EAST ASIA AND THE PACIFIC REGION

URBAN SANITATION REVIEW:

A CALL FOR ACTION

THE WORLD BANK

Australian Aid

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Vietnam
Source: Chau Doan

Indonesia
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Source: Dennis Sabangan

November 2013

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Foreword

During the last three decades, the countries of East Asia have experienced fast economic growth and a high proportion of this growth originates from the cities. The proportion of urban population will double from close to 25 percent in 1980 to over 50 percent in 2020. However, this surge in economic performance and urban population has not been matched by an increase in urban sanitation services.

Although access to sanitation in urban areas in the region is above 70 percent in most countries, service provision beyond access remains an issue: collection and treatment of wastewater and septage is low and sanitation operations are not yet institutionally and financially sustainable. The cost of inadequate sanitation is large with a combined cost for Indonesia, Philippines, and Vietnam estimated to be US$8.5 billion annually in terms of health and environmental related economic losses. A comprehensive and collective effort is needed to eliminate these losses.

This report synthesizes urban sanitation issues in Indonesia, the Philippines and Vietnam. Separate reports for each of these countries have also been prepared. These country reports were based on analysis of previous work and through interaction with sector professionals. Workshops were carried out in Jakarta, Manila, and Hanoi to seek feedback on the findings of the country reports. This synthesis report broadly presents the issues that are faced across the region while the country reports mention specific actions to be taken in a country.

All cities aim to be clean and provide a healthy environment for the citizens. To this end, this report highlights the benefits of improved sanitation that would lead to better health, increased economic productivity, and an improved city environment. A key finding of the report is that, to address concerns of the poor, a city-wide sanitation plan needs to be implemented as the poor often reside next to polluted waters that are generated elsewhere in an urban area.

Social, technical, financial and institutional issues that could drive change were examined which led to recommendations on:

- improving services through infrastructure development and institutional strengthening;
- providing public financing as the costs for improved sanitation will be large; and
- promoting behavior change for communities, households, and for service providers and government officials through better information, education, and communication.

This report illustrates the need for interventions across the board in improving sanitation through changes in policy, financing, and regulatory arrangements. The World Bank Group is committed to work with governments in East Asia to provide sustainable sanitation solutions that would lead to cleaner cities and reduced health risks for the population, including the poor.

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November 2013

Acknowledgments

This report has been prepared with the financial support of the Australian Government. A broad consultation effort was undertaken in Indonesia, the Philippines and Vietnam and workshops were conducted to seek feedback from stakeholders as part of the report development process.

The Task Team Leader (TTL) for this task is Sudipto Sarkar and the Sector Manager for the product is Charles Feinstein. The previous TTL was Alan Coulthart. Major contributions to this report and the country reports have been provided by the following staff from the Bank and the Water and Sanitation Program (WSP): Victor Vazquez Alvarez, Irma Magdalena Setiono, Christopher Ancheta, Hung Duy Le, Richard Pollard, Demilour Reyes Ignacio, Almud Weitz, Eduardo Perez, Vinh Quang Nguyen, Alexander Danilenko, Edkarl Galing and Isabel Blackett. Important contributions were also made by a team of consultants, including: Eric Buhl-Nielsen, Mara Baranson, Ross Kearton, John Smithson, James Corning, Salvador Ner, Viet Anh, Liu Xujun, Risyana Sukarma, and Enrico Rahadi.

The efforts of the peer reviewers for the country reports and the regional report are also appreciated: Claire Kfouri (for Vietnam), Eduardo Perez (for Philippines and Indonesia), Michael John Webster (for Philippines and Indonesia), Manuel Mariño (for the Vietnam and regional reports), Pier Mantovani, and Greg Browder (for the regional report). Valuable inputs were also provided by Julia Bucknall, Water Sector Manager, who chaired the Quality Enhancement Review meeting.

Acronyms

AKKOPSI	Association of Cities and Districts Concerned about Sanitation in Indonesia
AMPL	Indonesia's Steering Committee for Drinking Water and Environmental Health
BAPPENAS	National Development Planning Agency (Indonesia)
BOD	Biological Oxygen Demand
BCC	Behavior Change Communications
CSC	Communal Sanitation Center (Indonesia)
CSP	City Sanitation Plan
CSS	Combined Sewerage System
DEWATS	Decentralized Wastewater Treatment Systems
DOH	Department of Health (Philippines)
DPWH	Department of Public Works and Highways (Philippines)
EAP	East Asia and the Pacific
GDP	Gross Domestic Product
HCMC	Ho Chi Minh City
HH	Household
IEC	Information, Education and Communication
IWRM	Integrated Water Resources Management
JMP	Joint Monitoring Program
KPI	Key Performance Indicator
LGU	Local Government Units (Philippines)
LWUA	Local Water Utilities Administration (Philippines)
MWCI	Manila Water Company Inc. (Philippines)
MWSI	Maynilad Water Services Inc. (Philippines)
MWSS	Metropolitan Waterworks and Sewerage System (Philippines)
MPW	Ministry of Public Works (Indonesia)
NSSMP	National Sewerage and Septage Management Program (Philippines)
NTP	National Target Program (Vietnam)
OD	Open Defecation
PPSP	Indonesia's accelerated sanitation development plan: *Percepatan Pembangunan Sanitasi Permukiman*
RPJMN	Indonesia's medium-term development plans
SNIS	Brazil's monitoring system: *Sistema Nacional de Informacoes sobre Saneamento*
SSK	City Sanitation Strategy (Indonesia)
SSS	Separate Sewerage System
US$	United States Dollar
USAID	United States Agency for International Development
WHO	World Health Organization
WQMA	Water Quality Management Area (Philippines)
WSP	Water and Sanitation Program
WWTP	Waste Water Treatment Plant

Executive Summary

INTRODUCTION

This study summarizes the main challenges to scaling up access to sustainable sanitation services in the urban areas of three countries in the East Asia and Pacific region—Indonesia, Philippines and Vietnam—and proposes the main steps these countries need to take to redress the status quo. The report is divided into four chapters. The first chapter provides an overview of the current level and quality of access to urban sanitation in the Region. The second chapter examines the causes leading to the current state of urban sanitation, using four thematic areas: people, technology, institutions and finance. The third chapter identifies those factors that need to be in place to trigger a different way of doing business in the sector and that may ultimately lead to transformational changes. The fourth chapter proposes recommendations on how countries can upgrade and scale up urban sanitation services. The study has been developed from information and data compiled in the existing literature and through the country reports for Vietnam, Indonesia and Philippines, which analysed the situation and proposed solutions for each country in more depth.

Urban sanitation is lagging in East Asia. About 2.5 billion people worldwide lack adequate sanitation—that's one third of the global population—and 660 million live in East Asia and Pacific (JMP 2012). This study identifies the main sanitation challenges faced by three countries in the region—Indonesia, the Philippines and Vietnam—and recommends ways to expand and improve urban sanitation services in an inclusive and sustainable way. There are far-reaching benefits from improvements to sanitation, including better health and a more productive economy. For example, infant mortality decreases with increased urban sanitation coverage (Figure 1).

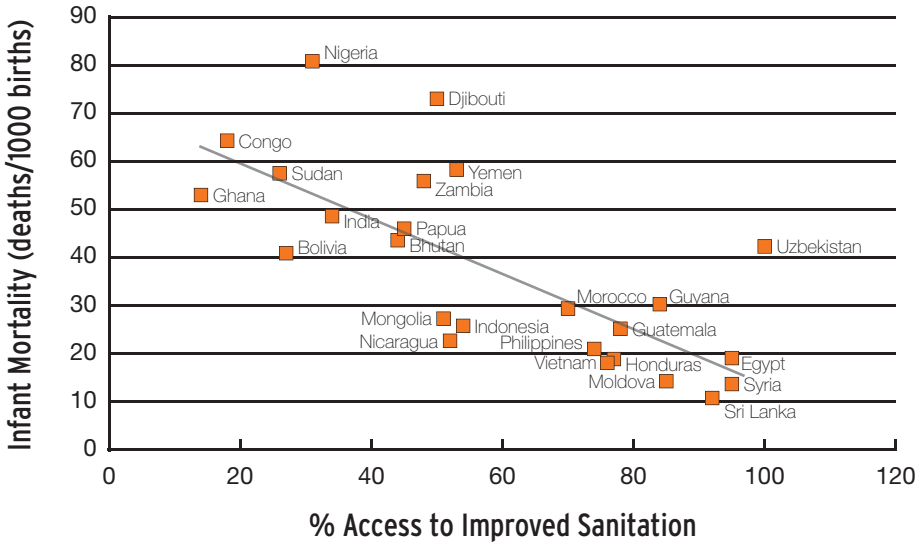
The economic cost of not addressing sanitation is high. East Asia is rapidly urbanizing, and its cities are engines of economic growth. While there has been economic progress in these urban areas, sanitation conditions have not improved. The economic impact of inadequate sanitation in the three focus countries is huge and increasing (US$8.5 billion) (Figure 2) (WSP 2008). To sustain economic growth, East Asian cities will need to address significant gaps in their sanitation services. But returns on sanitation investments are also high.

While access to sanitation is high, collection and treatment rates are low. Access to improved sanitation in urban areas is high (around 77 percent on average for the three focus countries).[1] However, adequate collection and treatment rates are significantly lower, as less than 6 percent of the septage[2] or wastewater[3] reaches a properly functioning treatment plant (Figure 3). In Indonesia and the Philippines, open defecation is still practiced in urban areas. This increases health risks, affects individual dignity, and is an inequitable burden on the poor. Safety, especially for women, is also an issue associated with open defecation.

- In Indonesia, septic tanks and onsite facilities dominate the urban sanitation arrangements and serve some 85 percent of households. Only 4 percent of the septage is treated, although a higher percentage is collected.

1 JMP defines sanitation access as "access to a facility that hygienically separates human excreta from human contact."
2 Solid waste from septic tanks that includes fecal coliform.
3 Wastewater that is contaminated with human feces.

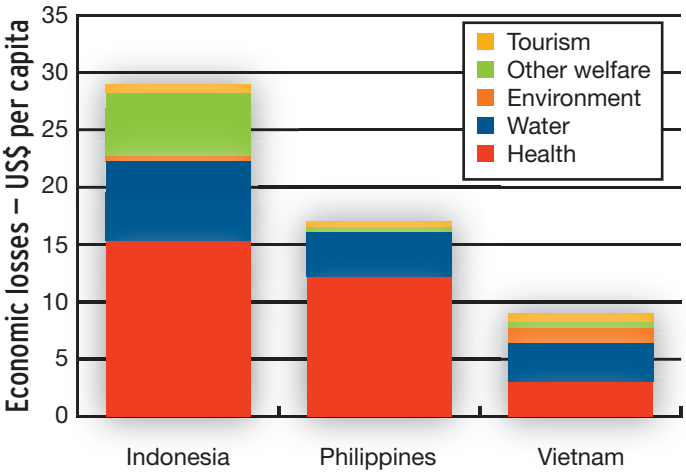
Figure 1: Infant mortality against urban sanitation coverage



Sources: JMP, World Bank 2011 figures.

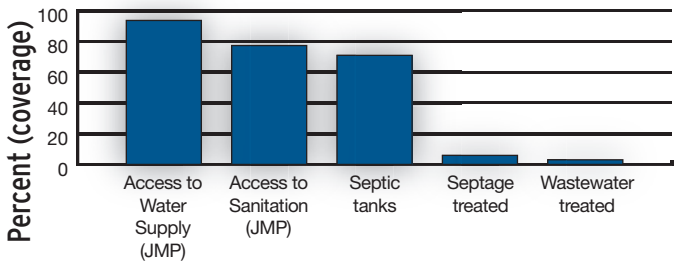
Note: For the purposes of the graph, countries that have per capita GDP between US$1000 to US$3000 were used.

Figure 2: Losses from inadequate sanitation



Source: WSP 2008.

Figure 3: Urban sanitation situation (urban population-weighted average across the three countries)



Source: East Asia Urban Sanitation Review, World Bank 2013.

Less than 1 percent of wastewater is safely collected and treated despite the presence of sewerage systems in 11 cities. Open defection is still practiced by about 14 percent of the urban population.

- In the Philippines, septic tanks and other onsite facilities dominate, serving 93 percent of the population. Only 10 percent of the septage is treated and safely disposed. Less than 4 percent of the urban wastewater is collected and safely treated and most of this is in Metro Manila; there are very few sewerage systems outside the capital and a few select tourist resort areas. About 3 percent of the urban population defecates openly.
- Vietnam is one of the growing lists of countries in the region where open defecation in urban areas has been eliminated. Vietnam, making use of combined systems, has a relatively high sewerage connection rate (60 percent). However, even after a number of years of concerted effort, only 10 percent of urban wastewater is safely treated. Septic tanks and on site facilities not connected to sewers serve the remaining 40 percent of the population. Only 4 percent of the septage is safely treated and disposed.

Better sanitation improves health. In EAP, cities have high population densities, with poor and non-poor areas in close proximity. Urban living concentrates waste; without effective urban sanitation there is a high risk of epidemic diseases such as cholera, as well as the chronic effects of poor health from diarrhea. Worldwide, about 88 percent of diarrheal deaths are due to a lack of sanitation facilities, together with inadequate water for drinking and hygiene (JMP). Inadequate sanitation pollutes water supplies, rendering them unsuitable for drinking, irrigation, and other purposes.

While returns are high, improvements to sanitation are impeded by the political economy of the region. A study carried out by the World Health Organization (WHO) shows that US$1 spent on sanitation will yield US$8 in economic benefits. Yet the political economy of sanitation is such that these investments have not been made in a timely manner due to inadequate incentives to invest in sanitation, the absence or scarcity of local champions to promote change, inadequate institutional arrangements to identify and address priorities, inadequate allocation of investment funds, inadequate capacity at the local level to provide decentralized sanitation services, the lack of viable investment proposals for the delivery of sustainable services, and the lack of political will to address tariff issues to ensure the financial sustainability of service providers.

SECTORAL ISSUES

The issues faced in the sector are summarized along these four groups: policy, technical, institutional, and financial.

People-centered policies

Policies to expand coverage exist but are not properly implemented. While policies exist at the national level to expand coverage, they are not implemented due to institutional and financial constraints. In many urban areas in East Asia, there are no citywide strategies in place to deal with flooding, groundwater contamination, and the separation of waste and its safe disposal. Piecemeal interventions have taken place but the sanitation problems remain as seen through low levels of treated septage and wastewater. Sewerage and drainage systems that serve high-rise and high-density areas are often incomplete; and efforts to upgrade the septage management system or to properly link the generation of wastewater to a citywide drainage strategy and sewerage system are missing.

Public awareness is low for sanitation. Ultimately, it is demand from citizens that will lead to better sanitation services. In the Philippines, concerned citizens led by civil society groups launched a legal challenge aimed at holding authorities accountable for the clean-up of Manila Bay. The challenge was upheld by the Supreme Court and has led to stringent and independent monitoring of performance in managing wastewater in the capital city. In many countries in the region, it was concern over the quality of drinking water that triggered citizen demand that led to lasting changes. For instance, in Korea, public awareness created increased demand for cleaner rivers, which in turn led to public actions to prepare projects and make financing available for wastewater investments and operations. The key ingredients for triggering improvements to sanitation in recent regional experience are: strong citizen awareness arising from an appreciation of the health and environmental consequences of poor services; access and free flow of information on environmental and utility performance between public authorities and civil society; and leadership by the public sector and organized civil society.

Cost-effective technologies

Inadequate collection and treatment makes wastewater a vector for disease. Water consumption is generally high in the region, and most households have flush toilets. Wastewater from households typically flows through septic tanks that do not function well, and untreated or under-treated wastewater is discharged into rivers and creeks through combined sewers. In most cities in East Asia, combined drainage systems are not properly designed to carry wastewater. These drainage systems in many places are open and often collect solid waste which can block of flow of wastewater especially during rain events. If the combined drains are blocked, sewage overflows to the streets creating a pathway for disease. The combined drains are also not well constructed which allows the infiltration of groundwater adding to the volume of water that would have to be collected and treated.

Poor design and maintenance of septic tanks make septage a vector for disease. A large portion of the urban population in East Asia relies on on-site sanitation, mostly septic tanks. Given the scale of investment required to provide sewerage systems, most cities will continue to rely on improved septage management for many years to come. However, septic tanks in most East Asian cities are poorly designed and constructed and not are emptied on a regular basis. When septage is

collected from the septic tanks, it is carried away by local private operators. Septage management is poorly regulated, creating motivation for illegal disposal of the septage, which raises health concerns.

Sound project preparation is often missing. Authorities have not invested in thorough project preparation and feasibility studies. Without quality feasibility studies and designs, there is a risk of over-design and under-utilization of sanitation improvement facilities. The treatment technology selected is often inappropriate and not the least-cost option. Also, house connections to the sewers are not of high quality resulting in the discharge of wastewater to the groundwater or soil and contributing to health and environmental risks. Urban sanitation improvements are often handled as infrastructure projects rather than as an element in a wider service delivery framework. Infrastructure is necessary but requires service-oriented planning to be sustainable.

Sustainable institutions for quality service

Urban sanitation requires horizontal coordination across a range of sectors and vertical coordination from the national to local level. There are at least three important levels to coordinate: service providers responsible for operation and maintenance, local government responsible for ensuring an effective regulation, and central government responsible for setting policy (Figure 4). There are important gaps in the enabling environment, complicated by three levels of institutions, which hamper the effective implementation of programs. Strategies to prioritize investments are not in place, financing policy is weak, and the institutional arrangements are often not clear.

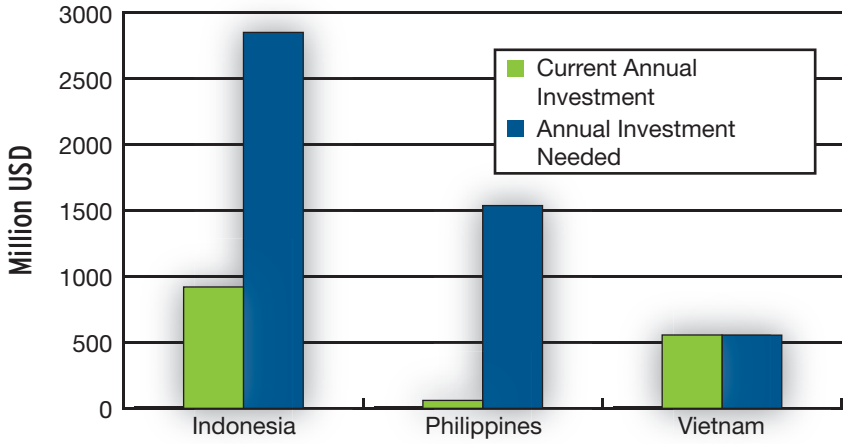
Figure 4: Complex enabling environment in the sanitation sector

Source: East Asia Urban Sanitation Review, World Bank 2013.

The limited number of professionals in the sector inhibits capacity. For the focus countries, the capacity is not adequate for carrying out sanitation services at policy and operational levels. In the Philippines, it is reported that only 500 out of the 2,500 registered sanitary engineers in the country are practicing sanitation professionals. Capacity building is not institutionalized as part of a career development path. Efforts to develop capacity are dominated by projects and special initiatives that are not self-sustaining. Professionalization of the sector is important for building, sustaining, and replicating capacity. For the focus countries, the sanitation profession has not benefitted from strong independent associations that ensure professional integrity and provide rewarding career prospects for new entrants. Both Korea and Malaysia have significantly enhanced sector capacity and performance by systematically institutionalizing training at all levels. Similarly in Korea, the Korea Water Supply and Water Works Association coordinated capacity building efforts in universities, research institutes, government, and the utilities.

There is insufficient managerial and financial autonomy in service provision. Autonomy makes it more feasible for a utility to make commercially and technically sound decisions. The balance between autonomy and accountability can be accomplished through effective governance. The most successful cases involve a strong board with consumer representation that provides overall strategic guidance, as well as establishing economic and performance conditions that are benchmarked against best practice. Autonomous and commercialized utilities that take responsibility for septage and wastewater collection and treatment are rare across the region. Often these functions are fragmented across city departments and prone to interference. Operational budgets are not well defined, and it is difficult to predict revenues and to plan future investments to improve services. There are opportunities for economies of scale to potentially improve efficiency by combining water, wastewater and septage management services within a city, and for larger cities to provide support services to satellite towns. This amalgamation of services under a single utility will help financial viability; however, developing institutional arrangements to support such economies of scale is not explored.

Figure 5: Annual investment in the sector: current *versus* needed



Source: East Asia Urban Sanitation Review. World Bank 2013.

Viable financial schemes

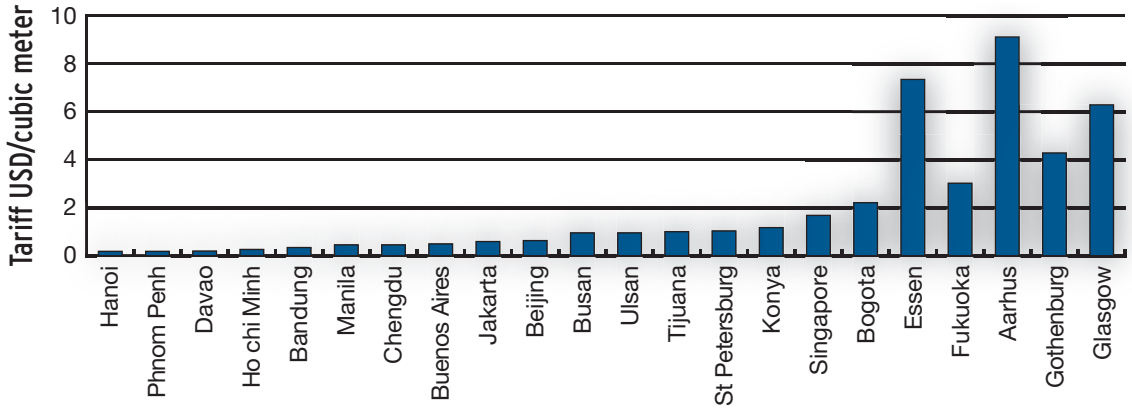
Substantial financing is needed to develop infrastructure and provide sustainable services for urban sanitation. By some estimates,[4] investment levels of at least US$250/person are needed. However, with the exception of Vietnam, this level of investment has not taken place (Figure 5). For instance, in Indonesia, the annual expenditure to reach the entire urban population over 15 years should be around US$2.9 billion (or 0.33 percent of GDP); however, the current expenditure on sanitation is US$920 million. Similarly in the Philippines, the annual expenditure should be around US$1.5 billion (or 0.68 percent of the GDP); however, the current expenditure on sanitation is US$60 million.

Policies are not backed by viable financing. The focus countries have sector policies; however, what is missing is developing, funding and implementing sanitation programs with a clear expenditure framework. The potential sources of finance—such as tariffs, taxes, and transfers from central government and the blend of loans and grants—are not well delineated. The rules that govern public transfers, tariffs, and the engagement of private sector finance are often unclear. As a result, the level of funding available to meet capital and operational needs is not well understood; public authorities are unsure of potential funding sources and are not confident about making significant investment decisions. The phasing of investments is also often not well considered and financing is primarily driven by country budget systems and cycles. It is difficult for city authorities to make transparent and well-informed economic decisions when the funding for the investments is uncertain.

Financing operating costs is an immediate challenge. Tariffs do not meet operating costs in any of the focus countries as their levels are low (Figure 6). Government and municipal authorities are often reluctant to increase tariffs because of concern about reaction from citizens. In some instances, an increase in tariffs appears affordable, but the authorities are hesitant to increase the cost recovery from user fees. This leads to deferred maintenance and inadequate services. The lack of cost recovery tariffs also creates the need to provide

[4] Based on Master Plans of Metro Manila and Feasibility Studies for Ho Chi Minh City.

Figure 6: Selected water and wastewater tariffs



Source: Brown, Hector. 2012.

operating subsidies to the service providers. Operating subsidies are subject to changes each year which also creates uncertainties in providing quality services.

RECOMMENDATIONS

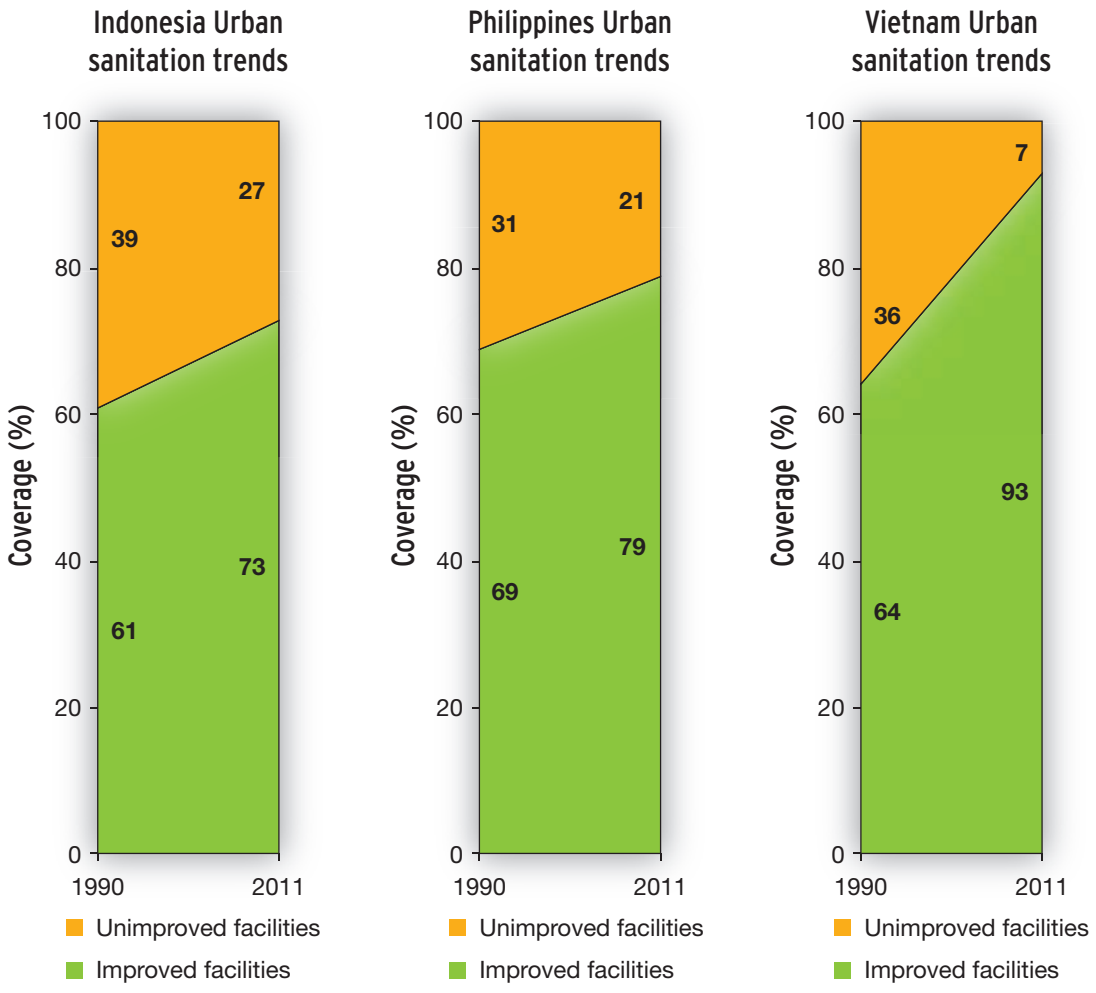
East Asian cities should aim to provide sustainable urban sanitation services to their citizens by focusing on improvements in three main areas through three broad practices[5]:

- **Area 1: Improved hygiene practices.** This is an ongoing effort in all countries in the region and should continue. Better sanitation practice in households can be strengthened through Behavior Change Communication (BCC) campaigns. These are especially relevant for the poor, as they often do not have adequate access to information that would lead to better sanitation practices.
- **Area 2: Improved toilet system.** Since the 1990s, there has been remarkable progress in all three focus countries in increasing access to improved toilet facilities (see Figure 7 below). However, there are gaps in coverage for the population. As illustrated in Figure 7, in Vietnam, 7 percent of the population—of which about 3 percent are poor[6]—still does not have access to improved sanitation facilities. In

[5] A five country study conducted in Cambodia, Indonesia, Lao PDR, the Philippines and Vietnam under the Economic of Sanitation Initiative (ESI); USAID and WSP; 2008.

[6] Access data from 2011 (JMP 2013). Estimations were conducted using data from national poverty assessments (WB). National Poverty Lines: Vietnam: 653,000 VND/person/month (GSO-WB 2010); Indonesia: Rp 211,726 person/month (BPS 2010); and Philippines: Php 1403 person/month (NSCB 2011).

Figure 7: Urban sanitation trends



Source: JMP 2013.

the Philippines, 21 percent still lack access, and in Indonesia 27 percent of the population does not have access, of which about 5 percent are poor. Efforts should be in place that will enable a higher percentage of the urban population to have access to improved facilities with a focus on providing assistance to the poor.

- **Area 3: Improved collection and treatment and disposal of human wastes.** Access to toilets is the first step and the next step is to collect and treat the wastes in a manner that will improve the environment and reduce health risks. In the focus countries, a very low percentage of treatment is carried out for septage and wastewater. The poor are most affected by this low level of treatment, as often they live next to polluted waterways. Thus, collection and treatment of human waste should be an area of increased attention by Governments.

The overarching goal is to collect and treat septage and wastewater in cost-effective ways. In Indonesia, Philippines, and Vietnam, access to improved water and sanitation services is high in urban areas. However, the level of treatment of septage and wastewater is low, creating health and environmental concerns. For instance, in Korea and China about 90 and 70 percent of the urban wastewater is treated, compared to treatment levels of only 1 percent in Indonesia, 4 percent in Philippines, and 10 percent in Vietnam. The three countries need to set up specific targets to improve and increase septage and wastewater collection and treatment levels. This implies setting adequate regulatory, institutional and financial environment, and also adopting practical approaches that allow for cost efficiency in the design of the overall septage management system at the city level. To increase collection and treatment of wastewater, sewerage networks have to be built or upgraded and wastewater treatment plants have to be constructed, in line with the interventions taken in China or Korea. These are capital intensive investments. As a result prioritization and planning are required to ensure that cost-effective solutions are implemented.

City-wide approaches to sanitation are needed. A comprehensive city-wide approach should be taken to ensure that the local government or utility make priority investments. The poor often live next to contaminated waterways but the waste is often discharged to the water bodies elsewhere and in upstream locations. Thus, while the poor should receive assistance on sanitation, human waste also needs to be collected and treated from other parts of the city. Consequently, city wide approaches to sanitation should be taken which include assigning clear responsibility and resources to a local government entity for the delivery of services. Better poverty mapping together with the level of service the poor have should be part of the process of planning for upgrading and extending urban sanitation.

This study finds that there are four key drivers of change that lead to improved urban sanitation services: citizen demand for better services, individual champions among the policymakers, the disclosure of information about negative environmental impacts of poor water and sanitation services, and effective regulations that are actually enforced (Figure 8). These drivers of change point to four key recommendations for policymakers: 1. Establish people-centered policies, 2. Make the best use of technology, 3. Focus on institutional performance, and 4. Secure financing for the sector.

People-centered policies

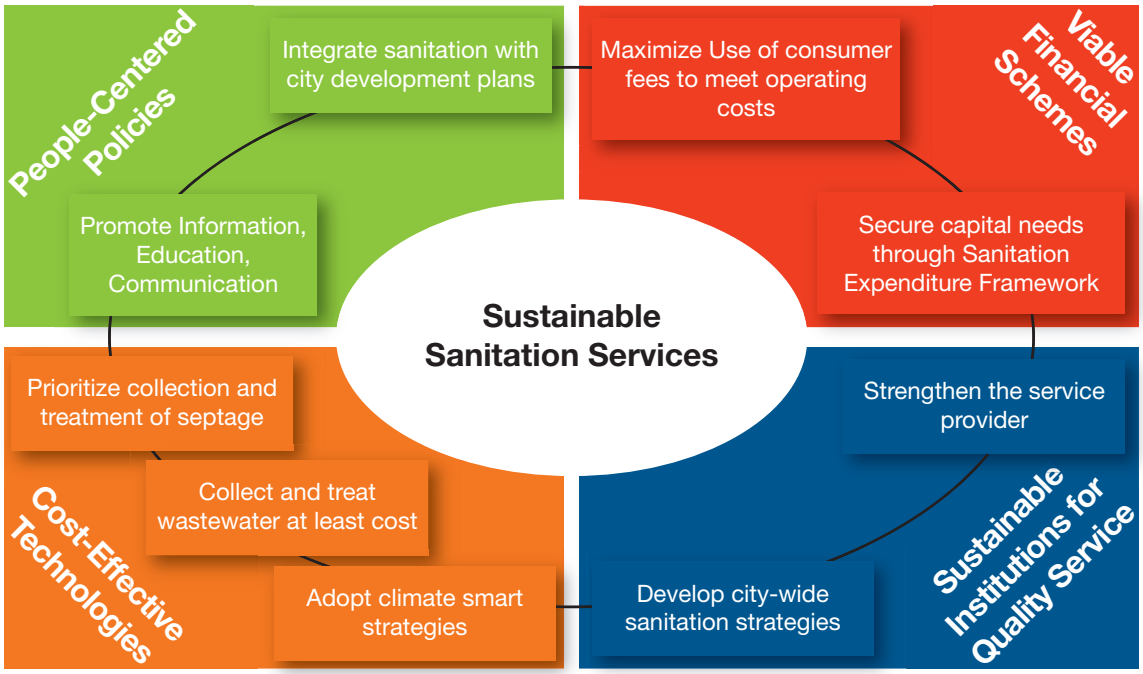
Sanitation should be integrated with city development plans. Guided by national policy, each city needs to set objectives that place urban sanitation at the core of a wider strategy for developing a modern city environment and sustaining a healthy and decent quality of life for its population. A people-centered approach starts with the recognition of the power of an informed public as the most effective driver of change.

A well-informed public is the strongest long-term guarantee of high standards for urban sanitation services. The demand for services from well-informed citizens to well-informed sector stakeholders is the basis for increasing levels of both the willingness to charge and the willingness to pay for better quality sanitation services. Innovative approaches are needed that draw on the strength of a well-informed citizenry and encourage the exchange of environmental health and utility performance information between authorities and the public they serve. Efforts to build civic awareness will also need to shape value systems, such as the appreciation of a clean environment. Information and education campaigns should focus on the collective gains of sanitation, and the associated benefits for public health, environmental protection, and economic development.

Cost-effective technical solutions

The most immediate, cost-effective action that can be taken by most cities is to strengthen septic tank operations and septage management. Septic tanks are prevalent in the

Figure 8: Summary of recommendations

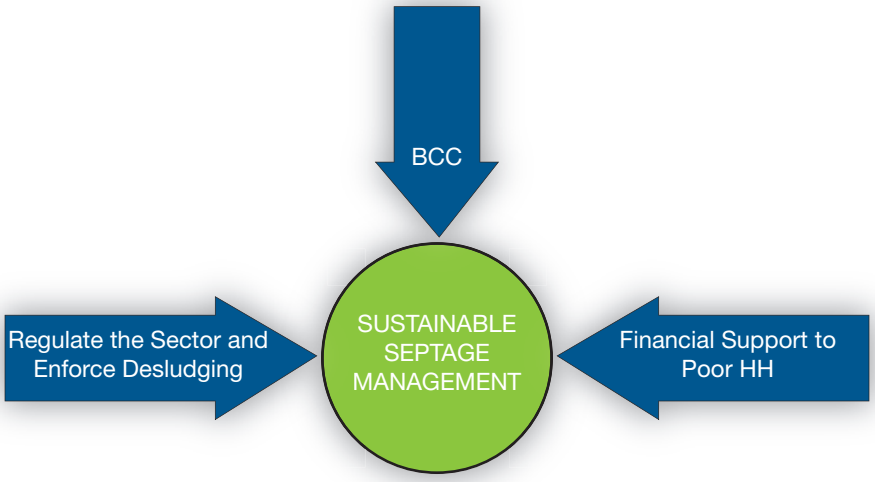


Source: East Asia Urban Sanitation Review, World Bank 2013.

region, but their operation is far from optimal. People rarely have access to functioning septic tanks or safe pit latrines. These facilities create health risks and need to be upgraded, especially in areas where shallow groundwater is used for drinking water. Collection of baseline data on household sanitation is needed, starting with an inventory of septic tanks which would help to track the frequency of septic tank cleaning events. Also, social mobilization would be needed through BCC to help the public appreciate the benefits of cleaning the tanks. Regulation that sets up responsibilities and enforces regular de-sludging of septic tanks and financial assistance to the poor to construct adequate septic tanks should also be in place (Figure 9). Improvements in septic tank management are not capital intensive, but efforts should focus on institutional and regulatory aspects.

Wastewater should be collected through maximization of sewerage network and house connections. A sound,

Figure 9: Sustainable septage management



Source: East Asia Urban Sanitation Review, World Bank 2013.

high-quality collection system is a necessary precursor for effective sanitation management. This includes not only the construction of sewer networks, but also proper house-connections, which is often not prioritized. An increase in house connections can be promoted through: (a) better regulations including a mandatory charge on the water bill to make environmental improvements; (b) BCC campaigns so that the citizens are aware of the benefits to connect to a sewerage network; and (c) financial assistance to poor households to connect to the network so that wastewater is moved away from the population in a safe manner.

Minimize the number of wastewater treatment plants in a catchment area. Wastewater treatment plants are expensive to build and operate. However, there are economies of scale as the per capita investment cost or operating cost on a cubic meter basis drops for larger plants. Thus, the approach should be to minimize the number of treatment plants in a catchment area, taking into account the topography, the availability and price of land, and investment and operating costs. Operations of a treatment plant can also be complicated, which is another institutional reason to limit the number of plants in a catchment area. Feasibility studies need to consider a variety of least-cost options for treating wastewater considering financial and operational viability across the life cycle of the system.

Climate-smart sanitation strategies should be adopted.[7] Because core sanitation infrastructure has a long life-span, current designs should incorporate projected climate change over the next century. As climate change increases the volatility of rainfall, sanitation planners need to know more about flows and pollution concentrations to ensure economic designs and optimize operations. Most cities in East Asia rely on combined sewerage systems, making drainage as vital as sewerage. Flooding and climate change uncertainties need to be included in feasibility studies. Opportunities to convert waste to energy should be explored more systematically. Furthermore, reuse of water and generation of bio-solids from sludge will become important parts of a climate-smart sanitation strategy.

Sustainable institutions for quality service

Every city should have a comprehensive and realistic city sanitation plan that outlines needs based on local conditions and presents broad solutions and performance benchmarks. These plans should incorporate the concerns of the poor, including the elimination of open defecation and the improvement of sanitation services in informal settlements. Urban planning needs to include locations for wastewater treatment facilities, taking into account issues such as current and future population density, zoning, flood risk, topography, and drainage systems. Monitoring and evaluation systems should also be incorporated into city plans to inform the public and to use as a management tool to determine progress.

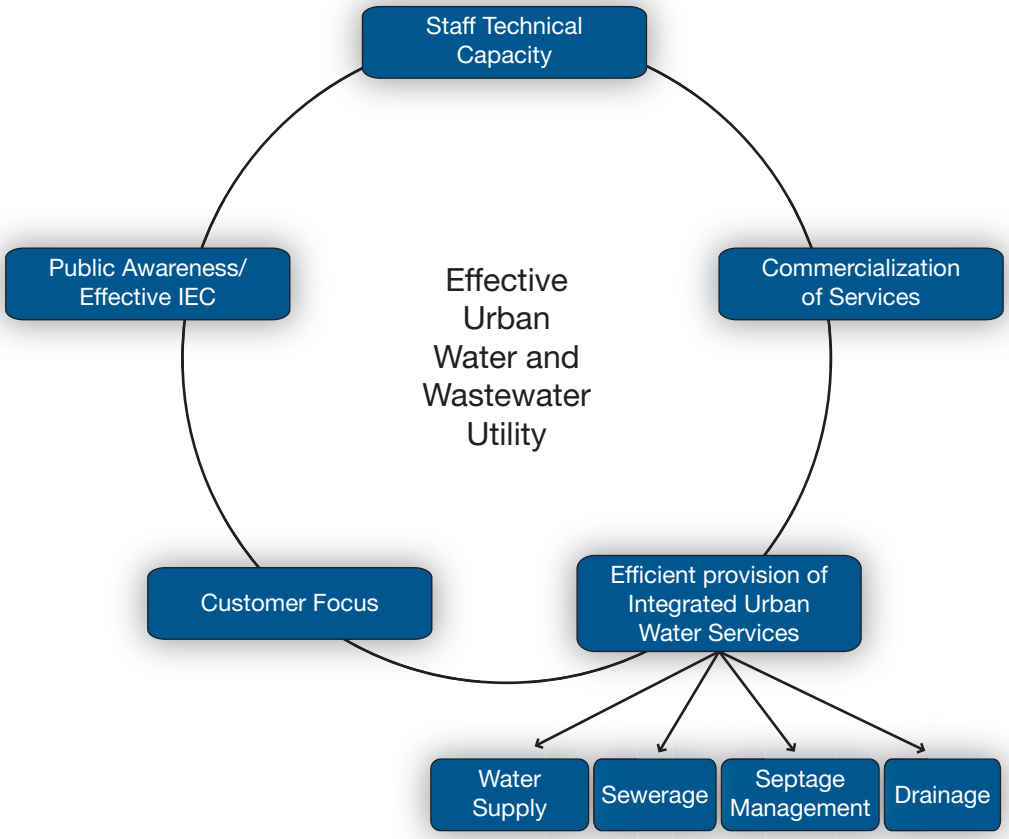
Strengthen the service provider. City authorities should put their urban sanitation services on a commercial footing. Currently, sanitation is not conceived of as a business in the focus countries. As a result, the professionalization of the sector is not yet complete. A robust regulatory environment should be combined with institutional strengthening to provide the incentives and means for service providers to improve their performance. Good practice emerging from regional and global experience points to the importance of: (a) recovering through tariffs, to the greatest extent possible, the costs of services that meet the health and environmental improvement plans of cities; (b) achieving economies of scale and thresholds of technical expertise by integrating water and sanitation services (wastewater and septage management) under a single utility (Figure 10); (c) establishing regional water and sanitation companies that can support services to small satellite towns; (d) monitoring and regulating utilities while providing an effective complaint procedure and an avenue for citizen participation and (e) considering city level interventions as part of wider catchment and basin management plans.

Viable financial systems

The estimated cost to address sanitation is high and capital needs should be secured through a sanitation expenditure framework. The estimated costs (using a per capita expenditure of US$250) are: US$42.7 billion for Indonesia, US$23.1 billion for the Philippines, and US$8.3 billion for Vietnam. Cities need to expand sanitation services by adopting a strategic expenditure framework for sanitation. Such a framework outlines the costs to improve sanitation; defines priorities; identifies mechanisms for the flow of funds, and arrangements for financial management; outlines plans to prepare projects along with expected targets and monitoring plan; and identifies sources of financing for viable projects. In the expanding economies of many EAP countries, it is the

[7] Climate change impacts were not core focus of the study and would require additional in-depth work.

Figure 10: Scheme of an effective water and wastewater urban



Source: East Asia Urban Sanitation Review, World Bank 2013.

absence of viable plans that is a key binding constraint. By developing comprehensive financial frameworks, countries such as Korea and Malaysia were able to make use of both conventional and innovative sources of finance.

Consumer fees should be used to meet operating costs. Ideally, national and city authorities need to raise consumer fees to meet operating costs, taking into account affordability for the poor. To help the poor, block tariffs can work where there are piped water systems. Other methods of support to the poor, such as direct transfers, should be provided. For a utility, when the tariffs do not meet operating costs, subsidies may be used to make up the difference between income and expenses; however, these operating subsidies should be phased out as soon as possible. The environmental policies and laws of most EAP countries call for wastewater costs being fully paid for by the polluter. Thus, dependence on taxes to meet operating costs should be phased out not only to encourage efficient water use, but also to bring utilities under the scrutiny of a paying public.

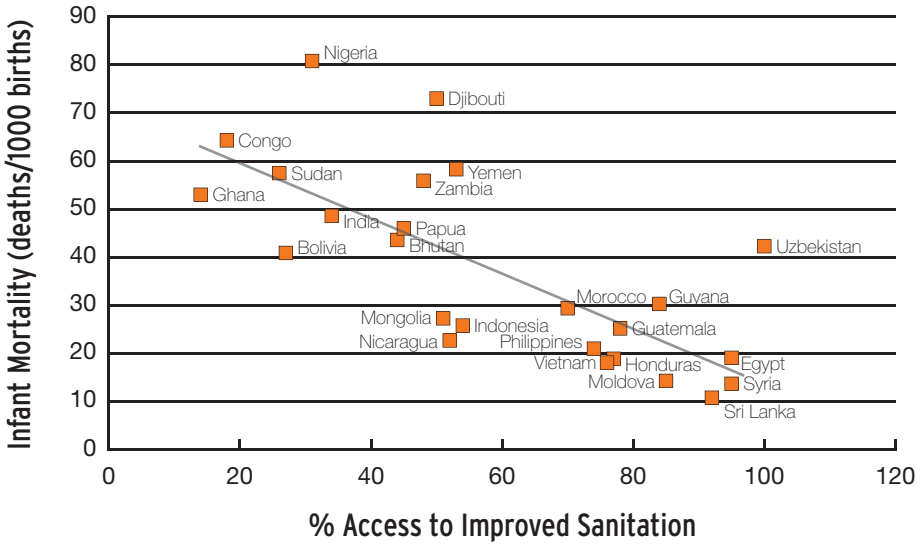
CHAPTER ONE
Sector Overview

This chapter presents an overview of the sector in the Region, with special focus on Indonesia, the Philippines and Vietnam. The chapter provides an overview of the main issues in the sector, leading to recommendations suggested in Chapter 4.

1.1 EXISTING SITUATION IN THE REGION

Urban sanitation is lagging in East Asia. World-wide there are 2.5 billion people who lack adequate sanitation, of which 660 million live in East Asia-Pacific (JMP 2012). About 88 percent of diarrheal deaths are due to a lack of access to sanitation facilities, together with inadequate availability of water for hygiene and unsafe drinking water (JMP). Inadequate sanitation pollutes water supplies, rendering them unsuitable for drinking, irrigation and other purposes. Improvements in sanitation services lead to significantly better health outcomes, as illustrated in Figure 1.1. In the EAP context, cities have high population densities often with poor and non-poor areas in close proximity. Sanitation solutions should therefore address the concerns of the poor and non-poor at the same time.

Figure 1.1: Infant mortality against urban sanitation coverage urban utility



Sources: JMP, World Bank 2011 figures.

Note: For the purposes of the graph, countries that have per capita GDP between US$1000 to US$3000 were used.

Figure 1.2: An example of untreated wastewater flowing past a high rise building and an informal settlement (Hanoi, Vietnam)

Inadequate sanitation leads to economic costs. East Asia is a rapidly urbanizing region, and the urban centers are the engines of growth. While there has been economic progress in the urban areas, sanitation conditions have not improved. Untreated wastewater often flows through urban areas (Figure 1.2).

It is estimated that the cost of inadequate sanitation is US$8.5 billion (WSP 2008). The breakdown of this cost in select countries from the region is: Vietnam—US$780 million, or 1.3 percent of GDP; Philippines—US$1.4 billion, or 1.5 percent of GDP; and Indonesia—US$6.3 billion, or 2.3 percent of the GDP. While access to improved sanitation is high in these countries, only a small percentage of the collected wastewater or septage is treated (Table 1.1), compared to other countries in the region such as China or Malaysia.

While policies to improve sanitation exist, their implementation has been slow. It is estimated that in East Asia, every US$1 dollar spent on sanitation provides a return of US$8 (WHO 2012). Governments recognize the benefits of improved sanitation and have developed policies to expand coverage. However, the implementation of the policies has been slow mainly due to: lack of strong demand from the citizens for improved services, inadequate institutional arrangements to identify priorities and prepare viable projects, inadequate allocation of investment funds, absence of clear policies to raise tariffs to ensure financial sustainability of operations, and lack of commercialization of sanitation operations.

Predominance of septic tanks in urban areas is a characteristic of the region. In the East Asian context, water consumption is relatively high—more than 80 liters per capita per day. Also, most urban households have septic tanks that are connected to combined sewers and drains. For instance, it is estimated that Metro Manila and Jakarta have about 2.2 and 1 million septic tanks, respectively. Also, in Ho Chi Minh City, it is estimated that more than 1 million septic tanks are in operation. Septic tanks are not well maintained or regularly cleaned. As a result, they do not function as intended which leads to under-treated or untreated wastewater eventually being discharged to water bodies in an around the cities and into the groundwater.

Wastewater and septage are the major vectors for disease. A low percentage of urban wastewater is treated, creating health hazards. Similarly, there is inadequate control over septage collection, transportation, treatment and disposal. Furthermore, the septic tank design and construction has not been well regulated. Figure 1.3 illustrates the dominance of

Table 1.1 Key indicators in focus countries

Country	Percent of Urban Population[1]	Urban Population Growth Rate (%)[1]	Access to Improved Urban Sanitation (%)[2]	Urban Wastewater Treated (%)[3]	Percent of Septage Treated[3]
Vietnam	26	3.5	93	10	4
Indonesia	45	3.0	73	1	4
Philippines	66	2.9	79	4	10

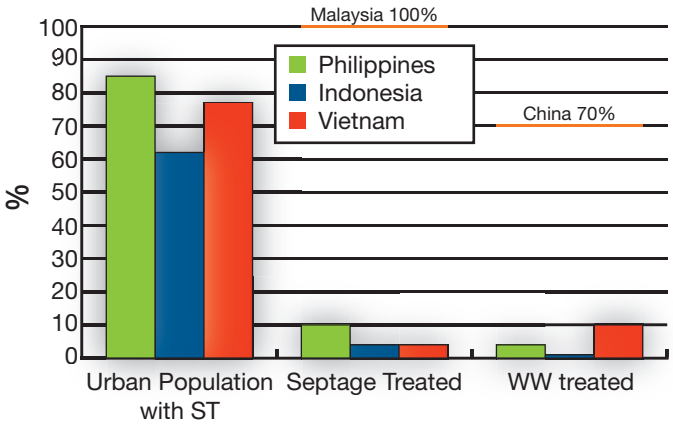
Notes:

[1] National sources and World Bank 2011.

[2] Source: JMP 2011

[3] Source: East Asia Urban Sanitation Review, World Bank 2013.

Figure 1.3: Urban population using septic tanks and percentage of septage and wastewater treated



Source: East Asia Urban Sanitation Review, World Bank 2013.

septic tanks in urban areas but at the same time shows how a small percentage of the septage and wastewater is treated. This creates the risk for spreading of water borne diseases such as cholera. For instance, in 2008 there was a cholera outbreak in Hanoi and fecal coliform levels in water bodies in and around Metro Manila are also reported to be high.

Behavior change is a primary challenge. Information on the importance of following good sanitation practices is not broadly available to the public. Similarly, the current poor water quality levels due to inadequate sanitation are not widely known. For instance, in the Philippines it was reported that diarrheal diseases are the second leading cause of morbidity among all ages and the third leading cause of mortality among children under the age of five.[8] Yet this information has not led to a country-wide momentum for change in sanitation practices. Broadly speaking, there is evidence that people are willing to pay the costs of improved sanitation if they can see clear benefits (WSP 2011).[9] Thus, policies should be developed which would allow the positive impacts of sanitation to be broadly known, creating momentum for change which would include: behavior change on better sanitation practices, citizen demand for better services which would trigger actions on the part of central and local government officials, and willingness to pay more for the services as the benefits are large.

Lack of adequate sanitation affects everyone, but the poor suffer the most. Inadequate sanitation affects all—poor and non-poor—as they all live within the same urban domain. Polluted water or contaminated soil in a city can affect human health of all citizens and consequently comprehensive city-wide sanitation solutions should be sought. The poor often live next to contaminated waterways in low-lying areas; this highlights the importance of treating wastewater collected in a catchment area. Open defection also tends to be more prevalent in low-income communities due to lack of toilets. For instance, in Indonesia about 14 percent of the urban population still practice open defecation. This affects the dignity and security of the concerned population, especially the women. Open defecation is an issue that needs to be addressed as part of sanitation strategies to assist the poor and reduce the environmental and health risks associated with presence of human waste in an urban setting.

1.2 COUNTRIES OF FOCUS: INDONESIA, THE PHILIPPINES AND VIETNAM

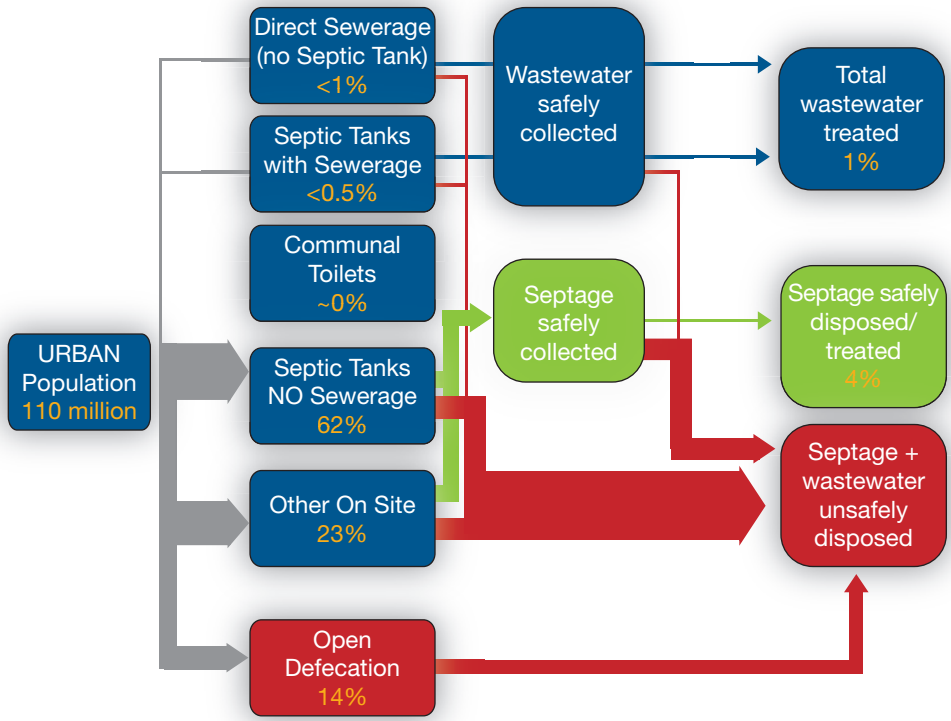
Indonesia

Challenges remain in reaching targets and achieving sustainable operation. The majority of urban households and businesses in Indonesia use septic tanks for wastewater disposal and, as in other East Asian countries, the use of water-flush toilets is common. However, less than 1 percent of the wastewater generated in the country is treated and septage treatment is also low (Figure 1.4). There has been an almost eight-fold increase in financing for sanitation since 2006, but it is still far from the projected investment needed to achieve the 2014 targets, which aim to reach 5 percent of the urban population through decentralized systems and a further 5 percent through centralized systems. Cost recovery also remains a challenge because of low connection rates and low tariffs. The sanitation services are mainly provided by a local government agency, separate from the water company. In some cases, the water and sanitation services are combined where the bill collection rate is higher as it is combined with the water bill.

Centralized systems are not fully utilized due to inadequate sewage network, including house connections. During the period 1980–2000, a number of centralized wastewater systems were built but they are still not working at full capacity (Table 1.2). The main reason for the under-utilization of the treatment plants is that the sewage network, including the house connections, is not well developed. The focus in the past was mainly on developing the infrastructure and now greater

8 Field Health Service Information System; Department of Health, 2007.
9 The Political Economy of Sanitation (2011).

Figure 1.4: Wastewater and septage flow in urban Indonesia



Source: East Asia Urban Sanitation Review, World Bank 2013.

Table 1.2: Capacity utilization of wastewater treatment plants in Indonesia

City (2006 Data)	Percent WWTP Capacity Used	Percent Sewer Capacity Used	Year of Commissioning	Major Rehabilitation
Balikpapan	64	38	2001	
Bandung	51	34	<1945	1994
Cirebon PU	60	43	1925	1998
Jakarta	12	30	1982	1996
Medan	28	87	1995	
Medan Parapat	8	21	2000	
Solo	98	47	<1945	
Tangerang	35	45		2004
Yogyakarta	63	74	<1945	1996
Average	47	47		

Source: USAID 2006.

attention needs to be paid to social marketing and behavior change aspects for the population and the readiness and institutional capacity of the local governments to connect more citizens. Home owners do not connect to the network because it is cheaper to use a septic tank. Ways to maximize the usage of the existing infrastructure for wastewater treatment should be considered as a priority. Lessons learned from this experience to increase household connections should be used in the planning for future wastewater investments.

There are sustainability issues with decentralized treatment systems and they need to be integrated with city-wide

sanitation plans. Recently, investments from the government, central and local level, have been mainly for decentralized systems. Such systems are well suited for areas where larger sewerage networks are not viable or to provide community solutions in low-income areas. However, there are issues that have emerged in the Indonesian context that have to be addressed. The decentralized systems have been mainly community managed, but it is now recognized that communities do not have the institutional and financial capabilities to properly operate and maintain decentralized treatment systems.[10] Broadly speaking, three types of decentralized systems have been constructed: (a) Communal Sanitation Centers (CSC) where the population uses a central facility for sanitation needs. CSCs constitute about 75 percent of the decentralized systems constructed; (b) simplified sewerage systems where the wastewater is taken to a decentralized facility for treatment. This corresponds to about 15 percent of the decentralized systems constructed; and (c) combination of CSC and simplified sewerage systems where the waste treatment system in CSC is also used for the treatment of effluent from simple sewerage system from the surrounding households which have private toilets. Some issues that have come up are:

- The CSCs usage has been around 20 percent of the expected demand. The national program implementation assumed that about 100 households or more would use a facility. However, the median usage is about 21 households. The demand for these CSCs would need to be reviewed because as more people receive piped water, the demand to visit these community systems would diminish. The operating costs for these systems are also high[11]—estimated to be around US$0.47/m^3 to meet effluent standards of 100 mg/l of Biological Oxygen Demand. For comparison, similar anaerobic centralized systems have significantly lower operating costs: Bandung—US$0.01/m^3; Medan—US$ 0.07/m^3; Yogyakarta—US$ 0.08/m^3; and Cirebon—US$0.03/m^3.
- For the simplified sewerage systems, the expected demand was that it would serve about 50 to 100 households and the median usage is about 50 households. The sewage systems for the decentralized treatment plants serve a useful purpose of collecting and transferring the sewage away from neighborhoods, especially in the poor areas. However, the treatment of wastewater for 50 households at a time does not bring economies of scale and is institutionally complex, as many small plants have to be installed in a sub-catchment area to scale-up sanitation.

Reforms in the sanitation sector are ongoing. A program is in place (Roadmap for Acceleration of Urban Sanitation Development) that aims to eliminate open defecation in Indonesia and increase the number of sewer connections and associated sewerage and wastewater treatment capacity to reach an additional 5 percent of the total urban population. A new program is being planned for the period between 2015 and 2020 to scale up sanitation through more centralized systems that have adequate house connections and sewage network and through a stronger collaboration between central and local governments.

Review of effluent standards. The effluent standards for wastewater would also have to be reviewed for the program starting from 2015. For instance, most countries in the region have a Biological Oxygen Demand limit of 50 mg/l or less in treated wastewater. In Indonesia, the current equivalent standard is 100 mg/l which allows for a lesser degree of treatment for the wastewater. When Indonesia strengthens its standards on wastewater effluent to reduce pollution, this would have an impact on the wastewater treatment approaches and costs. For instance, the decentralized systems currently used (which are mainly anaerobic) may not be suitable to meet lower effluent standards without an aeration process that would further add to the cost and complexity of operations. On the other hand, the centralized systems typically include an aeration process and would be able to handle a lower standard, but the issue of right-sizing the plant has to be addressed.

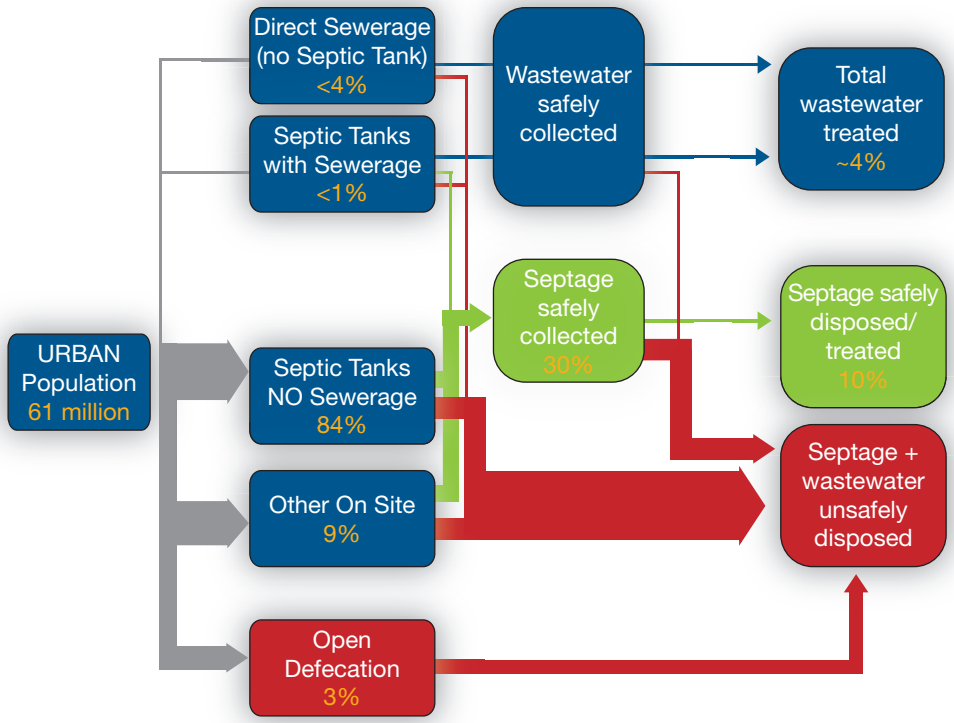
Philippines

Encouraging progress in upgrading and expanding urban sanitation services has been made in Metro Manila. In Metro Manila, the provision of collection and treatment of wastewater has been successfully privatized and the sector is well regulated. A well-conceived phased approach in improving sanitation is being implemented by two private concessionaires. This approach includes a strategy to upgrade septic tanks, existing drains, interceptors and treatment. The strategy aims to maintain and improve septage management programs in order to complement combined sewerage systems and, as affordability improves, to construct separate

[10] Review of Community Managed Decentralized Wastewater Treatment Systems in Indonesia, WSP 2012.

[11] Monthly operating cost of US$95 based on 84 users (21 households, assuming 4 users per household); per capita wastewater generated assumed to be 80 liters.

Figure 1.5: Wastewater and septage flow in urban Philippines



Source: East Asia Urban Sanitation Review, World Bank 2013.

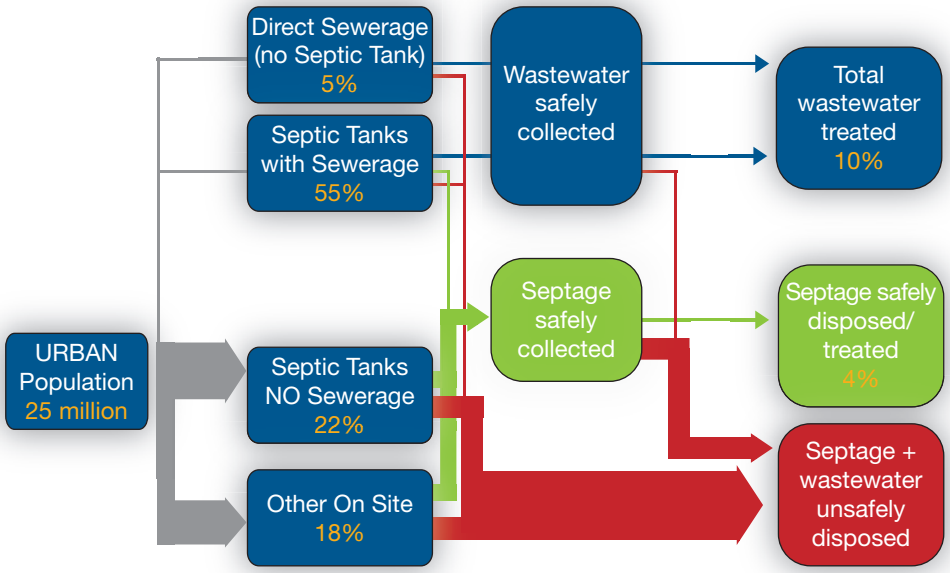
sewerage in selected areas. However, outside Metro Manila the progress on sanitation has been slow (Figure 1.5).

The only local government-operated sewerage system and treatment plant is in Baguio, while there are private sector operated sewerage and treatment systems in the tourist area of Boracay and in the special economic zones of Clark and Subic. Decentralized wastewater treatment systems (DEWATS) have been implemented in some areas such as in Dumaguete and Bayawan and for public facilities in other cities, but their viability at scale still needs to be demonstrated. There is currently an absence of any systematic sector monitoring system at the national and local levels.

A clearer sector strategy is needed, along with improved regulatory arrangements. The National Sewerage and Septage Management Program (NSSMP) was prepared in 2010 and sets ambitious targets for sewerage and septage management provision in urban areas outside Metro Manila. Yet, a clear strategy needs to be developed on how to implement this plan which would include regulatory, financing, and monitoring arrangements. Local action is still needed in most local government units (LGUs) to pass ordinances requiring septic tank de-sludging, appropriate disposal and treatment, and to enforce the Building Regulation and Sanitation Code provisions on septic tank design and construction.

Lack of capital investment is a significant constraint to sector development. So far, national government capital grants have not been available for urban sanitation, and neither LGUs nor Water Districts have been willing to borrow for either sewerage or septage management. Under the NSSMP, a proposed funding arrangement would include a 40 percent subsidy from the national government for sewerage, with the remaining 60 percent being shared by the Water District and the LGU. This arrangement will make available US$140 million for investments in the sector from the national government which would help with sector development. However, it is also important to prepare a pipeline of viable projects that can utilize the funds. Such a pipeline of projects is not in place. As more investments are made, it would be also critical to ensure that tariffs are adjusted to meet costs.

Figure 1.6: Wastewater and septage flow in urban Vietnam



Source: East Asia Urban Sanitation Review, World Bank 2013.

Vietnam

The policy to increase urban sanitation is in place, but issues remain with providing sanitation services in a sustainable way. Through a Prime Minister's decision, the overall policy to improve urban sanitation is being implemented. Investments have also taken place over the years (US$1.2 billion between 1991 and 2005), but this is not supported by a national strategy for urban sanitation. Work remains to be done to collect and treat septage and wastewater, as the overall treatment level is low (Figure 1.6). For the rural water and sanitation sector there is a National Target Program (NTP) and a similar approach to have a NTP for urban sanitation can be considered. Sanitation policies are implemented by provinces with various degrees of institutional capacity. In some cases, the institutional capacity is not adequate to effectively deliver services.

Attention needs to be paid to the quality of collection networks and sustainable operations, along with upgrades of the septage management systems. The approach taken in Vietnam to collect and treat the wastewater through centralized systems is economic and is the process that has been followed in other countries in the region such as China or Korea. Other countries like Malaysia have also focused on improving septage management along with the development of wastewater collection and treatment. In Vietnam, as of 2012, 17 wastewater plants were constructed and 30 more plants in the urban areas are planned. However, adequate emphasis has not been placed on the collection networks, which need: rehabilitation to prevent infiltration of groundwater; better design, with a proper slope to carry water during dry and wet weather conditions; and to have proper house connections so that wastewater is not discharged into the groundwater. In addition, attention needs to be paid to proper collection and treatment of septage.

Cost recovery levels are low. The central government has financed the investments in sanitation, often backed by loans from international donors. However, investment decisions have been made on a case-by-case basis and a strategic approach to address priority actions in the country has been missing. Furthermore, revenues from tariffs and fees often do not cover operating expenditures for the sanitation operations. This creates dependence on operating subsidies from provincial governments. The operating subsidies vary from year to year, depending on other competing needs, creating uncertainties regarding the quality of the sanitation services.

CHAPTER TWO
Urban Sanitation Sector Analysis

This chapter provides an overview of the sectoral issues that need to be addressed to improve sanitation.

2.1 PEOPLE-CENTERED POLICIES

Public awareness is low due to uninformed demand for sanitation. The negative impacts of unhygienic sanitation practices on human health are not widely known. At the household level, sanitation is typically seen as a private affair of the individual householder. However, if individual householders do not ensure that their septic tanks are working properly, are not interested in connecting the household to sewers where they exist, or are not willing to pay for wastewater services, collectively the community will suffer due to a poor environment and unacceptable health risks. Creating citizen demand for better quality services requires that they are aware of the serious health risks they face from poor sanitation service and practices. This requires making a shift from sanitation as a private concern to a public concern (Box 2.1)

Box 2.1: Facing the (Unpleasant) Facts

The Water and Sanitation Program (WSP) publication "Sanitation—It's Not a Private Matter Anymore" spells out a number of facts and messages about Indonesia, that are also relevant in most East Asian countries that could serve as a basis for public information campaigns:

- In Indonesia, out of every 1,000 live births, almost 50 children die before reaching the age of five.
- According to the Ministry of Health, one of the causes of these deaths is diarrhea brought on by poor sanitation.
- Nutrients from sewerage and septage encourage the growth of algae, which turns the water green. Algae uses up the oxygen in the water, killing fish and other aquatic life.
- Around 75 percent of the rivers in Java, Sumatra, Bali, and Sulawesi are heavily polluted by organic matter from household waste. The water gives off a putrid smell and turns black.
- Seventy percent of groundwater in cities in Indonesia is heavily polluted with sewage bacteria as a result of leaking septic tanks—yet half of city dwellers use groundwater for their daily needs.
- Although they are only supposed to drain rainwater, ditches are used for dumping gray water and garbage. As a result, ditches become blocked and are breeding grounds for disease.
- In urban areas, 35 percent of latrines are makeshift, having no water supply, no roof, or are not connected to a septic tank or other septic system.
- After emptying the contents of septic tanks, many sewage trucks illegally dump their loads of sewage sludge straight into rivers.
- In Jakarta alone there are more than one million septic tanks but almost no septic tank regulations to restrict the number per unit area or to require house owners to empty regularly.

Source: WSP 2007.

Figure 2.1: Open sewer channel in Jakarta, Indonesia

Ultimately, it is the demand from people that will lead to better sanitation practices. As the economies in East Asia grow, people will expect to live in a cleaner environment free from health risks and demand better sanitation services. Policy makers need to be prepared to respond to these demands by providing better services and build public awareness of the importance of sanitation services and practices to the health and well-being of households. The Association of Cities and Districts Concerned about Sanitation in Indonesia (AKKOPSI) Program in Indonesia provides an example of how civic awareness has helped in the delivery of better sanitation services. AKKOPSI was established by the mayors of the cities that had completed city sanitation strategies. Currently about 120 cities have joined AKKOPSI. It is an advocacy group to provide support for achieving the national sanitation targets by sharing experiences. The group meets quarterly and convenes annual City Sanitation Summits, and seeks to achieve a target allocation of at least two percent of local government budgets for sanitation. AKKOPSI has recently initiated City Sanitation Rankings to benchmark and measure performance in implementing City Sanitation Strategies.

Information exchange facilitates forming and understanding opinions. Information ideally flows two ways: from public authorities to consumers and from consumers to public authorities. Measures such as increasing tariffs are easier to implement if there is strong public awareness of the environmental and health impacts of inadequate sanitation. For instance, the European Union has for some years now conducted the "Water Barometer" survey to gauge and learn from public opinion.[12] The survey is an explicit "listening exercise" intended to understand consumer awareness and perceptions of water and sanitation issues and legislation, as well as their willingness to take individual actions to improve the water-related environment. The survey informs policy makers of the extent to which information campaigns have been successful and enables them to keep in touch with public attitudes and perceptions. Another example is in Vietnam where the authorities in Da Lat and Boun Ma Thout promoted household connections through a public awareness program which led to significant behavior change results (Box 2.2).

Citizen initiatives to clean-up the environment have been successful and are likely to continue. There are many successful environmental initiatives taken by citizens which have led to change. As mentioned above, policy makers should facilitate information exchange so that citizens are better informed about the state of the environment. Some examples of successful citizen movement include: the Mandamus issued by the Supreme Court of Philippines to clean up Manila Bay (Box 2.3). Another successful example is the clean-up of the Boston Harbor. In 2009, the Massachusetts Water Resources Authority mentioned that "It was only a little over 20 years ago that Boston Harbor was known as the "dirtiest harbor in America." Today, it's "a Great American Jewel." The Boston Harbor clean-up efforts picked up momentum after citizen-led efforts resulted in the clean-up of the harbor.

Constant public vigilance ensures better sector performance. Demand by citizens for urban sanitation is influenced by information on health and the environment, by how well civil society is organized, and by cultural factors. In the Philippines, there are opportunities through legal procedures for civil society or individuals to take legal action on a range of environmental issues. For example, the mandamus on the clean-up of Manila Bay successfully demonstrates that concerned citizens can engage with authorities and create change. To promote such change, civil society must continuously monitor the environment and provide feedback to the public authorities. For example, in the USA, a civil society organization called Baykeeper regularly reports on how well

[12] In 2000, in response to worsening water quality, the European Union launched the ambitious *Water Framework Directive* initiative, which aims to bring environmental performance of all 27 member countries to a similar level. Since the directive would need strong public support, based on public opinion that was founded on solid information, The *Water Barometer* survey was initiated. *Source:* European Commission, DG Environment 2012.

Box 2.2: Five-Point Strategy for Promoting Household Connections in Vietnam

In Da Lat and Boun Ma Thout in Vietnam, a series of information, regulatory, institutional, and pro-poor measures were needed to effectively promote household connections. These included:

- Public awareness was increased by launching an Information Education Communication (IEC) campaign to promote the connection of households to the public sewer system, citing the benefits of the program to the homeowner and environmental improvement to the community as a whole.
- Local authorities issued a decree mandating that all households located within an area served by public sewerage system or drains be connected to the system.
- A government subsidy was provided for household connections to encourage connection and to reduce the financial burden on the vulnerable households, especially the poor.
- Local authorities established a specific house connection group or department responsible for operating the sewer system. The purpose of such a group is to promote, issue permits and monitor the permitted household connections throughout the sewerage service area.
- Household connections are required to be an integral part of project formulation, funding, and implementation for new sanitation projects or existing sanitation projects that will be expanded.

Box 2.3: Mandamus by Philippines Supreme Court to Clean Up Manila Bay

In January 1999, a group called the Concerned Residents of Manila Bay sued several government agencies for the clean-up, rehabilitation, and protection of the Manila Bay. This concerned citizens group established that the fecal coliform level in Manila Bay exceeded norms in a significant way which required pro-active measures to reduce the pollution reaching the water body. On September 13, 2002, based on the law suit, a trial court in Philippines issued a decision requiring the government agencies to clean-up the bay. The Government agencies appealed to the Court of Appeals mentioning that the trial's court decision did not require the agencies to carry out tasks outside their basic work. This matter was then ultimately elevated to the Supreme Court.

On December 18, 2008, the Philippines Supreme Court ordered all concerned government agencies to coordinate in the clean-up, restoration, and preservation of Manila Bay. In the decision, the Supreme Court mentioned that Manila Bay was "a place with a proud historic past, once brimming with marine life and, for so many decades in the in the past, a spot for different contact recreation activities, but now a dirty and slowly dying expanse." Through this decision, the Supreme Court directed related agencies to carry out the clean-up and noted that time was of the essence in addressing the ongoing environmental degradation. Based on this decision of the Supreme Court, actions are being currently taken to collect and treat wastewater generated in the Metro Manila area.

the city authorities in San Francisco are controlling pollution in the Bay. Baykeeper runs a website, distributes information and promotes good performance of local sewerage agencies.[13] These actions point to the capability of well-informed citizens to understand the root causes of poor performance and to advocate for increased funding to the sector.

Monitoring systems improve accountability and performance. In the Philippines, one of the first steps of the new National Sewerage and Septage Management Program is to develop a national monitoring system that intends to review the status of service coverage and performance. In Indonesia, while awaiting the establishment of a formal national information system, mayors have initiated an inter-city ranking system that aims to benchmark sanitation performance. In Vietnam, the Government is considering to put in place web-based systems where the performance of water and wastewater utilities would be reported. Such systems will provide

[13] *Source:* http://baykeeper.org/news/column/working-capitol-healthier-san-francisco-bay-2012.

information on a systematic basis and inform the public on important issues which in turn will raise civic awareness on sanitation. One example of a monitoring system is in Brazil where the *Sistema Nacional de Informacoes sobre Saneamento* (SNIS; created in 1995) is credited with consolidating and accelerating progress not only in development of urban sanitation infrastructure, but also service provision performance. SNIS is a benchmark for performance indicators for a large number of both public and private service providers. The SNIS tracks about 80 performance indicators such as economic and administrative efficiency (30 indicators); water operational efficiency (20 indicators); sewerage operational efficiency (10 indicators); financial performance (10 indicators); and water service quality (10 indicators). SNIS publishes an annual yearbook where all indicators are tracked by the utility. In order to ensure a comprehensive database, access to loans and grants is conditioned on utilities joining the SNIS.

Figure 2.2: Sewers emptying into an urban water body

2.2 COST-EFFECTIVE TECHNICAL SOLUTIONS

Baseline conditions will determine different technical solutions. The starting condition in most urban areas is determined by the high use of water, where the option of flush toilets is widely used to remove human waste. This situation (use of flush toilets; most urban households using on-site systems) determines the main technical challenges the sector faces because septic tanks do not function well, the transfer of wastewater is not done in an environmentally safe manner, and wastewater is not treated before it is finally discharged which pollutes rivers and creeks. These issues are described below for a better understanding of the problem.

- Most urban households have septic tanks but often the design and the construction quality is poor. These tanks are not emptied regularly either because they are inaccessible or there is no service available or demanded. In poor areas, pit latrines are used that discharge directly into street drains. In some poor areas, open defection also occurs. Human waste from these practices causes health and environment concerns. The service providers are typically private and not well regulated where septage collection services are provided under a regulatory framework that ensures quality services and guarantees competition.[14] The collected septage is not always disposed in designated landfills and is frequently discharged illegally causing environmental and health concerns.
- Solid waste: in the urban areas, solid waste is often discharged in combined sewers and open channels. Solid waste blocks the drains, which leads to wastewater overflowing to the streets. Removal of solid waste not only improves the environment but helps to improve the aesthetic and hydraulic conditions of open canals. Thus, the removal of solid waste should be considered together with removal of septage and wastewater.
- Combined sewerage systems: the combined sewerage networks—those that carry storm water and wastewater—in the East Asian context are mainly designed to drain storm water. However, effluent from septic tanks and other on-site sanitation structures are discharged in these drains which ultimately leads to wastewater being discharged to open channels or urban creeks (Figure 2.2). These combined drains are not well constructed which allow the infiltration of groundwater, increasing the volume of wastewater that is collected in the drains. The condition of these drains needs to improve to maximize collection of wastewater and minimize runoff infiltration.
- Separate sewer systems: in new developments, most cities plan to lay separate sewers that convey wastewater directly from households to a wastewater treatment plant by means of a piped network. When separate systems are created, the sewers will convey wastewater while the storm drains will convey rain or flood waters. Separate sewers help to meet the objectives of separating

[14] Sanitation Markets (Pathfinder Paper), Sophie Tremolet 2012.

humans from waste and minimizing contamination of the environment.

Wastewater and septage are the major vectors for diseases. Due to the use of flush toilets, the high intensity of water use, and predominance of septic tanks, the difference between onsite and offsite sanitation is blurred.[15] In many cases, disposal of wastewater remains a challenge as it leaks from the septic tank and ends up in streets becoming a vector for the spread of waterborne diseases. This is the main reason for implementing a proper drainage and collection system, even in areas that will still be relying on septic tanks in the future.

Septage management is an immediate challenge in most Asian cities. The vast majority of the urban population is served by septic tanks which are not properly maintained or regulated. The three most common problems with septic tanks are that, when they are not working well, they: (a) fail to separate waste from humans; (b) contaminate groundwater and open channels; and (c) create health and environmental risks when the septage from the septic tanks is disposed illegally in areas (land or water) that are not designed to receive the waste. In the East Asia region, Malaysia has an innovative program on septage management with a number of innovations, such as payment arrangements that include regularly scheduled de-sludging. This is working well with 100 percent coverage in the areas served by the system. In Metro Manila, an environmental fee is charged for all consumers for which they receive a regular septic tank emptying service.

Septage disposal and treatment is inadequate. Almost all urban centers in the region have septage management systems that are run by the private sector, indicating that septage collection is financially viable. However, septage collection from households is not uniform and only a small portion of the septage collected is treated. In Indonesia, only 4 percent of urban septage is treated. In the Philippines although over 30 percent of septage is treated in Manila; outside of Manila, this figure falls to 5 percent. In Vietnam it is estimated that 4 percent of septage is treated.

Presence of septic tanks reduces organic load, hence wastewater systems have to be designed accordingly. Most urban households have septic tanks (Vietnam 77 percent; Philippines 85 percent; Indonesia 62 percent) or structures similar to septic tanks that retain most of the solids in wastewater, while allowing the liquids to flow to the drains. Similarly, in most other large cities, the wastewater in households is typically first discharged to septic tanks. A key outcome of the presence of these tanks is that the organic load content (Biological Oxygen Demand, or BOD) in the wastewater that reaches the drains is lower since part of the organic load is separated through the solids that are retained in the septic tank. The implication of this is that wastewater treatment systems have to be typically designed for a lower BOD level. Groundwater infiltration, due to sewerage pipes in poor condition, also substantially lowers the BOD level for wastewater that reaches the treatment plants.

Presence of combined sewer systems will influence decisions on sewers. In most cities in East Asia, combined drainage systems are used that carry wastewater from households and rain water during wet weather conditions. Very often these combined systems are not properly designed or constructed. These drains are normally designed to collect storm water and not designed to collect wastewater but nevertheless, wastewater is discharged to these drains (Figure 2.3). During floods—which are common in East Asia—these drains overflow and create pollution due to the presence of sewage. The drains also allow significant infiltration of groundwater which dilutes the wastewater almost to the level required for effluents as seen in Vietnam. Furthermore, due to the infiltration of groundwater, the hydraulic volume that is transferred to the wastewater treatment plant is increased; and the groundwater has to be treated as well as it is mixed with the wastewater, although it may not be necessary to treat the groundwater.

Figure 2.3: Combined drainage systems in Hanoi, discharging to open channel

[15] Delivering Sanitation to the Urban Poor: A Scoping Study, Draft Paper, WSP 2012.

Separate sewerage systems are being considered in many cities, which will improve wastewater management, but they are expensive. In some cases, especially in established part of cities, combined systems are being replaced with separate systems. There are pros and cons of both systems and many cities that have long had sewerage systems still retain combined sewers. For instance, London—which was one of the first cities in the world where sewerage systems were developed—still uses combined systems. In the East Asian context, separate sewers may not be implemented on a wide scale in the near future due to costs and difficulty in installing separated sewers in roads that are narrow and in densely populated areas of cities.

Household demand to connect to sewerage connections is low. This is a major issue in the three countries of focus. In Indonesia, the Philippines and Vietnam the country studies found a consistent hierarchy of consumer demand that moves from: (a) access to safe water; to (b) access to a toilet that has privacy; to (c) effective drainage of local areas; and to (d) safe disposal of waste into receiving waters. There is little demand for sewerage connection if septic tanks work without apparent problems to the householder. Strategies are not in place to encourage connection to sewerage systems and the regular emptying of septic tanks. Capacity utilization is low due to low household connection rates. Sanitation plans, where they exist, do not take into account the above mentioned hierarchy of demand. Although, wastewater from the septic tanks end up in the combined drains, it would be important to have proper house connections to sewer lines (combined or separated) as they are installed or rehabilitated. This will prevent the discharge of wastewater to the groundwater or streets.

Open defecation is still practiced. Open defecation has been eliminated in Vietnam in the urban areas. However, about 14 and 3 percent of the urban population defecate openly in Indonesia and Philippines, respectively, mainly due to the absence of toilets. Open defecation increases the risk of the population being affected with diseases. Furthermore, it reduces the dignity of the citizens that have to defecate openly and it affects equity of services in an urban society. Safety, especially for women, is also an issue associated with open defecation that needs to be addressed.

Sound project preparation is often missing. A city-wide approach to identify priorities and, thereafter, preparing a viable feasibility study that would address technical and financial concerns are missing. To reduce costs, local governments hire consultants that may not have the adequate experience in addressing site specific issues. Sometimes, standard designs are used which results in over-designed systems and use of treatment technology that may not be cost effective. As mentioned before, the issue of house connections is not looked at in detail, resulting under-used treatment plants. Furthermore, the emphasis typically is on the construction of the infrastructure; however, the operational aspects—such as the presence of a financially viable local company that can collect and treat the wastewater—are not considered at the project planning stage.

Economic decisions on investments and operations not often made. Wastewater management is a new business in many parts of East Asia and the feasibility studies prepared by consultants are often not questioned in a rigorous manner that could lead to an optimization of the investment. For the feasibility study analysis, adequate data—water quality and quantity—are not always collected or used to make an informed decision on the wastewater treatment technology choice. There is also a lack of information on technology alternatives that allow decision makers to make the optimal choices that would be economic. When wastewater treatment plants do not function as planned, usually it is not the failure of the technology—as the processes used for wastewater treatment are well established. The main reasons for non-functioning treatment plants are:

- the cost of operations cannot be sustained by the tariffs;
- household connections are not maximized or the network is not fully developed; and
- the operations are complex and the institutional capacity to operate a wastewater plant is not adequate.

Investments are still not adequately phased, especially for wastewater. Wastewater treatment plants are built with over-optimistic demand projections on the volume of wastewater that needs to be treated. The lack of sewer networks or optimal number of household connections contributes to the inadequate demand of the wastewater treatment plant. Furthermore, the quality of the wastewater with low concentration of biological load is not taken into account in the design. As earlier outlined, it is common to find actual BOD levels less than 100 mg/l in East Asian cities due to the presence of septic tanks which remove some biological load and the combined sewers which allow storm water to dilute the wastewater. However, the sophisticated technology chosen is

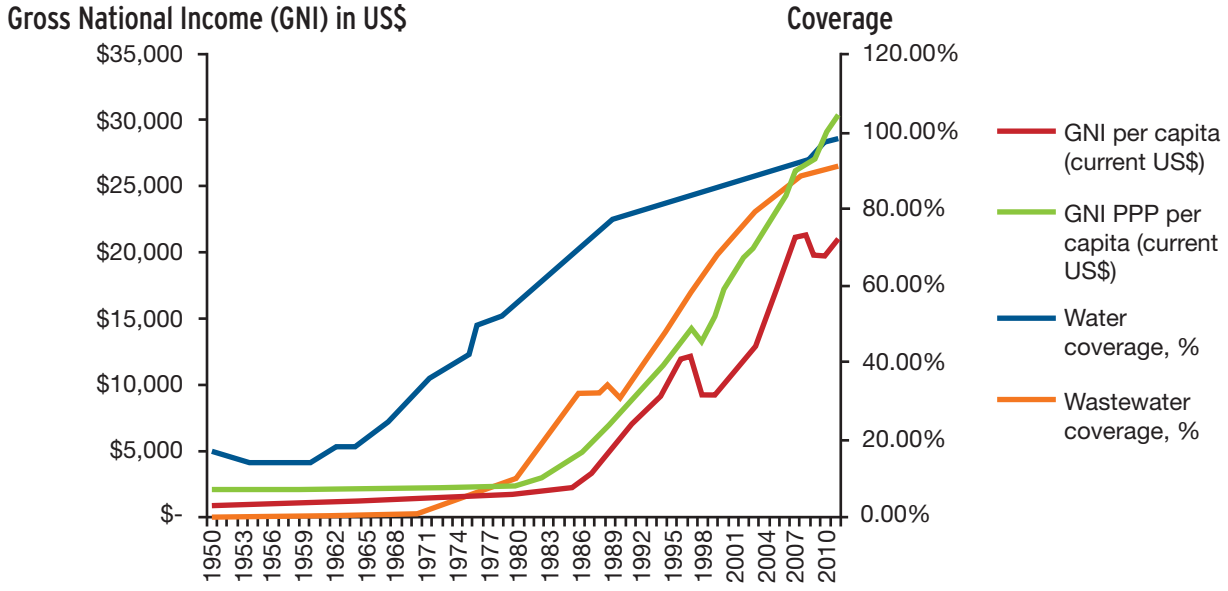
designed to handle much higher BOD loads. Overdesign—by building a plant larger than required or using overly sophisticated technology—leads to higher investment and operational costs which should be avoided.

Other countries in East Asia have sequenced technical solutions. In East Asia, countries with a higher gross domestic product (GDP) have also sequenced their sanitation investments and they serve as models:

- Korea: initially, there was a focus on collecting the wastewater effluent and on accelerating the implementation of treatment capacity. As part of this effort, emphasis was put on replacing sewer pipes through a maintenance program that lowered groundwater infiltration. This, in turn, lowered the volume of wastewater that was pumped to the treatment plants. As sewerage collection systems were upgraded, wastewater management improved, a greater proportion of waste was captured and treatment was more effective. With a rapidly increasing urban population and in line with growing GDP, the focus has moved in phases from the introduction of sewerage in the 1980s to the treatment of waste water in the 1990s to the removal of nutrients in the 2000s (Figure 2.4).
- Malaysia: the country adopted a sequential investment pattern of first investing in collection of wastewater and then gradually increasing the level and sophistication of treatment and environmental protection over time. Connection to a well-functioning septic tank that is de-sludged regularly and where the groundwater can safely absorb the overflow is accepted as a solution; this precludes the need to build expensive sewerage and treatment systems. This policy, however, requires strong regulation with meaningful fines for non-compliance. In developing the sanitation strategy, the country also ensured that the cost and the level of treatment grew in tandem with the wealth of the population.

Adapting to climate change presents serious challenges to the sanitation sector. In some areas, the balance of supply and demand will change due to changes in the seasonality of rainfall. More frequent and intense rainfall events are expected to occur. As most of the drains in East Asia are combined, there is a risk of more frequent sewage overflows to the streets affecting human health and the environment during flood events. In addition, climate change will increase the emphasis on water reuse in the long run, as is already happening in water scarce regions. The reuse of nutrients and the production of bio-gas from the sludge also offer prospects for the sector to contribute to climate change mitigation. As the treatment and collection of septage increases and as more sludge is generated through increased wastewater treatment, opportunities to use sludge and septage as nutrients for agricultural purposes will increase.

Figure 2.4: Sequence of development in Korea



Source: Yoon, Joo-Hwan. 2011.

Waste to energy has not been sufficiently explored. The medium to large wastewater treatment plants provide an opportunity to generate electricity from the gases generated in the plant, in spite of the low concentration of BOD in the wastewater. However, it has not been common practice to generate electricity in the plants that are located in the region. Electricity generated and used in the plants would help to reduce operating expenditures as energy use constitutes a significant cost. Furthermore, waste to energy measures would also help to reduce green-house gases. As new wastewater treatment plants are considered, it would be important for decision makers to consider installing infrastructure that would generate electricity. The officials in Ho Chi Minh City are considering such a measure for a large treatment plant and the expectation is that this project would set examples for other new plants under consideration. Experienced operators, however, need to be in place to derive energy from sludge as the operations are complex.

There are limited experiences on water reuse. Nutrient reuse, water reuse, and energy production from wastewater is not common in Indonesia, the Philippines, and Vietnam. However, there are successful experiences in the region that can provide lessons in this field. In Korea, as part of the green growth initiatives, there are plans to increase water reuse and to reduce energy use at treatment plants. Increasingly, water in Korea is called the "Blue Gold" of the future. Similarly, in Singapore recent advances in converting wastewater to drinking water have shown that concrete measures can be taken to address the issue of water shortages that many cities will increasingly face in the future. In Singapore, the recycled water is called NEWater and it already supplies about 30 percent of demand. It is expected that by 2060, 50 percent of the water used will be recycled water. Singapore also has a plan to increase its supply of desalinated water and by 2060 about 80 percent of the water will be either NEWater or desalinated water (Table 2.1).

Table 2.1: Meeting future water needs in Singapore

Year	NEWater	Desalinated Water	Imported Water and from Reservoirs
2012	30%	10%	Rest
2060	50%	30%	Rest

Source: Public Utilities Board, Singapore.

2.3 SUSTAINABLE INSTITUTIONS FOR QUALITY SERVICE

The enabling environment is not in place. The current programs to expand sanitation services are not comprehensive enough when compared with the magnitude of the problem of lack of adequate sanitation. There are important gaps in the enabling environment that hamper effective sanitation management: strategies to prioritize investments are not in place, the institutional arrangements are often not clear, and viable projects are not in place that can attract financing from public and private sources. Furthermore, local sanitation service providers are not in a financially viable position as tariffs do not meet operating costs. This makes them dependent on subsidies and services (such as regular drain clearance) are cut to reduce expenditures in case the subsidies are not adequate.

Policies to expand sanitation services exist, but implementation has been slow. In the three focus countries, the overall service targets in terms of population and wastewater to be collected and treated provide a perspective on the magnitude of the issue.

- In Indonesia, service expansion policies are defined in the medium-term development plans (RPJMN) produced every five years, the National Policy and Strategies on Domestic Wastewater Management, and through the policy on minimum service standards established by the Ministry of Public Works (MPW). Although the funding for sanitation has increased, the funds have not been sufficient to scale-up sanitation where about 1 percent of the urban wastewater is treated. After 2014, Indonesia's accelerated sanitation development program (PPSP, which stands for *Percepatan Pembangunan Sanitasi Permukiman*) will continue through a second phase, which will provide the Government an opportunity to develop a comprehensive program.
- In the Philippines, in Metro Manila, the Supreme Court Decision to clean up Manila Bay and the requirements of the Clean Water Act have set a clear path for service expansion. It is expected that by 2037, the wastewater generated in the geographic areas covered by the two Metro Manila private concessionaires would be fully collected and treated. Outside Metro Manila, plans to expand services are less firm, although the implementation of the National Sewerage and Septage Management Program and the Government's plans to expand urban wastewater services to reach 50 percent coverage by 2030 in the

17 Highly Urbanized Cities will help to bring focus on service expansion goals.

- In Vietnam, through a decision of the Prime Minister (Decision 1930), the Government has set a target that by 2020, 60 percent of wastewater in cities of Class 3 and above, and 40 percent of wastewater in cities/towns of Class 4 and 5, should be collected and properly treated. As it would be difficult to implement such a large program, the Government should establish priorities with an implementation plan covering infrastructure and financing needs.

Countries may have different paths to increase and improve coverage. The starting condition in every country is different and, as a result, the path to achieve higher level of sanitation will vary.

- In Indonesia, an added policy dimension is that many parts of the urban population do not have piped water coverage, and water from shallow wells is used. For instance, in Jakarta piped water coverage is about 60 percent. In such an environment, if septic tanks do not function well, the risk of contaminating the drinking water is high. Thus, apart from the efforts of improving sanitation, policy measures to increase piped water coverage should be taken.
- In the Philippines, in Metro Manila, the plan to increase sanitation coverage is moving ahead and is being driven by the Supreme Court Decision to clean up Manila Bay. An ambitious program to reach 100 percent coverage on sanitation has been developed by the two private concessionaires (Box 2.4). Currently, there are no plans to provide grants for financing the improvements and the investments have to be financed through cross subsidies from water. This, however, may create pressure to increase tariffs significantly as wastewater investments do not generate revenues. Outside Metro Manila, apart from Baguio, the tourism center of Boracay and the special economic zones of Clark and Subic, wastewater coverage is minimal. Policies and plans need to be put in place to improve septage management and wastewater collection and treatment for the rest of the country. Initial work has started through the NSSMP through which the central government has agreed to finance 40 percent of the investment cost of sewerage for the 17 Highly Urbanized Cities. Subsidies will not be provided for septage management, which is considered to be a viable operation for financing by local government or Water Districts.
- In Vietnam, there is no specific program to improve septage management. On wastewater, although collection systems exist, they have to be upgraded and extended. A number of wastewater treatment plants are in operation in the country and more plants are expected to be put in place in the coming years. The construction of plants was made possible by the central government's policy to finance 100 percent of the investment cost. But while the investments are in place, there are operational issues that need to be addressed including insufficient house connections, financial sustainability, and inadequate operations. These should be areas of policy focus in the country.

Close coordination of central and local governments is necessary. Commonly, sanitation policies are set by the central government while the implementation is done by local governments. Thus, close coordination is needed between the two levels of governments. Each country in the region will have a different approach to promote coordination among agencies depending on country-specific conditions. However, there are three examples that are instructive:

- Malaysia achieved coordination by first centralizing sanitation responsibilities under a single ministry which allowed for unified management. Once facilities were in place, capacity was built, and the sector was strengthened Malaysia started to gradually decentralize to local governments which have the capacity and means to provide quality sanitation services;
- Korea applied the principles of integrated water resources management (IWRM) and used the river basin approach as a means of promoting coordination across sectors and among upstream and downstream entities; and
- In Indonesia, the Steering Committee for Drinking Water and Environmental Health (AMPL) is responsible for implementing sanitation strategies. The executive body of AMPL is the Pokja (working group). Both the Steering Committee and the Pokja are chaired by the BAPPENAS (National Development Planning Agency) and comprise members from the Ministries of Public Works, Health, Home Affairs, Finance, Industry, Environment, Housing, Education, and the Central Statistics Bureau. Many of the Pokja members collaborate closely on water and sanitation policy issues which has led to increased awareness on sector issues in the country.

Professionalization of the sector is still underway. Sustainable urban sanitation is a relatively new business and the overall sectoral knowledge in the focus countries is still developing. In the Philippines, it is reported that there are only 500 out of the 2,500 registered sanitary engineers practicing their profession. Decentralization has tended to scatter rather than

Box 2.4: Private Sector Success in Manila

Water crisis gave birth to private participation—In 1995, the Water Crisis Act was passed, providing the legal framework for the privatization of the Metropolitan Waterworks and Sewerage System (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 currently around 7.2 million people and MWCI the East Zone with 23 cities/municipalities serving around 6.2 million people. The companies are regulated by the MWSS Regulatory Office.

A realistic and phased strategy is delivering promising results—A Sewerage and Sanitation Master Plan (2005) proposed to increase sanitation services through collecting the wastewater through interceptors and existing combined drains and directing the wastewater to treatment plants for treatment. The strategy also involves a septage management program. MWSI and MWCI sewerage coverage is now 8 and 9 percent, respectively; and both companies plan to increase coverage to 100 percent by 2037. Currently, MWSI operates five treatment plants with a capacity of 470 million liters per day, although an additional six major and 16 smaller plants are proposed in the next phase of development. MWCI operates 33 sewage treatment plants with a capacity of over 100 million liters per day. It has two septage treatment plants and about 50 vacuum trucks that regularly clean the sludge from septic tanks in the East Zone.

This is a successful experience in the region because of:

- remarkable growth in treating septage (Fig. 4.4);
- a comprehensive approach to collecting and treating wastewater is taken by assessing the needs of the city through a Master Plan and addressing priorities at a catchment level;
- the regulatory environment is clear;
- the presence of customer-oriented utilities that provide information to the consumers to improve services; and
- a public-private partnership exists that has improved services on water, wastewater, and septage management.

	2008-2012	2013-2016	2017-2021	2022-2037	Total
			Maynilad		
Sanitation coverage	14%	30%	60%	100%	
Investment cost	US$113 M	US$411 M	US$604 M	US$622 M	US$1.75 B
			Manila Water		
Sanitation coverage	30%	45%	63%	100%	
Investment cost	US$295 M	US$680 M	US$164 M	US$481 M	US$1.62 B

Source: Sewerage and Sanitation Master Plan 2005.

replicate or enlarge the pool of sanitation expertise. Professionalization of the sector is important for building, sustaining, and replicating institutional capacity. Two examples are provided below:

- In Malaysia, training and professionalization of sector staff was carried out systematically. Cadres of sanitation professionals—functioning at all levels—were trained through universities, vocational training colleges and on-the-job experience through a training program run by the national utility. This capacity building, which was done at scale and at all levels, is enabling Malaysia to decentralize services.
- In Korea, a national certification system was introduced in the 1990s to improve the expertise of water treatment plant operations especially for small-scale plants. This was further formalized in 2002 by the newly established Korea Water Supply and Water Works Association which coordinated

the capacity building undertaken by universities, research institutes, government, utilities, and the private sector.

Managerial and financial autonomy for efficient service provision is absent. The entity that is providing sanitation services at the local level is vital in ensuring that health and environmental concerns are properly addressed. These entities could be departments of local governments or a utility that provides sanitation services to the population. The entities that provide sanitation services are typically financially weak, excepting in large cities, as they do not meet expenditures that are needed to run sanitation services. The financial weakness stems from the fact that sanitation tariffs do not meet operating costs and the service provider has to depend on subsidies from the local government which may vary. Operational budgets are not well defined and it is difficult to predict revenues and to plan future investments to improve the services. The service standards are also not well defined, although there are exceptions such as the concession arrangements in Metro Manila where the two concessionaires have an obligation to the regulator to increase coverage.

Except for septage management, private sector operations are not viable. Aside from the successful Metro Manila case, the role of the private sector has been limited in the collection and treatment of wastewater due to regulatory risks and low tariffs. Regulators such as the Regulatory Office under MWSS are not yet present outside Metro Manila and in other countries. A regulator would ensure that quality services are provided at economic tariffs. The risks in the septage collection business seem low as private companies are involved in all three focus countries. However, the way septage is treated and disposed of should be regulated as there are concerns that septage is not being handled in an environmentally safe manner.

Combining sanitation (septage and wastewater) and water supply operations is a viable solution that is not always followed. Merging water and sanitation services leads to economies of scale. Furthermore, the customer base for the service provider is the same, which facilitates billing and enforcing the collection of sanitation fees. Thus, wherever possible, the water and sanitation services should be merged. Such examples of merged utilities exist in Dalat (Vietnam) and in Metro Manila. For the latter, there are no subsidies from the local governments. As the two concessionaires are private entities, the water tariffs cross-subsidizes the investment and operating costs for septage and wastewater collection and treatment, and overall the two concessionaires are profitable. This illustrates that it is possible to run financially viable sanitation operations, especially if the business is combined with water.

2.4 VIABLE FINANCIAL SYSTEMS

The cost to improve sanitation is significant. The investment cost to improve sewers, construct wastewater treatment plants, and make other improvements on septage management is estimated to be at least around US$250 on a per capita basis[16]. However, it is recognized that the per capita cost would vary depending on the situation in a city and the plans to upgrade septage management and to collect and treat wastewater. Using a per capita cost figure of US$250, the total cost to cover the urban population in the focus countries in the next 15 years is: US$42.7 billion in Indonesia; US$23.1 billion in Philippines; and US$8.3 billion in Vietnam (Table 2.2).

16 Based on Manila Sewerage Master Plan and Feasibility studies for Ho Chi Minh City.

Table 2.2: Cost of sanitation

	Vietnam	Indonesia	Philippines
Current urban population (million)	23	110	61
Urban population in 2025 (million)	36	172	95
Current wastewater volume (in 1000 m^3/day)	3,424	16,538	9,108
Current treatment of wastewater (percentage)	10	1	4
Investment needed to collect and treat wastewater until 2025 (US$ billion)*	8.3	42.7	23.1

*Assuming a per capita investment cost of US$250.

Source: East Asia Urban Sanitation Review, World Bank 2013.

Urban sanitation investments are often not guided by strategies or integrated into investment planning cycles. Urban sanitation represents a major investment for most cities and towns. However, often these investments are not integrated into the multi-annual investment planning cycle for the municipality as part of urban development plans. City-wide sanitation plans or Sewage Master Plans are not commonly developed. Accountability is weakened if city leadership is not well informed about the development of the sector and is unable to present a compelling case for investment to the public who will ultimately be paying for the systems through taxes or tariffs. A key lesson from the city sanitation strategies pioneered by Indonesia (Box 2.5) is that these strategies need to be city-developed, city-led and city-owned even if there is a matching subsidy available from the central government.

Sanitation policies and plans are not translated into funded programs. The focus countries have sector policies, but these policies have not translated into implementable and funded programs with a clear expenditure framework. The potential sources of finance such as tariffs, taxes and transfers from central government and the blend of loans and grants are not well delineated. The rules that govern public transfers, tariffs, and the engagement of private sector finance are not uniform and are determined on a case-by-case basis. As there is uncertainty in the investment financing and rules to access government grants, the authorities sometimes defer investment decisions which, in turn, affects the development of the sector.

Investments in sanitation in Indonesia and the Philippines are low compared to needs. In these two countries, the actual expenditures have been low compared to the needs, creating large wastewater infrastructure and service gaps. In Vietnam, the expenditures have been around 0.45 percent of the GDP and, if this trend continues, the country would make significant improvements in sanitation. Assuming that the investments are to take place over the next 15 years:

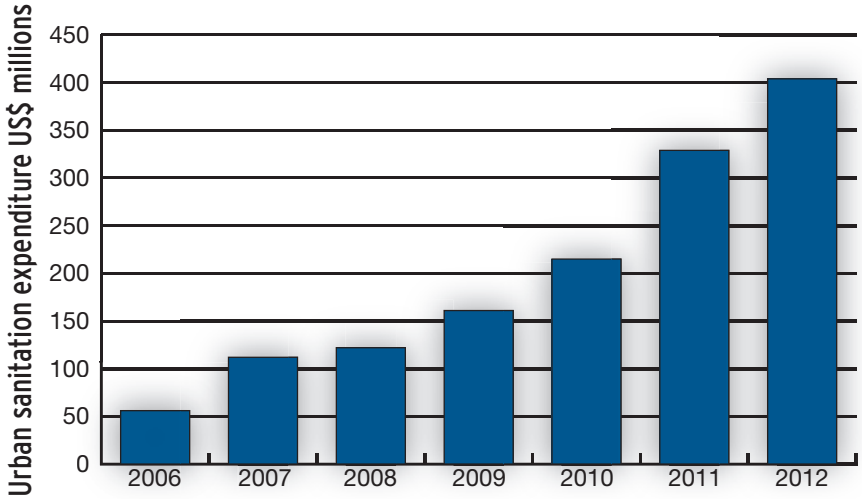
- In Indonesia, the annual expenditure should be around US$2.9 billion (or 0.33 percent of GDP); however, the current expenditure on sanitation is US$920 million (0.1 percent of GDP), financed by the government and other sources. This includes a significant increase in financing for the sector—mostly focused on decentralized systems—from around US$50 to US$400 million per year between 2006 and 2012 (Figure 2.5).
- In the Philippines, the annual expenditure should be around US$1.5 billion (or 0.68 percent of GDP); however, the current expenditure on sanitation is US$60 million (0.03 percent of GDP). The historical expenditure on water and sanitation in the Philippines from 2001 to 2007 has been about US$72 million annually, with the bulk of the investments being in the water sector. While the investments in wastewater have been low, the NSSMP for the Philippines foresees a first-phase, 10-year investment level of some US$641 million to serve the urban areas outside of Manila.

Box 2.5: Indonesia: City Sanitation Strategies Lessons Learned

As of mid-2012, the cities in Indonesia have prepared 240 sanitation plans. The broad lessons that are emerging from the preparation of the plans are:

- Ownership: The city has to take charge and have ownership of the process and the plan. This also implies that adequate institutional capacity must be in place for the cities to lead the development of sanitation plans.
- Comprehensive: Strategies have to take into account not just sanitation, but also drainage and solid waste management.
- Coordinated: Strategies have to involve not just the public sector, but also the private sector and civil society. Within the public sector, they should involve all the relevant departments ensuring that the planning, health, environment, and public works functions are at the core of the process.
- Top-down meets bottom-up: Strategies must engage with both top down planning based on targets and bottom up planning based on community and demand-driven processes.
- Evidence-based: Based on empirical data, the plans must be credible and well founded on demographic data, and be based on a thorough investigation of the existing facilities, services. and urban environmental sanitation situation.

Figure 2.5: Central Government allocations for urban sanitation in Indonesia

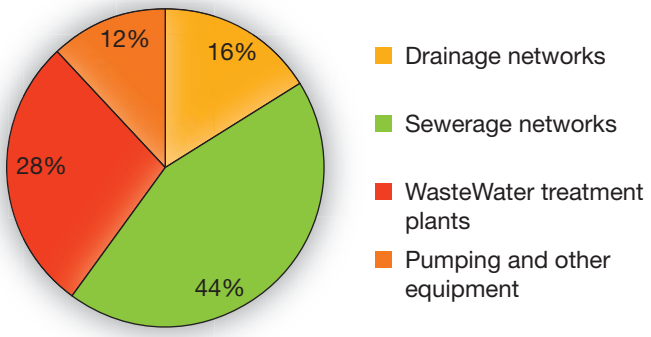


Source: Urban Sanitation Development Program (USDP), Indonesia.

- In Vietnam, the annual expenditure should be around US$555 million (or 0.45 percent of GDP) and the current expenditure is at that level (0.45 percent of GDP). A rapid increase in urban population and the Government's decision to improve urban services resulted in increases in expenditures in sanitation. In the 15-year period between 1995 and 2009, about US$1 billion was spent or an average of about US$69 million per year. The expenditures were on drains, sewers, wastewater treatment plants, and pumping stations as illustrated in Figure 2.6.

Wastewater tariffs do not meet operating costs. The tariffs that are in place in the region do not meet operating costs of wastewater collection and treatment. In the case of septage management, tariffs cover the cost of private operations of septage collection. However, the discharge of septage is expected to come under more regulation leading to increases in septage collection fees. In the case of wastewater, because operating costs are not met, maintenance is deferred and as a consequence services are inadequate. These are key regulatory issues that need to be addressed for the financial viability of the sector. An overview of the tariff story in different countries is described below (and depicted in Figure 2.7):

Figure 2.6: Estimated share of urban sanitation expenditure in Vietnam



Source: Hydroconseil 2010.

- In Indonesia, the wastewater tariff varies across the country. Tariffs range from US$0.77/m^3 in Surakarta to US$0.15/m^3 in Banjarmasin. Other cities like Medan have a fixed monthly tariff of US$2.4 per household. Apart from the low tariff, another constraint is that the systems are not fully utilized—household connections are lower than the planned amounts and wastewater flows to the treatment plants are lower than planned volumes.
- In Vietnam, there are two regulatory instruments to establish wastewater tariffs. The first one is the Environmental Protection Fee, which is established by the Ministry of Environment. The fee is calculated on a percentage—about 10 percent- of billed water (Decree 67). The second one is the Wastewater Fee, charged by the water utilities on the basis of water consumed (Decree 88). The implementation of these instruments is not uniform, as there is a wide range in the fees. Municipalities also only apply

one of the instruments. Dalat uses a wastewater fee of US$ 0.05/m³ of water consumed using the Decree 88 while Ho Chi Minh City charges 10 percent of the water bill using provisions of Decree 67 which translates to a charge of around US$0.025/m³ for households. In addition, the high operating costs of treatment plants increase costs overall, which in turn creates greater pressure to increase tariffs.

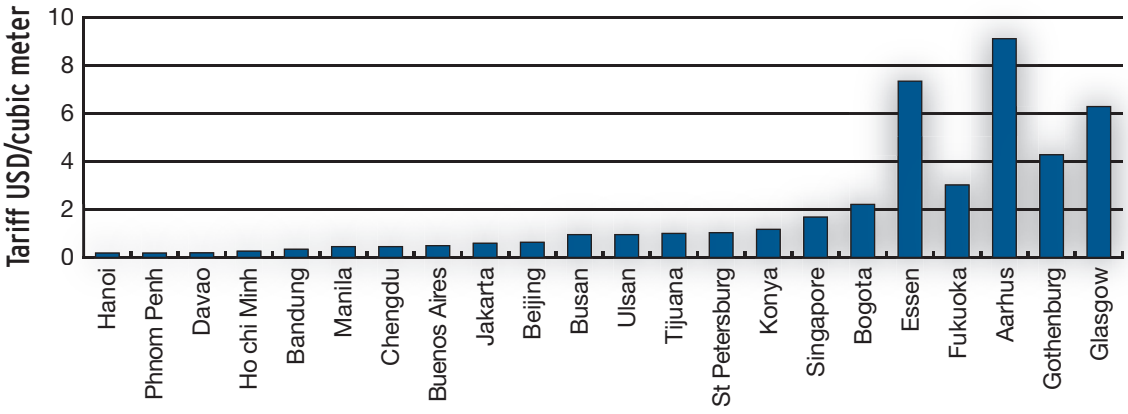
- In the Philippines, the wastewater and septage management fee in Metro Manila is defined as a surcharge in the water bill. This surcharge is presently 20 percent for all households irrespective of whether they have a sewer connection. This represents, on average, a sanitation fee of around US$0.12–0.15/m³ for the two concessionaires that are responsible for the provision of water, wastewater and septage management services. In the case of septage management, the service includes regular de-slugdging. Being private companies, the two concessionaires do not receive operating subsidies and they have to meet all their costs. However, as the wastewater tariffs are not adequate to cover all costs (investments and operations), the wastewater and septage management operations are cross-subsidized by the water operations. The few urban sewerage schemes operating outside Metro Manila have low tariffs in the form of fixed fee per month—US$0.02 to US$0.7/m³ in the city of Baguio, which requires the sanitation operations to be subsidized.

Wastewater companies are dependent on varying operating subsidies. As wastewater utilities are not able to recover costs, they rely on operating subsidies. However, these operating subsidies are financed through the city budget and may vary depending on the overall revenues and expenditures of a city. This brings uncertainty to the level of service. For example, in Ho Chi Minh City (HCMC), the cost recovery for drainage and wastewater management is around 60 percent.[17] This can be increased as tariffs are set low and a modest increase would be affordable. However, instead of raising the user fees and making the wastewater utility more self-reliant, the authorities continue to provide operating subsidies.

Unwillingness to charge is an increasingly common obstacle to financial sustainability. Government and municipal authorities are often reluctant to increase tariffs because of concern about popular reaction. In Buon Ma Thuot (Vietnam), surveys concluded that users were willing to pay for services up to a cost-recovery level. However, once a project had moved into the operational stage, the authorities abandoned the planned fee structure and continued to fund the operational deficit through the city budget. In many instances, it is seen that an increase in tariff is affordable, but still the authorities are hesitant to increase tariffs and increase the cost recovery from user fees.

[17] Implementation Completion Report, Ho Chi Minh City Environmental Sanitation Project; World Bank 2012.

Figure 2.7: Selected water and wastewater tariffs



Source: GWI 2012.

CHAPTER THREE
Drivers and Factors of Sustainable Urban Sanitation

This chapter presents the *drivers* of change for the sector and then explores the various *elements* that appear to influence or facilitate change. These factors were identified through the detailed country studies and are presented using the people, technology, governance, and financial sustainability framework used in previous chapters.

3.1 DRIVERS FOR SUSTAINABLE URBAN SANITATION

Drivers for change. The main drivers for investing in urban sanitation and ensuring continuing service provision are the imperatives of ensuring public health, protecting the environment, and contributing to development.

- **Public health is the primary argument for improved urban sanitation and environmental health.** Urban living concentrates waste and, without effective urban sanitation, there is a risk of the spread of disease through epidemics such as cholera, as well as the chronic effects of poor health from diarrhea. Tables 3.1 and 3.2 illustrate the diarrheal diseases which are largely sanitation-related and a major cause of illness and death. A study carried out by WSP in South East Asia on the economic impacts of Sanitation (WSP, 2008) concluded that the health impacts had the greatest economic impact as shown in Figure 3.1. The four countries in the study (Vietnam, Philippines, Indonesia and Cambodia) have a total of 400 million people and poor sanitation causes 180 million disease episodes and 100,000 premature deaths annually.

Table 3.1: The 10 leading causes of death (Low-income countries, 2004)

Cause of Death	Deaths in Millions	% of Deaths
Lower respiratory infections	2.94	11.2
Coronary heart disease	2.47	9.4
Diarrheal diseases	1.81	6.9
HIV/AIDS	1.51	5.7
Stroke and other cerebrovascular diseases	1.48	5.6
Chronic obstructive pulmonary disease	0.94	3.6
Tuberculosis	0.91	3.5
Neonatal infections	0.90	3.4
Malaria	0.86	3.3
Prematurity and low birth weight	0.84	3.2

Source: World Health Organization data quoted in Schlipköter (2010).

Table 3.2: Mortality and morbidity of infectious diseases

Mortality and Morbidity Due to Selected Infectious Diseases		
Cause of Death	Annual Deaths	Annual DALYs*
Lower Respiratory Infections	4.1 million	94.5 million
Diarrheal Diseases	2.1 million	72.7 million
HIV/AIDS	2 million	58.5 million
Tuberculosis	1.4 million	34.2 million
Malaria	889,185	33.9 million
Measles	423,710	14.8 million
Neglected Diseases	195,098	19 million
Sexually Transmitted Infections	128,472	10.4 million
Polio	1,195	34,399
Other Infectious Diseases	1.3 million	28.5 million

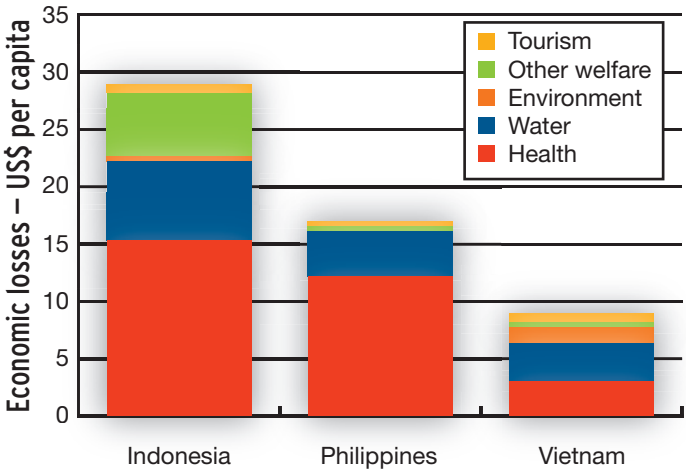
Notes:

*DALY = Disability-Adjusted Life Years, which is the years of healthy life lost due to disability, sickness or premature mortality.

N/A = not available.

Source: Global Health Council 2009 quoted in Schlipköter (2010).

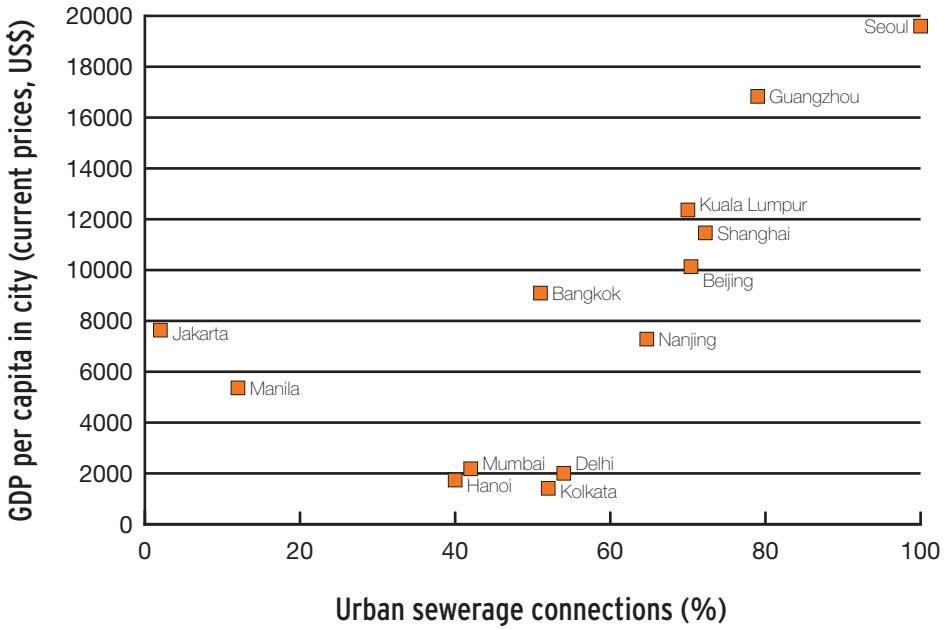
Figure 3.1: Losses from inadequate sanitation



Source: WSP 2008.

- **The impact on the environment is a second powerful driver.** Inadequate sanitation affects the environment through pollution of water supplies, which renders them unsuitable for drinking, irrigation and other purposes. Polluted water can also affect fish and agricultural production, as well as the tourism industry, thereby having significant economic implications. Integration into the global economy through agricultural and seafood exports has encouraged sanitation improvements. Agricultural exports from a number of Latin American countries, such as Chile and Mexico, were closed down because of water- and sanitation-related disease outbreaks in the importing countries, notably the United States. The WSP study on the economic losses from inadequate sanitation estimates that the combination of inadequate water quality and environmental conditions accounts for a significant percentage of the impact (Indonesia 25 percent; Philippines 23 percent; and Vietnam 52 percent). In Philippines, environmental pollution of Manila Bay has also been a powerful driver for action in the sanitation sector.
- **Aspiration to improve quality of life is also a strong driver.** As income levels increase and basic needs are met, people expect a better quality of life and environment in which they live. Figure 3.2 illustrates the correlation between GDP in a city and the urban sewerage connection. Cities in East Asia are engines of economic growth. As they continue to develop economically, income levels will rise, leading to demand for better environmental conditions. The figure also illustrates how Jakarta and Manila have a lower rate of sewerage connections compared to cities with similar per capita GDP.

Figure 3.2: Urban sewerage connections against city GDP per capita

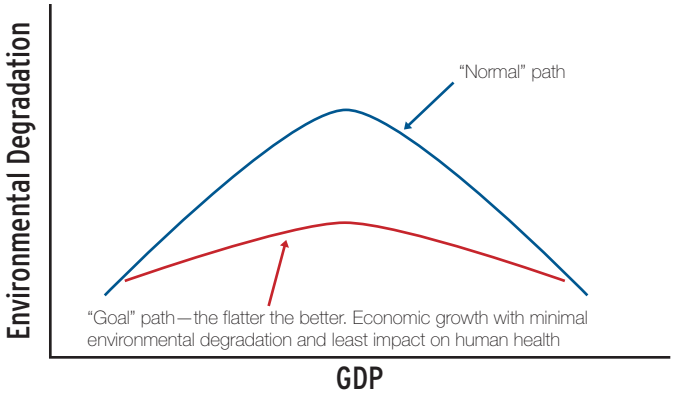


Sources: East Asia Urban Sanitation Review. World Bank 2013; Asian Green City Index, 2011 (Siemens AG); Asian Sanitation Databook, Asian Development Bank 2008.

3.2 FACTORS FOR CHANGE

Policy makers face an array of choices in terms of what to change in order to move forward on the path towards sustainable urban sanitation. The Kuznets Curve—first drawn up to explain rises and falls in inequality as GDP grows—has also been applied to the environment to explain the observed relationship between income and pollution by illustrating how increases in GDP affect the value placed on improved environment (Figure 3.3). The Kuznets Curve has explained changes in air pollution. Changes in environmental degradation arising from urban sanitation could follow a similar path as air pollution and thus be potentially explained by the Kuznets curve. In the first stage, increased environmental degradation ensues as the economy grows, urbanization grows denser and waste concentrates. In the second stage, as basic services are met, a turning point is reached where increasing wealth leads to adoption of waste management technology and greater regulation to stabilize environmental degradation. In a third stage, there is a recovery as pollution to rivers is reduced and earlier levels of water quality return, as has been seen in most of the industrialized world. For policy makers in East Asia, the goal would be to follow a flatter path (as depicted above) where growth in GDP will have minimal negative environmental impact.

Figure 3.3: Application of Kuznets curve to environmental degradation



Source: East Asia Urban Sanitation Review, World Bank 2013.

Factors that positively influence change. Table 3.3 (which derives from discussions undertaken during preparation of the country reports) outlines the key factors that stimulate positive change and pairs this with an overview of the role of the stakeholders—the public, the service provider, local government, and central government—in that change process. Further guidance on achieving sustainable sanitation is provided by examining what has been done in Indonesia to address the political economy of sanitation (Box 3.1).

Table 3.3: Factors that positively influence change

Factors that influence change (from the country studies)	Main Stakeholder(s) Responsible for This Action				Comments
	Public	Service Provider	Local Authority	Central Authority	
1. People demanding change	⏻		⏻	⏻	The public seeks changes to improve their quality of life. The authorities implement change to increase public satisfaction.
2. Champions among policy makers pushing for change			⏻	⏻	Champions help increase awareness which stimulates willingness to make changes.
3. Disclosure of information on negative environmental impacts (e.g., water quality)		⏻	⏻		Disclosure by the different stakeholder categories prompts different sorts of changes.
4. Presence and effective implementation of national legislation and regulation			⏻	⏻	Legislation and regulation stimulate and guide changes made by authorities.
5. Adequate institutional capacity needs to be in place		⏻	⏻	⏻	Institutional capacity is needed as a foundation for change.
6. Strategic plan for investment and operations is in place	⏻	⏻	⏻	⏻	Each category of stakeholder plays a role: the public pays tariffs that support operations; the service providers seek to operate efficiently; and the authorities shape the operating environment.

Box 3.1: Achieving Sustainable Sanitation—Indonesia Study

Multiple steps taken over time can bring progress on sustainable urban sanitation. A study of the political economy of sanitation in Indonesia (WSP 2011) concludes that the following steps could be taken to mitigate political economy effects: (a) identify key entry points in national and sub-national policy and planning cycles, as this is crucial due to the relative inflexibility of national Indonesian policy formulation; sequence different interventions over different time scales (e.g., strengthen community-based systems before or while large infrastructure systems are being developed); (b) ensure that funding mechanisms are politically acceptable and negotiations are flexible, as this is necessary to reduce and mitigate wide opposition, particularly to multilateral loans; (c) identify the type of evidence needed from rigorous analysis that is appropriate to different target audiences: analysis and evidence from a regional comparative study on economic impacts of sanitation has had significant effects within national and sub-national governments, but it has had less effect on raising wider public awareness; (d) support efforts to increase and/or ensure clarity over institutional roles and responsibilities, as this will increase the space for demand-side accountability; (e) ensure that both government commitment on the supply side and public commitment on the demand side are supportive of investment; and (f) define sanitation more broadly to include solid waste management and drainage, as well as sewerage and wastewater.

People demanding change. Public demand is potentially the strongest and most reliable factor in promoting change. By and large, the public demand for change in sanitation has not been that emphatic mainly because the public is not fully informed about the negative impacts of inadequate sanitation services. In addition, a greater voice for women will tend

to increase demand. In Indonesia, low public awareness has been recognized as a crucial barrier to urban sanitation and a range of innovative measures have been put in place to increase awareness including a partnership with the media. Similarly, the case of the *mandamus* in Metro Manila (Chapter 2) shows how concerned citizens can achieve progress in improving water quality. Lack of public awareness not only hampers the ability to raise wastewater tariffs to meet higher costs of better services, but also affects the pace of change in making improvements in sanitation practices such as regular cleaning of septic tanks or connecting households to sewers.

Champions among policy makers pushing for change. Public authorities (local and national) make change happen, stimulated by champions. A combination of drivers, an enabling environment and catalytic factors are needed to create breakthrough results. A driver for the public authority changes will ultimately be public opinion expressed as a demand. The extent and nature of this demand will be determined by: (a) cultural factors which influence the level of tolerance; (b) the information environment which influences the accuracy of the demand for improvements; and (c) the degree to which institutions exist to translate public demand into collective action. Champions are an important catalytic factor encouraging change. Sanitation investment, in particular, is often driven by local and/or national champions.

- In Indonesia, the new urban sanitation initiatives and new scale of funding for sanitation can be traced back to a number of champions at the national and local levels. For example, in Indonesia, the association of Mayors champions sanitation improvements.
- In the Philippines, champions such as the mayor or a senior official in the local authority have often been behind sanitation advances. At the national level, the Department of Public Works and Highways is spearheading new initiatives in addressing the sanitation problems. Champions help achieve needed steps such as necessary increases in tariffs, which are often difficult to achieve due to concerns over affordability and public reaction, among others.

Disclosure of information on negative environmental and health impacts. Public worry over pollution of drinking water seems to be the strongest health-related concern driving investment in sanitation. However, other environmental concerns are also strong drivers, especially in recreational and tourist areas. In Korea, public apprehension over polluted drinking water has been a strong driver for scaling up wastewater treatment as shown by the innovative practice of downstream towns paying for upstream wastewater treatment. In the Philippines, the decision to investment in septage treatment in the cases of Baliwag and San Fernando arose because of the fear of groundwater pollution. In the cases of Bayawan and Dumaguete, the decision to invest arose because of concern over pollution of recreational coastal waters; and the local authorities of Baguio and Boracay built sewage treatment systems after pollution incidents threatened the tourist industry. Risk of environmental epidemics such as cholera and yellow fever has also spurred sanitation improvements in some regions. Preventing epidemics was the original driver for implementing urban sanitation in the industrialized countries. For example, in Latin America, Buenos Aires and large cities in Brazil suffered epidemics in the 19th century that prompted calls for better potable water and sanitation. After eradicating cholera for more than one hundred years from Latin America the disease returned in 1991 and spread across the whole of the region within less than three years, again lending urgency to programs of better urban sanitation. Similarly, the development of sewers accelerated in London after the summer of 1858 when the smell of untreated human waste affected citizens (the situation is also known as the Great Stink).

Presence and effective implementation of regulations. Effective regulation is a strong driver for improving sanitation services. Where local authorities are held to account, services are likely to improve. In Malaysia, effective regulation creates steady demand and scheduled septic tank emptying arrangements have been built into the tariff. Frequent septic tank emptying and safe disposal has improved service provision in many towns. In the Philippines, the regulatory environment within Metro Manila is much more effective than for other cities in the country, and this enhances the effectiveness of septage services in the capital city. Furthermore, it has been shown that well-regulated septic tank emptying can be financially viable and provide an income stream both for private and public operation.

Adequate institutional capacity needs to be in place to support progress in the sector. Insufficient attention is given to training and professionalization of the sector. In Indonesia it is estimated that the national strategy will require some 15,000 sanitation professionals.[18] In Vietnam, low capacity at

[18] PT Qipra Galang Kualita. Sanitation Personnel: Capacity Development Strategy, March 2012, WSP.

the local level leads to long delays and cost overruns, with projects taking longer to progress from concept to commissioning. Specialized training is needed to plan for sanitation investments and to operate the systems. Developing such training programs should be integrated in country plans to improve sanitation.

Strategic plan for investment and operations needs to be in place. Local authority prioritization of urban sanitation services is important, and the commitment of local authorities to promote sanitation and ensure a high quality of services is paramount. For instance in Metro Manila, the local authorities have ensured that the urban sanitation services are well managed through a public-private partnership. Furthermore, financing needs to be available and readily accessible. This remains a main issue in the three focus countries as capital and operating subsidies are currently required.

CHAPTER FOUR
Recommendations

This Chapter provides recommendations to address the main challenges in the sector and help cities to be clean and healthy. Recommendations are divided in four key areas: setting up people-centered policies, implementing cost-effective technical solutions, developing sustainable institutions for quality service, and developing viable financial systems (Figure 4.1).

4.1 PEOPLE-CENTERED POLICIES

Overall, policies exist to upgrade services and expand coverage, but they need to be implemented through people-centered approaches. Currently sanitation improvements are constrained by a vicious cycle where the lack of awareness by the community of the implications of inadequate sanitation leads to limited political support which in turn leads to limited sanitation interventions. To break this cycle, a combination of long-term people-centered policies are needed that would address poverty and promote behavior change. At the same time, city-wide sanitation plans that are integrated with urban development should be developed and implemented.

Recommendation 1: Integrate sanitation with city development plans

City Sanitation Plans (CSPs) needed. Clean and healthy cities are key to eliminating water-borne diseases and improving the quality of life of many people that live in the vicinity of

Figure 4.1: Achieving sustainable urban sanitation

untreated wastewater and raw sewerage. This initiative exists in Indonesia, however the plans are not always comprehensive. Due to inadequate institutional and technical capacity at the local level, the plans have not contributed to the scale-up of sanitation in Indonesia. For instance, only about 1 percent of the wastewater collected is treated. Guided by national policy, each city needs to set objectives that place urban sanitation at the core of a wider strategy for developing a modern city environment and sustaining a healthy and decent quality of life for its population. To this end, urban areas need to develop CSPs that will identify issues and cost-effective solutions. In these CSPs, people-centered approaches should be taken as well-informed citizens will create the demand for cities to make changes. Plans need to be comprehensive and realistic with confirmed funding and a clear implementation schedule.

Address poverty through city-wide interventions. Untreated septage and wastewater typically are found in areas where the poor live. This phenomenon is more pronounced in low lying areas where wastewater and stormwater accumulate from other parts of the city. Thus, a city-wide solution is needed where wastewater is captured throughout the city and treated before it reaches low-lying areas, affecting the population including the poor. At the same time, initiatives to eliminate open defecation such as behavior change campaigns and financial support to the poor should be incorporated as a key part of these integrated solutions. Furthermore, the operations of septic tanks and septage collection and treatment should be undertaken at the city-wide level given the large positive externalities of such interventions. The City Sanitation Plans should identify issues and recommend cost-effective solutions for all sanitation related services from collection of septage and wastewater to treatment by taking into account life-cycle costs (investments and operations).

Recommendation 2: Design and implement behavior change communication strategies

Social accountability should be increased. A well-informed public is a strong driver in ensuring high standards of environmental and urban sanitation performance. Although awareness is not the only factor influencing demand for sanitation services, it plays the major role and forms the basis for behavior change, willingness on the part of city governments to charge for sanitation, and willingness on the part of citizens to pay for quality services. The strategy should be to promote behavior change so that within a community clean public spaces are created and maintained. This can be achieved through smart BCC campaigns, including the use of social media and activities in schools and social centers. These interventions need to be consistent and long term, and should be closely monitored to determine progress. Eco-Asia, with support from USAID, has developed a 10-step promotion tool kit for sanitation (Box 4.1) which draws on lessons from a number of different Asian countries and incorporates social marketing techniques. Information and education campaigns should focus on the importance of the collective gains of sanitation and the associated benefits on public health and economic development.

Information technology can help to acquire information from citizens and shape improvement plans. Mobile phones are available widely in cities and also in low-income areas where sanitation services may not be adequate. Citizens can use their smart phones and inform local authorities about the need to make sanitation improvements by sending in a short description of the problem along with pictures. Citizens could demand various types of sanitation improvements including measures to stop open defecation, protection of children from

Box 4.1: Ten-Step Promotion Tool Kit for Urban Sanitation

Step 1: DEFINE problem, audiences and ideal behaviors;

Step 2: GATHER information;

Step 3: FOCUS on feasible behavior for one audience and problem;

Step 4: STRATEGIZE long-term change goal, objectives, and impact;

Step 5: PLAN short-term promotion;

Step 6: CREATE promotional materials and activities;

Step 7: PRETEST and finalize materials and activities for production;

Step 8: IMPLEMENT the promotion campaign;

Step 9: MONITOR promotion process and outcomes;

Step 10: EVALUATE promotion outcomes and improve

Source: http://www.10step-toolkit.org.

exposure to contaminated water and soil, improvement of sanitation facilities for the public and especially for girls in schools, better management of wastewater and drains, and improvements in response time. Sanitation meetings have been conducted in Indonesia, Philippines, and Vietnam to seek ideas on mobile phone applications. These ideas could be developed further to promote sanitation at the city level. In a rural water and sanitation program in Vietnam, mobile technology is being used to promote transparency and social accountability, as well as health monitoring and evaluation, illustrating how such methods could also be used for the urban setting.

4.2 COST-EFFECTIVE TECHNICAL SOLUTIONS

Wastewater and Septage are disease vectors and should therefore be properly collected and treated. Figure 4.2 illustrates a typical problem in East Asian cities. All human waste eventually ends up in water bodies that are often open drains located in populated areas or as septage that can be a health hazard if not properly handled. To help improve human health, the risk of disease through these pathways of contamination has to be reduced. Technical recommendations are made below on how City Sanitation Plans can provide solutions to collect and treat septage and wastewater in a cost-effective manner.

There are three types of technical solutions proposed depending on the situation. The overall technical approach in addressing sanitation can be as follows (depicted in Figure 4.3):

- Type 1 homes—septic tanks or pit latrines with no connection to combined or separate sewers. This situation occurs mainly in Indonesia. For these homes, the priority would be to ensure that septic tanks operate effectively and septage management is done properly;
- Type 2 homes—septic tanks connected to drains or combined sewers: this situation occurs mainly in the Philippines and Vietnam. For these homes, the priority would be to: (a) ensure that the septic tanks operate effectively and septage management is done properly; (b) intercept the wastewater coming out of the homes before it reaches the water bodies. This would mean construction of interceptors and upgrading of existing sewers and house connections; and (c) treat the collected wastewater in a cost-effective manner; and

Figure 4.2: Flow of fecal matter

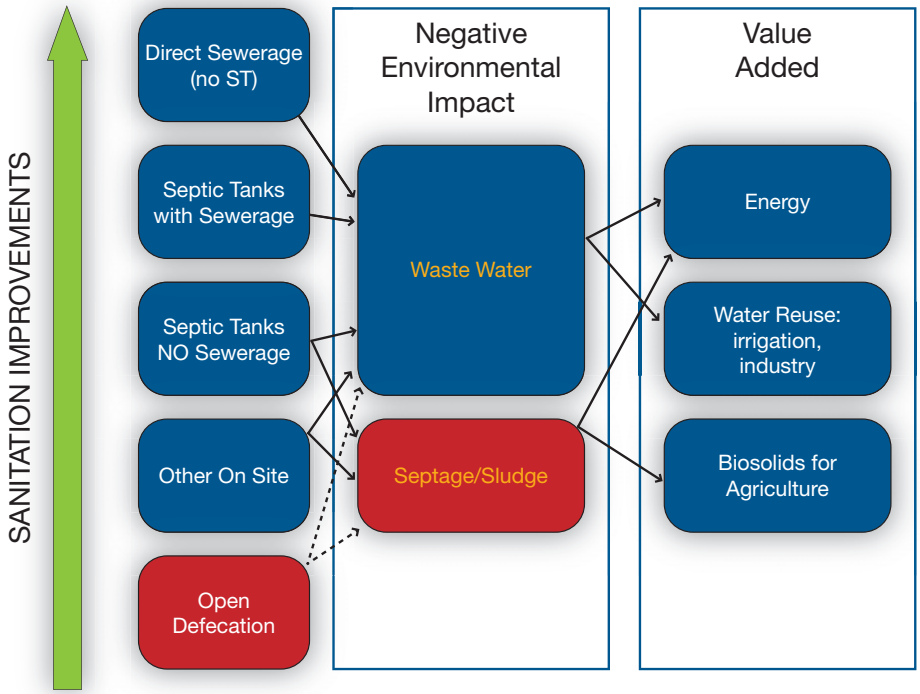
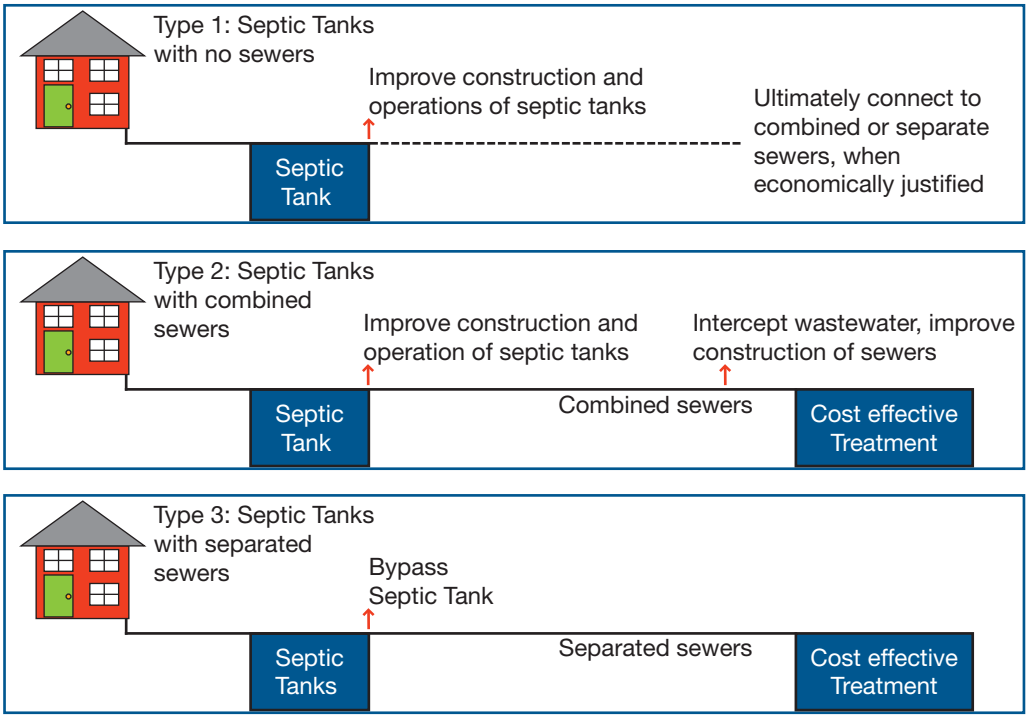


Figure 4.3: Three types of technical solutions proposed



- Type 3 homes—septic tanks are connected to separate sewers or there are no septic tanks and the wastewater flows directly to separate sewers. These situations occur often in new development areas where the construction of new septic tanks is not the preferred option. For these homes, the approach would be to: (a) ensure, in the short term, that the septic tanks operate effectively and septage management is carried out properly. However, in the medium term, the septic tanks should be directly connected to the separate sewer system; and (b) treat the collected wastewater in a cost-effective way.

Recommendation 1: Prioritize the collection and treatment of septage

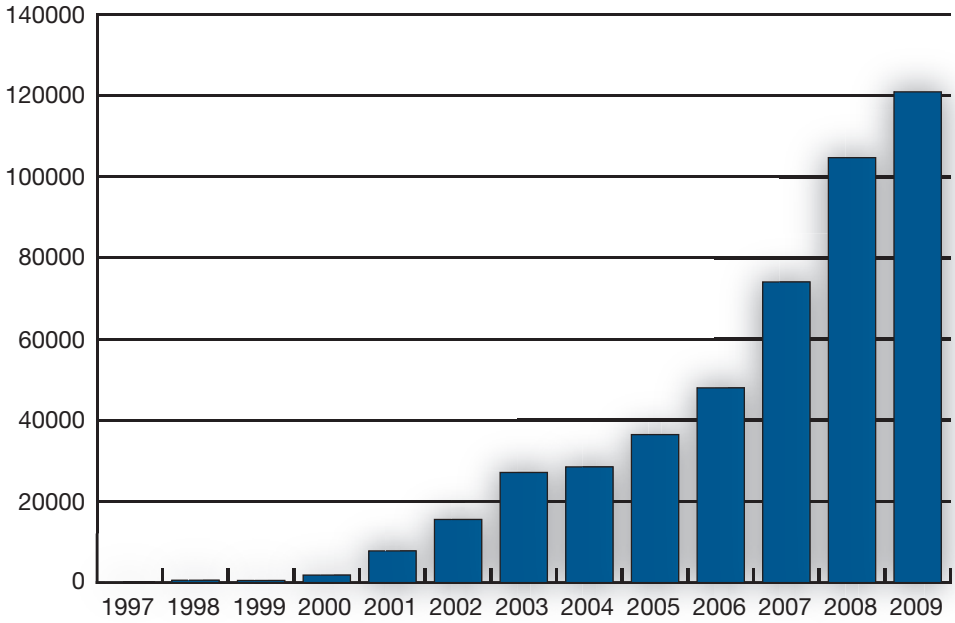
Septic tanks are prevalent in the region and their operations have to improve. Septic tanks will remain in place in most cities for the foreseeable future and effective operation of these tanks and management of septage is an integral part of the sanitation strategy in the region. In Metro Manila, a successful septage management program is in place and emptying of tanks has steadily increased. The two concessionaires (Manila Water and Maynilad) are responsible for septage management and are monitored by a regulator. In addition to collecting the septage on a regular basis, the two companies also treat the septage before discharge to a landfill (Figure 4.4 on the next page). Such an example should be considered for other cities.

Strengthen Septic tank operations and septage management. An effective septage management system can be developed through well-designed and constructed septic tanks that are regularly de-sludged; Behavior Change Communication campaigns; and a well-regulated sector, especially considering the operating conditions of the private companies that primarily collect and transfer the septage (Tremolet 2012).[19] Financial assistance to the poor should also be provided to rehabilitate the septic tanks where the design is inappropriate, construction has been inadequate, or if it is inaccessible for emptying (Figure 4.5). Other ways to ensure that septage is handled properly include:

- combining billing and collection for septage management with water services to increase willingness to pay for the emptying tanks (USAID, 2010);[20]

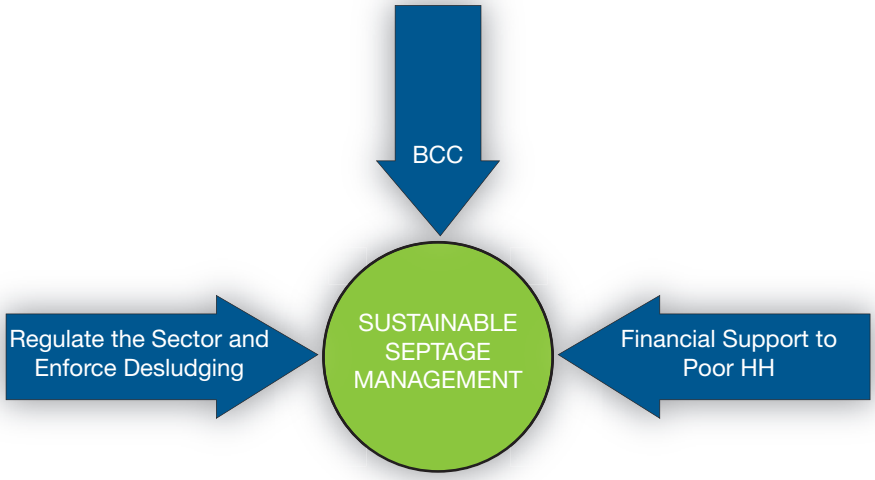
19 Sanitation Markets, Pathfinder Paper, Tremolet 2012.
20 A Rapid Assessment of Septage Management in Asia, USAID 2010.

Figure 4.4: Number of septic tanks de-sludged in Metro Manila



Source: Maynilad Water Services Inc. and Manila Water Company, Inc.

Figure 4.5: Sustainable septage management



- regulating the operations of the private companies that collect septage. This includes requiring companies to provide information on the volume of sludge collected and disposed, and installing Global Positioning Systems (GPS) to monitor the movement of the septage trucks to prevent illegal disposal of sludge;
- constructing septage treatment plants and landfills where the septage may be treated and discharged in an environmentally safe way;
- providing financial assistance to the poor for the rehabilitation or construction of septic tanks; and
- monitoring the groundwater to ensure that it is not polluted due to inadequate operations of the septic tanks, especially if groundwater is used for drinking purposes.

Provide appropriate on-site sanitation. If septic tanks or latrines are not well constructed and cause environmental or health concerns, they should be replaced as a priority.

Similarly, if no regular sewerage is planned in the areas where the pollution is evident, the immediate strategy should be to upgrade the on-site systems to effective septic tanks, unless other options exist such as communal sanitation facilities or decentralized systems through a simplified sewerage system.

Recommendation 2: Collect and treat wastewater at least cost

Wastewater is a major vector for disease and should be collected before it reaches water bodies. Most homes have septic tanks but, due to the intensive water use and suboptimal functioning of septic tanks, water contaminated with fecal matter is discharged from septic tanks and reaches waterways through poorly constructed drains or combined sewers. Therefore, special attention should be paid to proper collection of wastewater through:

- construction of interceptors that would collect the wastewater before discharge to the major water bodies. This is the approach that has been followed in Ho Chi Minh City (see Box 4.2) and also in Metro Manila. The sewer dimensions should be carefully calculated to allow for proper drainage capacity in wet weather; and
- upgrading and construction of sewers to remove the polluted waters from neighborhoods and treat the water in a cost-effective way. Sewers should be properly designed and constructed to minimize infiltration and intrusion of solid waste to prevent obstruction of wastewater flow. Simplified sewerage as a cost-effective solution should be explored as in the experience of Brazil where smaller diameter sewers have been used with shallow excavation.

Connection to sewers is important to remove polluted water from neighborhoods. A higher connection rate to sewers will ensure that wastewater generated in an area is transferred to another location for treatment. This will eventually help improve the environment and reduce health concerns. This approach was taken in London in the mid-1800s when the city faced sanitation issues due to urbanization (Box 4.3). In the focus countries, experience has been that while sewers (combined or separate) exist, not all homeowners connect to them. This issue needs to be addressed by:

- regulating and enforcing homeowners to connect to sewers in cases where sewer lines are available in the vicinity of a home. In Vietnam and in Metro Manila, an environmental fee is charged as a percentage of the water bill, whether or not the home is connected to the sewer network. As the users pay, it creates an incentive for them to consume less water and also allows the utility to generate revenues to address sanitation issues. There is a public health reason to connect to sewers so that wastewater is not discharged to open drains in front of homes creating a health risk. Furthermore, by taking away the wastewater from neighborhoods, the risk of contaminating the groundwater is reduced;
- implementing BCC campaigns on the benefits of sanitation and connecting households to sewers; and
- providing financial assistance to the poor to connect to the sewers. The connections could be made by the wastewater company and recovered over time through tariffs as in the case in Vietnam.

Specific analysis should be carried out at the city level to determine whether separate or combined sewers should be developed. As depicted in Table 4.1, there are certain technical advantages to installing separate sewers (pumping costs are lower, contamination during flood seasons eliminated). However, it would be very expensive to replace the current combined systems in most cities with separated sewerage systems (SSS). Also, in some cities, there may not be enough physical space to construct separate sewers and the cost of disruption would be very high. Thus, the decision to develop or switch to separate sewers should be taken on a case-by-case basis and when cities can afford it. However, once separate systems are in place, it would be important to:

- bypass the septic tanks in households as they would not be needed. Two benefits would emerge by eliminating the use of the septic tanks: homeowners would not have to incur the cost of cleaning the septic tank, and the risk of groundwater pollution due to malfunctioning septic tanks would be reduced; and
- recognize that a higher biological waste load would be transferred to the wastewater treatment plants as the treatment of the wastewater in the septic tanks will no longer take place. To this end, the wastewater treatment plant should be designed in a manner that can handle higher levels of biological waste. Also, it would be important to ensure that the separate sewers do not discharge wastewater to open channels as the health risk would increase with a higher level of biological waste load.

Box 4.2: Effective Urban Investment—Vietnam's Nhieu Loc—Thi Nghe Canal Is Revived

The Nhieu Loc—Thi Nghe Canal runs through the center of Ho Chi Minh City, Vietnam's largest city. This canal once resembled an open sewer. While the canal collected rainwater and water from the Saigon River, it also received a constant flow of untreated wastewater and domestic waste from surrounding slums and seven of the city's most populous districts.

Transformation process

A process of transformation leading to revival of the canal started in the 1990s. From 1993 to 2003, the city invested Vietnamese Dong (VND) 1.6 billion (about US$80 million) in providing compensation to and for resettling 7,000 households living in slums along the banks of the canal. Efforts were also made to improve the functioning of the canal, including limited dredging and structural investments.

In 2002, the World Bank became involved in the revival efforts by funding the Environmental Sanitation Project. About US$317 million was spent to support major works including sediment dredging within the canal and the installation of a sewerage network to intercept and collect domestic wastewater. Nearly 60 kilometers (km) of pipes were laid under the canal, creating an expanded wastewater network in the city center. A pumping station was connected to the network to safely collect and dispose of wastewater and to reduce tidal and storm-water flooding in the city. Along the canal, another program of resettlement of families was necessary followed by a rehabilitation and reinforcement of 18 km of the canals' embankments. The collected wastewater would be treated through a treatment plant that is being planned under the proposed Second HCMC Environmental Sanitation Project.

Project achievements

The project has directly benefitted 1.2 million people in HCMC with improved sanitation, provided 400,000 people with flood protection infrastructure, and revitalized the polluted canal so that it is now clean enough to host fish.

These accomplishments are a source of civic pride to all the city's residents. The lessons learned from the Nhieu Loc—Thi Nghe area are now being applied to upgrade the Tan Hoa Lo Gom Canal, through the Bank's HCMC Urban Upgrading Project aiming to improve living conditions in the poorest neighborhoods.

BEFORE…. **AFTER….**

Box 4.3: Sanitation in the United Kingdom

England was one of the first areas of the world to urbanize and it went through some of the sanitation issues that are seen in East Asia today. By the late 1700s, citizens of London had access to water through wells and from the Thames River. Sewers were also in place to carry grey water and 'night soil' men would remove the excreta from cesspools and sell to farmers for fertilizers.

However, from the beginning of the nineteenth century, a number of factors emerged that worsened London's sanitary conditions leading to cholera epidemics in 1831, 1848, and 1853: (a) the population of London increased rapidly and between 1800 and 1860—trebling to nearly 3 million; (b) cesspools started to be connected to the sewer lines that were discharging to the Thames; (c) the water consumption per household rose from 160 to 244 gallons/day due to the introduction of Water Closets; and (d) the market for human waste as a fertilizer collapsed with the introduction of guano imported from South America.

In the summer of 1858, the Thames and its tributaries were carrying raw sewage. It was also a hot summer that led to foul odors affecting the population and members of the Parliament (located next to the river). The unsanitary conditions of the summer are referred to as 'The Great Stink' which was a driver in the enactment of the Metropolis Management Amendment Act and which led Joseph Bazalgette to design and plan a series of interceptor sewers on each bank of the Thames to collect the wastewater and then discharge it well downstream of London. This approach is similar to that being followed in HCMC and Metro Manila.

Starting from the mid-nineteenth century, the sewerage system developed further to the current modern system that is effective in treating pollution. Five key lessons for sustainable development of urban sanitation can be distilled from the United Kingdom experience: (a) public awareness of the benefits of sanitation; (b) public acceptance of the fair cost, and a willingness to pay for it; (c) public representation and effective powers to influence service provision; (d) legal framework for service providers and their duties; and (e) financial sustainability of service providers.

Later refinements of the England and Wales sector involved practical organization of service providers and division of responsibility between those providing the service and those safeguarding the standards: (a) water and sewage should be a unified service; (b) service providers have physical boundaries which are coincident with natural drainage boundaries (e.g., river catchment areas), which make it easier to coordinate water resource development and environmental management; and (c) regulators with effective resources and legal remedies are provided for quality of service and cost of service.

Figure 4.6: Improving household connectivity

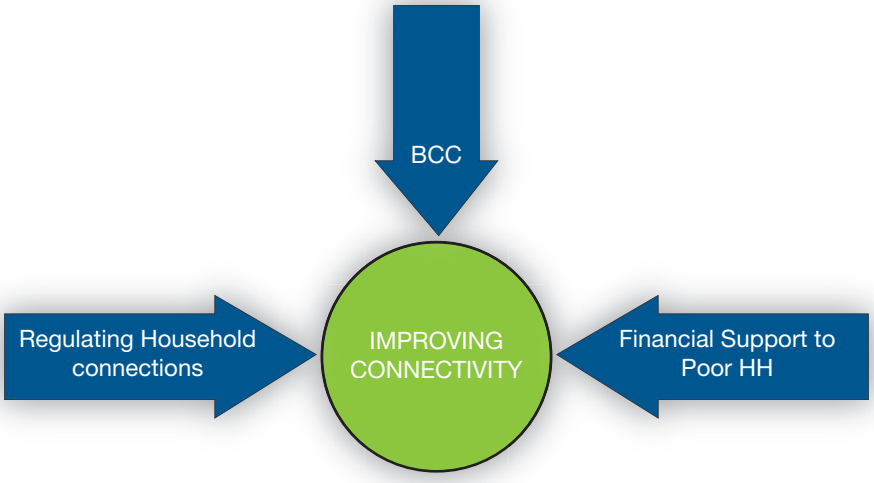


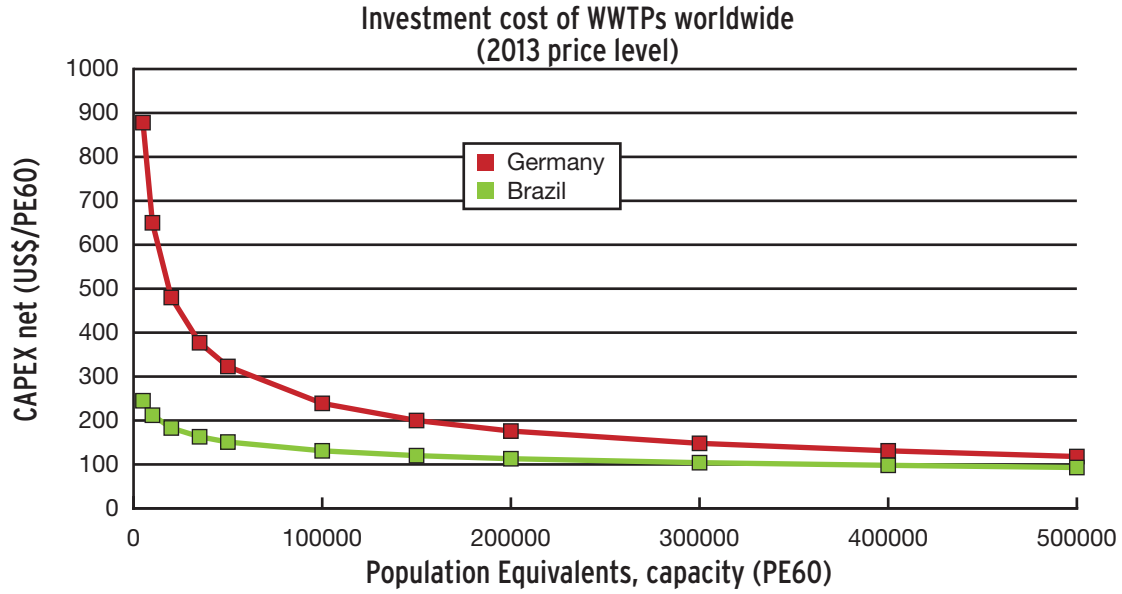
Table 4.1: Pros and cons of CSS and SSS

	Pros	Cons
CSS	• Collection system is economical as it uses existing channels • Polluted water from the streets during rain events is collected and treated	• Pumping costs are greater because of higher water volumes • Odor generation
SSS	• No need for septic tanks • Pumping costs can be less	• It is expensive to construct a dual collection system • Runoff from the streets during rain events is not collected and treated

Minimize the number of treatment plants in a catchment area. Investment costs of wastewater treatment plants (WWTPs) drop substantially on a per capita basis with an increase in size. Thus, in principle, the goal should be to maximize the size of a treatment plant for a particular catchment area through the construction of sewers to take the polluted water away from the residents. Decisions on an optimal number of treatment plants in a catchment area should be made based on sound financial and technical analysis at the catchment area level, taking into account the life cycle of a plant including the cost of land, cost of operations, cost of sewer networks, and cost for the wastewater treatment plant. From the examples below (Figure 4.7), it is seen that economies of scale start to appear when treatment plants are designed for more than 100,000 Population Equivalent (i.e., serving more than 100,000 people where the per capita biological waste generated is 60 gm of BOD5). The per capita operating costs also decline substantially with larger treatment plants. Given that investment and operating costs of larger treatment plant are lower compared to smaller plants, the approach should be to build larger treatment plants which would minimize the number of treatment plants in a city. This will also make it institutionally less complex if the number of plants is limited. Such an approach of having centralized treatment plants has been followed in other parts of the world including Korea and China, where urban sanitation improvements were steadily achieved.

Low-cost technologies for wastewater and septage treatment should be chosen to make operations viable. The

Figure 4.7: Investment cost of wastewater treatment plants in Brazil and Germany



Sources: Buchauer, K. 2012.

choice of technology is important, as it determines the financial and operational viability of a treatment plant. Two factors should be considered while determining the suitability of a technology:

- low life-cycle cost, which is a combination of investment and operation cost. Treatment facilities that have high operational costs are often not run properly due to lack of funding. A lower operating cost also reduces the pressure to increase tariffs. If higher effluent quality is required, it can be achieved by combining various low-cost processes into a single treatment plant (Libhaber, Orozco-Jaramillo, 2012). The price of land for the construction of a treatment plant is an important factor and should be taken into account in determining the life-cycle cost; and
- phasing investments, very often the hydraulic and the biological load of the wastewater does not materialize as planned, immediately after a new treatment plant comes on line for operations. This is because it takes time to build a comprehensive sewerage network to collect wastewater from a catchment area. As it is economical to minimize the number of treatment plants, the approach taken should be to phase the construction of the treatment plants to meet immediate wastewater flows and allow expansion in the same location to meet future demands.

The type of treatment chosen would have to be case specific. There are many types of technologies that are available to treat wastewater, and the choice of the technology would depend on the site-specific conditions and the operational cost recovery goals. As many East Asian cities are close to the sea, the option of using sea outfalls may be considered after adequate level of treatment. Constructed wetlands are also popular in China to remove nutrients (nitrogen and phosphorous) and could also be considered for the countries of focus. Anaerobic treatment processes are not common in East Asia, but they should be considered along with the aerobic processes:

- aerobic treatment options are used in most countries in East Asia, as the technology is well established and commonly used in the region. However, the energy consumption for aerobic treatment is higher compared to anaerobic options; and
- anaerobic treatment, which is a cheaper option, as the construction is simpler and there is no need to introduce oxygen into the wastewater. In addition, there is less sludge generated compared to an aerobic process and methane from the plant can be used to generate electricity. However, the anaerobic processes also have some disadvantages: operation is sensitive to the biological load and temperature, it does not remove nutrients (phosphorous and nitrogen), and it can produce odors and corrosive gases (Libhaber, Orozco-Jaramillo, 2012).

Recommendation 3: Adopt climate-smart sanitation strategies

Flooding and climate change uncertainties should be internalized in the feasibility studies. Most cities in East Asia have combined systems, and for that reason drainage deserves the same importance as sewerage. Before sewer networks are constructed there should be a monitoring system established to measure flows and pollution concentrations to optimize operations. Rainfall analysis should also be undertaken to ensure adequate dimensioning of the pipes. When constructing new or upgrading combined sewer networks, the following three objectives should be kept in mind:

- the network should have enough drainage capacity to avoid floods in a city. Apart from increasing the sewer pipe size which can be expensive, other options should be considered to reduce surface run-off such as permeable pavements, storm tanks, soakaways, infiltration trenches or green roofs. Such measures are becoming increasingly popular in many parts of the world to reduce operating costs of wastewater systems.
- the network should minimize the discharge of sewage into water bodies to reduce risks to human health and improve the environment. Innovative solutions such as variable Combined Sewer Overflows or bypasses could be used that would control the volume and concentration of wastewater that reaches a treatment plant; and
- the network should maximize the biological load to the treatment plant by connecting as many houses as possible. Furthermore, groundwater infiltration to the sewerage pipes should be minimized through proper construction techniques: to reduce the volume of water that is carried in a network so that pumping costs are minimized; so that excess capacity is in place to carry storm water as needed; and to ensure that dilute wastewater does not flow into the treatment plant as this would result in low utilisation of the plant.

Solid waste management should be part of the sanitation strategy. This is particularly true when considering the illegal dumping of garbage in the streets that ends up clogging drains and sewers, leading to floods (which have

become more intense due to climate change) or discharge of untreated wastewater into the streets. Operation and maintenance costs of sewerage considerably increase due to blocked drains. Therefore, solid waste management should be part of the sanitation strategy. Behavior Change Campaigns are also important so that the population is aware of the importance of not illegally dumping waste in drains and water bodies.

Options to convert waste to energy should be explored. Generation of electricity from the sludge in the wastewater treatment plants has not been fully explored. Electricity generated in the plant could reduce the overall energy consumption in wastewater treatment plants reducing the operating costs. The conversion of methane to electricity also reduces carbon emissions contributing to efforts to mitigate climate change. Best experience should be sought to analyze the viability of incorporating energy recovery technologies on a case-by-case basis and it should be adequately reflected in the feasibility studies. Converting waste to energy, however, requires skilled operational techniques and such institutional capacity needs to be in place for sustained energy generation from wastewater treatment plants.

Sanitation by-products have value that can influence sanitation management. There are two by-products of wastewater treatment that have monetary value and can be a factor in sanitation management (Tremolet 2012):

- reused water can be used for agricultural purposes and can be factored into the overall supply of water if the treatment level is adequate. The cost of irrigating urban spaces and golf courses can be reduced if re-used water is used. Aside from irrigation, re-used water is used for drinking purposes in Singapore which has set a benchmark in the region on the potential use of wastewater. However, there are risks to public health if re-use of the water is not properly regulated; and
- bio-solids for fuel or fertilizer is also an important by-product from wastewater treatment plants. The use of the bio-solids is increasing in the region but again there is need for regulations and their enforcement to promote good practices in handling sludge.

4.3 SUSTAINABLE INSTITUTIONS FOR QUALITY SERVICE

Sanitation is a complex business and the policy and institutional environment has to be well adapted. Urban sanitation management involves many institutions and incorporates many different sectors including finance, health, urban development, and the environment. Policies, laws, and regulations have to be tackled at the same time at the central and local levels for effective sanitation management. While the three focus countries of Indonesia, Philippines, and Vietnam have policies to increase sanitation, the implementation of these policies needs to be accelerated.

Recommendation 1: Develop city-wide sanitation strategies

Ensure that a comprehensive national program for urban sanitation is in place. As the previous sections demonstrate, sanitation improvements have not been uniform across the three focus countries and much more remains to be done. A comprehensive action oriented program with targets and funding is needed in all countries to improve services. In Indonesia, Philippines, and Vietnam, national programs exist but they need to be strengthened in the following ways:

- prioritize investments. Based on the needs, priorities for improving sanitation in various parts of the country should be established. These priorities could be based on health or environment indicators or regional development priorities. The priorities should be linked with short, medium and long term targets that should be periodically revised every three to five years. Decisions on establishing priorities should be based on economic principles and taking into account the concerns of the poor;
- institute a strong coordination mechanism. To overcome the issue of institutional fragmentation, there should be a lead national agency appointed to coordinate the development of sanitation planning among agencies, ensure that public financing is in place, strengthen the service deliverers, and monitor progress; and
- make public funding available. Large amounts of public sector funding would be required to make progress in sanitation—at least US$250 on a per capita basis. A financing plan should be in place to support the prioritized investments. To this end, Ministries of Finance of the respective countries should be involved as a key agency that would inform the sector ministries on the availability of resources which in turn would help to identify priority investment actions.

City-wide-wide economic solutions should be pursued. Urban development plans include population projections, development plans for different areas in a city, ways to

address informal settlements, and infrastructure development plans such as roads and housing. These are important factors that need to be considered in preparing City Sanitation Plans that should cover the entire city, including the poor. The approach in addressing sanitation should be as follows:

- A City Sanitation Plan—a strategic document that outlines the need for better sanitation based on local conditions and presents broad solutions—should be developed for urban catchment areas before any decision on investment is taken. The City Sanitation Plans should be used to secure financing from central and local government entities. Furthermore, the City Sanitation Plans should ensure that the local government will be in charge of delivering the services. Once a City Sanitation Plan is in place, detailed investments have to be prepared through feasibility studies. City Sanitation Plans should have a monitoring plan to determine progress on sanitation.
- Prioritized options that take into account the 'big picture' should be progressed considering life-cycle costs comprising investment and operating costs. There may be social obligation exceptions where sanitation facilities, although not economic, are required solely for health improvement reasons, to support the poor through community sanitation facilities or to eliminate open defecation.

Urban planning must account for availability of land for septage and wastewater treatment facilities. To reach economies of scale, it is important to minimize the number of wastewater treatment plants in a city. To this end, advance planning is required to determine the availability of land for wastewater treatment considering issues such as current and future population density, zoning plans, flood potential, the topography, and the drainage systems. These elements have to be factored into the overall life-cycle cost. The availability of land will be a key factor in determining the type of treatment and the length of sewers that would lead to a wastewater treatment plant. Land as well as being expensive is also politically contentious when it is to be used for wastewater treatment because of the "Not in My Backyard" (NIMBY) syndrome expressed by residents. The siting of septage treatment facilities also has to take into account the NIMBY syndrome and the environmental effects of sludge transportation.

Concerns of the poor should be incorporated in the City Sanitation Plans. The poor constitute a large portion of the urban population (Indonesia 18 percent; Philippines 13 percent; and Vietnam 6 percent) and their concerns need to be taken into account. In preparing CSPs to support pro-poor investments, comprehensive analysis should be carried out to assess the interests of the stakeholders and to identify incentives and potential winners and losers (WSP 2011).[21] Support to the poor would entail:

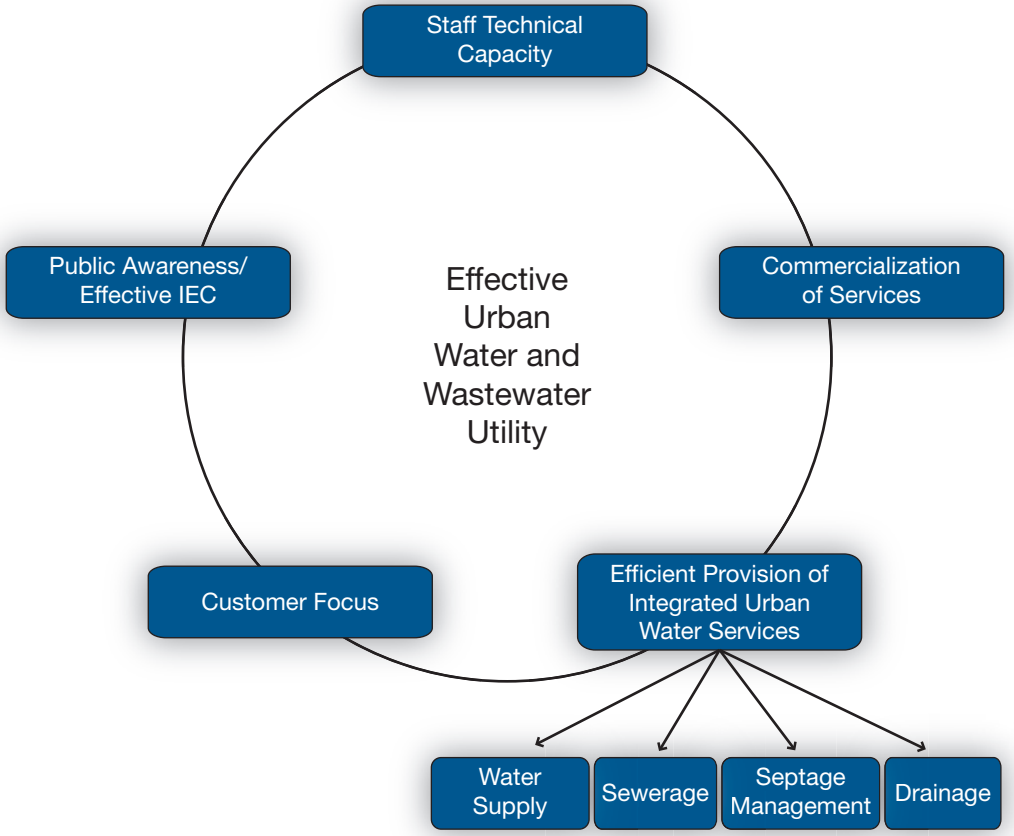
- Eliminating open defecation (OD). As mentioned earlier, OD is a problem in many cities and this issue needs to be addressed as a priority to improve the dignity of the residents that have to defecate in the open. Reducing open defecation also creates equitable service provision and improves the overall environmental condition in a city. Open defecation is more prevalent in Indonesia and in the Philippines. In Vietnam, open defecation is not prevalent.
- Improving access to finance for the poor to improve sanitation. The private costs borne by the poor to connect to the sanitation network and in constructing toilets or upgrading septic tanks should be supported, as needed. Micro credits, revolving funds, micro-guarantees or micro insurances, direct subsidies, vouchers, collective credits, and ex-post subsidies linked to results, are mechanisms to be considered (IRC, 2011). In addition, the use of block-tariffs for sanitation services or targeted subsidies could be considered.
- Improving services in informal settlements. Sanitary conditions are often worse in informal settlements as the urban density is high and wastewater and septage is not properly collected and treated. Slum upgrading programs need to address the issue of better wastewater and septage management, similar to the approach taken in the Nhieu Loc Thi Nghe (NLTN) area in Ho Chi Minh City. Slum upgrading is not an easy task and the political and legal barriers should be addressed to improve services. In addition, multiple levels of consultation and direct engagement with households should be conducted (WSP 2012).[22]

Recommendation 2: Integrate urban water management

Robust regulatory environment should be in place to jointly address water and sanitation issues. A regulatory environment at the local level that ensures quality of service at economic costs is paramount. As sanitation is linked to water supply, the business of providing water and sanitation

[21] Evaluating the Political Economy for Pro-Poor Sanitation Investments. Research Brief, WSP 2011.
[22] Delivering Sanitation to the Urban Poor: A Scoping Study, Draft Report, WSP 2012.

Figure 4.8: Scheme of an effective water and wastewater urban utility



services should be jointly regulated. A robust regulatory environment should be combined with institutional strengthening to provide the incentives and means for service providers to enhance their performance. Good practice emerging from regional and global experience points to the importance of: (a) recovering through tariffs, to the greatest extent possible, the costs of services that meet the health and environmental improvement plans of cities; (b) achieving economies of scale and thresholds of technical expertise by integrating water and sanitation services under a single utility (see Figure 4.8); (c) establishing regional water and sanitation companies that can support services to small satellite towns, incorporating also septage management, and drainage; (d) closely monitoring and regulating utilities while providing an effective complaint procedure and an avenue for citizen participation and (e) considering city level interventions as part of wider catchment and basin management plans.

Urban sanitation services should be commercialized. There are costs involved in delivering sanitation services and these costs should be recovered to provide quality services that would meet the health and environmental improvement plans of cities. Countries that have made improvements in sanitation have utilities that provide these services in cities and such a model should be followed in the EAP countries. Examples include Metro Manila which is served by two private companies, and public utilities in Vietnam. The advantage of having a commercial operation is that the operating costs and revenues are transparent and available to public officials who can make the necessary improvements to strengthen the utility on institutional and financial matters. In addition, four other factors should be considered to promote commercialization of sanitation utilities:

- Wherever possible, merge the water and sanitation services so that they are provided by a single utility. Water and sanitation services are closely connected and a single bill can be used to recover the costs. In the EAP countries, such an approach is possible as water services, if provided by the local government, are metered. The exception may be in Indonesia, where piped water service coverage is not high. In such a case, the provision of piped water services may also be considered if

it makes economic sense, along with improvements in the institutional arrangements.

- Determine the possibility of establishing regional water and sanitation companies. To achieve economies of scale on institutional and financial matters, agglomeration of utilities should be considered.[23] The urban service provider can offer support to the outlying smaller towns and suburbs that would have difficulties in providing services by themselves. Vietnam has water companies that serve a province and they could take on such a responsibility to provide water and sanitation services to the entire province. In the Philippines, outside Metro Manila, there are a number of small water service providers and their functions also could be consolidated. Examples of regional companies that provide water and sanitation services exist in China, Korea, Malaysia, United Kingdom, Brazil, and other countries. Ideally, these utilities should also be responsible for the provision of septage collection and disposal (directly or through subcontractors) and drainage operations, since wastewater is usually collected through a system of combined sewers and overflows.
- Regulate the operations of the utilities. The performance of the utilities in service delivery should be monitored by the local or central governments and improvements should be made on a continuous basis. A regulator should be responsible for: regulation of services provided by a utility, including penalties for non-compliance; defining and overseeing the tariff system; and monitoring the performance of utilities. In Vietnam, the Government is planning to create a benchmarking system on the performance of the water and sanitation companies. Once such a system is in place, it would greatly help to improve the services of the water companies. The two concessionaires in Metro Manila are also effectively regulated by the public authorities which are factors in the improvements in wastewater and septage management in the city. In the Philippines, the Government is also considering the establishment of a national regulator.
- Develop institutional capacity at the local level to effectively manage sanitation. The sanitation business is relatively new in the focus countries and as a result, professionalization of the sector is not yet complete. Sector expertise needs to be in place so that policies are implemented by local authorities by implementing investments effectively and carrying out operations in a sustainable manner. Optimizing the operations of a treatment plant requires experience to balance energy consumption and biological load reduction. Wherever possible, training should be provided to the operators so that they are able to maximize the reduction of pollution at the least cost. Water associations are present in the focus countries and they play an important advocacy role in promoting the water sector. These water associations or similar agencies should also take up the cause of sanitation to improve services. In Korea, professional associations have become a knowledge management hub for urban sanitation and contribute to sector capacity by encouraging viable career paths for those that enter the profession. Such associations can also serve a lobbying function and ensure that codes of practice are kept updated.

Set up monitoring and evaluation systems. A monitoring program should be incorporated in a city-wide sanitation plan and used as a management tool to determine progress. The monitoring system should include parameters such as number of people served, volume of septage and wastewater collected and treated, improvement in health conditions, improvement in water quality, reduction in the pollution load discharged, energy spent per kilogram (kg) of BOD treated, and financial cost recovery through tariffs.

4.4 VIABLE FINANCIAL SYSTEMS

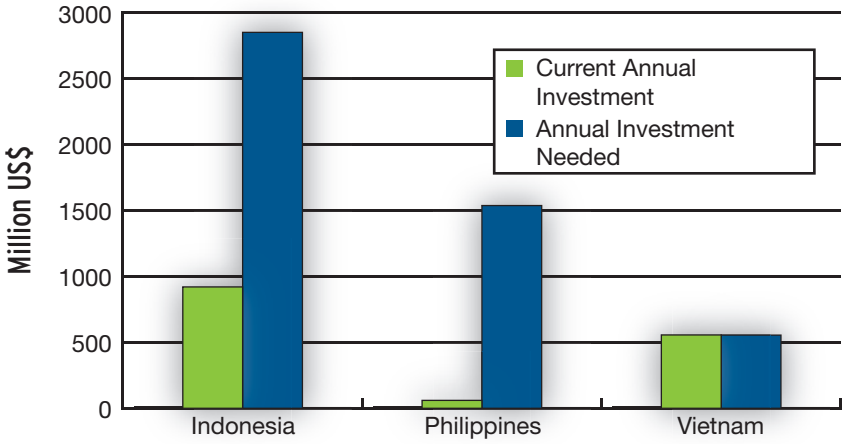
The cost of improvements in sanitation will be high. Careful planning is needed to ensure that resources in a country are well spent to address priority investments that will contribute towards shared prosperity through better sanitation.

Recommendation 1: Secure capital needs through a sanitation expenditure framework

A well-defined sanitation expenditure framework needs to be in place with sources of funding identified. Figure 4.9 illustrates how the financing for the sector in Indonesia and Philippines has been low compared to the needs. To improve urban sanitation, the countries would have to spend more resources. The expenditure framework would outline the costs to improve sanitation; define priorities and related costs; identify sources of financing, establish mechanisms on funds flow and financial management arrangements; outline plans to prepare projects along with expected targets and monitoring plans; and identify viable projects for the short, medium and long term. Such frameworks have been

[23] Gaining Operational and Managerial Efficiencies Through Water System Partnerships; US Environmental Protection Agency, October 2009.

Figure 4.9: Annual investment: current *versus* needed



Source: East Asia Urban Sanitation Review, World Bank 2013.

prepared for the countries that joined the European Union recently as they had to develop a plan to meet European Union requirements on water quality within a fixed period. While each country in East Asia will have to develop the expenditure frameworks based on country and sector conditions, these should include:

- investments: (a) review sector needs through a country-wide assessment; (b) prioritize cities where activities need to take place based on criteria such as environment, health, and regional growth objectives; (c) estimate overall investment costs for the priority cities; and (d) define a financing policy for the sector which would include a plan of recovering investment costs through tariffs and the use of subsides that are fiscally affordable; and
- operations: (a) develop clear policies to increase wastewater tariffs; and (b) develop plans to phase-out operating subsidies. This would include plans to use treatment technologies where operating costs are low.

The sanitation expenditure framework has to be linked with the fiscal plans of central and local governments. The bulk of the investment financing will be from public resources as seen through various examples in the world. Given the large public good element of universal sanitation, public investment for sanitation is justified. However, the public investments for sewerage and wastewater treatment would have to be fiscally affordable and sanitation investments should be carried out in their order of priority.

Private financing of infrastructure in new developments is possible. Overall, private financing for the sector has been limited in East Asia with certain exceptions where land developers have built small sewerage networks and treatment plant where the costs have been recovered through the sale of new property. Such schemes, however, can be replicated in other areas where the value of the new property sold is high. For instance, the Government of Malaysia introduced a policy that obliges housing developers to build sewerage systems for areas comprising more than 30 households or 150 people equivalent. The government effectively made use of a real estate growth to fund sewerage and urban sanitation infrastructure. It did this through building codes that made wastewater infrastructure mandatory for new developments and by charging for connection to existing systems.

Regulatory changes are needed to attract commercial capital and private operators. Under the current circumstances, where tariffs do not meet operating costs and the regulatory environment is not clear, commercial financing for the sector has been limited. An exception is the case of Manila, where Manila Water and Maynilad have embarked on an ambitious investment program to have full wastewater coverage in the city. The companies are raising commercial financing for the investments and, since wastewater tariffs are low and the companies do not receive grant financing, the investment costs would not be recovered through wastewater tariffs. Thus, cross subsidization from the water business would be needed. This case in Metro Manila demonstrates that it is important to:

- have an economic regulator that will ensure that quality services are provided at economic tariffs. The regulator will ensure that tariffs are adjusted to meet regulatory requirements on the service levels; and
- merge the water and sanitation services. Such an approach allows common billing and a cross subsidy between water and wastewater. In the medium to longer term, however, wastewater tariffs have to increase to reach cost recovery levels and the public needs to be informed about the need to raise wastewater tariffs.

The funding strategies have to be developed with a wide range of central government ministries. Improving sanitation management involves the local governments for implementation issues, but a wide range of central government agencies should also be involved. Apart from the sector agencies, it would be important to include the ministries and

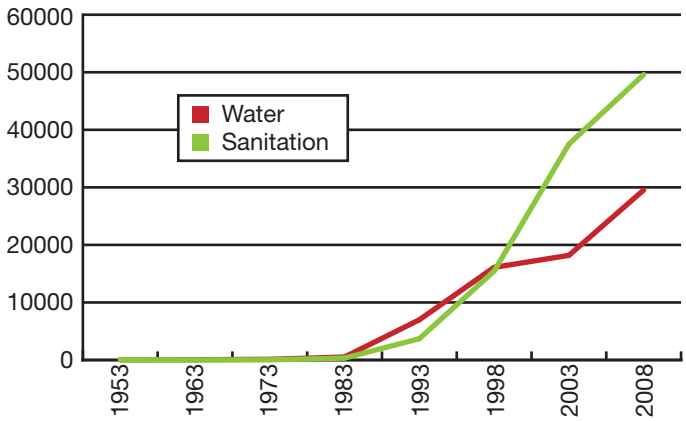
departments that are responsible for finance and economic planning. Key decisions on setting priorities, government support for sanitation, and institutional arrangements should be taken by a wider range of central government agencies that address issues on the economy, finance, and the sector. In the focus countries, there are explicit policies that the central government would provide support for investments which makes their involvement critical:

- Indonesia: the DEWATS program been funded by the central government through the PPSP program and this program is expected to be in place until 2014;
- Philippines: the NSSMP stipulates that 40 percent of the investment cost for sewerage in the 17 Highly Urbanized Cities will be financed by the central government and funds have been allocated in the budget for 2013; and
- Vietnam: Sanitation investments have been mainly financed by the central government through grants, based in inter-governmental policies on transfer of funds.

Innovative sources of finance can help in the medium term. Countries that have achieved close to universal coverage, or which are well on their way, have often used highly innovative sources of finance. In Brazil, funds for urban sanitation were provided through a workers pension fund (Fondos *de Garantiapor Tempo de Servico*). In China, the Urban Maintenance and Construction Tax was introduced in 1985 to help finance urban infrastructure development, as seen in the rapid increase of water and sanitation investments (Figure 4.10). Korea has a remarkable achievement of increasing the national coverage of sewerage network for its citizens from 39 percent in 1992 to 76 percent in 2002. This was partly financed through liquor tax revenues. Liquor tax collected by the national government was transferred to the local government, through the Local Subsidy Program to support road construction, water quality protection, agricultural and fishery development, youth education and rural development. It is estimated that between 1992 and 2002, about 7 trillion won was spent on sanitation investments (sewers and wastewater treatment) of which about 28 percent was financed through the liquor tax revenues.

Figure 4.10: Investment in water and sanitation in China (1953–2008)

Yuan million



Source: China Small and Medium Towns Overview, World Bank, 2012.

There will be private investment costs for which the poor may need to be supported. Most of the expenditures will be for public investments in sewers and wastewater treatment plants. However, there are private costs for individual homes to either upgrade septic tanks or to connect to sewers or combined drains once a new network is installed in front of a house. Homeowners may have difficulties in accessing funds for the investments to connect to the sewer network. To support homeowners—including the poor—microcredits could be provided which would allow the homeowners to pay for the cost over time, which would offer an affordable scheme. An example of such a scheme is in Santiago, Chile which has 97 percent sewerage connection. This was possible through a financing model introduced by the Municipal Works Company of Santiago which provided different loan systems for the poor, depending on the extent of poverty.[24] It has been seen that hardware subsidies of some form usually play a critical role in expanding access to sanitation in poor areas, just because lump sum initial investments are the most common barrier for poor households (WSP, 2010). Results-based financing (RBF) also contributes to realign incentives and foster more equitable and efficient services for the poor. An interesting form of RBF is to support suppliers to provide them with incentives to prioritize the poor (WSP, 2011).[25] When this kind of subsidy is provided on an output basis rather than an input basis, it can be effective at stimulating demand and leveraging private investment.

[24] Sanitation Financing Models for the Urban Poor, International Water and Sanitation Center, November 2011.

[25] Identifying the Potential for Results-Based Financing for Sanitation, WSP, 2011.

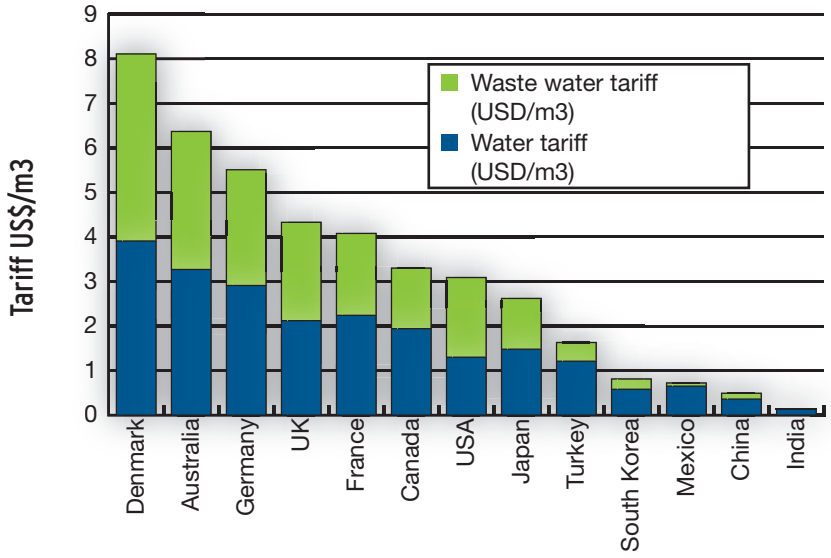
Recommendation 2: Maximize the use of consumer fees to meet operating costs

Wastewater costs should be fully paid by the polluter or user. In Vietnam, the wastewater charges are a percentage of the water bill. In the case of Metro Manila, this also includes septage management services. This is a practical approach as the water and sanitation sectors are linked. Wastewater charges should meet operating costs and by linking the water and wastewater fees, incentives are created to minimize water consumption and thereby reduce wastewater generation that would have to be collected and treated. In the East Asian countries, wastewater charges are normally less than 20 percent of the cost of water. However, this will change over time as operating costs increase to collect and treat the wastewater. Figure 4.11 shows that in high-income countries (Germany, Denmark, Australia, United Kingdom), the cost of wastewater is just as high as water.

Dependence on taxes to meet operating costs should be phased out. Tariffs in the three focus countries are not adequate to cover operating expenditures, and the difference is covered through operating subsidies generated through local taxes. Subsidies, if used, should be directed towards capital costs rather than operation and maintenance costs. Public support for the investments could be justified given the environmental externalities. However, operating subsidies financed by taxes should be avoided to promote economic operations. It is critical that sector financing plans jointly take into account the resources that can be used from the '3T' areas—tariffs, taxes (local), and transfers (from the central government). Figure 4.12 illustrates how different countries in the world have financed their water and wastewater operations through a combination of the 3Ts. The level of financing through tariffs in the three focus countries is low (less than 20 percent), indicating the need for tariff reforms as the economy grows and as ability and willingness to pay increase.

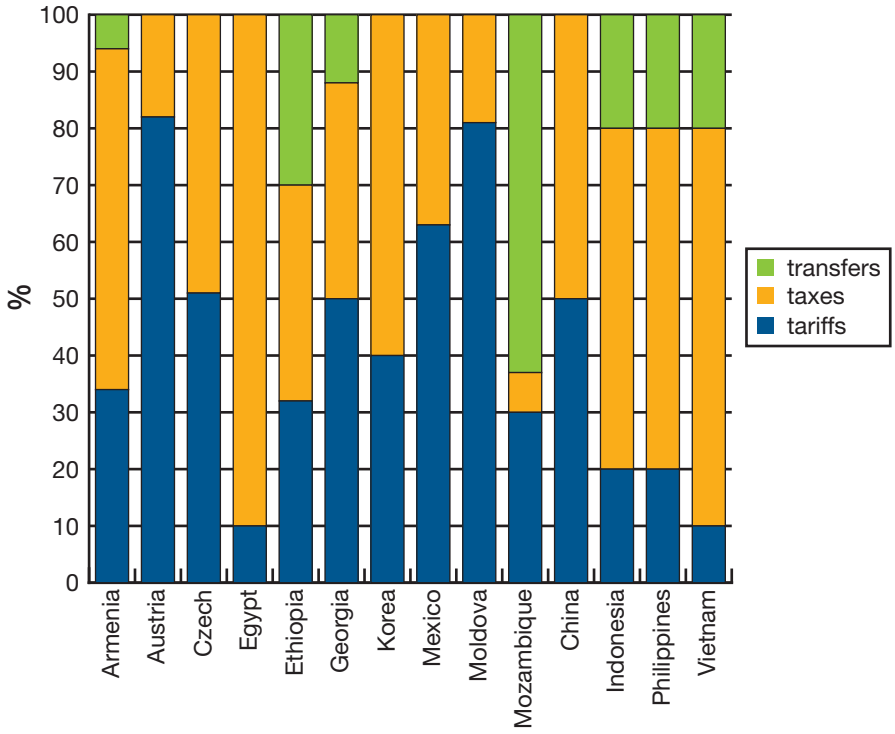
Block tariffs are a practical way to support the poor where water supply systems are in place. For operational expenses, while tariffs have to increase to meet costs, there are cases where these increases may also not be affordable to the poor. Targeted direct subsidies (income assistance) can be provided to the poor to help them pay for the utility expenditures. This is the most efficient way to help the poor, however, it is administratively difficult as a database on the recipients of the financial assistance has to be maintained and regular payments have to be made by the local government authorities. Another way to assist the poor where there are water supply systems in place would be through a block-tariff

Figure 4.11: Comparison of average tariffs in selected countries



Source: Brown, Hector. 2012.

Figure 4.12: Estimated shares of tariffs, taxes and transfers in water and sanitation finance



Source: OECD 2009.

system where the water and associated wastewater tariff would be low below a certain threshold (say 5 m^3/month/household). Tariffs above the low consumption threshold have to be higher to offset the revenue impact on tariffs made available to the poor. This system is easy to implement and is already in place for water tariffs in Indonesia, Philippines, and Vietnam and many other parts of the world. In the region, as the tariffs are revised for wastewater, the use of a block tariff system should be considered.

4.5 IMPLEMENTATION ROADMAP

Comprehensive interventions should be made to make improvement in the sector. The recommendations mentioned is summarized in a roadmap that can be made country specific with the agreement of the major stakeholders—central government, local government, service providers, and citizen groups (Table 4.2). Following the actions laid out in the short, medium, and long term will help to create sustainable sanitation services in the urban areas.

Table 4.2: Roadmap to sustainable sanitation services in urban areas

Recommendations	Actions	
	Short Term	Medium to Long Term
	People-Centered Policies	
Integrate sanitation with city development plans	• set objectives, priorities and realistic targets • ensure low income and peri-urban areas are served • involve the public in the planning process	• integrate sewage and septage management plans with urban development plans • train related officials and personnel
Design and implement Behavior Change Communication Strategies	• conduct surveys and identify targets • develop toolkits incorporating social marketing techniques	• implement Behavior Change Communication stategies
	Cost-Effective Technical Solutions	
Prioritize the collection and treatment of septage	• combine billing and collection of septage with other water services • regulate companies that collect and discharge septage • increase septage treatment capacity in cities • provide assistance to the poor for better on-site sanitation	• monitor groundwater pollution • increase direct sewage connections to replace on-site solutions
Collect and treat wastewater at least cost	• intercept flow of wastewater to water bodies • expand sewerage network • increase household connections to sewers • provide assistance to the poor to connect to sewers	• expand capacity to treat wastewater
Adopt climate smart strategies	• consider climate effects for wastewater and drainage activities • explore waste to energy activities • pilot use of wastewater re-use and bio-solids	• scale up waste to energy activities • scale up wastewater reuse
	Sustainable Solutions for Quality Service	
Develop city-wide sanitation strategies	• eliminate open defecation • develop city sanitation plans to expand and improve services	• implement city sanitation plans
Integrate urban water management	• integrate water and sanitation services through a single service provider • establish monitoring systems to determine progress made in cities	• develop institutional capacity to operate sanitation systems
	Viable Financial Systems	
Secure capital needs	• define investments to meet sector goals through Sanitation Expenditure Framework • provide financial support to the poor for investments	• provide financing through public sources in a fiscally affordable manner • promote the role of the private sector for financing and operations
Use consumer fees to meet operating costs	• develop policies to increase wastewater tariffs to meet operating costs • ensure wastewater tariffs are regulated • ensure poor can afford to receive sanitation services	• implement policies to increase tariffs which will reduce the need for operating subsidies

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