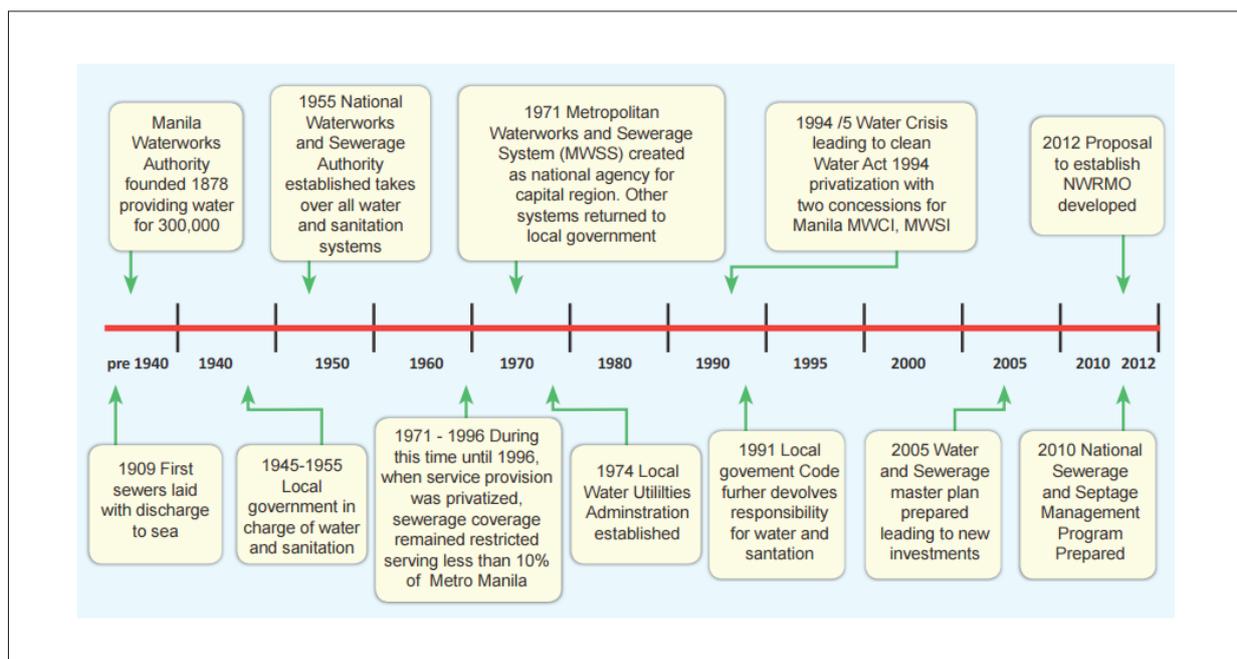


Figure 5: Key events in septage management development in the Philippines

- Provides a tariff structure to sustain the septage program;
- Provides penalties for non-compliance.

FINANCIAL ASPECTS AND BUSINESS MODEL

Organized septage management programs in the Philippines are funded by user fees and tariffs, which are based on the concept of full cost recovery. In Manila, the two concessionaires charge their customers 20 percent of the water bill as an “environmental fee”, which includes watershed management, water source protection, conservation related expenses, and sanitation including desludging. Customers are entitled to have their septic tanks desludged once every 5 years for no additional charge. Additional desludging services are available, at a cost

of PHP 3,000 (USD 60.00) for residential customers, and PHP 6,000 (USD 120.00) for commercial customers (for a 10-cubic meter load).

In Dumaguete, a tariff of PHP 2.00 (around US 0.05) is charged for each cubic meter of water consumed. With an average household consumption of 24 cubic meters per month, this results in an average monthly septage charge PHP 48.00 (USD 1.00). In return, all customers are entitled to one septic tank desludging service every 5 years. This tariff was set at the inception of the program in 2009, and was based on the idea of achieving full cost recovery in between 5–7 years.

The 2012 balance sheet from the Dumaguete City Septage Management program is illuminating (Table 3). It shows that the program generates net income, even after covering the cost of depreciation

Item	Pesos	Pesos
Septage “User Fee” Revenue from 24,000 households x 25cum/month x 12 months x P2.00/cum		14,700,000.00
Assessment/Production Meter		640,000.00
Less: Billing adjustment memo	24,000.00	
Senior Citizen Discount	1,200.00	25,200.00
Net “User Fees” revenue		15,355,200.00
Other Income (Charges)		
Bank Interest	7,200.00	
Bank Charges	(4,200.00)	3,000.00
Total Income		15,358,400.00
Operation and maintenance		
a. Salaries, honoraria and wages		4,306,488.00
b. Fuel and oil		2,182,600.00
c. Depreciation		1,500,000.00
d. Financial assistance to host barangay		1,002,300.00
e. Maintenance		838,000.00
f. Security Services		360,480.00
g. Travelling and training		200,000.00
h. Representation		
i. Taxes, insurance, and licenses		131,400.00
j. Truck and plant supplies		108,400.00
k. Utilities		75,600.00
l. Medical and vaccine		65,000.00
m. GSIS, Philhealth, contributions		54,793.52
n. Office supplies expenses		50,000.00
o. Miscellaneous and general		218,000.00
Total operating and maintenance expenses		11,243,111.52
Net Income		4,115,288.48

Table 3: 2012 Balance sheet for the Dumaguete City Septage Management Program. Source: Dumaguete City Planning Department, 2013

Item	2014	2015	2016
Total Income	15,836,817	16,311,972	18,679,231
Depreciation	2,361,051	2,411,694	2,349,696
Operating expenses (includes deprecation)	13,370,514	14,181,870	13,460,173
Net Income	2,466,303	2,130,102	5,219,058

Table 4: Net income after expenses and depreciation in Dumaguete

Year	Number of septic tanks desludged per year
2012	52,514
2013	65,936
2014	65,855
2015	67,252
2016	82,143
TOTAL	333,700

Table 5: Number of septic tanks desludged per year by Manila Water Company

and paying financial assistance (investments) to the host community. Profitability has been maintained, with record net income recorded in 2016 (Table 4).

BUSINESS MODELS

The concessionaire business model for septage management that has its roots in the 1971 law (Republic Act 6234) which created the Metropolitan Waterworks and Sewerage System (MWSS), then a government agency. Then, the 1997 “Water Crisis Act” (RA 8041) paved the way for privatization of MWSS by transferring water system operations to the private sector, with the goal of significantly improving services.

According to Ryan Orillo, Senior Wastewater specialist, MWSI applies two desludging business models.¹⁷ The first is a regular desludging scheme, which provides scheduled desludging in selected communities, where trucks and crews work neighborhood by neighborhood to achieve desludging on a scheduled 5-year cycle. MWSI contracts third parties to provide these services. For communities where on-demand services are provided, or for customers that require additional desludging services, MWSI staff perform the work. The rationale is that scheduled desludging is more routine, resulting in fewer customer complaints, whereas customer satisfaction with on-demand services is potentially lower. Orillo (May 8, 2017)

believes that desludging services are best provided by highly trained in-house staff.

MWC adopts a different approach. It owns all the desludging vehicles, but subcontracts the driving and desludging operations to a third party. Its program has been quite successful, although still well below their goal of servicing every septic tank every 5 years (Table 5). However, given the rate of growth in desludging services, MWC is well on its way to achieving full coverage by the end of the concession agreement in 2037.

CAPACITY DEVELOPMENT

Septage management capacity refers to: i) how much septage can be collected, and treated (in cubic meters per day), and ii) the capacity of staff and service providers to carry out the required activities.

In Manila, septage collection and treatment capacity is determined in the Concessionaire Agreement, which provides the specific sanitation coverage targets by year for each of the cities and municipalities within the coverage zone. This in turn influences the infrastructure requirements for both treatment and collection capacity. The targets for MWSI are regular desludging for 80 percent of customers by 2021, and sewerage coverage for all customers by 2037.

To achieve the septage capacity targets, MSWI operates a fleet of 63 septage desludging trucks: 57 of which have a volumetric capacity of ten cubic meters, and six that have a volumetric capacity of four cubic meters. They also have three treatment plants that should meet the treatment capacity target the end of the current concessionaire agreements (2037). Manila Water has a fleet of more than 100 trucks, most of which have a tank volume of 10 cubic meters (Figure 6).

MWSI HAS A STAFF CAPACITY BUILDING PROGRAM THAT COULD SERVE AS A MODEL FOR REPLICATION THROUGHOUT THE PHILIPPINES AND BEYOND

MWSI has a staff capacity building program that could serve as a model for replication throughout the Philippines and beyond. It adopts a two-step program:

- Annual company-wide training on the core values and mission of MWSI; and



Figure 6: Part of Manila Water’s desludging fleet. The trucks are owned by MWC but operated by EnviroKonsult, a third party contractor.



Figure 7: Rizal Boulevard today, an important part of Dumaguete City’s identity, and a driver of tourism and economic development.

- Annual septage management training for two or three days for all septage program staff that includes:
 - Policies and procedures;
 - Customer service;
 - Safety; and
 - Traffic management.

In Dumaguete City the treatment plant has been designed to treat 85 cubic meters per day. Average flows in 2016 are between 55 and 60 cubic meters per day. While there is still some treatment capacity left in the existing plant, program managers should begin planning for the future when demand exceeds capacity. Similarly, while the number of trucks are adequate to meet current demand, as demand increases, additional desludging equipment training will be required. Costs for capital expenditures (CAPEX) are covered by the tariff.

Formal training programs are lacking in Dumaguete for staff and management. As new equipment comes on line, such as GIS tracking and automated receiving stations, staff training on the proper operation and maintenance of the equipment will be required.

DRIVERS OF CHANGE AND LESSONS LEARNED

Dumaguete

In Dumaguete City, the most significant driver of change was the drafting of a city ordinance establishing a septage management program and minimum criteria for on-site wastewater treatment systems. A promotions campaign was initiated to raise community interest in and willingness to pay for the program, as well to promote the new ordinance. At the same time, plans were developed for the city’s septage treatment plant and the decentralized wastewater systems for key institutional buildings.

Other drivers of change include:

- The realization that improving sanitation, especially if it could restore the water quality of the bay along Rizal Boulevard, could stimulate economic development. This gave the mayor’s governmental offices a clear focus and established motivation for collaboration (Figure 7).
- The Philippine Clean Water Act of 2004 and its mandate that local governments implement septage management programs if sewerage systems are not affordable. This was the primary reason cited for the promulgation of the local septage ordinance.
- The community, through stakeholder meetings, agreeing to the need for a septage management program. This was also driven by the multisector awareness campaigns.

- Showing that the program would be a money maker and not a burden to the city coffers.
- The City agreeing to support the host community of the septage treatment plant, and then forging a long-term agreement with them.
- The sustained awareness and multimedia promotions campaigns, which gained support for the program.
- Interest and technical assistance from USAID.

IN DUMAGUETE CITY, THE MOST SIGNIFICANT DRIVER OF CHANGE WAS THE DRAFTING OF A CITY ORDINANCE

The major challenges in Dumaguete include:

- Lack of real time data tallying the number of cubic meters of waste collected and costs of the treatment and collections programs.
- Re-developing and then launching targeted promotions campaigns to drive the willingness to participate in the program.

Metro Manila

Prior to 1995, it was recognized that Manila’s water system was not working well as a public corporation. The system was “inefficient, debt-ridden, and

overstaffed” with one of the highest non-revenue water (NRW) level in Asia.¹⁸ NRW is water that is produced, and delivered but not sold due to leakage or theft and is indicative of a poorly operating utility. Today, both concessionaires operate award-winning utilities. The drivers of this change in Manila included:

- The Water Crisis Act (Republic Act 8041), which was signed in 1997 which paved the way for privatizing the concessionaires.
- The 1997 concession agreements with two private consortiums to manage the utility. The goals of privatization were to increase efficiency and improve service standards for water delivery and expanding services to the poor.
- Pursuit of excellence by both companies. Both have pursued and achieved ISO certifications for their treatment plants and overall programs.¹⁹

The 2008 Supreme Court Decision requiring the cleanup of Manila Bay was another significant driver of change. Progress by the affected government agencies in meeting the court ordered mandates has been slow, however appears to be stepping up pace in 2017 as key agencies have begun ramping up efforts. While the Supreme Court decision has been an important driver, change in leadership at both LLDA and DENR may also be driving the push for septage management.

Despite many challenges in the ensuing years, including the bankruptcy of Maynilad Water Services Inc in 2003 these targets have generally been achieved.



Figure 8: Manila Water’s first Waste to Energy (WTE) septage treatment plant

Year	Number job orders	Volume	Volume collected per working day
2010	2,223	10,953	44
2011	2,964	14,604	58
2012	2,964	14,604	58
2013	2,964	14,604	58
2014	3,293	15,501	62
2015	3,921	17,884	72
2016	3,512	16,581	66

Table 6: Summary of desludging operations – Dumaguete City, May 2010–Dec 2016

Finally, the economics of septage management is a key driver of change towards highly efficient and energy positive septage treatment systems. One example is the new Waste to Energy (WTE) septage treatment facility that works in conjunction with Manila Water Company’s South septage treatment plant (Figure 8). According to the company: “Once the WTE system operates at full-scale, it can fulfill more than 100 percent of the power requirements of the South Septage Treatment Plant, reducing greenhouse gas (GHG) emissions of the facility by 267 tons of carbon dioxide (CO2) in a year and generating to up to PHP 17 million (USD 340,000) in annual savings for the Company on power expenses.”²⁰

LESSONS LEARNED AND IMPACTS

Lessons learned in Dumaguete City are:

The current model of desludging operations appears to be meeting demand. The estimated total number of septic tanks is around 20,000, and the average number of desludging jobs is 3,500 per year, thus the estimated number of tanks desludged in a five-year cycle is 17,500. Although some septic tank owners do not request the service within the five-year cycle, most do, and the fact that most job orders are completed within 24 hours is an indication that the program is working for the majority of citizens and the city (see Table 4 for a summary of the desludging operations in Dumaguete City to 2016).

Table 4 Provides the annual number of tanks desludged (job orders) as well as the total annual volume collected, as well as the volume collected per working day (50 weeks a year, 5 days a week = 250 days/year. Some addition points:

- Data for year 2010 is for May – December;
- Data for years 2011, 2012, and 2013 are approximate

- Data shows a moderate drop in activity in 2016 compared with 2015, although no reason for the drop has been provided. Data from 2017 indicates desludging rates similar to 2016 indicating that 3,500 tanks may be an average for Dumaguete City, operating on a demand-based model with no promotional activities conducted.

There are theoretical advantages to a scheduled desludging model, including economies of scale and greater program efficiency. In practice, however, these were not realized when the program shifted to the demand based model. The current program in Dumaguete City is working, but not everyone calls even though they are paying for the service. The net result is that for the treatment plant, less septage being collected and treated than anticipated, resulting in lower operating expenses (Table 3) and higher profits than originally anticipated.

There appears to be a direct correlation between the community outreach and level of interest in the program. When the promotion campaigns tapered off, so did the participation rate.

A pro-poor tariff structure is widely accepted by the community. The LGU and Water District, in their formative memorandum of agreement included a provision requiring that both parties must agree on any future rate adjustments. This helps to maintain current funding levels at a time when there is political pressure to reduce the septage tariff.

Private desludgers can be encouraged to dispose of collected sludge into a city’s treatment plant for a small fee.

Visits from local government units, private groups and international development agencies can promote innovative approaches to sanitation. The city’s system is now a model to other local government units.

The Manila desludging experiences have also resulted in lessons learned:

Early land banking is beneficial. In a city like Manila where real estate is expensive, it is important to land bank as early as possible. Otherwise, acquiring land to construct septage treatment facilities will be difficult even if funds are available. Once acquired, the land must be fenced and regularly monitored to prevent informal settlers taking up residence because this could limit future development. Prior to actual construction, the land could be used for warehouses or planting crops.

Allow time for program preparatory work. When planning for FSM services, considerable time must be allotted for preparation or “upstream” work such as land acquisition and securing permits and endorsements. As these are mostly subject to personalities and opinion, it is important to be realistic when drafting the timeline for a project. In Manila, the whole process of acquiring land and securing endorsements is up to two years.

Continuous data gathering is essential. Other than updating assumptions made, data gathering is essential to help inform management decisions. It was crucial in determining the right service level agreement to be put in place when outsourcing desludging operations. It can be crucial in determining organizational composition, investments needed (repair, maintenance and replacement of vehicles, expansion of treatment plants), reporting performance and determining tariff. Data also helps when presenting a case to the public and helps to convince them to get their septic tanks desludged regularly.

Operational efficiencies must be in place. Outsourcing the desludging operations, including fleet maintenance, have proven to be more economical than carrying out the operations in-house. But to do this, a robust service level agreement that is fair to both the concessionaire and to its contractor, must be in place. For the East Zone, a service level agreement based on distance and volume is in place that offers incentives when they collect more. This must be countered with a good monitoring check, done through regular reporting and random measurement of tanks. On top of that, checks on the contractor itself helps ensure good performance.

Community partnership is preferable. At a minimum, community partnership is necessary to avoid complaints about very visible desludging operations. In Manila, this partnership has helped pave the way for scheduled desludging services.

OUTSTANDING CHALLENGES AND WAY FORWARD

Outstanding challenges for Manila’s and Dumaguete’s septage management programs include:

New standards for nutrient removal. In 2016, the Department of Environment and Natural Resources promulgated new regulations on effluent quality (DAO 2016–08), which sets more stringent requirements for nutrient reduction. Nutrients, especially nitrogen and phosphorus are difficult to remove from wastewater effluent and require tertiary treatment units. Even though existing wastewater and septage treatment facilities are granted a five-year grace period for compliance, meeting these standards on a consistent basis will be a challenge.

Increasing community acceptance of septic tank desludging. Acceptance levels or the percentage of customers that use the desludging services (even though they are paying for them through their bills) has been historically low. In 2016, around 50 percent of customers in communities where scheduled desludging is offered used the services when the trucks were in their neighborhood. Despite significant promotion by the concessionaires in Manila, more community outreach is needed.

Traffic congestion in the city is getting worse each year. This means that trucks need longer to reach the target neighborhood or building, and the treatment plant. As a result, more trucks and staff will be needed to meet the compliance targets set in the concessionaire agreements.

Accessibility of the septic tanks. Narrow roads and indiscriminate parking and road obstructions are a continuing challenge. Closer work and more coordination with barangay (individual communities with their own elected officials) officials is one way of alleviating this problem.

Implementing the Smart Scheduling System, wherein a customer’s bill will include a reminder that their septic tank is due for regular desludging. This will also affect smart job order management. This applies to both Manila and Dumaguete and is likely to improve participation rates.

Reusing treated biosolids continues to be a challenge in both Dumaguete City and in Manila. Most of the treated biosolids are taken to a site some 36 kilometers away from Manila, which translates as significant transport operational cost. There is little agriculture and hence no market for treated biosolids within metro Manila, even when concessionaires give the sludge away. MWSI engages with a private sector

company that processes biosolids for reuse, although the volumes and values are not publicly available.

Real time management information data is needed.

In Dumaguete City, data collection is the biggest current challenge. There is no effective data system for collecting statistics such as including i) how many tanks have been desludged, ii) volume of septage treated, and iii) revenue collected. Many data

acquisition systems that provide real time monitoring are available, however. This will be especially important in Dumaguete as there are renewed calls for transparency and up-to-date information on which to base managerial decisions. Both concessionaires in Metro Manila are successfully using real time monitoring systems.

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ABBREVIATIONS AND ACRONYMS

CWA	Clean Water Act
DENR	Department of Environment and Natural Resources
DILG	Department of Interior and Local Government
DOH	Department of Health
LINAW	Local Initiative for Affordable Wastewater Treatment
LLDA	Laguna Lake Development Authority
MWC	Manila Water Company
MWSI	Maynilad Water Services Incorporated
MWSS	Metropolitan Waterworks and Sewerage Authority
NRW	Non-revenue water
NSSMP	National Sewerage and Septage Management Plan
USAID	United States Agency for International Development

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Felicidad Narvaez, independent septage consultant

Jay Yu Tecsan, independent septage consultant

Josie Antonio, independent septage consultant.

AUTHORS

David Robbins, President, Global Development Services, LLC, [dmrobbins10@gmail.com](mailto:dorrobbins10@gmail.com), 605 Bristlecone Court, Berthoud Colorado, USA 80513

Lyn Almario, Consultant, Asian Development Bank, aalmario.consultant@adb.org

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