

EAST ASIA AND THE PACIFIC REGION
URBAN SANITATION REVIEW

PHILIPPINES COUNTRY STUDY



DECEMBER 2013



THE WORLD BANK



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FOREWORD

The Philippines is a middle income country and will continue to pursue its development goals in the coming years. As a country, it has made considerable achievements in meeting the Millennium Development Goals. Its citizens benefit from good access to quality water supply and have access to toilets. However, issues remain with respect to treatment of septage and collection and treatment of wastewater.

Inadequate sanitation leads to health and environmental related economic losses. In the Philippines, these losses amount to about 1.5 percent of Gross Domestic Product. To reduce the loss, this Philippines Country Report provides ideas on how the country can improve in the provision of quality urban sanitation services to its citizens. The report aims to provide guidance to policy makers at the central and local levels on social, institutional, technical and financial aspects of the sector. The report has a focus on institutional issues which have to be addressed as a priority and improvements in the institutional front will help to augment other aspects related to service delivery.

Greater efforts will be needed to raise awareness on sanitation issues and the benefits of improved sanitation. Also, a variety of actions will have to be carried out to increase the effectiveness of sector operations. The interventions that are needed should aim to: build institutional capacity in the sector, strengthen the legislative and regulatory framework, clarify institutional roles and responsibilities, seek cost effective solutions, and develop viable financial plans for investments and operations. Particular attention should be paid to the concerns of the poor as they often reside in areas that are polluted and may not have sufficient resources to improve their living conditions.

The government is undertaking a sector reform program that will address the institutional and financial issues and remains committed to enhancing the quality of water and sanitation services provided to the citizens of the Philippines. These efforts will contribute to continued progress towards cleaner and healthier cities and achievement of the long-term development goals of the Philippines.

ACKNOWLEDGMENTS

This country report on the Philippines provides the background for the Urban Sanitation Review for the East Asia and the Pacific Region. The country report was prepared through a consultative process in the Philippines which included meetings with central and local government authorities and review of sanitation operations in the cities of Metro Manila, Baguio, Baliwag, San Fernando, Dumaguete, and Bayawan. Also, a workshop was held in Manila on February 19, 2013 to seek inputs from stakeholders. This report has been prepared with the financial support of the Australian Government.

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The Task team for this report greatly appreciates the technical contributions made by the various stakeholders who were consulted during the preparation of the report and the financial support provided by the Australian Government to prepare the report.

ACRONYMS

BOD	Biological Oxygen Demand
CAPS	Center for Advanced Philippine Studies
CENRO	City Environmental and Natural Resources Office
DENR	Department of Environment and Natural Resources
DEWATS	Decentralized Wastewater Treatment System
DILG	Department of the Interior and Local Government
DOH	Department of Health
DPWH	Department of Public Works and Highways
EMB	Environmental Management Bureau
EOHO	Environmental and Occupational Health Office
ESSO	Environmental and Social Services Office
FHSIS	Field Health Service Information System
GDP	Gross Domestic Product
GOCC	Government Owned and Controlled Corporation
HUC	Highly Urbanized City
IRR	Implementing Rules and Regulations
JICA	Japan International Agency for Cooperation
JMP	Joint Monitoring Programme for Water and Sanitation
KPI	Key Performance Indicators
LGU	Local Government Unit
LWUA	Local Water Utilities Administration
MCWD	Metro Cebu Water District
MDG	Millennium Development Goals
MLD	Million liters per day
MWCI	Manila Water Company Inc.
MWSI	Maynilad Water Services Inc.
MWSS	Metropolitan Waterworks and Sewerage System
NAWASA	National Waterworks and Sewerage Authority
NEDA	National Economic Development Authority
NGO	Non-Governmental Organization
NRW	Non Revenue Water
NSSMP	National Sewerage and Septage Management Program
NWRMO	National Water Resources Management Office
PD	Presidential Decree
P	Philippine Peso
RA	Republic Act
USAID	United States Agency for International Development
WD	Water District
WQMA	Water Quality Management Area
WSP	Water and Sanitation Program

EXECUTIVE SUMMARY

Sector Performance Overview

- 1. This Philippines Country Study forms part of the East Asia and the Pacific Region Urban Sanitation Review** that focuses on three of the emerging middle income countries of East Asia: Indonesia, Philippines and Vietnam. The regional review aims to develop a strategic framework to help guide national urban sanitation programs and their implementation in these emerging middle income countries. This country study contributed to the regional review by providing important information on sector operations in the Philippines.
- 2. The development of urban sanitation in the Philippines needs to be considered in the context of the different situations in Metro Manila and the other parts of the country.** In Metro Manila, the Water Crisis Act of 1995 saw the privatization of the Metropolitan Waterworks and Sewerage System (MWSS) whereby two private firms – Manila Water Company Inc. (MWCI) and Maynilad Water Services Inc. (MWSI) – were awarded concessions to manage the water supply and wastewater systems until 2037. In the early years of privatization, little progress was made on sanitation. However, through the adoption of a more affordable strategy utilizing combined systems and storm overflow interceptors, the concessionaires are accelerating coverage and are currently targeting full coverage by the end of the concession period. In parallel, the concessionaires are pursuing a septage management program, as the strategy involves maintaining the use of existing septic tanks.
- 3. Outside Metro Manila, aside from the City of Baguio and a few special locations (Boracay, Clark, Subic), there are no sewerage systems in any of the urban centers.** With 84 percent of urban households discharging wastewater to septic tanks, in most cities the primary sanitation service providers are unregulated private sector septic tank de-sludging services. There are only a few formal septage management services operated by either Local Governments Units (LGUs) or Water Districts. The overall country coverage for sewerage is only about 4 percent. This is despite the economic losses of poor sanitation being estimated to be around 1.5 percent of GDP.¹

¹ Water and Sanitation Program (WSP), August 2011. The Economic Returns of Sanitation Interventions in the Philippines.

4. **The Clean Water Act enacted in 2004 was intended to address the issues of wastewater and septage management.** This resulted in the preparation in 2010 of the National Sewerage and Septage Management Program (NSSMP), which is now in the early stages of implementation. However, urban sanitation services in the Philippines are not adequate and the following issues have to be addressed:
- Only 4 percent of wastewater is treated resulting in pollution of waterways and sub-soils.
 - While 84 percent of the urban population discharges wastewater to septic tanks, only about 10 percent of the septage is treated, most of which is in Metro Manila.
 - About 3 percent of the urban population defecates in the open.
 - At the national level, sector responsibilities are fragmented which has not allowed effective implementation of sanitation policies. However, recently, the Department of Public Works and Highways (DPWH) has been assigned as the lead agency to co-ordinate activities with other agencies which has raised expectations that the sector performance will improve.
 - Governance arrangements for sanitation at the local level are not well developed, except in Metro Manila where an effective regulatory system is in place. Local governments and Water Districts have not demonstrated significant interest in financing and managing the sector and also lack appropriate resources.
 - The financing for the sector is inadequate. The investment costs are estimated to be US\$250 on a per capita basis but financing for such level of investments is not in place. Furthermore, the operations for wastewater services are not recovered through tariffs.

Key Drivers and Barriers to Sanitation in Philippines

5. **There are several key drivers for and barriers to the provision of effective sanitation in the Philippines.** These were identified through a consultative process during the preparation of this study. Drivers include: (a) citizen interest in reducing pollution of water bodies; (b) legislation requiring agencies to take action; (c) contractual requirements between the local government and service provider to improve services; (d) presence of technical assistance to prepare viable interventions; (e) presence of local ‘champions’ for sanitation; and (f) viable business opportunities in providing sanitation services. Barriers include: (a) lack of regulation and enforcement of prescribed penalties; (b) lack of institutional arrangements for providing finance to the sector; (c) lack of community awareness of the impact of inadequate sewerage and septage management systems; (d) limited human resource capacity and skills in sanitation; and (e) fragmentation of the institutional arrangements for the sector.

Sector Analysis

6. **The government has shown commitment to improved sanitation** through initiatives such as the Clean Water Act, the NSSMP and the current proposal to establish a Water and Sanitation Board under the proposed National Water Resources Management Office (NWRMO). However, the governance, financial, technical and human resource challenges are immense. The report considers what is needed in each of these categories to address the issues that are constraining development of the sector.

Social

7. **Greater awareness is needed, and civil society can play a role.** While there is widespread acknowledgment by the sector agencies that awareness within the community of the impact of poor sanitation needs to be increased, this has not been effectively addressed. The continuing *Mandamus*² issued by the Supreme Court on the cleanliness of Manila Bay is an example of concerned citizens demanding better services that could be adopted by other urban centers. Another modality by which awareness can be raised is through advocacy by city development groups, such as the private sector, civil society, and academia. These groups could take a role in measuring the performance of a city in providing basic services against agreed benchmarks and also inform the city governments to improve urban services such as sanitation. The Department of Health's Field Health Service Information System (FHSIS) in 2007 reported that diarrheal diseases are the second leading cause of morbidity among all ages and the third leading cause of mortality among the children under the age of five.³ However, such information is not widely available. Education and health agencies, tourism departments, municipalities, and regulatory agencies can also play an important role in raising awareness on the importance of proper sanitation which in turn will create increased demand from citizens to have clean water bodies in urban areas and manage human waste in an effective manner.

Institutional

8. **Current sector fragmentation needs to be addressed.** Since the passage of the Local Government Code in 1991, the local governments have had a clear responsibility for the provision of sanitation facilities within its jurisdiction, but few local governments or Water Districts have implemented sewerage or effective septage management schemes. At the national government and policy level, the sector has become fragmented resulting in weak incentives for the local governments to meet their responsibilities with regard to sanitation. The current policy approach to provision of urban sanitation attempts to address this fragmentation and has, as its basis, the 2004 Clean Water Act which remains the driving piece of

² A Mandamus is a judicial remedy from a court to public authorities to carry out specific functions that are required by law.

³ USAID, April 2011, Water and Sanitation Sector Assessment for the Philippines.

legislation to improve urban sanitation countrywide. Measures being considered in the reform process to address the sector fragmentation include nominating a single lead agency for urban sanitation (DPWH), establishing a single regulator for the sector (under the proposed NWRMO), considering amalgamation of the many service providers, emphasizing the water quality management area (WQMA) approach utilizing river basins, and improving centralized monitoring of sector performance. However, these approaches are all in the very early stages of either consideration or implementation and much work remains to be done.

- 9. The development of a professional approach to the implementation and management of sewerage and sanitation programs is needed.** Currently, the only professional large-scale service providers for sanitation in the Philippines are the concessionaires in Metro Manila. Most Water Districts and local governments do not have the institutional strength to professionally plan, implement, and manage sewerage systems, although some are managing septage management programs. With the exception of Metro Manila, the number of wastewater management interventions has been limited in the country which in turn has not promoted the professionalization of the sector for efficient service delivery. In addition, training opportunities are limited. The proposed NSSMP Office within the DPWH has recently received the responsibility to strengthen the sector but the office is not yet fully staffed. There is also a need to make Water Districts accountable for meeting their commitments to sanitation development through the establishment of Key Performance Indicators (KPIs) and targets. This review and experience from other countries suggest that sewerage systems are best managed in conjunction with water supply systems where a single operator is responsible for both water and sanitation services.

Technical

- 10. City Sanitation Planning needs to be undertaken which should include the concerns of the poor.** The delivery of sanitation services is localized in an urban area; hence, a city is likely to be the basic planning unit. There will be variations in population density, need for improved sanitation, topography, and income levels that may dictate different approaches. To account for these differences and to make sanitation improvements specific to an area, City Sanitation Plans need to be prepared. These City Sanitation Plans should take into account a range of technical, financial and social factors when proposing appropriate cost-effective interventions. It would be particularly important to take into consideration the concerns of the poor. The poor often live in low-lying areas where water bodies are polluted and they may not have the financial means to pay for the entire investment and operational costs for service delivery. Thus, in developing the City Sanitation Plans, the financial arrangements should be such that they would take into account affordability considerations of the poor with respect to paying for the services.
- 11. A cost-effective path for sanitation and sewerage should be developed.** The experience in Metro Manila is that significant improvement in coverage cannot be achieved using a conventional, separate sewerage approach as this is not

affordable within the range of tariffs that consumers are willing to pay. The approach now being adopted by the concessionaires in Metro Manila is a staged approach initially utilizing existing septic tanks discharging to combined sewers from where the combined sewage is intercepted and treated prior to discharge to major water bodies. This precludes the need for a connection fee, but requires an overall environmental charge to be levied on all households to cover the cost of wastewater and septage management. The system can be upgraded to a separate system as affordability improves. This way wastewater from both high and low income areas is collected and treated. Apart from Metro Manila, this staged approach of wastewater management has been followed in other East Asian cities and this experience can be replicated in the major urban areas of the Philippines.

- 12. Regarding septage management, septic tanks will continue to be the most prevalent means of sanitation in Philippine urban centers for many years to come.** Hence, there is the need to accelerate septage management programs across the country to ensure that septic tanks operate efficiently and septage is disposed of safely. Promising starts for effective septage management programs have commenced in Metro Manila and several cities (Dumaguete, Baliwag, San Fernando) in the regions. However, viability of operations depends on the septage collection and treatment service being utilized widely and therefore local governments need to pass ordinances requiring regular septic tank emptying, proper disposal of septage and retrofitting of poorly designed or constructed tanks. Innovative solutions for re-use of treated sludge will also make the program more attractive to local governments and Water Districts.

Financial

- 13. An overall financing structure needs to be in place for the development of infrastructure and sustainable services for all, including the poor.** Based on the experience in Metro Manila, it is estimated that the capital cost of improving the infrastructure would be at least US\$250 on a per capita basis. This expenditure is substantial and it would be difficult to entirely recover this cost through tariffs. Government financing has been provided in other countries in the world that have developed wastewater management infrastructure. Such a scheme is also being considered in the Philippines through the NSSMP where the government plans to provide 40 percent subsidy for capital costs. However, the demand for such government support so far has been limited as the service providers still have to come up with the remaining financing. Similarly, for operating costs, it is difficult for service providers to meet full costs through tariffs. For instance, in Metro Manila, the wastewater operation is subsidized through water tariffs. Tariff policies should be in place that would aim to recover operational costs through tariffs which in turn will help to improve the sustainability of the services. At the same time, the concerns of the poor have to be addressed. If the poor cannot afford the tariffs, financial assistance should be provided to them. These issues of financing capital and operating expenditures and assistance to the poor should be covered through an overall financial framework that would establish priorities and provide public financial support as needed.

14. Institutional structures should support sustainable financing and services to the poor. Apart from the lack of financing, the institutional arrangements to support viable financing schemes were also presented as barriers for sector development. The Local Water Utilities Administration (LWUA) is intended to be the financing agency but its support to the Water Districts has been limited; and financing from the other banks (commercial and government owned) also has been limited given the lack of a regulatory system and the low levels of cost recovery from the sanitation business. Given that large amounts of public resources would be needed for the investments, proper institutional arrangements at the central government level need to be in place to establish priorities and transfer resources on a timely basis for investments. At the same time, at the local level, regulatory systems should also be in place to support cost recovery of operations from tariffs.

Recommendations

15. This is a summary of the recommendations that emerged during the preparation of this paper. These recommendations aim to promote clean and healthy urban areas through improved sanitation services, including better septage and wastewater management.

A. Social

Key issue: While some community awareness on the environmental impact of poor sanitation has been demonstrated for Manila Bay and several specific locations, there is still a need to increase demand for improved sanitation service delivery.

Recommendations:

- Central and local government authorities to promote public awareness on sanitation.
- Engage civil society to inform and encourage citizens to seek improved services from LGUs and Water Districts.

B. Institutional

Key issues: Governance arrangements for sanitation at all levels are fragmented and not well developed. The sector is not regulated outside Metro Manila and there is no clear approach for managing sanitation systems at local government level.

Recommendations:

- The government to develop the institutional structure necessary to successfully implement the NSSMP.
- Hold LGUs more accountable for delivery of sanitation services and at the same time provide them with the necessary institutional and financial support. The option of having a single utility providing both water and sanitation services should be considered.

C. Technical

Key issue: Only a small percent of urban wastewater and septage is treated. Although 96 percent of urban households have access to a toilet, only 4 percent of wastewater is treated resulting in pollution of waterways and sub-soils. And, while 84 percent of the urban population discharges wastewater to septic tanks, only about 10 percent of the septage is treated, most of which is in Metro Manila. Furthermore, about 3 percent of the urban population defecate in the open.

Recommendations:

- LGUs to prepare and implement City Sanitation Plans. These plans would establish priorities within a city and determine cost effective viable solutions for all socio-economic groups within the city, taking into account the technical and financial considerations.

D. Financial

Key issue: Significant increase in financing is needed to provide improved wastewater and septage services to the urban population. The per capita cost is estimated to be at least US\$250 per capita. In addition, there are operating costs that are not recovered today and tariffs would have to be adjusted so that the operating costs are covered. Furthermore, assistance to the poor has to be considered as part of the financial planning for the sector.

Recommendations:

- National government should develop a sanitation investment framework.
- LGUs to prepare financing proposals for sanitation programs based on approved City Sanitation Plan, including cost recovery tariff policies.
- Provide financial support to the poor, as designed in City Sanitation Plans.

1. Overview of Sector Performance

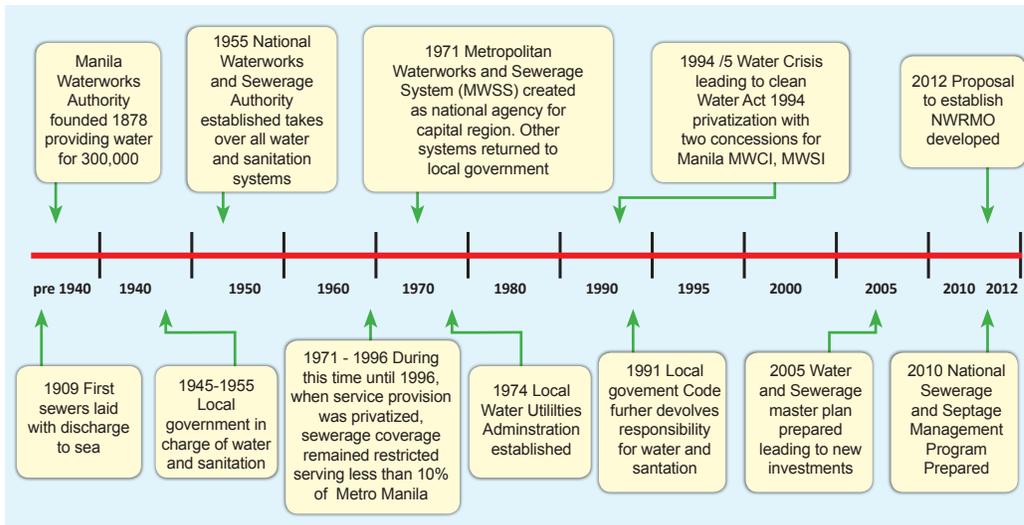
1.1. Context

1. **The Philippines Country Study forms part of the East Asia and the Pacific Region Urban Sanitation Review that focuses on three of the emerging middle income countries of the region:** Indonesia, Philippines and Vietnam. The regional review presents a strategic framework to help guide national urban sanitation programs and their implementation in these emerging middle income countries. The regional review takes a broad view of the urban sanitation sector that captures the important interdependence of the political economy, social, public policy, technical, financial and institutional aspects of expanding coverage for all, including the poor, in a way that is affordable and sustainable. The Philippines Country Report was prepared to provide inputs for the regional review and the report was prepared through consultations with government agencies, service providers, and donors. In addition, case studies for some urban areas were prepared to see how sanitation operations are carried out in the Philippines and a consultative workshop was held on February 19, 2013 in Manila. The findings of the Philippines Country Study are briefly presented below which complements the findings of the regional report that has been published separately.

1.2. History of Urban Sanitation Development in the Philippines

2. **Urban sanitation development in the Philippines needs to be considered from two levels: that of development in Metro Manila and that of the remainder of the country.** Whereas over the past ten years progress has been made in improving coverage of sewerage and sanitation in Metro Manila, it is only in the recent past that steps have been taken towards developing a more effective strategy to improve sanitation in the urban sector outside Metro Manila. The institutional arrangements in Metro Manila are clear for service improvements and the progress has been steady; however, attention needs to be paid to the areas outside Metro Manila as improvements on institutional, regulatory, and financial areas are needed to meet the plans of the government to improve sanitation. A timeline for the history of the development of the sanitation sector is shown in Figure 1.1 below and some key sector indicators are presented in Annex 7.

Figure 1.1: Timeline for Sanitation Development in the Philippines



- 3. Metro Manila has had a piped water system since 1878 and a sewerage system since the early 1900s.** The Manila Waterworks Authority was founded in 1878 when the first water system (known as the *Carriedo* system since funds were donated by the Spanish philanthropist Francisco Carriedo y Peredo) was installed. This system served around 300,000 people and water production was about 19 million liters per day (MLD). By the year 1909, the system became known as Manila Water Supply System and was expanded with the construction of the Wawa Dam, which increased the production to 92 MLD. At around the same time, a sewerage system was constructed in Manila City that discharged via an outfall into Manila Bay. This system is still operational although it has been upgraded in various stages over the years. In 1919, the name of the system was changed to Metropolitan Water District. By the year 1938, the system was serving around 900,000 people and the water production capacity increased to around 200 MLD. After the country received its independence in 1946 and until 1955, the local authorities were responsible for the management and operation of water supply and sanitation systems. In 1955, the National Waterworks and Sewerage Authority (NAWASA) was founded and it took over the operation and management of the water supply and sanitation systems in the country, including Metro Manila. This situation continued until 1971 when the Metropolitan Waterworks and Sewerage System was created as a national agency. The MWSS was tasked to control all waterworks and sewerage systems in the National Capital Region, the entire province of Rizal, and part of the province of Cavite. During this time until 1996, when service provision was privatized, sewerage coverage remained restricted to the original Manila system, the Magallanes system serving the Makati commercial and high end residential area, and a few small, decentralized systems in Quezon City.
- 4. Water supply and sanitation service provision in Metro Manila was privatized in 1996.** In 1995 the Water Crisis Act was passed, providing the legal framework for the privatization of the MWSS. Private participation was implemented through a concession contract in which two concessionaires -Manila Water Company,

Inc. and Maynilad Water Services, Inc. - were assigned the task of operating and managing the facilities, whereas MWSS preserved the ownership of the infrastructure. MWSI was assigned to operate the West Zone with 16 cities/municipalities serving currently around 7.2 million people⁴ and MWCI the East Zone with 23 cities/municipalities serving around 6.2 million people⁵ (Table 1.1). The companies were regulated by a newly created MWSS Regulatory Office.

- 5. By the end of the Concession in 2037, both concessionaires propose to provide 100 percent sewerage coverage throughout their service area.** A Sewerage and Sanitation Master Plan for the Metro Manila area, prepared in 2005, developed a strategy that proposed to provide sewerage coverage through combined systems using existing drains and collection by interceptors directing sewage to treatment facilities.⁶ This requires an ongoing septage management program in combination with sewerage development. The concessionaires were given ambitious targets for sewerage coverage and both concessionaires have agreed to provide 100 percent wastewater management coverage in their service area by the year 2037, supported through a rate rebasing exercise.⁷ Annex 1 provides details of the current status of sanitation service delivery in Metro Manila.

Table 1.1: Metro Manila Concessionaire Performance

	MWSI	MWCI
Population served	7.2 million	6.2 million
Water Connections	955,234	857,981
Sewerage Connections	75,414	99,206
Population Covered (2012)	545,000	800,000
Sewerage Coverage (2012)	6%	13%
Projected Sewerage Coverage (2037)	100%	100%
WWTP Capacity (2012)	468 MLD	128
Projected WWTP Capacity (2022)	661 MLD	1,000 MLD
Sewage Treated (2012)	200 MLD	128 MLD
Septic tanks de-sludged/year	53,000	54,000

- 6. Outside Metro Manila, sewerage coverage continues to be extremely limited.** Until 1955, operation of water supply and sanitation systems was the responsibility of the local authorities. However, sewerage coverage was virtually non-existent with the only sewerage system outside Metro Manila being a limited system in Baguio City. In 1955, with the establishment of NAWASA, responsibility for urban water supply and sanitation was passed to the national government, but in 1971 with the formation of MWSS, municipal water supply and sanitation systems outside Metro Manila⁸ were transferred back to the LGUs. Most of these systems were in poor condition and the responsible LGUs faced difficulty

⁴ The service area includes a current population of 9.2 million people of which about 7.2 million are served by MWSI.

⁵ The original concession was intended to cover only the 16 cities and 1 municipality comprising Metro Manila, but has been expanded to include additional cities and municipalities in Rizal and Cavite.

⁶ Sewerage and Sanitation Master Plan for Metro Manila, MWSS, SKM – November 2005.

⁷ Rate rebasing is a process performed every five years which serves as a basis for reviewing the Concessionaires' performance as well as determining the new business plans that the companies will need to undertake. The exercises also ensures that notwithstanding the changes in the economic and operating assumptions, the companies will be able to recover all of their expenditure, plus the guaranteed rate of return. As such, this exercise serves as one of the major drivers of tariff adjustment under the Concession Agreement.

⁸ There are about 1,500 cities and towns outside Metro Manila.

in improving or expanding water supply and sanitation coverage. There were effectively no sewerage systems outside Metro Manila at this time, and the septage management programs implemented were basic with limited regulatory oversight for the private companies that collected the septage.

7. **The concept of forming local Water Districts responsible for urban water supply and sanitation outside Metro Manila was introduced in 1973 under the Provincial Water Utilities Act (Presidential Decree [PD] 198).** PD 198 also allowed for the creation of the LWUA as a specialized lending institution to provide financing and technical assistance in the development of the local Water Districts. LWUA has to date formed a total of 860 Water Districts of which only 502 are presently operational. These Water Districts have a total served population of about 17.6 million through 3.1 million water supply service connections. In terms of sanitation, no Water District is currently operating a sewerage system. Two Water Districts (Dumaguete and Bayawan) are in partnership with the local government for the management and operation of a septage treatment plant and the Baliwag Water District is currently constructing its own septage treatment plant.
8. **Responsibilities became more decentralized under the framework of the Local Government Code of 1991 with barangays, municipalities, provinces and cities being required to finance, operate, and maintain their own water supply and sanitation systems.**⁹ During the 1990s, the National Economic Development Authority (NEDA) Board passed several resolutions on the sector, including NEDA Board Resolution No. 5 that stated that LGUs shall primarily be the implementers of sanitation and sewerage programs with the national government providing assistance to develop their capacities in certain areas. During this period until the passing of the Clean Water Act in 2004, little progress was made in sanitation outside Metro Manila.
9. **In 2004, the Clean Water Act (Republic Act [RA] 9275) was enacted and its Implementing Rules and Regulations (IRR) prepared in 2005.** This together with the Code of Sanitation of the Philippines (PD 856) and its IRRs of 1995 and 2004 provide the regulatory framework for sewerage and septage management programs. The Clean Water Act included the provision to prepare a National Sewerage and Septage Management Program led by the Department of Public Works and Highways. Both LWUA and MWSS have traditionally been attached agencies of DPWH, except for a short period in the late 2000s when LWUA was transferred firstly to Department of Finance and later to Department of Health, but has now been transferred back to DPWH, thereby giving DPWH the lead role in managing the sector.
10. **The sanitation sector has been in a state of transition over the past decade.** However, landmark legislation — such as the Local Government Code and the Clean Water Act — and associated implementation activities, such as the NSSMP, will lead to sustainable solutions. DPWH is recognized as the leading sector agency, which is appropriate given its role in NSSMP and its oversight role over LWUA and MWSS. The Department of Health (DOH) continues its key role in regulation of septage service providers in the regions, in setting of standards,

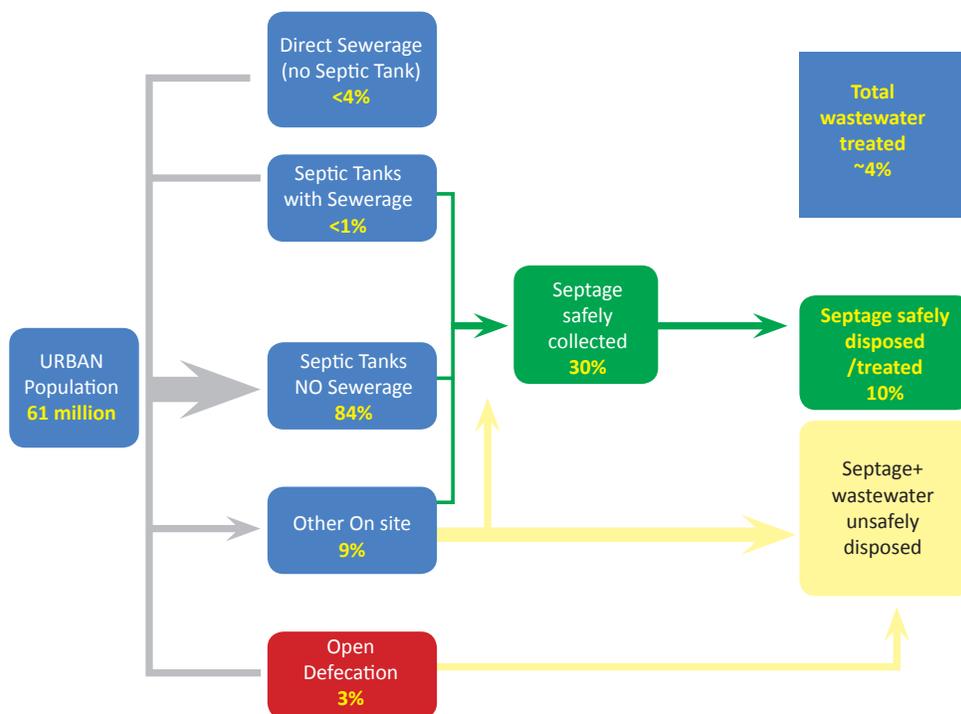
⁹ Section 17, Local Government Code.

and rural sanitation and hygiene awareness with the Department of Interior and Local Government (DILG) responsible for developing training toolkits and capacity building of LGUs. Local governments continue to take responsibility for sanitation within their jurisdiction which is delegated to Water Districts as appropriate.

1.3. Description of Sector Performance

11. While access to sanitation facilities is high, wastewater and septage are largely not treated. Wastewater and the septage that are generated from the urban toilets are largely not treated leading to environmental and health concerns. Only about 4 percent of the wastewater in the country is treated and it is estimated that about 10 percent of the septage is properly treated and disposed (Figure 1.2). Most of the wastewater and septage that is treated is due to the activities in Metro Manila. Outside Metro Manila, medium sized sanitation facilities exist in Baguio (see Annex 2), Boracay, and the Clark and Subic Special Economic Zones. Partial sewerage systems were developed in Zamboanga and Cababatuan with collection systems serving part of the town center but there are no treatment facilities in these cities. Furthermore, 3 percent of the urban population defecates in the open due to lack of proper facilities. Elimination of open defecation has to be a priority activity to improve sanitation practices. Sector performance depends on a variety of factors. A brief summary of the status of the sector is presented below in the context of the following factors: social, institutional, technical and financial. These factors are analyzed further in Chapter 2 and recommendations are provided in Chapter 3.

Figure 1.2: Wastewater and septage flow in urban Philippines



Source: East Asia and the Pacific Region Urban Sanitation Review, World Bank 2012.

Social

- 12. Lack of awareness of the population of the need for sanitation systems is commonly cited as the major reason for lack of progress in increasing coverage of sanitation and sewerage across the Philippines.** During discussions – with government, service providers, donors, and civil society - for the preparation of this study a universal opinion emerged that the population is not fully aware of the benefits of sanitation. Citizens want to transfer the wastewater away from their homes but the need and the cost to convey and treat the waste are not well known. Furthermore, there is an apparent lack of understanding among the general population about the linkage between poor sanitation and disease. This translates into limited actions by the LGUs to improve sanitation in their jurisdictions due to their perception that citizens will not be willing to pay the real costs for effective wastewater collection and treatment. The DOH's FHSIS in 2007 reported that diarrheal diseases are the second leading cause of morbidity among all ages and the third leading cause of mortality among the children under the age of five. Such information should be made more publicly available to raise the awareness on the linkages between inadequate sanitation and poor health. There is need for hygiene awareness programs, with a concerted, long term effort, that often begins with community and school-based outreach and social marketing programs that focus on household hygiene while building a constituency for improvements in community sanitation.
- 13. While health has generally not been a driver in the community for improved sanitation, pollution of water bodies has in some instances resulted in some action being taken.** The most dramatic example of this has been the continuing *Mandamus* affirmed by the Supreme Court in 2008 requiring the responsible agencies to take action to improve the water quality of Manila Bay (Box 1.1). While this action was brought about by a group of concerned citizens, it does set a precedent for similar action to be taken in other parts of the Philippines. Another example is Boracay, where in the mid-1990s this well-known tourism destination experienced a severe decline in tourism brought about by the degradation of water supply and sanitation conditions which included severe water shortages, degradation of groundwater (pollution and saline intrusion) and improper wastewater disposal. The impact of this degradation on the Island's economy was made especially clear following reports of high levels of fecal coliform in near-shore waters. In response, the government with assistance from the Japan International Agency for Cooperation (JICA) implemented the Boracay Environmental Project which significantly improved water and sanitation infrastructure. An evaluation undertaken several years later recorded significant positive health and social impacts, which includes an almost complete elimination of acute gastroenteritis; expanded tourism revenues; and substantial increases in production and marketing of vegetables, fruits, plants, and seafood.

Box 1.1: Manila Bay Mandamus

A Mandamus is a judicial remedy from a court to public authorities to carry out specific functions that are required by law. The Manila Bay Mandamus case commenced in 1999 in the Regional Court in Imus, Cavite; however, it was not finally resolved until 2008 when the Supreme Court made a judgement on the basis of the Environment Code (PD1152) that agencies responsible for the pollution of Manila Bay – including the Department of Environment and Natural Resources, the Department of the Interior and Local Government (through its mandate over LGUs), the Metropolitan Waterworks and Sewerage System, the Local Water Utilities Administration, the Department of Agriculture, the Philippine Coast Guard, the Philippine Ports Authority, the Metro Manila Development Authority, the Department of Public Works and Highways, the Department of Health and the Department of Budget and Management – have a mandate to take specific actions related to cleaning Manila Bay. Therefore, the Supreme Court determined that the agencies can be compelled by Mandamus to clean up Manila Bay. The various agencies that are subject to the Mandamus are required to submit reports to the Manila Bay Coordinating Office of the Department of Environment and Natural Resources, which then produces a consolidated report to the Committee that is responsible to the Supreme Court. The agencies are monitored against an Operational Plan for Manila Bay Coastal Strategy that was prepared in 2005 and includes a 20 year plan with specific actions and performance indicators.

Institutional

- 14. Philippine laws and policies governing the water and sanitation sector have evolved over time.** The major responsibilities for providing sewerage and sanitation were defined with the creation of MWSS in 1971 and LWUA and the Water Districts under PD 198 in 1973. MWSS became responsible for water supply and sewerage in Metro Manila cities and municipalities and LWUA was responsible for large cities and municipalities with a population of 20,000 or more outside of Metro Manila. A major change in the water supply and sanitation sector came with the passage in 1991 of Republic Act No. 7160 known as the Local Government Code. The provision of water supply and sanitation services became the responsibility of LGUs from planning, implementation, monitoring, and evaluation of services. The LGUs also became responsible for financing water supply and sanitation projects which was new to them and for which they did not have the capacity to implement. While LWUA was able to provide technical, institutional and financial support to Water Districts, the emphasis was on water supply rather than sanitation.
- 15. In 2004, the Clean Water Act (RA 9275) was enacted.** This Act, together with the associated regulations, provides the regulatory framework for sewerage and septage management programs. The Clean Water Act included the provision to prepare an NSSMP led by the Department of Public Works and Highways. The NSSMP was prepared in 2010¹⁰ and sets short and long term targets for sewerage

¹⁰ AECOM, SuSEA, Water and Sanitation Program, Asian Development Bank (ADB). November 2010. National Sewerage and Septage Management Program (NSSMP).

and septage management provision in urban areas outside Metro Manila. These targets are:

- by 2020, all LGUs have developed septage management systems and the 17 highly urbanized cities (HUCs) have developed sewerage systems;
- by 2020, approximately 43.6 million people have access to septage treatment facilities and about 3.2 million will have access to sewage treatment facilities;
- by 2020, P (Philippine Peso) 26.3 billion has been invested in sanitation improvement projects; and
- by 2020, about 346 million kilograms of Biological Oxygen Demand (BOD) is diverted from the environment per year as a result of the sewerage and septage management projects.

16. The most recent proposed reform in the sector is the establishment of a National Water Resources Management Office that will manage and regulate the country's water resources for domestic water supply, sanitation, irrigation, hydropower, fisheries, aquaculture, flood control, navigation and recreation. It is proposed that the NWRMO will be under the Office of the President and it will include a Water and Sanitation Commission that will perform regulation of water supply, sanitation and sewerage service providers. Currently the Executive Order to create the NWRMO and the Act to create the Water and Sanitation Commission are in progress, although the establishment of the office will require legislation that may take several years.

17. The laws and policies governing sanitation and sewerage in the Philippines are based on separate provisions contained in several legislations and policy pronouncements. The National Plumbing Code provides guidelines, criteria and standards for the design and construction of sanitation and sewerage facilities. The Sanitation Code of 1975 provides guidelines on excreta disposal and drainage, sewerage collection and disposal. Presidential Decree 1121 that created the National Environmental Protection Council stated that polluters are responsible to contain, remove, and clean up certain pollution incidents. The Clean Water Act prescribes penalties for owners of treatment facilities (including LGUs) that do not meet agreed discharge standards for point source pollution; but there are no penalties for an LGU or Water District for non-point source pollution resulting from a failure to provide any sewerage system.

18. There is an overall lack of reliable sanitation-related information. Coverage, sector performance and cost figures are not regularly updated, definitions are not standardized and available statistics often conflict preventing proper allocation of resources and planning for the sector. This reflects the absence of a sector monitoring system at national and local levels and also indicates the need to invest in information management so that sector performance can be systematically benchmarked.

19. There are many institutions involved at the national level. The key functions of the various agencies are listed below:

- **NEDA** coordinates the preparation of national development plans and investment programs, formulating sector policies and strategies and monitoring implementation of policies, programs and projects including those on sanitation.¹¹ The NEDA, through its Water Resources sub-committee, sets policies for the sector and has overall responsibility for direction on the National Sewerage and Septage Management Program.
- **DPWH** is responsible for implementation of the National Sewerage and Septage Management Program and oversees both MWSS and LWUA, which are attached agencies. The Environmental and Social Services Office (ESSO) of DPWH has been designated as the department to program and manage the NSSMP. Effectively, due its oversight role, DPWH is now the lead agency for the urban sanitation sector.
- **The Environmental Management Bureau (EMB)** of the Department of Environment and Natural Resources (DENR) regulates effluent standards for wastewater quality which is critical to controlling pollution of groundwater and surface water sources. The EMB-DENR Regional Offices are responsible for designating Water Quality Management Areas under the Clean Water Act and the development of Action Plans for the WQMAs including addressing pollution from domestic sources. The EMB-DENR Regional Offices also provide advocacy to Water Districts, LGUs, industries and other stakeholders to take action to reduce water pollution of water bodies within the WQMA. EMB-DENR, through the Manila Bay Coordinating Office, is also the lead agency in the implementation of the Operational Plan for the Manila Bay Coastal Strategy that includes reduction of domestic pollution entering Manila Bay.
- **DILG**, through its Water Supply and Sanitation Unit, provides capacity building programs for LGUs in preparing local sanitation plans, providing information on available sector programs, and facilitating access to financing for sanitation projects. In its role of overseeing LGUs, DILG monitors the performance of LGUs in providing basic services, including sanitation. DILG is currently providing capacity building for LGUs to develop sanitation master plans which will be a pre-requisite for the development of sewerage systems. DILG also provides advocacy for LGUs to address sanitation and has developed a water supply and sanitation toolbox to assist LGUs in their development programs.
- **DOH**, through its Environmental and Occupational Health Office (EOHO), develops plans, policies, programs and strategies to manage health hazards and risks associated with environmental and work related factors. DOH is responsible for implementation of the Sanitation Code (together with the LGUs), the issuance of standards and guidelines for environmental health, and for the development and implementation of hygiene awareness programs through its regional offices. DOH is the key agency for the implementation of the National Sustainable Sanitation Road Map and takes the lead in rural

¹¹ NEDA. 2011. Philippines Development Plan 2011-2016.

sanitation activities. DOH also provides training programs in sanitation for the LGU health agencies, in particular for the Sanitary Inspectors.

- **The LWUA** is mandated under its charter to provide funds for sewerage and sanitation to Water Districts. LWUA also provides technical assistance to Water Districts and is responsible for regulating their activities. However, no Water District is currently operating a sewerage system, although some are now becoming involved in septage management.
- **Water Districts and LGUs** are also potentially service providers of sewerage and sanitation in their jurisdictions, but to date they have not generally realized their mandates. Only Baguio City operates a reasonably substantial sewerage system. LGUs have the mandate to provide sanitation services to residents within their jurisdiction but they do not yet have the financial and technical capacity to provide a wide range of sanitation services. Potentially, the private sector can also be service providers but aside from MWSI and MWCI there are few private sanitation service operators in the country that can provide wastewater management services, although there are many private companies offering de-sludging services.
- **MWSS** has signed concession agreements to ensure sanitation services in Metro Manila. The east and the west areas of Metro Manila are served by MWCI and MWSI, respectively. These private companies have signed concession agreements with MWSS. The Regulatory Office of MWSS regulates the performance of both concessionaires and undertakes a rate rebasing process every 5 years to adjust tariffs in accordance with concessionaire performance and water supply, sewerage and sanitation targets.
- **The Housing and Land Use Regulatory Board and National Housing Authority** provide standards and regulations for the development of housing settlements that include protection of the environment including the provision of wastewater systems and treatment and disposal of human waste.

Technical

20. The predominant sanitation technology in urban Philippines is the septic tank.

According to the 2010 JMP¹² report, 84 percent of urban households discharge wastewater to a septic tank. In Metro Manila alone, there are an estimated two million plus septic tanks. While the Sanitation Code, National Plumbing Code and local Government Building Codes provide standards for design, construction and effluent standards for septic tanks, these are often not enforced with the outcome that many septic tanks are poorly designed and constructed and are ineffective in providing minimal treatment. This is compounded by the fact that owners do not usually regularly de-sludge their septic tanks. It is reported in Manila that at least 20 percent of septic tanks are inaccessible¹³ and owners are reluctant to bear the

¹² WHO (World Health Organization) and UNICEF (United Nations' Children's Fund) Joint Monitoring Programme for water supply and sanitation.

¹³ Sewerage and Sanitation Master Plan, MWSS/World Bank, 2005.

cost of accessing them for de-sludging. Septic tank effluent typically overflows to open combined drains. Many septic tanks are in direct contact with groundwater and leak due to inadequate construction. In Metro Manila and a few cities, de-sludging services are offered by the utility, local government or Water District, but septage treatment facilities are few outside Metro Manila. Usually de-sludging services are offered by private companies and sludge is disposed to local water bodies or solid waste land fills.¹⁴

- 21. In Metro Manila, the original sewerage targets of the concessionaires were ambitious.** This was based on conventional sewerage comprising separate systems and centralized treatment plants that had been proposed by a series of Wastewater Master Plans produced since the 1960s. As the concessions progressed through a series of rate rebasing processes, it became clear that these targets were not feasible given the impact it would have on tariffs and the willingness and ability to pay of the population of Metro Manila. A Master Plan prepared in 2005¹⁵ proposed a staged approach with the initial stage comprising a combined system allowing the septic tank effluent to continue to drain into the local drainage system from where it is intercepted and directed to decentralized wastewater treatment plants spread across ten major catchments. New developments could continue to be provided with separated sewerage, but for the vast majority of areas, the combined system approach utilizing existing septic tanks provides a more affordable solution that will allow for 100 percent coverage of wastewater services by the revised end of the concessions in 2037. Septage management programs will need to be retained to complement the combined systems and the drainage system needs to be rehabilitated¹⁶ to accommodate the combined flows.
- 22. Outside Metro Manila, sewerage systems exist only in Baguio, Clark and Subic Export Zones and in Boracay (Table 1.2).** All these systems use conventional sewerage systems and activated sludge treatment plants. These facilities are reported to produce an acceptable effluent, although the quality at Baguio at times is impacted by overloading. Septage treatment plants have been constructed in Dumaguete, Bayawan, San Fernando and Baliwag. Aside from Baliwag, lower technology solutions utilizing lagoons have been utilized as sufficient land is available. In Baliwag, a mix of mechanized and non-mechanized technology was adopted utilizing screens with a belt press and activated sludge treatment. Facilities at San Fernando and Baliwag are not yet operational, so no evaluation can be made on their performance.
- 23. Existing wastewater installations operate well.** The general impression from visiting a range of installations — from centralized sewerage in Manila and Baguio to septage treatment facilities in Dumaguete and Bayawan and DEWATS in Dumaguete — was that operation was generally good, the systems were being

¹⁴ Department of the Interior and Local Government, USAID. 2007. Septage Management in the Philippines, Current Practices and Lessons Learned.

¹⁵ The Sewerage and Sanitation Master Plan is once again being updated in 2012/2013 with support from the World Bank.

¹⁶ Local drainage in Metro Manila is the responsibility of the local governments, with DPWH being responsible for major floodways. The effectiveness of the combined systems therefore depends on appropriate coordination between the concessionaires and the local governments.

Table 1.2: Details of operational and planned wastewater facilities in the Philippines

Type of Facility	Location	Status
Sewerage Systems		
Operational	Metro Manila (MWSI and MWCI; although sewerage coverage is low, the two concessionaires are collecting the wastewater through combined sewers before the wastewater is discharged to water bodies)	MWCI 13% sewerage coverage; treatment capacity 128 MLD MWSI 6% sewerage coverage; treatment capacity 468 MLD
	Baguio	40% city coverage, 8,000 connections. Plans to upgrade WWTP.
	Boracay	50% sewerage coverage, treatment capacity 6.5 MLD
	Clark Special Economic Zone (Clark Water Corp.) Subic Bay Metropolitan Authority (Subic Water and Sewerage Co.)	Clark: 50% coverage, treatment capacity 13MLD Eight wastewater treatment plants; 64% coverage of Freeport Zone
Feasibility Studies Prepared	General Santos, Davao, Dagupan, Calamba, Cotabato, Roxas and Cagayan de Oro	Prepared in 1992-94. However, investments did not proceed due to financial viability issues
Septage Management Programs		
Operational	Metro Manila (Dagat-Dagatan, San Mateo, Taguig (FTI), Pinugay)	MWSI (450m ³ /day); MWCI (600 m ³ /day)
	Dumaguete	Treatment capacity 80m ³ /day
	Bayawan	Treated in leachate treatment plant at solid waste landfill
	Alabel	Treatment capacity 80m ³ /day
Under Construction	San Fernando (La Union)	Treatment Capacity 30 m ³ /day
	Baliwag	Treatment Capacity 120 m ³ /day
Funding Approved ^[1]	Metro Naga, Laguna, Cagayan de Oro	
Feasibility Studies Prepared ^[2]	Cabantuan, Metro Cebu, San Pablo City, Bacolod City, Kalibo, Roxas, Iloilo, Mabalacat, San Jose del Monte, Haganoy, Laguna, General Santos, Isabela Basilan, Metro Kidapawan, Zamboanga City, Tagum	
Operational Decentralized Wastewater Treatment Systems (DEWATS)^[3]		
Public Markets	Dumaguete, Calamba, Manjuyod, El Nido, Sorsogon, Sta Ana,	
Slaughterhouses	Ilioilo, Laguna, Sta Cruz, San Fernando (La Union), Buang, Zamboguita, Zamboanga	
Housing Estates	Calbayog, San Fernando (La Union), Quezon City (4 locations), Quezon Province (7 locations), Lipa	

Source: Information based on discussions as well as: United States Agency for International Development (USAID), Philippines Sanitation Alliance, Final Report; information from Philippines Water Revolving Fund Program; and Philippines Sanitation Alliance, Final Report.

Notes: ^[1] Based on information from USAID, Philippines Sanitation Alliance, Final Report; ^[2] Based on information from Philippines Water Revolving Fund Program; and ^[3] From Philippines Sanitation Alliance, Final Report.

utilized, and that treated effluent was of acceptable standards. This was verified by effluent results from the Bayawan¹⁷ and Baguio¹⁸ facilities, and reported results in Dumaguete.¹⁹ Each of these systems is operated by the LGU and the staff managing and operating the systems appeared to have high degree of ownership in the development process and pride in the installations.

- 24. Until recently there has been limited development of community based sanitation projects or decentralized treatment systems for local government facilities such as public markets and slaughterhouses.** Through the advocacy of donors, some decentralized systems have started to be constructed in areas such as San Fernando and Bauang in La Union, Dumaguete and Bayawan where the local governments have been concerned with pollution of the environment from their public enterprises and from new housing estates. These decentralized systems usually comprise an anaerobic baffle reactor with a wetland for polishing the effluent. However, it is a fairly intensive process to motivate the local governments to take on the responsibilities of constructing and operating sanitation facilities. Furthermore, the decentralized systems provide localized solutions and if city-wide approaches are being sought, centralized systems should be considered due to reasons of economies of scale.

Financial

- 25. Of the P 16 billion allocated to water supply and sanitation during 2001 to 2007, only 3 percent was for sanitation.** This is despite the high economic losses projected due to poor sanitation. The annual national expenditure on water supply and sanitation projects from 2001 to June 2007 is shown in Table 1.3 below. Out of the P 3.7 billion spent by the national government on water supply and sanitation, about P 1.9 billion was spent through the Municipal Development Fund. For the government-owned and controlled corporations (GOCC) expenditure, LWUA received only about P 1.1 billion from the national government, but it was able to fund investments of around P 11.2 billion as it borrowed funds and used internally generated cash. Unfortunately, information on national expenditure for the sanitation sector is not systematically available beyond 2007, indicating the need to have an overall financial plan and a monitoring system for the sector.

¹⁷ For Bayawan Treatment Plant, average influent BOD (Sept-Oct 2006) was 139.5 mg/L and average effluent BOD (Sept-Oct 2006) was 3.84 mg/L. June 27, 2007 spot check – influent BOD was 95.4 mg/L and effluent BOD was 3.4 mg/L (USC Water Laboratory, Cebu).

¹⁸ For Baguio between 2010 and 2011, influent BOD ranged between 163 mg/L and 648 mg/L while the effluent standard is 30 mg/L BOD (City of Baguio Upgrading Program Report).

¹⁹ Public Market Treatment Plant at Dumaguete is reported to receive an influent ranging from 400-800 mg/L BOD and produce an effluent ranging from 10-58 mg/L (Local Initiatives for Affordable Wastewater Treatment Project).

Table 1.3: Annual national expenditures on water supply and sanitation projects
(2001 – June 2007, in Million P)

Source	2001	2002	2003	2004	2005	2006	2007 (6 mo.)	Total
Nat. Govt.	735	995	343	68	263	715	606	3728
MDF	732	946	200	20	0	0	0	1898
GOCCs	3725	2081	1202	0	1714	1054	2488	12266
MWSS	821	203	7		6	8	8	1054
LWUA	2904	1877	1195		1708	1046	2480	11211
Total	4460	3077	1546	68	1977	1769	3095	15995

Source: Department of Budget and Management and WSP, May 2010.

- 26. In Metro Manila, the two water service concessionaires have invested more than P 2 Billion on sanitation and sewerage upgrades up to 2011** and are committed to spend increased amounts to meet the revised sewerage and sanitation targets. These improvements are taking place in Metro Manila because the public regulatory agency, MWSS, has incorporated performance standards into each concession contract and allowed the concessionaires to recoup investments through the rates charged for water and sanitation services. In the past, the tariff policy adopted for sanitation and sewerage was to charge a 10 percent environmental fee on top of the water tariff for all consumers, irrespective of whether or not they had access to a sewerage system and a 50 percent surcharge for those with sewerage connections. However, this proved a disincentive for people to connect to the sewerage system when it became available. Furthermore, the current development strategy being adopted by both concessionaires is to implement a combined sewerage approach, where rain water and wastewater are intercepted and treated. Under this system, direct connections are not required as wastewater through septic tanks of households is conveyed to the combined sewer system. The tariff structure has, therefore, been modified to a 20 percent surcharge on top of the water bill for all households, irrespective of whether or not they have a sewer connection. However, the cost recovery through tariffs is not adequate to cover the capital and operating expenditures related to wastewater and septage management. As these two private concessionaires do not receive funds from the national government, the sanitation operation is thus cross-subsidized by water.
- 27. Outside Metro Manila, there are few urban sewerage or septage management schemes operating to provide a guideline on charging for sanitation operations.** The Baguio LGU is charging those connected to the sewerage system P 35/month which is about P 1/m³ of sewage based on the average water consumption. The service is heavily subsidized by the LGU which has revenue from the sewerage system of P 4 million against expenditures of P 18 million. For a septage management service, the Dumaguete LGU/Water District charges P 2/m³ of water consumed which seems to be adequate to run operations in a sustainable manner.

2. Sector Performance Analysis

28. Progress is constrained by several barriers that need to be overcome if the sector is to successfully meet not only the Millennium Development Goals (MDGs), but result in sustainable services for wastewater and septage management. Effective and efficiently managed sanitation infrastructure will lead to improved health, reduce economic losses and produce an improved environment for the urban population. This section looks in greater depth at the performance of the sector, continuing with the focus on social, institutional, technical and financial aspects. Key issues are examined and solutions identified to guide the path forward on further development of the sector.

2.1. Social

Issues

29. Awareness on the costs of inadequate sanitation is low which has resulted in limited progress on septage and wastewater management. Insufficient awareness of the benefits within the community of improved sanitation is usually cited as the primary reason for limited progress on urban sanitation facilities outside Metro Manila. Despite the almost universal response regarding lack of awareness, there does not appear to have been a concerted awareness campaign to address the situation. The resources of national government departments to undertake awareness campaigns have been limited. At the local government level, the City Health Offices and the City Environmental and Natural Resources Offices (CENROs) also lack resources and institutional capacity to lead a comprehensive public awareness program that would lead to change. Local government information and tourism offices also are potential participants in awareness campaigns. However, these local agencies lack human resource capacities and often skills to undertake these roles and need support to develop their capacity in these aspects.

30. Limited focus is given by environmental NGOs to addressing urban sanitation. Most NGOs that are focused on the environment are more likely to be found working in the rural sanitation sector focusing on on-site facilities and the issues related to septage and wastewater management are not largely discussed. Some NGOs have addressed sanitation for specific housing settlements in Metro Manila and other cities, but not on a city wide basis. There are some private organizations that have marketed decentralized treatment facilities but their impact remains small-scale and awareness creation is not a major focus. The outcomes of the decentralized systems to improve sanitation management in a cost-effective way and the difficulties in scaling up these systems would be important lessons for the country. However, there appears to be a lack of effective dissemination of knowledge and learning from the experiences gained.

Path Forward

- 31. Creating awareness or demand for sanitation can stimulate change.** It requires a comprehensive understanding of the political economy of sanitation and a range of approaches directed towards different stakeholders in the sector such as local legislators, executives, the private sector and the community. Approaches can include providing a selection of rewards and sanctions, an affordable mix of technologies and a long term strategy of engagement and promotion. A campaign to raise awareness and understanding amongst stakeholders was done successfully for air pollution in Metro Manila and a similar awareness program could be replicated for sanitation. The air pollution campaign became effective because statistics on the morbidity of air pollution was widely available when the health of the population was being affected (coughs, sore throats, and respiratory problems). Benefits of improving the air quality had a direct impact on ordinary people, demonstrating the importance of providing information on the impact of poor sanitation to drive change.
- 32. Awareness can be raised through advocacy by city development groups.** An example is the newly formed private sector/civil society/academe group Mega Cebu that could take a role in measuring and improving the performance of a city in providing basic services against agreed benchmarks and creating pressure on city governments to improve services such as sanitation. Metro Cebu, the second largest urban agglomeration in the country, has not addressed sanitation in a significant way. Despite the willingness of the Metro Cebu Water District (MCWD) to implement a septage management program, out of the eight LGUs comprising MCWD, only one has been able to pass an ordinance requiring citizens to de-sludge septic tanks which is a prerequisite for an effective septage management program. Similarly, in Metro Manila, the two concessionaires have started public awareness campaigns on the importance of better sanitation practices and such campaigns could be replicated elsewhere.
- 33. In each of the locations visited during this study where sanitation improvements had been made or were in progress, pollution of groundwater or coastal waters was the main driver for the local government to act.** Both in Baliwag and San Fernando (Annexes 3 and 4, respectively) concerns had been expressed by the community regarding pollution of groundwater sources encouraging the Water District and local governments to develop septage management programs. In Dumaguete (Box 2.1 and Annex 5), concerns were expressed by the community about the coastal water quality along the shoreline adjoining Rizal Boulevard, a popular recreational location for tourists and residents, prompting the local government to implement a septage management program and construct a treatment plant to treat waste from the city market. In Bayawan (Annex 6), the city government wanted to improve the foreshore and undertook a program to upgrade informal settlements. In the new housing complex provided, a treatment facility was required to meet environmental regulations and prevent pollution of the coastal waters. This was complemented by a city wide septage management

program. These examples indicate that a community informed about the benefits of sanitation can work effectively with committed local governments to improve sanitation practices.

Box 2.1: Drivers for Sanitation Program in Dumaguete

In Dumaguete, public demand for better sanitation services has been voiced by residents and NGOs active in the area for several years. It could have been borne out of a discontinued pastime of residents in the locality – swimming along the coast of Rizal Boulevard. It was also compounded by the fact that locals who undertook their fishing livelihood in the area were also negatively affected. Prompted by this situation, environmental studies were conducted which indicated that the coastal waters of Dumaguete showed an extremely high coliform count, especially along Rizal Boulevard, making the area unfit for water sports or fishing. The observation was aggravated by additional findings that about 10 outfalls discharge untreated wastewaters from residences and the city’s business district. Furthermore, there was concern that not all septic tanks in the city were performing well (the city has an estimated 20,000 tanks) and leaks from the tanks could contaminate the groundwater. In consideration of all of the above, the LGU included sanitation as one of its priority areas for urban development. In this undertaking, city officials and stakeholders developed strategic interventions based on a participatory planning process. Consequently, they worked together in identifying their local priority projects including a septage management system and treatment facilities for the city market.



2.2. Institutional

Issues

34. The sanitation sector is fragmented, with multiple agencies involved on policy and project implementation matters. This includes local governments who under the Local Government Code are responsible for water and sanitation programs in areas under their jurisdiction. Furthermore, there are over 2,000 service providers primarily for water, including the Water Districts, LGU managed systems, private sector managed systems, cooperatives, Rural Water Supply Associations, Barangay Water Supply Associations, and a range of other community managed systems.²⁰ At the national government level, a number of agencies have some responsibility

²⁰ USAID, April 2011. Water and Sanitation Sector Assessment for the Philippines.

for sanitation. Some of the key central government agencies are: DPWH for urban sewerage, DOH for rural and on-site sanitation and setting of standards, DENR for water quality monitoring, and DILG for capacity building at the LGU level. However, until recently, a lead agency was not assigned to co-ordinate activities across the sector which contributed to the institutional fragmentation. Recently, DPWH has been assigned to take the lead in sector activities which raises expectations that the issue of institutional fragmentation will be addressed.

- 35. Institutional capacity in the agencies responsible for the urban sanitation sector at all levels is limited and is a key constraint to further development of the sector.** DPWH, which is now effectively designated to take the lead in implementing NSSMP, does not have the necessary staff to implement the sewerage and septage programs. The Environmental and Social Safeguards Office of DPWH, which is designated as the office that will implement NSSMP, would need considerable strengthening and technical assistance to effectively undertake this role. The EOHO of the Department of Health, the lead agency for implementing the Strategic Sanitation Road Map²¹ and for all sanitation activities except sewerage systems, has a staff of five people and a limited budget. Similarly, the Water and Sanitation Project Management Office of DILG, responsible for capacity building and advocacy activities for sanitation with the LGUs has a staff complement of about six. At the Regional and District levels, DPWH and DILG have limited expertise on wastewater management and the sanitation activities of the Regional DOH are limited to primarily rural sanitation. Similarly, at the LGU level, generally the city planning and engineering offices do not have sanitation expertise. One exception is the Metro Manila area, where the sanitation services are being handled by trained professionals hired by the two concessionaires.
- 36. Regulation of service providers outside Manila is ineffective.** While there has been considerable legislation passed over the years relating to the water and sanitation sector, penalties for not complying with the legislation are unclear and enforcement has generally been weak. Although LGUs and Water Districts have responsibilities for providing sewerage and septage management systems, no penalty is defined for these entities if there is non-point source pollution in receiving waters due to lack of wastewater and septage management systems. Outside Metro Manila, the Water Districts and LGUs do not have to meet any coverage targets for sanitation and there are no sanctions for failing to comply with the mandate to provide sanitation. LWUA is a *de facto* regulator of the Water Districts but it has limited capacity to regulate sanitation services. Where LGUs are the service providers, DILG could be expected to act as the regulator, but this does not happen in practice. In contrast, the regulatory structure in Metro Manila has been effective in steadily improving sanitation practices in the city.

²¹ Republic of the Philippines, Department of Health. April 2010. Philippine Sustainable Sanitation Roadmap.

37. While the Sanitation and Building Codes provide requirements for septic tank design and construction, there tends to be low compliance and enforcement of these regulations. However, the DOH Centers for Health Development (CHD) that are located in each province have been mandated, in the updated Implementing Rules and Regulations of the Sanitation Code, to regulate septage haulers and treatment facilities with regard to collection, treatment and disposal of domestic sludge. In LGUs where septage management programs are now being established such as in Baliwag and Dumaguete, new ordinances are being enacted by the city governments with regard to septic tank requirements, mandatory de-sludging of septic tanks, and requirements to retrofit poorly designed tanks. However vigilant monitoring and stricter enforcement are required for the ordinances to be effective.

Path Forward

38. The two most influential pieces of legislation that have been drivers for the sanitation sector have been the Water Crisis Act which enabled the privatization of MWSS and the Clean Water Act. To date, sanitation and sewerage issues have not emerged as a high priority in most local governments. However, the Clean Water Act has paved the way for the National Sewerage and Septage Management Program that has the potential to accelerate the development of urban sanitation. The Clean Water Act was a significant driver because it defined specific actions to be undertaken by agencies and provided a timeline for these actions. The Act addressed pollution of water bodies which was a concern for citizens, but recognized that domestic wastewater was a significant contributor to this pollution and proposed measures that would serve to control discharges of domestic wastewater to rivers and streams. Although the timeline in meeting the proposed actions of the Clean Water Act have not been adhered to, there is broad support to implement the specified actions. Effective implementation of the Clean Water Act will lead to sustainable solutions for the sector.

39. There is currently an ongoing water sector reform process with the proposed establishment of a National Water Resources Management Office. The proposed NWRMO, under the Office of the President, is intended to integrate and coordinate national policies and plans for managing the country's water resources and create a policy and regulatory environment to improve services for all sub-sectors under water, including water supply and sanitation. In addition, the proposed Water Sector Reform Act is focused on amalgamation of the many water and sanitation service providers and on private sector participation in the sector. These two initiatives – establishment and operations of NWRMO and amalgamation of service providers – may also have a significant impact on the efficiency of service delivery and the way the sanitation sector is managed.

- 40. A common factor in the development of sanitation facilities in all of the case studies was the presence of a ‘champion’ in the LGU or Water District,** usually the Mayor, City Planning Officer, City Engineer or Water District General Manager who has an interest in the topic of sanitation and is proactive in seeking sustainable solutions. At the national government level, the current sector reform process and the implementation of the NSSMP is being driven by the commitment being shown by the leadership in the government responsible for the sector. While ‘champions’ are critical to create the support and funding for sanitation interventions in an environment when sanitation is not always a priority, it is also important to develop appropriate institutional capacity to sustain and implement the reforms. This highlights the need for institutions that can plan for and sustain improvements in sanitation.
- 41. It is more efficient to manage both water supply and sanitation within the one utility.** This has been the approach in Metro Manila and is the approach taken in many other cities in the world. Making a single utility responsible for both water and sanitation has helped to pursue the plans in Metro Manila to increase sanitation coverage and service. The primary benefit of this approach has been that the water and sanitation business are considered together by the same utility that has a common set of consumers. Furthermore, there are economies of scale in terms of managing the systems with one management group overseeing both water supply and sanitation. The billing system is also common and the wastewater and septage management service charges are collected along with the water bill.

2.3. Technical

Issues

- 42. Septage and Wastewater are not collected and treated properly.** As mentioned earlier, while most urban citizens have access to improved sanitation facilities, the human waste that is generated is not systematically collected and treated. The primary focus of sanitation improvement should be to develop cost-effective solutions where the wastewater and septage are collected and treated. Septic tanks will be in place in most areas in the foreseeable future and ways to improve their performance should be considered. This would include proper construction of the tanks where the solids and liquids are separated, that discharge from the tanks does not pollute the groundwater, that the tanks are regularly cleaned, and that the collected septage is treated.²² Similarly for wastewater, the discharge of untreated wastewater has to be controlled through appropriate collection and treatment.

²² Department of Health. June 2008. Operations Manual on the Rules and Regulations Governing Domestic Sludge and Septage

43. With the combined sewerage systems, organic waste concentration reaching the treatment facilities is low. Although the number of wastewater treatment plants is limited in the country, the treatment plants that are in operation indicate that the wastewater is normally diluted if combined systems were used to transfer the wastewater. The dilution is due to the leaks in the sewers which allow infiltration of groundwater and also since the sewers are combined in nature where wastewater is mixed with storm water during the wet season. Furthermore, the wastewater that enters the sewer systems normally passes before through septic tanks where some reduction of organic load takes place. This factor (low level of organic waste in a unit volume of water) should be taken into account to design for the treatment of wastewater as the volume of organic waste to be reduced would be limited. The combined systems and the septic tanks are expected to be in place for some time, but groundwater infiltration has to be reduced. Otherwise, groundwater that infiltrates the sewers would add to the pumping costs and create the need for a larger infrastructure.

Path Forward

44. The technical lessons learned in Metro Manila can be replicated elsewhere in the country. The 2005 Sewerage and Sanitation Master Plan in Metro Manila proposed an affordable approach to providing sewerage using combined systems that convey septic tank effluent and stormwater to wastewater treatment plants. Septage management systems would still need to be employed under this scenario as the septic tanks would remain part of the system. Over time, the systems could be converted to separate systems as affordability and willingness to pay increased. Both MWCI and MWSI now propose 100 percent sewerage coverage by the end of the concession in 2037, using the existing combined systems and some separated systems. The concessionaires are also constructing interceptors to collect the wastewater before it is discharged to water bodies. There is also a plan in place to gradually increase the treatment of the collected wastewater.

45. One key consideration for determining which locations to prioritize for sewerage development may be those that have been designated by DENR as WQMAs. The designation of WQMAs based on physical boundaries (river basins/catchments) is a key requirement of the Clean Water Act. Six WQMAs have been designated, and an additional 28 will be developed by 2014. Once designated, a WQMA Governing Board is established that includes relevant national and local government representatives and develops a ten-year action plan to improve water quality in the WQMA. An example of this is the Marilao-Meycautaun-Obando river system described in Box 2.2. Selecting cities that are part of designated WQMAs for sewerage development will provide a more structured and planned approach integrated with the Clean Water Act. With a WQMA, the need for inter-LGU planning and collaboration becomes relevant especially when a common or shared water resource such as a river, lake or coastal water body becomes vulnerable to pollution.

Box 2.2: Water Quality Management Areas

A key initiative of the Clean Water Act is the designation of Water Quality Management Areas. One of the first WQMAs was the Marilao-Meycauatan-Obando River System. This river system, which drains into Manila Bay, is incorporated in seven LGUs in Metro Manila and Bulacan provinces including the cities of Caloocan, Valenzuela, San Jose del Monte and Meycauatan. Baseline surveys prior to the designation of the WQMA showed that over 70 percent of the BOD loading of this river system resulted from domestic wastewater, although many industries in particular tanneries and metal plating factories also discharge wastes into the rivers. The river banks are also home to large numbers of informal settlers without adequate sanitation facilities. The WQMA Board through the EMB-DENR of Region 3 has prepared a ten-year Action Plan to improve water quality in the river system with a projected expenditure of P 10.2 billion to construct wastewater collection and treatment facilities, septage management programs, stormwater management programs, control of industrial discharges, water quality monitoring, and relocation of informal settlers. EMB-DENR has been conducting comprehensive awareness campaigns with LGUs, Water Districts, industries, and the community regarding the Action Plan. Integrating sewerage and septage management assistance under NSSMP with the implementation of the WQMA Action Plans would seem to be an efficient means by which to meet the objectives of the Clean Water Act.

- 46. The impact of the environment in driving sanitation development is demonstrated in most of the case studies outlined in the Annexes to this report.** From the case studies in Baliwag (Bulacan) and San Fernando (La Union) – (Annexes 3 and 4, respectively), it was the risk of pollution of the groundwater drinking supplies that led to the decision to develop septage treatment facilities. In Dumaguete and Bayawan (Annexes 5 and 6, respectively), pollution of the coastal waters, which are potential tourist and recreational locations, convinced local authorities to take action to reduce pollution caused by domestic wastewater effluent. In Baguio, a popular tourist destination and summer capital, a sewerage system was initially developed to maintain the environment which was the key attraction for visitors. In Boracay, a premier tourist destination in the country, reported pollution of the coastal waters created a momentum to improve wastewater management in the city.
- 47. Sanitation interventions need to be holistic at the city level. The environmental externalities of improved sanitation are large.** Untreated wastewater or indiscriminate discharge of septage can affect all citizens within a city boundary. Thus, local authorities should seek city-wide solutions to improve sanitation which would include the elimination of water borne-disease and improving the quality of life of people that often live in the vicinity of polluted waterways. The needs of the entire city should be considered and priority actions should be determined with a focus to improve the environment and reduce health risks. In seeking city-wide solutions, the issues mentioned above – septic tank and septage management; and wastewater collection and treatment – have to be addressed. City Sanitation Plans should be developed as a starting point for urban areas that would take into account institutional, financial, technical, and social considerations. This type of work has been carried out in Metro Manila through the Master Planning process and it should be replicated elsewhere in other cities.

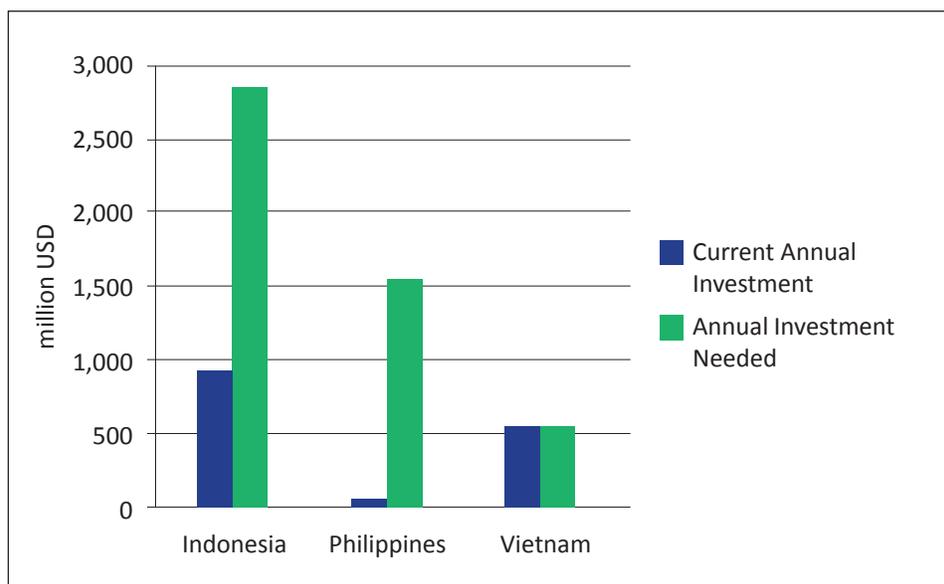
2.4. Financial

Issues

48. Investment expenditures in sanitation have been limited compared to the needs.

Under the regulatory regime of MWSS, the two concessionaires in Metro Manila in the recent years have made steady progress in improving sanitation through improved septage and wastewater management. The regulatory arrangement also allows the two concessionaires to recover the costs, although the costs are being recovered through the water tariffs in the form of cross-subsidy. However, at the national level (including the interventions in Metro Manila) the expenditures on sanitation have been around US\$60 million on an annual basis. However, it is estimated that expenditures of around US\$1.5²³ billion on an annual basis (until 2025) are needed to serve the urban population. Figure 2.1 illustrates the gap between the actual expenditures and needs in the Philippines, Vietnam, and Indonesia.

Figure 2.1: Comparison of annual expenditures in sanitation against the needs



²³ Annual investment needs are estimated using a per capita cost of US\$250, based on experience in Metro Manila which includes costs of sewers and treatment of wastewater and septage. Currently, the urban population in the country is 60.7 million. The national urban population that has to be served will be about 92.2 million by 2025.

- 49. Low willingness to pay by the community can also affect operations.** The experience in Dumaguete, Baliwag, San Fernando and Bayawan shows that fees for septage collection and treatment can be sufficient to cover costs. However, it is difficult to cover the costs of operating sewers and treatment plants through tariffs. In other countries, where advanced wastewater management systems are in place, the operational cost for wastewater services is almost as expensive as that for water. Unless the wastewater and septage tariffs cover operating costs, the issue of viability of operations arises. Furthermore, it becomes difficult for service providers to seek financing when the tariffs are not sufficient to cover the operational costs.
- 50. For the poor, the impact of inadequate sanitation is large.** About 13 percent of the urban population in the Philippines is poor and they often live in informal settlements where sanitary conditions are not optimal. Untreated septage or wastewater is often found near the areas where the poor live, although the human waste may have been generated in other parts of the town. In addition, about 3 percent of the urban population - mainly the poor - still defecates in the open. The ability for the poor to pay for improved services is also low which further adds to the challenge. These concerns of the poor have to be taken into account in the City Sanitation Plans where viable services for an entire city should be considered.²⁴

Path Forward

- 51. National sanitation investment framework needed.** As mentioned above, the actual annual investment expenditures are low compared to the sectoral needs. Financial support from the government would be needed for the Philippines to improve urban sanitation. However, at the same time, the financial support from the government should be fiscally affordable and targeted towards priority investments. The NSSMP already outlines a policy that the investment subsidy would be 40 percent. However, the demand for such grants has not been high since it has been difficult for the local governments to raise the remaining financing. In this context, the grant financing policy needs to be reviewed, taking into account that in other countries where sanitation services are advanced the grants provided for investments financed a larger portion of the costs. The Government of the Philippines recognizes that such a financing framework is needed and recently under the leadership of NEDA, a framework is being developed with technical assistance from the Bank.

²⁴ Water and Sanitation Program (WSP), September 2012. Delivering Sanitation to the Poor: A Scoping Study.

- 52. City Sanitation Plans should have viable financial plans.** While investments may be financially supported by the central government, operations should be covered through tariffs. The dependence on operating subsidies from the local government is not effective in promoting efficient operations and at the same time the fluctuations in the subsidies may affect the level of service. Thus, there should be a plan to phase out operating subsidies which should be reflected in the City Sanitation Plans. Furthermore, cost effective sanitation solutions should be pursued which would result in economical operating costs. In addition, combining the water and sanitation business should be considered – as in Metro Manila – since the services are closely connected. In fact, the Clean Water Act stipulates that in urban areas where waterworks are operational, the water service provider (Water District or LGU) shall be responsible for the sewerage facilities; this requirement of the Act should be implemented to promote financial viability of the utilities.
- 53. Services to the poor have to be incorporated in the City Sanitation Plans.** The City Sanitation Plans should address the concerns of the poor including: (a) elimination of open defecation by the construction of public toilets where a fee could be charged for the maintenance of the facility; and (b) financial support for households to connect to the wastewater network. Micro-credits, grants, vouchers etc. could be used to support such an initiative; and (c) improvement of sanitation facilities in informal settlements. Sanitary conditions are often worse in the informal settlements as urban density is high and human waste is not properly managed. For these areas, public toilets and infrastructure to transfer the wastewater should be considered.

3. Recommendations

54. A summary of recommendations is provided below. These recommendations are based on the findings during the site visits and the review of the sanitation sector in the country. The over-arching goal of the recommendations is to improve sanitation practices to reduce health risks and create a better environment for the urban population of the Philippines.

Social

Key Issue: While some community awareness on the environmental impact of poor sanitation has been demonstrated for Manila Bay and several specific locations, there is still a need to increase demand for improved sanitation service delivery.

Recommendations: Social

- Central and local government authorities to promote public awareness on sanitation. This would include: (a) reviewing and improving systems for collection and dissemination of information on sanitation coverage, health, and environmental impacts; and (b) undertaking programs to publicize information on water quality.
- Engage civil society to inform and encourage citizens to seek improved services from LGUs and Water Districts. Civil society can inform and encourage citizens to seek improved services from LGUs and Water Districts.

Institutional

Key issue: Governance arrangements for sanitation at all levels are fragmented and not well developed. The sector is not regulated outside Metro Manila and there is no clear approach for managing sanitation systems at local government level.

Recommendations: Institutional

- The government to develop the institutional structure necessary to successfully implement the NSSMP. This will include: the establishment of a cadre of sanitation specialists within the DPWH NSSMP office; building of capacity and financing to prepare the required sewerage and septage management plans; selection of pilot NSSMP locations based on WQMAs; and taking action to strengthen training capacity for sanitation professionals of all disciplines.
- Hold LGUs more accountable for delivery of sanitation services. This will be achieved by identifying the service provider, establishing targets and regulating the providers of the services. The option of having a single utility providing both water and sanitation services should be considered.

Technical

Key issues: Only a small percent of urban wastewater and septage is treated. Although 96 percent of urban households have access to a toilet, only 4 percent of wastewater is treated resulting in pollution of waterways and sub-soils. While 84 percent of the urban population discharges wastewater to septic tanks, only about 10 percent of the septage is treated, most of which is in Metro Manila. Furthermore, about 3 percent of the urban population defecate in the open.

Recommendations: Technical

- LGUs to prepare and implement City Sanitation Plans. These will include least-cost options for the collection and treatment of wastewater and septage in a prioritized manner within a city. The City Sanitation Plans should: outline least-cost methods to collect and treat wastewater and septage, develop a septic tank management program so that they are constructed properly and regularly de-sludged, define a regulatory system with specific targets so that the performance of service providers can be assessed, and present a plan on how the concerns of the poor should be addressed.

Financial

Key issues: The cost is large (at least US\$250 per capita) to provide improve wastewater and septage services to the urban population. An overall financing framework for investments is needed given the large amounts of public resources required to make the improvements in urban sanitation. Operating costs for wastewater management are not covered. User fees will need to be adjusted so that costs are recovered to ensure viability of operations. The poor often do not receive quality service and the financing plan should cover their needs to eliminate open defecation, connect to the sewerage network, and make improvements in sanitation facilities.

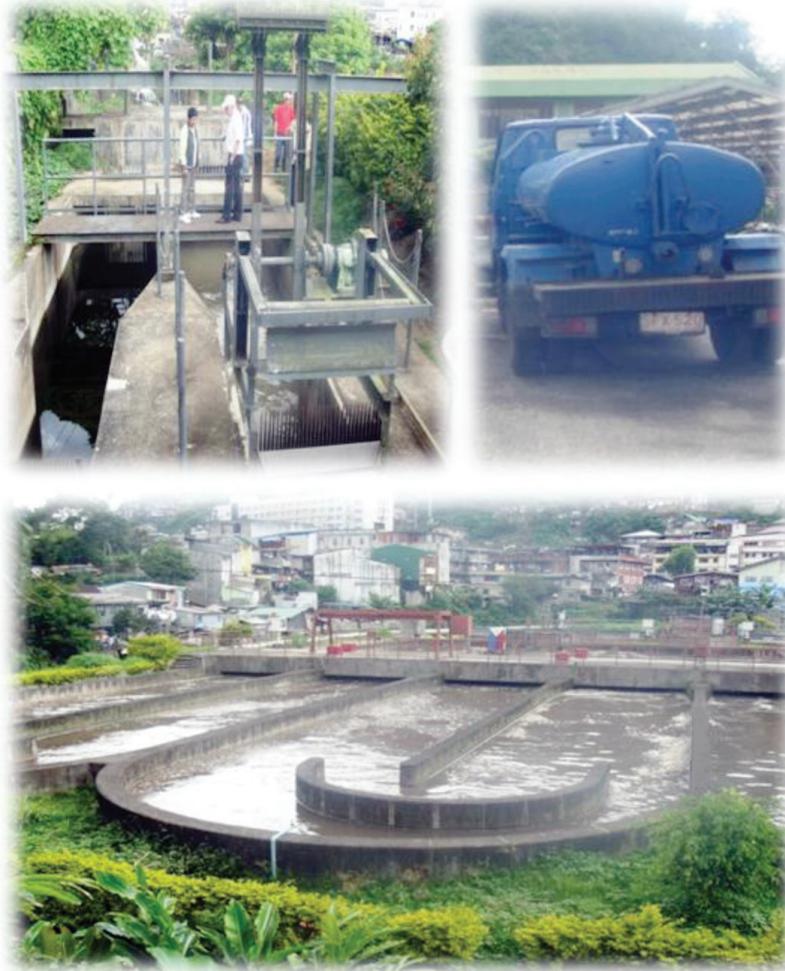
Recommendations: Financial

- National government should develop a sanitation investment framework.
- LGUs to prepare financing proposals for sanitation programs based on approved City Sanitation Plan, including cost recovery tariff policies.
- Provide financial support to the poor, as designed in City Sanitation Plans.

ANNEXES

Six case studies

Between June 18 and July 28, 2012, field visits were carried out in six urban areas to have a better understanding of the sanitation operations in the Philippines. Key findings from the field visits are summarized in the annexes that follow. The urban areas that were visited were: Metro Manila, Baguio, Baliwag, San Fernando, Dumaguete, and Bayawan. Key sector indicators at the national level are also presented (Annex 7).



Annex 1

Metro Manila Sewerage and Sanitation

1. Development of Sewerage and Sanitation in Metro Manila

The first sewerage system was constructed in Metro Manila as early as 1906. The Central Sewerage System covering parts of Manila City flows to Tondo pumping station where it receives primary treatment before discharge to Manila Bay through a sea outfall. This system was managed by the Metropolitan Water District until 1955, then the National Waterworks and Sewerage Authority until the creation of the Metropolitan Waterworks and Sewerage System in 1971. From 1971 until 1996, when service provision was privatized, sewerage coverage remained restricted to the original Manila system, the Magallanes system serving the commercial area and some residential areas in Makati and a few decentralized systems in Quezon City.

In 1995, the Water Crisis Act was passed, providing the legal framework for the privatization of MWSS. Private participation was implemented through a concession contract, in which two concessionaires, Manila Water Company Inc (MWCI) and Maynilad Water Services Inc (MWSI) were assigned the task of operating and managing the facilities, whereas MWSS preserved the ownership of the infrastructure. MWSI was assigned to operate the West Zone with 16 cities/municipalities serving around 7.2 million people; and MWCI was assigned the East Zone with 23 cities/municipalities serving around 6.2 million people.

A Regulatory Office was formed in MWSS that regulated the two concessionaires. The two concession contracts have now been extended to 2037 when both MWCI and MWSI are expected to serve 100 percent of the population in their coverage area. A Supreme Court ruling, which imposed an ongoing Mandamus (Box 1.1 in the main report) for the protection of the water quality of Manila Bay, has provided additional incentive for the two concessionaires to address sewerage and sanitation coverage.

After MWSS was created in 1971, a number of master plans had been prepared in order to address the sewerage and sanitation requirements of Metro Manila. However, none of these master plans were fully implemented due to mostly financial, social and institutional constraints. The delay in sewerage and sanitation development contributed to the environmental degradation of the water bodies in Metro Manila, including Manila Bay. In 2005, a Sewerage and Sanitation Master Plan developed a strategy that proposed to provide sewerage coverage through combined systems utilizing existing drains and collection by interceptors directing sewage to treatment facilities. This strategy requires an ongoing septage management program in combination with sewerage development. This strategy was accepted by the concessionaires and subsequent projects have focused on intercepting and treating wastewater before it is discharged to the water bodies and collecting and treating septage from septic tanks.

MWSI sewerage coverage is now 6 percent, targeted to increase to 28 percent by 2017, 66 percent by 2027 and 100 percent by 2037. Currently MWSI operates five treatment plants with a capacity of 468 MLD, although an additional six major and 16 smaller plants are proposed in the next phase of development. MWCI sewerage coverage is currently about 13 percent of its service area. It operates 38 sewage treatment plants with a capacity of around 128 MLD, has two septage treatment plants and about 50 vacuum trucks that regularly clean the sludge from septic tanks in the East Zone.

2. Sanitation Conditions

The three main river systems in Metro Manila – namely: (a) Pasig River with Marikina and San Juan Rivers as tributaries; (b) Navotas, Malabon, Tullahan-Tenejeros River Systems; and (c) Paranaque-Zapote River Systems – are now all polluted. It is estimated that about 84 percent of the households in Metro Manila and 72 percent of households in Rizal and Cavite Provinces have septic tanks but maintenance is inadequate. The use of septic tanks, for those not connected to the sewer system, is specified in the National Plumbing Code. The estimated number of septic tanks in the MWSS service area is around 2.17 million.

3. Manila Water Company Inc (MWCI)

MWCI serves 6.2 million people, covering 23 cities and municipalities, and it has a staff complement of 1,570 employees located in the main office and eight Business Areas. In 2011, capital expenditure was P 9.2 billion of which P 1.4 billion was spent on wastewater and septage/sludge management programs. Total operating expenses were P 4.03 billion and revenues P 11.70 billion. Other data for the period 2009-2011 is shown in Table A1.1.²⁵

Table A1.1: Select Performance Indicators for MWCI

Performance Indicator	2009	2010	2011
Non-Revenue Water (NRW)	15%	11%	11.2%
Volume of wastewater treated (MLD)	50	58	70
BOD removed (tons)	3841	2735	3776
No. of septic tanks de-sludged	65,355	56,466	52,147
No. of households receiving de-sludging services	291,469	242,026	178,258
Volume of septage treated (m3)	226,934	203,595	160,799
Volume of bio-solids produced (m3)	29,635	20,968	20,443
CAPEX for service improvement (Billion Pesos)	5	9.6	9.2

²⁵ Source: Manila Water 2011 Sustainability Report.

As of December 2011, MWCI has a total of 857,981 water connections. There are currently 99,206 sewerage connections serving 146,237 households. MWCI is proposing an increase in sewerage coverage over the next 10 years with a focus on providing interceptors and treatment facilities for combined systems in the Marikina, San Juan and Pasig River catchments within their service area. The proposed investment to reach this coverage is P 36 billion. While the systems in the Marikina, San Juan and Pasig River catchments are currently planned as decentralized systems, the plan is being reconsidered given the additional operational expense of many, small separate decentralized treatment facilities. While centralized systems are more economical in terms of life-cycle costs, land acquisition is more difficult for larger systems. Thus, the availability of land will be a key factor in deciding on the type of treatment plants to be used by Manila Water.

4. Maynilad Water Services Inc. (MWSI)

MWSI serves 7.2 million people, covering 16 cities and municipalities, and it has a staff complement of 2,166 employees. MWSI had a total of 955,234 water connections with 75,414 sewerage connections as of 2012. With the sense of urgency required by the Supreme Court's continuing Mandamus, MWSI is now proceeding with a rapid expansion of sewerage services with the objective of providing 28 percent coverage by 2017 and 100 percent coverage by 2037. As with MWCI, expansion of the sewerage coverage will be on the basis of combined systems with interceptors.

5. Conclusions Regarding Sewerage and Septage Management in Metro Manila

The Clean Water Act and the NSSMP require the following actions, by MWSS and the concessionaires, which have led to positive outcomes:

- 1) Mandatory connection of households and commercial establishments to existing, available sewerage lines. This has been hard to enforce but the policy now is to use the combined sewerage systems to achieve coverage. A uniform 20 percent surcharge on the water tariff has now been adopted by both concessionaires for all households irrespective of whether or not they are connected.
- 2) Both water concessionaires to comply with effluent standards formulated pursuant to the Clean Water Act. The treatment facilities operated by the concessionaires are compliant with the Clean Water Act requirements.

Some of the main issues constraining improvement in service coverage are mentioned below and should be taken into account while expanding sanitation services in the country:

- high cost of providing separate systems;
- high acquisition cost of land for treatment facilities and unavailability of land with sufficient area;

- low willingness to pay by the consumers for sanitation. As a result, the water services cross-subsidize the wastewater management operations; and
- disturbance in economic activity caused by new construction, particularly in built-up, densely populated areas.

Essentially, the rate at which sewerage facilities can be expanded in Metro Manila depends upon the amount of tariff that the residents are willing to pay. The rate rebasing exercise, conducted every five years, links the projected capital investment with the proposed coverage and new tariff.

The concessionaires have taken the initiative to plan their investment according to watershed catchment areas in order to be better able to capture environmental benefits in polluted areas that are densely populated. Furthermore, the localized treatment plants optimize pumping costs and the construction of infrastructure to transfer the wastewater. This is evidenced in MWCI's focusing on the Marikina, San Juan and Pasig River systems and MWSI focusing on the San Juan river basin. This approach may be best replicated outside Metro Manila by taking an integrated approach to providing wastewater facilities as part of the action and investment plans for the Water Quality Management Areas being designated now in response to the Clean Water Act.

In general there is no question that the privatization process of the management and operation of the water supply and wastewater systems has progressed the development of sewerage and sanitation in Metro Manila. In the initial years after privatization in 1997, only limited progress was made in sanitation and sewerage as the concessionaires concentrated on improving water supply delivery. Investments in sewerage and wastewater treatment were limited in the early phase of the concession period. However, the Clean Water Act, the increasing environmental concerns of resident groups in Manila, and the recent Supreme Court *Mandamus* have prompted the concessionaires to increase investments in sanitation and sewerage. The implementation of the combined sewerage approach has proven to be a more affordable solution and now both concessionaires plan to provide 100 percent sewerage coverage by the end of their concession period in 2037.

Given the emerging success of the concessionaires in increasing sewerage and sanitation coverage in Metro Manila, the question arises as to why this has not occurred in the other areas of the country, especially in the larger cities. Notwithstanding the political will to introduce the private sector, the primary reason is legal. It was the Water Crisis Act applying to Metro Manila that enabled legislation to be put in place to allow privatization of the MWSS services. Equivalent legislation would need to be enacted to enable privatization of systems currently managed and operated by the Water Districts.

Annex 2

Baguio Sewerage System

Baguio is situated at an altitude of approximately 1400m and is located about 250 km north of Manila. It is divided into 128 barangays and had a population of 318, 676 in 2010. However, this population can expand dramatically during the summer tourist season. The topography in the city is mountainous with many different elevation zones across the 128 barangays. A sewerage system was originally constructed in Baguio during the American time in the 1920s, but it was in 1986 that the system was upgraded from funding through a Php 400 million JICA financial assistance to cover 65 barangays. This included collection system expansion to 55km of pipelines, and construction of a wastewater treatment plant with capacity of 8,600 m³/day. Despite the topography there is only one lift station. The treatment process comprises screening and grit removal, primary sedimentation, extended aeration by means of an oxidation ditch, final sedimentation, sludge thickening, storage and drying and disinfection.

The sewerage system is operated and maintained by the Baguio LGU through the City Environment and Parks Management Office with a total of 29 staff. The LGU collects about P 4 million/year while the operating cost is around P 18 million/year. This raises the issue of financial viability of operations to provide quality sanitation services to the consumers.

It was reported by the Water District that connections to the sewerage system have been constrained since the individual householders had to pay to connect to the sewer main. Nevertheless flow into the wastewater treatment plant has been increasing and in 2010 reached a peak annual average of 12,434 m³/day, 45 percent above the flow capacity and more than 100 percent above the design influent BOD. The 63 served barangays cover 41 percent of the city population or 25,000 households. Despite the overloading, the treatment plant is operating satisfactorily, although there have been some occasions in recent years when the prescribed effluent standards have not been achieved resulting in fines being imposed by EMB-DENR.

To address overloading at the wastewater treatment plant, the city allocated P 30 M in 2011 for dewatering of sludge and has approved in 2012 P 50 million to implement the construction of a Sequencing Batch Reactor unit to accommodate an additional 4,000 m³/day capacity. The city operates two vacuum trucks for de-sludging septic tanks and collected septage is disposed of into the sludge holding tank of the WWTP. In addition there is a proposal to construct a septage management facility on the treatment plant site to cover the 63 barangays not served by the sewerage system. The septage management plans are expected to be implemented through a public-private partnership. The city also proposes to pass an ordinance to provide for mandatory de-sludging of septic tanks every five years.

The Baguio Sewerage System has been operating now for over 26 years under the management of the local government. Despite low tariffs and operating at a significant loss, the LGU has been able to maintain the facility in a reasonable condition. Some of the features of the system are:

- LGU appears to prefer to subsidize the plant operation than charging a tariff that would cover operation and maintenance. However, this approach of subsidizing operations can affect the quality of service as the revenue stream for the operator is subject to the availability of LGU funds.
- LGU is prepared to commit funds for treatment plant expansion and rehabilitation. The fines imposed by EMB-DENR for the LGU to not meet effluent standards on a few occasions have in part motivated this willingness to invest in additional sanitation facilities.
- LGU recognizes the need to develop a septage management plan for the barangays not served by the sewerage system and to pass an ordinance requiring mandatory de-sludging of septic tanks.
- Baguio is unique in being the only highly urbanized city outside Metro Manila to operate a sewerage and sewage treatment system. Despite this, the city has been penalized for exceeding point source effluent standard in contrast with other cities with no sewerage facilities where non-point source pollution is significant but for which no penalties apply.
- Baguio is an environmentally sensitive area and the citizens are reportedly concerned with watershed management, forest cover, and protection of rivers.

Annex 3

Baliwag Septage Management Project

The Municipality of Baliwag is located on the western-most part of Bulacan Province, 52 km from Manila and includes 27 barangays. The 2007 population was 136,982 and is currently about 160,000. Of the 25,000 households in the municipality, 98 percent have toilet facilities and 74 percent have septic tanks. For those without septic tanks, wastewater is largely discharged directly to rivers or the drainage system. Many of the septic tanks are not constructed according to standards, some with open bottoms allowing human waste to contaminate groundwater.

The Baliwag Water District (WD) is the main water service provider of the municipality. All of the 27 barangays are served by the waterworks system. The WD currently serves 25,000 connections, up from 1,300 in 1993. Water supply is from 18 deep wells. A 24 hour service is provided and NRW is estimated to be 15 percent.

Baliwag was one of three LGUs that were selected as pilots for septage management feasibility studies to be undertaken by the Philippines Water Revolving Fund Program, supported by USAID (the others were Metro Cebu and Cabantuan). The pilot is now being implemented in Baliwag. The primary driver of progress for the septage management project in Baliwag has been to protect groundwater sources from contamination. The LGU passed an ordinance establishing a septage and sewerage management program that required mandatory desludging of septic tanks, stipulating design standards for septic tanks and sewerage systems, setting discharge design standards, establishing enforcement arrangements and penalties and setting effluent quality standards.

The Water District purchased the lot for the septage treatment facility. The WD also financed the total cost of the facility (P32 million for the septage treatment plant (SpTP) and P 15 million for the two vacuum tankers) through a loan. The tariff to cover the cost of the program will be included in the water rates (10 percent of the monthly water rate). The SpTP has a capacity of 30 m³/day, based on six hours of operation, or 120 m³/day based on 24 hours of operation. Given the high cost of providing power supply to the site, the WD proposes to use solar power to run the plant.

Public consultations were undertaken in all 27 barangays. There was some initial resistance within the community, but they have now accepted the importance of septic tank and septage management. The selected design of the SpTP was a medium level technical option comprising a bar screen and grit removal facility instead of a fully mechanized septage acceptance unit. The design effluent standard is 50mg/L BOD. Treated bio-solids will be either transferred to a landfill or used for land application. Operation of the septage treatment plant and the vacuum trucks will be done by the WD.

In addition to the septage management project, a program to repair and upgrade existing septic tanks has been introduced by the WD. Financial support to assist people to upgrade septic tanks is being arranged through a micro-finance facility with interest rates of about 4 percent. The LGU has also promised to assist households without septic tanks with the construction costs.

Baliwag WD is also considering the development of a sewerage network and treatment of wastewater. Financing, however, is a concern and the 40 percent grant from the central government may not be sufficient for a viable financing scheme as the WD will have difficulties in financing the rest (60 percent) of the cost. The other constraint on building the sewerage network will be the disruption to traffic in narrow streets.

The Baliwag Septage Treatment Program has some characteristics which have led to the current developments:

- an effective Water District that has been able to deliver services;
- an LGU with a concern for the potential of contamination of water sources and which is able to take mitigation measures; and
- willingness of the WD and LGU to undertake extensive consultation with the community.

Annex 4

San Fernando City (La Union) Sanitation Projects

San Fernando is a coastal city with a population of 120,000 and is the capital of La Union Province. The city has 59 barangays, with 72 percent of the city classed as urban. The maximum population density is 290 people/ha and there are four barangays with population densities in excess of 130 people/ha. All other barangays have densities less than 100 people/ha. The Metro San Fernando Water District (MSFWD) covers five LGUs, but supplies water to only 8,500 connections out of a potential 40,000 households. Even in San Fernando City, there are only 4,500 connections out of a potential 8,000.

Interest in sanitation in San Fernando City developed in 2003 when the Center for Advanced Philippine Studies (CAPS) became involved in the provision of eco-san toilets in three low income coastal and upland barangays where open defecation was occurring due to limited sanitation facilities. The city government allocated P 1 million for construction of eco-san facilities in these barangays. In addition the city allocated P 300,000 per year for maintenance of the eco-san toilets which were also constructed in three elementary schools, the Botanical Gardens and some other public places. In 2006 the city updated its Sanitation Code and passed its Strategic Sanitation Plan which formed the basis for the construction of a septage treatment plant and a decentralized wastewater treatment system facility. The city of San Fernando has served as a model for the development of the ecosan concept and CAPS has worked with the provincial government to develop ecosan toilets in other municipalities in the province.

Following on from the Strategic Sanitation Plan, the city government decided on the need for a septage treatment plant when it was observed that out of 59 wells in the city, 56 were contaminated with coliform bacteria. It was also observed that septic tanks were not being de-sludged due to the high de-sludging fee (in excess of P 8,000 per household) as sludge needed to be transported to the Sewage Treatment Plant in Baguio City, adding to the transportation cost. To address this issue, the San Fernando City raised funds to construct a septage treatment plant. The capacity of the plant is 30 m³/day and it can serve 25,000 households. The de-sludging cost is also expected to be lowered as septage transportation costs will be reduced.

The city ordinance for septage management was amended in 2010 and it requires septic tanks to be de-sludged every five years, for septic tanks to be upgraded to meet the required standards, and the hiring of a Sanitary Engineer to manage the septage treatment facility. There were two public consultations undertaken before passage of the ordinance.

Several staff (about six) from the General Services Office (GSO) of the city government will be assigned for operation and maintenance of the septage treatment facility. Monitoring and supervision will be done by the City Environmental and Natural Resources Office (CENRO). While the city will operate the plant, private contractors will be hired for the de-sludging at the household level based on a tender process. Construction of the facility was completed in February 2012. The treatment process comprises screening, primary settlement, initial treatment through an anaerobic baffled reactor followed by an Upflow Anaerobic Sludge Blanket installation, facultative and maturation ponds and disinfection.



The San Fernando situation demonstrates the need for a coordinated approach to sanitation and the need for sanitation planning. Different types of sanitation facilities are appropriate for different locations, even in an urban setting. About 80 percent of households have septic tanks so a septage management program is essential.

Some of the factors supporting the progress in San Fernando are:

- In the absence of the Water District, the LGU has taken the initiative to develop a range of sanitation interventions in the city.
- The presence of several drivers to prioritize sanitation, such as: pollution of groundwater coupled with a poor piped water supply and expensive de-sludging services resulting from high transport costs.
- Presence of a local NGO with the expertise on ecosan, the skills to mobilize the local communities to learn and adapt to a new way of sanitation, the experience of working with local government to develop a sanitation strategy.

Annex 5

Dumaguete Sanitation Projects

Dumaguete City is the capital, sea port and largest city of the Province of Negros Oriental. The 2007 census showed a population of 116,392 people. The city is situated on the plains of the south-eastern coast of Negros Island near the mouth of the Banica River. Public demand for better sanitation services had been voiced by residents and NGOs active in the area several years ago. These concerns were also taken up by members of the City Council, in its deliberation of local issues. These included health concerns for swimmers along the coast of Rizal Boulevard and the negative impact on fishing due to pollution.

Prompted by these concerns, environmental studies were conducted which indicated that the coastal waters of Dumaguete showed high *coliform* count, especially along Rizal Boulevard, making the area unfit for water sports or fishing. The observation was supported by additional findings that about 10 outfalls discharge untreated wastewater from residences and the city's business district. In addition, some 20,000 poorly designed and inadequately maintained septic tanks were perceived as potential sources of contamination to the city's 16 deep and 900 shallow wells due to indiscriminate disposal of septage. Thus, the primary sources of water supply were gravely threatened.

In consideration the above, the LGU included sanitation as one of its priority areas for urban development. In this undertaking, city officials and stakeholders developed strategic interventions and solutions to their situation, based on a participatory planning process. The facilities developed and planned through this process included a low-cost septage treatment lagoon to protect the groundwater from pollution from septage and a Decentralized Wastewater Treatment System to prevent pollution from the wastewater generated in the marketplace.

Public Market WWTP

The city's public market made use of the Anaerobic Baffle Reactor System, a non-mechanized treatment process, to treat hospital and domestic wastewater. This system is composed of a settling tank, an anaerobic baffle reactor, an anaerobic filter and a planted gravel filter. The city's treatment facility can process 80 m³ of wastewater per day. The construction cost of the plant was US\$3.2 million. The treatment plant receives public market wastewater whose BOD ranges from 400 mg/l to 800 mg/l. Effluent BOD ranges from 10 mg/l to 50 mg/l.

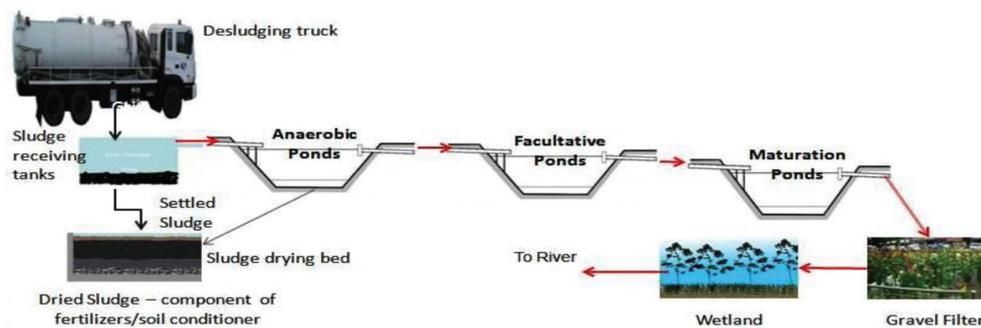
The City Planning and Development Office (CPDO) was the lead agency in the planning, construction and operation phases of the WWTP. Funding requirements for the establishment of the facility was completely sourced from the city's local development fund. Quarterly monitoring of the treatment plant's influent and effluent are conducted for BOD, TSS and nitrates. Sampling activities are conducted by the City Environment and Natural Resources Office (CENRO). To date, the facility

incurs a monthly operating cost of P 3,200, which is supported by the toilet user fees collected at the public market. Having this cost recovery mechanism in place helps defray the O&M cost of operating the treatment plant. Treated wastewater coming from the public market is reused for landscaping purposes – watering the plants at Quezon Park.

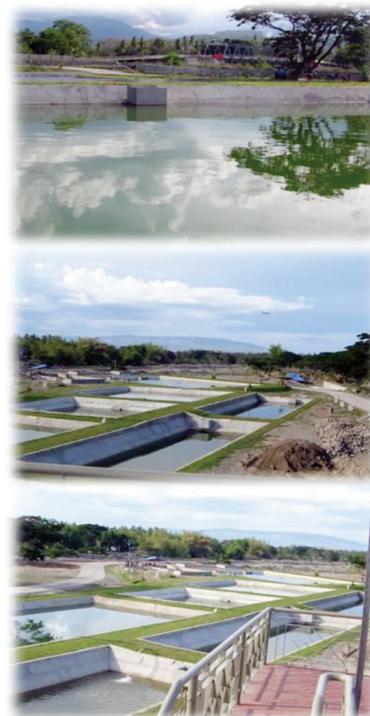
Septage Treatment Plant

Dumaguete’s septage treatment plant (STP) was designed to process all of the LGU’s septage generated from both households and business establishments. Its operational system is illustrated in the schematic below (Figure A5.1). The facility has a total area of 2.0 hectares and currently employs seven de-sludging trucks, five of which were procured with revenue earned after commencement of operations.

Figure A5.1: Overview of Dumaguete’s septage treatment system



In anticipation of the operating and maintenance costs that would be incurred by the facility, the city government and the Dumaguete City Water District signed a Memorandum of Agreement (MoA) defining each party’s role in the joint ownership and operation of the facility. The agreement included provisions on the sharing of capital and operation costs, mechanisms to collect service fees, and sharing of revenues. The partnership is the first of its kind in the country, where the LGU and the local Water District actively collaborate in implementing the city’s septage management system, wherein the Water District is responsible for collecting septage, transporting it to the treatment facility and collecting the septage fees; and the city government is responsible for operating and managing the septage treatment plant. The capital cost of the treatment plant and the two tankers initially procured was P 22 million which was shared equally by the city and the Water District.



In order to ensure sustainability, the MoA between the city government and the Water District authorized the Water District to collect an additional fee of P 2 per cubic meter (m³) of water consumed. People not connected to the water system can opt to put a meter on their well and pay a fee based on metered users. Funds generated from these fees will ensure that households and business establishments would be serviced every three to five years, by the fleet of vacuum trucks, and have their respective septage treated in the STP.

The monitoring system for the treatment efficiency of the STP has been initiated by the city government. Parameters being monitored include (a) characteristics of raw septage; (b) BOD; (c) total suspended solids; (d) nitrates; and (e) microbial removal of the anaerobic, facultative and maturation ponds, including the constructed wetland. The results of these regular monitoring activities are evaluated in compliance with DENR effluent standards on: (a) land disposal of effluents and (b) industry performance standards for stabilization ponds. The final effluent is not directly discharged to any receiving body but rather made to leach in an area that is at least 100 meters away from the nearest river.

Settled sludge from the septage receiving tanks and anaerobic ponds are extracted and left to dry at the sludge drying beds. The *sludge cake*, generated from the drying beds are then distributed for free to farmers within the host barangays, who then in turn make use of the material as a component to organic fertilizers or as soil conditioners.



Sewerage

The city government is considering developing a sewerage scheme comprising an interceptor along Rizal Boulevard to intercept the combined sewerage and drainage from about 10 outfalls entering the coastal waters. However, the proposed 40 percent subsidy from the central government for sewerage infrastructure may not be sufficient to finance the investments as the city government may have difficulties in securing the remaining funds.

Conclusions

For the wastewater treatment plant in the market place and for the septage treatment undertakings, the sustained commitment of the city management was considered crucial. The CPDO's oversight facilitated the project.

Both the LGU and the Water District understand that the payback time on the investment in the Septage Treatment Plant will be five to six years. Revenues, since the commencement of operations in 2010, have already enabled the city and Water District to procure an additional five vacuum tankers. The Water District is currently discussing with three surrounding municipalities about their participation in the septage management program using the Dumaguete Septage Treatment Plant.

Annex 6

Bayawan Sanitation Projects

The City of Bayawan is located at the north-western extent of Negros Oriental and has a current population of about 120,000 people. In 2005, during the development of a housing project, local officials anticipated the need to address the community's sewage management needs. In the process, the utilization of constructed wetland technology was identified and evaluated as the most cost effective and affordable solution for the community and the LGU. In the system, domestically generated wastewater, coming from both the kitchen as well as household toilets, flows first to communal septic tanks. The overflow from the septic tanks goes to the main sump then flows by gravity to the anaerobic baffled reactor. The partially treated wastewater is subsequently pumped to the reed beds. The final effluent is then either re-circulated to the reed beds or reused for either the irrigation requirements of the community's organic farming project or as standby water for fire-fighting purposes.

The system was constructed between 2005 and 2006. The total project cost for the wastewater treatment plant (WTP), which includes consultancy fees, labor and materials amounted to about US\$227,000. The estimated operating and maintenance cost is about US\$1,800. The residents pay an amount of P 12.50 per day for the use of the houses which includes the cost of services, including sanitation. Through the project, capacity building activities such as the administration of training courses on the operation and maintenance of the facility was given to the staff of the City Engineering Office and members of the village association. The water quality monitoring of the WTP's influent and effluent is undertaken by the local Water District.

The vision for urban renewal and ecological sanitation was to:

- protect coastal waters from pollution with domestic wastewater;
- protect the health of the local residents through improved housing with safe sanitation and wastewater treatment facilities; and
- demonstrate the constructed wetland technology.

LGU-wide Integrated Waste Management Facility

Given its success so far in a housing community, the city has also embarked on a waste treatment facility, which accordingly employs a holistic approach in dealing with both its municipal solid waste as well as wastewater from both community septage and the resultant leachate of the adjacent sanitary landfill. The wastewater treatment facility, illustrated in the grouped photo below, to date is treating the collected septage from the LGU's households and commercial establishments. It employs the conventional use of a digester, drying beds and a reed bed (i.e., the constructed wetland).



The sanitary landfill was constructed in 2010 and receives the locality's municipal solid waste. With waste segregation, the sanitary landfill is expected to have a life span of 30 years. The leachate that percolates underneath its network of perforated pipes drains to the nearby wastewater treatment facility making use of the same processes as the treatment of collected septage sludge mentioned above. Thus, this integrated approach led to savings for the city as it did not have to construct a separate wastewater treatment facility for the leachate.

The city has passed an ordinance relating to the construction and cleaning of septic tanks. The sanitary landfill and associated treatment facilities were funded through borrowing by the city starting with a US\$7 million loan. A charge of P 30/month is made for septage collection and this is collected by the Water District and remitted to the city. This would represent about 5 percent of the water bill. Public hearings were conducted to explain this charge.

Annex 7

Key Sector Indicators

Indicator	2000	2010
Population and Growth Rates		
Population (million)	76	92
Population, total annual growth rate, (%)	2.1	1.9
Urban share (% of total)	59	66
Urban annual growth rate (%)	3.8	2.9
Rural share (%)	41	34
Rural annual growth rate (%)	0.1	-0.3
Sector Performance		
Urban sanitation coverage access to toilet, JMP access (%)	74	79
Urban access to onsite sanitation (%)	84	96
Urban functionality of onsite sanitation (%)		30
Urban proportion of septage treated (%)		10
Rural water supply coverage, JMP access (%)	77	92
Rural sanitation coverage, JMP access (%)	45	69
Water resources, per capita per year (m ³ /p/year)		5,400
Urban water supply coverage, JMP access, (%)	93	93
Urban access to house connections (%)	50	61
MDG Targets		
MDG water supply target coverage (%),		92
MDG sanitation target coverage (%),		79
Infant mortality (per 1000 live birth)		19
Financial Performance		
Per capita GDP, date, (US\$)	1,053	2,123
Total annual sanitation sector investments, (US\$ million)		60
Sanitation sector investments as percentage of GDP (%)		0.03

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