EAST ASIA PACIFIC REGION **URBAN SANITATION REVIEW**

INDONESIA

COUNTRY STUDY

SEPTEMBER 2013

THE WORLD BANK

Australian AID

Table of Contents

BOXES

FIGURES

TABLES

Acknowledgments

This country report on Indonesia provides the background for the Urban Sanitation Review for the East Asia and Pacific Region. The country report was prepared through a consultative process in Indonesia which included meetings with central and local government authorities, review of sanitation operations in the cities of Medan, Surakarta, Palembang, and Banjarmasin, and a workshop that was held in Jakarta on February 21, 2013. This report has been prepared with the financial support of an AusAID grant.

The Task Team Leader (TTL) for this task is Sudipto Sarkar and the Sector Managers for the product are Charles Feinstein and Nathan Belete. The previous TTL was Alan Coulthart. The main author of this report is Ross Kearton (consultant) and inputs have been provided by the following staff from the Bank and the Water and Sanitation Program (WSP): Victor Vazquez Alvarez, Irma Magdalena Setiono, George Soraya, Fook Chuan Eng, Richard Pollard, Demilour Reyes Ignacio, Almud Weitz, Eduardo Perez, Alexander Danilenko, and Isabel Blackett. Important contributions were also made by a team of consultants, including: Enrico Rahadi Djonoputro, Risyana Sukarma, Eric Buhl-Nielsen, and Mara Baranson. The peer reviewers for this report were Eduardo Perez and Michael John Webster.

The task team for this report greatly appreciates the technical contributions made by the various stakeholders who were consulted during the preparation of the report and the financial support provided by AusAID.

Abbreviations and Acronyms

ADB	Asian Development Bank
AKKOPSI	*Asosiasi Kabupaten Kota Peduli Sanitasi* (Association of Cities and Districts Concerned about Sanitation)
AMPL	*Air Minum dan Penyehatan Lingkungan* (National Steering Committee for Drinking Water and Environmental Health
APBD	*Anggaran Pendapatan Belanja Daerah* (Local Government Budget)
APBN	*Anggaran Pendapatan Belanja Negara* (National Budget Funding)
AusAID	Australian Agency for International Development
BAPPEDA	*Badan Perencanaan Pembangunan Daerah* (Regional Agency for Planning and Development)
BAPPENAS	*Badan Perencanaan Pembangunan Nasional* (National Development Planning Agency)
BLH	*Badan Lingkungan Hidup* (Local Environmental Agency)
BLUD	*Badan Layanan Umum Daerah* (Local Service Delivery Agency)
BPLHD	*Badan Pengendalian Lingkungan Hidup Daerah* (Provincial Environmental Agency)
BOD	Biological Oxygen Demand
BORDA	Bremen Overseas Research and Development Association
Cipta Karya	Directorate General of Human Settlements
DAK	*Dana Alokasi Khusus* (Special Budget Allocation for Local Government)
DEWATS	Decentralized Wastewater Treatment Systems
DK	*Dinas Kebersihan* (City Cleaning Department)
GDP	Gross Domestic Product
GOI	Government of Indonesia
HIS	Health Information System
IDB	Islamic Development Bank
IDR	Indonesian Rupiah
IPLT	*Instalasi Pengolahan Lumpur Tinja* (Septage Treatment Plant)
ITB	*Institut Teknologi Bandung* (Bandung Institute of Technology)
IUIDP	Integrated Urban Infrastructure Development Program
IUWASH	Indonesia Urban Water, Sanitation and Hygiene Project
ISSDP	Indonesia Sanitation Sector Development Program
JICA	Japan International Cooperation Agency
JMP	Joint Monitoring Program
JWSRB	Jakarta Water Supply Regulatory Body
KLH	*Kementerian Lingkungan Hidup* (Ministry of Environment)
MCK/MCK+	*Mandi Cuci Kakus* (communal toilets)/MCK + primary treatment system
MDG	Millennium Development Goals
MLD	Megaliters (or Million Liters) Per Day
MOF	Ministry of Finance
MOH	Ministry of Health
MOHA	Ministry of Home Affairs
MPW	Ministry of Public Works
MSMIP	Metropolitan Sanitation Management Investment Project
NGO	Non-Government Organization
ODF	Open Defecation Free
O&M	Operation and Maintenance
PDAM	*Perusahaan Daerah Air Minum* (Local Government Owned Water Utility)
PD PAL	*Perusahaan Daerah Pengelolaan Air Limbah* (Local Government Owned Wastewater Utility)
POKJA	Working Group
PP	*Peraturan Pemerintah* (Government Regulation)

PPP	Public Private Partnerships
PPSP	*Program Percepatan Pembangunan Sanitasi Perkotaan* (Road Map for Acceleration of Urban Sanitation Development)
PROKASIH	*Program Kali Bersih* (Clean River Program)
PROPER	Program for Pollution Control Evaluation and Rating
RBC	Rotating Biological Contactor
RPJMN	*Rencana Pembangunan Jangka Menengah Nasional* (Medium Term Development Plan)
sAIIG	Australia Indonesia Grant for Sanitation
SANIMAS	*Sanitasi Oleh Masyarakat* (Sanitation by Communities)
SDO	Service Delivery Organization
SKPD	*Satuan Kerja Perangkat Daerah* (Regional Working Unit)
SS	Suspended Solids
SSK	City Sanitation Strategy
STBM	*Sanitasi Total Berbasis Masyarakat* (National Strategy for Community Based Total Sanitation)
UASB	Upflow Anaerobic Sludge Blanket
UNICEF	United Nations Children's Fund
UPTD	Unit Pelaksana Teknis Daerah (Regional Technical Implementation Unit)
USAID	United States Agency for International Development
USD	US Dollar currency
USDP	Urban Sanitation Development Program
WASPOLA	Water and Sanitation Sector Policy Formulation and Action Planning Project
WHO	World Health Organization
WSP	Water and Sanitation Program
WWTP	Wastewater Treatment Plant

Executive Summary

The Executive Summary is organized into three sections: Sector Performance Overview, Sector Analysis (covering people aspects, technology, governance, and finance), and Recommendations.

A. Sector Performance Overview

This Indonesia Country Study forms part of the East Asia Urban Sanitation Review. The Review focuses on three of the emerging middle income countries of East Asia: Indonesia, Philippines and Vietnam. The Reviewwill develop a regional strategic framework to help guide national urban sanitation programs and their implementation in these emerging middle income countries.

Almost half of Indonesia's population of 245 million people lives in urban areas and their need for safe wastewater management services are growing rapidly. The majority of urban households and businesses in Indonesia use septic tanks for wastewater disposal, and the use of water-flush toilets is common. About 14 percent of urban dwellers still practice open defecation. Although access to improved sanitation in urban Indonesia was about 73 percent in 2010, this only considers the basic criteria of access to a facility as defined by the World Health Organization (WHO) Joint Monitoring Program (JPM) and not safe collection and disposal of wastewater and septage, which is only 1 percent and 4 percent, respectively. This coverage is significantly lower than in other East Asian countries despite Indonesia having experienced significant economic growth in recent years, surpassing many of its neighboring countries. The economic impacts of poor sanitation[1] in Indonesia are significant. A study carried out by the World Bank's Water and Sanitation Program estimates that Indonesia lost IDR56 trillion (USD6.3 billion) in 2007 due to poor sanitation and hygiene, equivalent to about 2.3 percent of the country's gross domestic product.

Beginning in 2000, the central government, coordinated by BAPPENAS,[2] embarked on a series of initiatives to reform water supply and sanitation sector policies. These reforms were aligned with decentralization which devolved responsibility for sanitation to the local government. The following has been achieved:

- establishment of the *Acceleration of Urban Sanitation Development Program* (PPSP) to assist local governments in comprehensive citywide sanitation planning through the preparation of City Sanitation Strategies (SSK). As of mid-2012, 240 cities and regencies have prepared SSKs, and 330 of the 496 local governments in Indonesia are expected to complete them by 2014;

- inclusion in the 2010-2014 Medium Term Development Plan of sanitation targets: (a) Indonesia to be 100 percentOpen Defecation Free; (b) 10 percent of the total population to be using off-site wastewater management systems; and (c) 90 percent of the population to have improved on-site or shared facilities;

- a total of approximately 1700 decentralized wastewater treatment systems (DEWATS) constructed countrywide with another 4,000 DEWATS systems planned to be implemented by 2015;

[1] Note that in the context of Indonesia, sanitation covers wastewater management, solid waste and urban drainage.

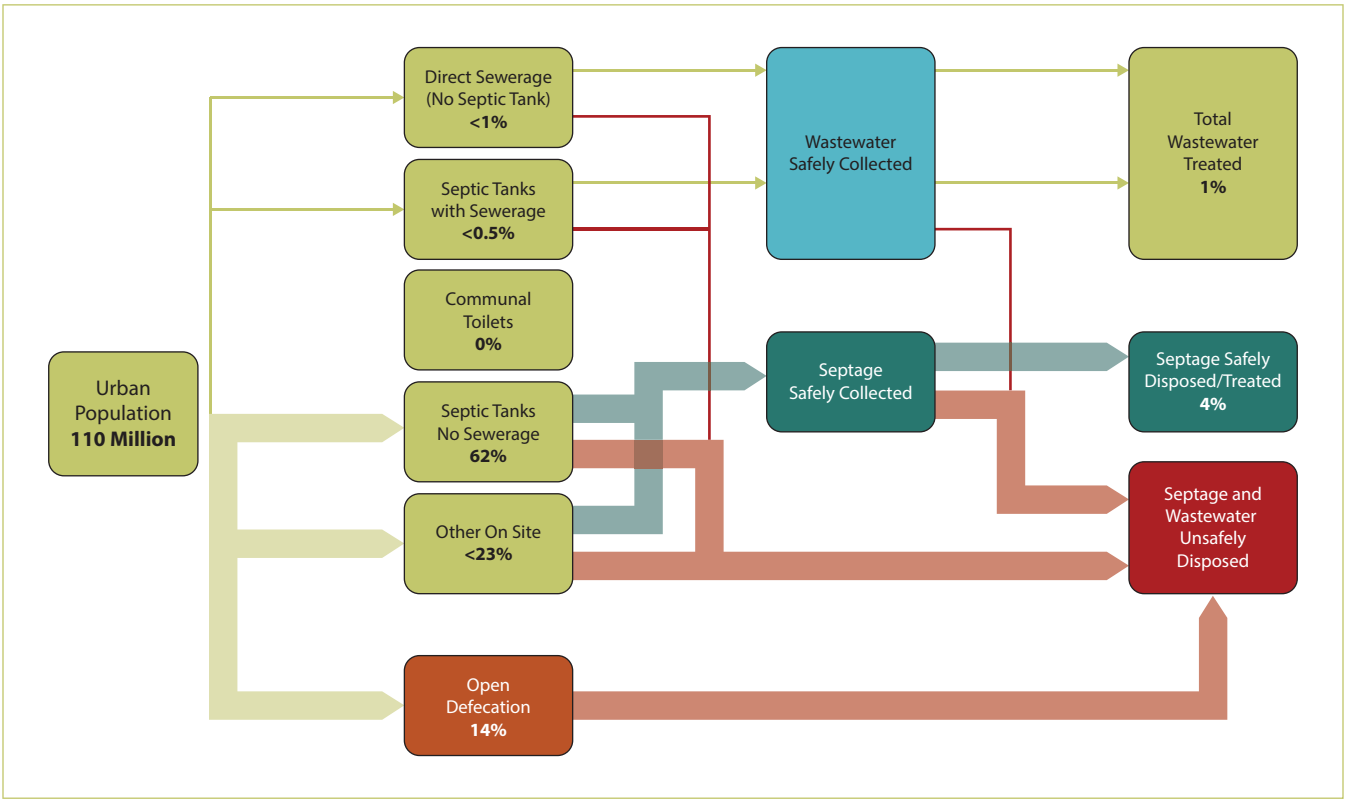
[2] The National Development Planning Agency.

- centralized sewerage systems planned for an additional five cities such that 32 million people or 15 percent of the population in 16 cities will be covered by centralized sewerage systems;
- national government expenditure on sanitation increased eightfold between 2006 and 2012, from IDR540 –IDR4,200 billion; and
- the Association of Cities and Districts Concerned about Sanitation in Indonesia (AKKOPSI, established in 2011) now comprises over 200 cities. Members of AKKOPSI have committed to allocating at least 2 percentof their budget to sanitation in the future.

Despite these impressive initiatives, urban sanitation (particularly wastewater management) continues to perform inadequately and faces critical issues that need to be urgently addressed, as follows:

- The total amount of urban wastewater being treated is only 115 million liters per day (MLD), or approximately 1 percent of the total urban wastewater produced (Figure 1).
- While over 60 percent of the urban population has flush toilets discharging to septic tanks, only 4 percent of septage is treated despite almost 150 septage treatment plants having been constructed during the past 20 years.
- The urban poor suffer disproportionately from the low sanitation coverage, having less coping mechanisms than those with higher incomes – open defecation is still 14 percent in urban communities.
- Over 300 city sanitation strategies (SSKs) and sanitation investment plans have now been prepared by local governments and these plans will require an exponential increase in financing over the next five years to implement.
- The governance arrangements for sanitation service delivery at local government level are not well developed with no clear service provider and no organization to regulate the equitable delivery of services.
- Development of the centralized sewerage systems in the 12 towns with sewerage has been problematic with a seeming mismatch of demand and supply. There are a total of less than 200,000 connections and the rate of increasing connections has been extremely slow; treatment plants are less than 50 percent utilized and collection efficiency in some cities is as low as 30 percent,with only Bandung and Jakarta achieving cost recovery.

FIGURE 1: Wastewater and Septage Flow in Urban Indonesia



- The many Decentralized Wastewater Treatment Systems (DEWATS) constructed across the country have been well received by communities, but the public facilities suffer from reduced utilization over time, the systems do not produce a high quality effluent, and the community management lacks expertise to address technical issues. There is also some concern with the sustainability of the DEWATS as the revenue generated from customer fees is usually inadequate to cover major costs. Furthermore, these DEWATS cannot be scaled up to meet the huge demand to treat more wastewater and septage.

B. Sector Analysis

Given the commitment of the Indonesian government to improve sanitation and meet its ambitious targets in the sector, consideration has been given to what is needed to address the issues that are constraining development of the sector. The findings are presented in terms of people, technology, governance and finance.

B.1 People Aspects

Public awareness of the broader public health and environmental benefits of more comprehensively and effectively managing wastewater is limited. In consonance with long-standing Indonesian government concepts, wastewater management is popularly understood to be a private rather than a public responsibility. This has resulted in substantial investments by people at the household level through on-site infrastructure such as septic tanks but there is unwillingness to pay for wastewater services that benefit the community as a whole.

There are capacity constraints at all levels. Increasing sanitation coverage will require far more resource mobilization than simply increasing budget allocations and donor investment in sanitation. There are major gaps between the demand and supply of facilitators forcommunal DEWATS systems and for hygiene behavior (STBM),[3] both in the short term and in the medium-term. Shortages of personnel will also emerge for operators to run and maintain both the centralized and decentralized sanitation facilities across the country. While graduates from environmental engineering programs can be expected to fill the demand for technical personnel, environmental engineering does not attract a large number of university students. More comprehensive training courses are required to make the sector more attractive and to address the gaps in competencies.

B.2 Technology

The support needs at the interface between community-managed and institutionally-managed services have not generally been addressed. The Road Map for Acceleration of Urban Sanitation Development (*Program Percepatan Pembangunan Sanitasi Perkotaan*, or PPSP strategy of investing in small communal systems that can eventually be integrated with a central piped sewerage network makes good economic sense in principle, but it is not simply a matter of local governments divesting responsibility to community groups until a sewerage system is developed. The DEWATS program requires substantial investment in facilitation and technical collaboration between local government agencies and communities to ensure that the systems are effectively used and sustainably maintained.

On a citywide basis, there are a range of sanitation solutions appropriate for different socio-economic, topographic and demographic areas across the city. Comprehensive, citywide planning through the SSKswill outline areas suitable for centralized sewerage, those areas where DEWATS is appropriate, those where on-site solutions will remain for the foreseeable future as well asidentify the low income communities where immediate support is needed. The current DEWATS program under PPSP in principle offers communities a choice of options: MCK+ (*Mandi Cuci Kakus* [i.e., communal toilets] plus primary treatment system) with a communal septic tank or simplified sewer systems connected to a communal septic tank. In the longer term, simplified sewer systems are more easily adapted to conventional sewer networks, and they offer a level of service – house connections and the elimination of household septic tanks – that households want. However, the use of DEWATS systems should be evaluated in terms of the comparative costs with centralized systems, the suitability of the quality of effluent produced and the labor-intensive project preparation and operating requirements. For poor communities residing in areas where conventional sewerage is difficult to provide, such as in low lying areas along river banks or mountainous terrain, innovative on-site solutions need to be developed.

Increasing coverage in highly urbanized areas with separate, centralized systems requires huge investment and is also constrained by the difficulty in encouraging households to connect. This can be addressed through a phased approach. Initially, the septic tanks would be retained, and a combined systems approach adopted, intercepting existing drains through storm overflow interceptors and treat-

[3] *Sanitasi Total Berbasis Masyarakat* which is the National Strategy for Community Based Total Sanitation.

ing the combined flows before the wastewater enters the major water bodies. Over time the combined systems could be upgraded to separate systems as further finance becomes available and as community awareness and behavior change approaches increase the willingness to connect.

Septic tanks will continue to be the primary means of household wastewater disposal for the foreseeable future. However, previous attempts at implementing septage management programs in Indonesia have not been successful primarily due to the lack of incentive for residents to have their tanks de-sludged and for the operators to correctly dispose of septage at treatment facilities. There are many constraints to the development of an effective septage management program -- from lack of enforcement of septic tank design and construction standards to the lack of a legal, institutional or financing framework for septage collection, treatment and disposal. Some of the areas that need to be addressed in the development of a more effective septage management program are:

- ***policy framework and enforcement*** through the passing and enforcement of local government ordinances for proper design, construction and regular desludging of septic tanks, accompanied by a charging regime that removes the disincentives both at the householder and operator level;

- ***institutional arrangements and capacity***, involving establishment of sustainable institutional arrangements at the local government level for septage management, including private sector participation, accompanied by capacity building; and

- ***funding for septage management***. After demonstrating the financial viability of septage management programs, local governments should be encouraged to fund septage management programs either through local budgets or low interest loans.

B.3 Governance

The decision-making process has been sub-optimal leading to the current status of sanitation in Indonesia. Economic evidence of the cost of poor sanitation has played a key role in influencing BAPPENAS, the Ministry of Public Works (MPW) and the Ministry of Health (MOH) in particular to take a more proactive role in sanitation. And, the SSK preparation process has resulted in strong political buy-in in many municipalities. Nevertheless, achieving progress has been challenging. Some of the key issues are:

- ***sequencing of investments and operations*** to ensure that appropriate institutional arrangements are in place before contemplating major investment in the sector;

- ***use of evidence-based analysis to create demand for sanitation*** at the central and local government levels and with civil society and the private sector as well as within the community;

- ***creating demand and accountability for sanitation***, a slow public demand for sanitation is usually cited as a critical factor in the slow development of sanitation infrastructure in Indonesia. The PPSP and SSK have assisted in developing awareness and helped to create 'champions' for sanitation development. Deliberate linking of wastewater with drainage and solid waste also helps to create demand as historically these have been greater drivers of community demand than wastewater;

- ***building effective partnerships.*** Ensuring high levels of national and local government ownership of both the process and investments through a flexible and collaborative approach increases the appropriateness and sustainability of investments. At the local level, civil society involvement can increase commitment and sustainability of local government and the communities; and

- ***public debate and communication.*** Effective communication is needed to generate demand for sanitation across all socio-economic groups within cities or communities. Media interest in covering sanitation could be increased further by reframing it as a public interest issue (e.g., emphasizing risk and benefits) rather than as a technical issue and providing solid, appropriate evidence of the impact of poor sanitation.

Currently, there is no clear approach to ensuring professional management and regulation of wastewater systems. In order to encourage increased demand from the public for the provision of sanitation services, management needs to be more about service delivery than providing infrastructure. This requires the establishment by local government of a Service Delivery Organization (SDO), autonomous from local government operating with a 'performance agreement' that will set out their authority and accountability with respect to the local government, how performance is assessed, how they are paid, the consequences of failing to perform and how accountability will be enforced. This SDO should be responsible for management of all sanitation components including DEWATS, sewerage and septage management.

B.4 Finance

Although both national and local budget allocations for urban sanitation have risen dramatically since 2010, the needs are very large. This will be particularly critical during 2015-19 when investment plans prepared by over 200 cities under their SSKs will need to be implemented. The total investment required to achieve "full" sanitation coverage over twenty

years in the 330 cities and urbanized districts targeted under PPSP is estimated to be USD29 billion.[4] Clearly, an incremental approach will be required. Central government needs to develop an investment framework that defines central government grant contribution to sanitation and the expectations of financing by local government. Local governments need to be more proactive in accessing finance, including borrowing, and may need technical assistance in these areas.

Currently, most central government funding is directed towards DEWATS. Since central government grant funding is likely to remain as the major source of financing, it will need to be directed towards centralized systems in highly urbanized areas, including low income areas, if coverage is to increase significantly. Support for DEWATS and on-site systems should continue, but there should be a clear plan on how the issues of DEWATS would be addressed, especially issues related to achieving sustainable sanitation operations and scaling-up services to meet the needs of the country.

Cost recovery from centralized sewerage systems is poor and from DEWATS systems rarely sufficient for sustainable operations. The poor cost recovery is related to low utilization of the systems and it is probably most effective in the short term to require all households with access to a sewerage system to pay the same tariff, whether connected or not. There is a need to assess and consider alternative approaches to wastewater tariffs such as the introduction of a 'polluters pay' policy or including a sanitation fee as part of the water supply or power charges.

C. Recommendations

The following outlines recommendations to address the critical issues that face wastewater management in Indonesia. Ways to address specific sector issues are outlined in the matrix below:

- All local governments need to develop septage management programs through introducing appropriate legislation and ordinances, institutional arrangements, local financing and charging mechanisms.

- Conduct comprehensive citywide sanitation planning to identify areas for centralized sewerage, DEWATS, on-site solutions and introducing innovative approaches to provide services for the urban poor. The options selected should be justified on economic grounds, taking into account the capital and operating expenditures.

- To increase coverage, the central government needs to re-direct financing to the implementation of centralized systems in highly urbanised areas, while ensuring priority is given to sanitation for the urban poor.

- The DEWATS program should be considered in the context of comparative costs with other alternatives, effluent quality produced and operations and maintenance (O&M) arrangements.

- Wastewater service providers need to aim for cost recovery by implementation of 'polluter pays' principles through appropriate wastewater tariff structures, effluent discharge fees or through other means such as property taxes or other utility fees (e.g., water and electricity).

- Central government needs to develop a public expenditure framework for sanitation and assist local governments in raising finance for sanitation interventions. An institutional framework for managing sanitation by the local government needs to be established that will separate the roles of Owner, Service Provider and Regulator. This framework should cover all sanitation services associated with wastewater; DEWATS, septage management and sewerage.

- Demand by the community for wastewater management needs to be increased by improved focus on service delivery, awareness campaigns to promote behavior change and appropriate tariff structures.

[4] USDP Presentation on the PPSP, of which 40 percent is for wastewater.

Summary of Key Issues and Recommendations

Issue	Recommendations to Address Issues
64 percent of urban households have septic tanks, but only 4 percent of septage is treated. For the foreseeable future, about 90 percent of urban households will have on-site sanitation.	1. Implement program to conduct advocacy on effective septage management, possibly through AKKOPSI/CSS. 2. Local government to prepare and implement septage management plans and develop viable operations for septage management. 3. Local government to prepare city ordinances requiring regular de-sludging, septic tank retrofitting, proper disposal of septage. 4. Local government to establish septage management institutional arrangements. 5. Local government to introduce an environmental fee on households to cover the cost of desludging services and septage treatment. 6. Provide financial support for septic tank retrofitting, where required, through Service Provider, micro-financing, etc.
Less than 1 percent of urban wastewater is currently treated	1. Conduct citywide sanitation planning through SSK, focusing on the development of centralized systems in highly urbanized areas while ensuring that low income communities and eradication of open defecation are prioritized. 2. Continue DEWATS program in locations where centralized systems not viable, but with consideration of comparative costs, required effluent quality and O&M constraints. 3. Focus future DEWATS approach on provision of decentralized systems with sewerage networks rather than on MCKs. 4. Expand coverage of centralized sewerage more rapidly through a staged approach initially using combined sewerage and interceptors before transitioning to separate systems. 5. Design treatment facilities and set effluent standards to take account of influent and receiving water quality.
Huge investment is needed for 2014-2019 to implement current local government sanitation investment plans and for long term	1. Central government to develop a well-defined public expenditure framework and clearly articulated financing policy with sources of financing identified. 2. Provide technical assistance to local governments to assist in accessing finance for sanitation. 3. Central government budget to transition to funding primarily centralized systems. 4. DEWATS should be primarily financed by local government.
No clear institutional framework for wastewater management at local government level	1. Central government to develop guidelines for local government management of wastewater services focusing on service delivery to customers. 2. One Service Provider to have overall responsibility for wastewater infrastructure including centralized sewerage, DEWATS and septage management. 3. Regulatory arrangements to be developed for wastewater services, including tariff structures whereby consumer fees cover operating costs. 4. Professionalize the sector by developing additional training and licensing programs for specific skills areas. 5. Private sector to be encouraged to take on the role of Service Provider for all or part of a wastewater system.
Low utilization of existing sanitation systems – mismatch of demand and supply.	1. Feasibility studies for wastewater management to include real demand surveys. 2. Build public awareness on sanitation benefits to influence behavior change through government and civil society interventions. 3. Tariff or environmental fee structure to be adopted requiring all households to pay whether connected or not, but allowing cross-subsidies for low income households. 4. Low income households to be supported with connection fees, including through micro-financing. 5. Service Provider to undertake intensive demand creation campaign to accelerate the connection rate (Banjarmasin example).

I. Overview of the Urban Wastewater Management Sector in Indonesia

1.1 Background

With a population of about 245 million people, Indonesia is the world's fourth most populous country. Almost half of the population lives in urban areas; with an urban growth rate averaging 3.3 percent per year in 2011, the proportion of urban dwellers and their need for wastewater management services are growing rapidly. Although Indonesia is on track to meet the Milennium Development Goal (MDG) targets, collection and treatment of septage and wastewater need attention. Sanitation sector performance is shown in Annex 1.

Historically, wastewater management in Indonesia has been viewed as a household or private sector responsibility; as a consequence, public investment in sanitation infrastructure or services was negligible. Following independence in 1945, the primary focus of government was on building the nation and achieving economic growth, while the provision of basic services was not a priority for public expenditure. In the 1970s concern about health and welfare impacts on economic development led to increased investment in health programs, with limited investment in top-down projects for sanitation infrastructure. One important distinction in Indonesia is that sanitation or sanitasi is understood to cover solid waste and drainage, as well as wastewater management. The terms 'sanitation' and 'wastewater management' therefore need to be understood in this particular context.

Coverage of wastewater in urban centers in Indonesia is still very low. Despite increasing interest in sanitation, public investment in the sector has remained extremely low.Between 1970 and 2000, government spending on sanitation averaged just IDR200/person/year (USD0.021/person/year). Before 1980, only four cities had centralized sewerage systems that were constructed during the Dutch colonial period. By 2012 still only twelve cities[5] out of Indonesia's 98 municipalities[6] had centralized systems (Table 1.1). Most of these cover only a small fraction of the urban areas and are under-used.[7] For example, in Jakarta, the nation's capital and largest city, with an official population exceeding 10 million inhabitants (Metro Jakarta is over 28 million), the city's sewerage system covers only about 2 percent of the city population,[8] with a focus on commercial connections to hotels, apartments and offices in the central business district.

The history of sanitation development in Indonesia is shown in Figure 1.1.

[5] These are Balikpapan, Banjarmasin, Bandung, Batam, Cirebon, Jakarta, Medan, Prapat, Surakarta, Tanggerang, Yogyakarta, and Denpasar).

[6] In 2012_ Indonesia had a total of 529 "autonomous regions": 33 provinces, 398 regencies, and 98 municipalities.

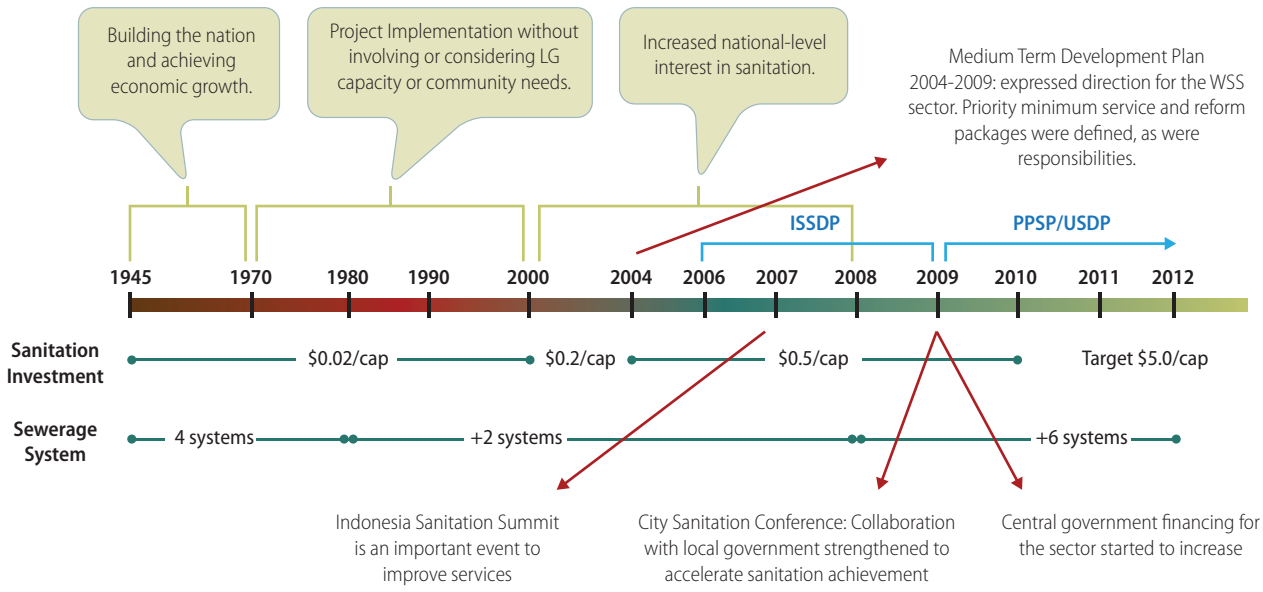
[7] The twelve municipal sewer systems plus a limited number of private housing estates have an estimated 200,000 connectionsin 2012, potentially serving approximately 1.1 million people.

[8] Concept and Strategy for Wastewater Management of Jakarta; PD PAL Jaya.

TABLE 1.1: Sewerage Systems in Indonesia (2012)

City	System	Total Capacity (m^3/day)	Used Capacity (m^3/day)	House Connections
Medan	UASB (Upflow Anaerobic Sludge Blanket)	10,000	5,650	12,370
Prapat	Aerated Lagoon	2,000	115	253
DKI Jakarta	Aerated Lagoon	38,880	704	1,407
Bandung	Anaerobic, Facultative & Maturation Pond	243,000 Installed 80,835	49,769	99,538
Cirebon	Anaerobic, Facultative & Maturation Pond	24,566 Installed 20,547	9,667	13,165 waiting list 14,585
Yogyakarta	Aerated Lagoon	15,500	7,314	11,000
Surakarta	Aerob Facultative & Biofilter	9,504	6,325	11,978
Bali	Aerated Lagoon	51,000	31,185	8,647 on DSDP II target 15,000
Banjarmasin	RBC	10,000	2,568	8,968
Balikpapan	Extended Aeration	800	800	1,452
Tangerang	Oxidation Ditch	2,700	600	1,200
Batam	Oxidation Ditch	2,852	150	300

FIGURE 1.1: History of Sanitation Development in Indonesia



[9] Prapat is shown separately in the table, although it is operated by the same utility as Medan, PDAM Tirta Nadi which is the only provincial water authority in the country. Medan and Prapat are therefore considered to be one system in some documents.

The majority of urban households and businesses in Indonesia use septic tanks[10] for wastewater disposal, and the use of manual water-flush toilets is common. About 14 percent of urban dwellers still practice open defecation. Overall, access to improved sanitation[11] in urban Indonesia was about 73 percent in 2010 with an additional 10 percent of the population sharing improved facilities. This coverage is significantly lower than other East Asian countries. In Southeast Asia, only Cambodia and Timor-Leste are on a par with Indonesia (see Table 1.2 below). Even these figures likely overstate the limited extent of 'improved sanitation' in urban Indonesia because the term 'improved' only refers to types of sanitation facilities used but not to methods for sludge or effluent management. Many improved toilets may provide little or no effective septage treatment and therefore retain most of the harmful public health, economic, and environmental impacts of unimproved sanitation.

TABLE 1.2: Sewerage Coverage in Asia

Percentage of Populations Connected to a Sewer System Selected Cities in Asia[12]	
Vientiane	0
Jakarta	**2.0**
Manila	7
Ho Chi Minh City	29
Dhaka	30
Phnom Penh	41
Delhi	60
Kuala Lumpur	80

In Indonesian cities, improvements to wastewater management and drainage are inseparably linked with solid waste management. In Jakarta alone, the city estimates that 6,500 tons of solid waste is produced daily, of which about 70 percent is collected. Most of the remainder,and some collected waste, ends up in the wastewater and stormwater drains of Jakarta. This jeopardizes the very limited wastewater collection and treatment systems that are in place by obstructing stormwater and wastewater drains and treatment machinery. Solid waste management is an important issue that must be addressed in any comprehensive sanitation strategy for Indonesia.

The economic impacts of poor sanitation in Indonesia are significant. A study carried out by the World Bank's Water and Sanitation Program (WSP) estimates that Indonesia lost IDR56 trillion (USD6.3 billion) in 2007 due to poor sanitation and hygiene, which is equivalent to about 2.3 percent of the gross domestic product (GDP).[13] In urban areas, the per capita cost of poor sanitation and hygiene amounts to about IDR275,000 (USD31.10) per annum. In recent years, awareness of the economic importance of wastewater management and government interest in investing in improvements have risen significantly, as described in the following sections of this Study.

1.2 Sanitation Policy

Following Indonesia's return to democracy in the late 1990s and subsequent decentralization, the responsibility for investment in municipal infrastructure and provision of services was transferred to local governments. Current laws specify the responsibilities of local governments (Law 32/2004 on regional governance) and outline the principal mechanisms for fiscal transfers (Law 33/2004 on fiscal balance). A more specific allocation of functions can be found in Government Regulation (PP)[14] 38/2007, and the role of provinces is clarified in PP 19/2010.

Beginning in 2000, the central government, with donor support, embarked on a series of initiatives to analyze and reform water supply and sanitation sector policies aligning these with decentralization mechanisms. This led to a sectoral and departmental dichotomy with functions based on responsibilities rather than administrative boundaries or population density. By 2006, separate but complementary draft policies for community-managed and institutionally-managed services were prepared and these are still under discussion. The approaches for individual, community, and institutionally managed services are shown in Figure 1.2 below.

[10] As discussed further in these reports many of these 'septic tanks' are open bottomed pits or *cubluks*, often with direct connection to waterways. Even correctly designed septic tanks do not usually have absorption trenches but discharge directly to the stormwater drainage system.

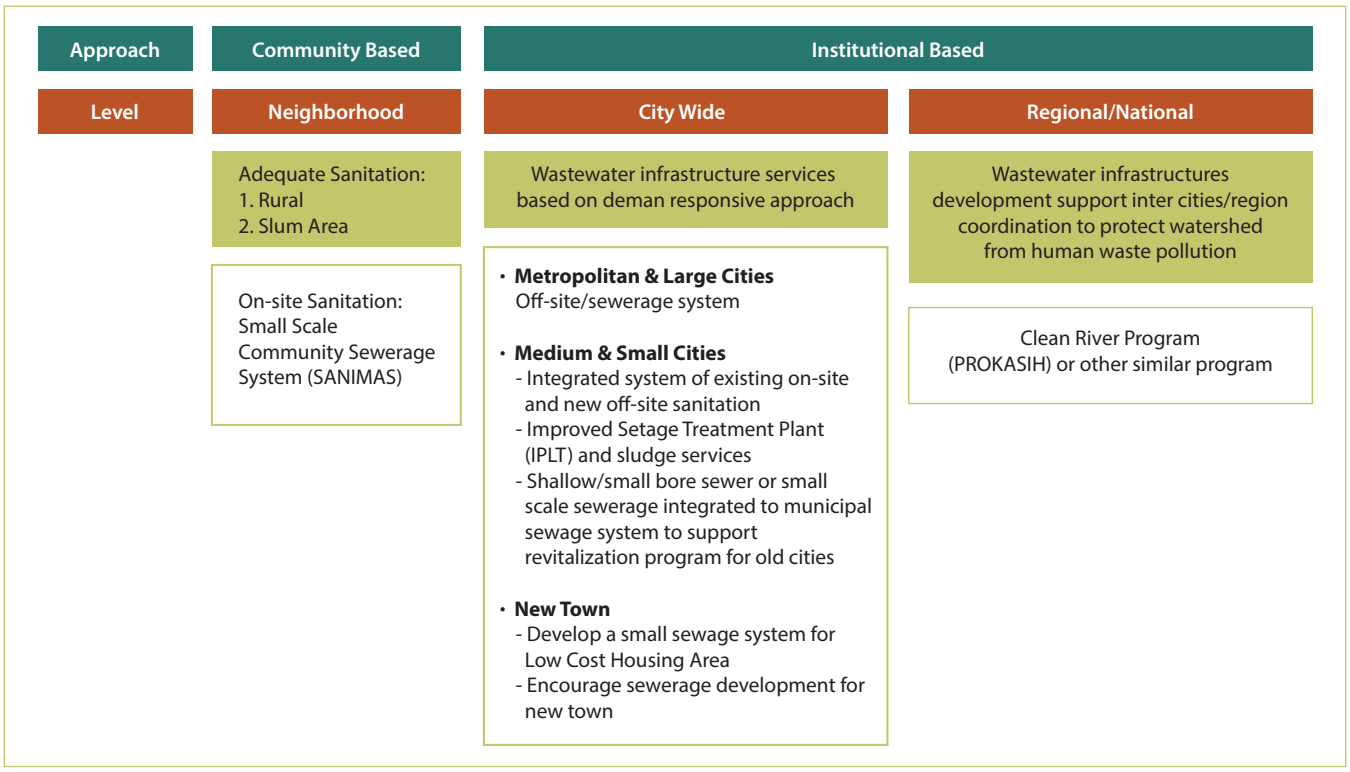
[11] Access to improved sanitation is defined as access to facilities that hygienically separate human excreta from human contact, consistent with the Joint Monitoring Program for the MDGs.

[12] Asian Development Bank, 2007

[13] Economic Impacts of Sanitation in Indonesia, Water and Sanitation Program, 2008

[14] A Peraturan Pemerintah (PP) is a national government regulation, but not a law.

FIGURE 1.2: Individual, Community and Institutional-based Sanitation Approaches[15]



The national Medium Term Development Plan (RPJMN) for 2010–2014 outlines key constraints to be addressed during the planning period. These are: inadequate regulatory instruments, low awareness of the importance and value of good wastewater management, limited local capacity to manage wastewater, lack of strategies and master plans, and limited funding. The Plan provides the following targets to be achieved by the end of 2014:

a. Indonesia is to be 100 percent Open Defecation Free (ODF);

b. Ten percent of the total population is to use off-site wastewater management systems, either conventional piped sewer systems with treatment plants, or community-managed simplified sewer systems with communal septic tanks (DEWATS); and

c. The remaining 90 percentof the total population will have access to improved on-site private or shared sanitation facilities.

Indonesia's Millennium Development Goal target for sanitation is somewhat less ambitious, with a targeted average of 78 percent of inhabitants to have access to improved sanitation in urban areas by the year 2015. This is reflected in the *National Policy and Strategies on Domestic Wastewater Management* issued by the MPW in 2008 (Per-MenPU 16/2008) andrepresents roughly a 10 percent increase in coverage from the 2009 estimates. To help achieve the RPJMN and MDG targets, in 2010 the Government launched the *Roadmap for Acceleration of Urban Sanitation Development* (PPSP) for the period 2010-2014, prepared by the inter-sectoral *National Working Group for Drinking Water and Sanitation* (POKJA-AMPL) under the leadership of the National Development Planning Agency (BAPPENAS).

The basic planning and policy tool for implementing PPSP is the City Sanitation Strategy (SSK), which is prepared by local governments through a highly consultative process that lays out a process for strategic planning, financing, and implementation of sanitation improvements. As of mid-2012, 240 cities and regencies have prepared SSKs, and 330 of the 496 local governments in Indonesia are expected to complete them by 2014. There are 160 local governments designated as "priority SSKs" that are in an advanced stage for investment and implementation from 2012 onward.

[15] Directorate General Cipta Karya, Ministry of Public Works, 2012

Other PPSP targets include the complete elimination of open defecation in Indonesia, and increasing the number of sewer connections and associated sewerage and wastewater treatment capacity to reach an additional 5 percent of the total urban population (or five million people) in 16 cities. In addition, the ongoing DEWATS/SANIMAS[16] program to expand community-managed sanitation facilities will build an estimated 5,000 additional community-managed simplified sewer systems, each serving about 80 households (about 2 million people in total) in 226 priority cities.

Under PPSP, ten to fifteen million people are anticipated to be served by community-managed DEWATS and the remaining urban dwellers are expected to have private on-site services using effectively functioning septic tanks. The target for DEWATS assumes an average of 80-100 households will be served by each system. This will require about 30,000 DEWATS/SANIMAS (primary treatment systems) be built in 330 cities and urbanized districts over five years, or about 20 DEWATS in each city or district per year. There are, however, issues related to institutional and financial matters that need to be addressed for DEWATS to scale up and to have sustainable operations.

The PPSP targets are ambitious, representing an increase in coverage of about 20 million people by the end of 2014. Increasing the coverage of the urban population by 5 percent with centralized sewerage and treatment will require additional services to about five million people; this will be based on a combination of an expansion of house connections and networks in the twelve cities that already have centralized sewerage and treatment with excess capacity, and additional construction of new systems. The estimated population in the 16 cities that either already havecentralized sewerage or are planned to be included in PPSP, is projected to be about 32 million people in 2014. The target would bring sewerage coverage in these cities to about 15 percent on average.

PPSP is complemented by the *National Strategy for Community Based Total Sanitation* (Sanitasi Total Berdasar-Masyarakat, STBM) issued by the Ministry of Health (MOH) under Decree No. 852/2008. The STBM strategy focuses on increasing demand for sanitation improvements through education, public awareness and the promotion of hygiene behavior change. The strategy also aims to create a conducive institutional environment through advocacy in public institutions, building the capacity of local agencies to implement programs, and by improving the service supply chain, mainly in the private sector.

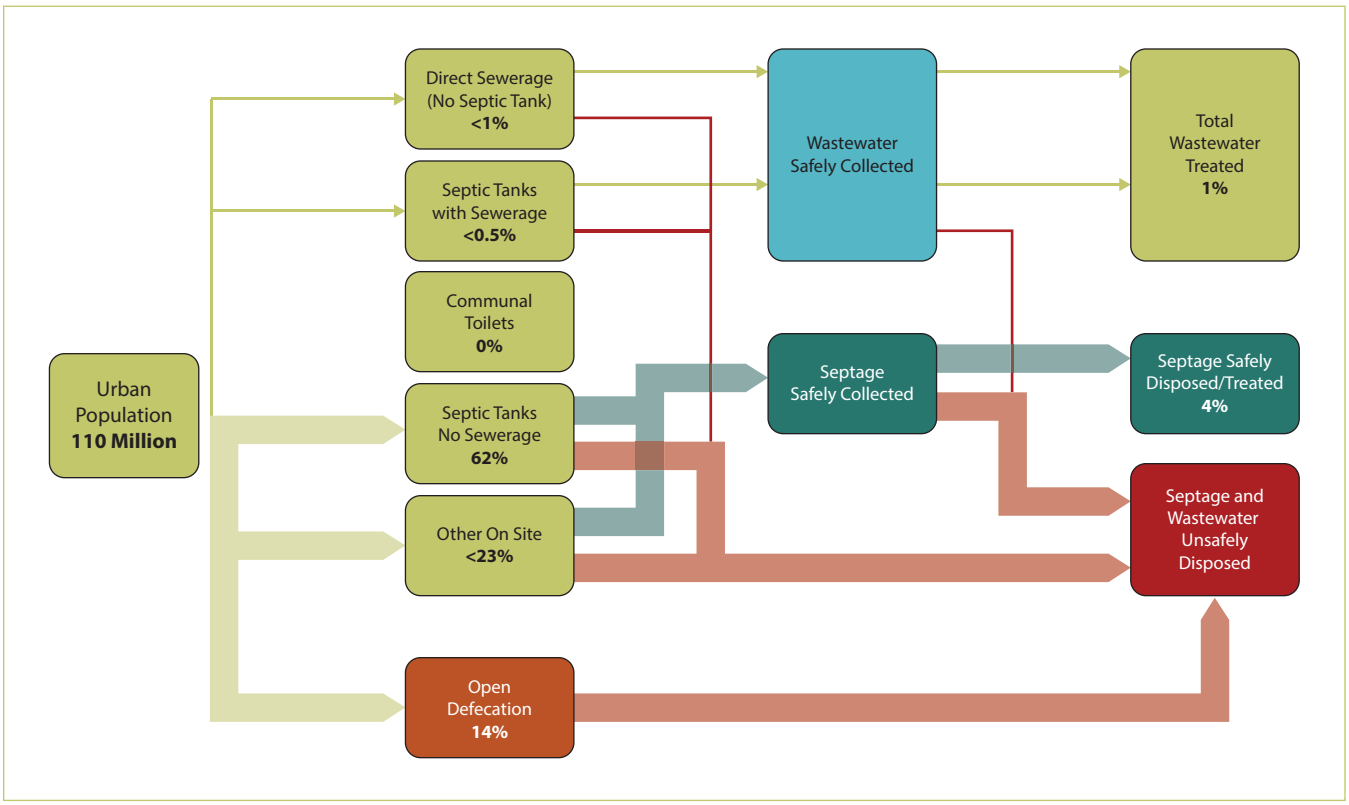
While there are national-level initiatives in place, they are not yet underpinned by sufficient national or local legislation to allow them to be effectively enforced. No formal, comprehensive national policy on sanitation has been promulgated in Indonesia, although a *de facto* policy is defined in the RPJMN (prepared by the Government every five years) and in PerMenPU 16/2008 issued in 2008 by MPW. The only national law pertaining to wastewater policy is Law Number 7/2004 on Water Resources. Article 21 of the law states that the protection and conservation of water resources should be achieved through management of sanitation facilities and infrastructure. The MPW regulation states that any local government that has not issued local regulations on wastewater management must do so, and local regulations, whether existing or new, must be consistent with the ministerial regulation. The regulation proposes joint responsibility between MPW and local governments for financing sanitation infrastructure development. However, in practice, these regulations have limited effect since they are not promulgated as laws and they are not binding on local governments. Inadequate legislation has resulted in a low level of treatment for wastewater and septage, although access to improved sanitation facilities is high (Figure 1.3).

1.3 Wastewater Management Technology

The predominant wastewater management technology in urban Indonesia is the septic tank. About 65 percent of households and commercial enterprises use them, and in Jakarta alone there are estimatedto be more than one million septic tanks. Although the MPW has established minimum design and effluent quality standards for septic tanks, these are rarely enforced. Due to negligible enforcement of design criteria, many septic tanks often leak and are in direct contact with groundwater. Moreover, most of the septic tanks in Indonesia are in fact *cubluks* (i.e.,one-compartment, lined but open bottomed pits) that rely on wastewater absorption in the subsoil and overflow to water bodies. More than 60 percent of households with wells also have a septic tank (either their own or the neighbor's) located within less than ten meters of the well, posing a potential contamination hazard. There are no national or local regulations governing septic tank sludge management or disposal.

[16] SANIMAS (*Sanitasi Oleh Masyarakat* or Sanitation by Communities) refers to the GOI program of decentralized community managed wastewater systems which may include public facilities or decentralized sewerage systems with a communal treatment facility. DEWATS is a more generic term for decentralized wastewater systems which includes SANIMAS and other decentralized systems.

FIGURE 1.3: Wastewater and Septage Flow in Urban Indonesia



The MPW embarked on an ambitious construction program in the 1990s, constructing septage treatment plants (*Instalasi Pengelolahan Lumpur Tinja*, IPLTs) throughout Indonesia. This resulted in the installation of about 140 IPLTs, of which 90 percentare now either not operational or are running on very low volumes. Most of these IPLTs were not complemented by an adequate collection system. Consequently, only 4 percent of septage[17] is collected and treated at an IPLT. Instead, the city cleansing departments (*Dinas Kerbersihan*) dispose ofseptage into sewers -- or wastewater treatment plants in the cities that have centralized sewer systems -- and to solid waste dumpsites or directly into the water streamsin cities which have no sewerage system. This can adversely affect the treatment process at the plants and the hydraulic performance of the sewer system. Private operators often dump indiscriminately in fields or rivers.

Centralized sewerage is currently limited to twelve cities (see Table 1.2 above). A very small number of housing estates have their own sewerage and treatment systems, primarily on the fringes of Jakarta. Treatment technologies that are commonly in use include aeration ponds, mechanically aerated lagoons, activated sludge systems, Upflow Anaerobic Sludge Blanket (UASB) systems, and rotating biological contact systems (RBCs). In almost all cases, either the treatment facilities or the sewer network, or both, are much underused. A study by USAID in 2006[18] found that, on average, 47 percent of treatment plant capacityand 50 percent of sewer network capacity was being used. Large amounts of idle capacity leads to excessive fixed costs. Poor sewer network quality in some locations, due either to poor construction or to age, causes substantial seepage of groundwater into the network, which dilutes the sewage resulting in increased volume of flow to the treatment works. This disrupts the treatment process and limits the number of connections that a plant can effectively manage.

Wastewater effluent standards in Indonesia are currently not stringent. The national standard for wastewater effluent is a maximum of 100mg/L Biological Oxygen Demand (BOD) and 100mg/L suspended solids (SS). Nutrient removal criteria are not included in the national standards. However, most local governments apply provincial standards which vary between provinces, but are generally 50 mg/L for both BOD and SS. This standard is proposed by the ongoing Asian Development Bank (ADB)-funded Metropolitan Sanitation Man-

[17] Refers to proportion of septage treated at septage treatment plants, not that disposed of into sewers or wastewater treatment plants.

[18] "Comparative Study: Centralized Wastewater Treatment Plants in Indonesia". USAID, 2006

agement Investment Program (MSMIP) for treatment facilities in the five project cities.[19] Neither nutrient removal, nor the quality of the receiving water is considered in the standards, although they may have been considered in the design of individual facilities. The Indonesian standards are less stringent compared with the other neighboring countries, although they may be strengthened in the future.

The MPW, local governments, and a number of non-governmental organizations (NGOs) have experimented with a range of technical options for both decentralized sewerage (DEWATS) and on-site wastewater management as interim solutions, since expanding coverage with conventional sewerage will take time. Through the Government of Indonesia (GOI)-sponsored SANIMAS Program, the MPW developed a community-led approach to installing communal sanitation systems that serves 50 -100 households. In 2006, the concept was adopted and has since been rapidly expanded by MPW, local governments, donor agencies and NGOs. Three types of basic SANIMAS systems are currently constructed: (a) community sanitation centers comprising public toilets, bathing and washing facilities constructed over a primary treatment system (known as MCK+); (b) shallow sewerage systems connected to a communal anaerobic digester; and (c) combined systems with both shallow sewers with house connections and a public facility at the digester site.

As of mid-2012,about 1700 DEWATS have been constructed (including some 500 under the SANIMAS program). A recent evaluation of DEWATS[20] found that the technical performance of most systems is satisfactory. Of 120 DEWATS sampled, 92 percent were in compliance with MPW effluent standards for septic tanks (<100 mg/l BOD). However, it is as yet unclear if these community-managed systems will be de-sludged on a sufficiently regular basis to maintain performance. Communities are satisfied; however,the collected revenue is not adequate to cover the cost of de-sludging as well as major repair. The majority of DEWATS that were constructed before 2010 were built under NGO-supported programs with extensive facilitation during the planning, design, and construction supervision process. Since the start of the recent scale-up such a high level of facilitation may not take place. Accordingly as PPSP is implemented, close attention will need to be paid to ensuring that adequate social and technical supervision is provided through MPW and local governments.

The majority of DEWATS constructed so far have been MCK+.[21] The recent WSP assessment of DEWATS found that usage of MCK+ declines quickly over time[22] and is far lower than originally planned, with only 20-30 households regularly using them compared with an average of 100 households per site that was used for the PPSP planning purposes. However, where the DEWATS comprise simplified sewer systems, they maintain usage with about 50 households at each site since they incorporate house connections. If actual usage rates are applied, meeting the PPSP target for DEWATS coverage will require over 52,000 systems to be constructed by 2014, which is almost twice the already ambitious estimate.

In recent years, MPW and other agencies have been researching improved, affordable septic tank designs. One popular development is the biofilter, a baffled fiberglass septic tank with aeration and a simple chlorinating device. The biofilter is produced in Indonesia and is now used in local government programs that promote septic tank rehabilitation, and in some community sanitation facilities. It is also available commercially and is priced competitively compared with a concrete or masonry septic tank that meets MPW design standards. The USAID-funded Indonesia Urban Water, Sanitation and Hygiene Project (IUWASH) program is funding the replacement of 4,000 septic tanks with biofilter installations in Medan.

1.4 Social Considerations

Indonesia has a strong and long established local socio-political structure based on neighborhood cells, wards, and sub-districts in urban areas. These entities each have popularly elected leadership and can be used to plan and manage community-level sanitation initiatives. In consonance with long-standing government concepts and policy, wastewater management is popularly understood to be a private rather than a public responsibility.

In urban areas, investment in improved sanitation by households has been substantial, with many households paying for septic tank construction and periodic pit emptying. In Jakarta alone, investment by households in septic tanks is estimated at USD150 million. However, awareness of the broader public health and environmental benefits of more comprehensively and effectively managing wastewa-

[19] MSMIP is supporting the development of centralised sewerage systems in the cities of Cimahi, Pekanbaru, Palembang, Jambi and Makassar.

[20] Review of Community Managed Decentralized Wastewater Treatment Systems in Indonesia, Water and Sanitation Program, June 2012 (Draft).

[21] MPW data indicate that 77% of all systems installed up to 2011 are MCK+. Of these, 16 percent are simplified sewer systems and 66% are combined systems.

[22] A major reason seems to be that the presence of an MCK+ raises awareness of and demand for improved sanitation; MCK+ users that can do so, then construct private facilities at their homes.

ter has been low. Consequently, popular demand for public investment and willingness to pay for wastewater management services has, until recently, also been low. This is compounded by low expectations by the public of the ability of public institutions to deliver high quality services. In recent years, partly as a result of the efforts made under the PPSP and STBM initiatives, attitudes and with it political pressure to invest in wastewater management seem to be changing.

There is evidence that people are willing to pay at least some of the costs of improved sanitation, if they can see clear benefits (i.e., in convenience or privacy or prestige).[23] Increasing community involvement in decision-making processes and financing also increases ownership and willingness to pay. There is evidence that lower and middle income families in high-density neighborhoods with limited sanitation options have a relatively high willingness to pay for sanitation improvements in comparison with better off households that have already invested in sanitation solutions that remove the problem from their immediate property.

A feature of urban areas in Indonesia is that poor and non-poor live in close proximity and the entire population has poor sanitation. The poor sanitation in neighborhoods negatively affects the poor and non-poor, given the large environmental externalities related to inadequate collection and treatment of septage and wastewater.

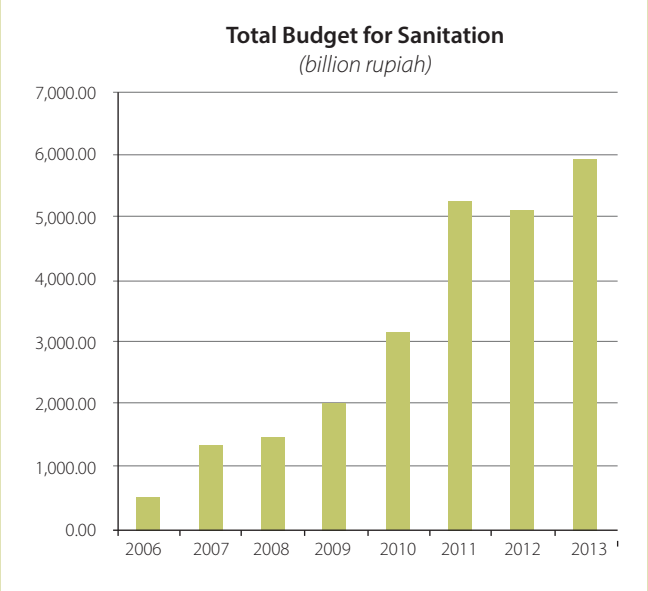
1.5 Financing

Decree No. 16/2008 on the National Policy and Strategy for the Development of Domestic Wastewater Management outlines central government sector financing responsibilities. These are: (a) provisions to encourage the mobilization of funds for household wastewater management; (b) the facilitation of private-public participation (PPP) for wastewater services; and (c) the initial investment in piped sewerage and wastewater treatment facilities, which can further be developed by regional governments.

There are three main sources of national financing for sanitation: national budget funding (APBN), special grant allocations from the national budget to local governments (DAK), and local government budgets (APBD). Since 2010 there has been a DAK dedicated to sanitation to support implementation of the PPSP. In addition, there is substantial donor funding in the form of loans and grants. It is projected that donor resources will finance about 12 percent of the total financing requirement (63 percent grants and 37 percent loans) over the PPSP implementation period.

The national budget allocation for urban sanitation has risen dramatically since the launch of the PPSP in 2010, but the needs are very large. The total investment required to achieve 'full' sanitation coverage over twenty years in the 330 cities and urbanized districts targeted under PPSP is estimated by the Urban Sanitation Development Project (USDP) at about USD29 billion (of which 40 percent is for wastewater[24]). The PPSP investment costs through to 2014 are estimated by BAPPENAS and MPW at about USD6.8 billion (IDR62 trillion).[25] In 2006, the total national development budget allocation (APBN) for sanitation amounted to 540 billion rupiah, or about USD57 million. Virtually all sanitation investment was from the central government via MPW, but it amounted to less than 0.1 percent of the total national development budget. By 2010, sanitation investment had risen to over two trillion rupiah, or about 0.2 percent of the total development budget. In 2012 the national sanitation budget allocation (see Figure 1.4 below) is almost 3.9 trillion rupiah (about USD422 million) of which about 26 percent comes from special budget allocations (DAK) channeled through local government budgets.

FIGURE 1.4: Total National Government Sanitation Budget (2006-2012)[26]



Source: USDP

[23] Global and Economic Sector Work on the Political Economy of Sanitation, Oxford Policy Management, 2010

[24] USDP Presentation on the PPSP.

[25] This amount includes investment requirements for all aspects of the PPSP, including solid waste management and drainage in addition to wastewater management. It was not possible to obtain reliable disaggregated figures during the limited time of the study.

[26] National budget includes loans and grants

Local governments have also increased budget allocations for sanitation. In 2008, local governments allocated only about 0.5 percent of their APBD funds for sanitation. Sanitation awareness campaigns and, in particular, evidence of the economic costs of poor sanitation have led to a marked increase in financing by local governments. In 2012, APBD allocations for sanitation ("pure" APBD excluding DAK) ranged between two and four percent, with some cities allocating much more.[27]

Overall, as shown in Figure 1.4 above, there has been an almost ten-fold increase in national government financing for sanitation since 2006 (including loans and grants), but it is still far from the projected investment needed to achieve the 2014 targets. Projected financing allocations from all sources are summarized in Table 1.3 below. The national budget (APBN) amounts for 2010 to 2012 refer to actual-budget allocations while other years are projections. Although budget allocations in 2010 and 2011 were substantially higher than the PPSP projected requirements, and about equal in 2012, there are projected deficits for 2013/2014. However, while the budget allocation has been substantially increased, effectiveness of the expenditures to scale-up sanitation and provide services in a sustainable way remains unclear.

At the utility level cost recovery is very low. Due to the extremely low connection rates in comparison with system design capacities, almost all of the 12 existing wastewater operators are burdened with very high depreciation costs per connection; they are also unable to collect adequate tariffs to fully recover costs. The low collection efficiency is compounded by the low coverage of households with piped water supplies. Only households with water connections can be charged an adequate tariff based on water consumption. Other households are charged a low, flat fee which, even then, is not collected systematically. A study published by USAID in 2006[28] found that only Bandung and Jakarta[29] were able to achieve full cost recovery, including depreciation. Banjarmasin is able to cover operating costs, but all other cities operate the wastewater treatment systems at a loss, supported by subsidies from the water utility and/or local government.

1.6 Institutional Arrangements for Sanitation

The decentralization of political and fiscal power in 1999 radically altered institutional roles for implementing sanitation strategies and programs. Central ministries transferredmost sanitation planning, development, financing, and management responsibilities to local governments and focused on policy development, standard setting, and capacity building. BAPPENAS assumed a coordinating role with responsibility for policy developmentin the sector.

TABLE 1.3: Projected Financing Allocations for Sanitation (2010-2014)

Source of Financing	Projected/Actual financing for PPSP (IDR billions)					
	2010	2011	2012	2013	2014	Total
Projected financing requirements (PPSP Roadmap)	4,247	7,146	10,657	23,297	17,277	62,625
Financing sources:						
National budget (APBN, DAK)	1,883	3,795	4,022	4,302	4,766	18,768
Provincial budgets (APBD-P)	357	407	766	909	997	3,436
Municipal/District budgets (APBD-KK)	2,816	3,703	4,540	5,944	7,795	24,798
Donors (based on current commitments)	1,096	2,097	1,224	1,633	1,454	7,503
Communities and Private Sector (CSR)	18	55	105	234	171	583
Total projected allocations:	6,170	10,058	10,656	13,021	15,184	55,088
Surplus/Deficit:	1,922	2,912	-2	-10,276	-2,093	-7,537
Surplus/Deficit (%):	45%	41%	0%	-44%	-12%	-12%

Source: USDP

[27] In 2012 Probolinggo is holding a record with 7 percent of the APBD budget applied to sanitation.

[28] Comparative Study of Wastewater Treatment Plants in Indonesia, USAID/ESP, 2006.

[29] The Jakarta system serves primarily hotels and commercial establishments in the CBD where collection efficiency is high. Operating costs of the Jakarta system are relatively low.

A large number of national level government departments and ministries[30] are stakeholders in sanitation investment and provision of sanitation services to urban populations. These include BAPPENAS, the Ministry of Health (MOH), MPW, Ministry of Home Affairs (MOHA), Ministry of Public Housing (MPH), the Ministry of Environment(MOE), and the Ministry of Finance (MOF). With no single national level ministry officially responsible for sanitation policy, and responsibilities shared among at least five ministries, urban sanitation has no distinct 'institutional home.' As a consequence, there are varying degrees of interest in providing sanitation services among the involved institutions.

BAPPENAS and the Sector Working Group. The principal national body for coordinating the implementation of sanitation strategy is the *National Steering Committee for Drinking Water and Environmental Health* (*Air Minum dan Penyehatan Lingkungan*, AMPL). The executing body for AMPL is an inter-sectoral Working Group, POKJA-AMPL. The POKJA comprises director level and sub-directorlevel representatives, and provides policy and implementation guidance. Both the Steering Committee and the POKJA are chaired by BAPPENAS and comprise members from the ministries of Public Works, Health, Home Affairs, Finance, Industry, Environment, Public Housing, Education, and the Central Statistics Bureau. Many of the POKJA members have been collaborating closely on water and sanitation policy issues for more than a decade. The group shares a common vision of the PPSP and the STBM strategies and meets frequently to maintain momentum and direction in the implementation process. There are also working level "implementation units" supporting city sanitation strategies ledby MPW, city/district AMPL working groups led by MOHA, and sanitation/health promotion groups led by MOH with the goal ofachieving the PPSP objectives.

Ministry of Public Works. Whereas BAPPENAS provides coordination and planning support, MPW's Directorate General of Human Settlements (CiptaKarya) provides local governments with infrastructure development and rehabilitation, technical assistanceand technical and service performance standards. MPW also collaborates with the Ministry of Finance administering budgets for wastewater management facilities at the national, regional, provincial, local, and project levels.

Ministry of Health. MOH is responsible for hygiene and sanitation promotion, capacity building and sanitation emergency response systems, especially in low income communities. MOH also sets standards and monitors drinking water quality. In conjunction with MPW and MOE, MOH also administers and enforces regulations for domestic wastewater including wastewater treatment plants, IPLTs, and community-based systems but has very limited capacity to do so effectively.

Ministry of Home Affairs. MOHA haslead responsibility for development of the capacity of local governments, and for supporting provincial and city/district level POKJA-AMPLs. MOHA maintains a direct line of communication between central and local governments. As such, it influences how local governments respond to GOI policies and programs for wastewater management.

Provinces. Initially after decentralization, the role of provincial governments was not well defined. Government Regulation No. 19/2010 states that the provinceis required to monitor the development of local goverment (Kabupaten/Kota) regulations. The budget for this task is charged to the National Budget (APBN) through the deconcentration budget.Currently, provinces receive substantial budget allocationsfrom central government, andMPW's technical departments as well as other ministries channel their support for local sanitation programs through their respective provincial offices.

Local Governments. Municipal and district local governments have responsibility for delivering public services including wastewater management to their constituents. In most cases, the municipal or district cleansing department (*Dinas Kebersihan*) is responsible for arranging septic tank sludge emptying services and management of IPLTs. Sewerage systemsare usually managed by a department of local government, the local government owned water utility organization (*Perusahaan Daerah Air Minum*, PDAM) or a separate local government owned sanitation utility (*Perusahaan Daerah Penanganan Air Limbah*, PD PAL). While PDAMs generally have systems in place, including for billing and collection, to enable them to manage both water and wastewater infrastructure, most view the wastewater system as an additional burden and cost centerdue to the difficulty of earning revenue from wastewater activities. Two cities, Jakarta and Banjarmasin, have chosen to establish a PD PAL which has the advantage of being independent from local government and the PDAM. However, less reliance on technical and/or financial support from the PDAM or the local government carries risks. The two PD PALs that have been established feature strong and competent management and they have been able to retain combined billing arrangements with their respective PDAMs.

[30] There are two types of ministry lines: technical departments and state ministry. The former have technical resources at national and provincial level while at district level, they mostly have partnering offices. The state ministries, on the other hand, do not have sufficient technical resources and need to work together with technical departments to implement their programs. MPW is also a state ministry and not technical department.

AKKOPSI. The Association of Cities and Districts Concerned about Sanitation in Indonesia (AKKOPSI) was established in 2011 as an initiative by the mayors of the cities that had completed SSKs at that time. Initially, about 120 cities joined AKKOPSI, which now comprises over 200 cities.AKKOPSI is an advocacy group supporting the achievement of the PPSP targets through the sharing of experiences. The group is very active, meeting on a quarterly basis and convening annual City Sanitation Summits with an objective of achieving a target allocation of at least two percent of local government budget for sanitation. AKKOPSI promotes implementation of the PPSP program through Advocacy and Horizontal Learning (AHL) to members and non-members of AKKOPSI. AKKOPSI has recently initiated *City Sanitation Rankings*, as a means for benchmarking and measuring performance for the implementation of City Sanitation Strategies.

II. Sector Performance Issue Analysis

2.1 Drivers and Barriers to Sanitation in Indonesia

A number of factors are driving the progress of urban sanitation in Indonesia, as a result of which the sector has seen a significant increase in investment since 2006. These drivers to date have generally been supply driven from central government. The key to improve sanitation coverage is to increase the demand from the community and from local government. At the same time, further progress is constrained by several barriers that need to be overcome if the sector is to successfully meet not only the MDG and PPSP targets, but result in sustainable infrastructure. Effective and efficiently managed sanitation infrastructure will lead to improved health, reduce economic losses and produce an improved environment for the urban population.

2.1.1 Current Drivers to Sanitation Development in Indonesia

NATIONAL GOVERNMENT PROGRAMMING

The primary driver for the development of sanitation, in particular since 2006, has been the prioritization of sanitation by national government. This was initially based on the implementation of the Indonesia Sanitation Sector Development Program (ISSDP) and is currently through PPSP. Although largely supply driven, this has contributed to an eightfold increase in funding for sanitation since 2006, so that the sanitation budget now exceeds the budget for water supply systems. The program to prepare SSKs in 330 cities is impressive, although there are concerns about how these plans will be effectively implemented. Through the establishment of POKJAs at local government level engaged in preparing the SSKs, a better understanding of sanitation issues has been developed throughout the city and district governments leading to increased demand for improved sanitation. Economic losses caused by poor sanitation may have been a major factor in driving national government support for the sector.

FOREIGN DONOR PROGRAMS

Foreign Donor programs have been major contributors to the expansion of sanitation in Indonesia, especially for municipal sewerage systems. Most of the 16 cities that either have, or are proposed to have, sewerage systems have been recipients of donor funding. This includes Medan and Yogjakarta (ADB), Surakarta and Banjarmasin (World Bank), the proposed ADB supported program in Cimahi, Pekanbaru, Jambi and Makassar, Australian Agency for International Development (AusAID) funding for Palembang, and Japan International Cooperation Agency (JICA) support in Denpasar and Jakarta. Although this support mostly consists of loans taken by national government and on-granted to the local governments, foreign donors have had a key influence in driving the programs. Otherpast and current donors include: AusAID through the Hibah and Infrastructure Enhancement Grant (IEG) Programs,[31] the Islamic Development Bank (IDB) through the Community Based Sanitation Project, the ADB through the Urban Sanitation and Rural Infrastructure (USRI) project, USAID for its institutional support, Netherlands, UNICEF, World Bank, WSP, and other organizations.

[31] In the Hibah program, AusAID is providing support to local governments to provide sewerage house connections on an output based aid basis; in the Infrastructure Enhancement Grant, an output based aid modality is also used to provide sewerage infrastructure for local governments.

ENVIRONMENTAL POLLUTION

Pollution of water bodies and water resources as a result of inadequate sanitation is a serious issue in Indonesia and will be a driver to improve sanitation practices. There are examples where specific environmental conditions have motivated local governments to address sanitation, and this trend is likely to increase as awareness for the environmental impacts grows. In Banjarmasin, a flat, low lying city at the confluence of two major rivers, the local government started focusing on sanitation as a result of increasing local awareness that its rivers, which are vital for basic needs and tourism, were becoming more polluted and that the fundamental causes needed to be addressed (see Annex 2). In Denpasar, the local government realized that the tourism industry could be impacted by pollution of beaches and the City's problematic drainage facilities, particularly, during the monsoon season. In Cimahi, the local government intended to attract clean industries to the city but realized that polluted drains and rivers discouraged potential investment. The local government of Pekanbaru recognized that their reputation as one of the cleanest and greenest cities in the country was at risk from increasing pollution of rivers and an unsatisfactory drainage system.

POLITICAL SUPPORT AND SANITATION 'CHAMPIONS'

The presence of 'champions' who act as trusted facilitators and negotiators has strengthened partnerships and relationships between key stakeholders in the urban sanitation sector in Indonesia. The establishment of the POKJA-AMPL at national level brought together a core group of sector professionals with a common view of sanitation sector priorities and development approaches that were instrumental in developing inter-ministerial collaboration for national programs such as PPSP. This initiative was led by BAPPENAS providing a 'champion' in the sanitation sector which was instrumental in mobilizing support across the various departments with some responsibility for sanitation. 'Champions' at the local government level are equally important and supportive Mayors/Bupatis and utility heads in cities such as Banjarmasin, Palembang, Pekanbaru, Denpasar, Cimahi and Jambi have been instrumental in promoting sanitation improvements in their cities.

Other potential sanitation drivers such as legislative and executive arrangements, legal and contractual requirements, health impact and potential business opportunities have not had significant impact on the sector. Health, while undoubtedly a critical reason to invest in sanitation, has not been a motivator for communities or governments to prioritize sanitation. There is no national policy on sanitation, and while some local governments have enacted legislation requiring the construction of properly designed septic tanks and proper disposal of septage, these are rarely enforced effectively. There are no effective legal penalties for local governments that fail to meet their obligations in provision of sanitation to residents. The service providers for sanitation are generally government agencies or state owned enterprises that do not have performance criteria in-built into their contracts with government.

2.1.2 Current Barriers to Sanitation Development in Indonesia

LACK OF REGULATION AND PENALTIES

MPW does require local governments to issue local regulations on wastewater management, consistent with ministerial regulations,[32] but these regulations are not promulgated as law and are therefore not binding on local governments. Nevertheless, some local governments have passed legislation related to septic tank design and construction, mandatory requirements for new developers to install septic tanks or sewer connections, and in some cases requirements for correct disposal of septage. However, these requirements are rarely enforced. There is no national regulator that may require local governments to meet their obligations to provide sanitation for residents and no independent regulator at local or provincial level to regulate the performance of sanitation service providers. The Ministry of Environment (Kementerian Negara Lingkungan Hidup, KLH) and the provincial and district/city environmental agencies set the standards for effluent disposal and may penalize those who fail to meet those standards. However, this applies to point discharges from treatment facilities or industries and not for failure of local governments to implement wastewater systems that prevent the pollution of water bodies.

FINANCING

Given the significant financingrequired to provide universal sanitation coverage in urban centers in Indonesia, mobilizing financing is a barrier. Most cities still have borrowing capacity, but few cities have been willing to raise funds to finance wastewater related activities, including rehabilitation of their septage treatment facilities and development of a septage management program.[33] The charging of appropriate tariffs for sanitation services and increasing collection efficiency would impact on the viability of operations and the willingness of local governments and utilities to invest in sanitation. Finance could also be provided through PPP arrangements, but to date the private sector has shown limited interest in sanitation, most likely due to inadequate governance and low tariffs in the sector.

[32] In accordance with PerMenPU 16/2008

[33] USAID studies in the Philippines have shown that the establishment of a septage management program, including construction of a septage treatment facility, can be a viable operation for a local government or utility.

LACK OF AWARENESS

Sanitation continues to be a low priority formost local governments despite increased attention paid at the national government level. The reason given is that awareness within communitiesis low and, as a result, local governments have not emphasized sanitation. To change this, campaigns to raise awareness among local legislators, executives, the private sector, civil society and the community will be needed with a focus on improving the environment and reducing health risks. Within national Government, the responsibilities for raising awareness are distributed across four ministries, viz. MOE, specifically for environmental pollution; MOH, specifically for health impact; MOHA, specifically for awareness raising within the local governments; and MPW for technical guidance, with BAPPENAS in acoordinating role.The US-AID-funded IUWASH, currently supports sanitation in over 50 cities, and is working closely with each of these ministries in order to help develop awareness to improve the sustainability of projects that are delivered through both national governments and donor programs. There is also an important role for civil society in working with local communities to increase demand and in holding the local government to account for poor performance in the sector. One of the drivers for placing higher priority on sanitation by high levels of the national government was reported to be caused by the involvement of women's groups in raising awareness on the issue.

HUMAN RESOURCE CAPACITY

Human resource capacity within the agencies responsible for the sanitation sector is extremely limited at all levels,and thisis a key constraint to the further development of the sector. At the national level, the MPW Sub-Directorate for Sanitation responsible for administering the technical aspects of PPSP with a potential budget of USD6.3 billion until 2015 in 330 local governments onlyhas a workforce of about 15 staff. The MOH and MOHA responsible for setting of standards/creating awareness and local government institutional development respectively have even less human resources available for aspects related to sanitation. Provincial and local governments, while responsible for implementing sanitation programs, have very little expertise. At the local government level, generally the Public Works Departmentand the Regional Agency for Planning and Development (BAPPEDA) offices do not have specific expertise related to sanitation. Personnel from the city cleaning departments are largely engaged in managing solid waste. Local government personnel involved in sanitation are in most cases sanitarians under the Department of Health who more often than not are inadequately qualified.

The key impact of the lack of capacity to manage sanitation has been that sanitation programs have not been developed at the local government level in the past due to limited understanding of the associated issues. This is compounded by the inability of BAPPEDA to prepare sanitation plans and feasibility studies. If sanitation is not included in the local government plans, funding is not forthcoming. However, this has improved under PPSP where BAPPEDA has been generally responsible for coordinating the POKJA, resultingin sanitation becoming of a much higher priority. The low capacity at regional and national government levels compounds the problem for, as a direct consequence, suitableguidance to local government can therefore not be provided. The lack of capacity also is a determining factor for the poor enforcement of the Sanitation Code and the Building Code related to septic tank construction and design. This situation is a vicious cycle in the sense that without investment in sanitation, limited demand for the necessary skills will be created resulting in little incentive for professionals to gain these skills.

Capacity in the private sector is also generally very low. Most consultants have very limited experience, especially in design of sewerage systems, although experience in the community-managed DEWATS systems is more widespread. Given the limited coverage of sewerage, there are few local contractors who have constructed sewerage systems in Indonesia.

LOW CONNECTION RATES AND COLLECTION EFFICIENCY

In the twelve cities where sewerage systems have been constructed, it has been difficult for service providers to recover costs due to slow build-up of connections and the consequent under utilization of the system as well as low collection efficiencies. Only in Jakarta and Bandung has full cost recovery reportedly been achieved – in Jakarta due to the system primarily cateringto hotels and commercial establishments with a high demand for connections and in Bandung because it appears to have reached a scale (with about 100,000 connections) to support effective O&M. In the other cities, wastewater inflows to the treatment facilities are generally less than 50 percent of capacity due to the low demand for connections. Collection efficiency in Banjarmasin and Surakarta is on the order of 30 percent. Collection of tariffs in Surakarta, where the system is operated by the PDAM, is reported to be only feasible for those households that have a connectionto the water supply system. In Medan, collection efficiency is 90 percent as most households with a sewer connection also have a water connection (PDAM operated). Even in Denpasar, which is generally regarded to have been a relatively successful project, the uptake of connections has been slow. This is now being addressed to some extent through the hibah projects funded under AusAID. However, solutions to increase community demand need to be developed and implemented if sanitation operations are to be sustainable.The degree of hesitance of community members to connect to the sanitation system is not only related to the connection fees. Often to connect a household to the system, significant construction within houses is required, which is expensive and inconvenient for the families.

TECHNICAL BARRIERS TO SANITATION

There are physical constraints in many Indonesian cities that make it difficult or expensive to construct sewerage systems. There are numerous large cities in Indonesia such as Jakarta, Banjarmasin, Palembang and Pekanbaru, which are characterized by flat, low-lying topography adjacent to major rivers and with a high water table. It is expensive to provide traditional, separate sewerage in these cities due to the need to construct pipelines below the water table and the many pumping stations required to maintain the required slopes and self-cleansing velocities. The often narrow streets, high traffic volumes and densely populated inner suburban areas make the construction of piped sewerage system extremely difficult and expensive. Alternative systems such as simplified or small bore sewerage may need to be considered in some locations within these cities. A staged approach of initially constructing interceptors to collect and convey combined stormwater, sullage and sewage from local drains to sewage treatment plants will improve the quality of major water bodies at a lower cost than providing for separate sewerage.

There are also challenges associated with septage management. Most of the on-site facilities are open bottomed *cubluks* that rely on absorption of effluent by the subsoilinstead of appropriately designed and sealed septic tanks. This can potentially result in pollution of the groundwater, but retrofitting these pits to convert them into septic tanks would be a major undertaking. Routine de-sludging of septic tanks is desirable, but many septic tanks in Indonesian cities are located beneath the house which makes it expensive and inconvenient to provide access to the tank.

Provision of land for sewage and septage treatment facilities is an additional constraint when planning sewerage and septage systems. Land is at a premium in most Indonesian cities and often changes to the optimum system need to be made to accommodate the land which is available for the treatment facility.

2.2 Key Issues Impacting on Sanitation Provision in Indonesia

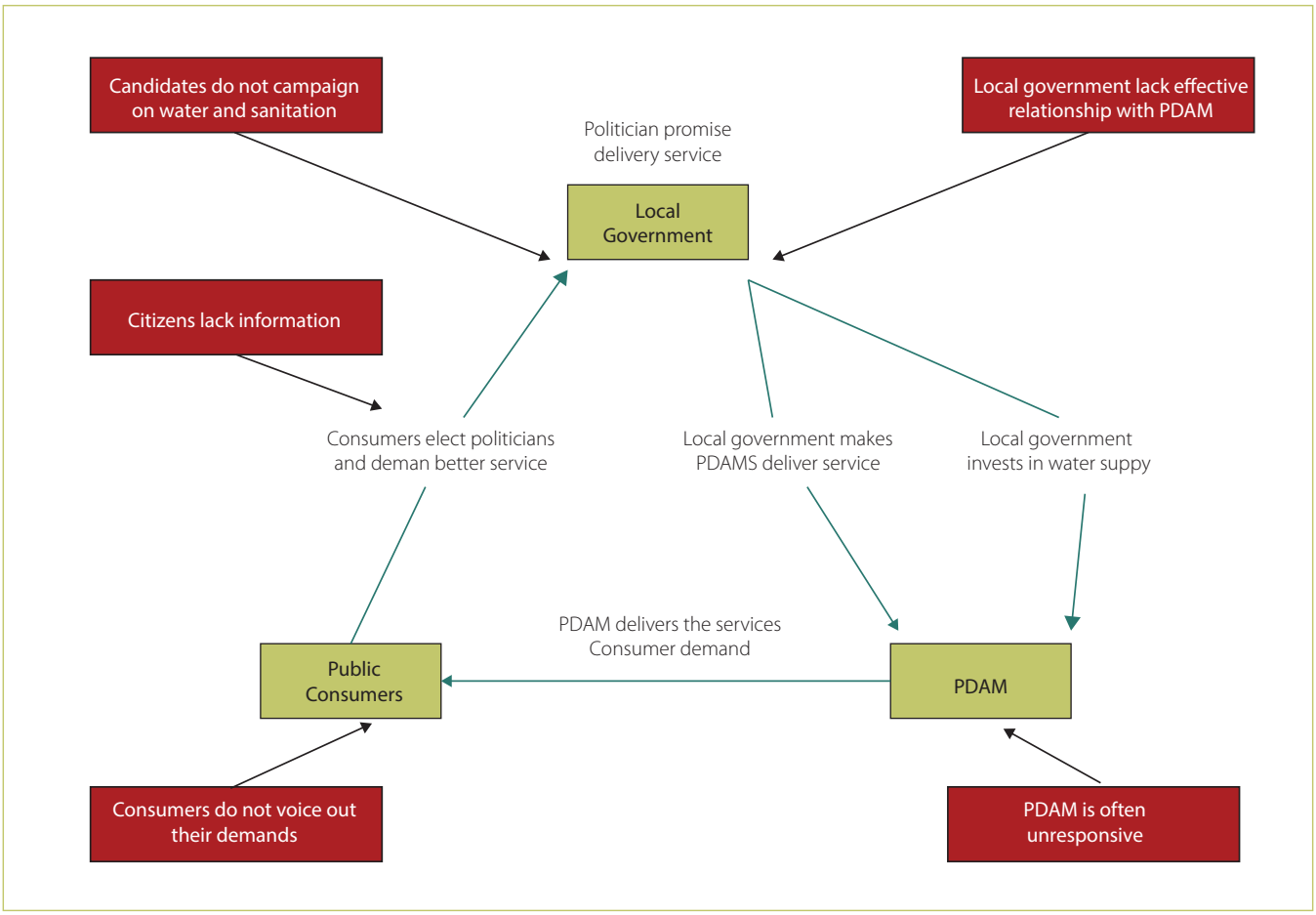
Several key issues that need to be addressed to progress development of the wastewater sector in Indonesia are described in the following sections. These include the political economy and how and why stakeholders, institutions and economic processes influence each other in wastewater management policy decision-making processes; how can the sector best be financed to meet the national planning targets; how to address deficiencies in human resource capacity to implement and manage wastewater infrastructure; what arrangements should be established for the management and regulation of wastewater systems at the local government level; where is the interface between community and institutionally managed systems; and, given that septic tanks will remain the primary means of wastewater disposal for the foreseeable future, what are the most appropriate septage management approaches. Some of these issues are illustrated below in Figure 2.1. Drivers and barriers for change in Indonesia were compared with the development of the sanitation sector in Latin American countries and the findings are summarized below (Box 2.1)

BOX 2.1: Comparison of Indonesian Experience with that of Selected Latin American Countries

A World Bank prepared paper entitled "Evolution of Urban Sanitation in Latin America" describes the historical background to the development of urban sanitation in five major Latin American countries: Argentina, Brazil, Chile, Colombia and Mexico. The paper also outlines the drivers and constraints that have impacted urban sanitation in these countries and the experience in implementing investments on sanitation over a 20 year period. Given that increased investment in sanitation by the Indonesian central government commenced only about seven years ago, the experience of these Latin American countries following the central government intervention may hold some lessons to be considered by Indonesia.

Common drivers for investment in the sanitation sector in the five Latin American countries and Indonesia included: (a) the increase in urban densities in those cities that eventually rendered septic tanks ineffective without a sewerage system tocollect effluent; (b) employment and business opportunities that construction and management of sanitation systems provided; and (c) environmental concerns regarding the pollution of water bodies. Common barriers included: (a) poor regulation of sanitation service delivery with no obvious penalties for local governments that fail the meet their responsibilities to provide sanitation; (b) inadequate attention to training and professionalism in the sector resulting in a serious lack of trained sanitation specialists; and (c) lack of access to capital finance for sanitation, although in Indonesia the situation may be under-investment rather than lack of access to finance.

FIGURE 2.1: Weaknesses in Local Government Sanitation Service Delivery[34]



2.2.1 Political Economy

Indonesia has made very substantial advances in creating awareness of the need for sanitation improvements throughout the country. It has been able to generate the political will, especially at the national government level, to allocate more resources for sanitation. This has involved a process spanning more than a decade which also involvedconsiderable trial and error. The political economy of sanitation is summarized below (Box 2.2). With technical assistance financed by AusAID through the Water and Sanitation Sector Policy Formulation and Action Planning Project (WASPOLA), a dialogue on water and sanitation sector policy reform ensued among working level (sub-directors) staff in several ministries with interests in the sector, which eventually evolved into the POKJA-AMPL. The POKJA-AMPL remains an influential inter-ministerial coordinating and planning body for the sanitation andwater supply sectors. From within the central government, the POKJA-AMPL members have been able to generate support for a national urban sanitation program at the ministerial level.

Within the national government, decision makers are increasingly using, and acting on, evidence related to the negative impact of poor sanitation to drive their prioritization of sector investments. Economic evidence has played a key role in influencing BAPPENAS, MPW and MOH staffin particular. The WSP study on the economic impacts of sanitation is consistently mentioned among government and donor partners as a key document in spurring government interest. This put figures on the economic losses caused by poor sanitation and as a country seeking to maintain its status as a regional economic leader, this had a significant impact on government interest in sanitation.

[34] Investment in Indonesia's Water Sector: Evidence of Capacity, Governance and Financing Effects, David Ehrhardt, Melissa Rekas, Kevin Richards.

BOX 2.2: Politcal Economy of Sanitation in Indonesia

In 2010, the World Bank's Water and Sanitation Program (WSP) conducted a global study on the Political Economy of Sanitation using Indonesia as a case study. The study was intended to address: (a) why are sanitation investments and service provision not given adequate priority; and (b) why are sanitation investments not strategically targeted towards increasing access to sanitation for the poor.

The study outlined some of the past and current political economy challenges faced in increasing urban sanitation investment levels such as the cultural and political context, the impact of decentralization, financing constraints, institutional arrangements, the prioritization processes of local government and willingness to pay of consumers. The key operational implications for understanding, addressing and managing the political economy constraints and opportunities of urban sanitation investment in Indonesia were outlined in the study and are summarized below.

Sequencing of investments and operations: *work on improving institutional multi-sectoral planning capacity has been a necessary first step before local investments for physical infrastructure in order to ensure they are more appropriate, effective and efficient.*

Use of evidence based analysis to create demand for sanitation: *a key factor in the increasing central government interest in sanitation has been evidence of the economic impacts of sanitation. There is potential to apply evidence based analysis to increase demand at the sub-national level.*

Creating demand and accountability for sanitation: *low public demand for sanitation is usually cited as a critical factor in the slow development of sanitation infrastructure in Indonesia. However, one outcome of the PPSP and SSK has been increased community awareness which has pushed the issue up the political agenda. Sanitation strategies have to be based on the actual demand from the community members, and so while this is often initially low, awareness raising is a key part of increasing demand.*

Building effective partnerships: *collaborative partnerships, between government, donors and civil society, that recognize national and local government ownership of the process and investments, have proven to be a more sustainable approach for sanitation development in Indonesia. Identifying and supporting appropriate 'champions' who are also trusted facilitators and negotiators can help build and strengthen these partnerships.*

Public debate and communication: *effective communication is needed to generate demand for sanitation across all socio-economic groups within cities or communities. At the local level civil society organizations have been involved only to a very limited degree, but when this has occurred it has often been effective in increasing commitment and sustainability. Media interest in covering sanitation could be increased further by reframing it as a public interest issue rather than as a technical issue and providing solid, appropriate evidence of the impact of poor sanitation.*

Another key development resulting from the establishment of the POKJA-AMPL and the shifting of power structures following decentralization was the concept of City Sanitation Strategies (SSKs). SSK is an evidence-based, bottom-up strategic planning process that responds well to increased power and mandates of local governments following decentralization and democratization.SSK requires the establishment of a city-level working group (POKJA), and to follow a six-stage process that includes:secondary data analysis, preparation of a White Paper, an Environmental Health Risk Assessment, and professional evaluation by members of the POKJA -- which all together results in the identification of geographic priorities and the development of an indicative Sanitation Development Plan. SSKs are then underpinned by a Program Memorandum that provides an investment plan and links the SSK with the national "bottom-up" planning and budgeting process. A creative approach was also followed by government involving SIKIB (Cabinet Ministers' Wives Solidarity) in fostering sanitation awareness. Several sanitation related activities have been conducted by SIKIB, such as the inauguration of SANIMAS facilities, SIKIB Peduli Sanitasi (SIKIB Care with Sanitation), scientific writer contribution and village patronage.

The SSK preparation process has resulted in a stronger political buy-in in many municipalities, which has been demonstrated by the increased role of AKKOPSI in sharing experiences from the SSK implementation process, awareness-raisingand demand for better sanitation services.The Association also works closely with the POKJA-AMPL in developing monitoring tools for assessing progress in PPSP implementation.

The SSK process is strongly supported by MPW. The completion of an SSK is a prerequisite for access to finance for selected projects within the PPSP. However, significant financing, capacity and institutional challenges remain. Given the ambitious program for preparing SSKs under PPSP and the limited resources for preparation, the quality of the documents remains uneven. However, the undisputed value in mobilizing interest across departments within local government through participation in the POKJA responsible for preparing the SSK has maintained sanitation at the forefront of the local government agenda.

2.2.2 Financing

Although national government funding for sanitation has increased about ten-fold since 2006, it still falls short of the actual requirements to significantly increase urban sewerage coverage. While the PPSP estimated a requirement of USD29 billion over the next 20 years for sanitation, this may be a low estimate given that the provision of wastewater services for a population of 172 million (estimated for the year 2025) would cost some USD42.7 billion. This based on an investment cost of USD250 per capita[35] to improve sewers, construct wastewater treatment plants, and make other improvements on septage management. Some of the findings related to the financing of the water sector in Indonesia are also applicable to the sanitation sector and they are summarized below (Box 2.3).

Most national and local government funding has been directed to DEWATS/SANIMAS projects in many cities and districts across the country, but this has hadonly negligible effect on the overall environment. By providing a few small systems across many cities, the impact has not been significant, as it affects only very small populations in each city. The larger centralized sewerage schemes are being supported through donor grants and loans such as the ADB Metropolitan Sanitation Management Investment Program (MSMIP), the AusAID-supported Indonesia Infrastructure Initiative (IndII), and the JICA projects in Jakarta; and these will have a more significant impact through the construction of centralized sewerage systems in 16 cities covering about 5 million people. In these larger projects, the local government provides support through land acquisition, compensation payments for land acquisitions, and house connections.

The PPSP through the Urban Sanitation Development Project (USDP) is now developing scenarios for a combinationof centralized, decentralized and on-site systems, along with the investment requirements to achieve these scenarios within the next 25 years. The scenarios that are being considered range from 15 percent to 32 percent of centralized sewerage coverage, with a corresponding significantly broad range in required investment. It is expected that the analysis will enable the national government to develop an overarching policy for financing the sector. There are selected guidelines available on elements of a sewerage scheme that

BOX 2.3: Investment in Indonesia's Water Sector

A study conducted in 2008 (Investment in Indonesia's Water Sector – Evidence of Financing, Capacity and Governance Effects, *Castalia) reviewed data from 42 cities and conducted in-depth analysis of another 6 cities to determine if there was under-investment in the water sector and, if so, what were the reasons for this under-investment. Although the study focused on the local government and the PDAMs and their role in the provision of water supply, some of the conclusions could be reasonably applied to sanitation. The study showed there was an under investment by local governments in water supply to meet the targets specified by the national government. The study analyzed several possible reasons for the funding shortfall in water supply, including profitability of the utility, borrowing capacity, governance, technical and managerial capacity and population. The most significant reason for higher investment in the sector was profitability which indicated that good governance through setting appropriate tariffs and controlling costs leading to profitability tended to result in more investment in the sector by local government.*

Interestingly, most local governments did not lack financial or borrowing capacity, but it was more about prioritization of the water sector over other competing needs. In order to increase investment in the sector, the report suggested that there would be value in focusing on water sector problems at a local level, and concentrating on good governance to help improve performance. The report concluded on the need for performance contracts between local government and utilities to improve accountability relationships and sector governance. Governance was also impacted upon by lack of information on the part of consumers to enable them to hold local government accountable for poor service delivery.

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

can be financed by central government (e.g., trunk pipelines, treatment facilities) and those elements that must be financed by local government (e.g., laterals, connections, land acquisition). These guidelines, however, tend to be more arbitrary rather than based on a firm policy regarding national government grants or loans to be raised by borrowings by local government such as has been recently developed in the Philippines.[36] Currently in Indonesia, despite formal budget processes at both local and national levels of government, informal institutions, relationships and processes still influence the budget processes, decisions and allocations. A mayor (or bupati) can petition ministers directly and decisions on policy and service delivery could be influenced through this informal route.

The government lacks a financial policy that otherwise could shape investment and planning. One of the reasons for this is that urban development activities continue to be divided among several ministries and local government when there is no urban planning or clear policy support for Cipta-Karya.

The utilization of the centralized systems currently implemented in the 12 cities is low, with only about 50 percentof the treatment capacity being used (see Table 1.1, earlier). The same applies for many of the decentralized systems. The primary reason for this has been difficulty in encouraging residents to make connections to the system and to pay the connection fee and ongoing tariffs. Innovative financing approaches with respect to alleviating the burden of the connection fee are being undertaken under the IndII program through the sanitation hibah[37] and the sanitation grants (Australia Indonesia Grant for Sanitation, or sAIIG) programs.[38] Issues relating to tariff structure needs to be addressed by implementing awareness programs for the wider public, although it is probably more effective in the short term to require all households with access to a sewerage system to pay the same tariff, whether connected or not. In Metro Manila, after many years of low utilization of sewerage systems due to low connection rates, a common tariff was applied to all residents irrespective of whether or not they had a sewerage connection.[39] For households without a sewerage connection, the fee covers septic tank de-sludging. However, Metro Manila's current policy is to use combined systems with interceptors collecting wastewater from the drainage system in those areas where households have not made connections to the system. This approach is also proposed as part of a solution to Jakarta's sanitation problems.

2.2.3 Implementation Capacity

Implementing the PPSP will require the mobilization of far more resources than simply increasing budget allocations and donor investment. A sanitation training and capacity study,[40] developed under the Water and Sanitation Sector Policy Formulation and Action Planning Project (WASPOLA), was completed in early 2012 which assessed the national capacity to implement PPSP and developed recommendations for a capacity building strategy to fill knowledge gaps. The main findings of the study with regard to human resource development in the wastewater sector were:

- Major gaps were identified between demand and supply of facilitators forcommunal DEWATS and for hygiene behavior (STBM), both in the shortterm and in the medium-term (next five-year development plan cycle). For example, the current SANIMAS program funded by the national government (350 installations/year), the Islamic Development Bank (1600 installations) and ISRA (1350 installations) will require about 8,000 facilitators;
- In the medium-term, personnel shortages will also emerge with respect to operators that can operate and maintain the sanitation facilities across the country;
- In the future, graduates from environmental engineering programs are expected to fill the demand for technical personnel. However, the reality is that environmental engineering does not attract a large number of university students. Graduates are more interested in seeking employment in high-earning industrial sectors, rather than in the sanitation sector;
- The number of students enrolling in sanitation related fields of study is far smaller than the intake capacity of most universities. Hence, there is significant potential for expanding enrolments without major investments to increase academic training capacity; and
- To attract new graduates, the image of the sector and technological vision must be made more appealing and relevant to current youth aspirations. Furthermore, job opportunities in the sector should be better disseminated.

[36] The National Sewerage and Septage Management Master Plan in the Philippines determined that development of sewerage systems in the highly urbanised cities should be supported by a 40 percent national government grant, and that it was feasible for the remaining 60 percent to be financed by the local government or Water District either based on revenue or borrowings.

[37] Under the sanitation hibah, sewerage connections made by the local government are reimbursed by the program on an output-based aid basis upon verification that the connections have been made. Connections for 90,000 households are projected under the current phase of the program. Some local governments waive the connection fee; others may require payment but either discounted or on an instalment basis.

[38] Under the sanitation grants program, up to 40 cities will be supported during 2012-2015 with installation of sewerage systems for up to 400 households. Local governments will be reimbursed for the cost of construction of the systems based on the number of connections made. The intent is that the systems will managed by the city utility and will eventually become part of a centralized system.

[39] Originally, in Metro Manila a tariff of 50 percent of the water bill was applied as a sewerage tariff for those with connections and 10 percent of the water bill charged to those without connections to cover septic tank de-sludging. This has more recently been amended to 20 percent for all residents irrespective of whether or not they have a sewerage connection.

[40] Sanitation Personnel: Capacity Development Strategy; WASPOLA Facility (BAPPENAS/AusAID/WSP-EAP), March 2012

With regard to competencies, the study identified the following gaps:

- Shortcomings in knowledge, skills, and attitude among sanitation personnel relate to:
  - o limited understanding of sanitation technologies among non-technicalfacilitators for DEWATS and city sanitation planning;
  - o low level of knowledge of current policies and approaches on sanitation development among technical-consultants;
  - o limited knowledge of the appropriate procedures for wastewater, solid waste, and drainage facilities among the respective operators; and
  - o limited writing and communication skills.

- There may also be a discrepancy in the understanding of the required level of competencies between sanitation personnel and key stakeholders (employers/managers). Mutually agreed competency criteria can reduce this gap. Using competency criteria, training needs assessments of the sanitation personnel will produce more objective results;

- Competence is only one of many factors that influence a person's work performance. A competent person will not be able to perform well in his/her position if the working conditions are not conducive to good performance. Among the working conditions that are often lacking in sanitation are the availability and adequacy of equipment and materials, funds, timeframe, support personnel, data and information;

- There is a clear deficiency in capacity development for sanitation professionals. The availability of training courses (and training providers) by technical institutions on sanitation subjects arelimited. Moreover, the existing training modules/courses are not designed in acomprehensive manner in the sense that it is difficult for potential trainees to attend a phased training program that matches their professional interests. Sequenced training courses (e.g., basic, intermediate, advanced) are not offered by local providers; and

- The existing sanitation-related professional certification systems require certificate holders to continually improve their competence. However, this requirement has not been followed through by a concerted effort (e.g. by participating in a well-structured training program). To provide accredited sanitation sector related training programs would likely lead to an increased demand for specific courses; it would also motivate training institutions to develop new training modules, cooperate with international training institutions (or sanitation institutions) and offer new courses to the public.There are a number of professional associations where sanitation personnel can build and expand their network. However, their specific roles are not clearly defined and associations are not used to the full potential. Their involvement in the sanitation sector is still incidental, and not designed to support current sanitation capacity development.

A sanitation human resources action plan has been prepared for the 2012-2014 period. Some activities have beenrecommended for immediate action due to their urgency. These include: (a) advocating the need to expand Indonesia's human resources capacity broadly to implement the PPSP; (b) widely promoting jobs in sanitation; (c) carrying out promotional visits for operators in the sanitation sector to educational institutions; (d) developing a unified job titling system for the sanitation sector; (e) developing a strategy for sanitation professionals to advance their skills and to get certified for sanitation professions; and(f) creating an Indonesian Network for Sanitation Personnel.

Some institutions are now starting to respond to the needs of the sanitation sector. For example, the Institute of Technology in Bandung (ITB) is planning a new study program for water and sanitation engineering. This was planned for mid-2012, but has been delayed until 2013. Furthermore, the International Water Association (IWA) is proposing cooperation between international sanitation experts, sanitation sector trainees, facilitators and university staff teaching sanitary and environmental engineering with a view to significantly upgrading knowledge and skills related to sanitation.

2.2.4 Management and Regulation of Sanitation Systems

Management and O&M of urban sanitation services are the responsibility of the local government. However, a wide range of modelsis currently being used. These include a local government *Satuan Kerja Perangkat Daerah* (SKPD, a Regional Working Group) or *Dinas* (e.g., *Dinas Kimpraswil* in Yogjakarta), an autonomous unit of a local government agency such as a UPTD/BLU[47] as in Denpasar and currently proposed for Yogjakarta, or a PDAM such as in Medan, Surakarta and potentially Surabaya. There are also many community-managed facilities constructed under the DEWATS/SANIMAS programs which the local government sometimes supports, but for which it receives no income and therefore

[41] A UPTD (*Unit Pelaksana Teknis Daerah*) is a Regional Technical Implementation Unit attached to a local government agency that has a degree of automony in the sense that it can charge for services and retain income for expenses, although it is not profit-making. A BLUD (*Badan Layanan Umum Daerah*) is also a technical operation unit of a local government agency that is allowed to operate with flexibilities or exemptions from rules applicable to the Dinas. It has some additional degree of autonomy to a UPTD, but is more complicated to establish.

does not consider it has a formal obligation. In addition, there are some 140 septage treatment facilities country-wide, most of which do not function; the management of these facilities is generally assigned to the local government (typically the Cleansing Department, *Dinas Kebersihan*), and is more often not integrated with the collection system. In addition, different organizations are often responsible for the sewerage and septage management systems.

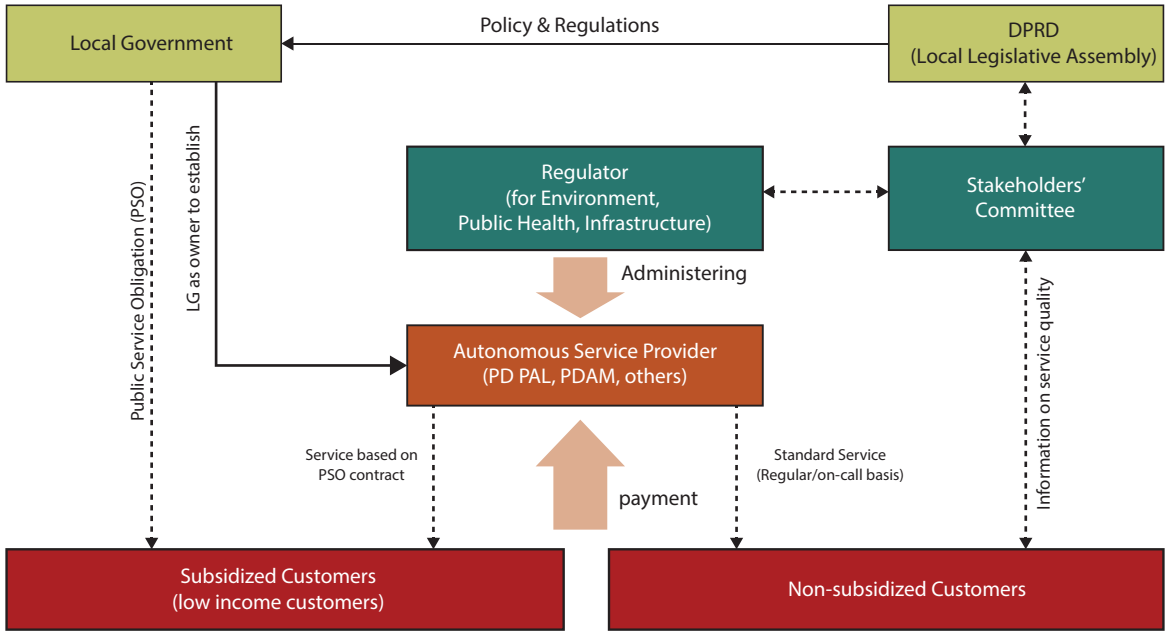
The institutional arrangements for the provision of sanitation, particularly wastewater management services are not clearly defined. The providers act as monopolies; they are often policy-makers and regulators at the same time. They tend to operate under the control of the government as government entities with very little incentive to operate efficiently or to adopt commercial business practices that would provide good customer care. There are no regulatory arrangements to impose standards and targets and to monitor performance. These service providers operate in a legal and regulatory framework that does not clarify roles and responsibilities, improve predictability in allocation of resources nor bear the consequences for good or poor performance. The ideal situation would be to have competent and reliable organizations (owner, service provider and regulator) with clear relationships between each other based on the different roles and responsibilities.

For best management, the service providers would act as autonomous entities, working in accordance with a 'performance agreement'. This agreement would set out their roles, responsibilities and accountability with respect to the local government, describe performance standards, payment mechanisms and schedules, as well as consequences deriving from failure to perform; it would also have regulations on accountability and its enforcement. Other features of this proposed management model illustrated in Figure 2.2 include:

- separation of policy making, operations and regulation functions. The overall responsibility for policy and design shall be with the local government;
- responsibility for mechanisms to encourage efficiency shall be with the service provider;
- increased autonomy for service providers, but more accountability based on clear roles and responsibilities which are supported by performance standards; and
- the service provider would need to support poor communities through a Public Service Obligation arrangement and would be entitled to receive subsidies from government for this purpose.

The most appropriate institutional arrangement for a Service Provider may be the PDAM, a PD PAL, a UPTD or a BLUD. The UPTD/BLUD option retains the services within government but provides the unit with a certain degree of autonomy which allows them to ring-fence part of their revenue for O&M, thereby contributing to enhanced sustainability.

FIGURE 2.2: Proposed Arrangements for Local Governance of Sanitation Systems



The PDAM is an attractive option as the required operational regulations and the fee structure are already in place. However, the downside is that sanitation experience within PDAMs is limited, and there is little interest or will to take over the management of wastewater systems which is considered to be not profitable and since many PDAMs are not financially strong. In the case of Banjarmasin, initially the wastewater system was managed by the PDAM, but over time it became clear that the wastewater division was not receiving the desired support from management. This led to a separation of the wastewater division from the PDAM and the formation of a PD PAL, which is now one of the more effective wastewater institutions in the country.

A BLUD provides a higher degree of autonomy and also management accountability, human resource management and operational and financial performance. However, the establishment of a BLUD requires approval by local legislation (Perda), which may prolong the process. The UPTD, which is usually attached to a particular Dinas, also has a certain degree of autonomy allowing it to collect and retain revenue for O&M expenses but has less flexibility than a PDAM, PD PAL or a BLUD. However, a UPTD can be established relatively quickly and even if the ultimate intention is to establish a BLUD, a PDAM or a PD PAL, then the UPTD can be an effective solution in the interim.

The most common approach currently is to form a UPTD with the intention that it will later on transition into a BLUD. Although some PDAMs (Medan, Bandung, Surakarta, and Palembang in the future) and PD PALs (Jakarta, Banjarmasin) are operating wastewater systems, four of the five cities that will be supported under the ADB-funded MSMIP, Cimahi, Pekanbaru, Jambi and Makassar, will adopt the UPTD/BLUD strategy and Yogyakarta expects to establish a UPTD by 2013. The IUWASH project is assisting with the establishment of sanitation management strategies in 54 cities, most of which will establish UPTDs.

Although consensus is starting to develop with respect to the Service Provider, less has been achieved in terms of determining the most effective means to regulate sanitation services. In the water supply sector, PDAMs are generally regulated by the local government in terms of tariffs and performance. Only in Jakarta, where the private sector is providing water services,does a separate regulatory body, the *Jakarta Water Supply Regulation Body* (JWSRB), exist although it still essentially reports to DKI Jakarta. In the sanitation sector, regulation in terms of tariffs and performance is expected to be a local government function for the foreseeable future, although this is not an ideal arrangement due to the vested interests of local government stakeholders. Environmental regulation usually is the role of the local government environmental agency, *Badan Lingkungan Hidup* (BLH). However, it may be beneficial if the Provincial Environmental Agency, *Badan Pengendalian Lingkungan Hidup Daerah* (BPLHD), takes on the role of environmental regulator, given that effluent standards are set by the Province, and the BLH at the local government level may have less authority to enforce the standards.

It is unlikely that in the short term an ostensibly independent regulator for the wastewater sector will be established unless the private sector becomes involved substantially. In this case, a body similar to the JWSRB may be formed for a particular local government. The proposed expansion of the Jakarta sewerage system may include private sector operators for the treatment facility. In this case, it might be appropriate to expand the charter of JWSRB to include regulation of wastewater services. In time, consideration might be given to the establishment of a *National Water Supply and Sanitation Regulatory Board* that, in terms of sanitation, would be independent of local government, regulating the performance of the sanitation Service Providers around the country. This model has been adopted for several Latin American countries, such as Chile, Brazil and Colombia[42] with some functions, such as economic regulation, delegated to the State level. In Indonesia, it might be appropriate for a national regulatory authority to be represented at the provincial level.

2.2.5 The Interface between Community-managed and Institutionally-managed Services

The original SANIMAS concept was aimed at developing community-managed simplified sewer systems as a cost-effective medium term solution for wastewater management in high density residential areas. This strategy of quickly investing in small communal systems that can eventually be integrated with a central piped sewage networkis not simply a matter of local governments divesting responsibility to community groups until a sewerage system is developed. A program of DEWATS facilities requires substantial investment in facilitation and long term technical collaboration between local government agencies and communities to ensure that the systems are effectively used and sustainably maintained. The early SANIMAS systems for the most part were established with technical guidance from the NGO BORDA[43] and its local partners. Institutional and technical facilitation was extensive. The program has expanded rapidly under the leadership of MPW and the range of local NGOs that assist in facilitation has expanded correspondingly.

[42] The Evolution of Urban Sanitation in Latin America, World Bank 2012.

[43] Bremen Overseas Research and Development Association (BORDA) is a non-profit international development organization headquartered in Bremen, Germany and regional offices in India, Indonesia, and Tanzania.

The current PPSP strategy assumes that, in the longer term, many DEWATS systems would be connected to larger scale sewer networks. At the same time, complementary systems would serve areas that are uneconomic to reach with conventional sewerage. In principle, communities are offered a choice of options: MCK+ with a communal septic tank, or simplified sewer systems connected to a communal treatment facility. In practice, surveys indicate that many local governments are promoting the MCK+ option, perhaps because it is faster and less complicated to construct. However, in the longer term simplified sewer systems are more easily adapted to conventional sewer networks; they also offer the specific level of servicethat households want (i.e., connections). Recent findings from the WSP study on community managed decentralized systems also show that the MCK+ installations are less sustainable.

At this stage, it is not clearif using DEWATS as an interim measure until they become part of a larger centralized system approachis occurring in practice. There are a few cases where this happens but it is probable that most DEWATS would be abandoned once households areincluded in the service area of a centralized system. The public facilities may continue to be used, although experience has shown that utilization of the community facilities reduces with time, particularly when piped water becomes available and when households start to install their own flush toilets. This raises the question of the economics of providing DEWATS as these may soon be superseded by a centralized piped system.

Current and future effluent quality standards for Indonesia also have an impact on the efficacy of the DEWATS approach. While 90 percent of DEWATS facilities are reported to meet the prescribed standards of less than 100mg/L BOD[44], due to receiving water quality improving over time, effluent quality standards are likely to become more stringent – in line with standards used in other countries in the region. Sanitation strategies should therefore carefully consider the efficacy of providing DEWATS in areas where centralized sewerage may be provided in the short to medium term. The DEWATS programs may be best restricted to discrete locations outside the likely service area of a sewerage system.

The current Australia Indonesia Grants for Sanitation[45] (sAIIG) program,[46] funded by AusAID under INDII, may be a more appropriate model. Under this program, decentralized simplified sewerage systems, intended to be managed by the local government wastewater utility, would be developed as an 'embryo' of a future centralized wastewater system. While sAIIG has experienced initial difficulties, primarily in shifting from the traditional SANIMAS approach, over time the sAIIG approach may prove to be more sustainable.

Nevertheless, it is expected that by 2015 over 6,000 DEWATS will be operating across the country, continuing to be a component of Indonesia's wastewater infrastructure. The original SANIMAS concept also assumed that, with adequate facilitation measures provided, communities would be able to finance and manage O&M of communal facilities without much external support. The experience, however, so far has been mixed. Perhaps the most significant finding from the WSP review of the DEWATS related to O&M, in particular the need for greater local government support to maintain the systems either by government arrangement or through contracting out of the services. Key areas of support include: effluent quality monitoring and regular de-sludging, assistance with major repair, and ongoing promotional and educational support.

Several cities under PPSP are providing O&M support for DEWATS. In Makassar, mobile "Technical Management Units" (UPTDs) are being established to provide community-level technical support to maintain both the DEWATS and the conventional sewer network. The PD PAL in Banjarmasin is developing a similar program in cooperation with Cipta Karya. The experience in operating a decentralized sewerage system in Malang is also summarized below (Box 2.4).

2.2.6 Septage Management

In Indonesia's urban centers,more than 70 percentof households currently discharge wastewater (often by use of pour flush toilets) to septic tanks or more commonly *cubluks*, which are essentially open bottom pits or soakaways. Septic tanks, where utilized, do not usually incorporate absorption trenches; the effluent is generally discharged either directly or indirectly into the local drainage system which effectively acts as a combined sewer. While the wastewater sector is attracting increasing amounts of financing through the PPSP, this will still only result in about a 5 percent centralized sewerage coverage by 2015 with an additional 2 percent being covered by DEWATS and communal systems. In Jakarta, the development of the first stage of sewerage expansion will focus on interceptors and, therefore, septic tanks or cubluks will still be utilized. Clearly, septic tanks (or *cubluks*) will remain the primary means of wastewater disposal for many years to come.

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

[45] http://indii.co.id/contents.php?id_contents=66&id_ref_menu=70

[46] It is proposed that this grant will support up to 40 local governments develop piped sewerage facilities during the period 2013-2015.

BOX 2.4: Decentralized Sewerage Systems in Malang

*In the early 2000s, with support from the USAID-financed CLEAN Urban project, the City of Malang initiated a decentralized sewerage pilot project aiming to demonstrate effective collaboration between communities and the city cleansing department (*Dinas Kebersihan, *DK). With donor financing, and joint planning between the community and DK a site was identified and land contributed by the community for a wastewater treatment plant with the capacity to serve about 10,000 people in two wards within the city. A plan for a network of shallow sewers was developed and neighborhood groups were formed to provide labor for the tertiary network construction and subsequent maintenance. The local government was expected to finance expansion of the trunk sewers to allow more neighborhoods to be connected. The neighborhood groups collect regular fees from the connected households to finance periodic pipe de-clogging and repairs to the tertiary network. In the first years of the pilot connections rapidly expanded to about 1,000 households, but further expansion requires extensions of the trunk lines by DK, which manages the treatment plant with financing from the municipal government. Thus far, financing has not been made available by the local government to expand the trunk network to allow additional neighborhoods to be connected.*

The Malang experience provides a good example of a model for local government and community collaboration. A very large proportion of the households in the original service area have connected to the sewer system, and they pay regular tariffs for the sewage service. DK has proven capable of managing the small treatment plant, but it is dependent on local government financing rather than on tariffs to cover the operating costs. If the local government invested in expanding the sewage network to allow additional connections up to the capacity of the treatment plant, it is likely that the system could achieve financial sustainability without local government financing.

During the 1990s, the national government initiated the installation of about 140 septage treatment facilities (IPLT) under the Integrated Urban Infrastructure Development (IUIDP) program, of which less than ten are now functioning effectively. The problem was not necessarily poor design, construction or even operation but rather the lack of incentives for residents to have their tanks de-sludged[47] and for the de-sludging operators to dispose of septage at treatment plants instead of discarding septage indiscriminately on land, in waterways or into the sewerage system.[48] These septage management projects lacked local support as well as the associated policies, monitoring and enforcement, operations training and public outreach to make them sustainable. Moreover, the decentralization policy of 2001 transferred management responsibilities to the local agencies without adequate training and ongoing technical assistance. As a result, it is now estimated that only 4 percent of septage is treated; furthermore, septage treatment facilities are either severely under utilized or in a state of disrepair. It is estimated that as much as 70 percent of the country's groundwater pollution stems from leaking septic tanks or *cubluks* (which are designed to 'leak') and septage disposed in waterways.[49]

The Indonesian Standard Code for Planning Septic Tanksis relatively comprehensive, but it is generally not enforced by local government and few facilities are built in accordance with the Code. In addition, there are no national or local laws that require regular or scheduled de-sludgingand no legal, institutional or financing framework for septage collection, treatment or disposal. Densely populated communities, mostly households owning septic tanks, are common in Indonesian cities; these tanks are often located under the housewith no access to a manhole needed for de-sludging. Few septic tanks have absorption trenches so most septic tanks discharge directly to the drainage system, while effluent from open bottom *cubluks* permeates into the subsoil or water table. While septic tanks can remove as much as 30-40 percent of BOD, to operate effectively, they need to be de-sludged every three to five years.

The common institutional arrangement for septage management isthrough a local government Dinas that also operates the solid waste facility. Even in cities such as Surakarta, Medan and Banjarmasin, where wastewater systems are managed by the PDAM or a PDPAL, septage management remains the responsibility of alocal government agency and not the PDAM/PDPAL. Commonly, de-sludging of tanks is on demand with and residents paying the de-sludging operator a service fee; the service operator in turn pays a tipping fee to dispose of the septage at an IPLT. This creates a disincentive from the perspective of the resident who will only request for septic tank de-sludging when it overflows and also for the operator (if a private de-sludging company) who may choose to discharge the septage indiscriminately (rather than paying a tipping fee or transporting the septage over even longer distances to the IPLT).

[47] In Lampung it is estimated that 22 percent of sludge generated is removed, but probably much less due to the watery nature of the sludge.

[48] Wastewater treatment plants are not designed to accept septage, which will reduce the operational efficiency of the plant. Dumping wastewater into the sewerage system reduces the hydraulic efficiency of the piped network.

[49] A Rapid Assessment of Septage Management in Asia, USAID, January 2010

WSP and IUWASH are working with the GOI to develop business models for septage removal, transport and treatment and, if possible, reuse. These studies, which draw the lessons learned from field investigations in a number of Indonesian towns and cities, are still ongoing with initial results available from the WSP study in Lampung, Tegal and Jombang. In each of these locations, septage management is undertaken by the local government, with de-sludging operations carried out by a mix of government and private sector operators. However, the current operations by private de-sludging operators are only marginally viable and probably only remain so by taking short cuts for the disposal of septage. As a result, the IPLTs have low utilization and septage treatment operations are not viable given the limited quantity of septage delivered to the plants.

The WSP study suggests that the imposition of a regular charge on all households to cover the cost of septage treatment could produce a viable operation and remove the disincentives for both the residents and the operators. Under this scenario, the residents would receive regular de-sludging while the private operators would be paid for services by the local government, so that it would not have to pay a tipping fee at the IPLT. The study highlights the need for improved management capacity, particularly for systems that aim to finance on-call or regular pit emptying through regular charges levied on all households. Monitoring and recording systems for septage collection and disposal also need to be established or improved.

There are opportunities for the private sector to be involved in septage management through sludge collection and transport or treatment facility operation under either a management or a lease contract. Private sector operators could be hired based on service contracts to provide a sludge collection and transport service on behalf of the municipality or the IPLT operator rather than offering a service in parallel to the municipality's own service. This would tend to formalize the involvement of the private sector contractors, something that is arguably desirable in the medium to longer term.

In order to increase the viability of septage management operations, sludge re-use is also being considered. In Metro Lampung, an entrepreneur is producing soil-conditioning material from solid waste on a site adjacent to the Metro Lampung solid waste dumpsite; the same approach is underway at around six other sites in Indonesia. Mixing fecal waste with the solid waste should increase the organic content of the bagged soil conditioner and this might increase its sales potential. Even if this proves to be the case, a challenge may remain in sourcing sufficient treated sludge to make commercial use viable.

Septage Management Policy Framework and Enforcement. **Currently few local governments have an ordinance in the building regulations that requires proper design and construction of septic tanks for all housing and developments where separate sewerage is not provided.** These septic tanks should be located such that they are accessible for regular de-sludging. More importantly, the appropriate design and construction of septic tanks needs to be effectively enforced by building inspectors. Retrofitting of poorly designed and constructed septic tanks or *cubluks* is recommended, but this is a major task and should be restricted to areas where it is unlikely that centralized sewerage systems will be built or where *cubluks* are likely to pollute the water table. A local government ordinance should also be enacted requiring households to de-sludge septic tanks at least every three to five years. In addition, monitoring and enforcement policies are necessary that require operators to dispose of septage only in authorized locations. However, to be effective these policies need to be accompanied by a charging regime that would remove the currently existing disincentives both at the householder and operator level. This is best achieved by imposing an environmental fee on all households that would cover the costs of de-sludging septic tanks and treating the septage.

Institutional Arrangements and Capacity. **The ambitious program to install septage treatment facilities in 140 towns during the 1990s failed, essentially because the institutional arrangements were not in place to implement a septage management program.** Removal of the disincentives for the householder and the operators, as discussed above, will create the necessary environment for a septage management program to operate effectively. However, this requires the necessary local government ordinances to be in place and the management of these services by a suitable organization. Although septage programs are currently linked to solid waste management programs managed by local government, septage management is more aligned with wastewater management,and is more logically managed by a wastewater utility. The studies being undertaken in Indonesia by WSP and IUWASH should be widely disseminated within local governments and wastewater service providers in Indonesia to create an awareness that septage management does not need be a drain on financial resources and that rehabilitation of the existing septage plants (or construction of new plants) can be financed with the expectation of obtaining financial returns. There are certainly opportunities for the private sector to become involved in septage management, at the very least as de-sludging operators, but ideally also as operators of IPLT facilities.

While private sector de-sludging services and treatment facilities are preferred, these services still need to be managed, monitored and supervised by local govern-

ment. In particular, local governments will need assistance in developing strategies for improved septage management that will include the development of information systems that establish sludge quantities, demand patterns, operational and financial arrangements.

Funding for septage management. **Currently, little national government capital funding is being allocated to septage management.** National government allocations for wastewater management are focused on DEWATS projects or supporting a few donor funded sewerage projects. Some donor funded programs incorporateseptage management as part of the wastewater management improvements. Local governments provide some support for operation and maintenance of septage collection and disposal but far less than is actually required and very limited capital funding for rehabilitation of facilities. In Jakarta, JICA intends support the implementation of the initial stage of the Jakarta Wastewater Master Plan based on combined flows and interceptors; septage management will remain an integral part of this program. Funding for this program should therefore include a substantial component for septage management.

Studies carried out by USAID in the Philippines[50] have shown that with appropriate local legislation and ordinances in place, septage management can be a viable operation that can cover the investment as well as O&M costs. With some support from national government, local governments should be encouraged to fund septage management programs, including the rehabilitation of septage treatment facilities. Private de-sludging companies can be engaged by local government or the sanitation utility under service contract arrangements which will improve monitoring and enforcement of septage disposal. However, this will require local government to increase demand by requiring households to regularly de-sludge their septic tanks and pay a fee to the local government agency or utility that is responsible for sludge management. Payment to private operators would be made on delivery of septage to the treatment facility, thereby encouraging these operators to dispose of septage at the appropriate location. This will most likely be successful based on adequate campaignsthat address both local government officials and the wider public to raise awareness of the importance of regular de-sludging of septic tanks and the impact of poor sanitation on the community.

[50] Business Model for a Water District Septage Management Program, Philippine Water Revolving Fund Support Program, USAID, 2010

III. Recommendations

Although until 2000, urban sanitation (particularly sewerage) in Indonesia was extremely limited, international projects starting with the ISSDP and followed by PPSP have provided a suitable framework and process for urban sanitation planning. The program has been supported by the central government as well as by international donors and was aided by the establishment of POKJAs at provincial and city/district level. Local government also has taken responsibility in implementing sanitation programs. Notwithstanding the progress, tremendous challenges remain; this concerns particularly the scaling up of a small program, that was essentially a pilot program in ISSDP covering 12 cities, to a vastly accelerated programsupporting 330 cities by 2014. Challenges include access to finance for the program at the national and local government levels, the need for regulating policies to formalize processes, the need to develop human resource capacities to implement the program, mobilizing the private sector and civil society to support sanitation programs, identifying institutional arrangements to manage the wastewater systems, and developing technical solutions that optimize coverage with available resources while addressing the environmental degradation caused by poor sanitation. While the policy framework is now starting to be put in place to better plan and implement urban sanitation programs, the arrangements to actually manage the systems and regulate the sector have not yet been established. There are certain key activities required that will build on the considerable progress made to date which will result in improved performance of the wastewater sector. Recommendations that will lead to improved performance are outlined below. For convenience, the recommendations are divided into policy, institutional,technical, social and financial aspects although there may be many overlapping features.

The following outlines recommendations to address the critical issues that face wastewater management in Indonesia. The key messages are:

- All local governments need to develop septage management programs through introducing appropriate legislation and ordinances, institutional arrangements, local financing and charging mechanisms.

- Conduct comprehensive citywide sanitation planning to identify areas for centralized sewerage, DEWATS, on-site solutions and the introduction of innovative approaches to provide services for the urban poor.

- To increase coverage, central governments need to re-direct financing to the implementation of centralized systems in highly urbanized areas, while ensuring priority is given to sanitation for the urban poor.

- The DEWATS program should be considered in the context of comparative costs with other alternatives, effluent quality produced and O&M arrangements. Financing should be primarily by local government.

- Wastewater service providers need to aim for cost recovery by implementation of 'polluter pays' principles through appropriate wastewater tariff structures, effluent discharge fees or through other means such as property taxes or other utility fees (e.g., water and electricity).

- Central government needs to develop a public expenditure framework for sanitation and assist local governments in raising finance for sanitation interventions.

- An institutional framework for managing sanitation by the local government needs to be established that will separate the roles of Owner, Service Provider and Regulator. This framework should cover all sanitation services associated with wastewater: DEWATS, septage management and sewerage.

- Demand by the community for wastewater management needs to be increased by improved focus on service delivery, awareness campaigns to promote behavior change, and appropriate tariff structures.

3.1 Policy Recommendations

Currently no formal, comprehensive national policy on sanitation has been promulgated in Indonesia. Nevertheless, a de facto policy is defined in the medium term development plans (RPJMN) issued every five years,the National Policy and Strategies on Domestic Wastewater Management, and the policy on minimum service standards issued by MPW. The current policy approach to sanitation is clearly captured by the PPSP, yet this is based on an arrangement between agencies and not underpinned by legislation or an administrative order that would require all levels of government follow the PPSP process.

National laws on environmental protection, housing and settlement, water resources and water supply that prescribe requirements related to sewerage and sanitation have not been replicated at the local government level where enforcement needs to take place. Planning, especially at the local level, tends to have a short term horizon displaying limited vision relating to sanitation as part of a longer term city development plan. There is also a need to establish or assign an effective sanitation (and water) regulatory office that has the authority to ensure that sewerage and sanitation service providers fulfill their mandate to provide sanitation services within their jurisdiction. While much has been achieved during the past five years regarding the development of an approach that has the potential to substantially improve the coverage of urban sanitation, this approach needs to be underpinned by policy development at the provincial and local government levels. Policy recommendations are outlined below:

- ***The national government to issue at least an Administrative Order confirming PPSP as the preferred approach to urban sanitation, requiring all agencies and local governments to follow this approach.***

- ***The POKJA at local government level shall propose the enactment of enabling local government legislation/regulations on sanitation covering at least the following:***

  - *the role of the local government to provide the community with the means by which wastewater can be safely disposed of and defining the duty of the residents to pay for these services;*
  - *the role of the private sector and the community in the provision and management of sanitation and wastewater facilities;*
  - *the requirements for all new housing that are not connected to a sewerage system to have a properly designed and constructed septic tank;*
  - *a requirement for developers to provide an acceptable wastewater system for all new developments, including a wastewater treatment facility - unless connected to an existing wastewater system;*
  - *a requirement for all households to de-sludge septic tanks within a fixed period (or alternatively the imposition of an environmental levy on all households that covers the cost of regularly de-sludging septic tanks);*
  - *regulations and their enforcement regarding the requirement to discharge septage in an approved location such as an IPLT;*
  - *establishment of an entity as a service provider responsible for the management and operation of the sanitation and wastewater system, with the right to collect fees from users of the system; and*
  - *establishment of a regulatory body to regulate the performance of the service provider, including the setting of appropriate tariffs.*

- ***In accordance with the PPSP/USDP Mid-Term Review,some adjustments to be made to the PPSP modules and manuals to ensure that the planning process leads to implementation at the scale necessary to achieve short, medium and long term targets. This will require:***

  - *development by cities/districts of a long term vision for sanitation with a 20-25 year perspective, with respect to centralized and decentralized sewerage systems as well as on-site systems;*
  - *targets for coverage with different forms of sanitation to be developed and agreed upon, and budget expenditure requirements determined to meet these targets and incorporated in planning documents;*
  - *PPSP to develop a framework that provides objectives, outcomes, outputs and indicators in accordance with the planning targets; and*
  - *the planning processes adopted by PPSP - such as the SSK, White Book and Program Memorandum - need to be in a format such that these documents can be prepared within a time frame commensurate with the planning targets. Now that the planning process is completed or underway across the country, there needs to be more emphasis on the stages required for implementation including master planning, design, procurement and financing. The planning targets need to take into account the human resource capacity to implement sanitation programs and the availability of financing.*

3.2 Institutional Recommendations

The institutional arrangements for the sector reflect the decentralization process, whereby the national government focuses on policy development, setting of standards and capacity building, while local governments are responsible for sanitation planning, development, financing and management of the infrastructure. Sector coordination is undertaken by BAPPENAS but in reality there is no single department responsible for sanitation -- with various functions being shared by BAPPENAS, Ministry of Public Works, Health, Home Affairs, Environment and Finance. The primary institutional issues relate to: (a) lack of capacity at the central, provincial and city/district level to implement the PPSP targets; (b) lack of a consensus on the most appropriate institutional arrangement to manage wastewater systems, both centralized and decentralized; (c) lack of any regulation of the sector service providers; and (d) difficulty in achieving cost recovery from the wastewater installations. There are many institutional arrangements in place in different cities/districts but the key requirement is to establish a Service Provider that is able to charge and retain tariffs for services and use the revenue for O&M and system expansion. There is also a need to establish an independent regulatory body that is independent from the Service Provider.

The following recommendations largely address the institutional arrangements that need to be put in place for the sector to operate more effectively and also to successfully implement the PPSP:

- ***The national government needs to develop a recommended approach for local government to establish a formal entity (Service Provider), responsible for the management of wastewater services at the local level, that is able to retain revenue for operation and maintenance and system expansion. This should be supported by technical assistance programs in cities/districts where PPSP implementation is ongoing.***
  - *The decision on the preferred model to be adopted for this Service Provider will need to be taken by the municipality/district. Part of the technical assistance should be to assist the proposed Service Providers to develop tariffs for sanitation and wastewater services that enable cost recovery but that do not place poor segments of the community at a disadvantage.*
- ***The Service Provider should be responsible for all sanitation and wastewater systems in the city/district. This includes direct O&M of centralized sewerage systems and septage management programs, and at least a support function for community-managed DEWATS. The roles of the Service Provider and the local government in the provision of sanitation services should be prescribed based on performance. Close coordination with POKJA AMPL at the province and municipality/district level must be developed.***
- ***The private sector should be encouraged to take on the role of Service Provider to deliver all or part of the sanitation and wastewater services. Provision of de-sludging and septage transport services is a basic service that can be provided by the private sector, but management contracts and concessions for delivery of all services can be considered.***
- ***The national government should develop a recommended approach for an independent regulatory body that can monitor the performance of local government and service providers in delivering sanitation services, including the evaluation of appropriate tariff structures. There should be a single regulatory body for water supply and sanitation services. It may be appropriate to locate the regulatory office at the Provincial level to provide a degree of separation from the city/district.***
- ***There is a need to upgrade capacities in the sector by developing training and licensing programs for specific skills areas. There is also a need to work with higher education institutions, the private sector and experienced NGOs to modernize courses and provide training in environmental engineering as well as to develop incentives (such as internships or scholarships for top students) for students interested in a career in wastewater management. These steps are needed given that capacity is a constraint at all levels (e.g., central and local government, private sector, and civil society).***

3.3 Technology Recommendations

City wide approaches to address sanitation are needed which also help the poor. Untreated wastewater or septage is a concern for all in a city and the positive environmental externalities of sanitation interventions are large. Thus, a comprehensive citywide approach should be taken to ensure that priority investments are addressed by the local government or the utility. The poor often live next to contaminated waterways but the waste is often discharged to the water bodies elsewhere and from 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, citywide approaches to sanitation should be taken which includes assigning clear responsibility and resources to a local government entity for the delivery of services.

Greater emphasis will need to be placed on the development of centralized sewerage systems if the percentage of wastewater treated is to be increased significantly. As the primary planning tool for the development of urban wastewater systems, the SSK is critical for identifying the appropriate combination of wastewater technologies adopted in the cities/districts. Analysis contained in the SSK should determine the extent of centralized sewerage systems (combined or separate), areas where decentralized systems are appropriate, and those where on-site systems will continue to be used for the foreseeable future. Some of the issues that need to be addressed in developing centralized sewerage systems will be decisions on whether to introduce staged development, using combined systems and interceptors prior to developing separate systems in order to more rapidly increase coverage; how to improve the current low utilization of the sewerage systems; which appropriate treatment technologies are cost effective but at the same time are able to address the probable increase in effluent standards; and the technology required to construct sewers in highly congested areas.

The current focus on rapid expansion of DEWATS will need to be critically examined. Considerations include the resource intensive requirements for implementation, the relative cost against the cost for constructing sewerage systems, the observed decline over time in usage of the public facilities, the difficulties in recovering costs for appropriate O&M, and the effluent quality of the treatment facilities which may not be suitable as effluent standards will become stricter over time.

Cities/districts need to develop effective septage management programs. Even after the current phase of PPSP is completed, some 90 percent of residents will still rely on on-site sanitation.Septage management programs are required that include suitable regulations requiring standards of septic tank design and construction, regular de-sludging of septic tanks, and proper disposal of septage.

The following recommendations address the technological needs to scale up sanitation development in a significant way:

- ***The experiences with inefficient wastewater treatment facilities and decentralized systems must be critically considered. A feasibility study should be conducted prior to any design, including at least a study on the real demand, willingness to pay, willingness to connect, real septic tank condition in the coverage area, and numbers of de-sludging service providers. Technical feasibility study guidelines should be prepared for use by the local governments.***

- ***Different approaches to sanitation are to be used, depending on the respective service areas. There are primarily three general categories of wastewater and sanitation systems that need to be implemented to increase coverage in a city:***

  - *These comprise: (a) centralized sewerage systems for city centers and other high density areas; (b) decentralized systems for discrete highly populated areas not adjacent to the centralized system; and (c) community-based systems, such as SANIMAS, for more low income or peri-urban areas. Although these may merge over time, cities need to do careful analysis of costs and benefits of comparative sanitation interventions in the SSK and planning and investment documents need to identify the various zones for budgeting and implementation.*

- ***A staged approach to sewerage – with the first stage being combined sewerage and drainage using the drainage system with storm overflow interceptors, is an appropriate approach for larger cities with limited sanitation coverage, given the huge investment required to increase sewerage and sanitation coverage to acceptable levels.***

  - *This approach also may increase the quantity of influent to fully utilize the treatment capacity prior to the system being converted to a fully separate system. However, it will result in a more dilute sewage reaching the treatment facility which will require an appropriate design approach. Sewerage laterals collecting separate sewerage can be adopted gradually as funding permits. The SSK should include a careful analysis of the options of providing separate and combined sewerage systems.*

Continued...

- ***Careful consideration should be given in SSKs to the efficacy of continuing with the scale of development of DEWATS that is proposed in the current PPSP planning phase. Analysis should include the resources required for planning and implementation of the systems, the comparative costs versus centralized sewerage systems, the institutional capacity to operate and maintain the systems, and the effluent quality produced, giving consideration to likely future effluent standard requirements in the country.***

  - *While community-managed DEWATS projects have formed a central role in meeting the Government's sanitation targets to date, and will continue to do so under PPSP, the ambitious target for DEWATS projects under PPSP also carries some risk. DEWATS are unlikely to provide the up-scaling in wastewater coverage required to meet future targets.*

- ***Planners need to carefully consider suitable locations for public facilities, such as MCK, and where to provide a decentralized system with a sewerage network, given that a recent study shows that the utilization of many MCK installations had declined. These decentralized schemes should have the potential to tie into future or current centralized networks.***

- ***It is critical that the local government, and preferably the wastewater Service Provider, enter into an arrangement with the community to provide ongoing support to the community-managed facilities.***

  - *Recent surveys of DEWATS projects have shown that: income levels are often too low to pay for proper operation and maintenance, many community management systems do not function adequately, treatment facilities are often not de-sludged, and there is limited post-construction support.*

- ***Where separate sewerage systems are utilized, residents must be encouraged to make connections so that the sewers and treatment facilities are fully utilized and the investment is justified.***

  - *The local authority/service provider has several means to achieve this, namely through: (a) a policy of enforcing connections for any household with access to a sewerage system; (b) charging of an environmental fee where all households pay a charge for sanitation which covers either a sewer connection or regular de-sludging of septic tanks; (c) the implementation of a 'hibah' approach where the cost of the connection is funded externally; (d) information, education and communication (IEC) campaigns so that the citizens are aware of the benefits to connect to a sewerage network; and (e) financial assistance to poor households to connect to the network so that wastewater is removed away from the population in a safe manner .*
  - *Septage management plans should include a financial analysis that will establish a charging mechanism for de-sludging. The imposition of an environmental fee that includes the cost of septic tank de-sludging may be considered, as it will improve the willingness of residents to have tanks de-sludged. This is likely to lead to a more regular use of de-sludging services rather than an on-call basis as the current practice. Regular de-sludging services will also contribute to better maintenance of septic tanks.*

- ***Design of the treatment facilities should take sewage influent conditions into account, so that they are able to operate efficiently under variable conditions. The effluent standards adopted should also take into consideration the impact on the receiving waters and whether the national or provincial standards are applicable for different situations.***

  - *Sewage influent at treatment facilities is often dilute with low BOD and of a lower volume than the design capacity of the treatment facilities due to the slow build up of connections (if separate sewers are utilized).*
  - *Although over time it may become desirable to adopt stricter effluent standards, this is unnecessary at this point in time as it would significantly increase the cost of providing wastewater treatment, which is not appropriate given the general poor condition of the receiving waters.*

- ***It is critical that septage management practices be improved, given that the use of septic tanks will continue for the foreseeable future in all cities. This will require enforcement of local regulations for design and construction of proper septic tanks and septage management and disposal. Furthermore, septage management plans should be developed for each city/district comprising arrangements for collection, transport and disposal.***

- ***Innovative sanitation technologies need to be implemented for poor urban communities living in coastal areas, where the terrain is unsuitable for conventional technology, or where the communities are extremely densely populated. These may take the form of public facilities, individual latrines such as eco-san toilets, or shallow sewerage technology.***

3.4 People Recommendations

A key to understanding the social issues related to sanitation in Indonesia is that wastewater management is commonly understood to be a private rather than a public responsibility. As such, residents are willing to spend money on removing wastewater from their immediate environment but the level of awareness of the broader public health and environmental benefits of more comprehensively and effectively managing wastewater is low. To date, even civil society has not been particularly active in generating public awareness in the sector or holding government to account for poor sanitation; this leaves the government itself as the primary driver of wastewater management improvements. In the past few years through the efforts of PPSP, awareness for sanitation was developed due to SSK preparation,the presence of 'champions' at the central and local government level, associated attitudes, and with it the political pressure to invest in wastewater management. The challenge now is to maintain and increase this impetus so that it reaches the local communities.

The recommendations to address people issues are as follows:

- ***Increase community buy-in to decentralized small sewer schemes and sewerage systems based on raised public awareness, so that communities understand the broader sanitation strategy challenges. This will require a coordinated approach between central, provincial and local government with MPW in the lead, supported by the Ministry of Environment with respect to environmental pollution, DOH with respect to health impacts, and MOHA with respect to raising awareness within local government staff. This approach will require considerable additional resources from each of these departments and local government to be able to expand reach via local organizations.***

- ***Review and improve systems for collection and dissemination of information on sanitation coverage, health and environmental impacts to assist in awareness raising.***

  - *Department of Health to use health information systems (HIS) to collect data on water borne diseases and use the HIS to educate communities on the impact and the costs of water borne diseases for the public.*
  - *Provincial and City BLH to use the PROKASIH and PROPER programs to disseminate data on pollution of water bodies, so that awareness raising activities can be included in city/district government programs.*
  - *Establish programs to publicize water quality of coastal and river waters and the extent to which they are safe for recreational purposes, to demonstrate the impact that poor sanitation has on tourism.*
  - *MPW, in conjunction with the Department of Education, to develop programs on the negative impacts of poor sanitation for dissemination in schools.*

- ***Society needs to play a more active role showing its concerns with respect to the link between sanitation and the environment; this may be conducive to developing a heightened awareness among communities of the negative impacts and costs of poor sanitation, which would trigger feedback of communities on the performance of the local government organizations managing the provision of sanitation services. The involvement of women's groups, such as(PKK/Dasawisma), in raising awareness at the local government level should be encouraged.***

3.5 Financing Recommendations

While national government funding for sanitation has increased significantly since 2006, it is still far short of what is required to meet PPSP targets or to significantly increase urban sewerage coverage. Most national and local government funding is directed towards DEWATS/ SANIMAS projects with loan funding being directed at the larger centralized sewerage projects in selected cities. It is advisable to adopt a more structured approach to funding based on priorities, sector development plans, and expected funding responsibilities of central provincial and local governments. In particular, studies have shown that local government can afford to invest more in the sector, but that wastewater management in general is not a priority. Cost recovery also continues to be an issue for utility providers for a range of reasons,including unwillingness or inability of communities to pay tariffs and/or connection fees or, in some cases, a reluctance to charge.

Recommendations to secure financing for the wastewater sector are as follows:

- ***The estimated cost to provide sanitation to Indonesia's urban population in 2025 is USD42.7 billion, and capital needs should be secured through a sanitation expenditure framework.***
  - *The framework should be well-defined with sources of financing identified. It would: outline the costs to improve sanitation; define priorities, mechanisms for the flow of funds, and arrangements for financial management; outline plans to prepare projects along with expected targets and monitoring plan; and identify sources of financing for viable projects.*
- ***The central government needs to develop a clearly-articulated financing policy in accordance with the planned program from PPSP.***
  - *This may be in terms of central government budgeting to fund certain elements of the works, such as sewers and treatment, with local government funding connections (possibly supported through a hibah program) and land acquisition or it may be a formula for a fixed percentage of the cost. An analysis needs to be undertaken of the investment needs and the contribution required from central, provincial and local government for planning purposes.*
- ***There is a need to develop incentives for local government to invest and borrow funds for sanitation as a priority. Further analysis may be required to determine the local budget required. AKKOPSI may be mobilized to assist in encouraging local governments to provide funding for sanitation.***
- ***Financing should be channelled through the APBD, except for major projects that may span administrative boundaries - in which case funding may be channeled through the province. This will provide a sense of ownership for the local government – as they will be implementing projects that provide sanitation systems which they will then operate and maintain themselves. In any case, the MPW will continue to provide technical support (e.g., design, quality assurance and technical performance monitoring).***
- ***Consumer fees should be used to meet operating costs.***
  - *Ideally, national and city authorities need to raise consumer fees to meet operating costs, if not immediately then as part of a tariff increase plan over time, while ensuring affordability for the poor. Block tariffs can work where there are piped water systems. For areas that do not have them, other methods of support to the poor, such as direct transfers, should be provided. Where the tariffs do not meet operating costs, subsidies should be available to make up the difference between income and expenses. Other possible models include application of the "polluter pays" principle through effluent discharge fees, or inclusion of a sanitation fee as part of the property tax or combined with other utility billings (water or electricity, etc.).*

Annexes

Annex 1: Sector Performance in Indonesia

Data on Indonesia's current performance in the wastewater sector is shown below in Table A1.1.

TABLE A1.1: Indonesia Urban Wastewater Sector Performance

Indicator	Year		
	2000	2005	2010
Population and Growth Rates			
Population (million)(BPS, 2012)	206	238 (2010)	245 (approximation of 2012)
Population, total annual growth rate (%) (Index Mundi, 2012)	1.04%		
Urban share (% of total) (GSO, 2010)	42.0	43.1	45.0
Urban annual growth rate (%) (GSO, 2010)	3.0		
Rural share (% of total) (GSO, 2010)	58.0	56.9	55.0
Rural annual growth rate (%) (GSO, 2010)			

Population and Growth Rates	Value	Note
Urban sanitation coverage access to toilet. Joint Monitoring Program (JMP) access, 2010 (%) (WHO – UNICEF, 2010)	73	83% if shared facilities included. Increased from 64% (not shared) in 2000
Urban access through sewerage connections (USAID,2006, WB Indonesia Sanitation Review, 2012)	About 1% of urban population	200,000 connections in 12 cities
Installed capacity of Wastewater Treatment Plants (WWTP) (MLD)-(USAID,2006, WB Indonesia Sanitation Review, 2012)	246	12 WWTPs
WWTP volume treated (MLD) - (USAID,2006, WB Indonesia Sanitation-Review, 2012)	115 (47% of the installed capacity)	12 WWTPs
Urban wastewater treated (%) - (USAID,2006, WB Indonesia Sanitation Review, 2012)	Approx 1%	
Proportion of systems that are combined waste water and drainage systems (%) –(WB Indonesia Sanitation Review, 2012)	10%	
Proportion of systems that are separate wastewater and drainage systems (%) (WB Indonesia Sanitation Review, 2012)	90%	
Urban proportion of septage treated (%) – (USAID,2010)	4%	Refers to proportion of septage treated, not that disposed of into sewers or waste-water treatment plants.
Urban water supply coverage, JMP access (%) (WHO – UNICEF, 2010)	92	
Share of urban population with 24/7 water supply (%) (WB Indonesia Sanitation Review, 2012)	>90%	in major urban centers
Share of urban water supply samples meeting water quality standards (%)	N.A	
Rural water supply coverage, JMP access (%)(WHO – UNICEF, 2010)	74	
Rural sanitation coverage, JMP access (%)(WHO – UNICEF, 2010)	39%	51% if shared facilities included.
2010 value, increased from 30% in 2000.		

Millennium Development Goal (MDG) Targets	Value	Note
MDG urban water supply target coverage (%) by 2015 (WHO – UNICEF, 2010)	75.3	Baseline 1993: 50.6% - 2009 – 49.8%
MDG urban sanitation target coverage (%) by 2015 (WHO – UNICEF, 2010)	76.8	Baseline 1993: 53.6% - 2009:69.5%
Infant mortality (per 1000 live birth) by 2015 (WHO – UNICEF, 2010)	23	Baseline 1991: 68 - 2007: 34

Financial Performance	Value	Note
Per capita GDP, 2011 (USD) – (World Bank data)	2,940	
Economic Growth Rate (%) – (World Bank data)	6.1%	
Poverty Rate (%) by 2012 (World Bank data)	12.5%	National poverty rate is the percentage of the population living below the national poverty line. National estimates are based on population-weighted subgroup estimates from household surveys
Poverty gap at USD2 a day (%) by 2010 (World Bank data)	14.3%	
Total annual water investments (USD million)		
Total annual sanitation sector investments (USD million) -2011 (USDP, 2012)	920	Annual sanitation investments from all sources increased from 420 million in 2010
Sanitation sector investments as percentage of GDP (%) – (USDP, 2010)	0.1%	
Representative WSS Tariffs (IDR per m^3) (WB Indonesia Sanitation Review Case Studies, 2012)	725 – 1,835	Tariff for household connection in Medan (the lowest) and DKI Jakarta (the highest)
Representative WWT Tariffs (IDR per m^3)- (USAID/ESP, 2004) (WB Indonesia Sanitation Review Case Studies, 2012)	500 – 7,500	
De-sludging fee (IDR per trip) (WB Indonesia Sanitation Review Case Studies, 2012)	250,000 – 500,000	Fee depends on distance
Non-Revenue Water (%)by 2010 - (WB Indonesia Sanitation Review Case Studies, 2012)	40%	
Typical CAPEX costs/capita of sewerage[51]	350-600	
Typical CAPEX costs/capita of decentralized wastewater treatment systems (DEWATS)	350-400	

[51] Based on the East Asia Urban Sanitation Review analysis using sources including USAID Study of Centralized Treatment Plants in Indonesia (2006), Wastewater Master Plans for eight cities in Indonesia, Indii (2010) and data gathered from field visits.

Annex 2: City Case Studies

The following cities were visited for this study: Medan, Surakarta, Palembang and Banjarmasin. Medan and Surakarta were chosen as pilot activities under an ongoing *Septage Management Study* under the USAID IUWASH Project. Palembang is one of eight cities where a Sewerage Master Plan was prepared under IndII and where a centralized sewerage system is currently in the process of detailed design. Banjarmasin has recently received grant assistance from IndII for the expansion of the sewerage system and has a successful operating PD PAL. Medan, Surakarta, and Banjarmasin all have existing sewer systems and should be able to provide useful insights on how wastewater systems are planned and managed in Indonesia. Palembang is known to have a well-managed PDAM, and the city has plans to develop a sewer system. All four cities have developed a City Sanitation Strategies (SSKs), and can provide insights into to how the Road Map for Accelerated Urban Sanitation is being implemented.

The Table below presents specific information on these urban centers.

TABLE A2.1: Overview of Select Urban Centers in Indonesia

City	Population (2009)	Location/Province	City Importance	Current Sanitation Situation	On-going Study
Medan	2,124,080	North Sumatera	Provincial capital, third largest city in the country, hub for western region	Has sewerage system built under ADB's Medan UDP, serving about 3% of city population	Septage study
Surakarta	529,059	Central Java	Medium size city, city with cultural heritage, second largest in Central Java after Semarang	Sewerage system exists, hertigaed from collonial period, expanded under WB's SSUDP	Septage study, ex-ISSDP
Palembang	1,442,529	South Sumatera	Provincial Capital, hub for southern Sumatera	No sewerage system	IndII-Master Plan, USDP
Banjarmasin	640,828	South Kalimantan	Provincial capital, city with many canals, close to the sea but not really coastal city	Has sewerage system built under WB's KUDP and expanded on its own, known for good performing PD PAL	ex-ISSDP

Annex 2.1 Case Study: Banjarmasin Municipality

MCKs in Banjarmasin

Population:	641,000
Number and type(s) of WWTPs:	6 completed, 1 planned for completion by 2013, all Rotating Bio-Contact systems. 26 SANIMAS systems
Percentage of households with some form of septic tank	55%
Number of sewer connections (2012):	10,000
Percent coverage with sewerage:	4%
Percent coverage with improved on-site or communal systems:	1%
Total sanitation coverage, 2012:	5%
Wastewater tariff collection rate:	30%
Piped water supply coverage (PDAM):	98%

The provincial capital of South Kalimantan Province, Banjarmasin is a flat, low-lying city at the confluence of the Barito and Martapura Rivers. Until 2000, the city had no sewer system and most of the population along the rivers disposed of wastewater directly into the rivers. In the late 1990s, the World Bank funded Kalimantan Urban Development Project provided a limited sewerage system through an investment of IDR50 billion

At the outset, Banjarmasin adopted a strategy to install and promote sewerage in the city center among commercial enterprises and high income households toimprove cost recovery.. Subsequently, the city's sewerage coverage expanded including a wider range of income groups, also in outlying areas of the city.

The sewer system and the treatment plant were managed by PDAM from 2000-2006, but by 2004,out of 3,000 PDAM customers only 200 households were connected. In 2007, it was decided to form a separate public enterprise for wastewater management (PD PAL). This approach also aimed at raising the profile of sanitation to become a higher priority among PDAM staff,who commonly saw their main focus as water supply. The key objectives for establishing the PD PAL were to attract competent and professional staff,maintain separate revenue and cost accounting for wastewater management, and to secure financing for sanitation that could not be diverted to other purposes. Its status as a public enterprise permits PD PAL to operate on commercial principles and raise professionalism by providing staff incentives. For example, PD PAL offers bonuses to its staff for each of the 1,000 connections installed.

The separation from PDAM was not complete as billing was still combined, with 25 percentof the water usage bill going to wastewater services. For households with sewer connections that did not have PDAM water connections, a flat monthly tariff was charged in line with the following schedule:

PDPAL Banjarmasin
Monthly sewer fee charged for customers without water connections

Customer category	Monthly sewer tariff (IDR)
Social services:	
Public services	5,000
Special social services (NGOs)	10,000
Non-commercial connections:	
Neighborhood Class A1	5,000
Neighborhood Class A2	10,000
Neighborhood Class A3	25,000
Neighborhood Class B	25,000
Commercial connections:	
Small-scale enterprise class I	5,000
Small-scale enterprise class II	20,000
Small-scale enterprise class III	35,000
Medium-scale enterprise	50,000
Large-scale enterprise	100,000
Industrial connections:	
Small-scale/neighbourhood industry	20,000
Medium-scale industry	30,000
Large scale and special industry	100,000
Market vendors:	
Micro-vendors (selling from buckets)	5,000
Table vendors	5,000
Kiosks	10,000
Stores	15,000
Grocers	20,000

PDPAL is currently able to recover its O&M costs but not the depreciation of assets. Tariffs are adequate but collection efficiency remains very low, at only about 30 percent.

Banjarmasin has benefited from strong political support for sanitation improvement and strong leadership within the PDAM and PDPAL. The Director of Wastewater Services within PDAM, who later became the director of PDPAL, is highly motivated and has a strong vision for the future of sanitation in Banjarmasin. The Mayor of Banjarmasin also is a strong advocate for sanitation, and has been a leading political figure in the promotion of implementing PPSP.

The main challenge to expanding the sanitation program in Banjarmasin is the relatively low demand. With flowing water bodies nearby and a long tradition of using them for waste disposal, demand and willingness to pay for sanitation improvements are low. Consequently, PDPAL has a very active public awareness program that includes childhood education, TV shows and advertisements, and web-based information. In addition to this, private enterprises through their Corporate Social Responsibility (CSR) programs are financing the construction of public rest rooms in tourism development areas, primarily along the riverfront. Banjarmasin was an early participant the preparation of the PPSP concept, and aSanitation Working Group (POKJA) was established already in 2006.

By the use of funds from national and local revenues, the Banjarmasin'sCity government started to promote PDPAL's service, financing a 'promotion' program, which in effect was a subsidy – to encourage households to connect. The promotion provides free connections and six months exemption from fee payments. After six months, the payment will revert to 25 percentof the water bill. By 2009,the total connections had increased to 3,000 (including 1,000 new connections in 2009 alone). The city currently has about 10,000 connections with anambitious plan to achieve 65,000 connections over the next five years.

PDPAL currently operates four treatment plants and sewer networks; it is planning to construct an additional three schemes by 2013. Current coverage of connections to the sewer network comprises about 4 percent of the population with about 1 percentcoverage with SANIMAS systems and improved household septic tanks. The city has a target of 50 percent coverage with adequate sanitation services by 2028. Local regulations now require all new housing developments to include sewer service and house connections rather than septic tanks.

For wastewater treatment, Banjarmasin has opted for rotating biological contact filters due to their relatively compact design, suitability for high water table areas, and low maintenance requirements. Because of the high water table and flat topography throughout the city, much of the sewer network lies below the water table. Construction quality is variable, and there is significant infiltration of groundwater, which increases volumetric loads at the treatment plants and reduces the capacity for treating pure wastewater. The INDII Project's Hibah Sanitasi output-based grant program is financing an expansion, upgrades to the sewer network to reduce groundwater inflows, and a vacuum system to augment flows within the network.

In addition, PDPAL operates a septic tank emptying service with *Dinas Kebersihan* that services all areas within the municipality that have not yet been reached by sewers. Fees charged for de-sludging are as follows:

PDPAL Banjarmasin
Septic Tank emptying fee schedule

Customer Category	Price per cubic meter	Minimum charge (IDR/2 M^3)
Business enterprises	IDR125,000	IDR300,000
Government Agencies	IDR125,000	IDR250,000
Private residences	IDR100,000	IDR200,000

The collected sludge is brought to PD PAL's treatment plants and is included in the sewage treatment process. A separate sludge treatment facility (IPLT) existsbut it is at a remote location next to the solid waste disposal site, and it is currently closed.

The SANIMAS Program has been implemented in Banjarmasin since 2006 by the Department of Human Settlements (*Dinas Cipta Karya*). Four to five schemes are constructed annually, primarily financed from the DAK Sanitasi. In total, 22 SANIMAS schemes have been completed to date, of which 18 are MCK+ and four are simplified sewer systems. Costs average about IDR300 million for MCK+ and IDR700 million for simplified sewer systems. Financing is provided by DAK, APBD, and about 30 percent APBN in 2012. SANIMAS is targeted at high density, low income areas near the rivers.

In addition, the Environment Department has constructed four MCK+ in public locations. Although referred to as SANIMAS, they differ in that they are not community-based. Sites are pre-determined by local government, primarily in or near markets and public housing. Facilitators then work with the community in the vicinity to organize local management of the facilities.

Annex 2.2 Case Study: Medan Municipality

MCK++ at Belawan (Medan)

Population:	2,125,000
Total annual growth rate	0.97% (BPS Medan)
Urban sanitation coverage (%)	94%
Urban on-site sanitation system (%)	90 % (BPS Medan)
Urban sewerage connections (%)	4%
Number and types of sewerage systems	One system: IPAL Cemara (Pulau Brayan);treatment capacity of 10,000 M3/day; used capacity of 5,650 m3/day; system Upflow Anaerobic Sludge Blanket (UASB) Reactor
Number of sewer connections	12,370 connections (serve 74,200 people)
Number and types of communal system	SANIMAS : 2,000 communal biofil septic tanks built by IUWASH (2012) plus 4,000 units (in 2013).
Numbers of WWTPs	One unit : IPLT Terjun is not functioning
Installed capacity of WWTP	10,000 M3/day
Sewerage system managed by:	PDAM Tirtanadi
Septage management by:	Dinas Kebersihan. Collected septage is discharged to IPAL Cemara.
Wastewater/sewerage tariff:	IDR22,000 (USD2.44)
Tariff collection rate:	96%

Medan, with a population exceeding two million people, is one of Indonesia's major cities, located on the flat coastal plain of Northwest Sumatra. A sewerage master plan was developed in the 1980s and a wastewater treatment plant was constructed in two phases in the early 1990s. The plant uses upflow anaerobic sludge blanket (UASB) technology. The long-term plan anticipated the construction of a series of UASBs with a total treatment capacity of 60,000 m^3/day. Only one UASB has been constructed thus far, with a capacity to treat about 10,000 m^3/day of wastewater, but a facultative pond has also been constructed that is sufficient for the planned 60,000m^3/day flow. The WWTP now receives about 18,000 m^3/day of sewage and the single UASB is unable to effectively treat this volume of wastewater. During the mission's site visit it was observed that there was insufficient retention time and the UASB was operating aerobically.

Currently, there are about 12,370 connections[52] to the sewer system covering less than 1 percent of the population. Motivation to connect to the system among households and commercial establishments has been low, in part because of their sunk investment in septic tanks. All connections established thus far have been provided free of charge.

The sewer system and WWTP is managed by the provincial water utility organization, PDAM TirtaNadi. Wastewater services for Medan and for a neighboring city (Parapat) are managed by a Wastewater Division under the Director for Planning and Production. Under PPSP, the PDAM plans to expand the sewer system and add 3,000 to 4,000 new connections from 2013 onward, with financing from the Hibah Sanitasi program and ADB's MSMH Project. PDAM has established a dedicated team for the sewerage expansion program, and is working in partnership with Malaysia's Indah Water Consortium implementing a marketing campaign to promote sewer house connections.

Like most cities in Indonesia, Medan currently relies almost entirely on septic tanks for wastewater treatment and there are an estimated 400,000 septic tanks in the metropolitan area. There is no effective regulation of their management such as for ensuring regular de-sludging and compliance witheffluent standards. The city cleansing department (*Dinas Kebersihan*) operates a small number of emptying trucks, and an unknown number of private operators also provide septic tank emptying services. A sludge treatment facility, operated by *Dinas Kebersihan*, was built adjacent to a solid waste landfill site on the outskirts of the city but the sludge treatment basins are damaged and affected by leachate from the landfill site. Therefore, the sludge treatment facility was closed some years ago. The sludge collected by *Dinas Kebersihan* is now treated at the IPAL Cemara. About 60 truckloads of sludge are delivered to the IPAL every month. It is estimated that provided that all of Medan's septic tanks were emptied every two years, this would result in over 200 truckloads per day of sludge being delivered for treatment. Almost all sludge is currently being disposed of illegally into rivers and streams.

USAID's IUWASH Project is supporting a sludge management pilot program in Medan, with a target to replace 4,000 malfunctioning septic tanks with improved biofilter tanks by 2014. As in other Indonesian cities, many areas are very densely populated without any structured urban planning. As a result, many householdscan only be reached by narrow pathways, which makes pit emptying by conventional suction trucks difficult or impossible. To address this, the IUWASH pilot project is adapting a sludge management model that was originally conceived by the NGO Mercycorps in Jakarta. Local sludge collection operators are selected by the community, then trained by IUWASH and provided with small de-sludging machines that can fit in narrow pathways. Collected sludge is then deposited in communal septic tanks and later removed by *Dinas Kebersihan* for final treatment at the IPLT. A local management group is formed that ensures that households make regular monthly payments for sanitation services covering the salary of the sludge collectors as well as the cost of sludge disposal by *Dinas Kebersihan*.

[52] Based on data from Ministry of Public Works: Centralized Wastewater Treatment Plant in Indonesia 2012.

Annex 2.3 Case Study: Surakarta Municipality

IPAL Mojosongo

Population:	501,000 (BPS Surakarta, 2011)
Total annual growth rate	0.46%
Urban on-site sanitation system (%)	Coverage of Households with septic tank will be decreased from 72.2 % (2007) to 70.56 % (2015)
Urban sewerage connections (%)	12.45%. MDGs target: 20% by 2015
Number and types of sewerage systems	Two systems: IPAL Mojosongo & IPAL Semanggi.
Plan: One system in Pucang Sawit (financed by DGCK and PDAM)	5%
Number of sewer connections	12.000
Number and types of communal system	SANIMAS system: 24 sites (by DAK & WASAP D) + 9 sites under-construction (by USRI)
Numbers of WWTPs	1 WWTP: Putri Cempo (not functioning)
Sewerage system managed by:	PDAM Kota Surakarta
Septage management by:	Dinas Kebersihan
Wastewater/sewerage tariff:	USD0.55 – USD0.77
Tariff collection rate:	30%
Piped water supply coverage (PDAM):	60%

Surakarta is the second largest city in Central Java Province, located some 600 km from Jakarta; it consists of five sub-districts and 51 villages, with an average density of 11,340 population/km2. The population in 2012 was 530,000 (equal to 122,462 households).

Surakarta city is one of the cities included in the ISSDP. Surakarta is located adjacent to the Bengawan Solo River, one of the largest rivers in Central Java Province. Many communitiy activities are carried out along this river, including open defecation practices directly or through toilets without any treatment processes (about 8 percent of the population). Initiatives have been undertaken by the Government of Surakarta to improve environmental health conditions in the region by constructing a sewerage system and the construction of a wastewatertreatment plant (WWTP). There are currently two sewerage systems, located in Mojosongo and Kemanggi, that were rehabilitated in 1990 with assistance from the World Bank. Both WWTPs are managed by PDAM Surakarta.

Access to improved sanitation coverage in Surakarta is more than 90 percent, and approximately 12.5 percent of households are served by a sewerage system that currently has a total of 12,000 connections. The Mojosongo WWTP is functioning well and treats 5,100 m^3/day of domestic wastewater, while WWTP Kemanggi treats about 4,300 m^3/day of wastewater. Approximately 80% of the population use septic tanks and communal systems.

The targets for sanitation coverage, as stated in Surakarta's Mid-Term Development Plan (RPJM) 2005-2010, will be difficult to achieve. The target is that 20 percent sanitation service coverage would be provided through the sewerage system. The target will be difficult to achieve due to the rapid population growth rate, lack of budget, absence of clear policies to implement sanitation management at the local level and institutional capacity.

SANIMAS is one of the main programs to help households gain access to improved sanitation coverage in Surakarta based on a communal system. 24 SANIMAS schemes had been built since 2005, which are financed from the Special Allocation Fund (DAK), WASAP D, and local government budgets. In the coming years, it is planned to build another 22 SANIMAS schemes.

Surakarta has one Septage Treatment Plant (STP) in Putri Cempo village, along with a solid waste disposal facility, managed by the Sanitary Office (*Dinas Kebersihan*). Recently, the plant has stopped operations since the road has been blocked by piles of garbage. This condition results in poor septage management and creates the risk of households illegally discharging septage into the environment.

Surakarta also does not have adequate policies for effective sanitation management. The current prevailing regulations are Surakarta Mayor Decree No. 5 of 2004 dated June 7, 2004 and Decree No. 10/DPRD/VI/2004 Surakarta City Council on June 7, 2004, regarding the Approval of Amendment of Surakarta Mayor Decree No. 15 Year 2002 on Determination of Wastewater Management Tariff and Wastewaster Customer Category. The fee collection rate is about 30 percent and focuses on those consumers that are connected to the water supply systems. At the present time, the cost to collect the fees for PDAM staff is higher than the revenues collected, making the operation of the sewerage system dependent on subsidies from PDAM and city government budget.

Monthly sewer fee charged for customers in Surakarta (IDR9.000 per USD)	
Customer Category	Monthly Sewer Tarriff (USD)
Household I	0.55
Household II	0.83
Commercial I	2.22
Commercial II	3.33
Industrial I	5.55
Industrial II	11.11

Annex 2.4 Case Study: Palembang Municipality

Settlements along the riverside

Population:	1,481,000
Total annual growth rate	1.76%
Urban sanitation coverage (%)	69%
Urban on-site sanitation system (%)	69% (only 30% of septic tanks are of solid construction and working properly)
Urban sewerage connections (%)	0%
Number and types of sewerage systems	5 housing estate sewerage systems
Number of sewer connections	559 connections
Number and types of communal system	Public Toilet: 69 units (DAK), 2 SANIMAS (DPW Province fund) + 7 SANIMAS (AusAID & Worldbank fund)
Numbers of WWTPs	One unit at Sukawinatan
Sewerage system managed by:	Housing estate authority
Septage management by:	Housing estate authority
Piped water supply coverage (PDAM):	80%

Palembang is located in a flat and mostly swampy area with a total area of 102.47 km^2; the average elevation is eight meters above mean sea level. Palembang is divided by the Musi River which is the largest in Sumatera.

Palembang does not have a centralised sewerage system due to its geographic constraints and the high groundwater level; also the swamps make it difficult to install stable pipe systems andto maintain a slope for gravity flow. However, decentralized systems in Palembang have been provided forfive new real estate areas where communal septic tanks equipped with absorption system are used. In 2009, a piped sewerage system was constructed by DGCK (PPLP is implemented by Provincial PIU) for 1.000 household connectionsbut no record is available on its current status.

The city constructed several communal septic tanks, mostly under the DAK budget and with 10percentAPBD counterpart funds. The land is usually voluntarily provided by the community. Under the community-based environmental sanitationprogram (sanitasi lingkungan berbasis masyarakat, SLBM), the City Council installed 69 units of communal toilets (MCK), between 2010 and 2012. In 2011, two SANIMAS schemes were constructed by the province with the land provided by the city.IndII has provided assistance to Kota Palembang in preparing a Wastewater Master Plan (2011); this is being followed up through the preparation of Detailed Engineering Design.

The city does not yet have adequate local regulations for the sanitation sector. This situation may weaken the environmental pollution control, especially since the Musi river is subject to pollution by domestic sewage. This raises concerns about public health and potentially water borne diseases, as the river is also used for domestic purposes, including bathing, washing clothes, washing dishes (user conflict). The city has regulations forthe management and fees for solid waste/sanitary service and septic tank de-sludging services; these regulations, however, in reality donot provide proper wastewater and septage management. Palembang does not have a septage treatment plant,and no official septage disposal facility. The tariffs for septage collection are as follows:

No	Septic Tank Size	Tariff (IDR)	Unit
1	0 – 3 m^3	200,000	Trip
2	3 – 6 m^3	300,000	Trip
3	6 – 9 m^3	400,000	Trip
4	> 9 m^3	500,000	Trip

Additional Cost for Out of Town (after the border)		
1	0 – 30 km	100,000
2	30 – 70 km	150,000
3	> 70 km	250,000

Tariff to Discharge the Septage to sPT (IPLT)			
1	1 – 1,500 Liter	50,000	Trip
2	1,500 – 3,000 Liter	100,000	Trip
3	3,000 – 5,000 Liter	150,000	Trip
4	> 5,000 Liter	200,000	Trip

References

Studies Completed until 2008

R 01	Water Supply and Environmental Sanitation Working Group, A Case Study of Aid Effectiveness in Indonesia, Final Draft #3, WSP-EAP, November 2008	Soft copy
R 02	Economic Impacts of Sanitation in Indonesia, A five-country study conducted in Cambodia, Indonesia, Lao PDR, the Philippines and Vietnam under the Economics of Sanitation Initiative (ESI), WSP-EAP Research Report, August 2008	Soft copy
R 03	Making Urban Sanitation Strategies of Six Indonesian Cities more Pro-poor and Gender-equitable: the case of ISSDP, A case study on social inclusion of SWITCH, May 2008	Soft copy
R04	Indonesia: Urban Water and Sanitation Improvement and Expansion Project (UWSIEP), Report on Sanitation Workshop, World Bank, April 2005	Soft copy

Studies Completed until 2009

R 05	Independent Evaluation of Australian Aid to Water Supply and Sanitation Service Delivery in East Timor and Indonesia, Working Paper 2: Indonesia, December 2009	Soft copy
R 06	Program Percepatan Sanitasi Permukiman (Sanitation Roadmap), POKJA Sanitasi , June 2009	Soft copy
R 07	Urban Sanitation in Indonesia: Planning for Progress, A Field Note, WSP, April 2009	Soft copy

Studies Completed until 2010

R 08	Proposed Loan and Technical Assistance Grants: Metropolitan Sanitation Management and Health Project, Report and Recommendation of the President to the Board of Directors, ADB, June 2010	Soft copy
R 09	Business Model for A Water District Septage Management program, Philippines Water Revolving Fund Support program, USAID, February 2010	Soft copy
R 10	A Rapid Assessment of Septage Management in Asia, Policies and Practices in India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand and Vietnam, USAID, January 2010	Soft copy

Studies Completed until 2011

R 11	Economic Assessment of Sanitation Interventions in Indonesia, A six-country study conducted in Cambodia, China, Indonesia, Lao PDR, the Philippines and Vietnam under the Economics of Sanitation Initiative (ESI), WSP, November 2011	Hard copy
R 12	Wastewater Investment of Sanitation Interventions in Indonesia, a six-country study conducted in Cambodia, China, Indonesia, Lao PDR, the Philippines and Vietnam under the Economic of Sanitation Initiative (ESI), WSP, November 2011	Soft copy
R 13	Wastewater Investment Master Plan Package III, Volume 5, Final Capacity Building Report – Cimahi, Activity W005, IndII, September 2011	Soft copy
R 14	Institutional Environmental Analysis: Surabaya, IndII Activity 216, Final Version, June 2011 (Hickling Corporation, project 80-403: Institutional Analysis in Three Cities)	Soft copy
R 15	Wastewater Investment Master Plan Package I: Surabaya, Final Capacity building Plan (LIDAP and FOPIP), IndII, June 2011 (Mott MacDonald)	Soft copy
R 16	Lessons in Urban Sanitation Development, Indonesia Sanitation Sector Development Program 2006-2010, WSP, May 2011	Soft copy
R 17	The Political Economy of Sanitation: how can we increase investment and improve service for the poor? Operational experiences from case studies in Brazil, India, Indonesia and Senegal, February 2011, WSP (full report and summary)	Hard copy

Studies Completed until 2012

R 18	Capacity Development Strategy, Final Report of the Sanitation Training and capacity Study, March 2012 (PT. Qipra Galang Kualita)	Soft copy
R 19	USDP Mid-term Review, The Embassy of the Kingdom of the Netherlands for Indonesia, January 2012	Soft copy

List of Other Publications

P 01	Community based sanitation (SANIMAS) in Indonesia	Power point presentation, MOPW, 2010
P 02	Improvement of Sanitation in Indonesia (Achieving in IYS and Next Step)	Power point presentation, MOPW, 2010
P 03	Report and Recommendation of the President to the Board of Directors	Project Report, ADB, 2010
P 04	Prakarsa Issue No 7 on Urban Sanitation	Journal, IndII, 2011
P 05	Presentation from the 2009 World Water Week in Stockholm	Power point presentation, WSP, 2009
P 06	Working Paper 2: Indonesia, Independent evaluation of Australian Aid to WSS Service Delivery in East Timor and Indonesia	Report, AusAID, 2009
P 07	Poor sanitation costs Indonesia over IDR58 trillion per year	Leaflet, WSP,
P 08	Planning for Urban sanitation in the Asian Context	Textbook, Gerald McManus,
P 09	Review of National Wastewater Management Options for Small Town in China	Textbook, MenahemLibhaber, 2010
P 10	The WATSAN National Working Group	Power point presentation, POKJA AMPL, 2011
P 11	It's Not a Private Matter Anymore!	Booklet, POKJA AMPL, 2007
P 12	Managing Transformation Sanitation Development in Indonesia 2006-2011	Power point presentation, BAPPENAS, 2012

THE WORLD BANK

Australian AID