MAKING URBAN SANITATION MORE INCLUSIVE IN PAPUA NEW GUINEA

DECEMBER 2020

ADB

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On the cover: Women and child in a province in Papua New Guinea (photo by ADB).

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PREFACE

ADB works with developing member country governments and utilities in the Pacific region to improve access to essential urban services including water supply and sanitation. In PNG, significant challenges remain in addressing sanitation services for the growing number of urban residents living in settlement and peri-urban areas. Poor access to sanitation undermines public health, constrains sustainable development and exacerbates hardship, particularly for women and girls.

This publication discusses various technical, institutional, and governance aspects surrounding sanitation in PNG, and identifies opportunities for government and stakeholders to make sanitation more inclusive. Recommendations are in-line with ADB's Livable Cities operational priority under Strategy 2030, and Sustainable Development Goal 6.2 to achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.

ACKNOWLEDGMENTS

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Children playing in a village

Photo by E. Galing

BACKGROUND

This publication summarizes the current status of urban sanitation in Papua New Guinea (PNG), highlighting the condition in informal settlements in Port Moresby and peri-urban communities in selected provincial towns. It discusses opportunities to make sanitation more inclusive through the introduction of an operational fecal sludge management (FSM) framework and offers lessons and practical recommendations for PNG government's action and sector stakeholders' support. The findings are drawn from the technical assistance (TA) support of the Asian Development Bank (ADB) to the water and sanitation sector in PNG since 2017, which has included surveys and studies in relation to the Water Supply Scheme for Tete Settlement Project (approved in 2019), the proposed Urban Water Supply and Sanitation Sector Project, and a small grant focused on FSM in urban settlements.

ADB Support to Citywide Inclusive Sanitation in the Pacific

ADB operates in 14 developing member countries (DMCs) in the Pacific region in planning and implementing investments to improve access to water and sanitation. Most Pacific DMCs are small, remote, and vulnerable to climate change and disaster-related shocks that make achieving sustainable and inclusive growth challenging. Pacific island countries' economies are constrained by small and isolated domestic markets, high costs of providing services, weak institutional capacity, and challenges in connectivity to regional and international markets. ADB provides TA support to DMCs to create and strengthen enabling environments in the design and implementation of water and sanitation projects, ensuring the success and sustainability of development assistance.

Under the Sanitation Financing Partnership Trust Fund,[1] ADB has partnered with the Bill & Melinda Gates Foundation[2] to improve knowledge, capacity, and awareness in DMCs on citywide inclusive sanitation (CWIS) principles. The TA is in line with Sustainable Development Goal 6.2 of achieving access to adequate and equitable sanitation solutions with special attention to the needs of women and girls and those in vulnerable situations. ADB's Strategy 2030 identified "making cities more livable" as one of its seven operational priorities to help DMCs build livable cities that are green, competitive, inclusive, and resilient.

[1] The Sanitation Financing Partnership Trust Fund follows a five-pillar approach comprising of grant investments, piloting innovative technologies, building capacity of water and wastewater operators, developing policies and standards, and improving institutional awareness. The grant facility will provide targeted support to facilitate investments in CWIS with the aim of increasing access to adequate and inclusive sanitation systems, to include sewered, non-sewered, centralized, and decentralized solutions for both urban and peri-urban areas.

[2] The Bill & Melinda Gates Foundation is working within strategic global partnerships to advance the CWIS framework and principles and to guide the reframing of urban sanitation strategies and investments, with a focus on equity, safety, and sustainability.

Group of children in Papua New Guinea

Photo by ADB

COUNTRY CONTEXT AND SECTOR PROGRESS

Papua New Guinea (PNG) has a population of around 9 million, of which around 13% live in urban areas. It ranks lowest in terms of water and sanitation access indicators among the 14 ADB Pacific DMCs. Since it makes up about two-thirds of the entire population of these 14 nations, PNG's poor access rates skew regional water and sanitation performance indicators downward. The UN's Joint Monitoring Program 2017 update showed a decline in access to improved sanitation facilities in PNG over the last 15 years, leaving 65% of the population still using unimproved sanitation facilities, also noting a large urban–rural discrepancy (Figure 1). The slow progress of urban sanitation in PNG over the last 15 years has provided only an additional 100,000 urban dwellers to access improved sanitation, failing to keep with the urban population growth of above half a million people.[3]

[3] World Health Organization–United Nations Children's Fund. 2017. *Joint Monitoring Programme for Water Supply, Sanitation and Hygiene.* https://washdata.org/. PNG has missed its Millennium Development Goal targets for water and sanitation and is not on track to meet its own national development targets of 70% access by 2030, and 100% access by 2050.

6 CLEAN WATER AND SANITATION

The shift from Millennium Development Goals (MDGs) to Sustainable Development Goals (SDGs) has essentially focused on achieving universal access and the elimination of inequalities. More importantly, the SDGs have introduced a new category of "safely managed" sanitation to measure the safe containment, emptying, transport, treatment and safe disposal of human excreta. Thus, the new SDG indicators require higher sanitation service standards, which in effect creates bigger challenges to the significant percentage of urban population in PNG currently using unimproved and basic sanitation services.

Figure 1: PNG SDG Sanitation Status (JMP 2017 update)

Sustainable Development Goal (SDG) Target 6.2

Definitions

No service (Open defecation)
Disposal of human feces in fields, forest bushes, open bodies of water, beaches or other open spaces or with solid waste

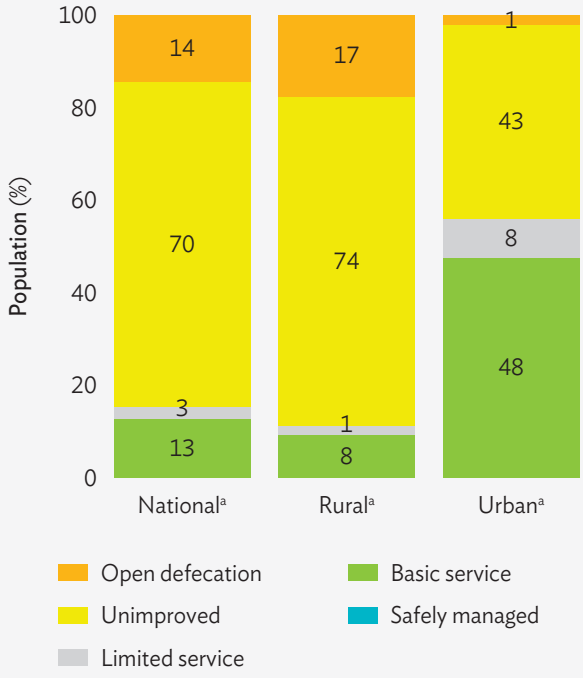
Unimproved service
Use of pit latrines without a slab or platform, hanging latrines and bucket latrines

Limited service
Use of improved facilities shared between two or more households

Basic service
Use of improved facilities which are not shared with other households

Safely managed
Use of improved facilities which are not shared with other households and where excreta are safely disposed in situ or transported and treated off-site

PNG Sanitation 2015



JMP = Joint Monitoring Programme, PNG = Papua New Guinea.

[a] No safely managed estimate available.

Notes: The JMP 2017 update report presents indicators and baseline estimates for the drinking water, sanitation, and hygiene targets within the Sustainable Development Goals (SDGs). The report introduces the indicators of safely managed drinking water and sanitation services, which go beyond use of improved facilities, to include consideration of the quality of services provided.

Source: World Health Organization–United Nations Children's Fund. 2017. *Joint Monitoring Programme for Water Supply, Sanitation and Hygiene.* https://washdata.org/.

Sector Policy and Strategy

The sanitation sector in PNG is governed by several policy frameworks and plans (Table 1).

Table 1: Sanitation Policy Frameworks and Plans in Papua New Guinea

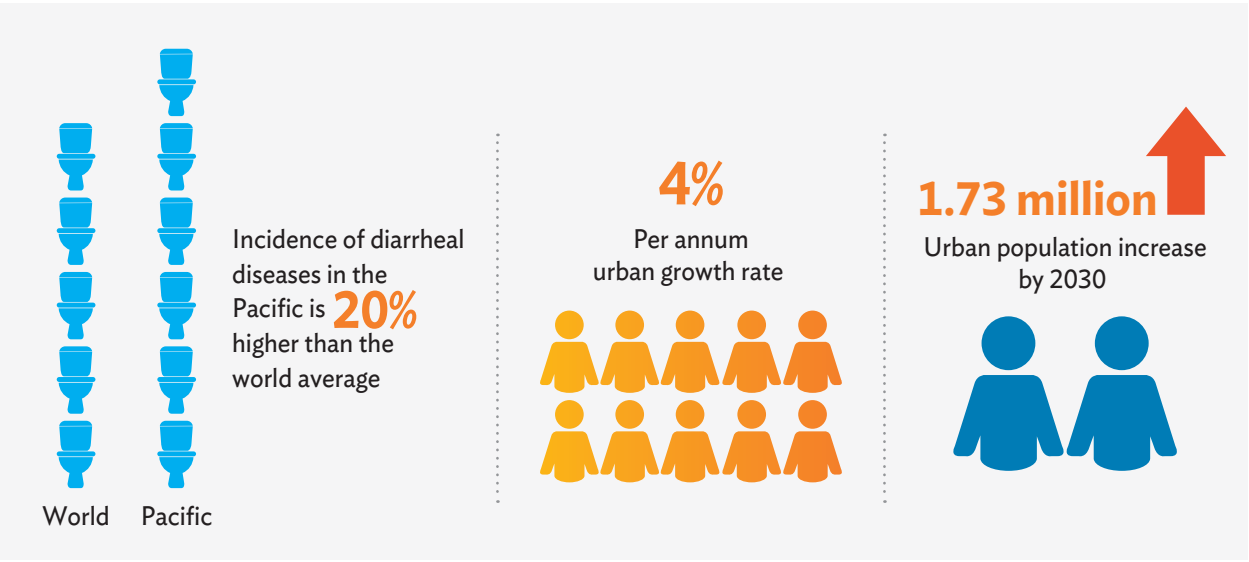
Policy Document	Year Published	
Vision 2050	2010	A visionary and comprehensive 40-year plan that commits to institutional strengthening, increased decentralized service delivery, recognition of PNG values and ways, and strong economic development. The vision links to development priorities promoting improved sanitation service delivery structure and monitoring framework.
National Strategy for Responsible Sustainable Development for PNG (StaRS) 2015–2030	2014	Embodies the country's long-term and sustainable development plan aimed at improving the ranking of PNG on the Human Development Index to 50th by 2050. Links sustainable development activities to clear budgets and monitoring progress against the Government of Papua New Guinea's key development objectives.
District Development Authorities Act	2014	Transforms the role of the former Joint District Planning and Budgeting Priority Committees through the creation of DDAs to further decentralize and improve sanitation service delivery, and to exercise local accountability and transparency.
National WASH Policy	2015	One of the pillars of StaRS, provides a framework to substantially improve access to water and sanitation services and to change hygiene behaviors, particularly to the underserved rural and peri-urban settlement areas. It aims to provide direction for planning, management, investments, and activities for all sector stakeholders in order to achieve its objectives and significantly improve services to meet set targets. The WASH Policy also provides for the establishment of a national statutory authority (NWSHA) to function as the sector apex body for policy implementation, regulation, coordination and systemization, monitoring and capacity building.[a]
National Water Supply and Sanitation Act	2016	Provides for the coordinated water supply and sanitation services and for the planning, design, construction, and management of the same systems in the country. Sanitation services covers conveyance, treatment, and proper disposal of sewage and wastewater.
Medium-Term Development Plan III (MTDP 2018–2022)	2017	The MTDP's Goal 7.4 seeks to improve access to safe drinking water, reliable and affordable sanitation, and hygiene facilities and has prioritized investments to upgrade the Port Moresby Sewerage System and sanitation and wastewater management in provincial and district towns.

DDA = District Development Authority, PNG = Papua New Guinea, WASH = water, sanitation, and hygiene.

[a] The National Water, Sanitation and Hygiene Authority (NWSHA) is proposed to set up subnational offices, to manage water, sanitation, and hygiene as a high priority development target for PNG. The Government of Papua New Guinea is underway in passing a legislation for NWSHA with its bill pending for presentation in Parliament since early 2019. The WASH Programme Management Unit under the Department of National Planning and Monitoring acts as the interim body that coordinates and implements the WASH Policy.

Source: Authors.

URBANIZATION CHALLENGE



The world is urbanizing at a rapid pace and the population living in cities is expected to increase by 50%, from 4 billion to 6 billion between 2016 and 2045.[4] Urbanization rates are increasing in all Pacific DMCs (except the Cook Islands and Samoa) as rural populations migrate to town centers and urban areas in search of better living standards and opportunities. However, the conditions in many of these urban centers contribute to public health risks, e.g., the incidence of diarrheal diseases was recorded to be 20% greater than the world average and over 4 times higher than in developed countries such as Australia and New Zealand.[5] The urban growth rate in PNG is predicted to reach 4% per annum in the next decade, and by 2030 the UN estimates that the urban population will increase to 1.73 million, accounting for 17% of the total population.[6] The Australian Department of Foreign Affairs and Trade reported in 2008 that, on the average, a new informal settlement was established annually between 2000 and 2011, with a population growth rate of 7.8% (twice that of Port Moresby overall).[7] Unplanned growth in cities puts pressure on formal utilities and service providers in meeting the demands for land and housing and provision for basic urban infrastructure and services like water, sanitation, wastewater, and solid waste management. These congestion forces, exacerbated by environmental pollution, undermine inclusive growth and hinder the potential creation of prosperous and livable cities.

[4] United Nations Department of Economic and Social Affairs. 2010. *World Urbanization Prospects: The 2010 Revision.* New York.

[5] World Health Organization. Diarrheal Disease Fact Sheet. http://www.who.int/mediacentre/factsheets/fs330/en/.

[6] United Nations Department of Economic and Social Affairs. 2010. *World Urbanization Prospects: The 2010 Revision.* New York. Anecdotally, the projected urban growth rate in Port Moresby could be as high as 10%.

[7] Australian Department of Foreign Affairs and Trade (formerly AusAID). 2008. *Making Land Work.* Canberra: AGPS Press.

▼ **Children playing in a village** (photo by E. Galing).

▼ **Urban settlement in Kerema, Papua New Guinea** (photo by K. Marshall).

▲ **Settlement in Kerema** (photo by K. Marshall).

Snapshot of Papua New Guinea Settlements

For decades, informal settlements have been an integral part of PNG's urban landscape. Port Moresby alone is home to at least 500,000 residents of which more than 50% is dispersed in 20 planned settlements and 79 unplanned settlements.[8] Informal settlements fall outside of the official city planning jurisdiction and are typically characterized by self-built houses without legal land tenure. Urban settlements in PNG are relatively low density, having clear separation from neighbors and defined boundaries.[9]

However, households in these low-income communities are overcrowded, having an average of 8–10 persons. With extended families, some households may even reach 30 people. Such high household density takes a toll in providing adequate levels of basic services like electricity, water supply, sanitation, drainage, and solid waste collection. Water utilities often have no obligation to provide services to informal settlements due to government's prohibitive policies that do not recognize households lacking land tenure as legitimate customers. Such regulations hinder efforts of service providers to expand or improve sanitation services to residents.

[8] United Nations Human Settlements Programme. 2012. *Papua New Guinea National Urban Profile.* Nairobi.

[9] World Bank Group. 2014. *Papua New Guinea: Sanitation, Water Supply and Hygiene in Urban Informal Settlements.* Washington, DC.

Traditional Systems Underlie Formal Institutions

Settlements in Port Moresby are composed of culturally diverse populations that influence community interaction and household behavior toward basic sanitation preferences. Attitudes like an objection to handling human excreta is dominant in the Melanesian culture, which in turn affects the acceptance of composting toilets and septage collection services. Currently, responsible agencies and service providers in PNG have no communication plans or tools for promoting appropriate sanitation technologies and services in many unserved informal settlement areas. The Department of Health has developed sanitation technical manuals while the Department of Works has produced sanitation promotion tools, but these materials will have to be updated and utilized for wider dissemination.

Customary leadership and traditional structures, as expressed in strong clan-based culture (wantok system) underlie the formal governance and institutional arrangement in PNG.[10] Government's intention to further decentralize service delivery has been hindered by political interference and corruption. Historically, weak governance and accountability at various administrative levels have led to inequitable distribution of resources and poor delivery of basic social services to the population.[11]

> "Pacific DMCs have universally lower rates of access to improved sanitation than to improved water supplies. Site constraints for building sanitation infrastructure often include insecure landownership, location of dwellings, land availability, water availability for toilet flushing and sewage conveyance, and susceptibility to flooding, tides, and high groundwater. Impacts of climate change—such as sea level rise, increased rainfall intensity, and storm surges—may place increased stress on existing sanitation infrastructure in many towns."
>
> (ADB Pacific Urban Update 2016)

[10] S. Larcom. 2016. Natural Resource Contests and Precolonial Institutions in Papua New Guinea. *Journal of Agrarian Change.* 17(3). pp. 612–629.

[11] G. Walton. 2019. Governance and Corruption in PNG's Public Service: Insights from Four Subnational Administrations. *Development Policy Centre Discussion Paper* No. 81. Crawford School of Public Policy, The Australian National University, Canberra.

Box 1: Landownership in Papua New Guinea

About 97% of all land in Papua New Guinea (PNG) is under customary ownership and only 2% is government or state-owned. Much of the state-owned land is abandoned or underdeveloped, eventually occupied by informal settlers. Government has no jurisdiction over customary land, and it is not subject to planning and development controls. Across PNG there is the notion of the "inalienability" of land tenure: people are custodians of the land for future generations and as such land cannot be voluntarily and permanently assigned outside of one's own group.[a] This has led to customary landowners contesting the legitimacy of land exchanges, for example, for natural resource exploitation, arguing they have been denied their birth rights.[a] In precolonial times, there were individual land use rights, but control rights were held collectively and could not be transferred outside the group.

Most of the informal settlements in urban and peri-urban areas are on customary land held by traditional landowners without formal registered title. Customary land cannot be bought or sold, with the exception of long and complex procedures, some involving explicit arrangements with traditional landowners to agree to lease or sell. However, the informal nature of these land dealings and settlement is prone to conflict. In Port Moresby, land is constantly sold, bought, and rented without prior knowledge and approval of the state or traditional landowners, and without going through formal process to document land title.[b]

[a] S. Larcom. 2016. Natural Resource Contests and Precolonial Institutions in Papua New Guinea. *Journal of Agrarian Change.* 17(3). pp. 612–629.

[b] NCDC. 2006. National Capital District Settlements Strategic Plan 2007–2011. Port Moresby: NCDC Strategic Planning, Regulatory Services.

Source: Authors.

Inadequate Sanitation Services in Informal Settlements

▲ **Toilet superstructures in Kerema (left and right)** (photos by K. Marshall).

Between 2017 and 2019, WASH Household Surveys in settlements were carried out with ADB support in Tete settlement (Port Moresby), Vanimo (West Sepik Province), and Kerema (Gulf Province).

The surveys were designed to establish WASH baseline conditions in settlement areas and to inform the design of future WASH interventions that maximize the benefits of planned water and sewerage improvements (Table 2).

Table 2: Key Findings from Household WASH Surveys

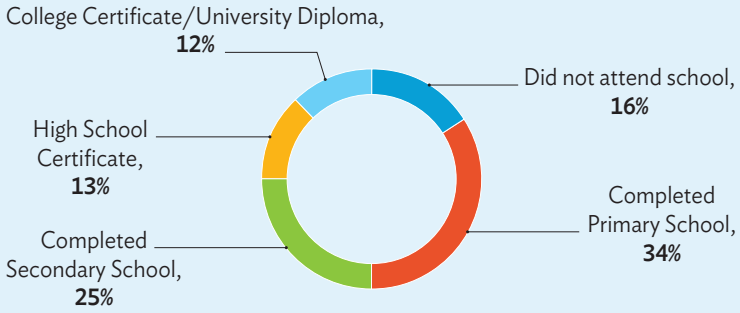
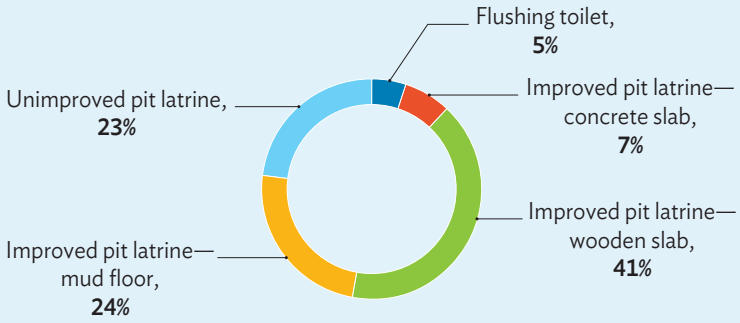
Tete Settlement, Port Moresby	
Survey size	 (152 HHs)
Estimated settlement population	8,000 people
Average HH size	8 people
Housing quality	Mix of permanent and semi-permanent
Perceived ownership of land and house	90% (tenants)
Female education	
HH weekly income <K100 (<$29)	25%
Water supply service	1 Eda Ranu communal standpipe intermittently serving entire community; people also collect water from other sources
Payment for improved water service	80% already pay average of K25 ($7.25)/week per household, but not to the utility
Sanitation condition	96% access to toilet, 1% practice OD 

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Table 2: ***Continued***

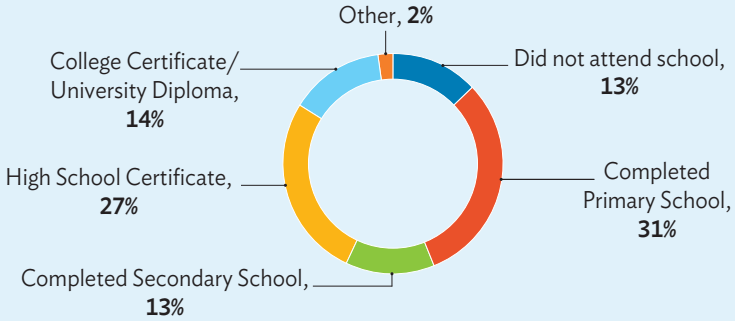
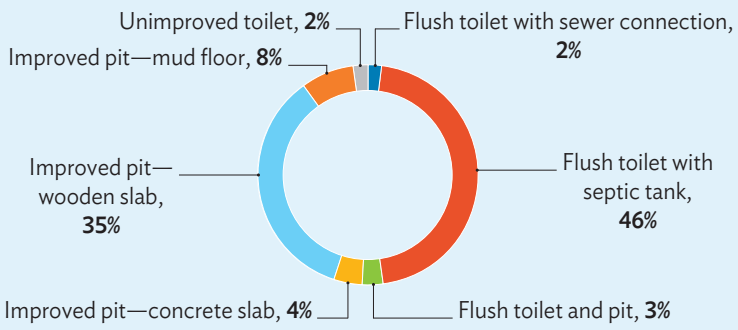
Kerema, Gulf Province	
Survey size	 (383 HHs)
Estimated settlement population	6,500 people
Average HH size	7.3 people
Housing quality	Mix of permanent and semi-permanent
Perceived ownership of land and house	61%
Female education	
HH weekly income <K100 (<$29)	29%
Water supply service	Rainwater primary source, complemented by open dug wells, springs and WPNG borehole
Payment for improved water service	31.6% willing to pay K10 ($3)/month for clustered service
Sanitation condition	70% access to basic toilet, 18% practice OD 

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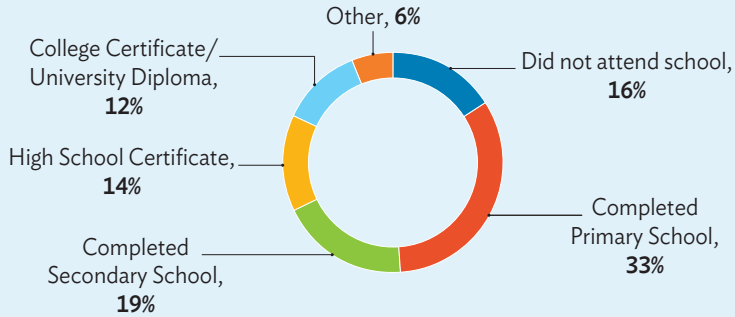
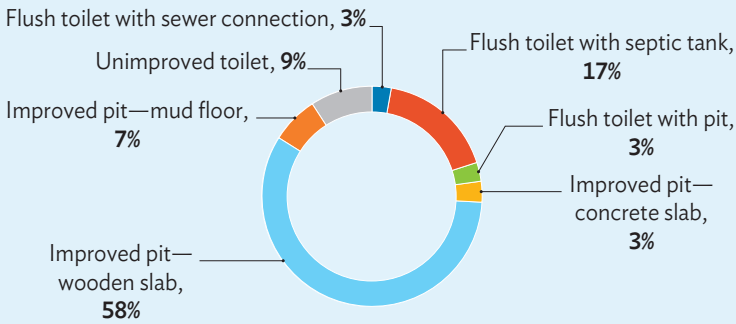
Table 2: *Continued*

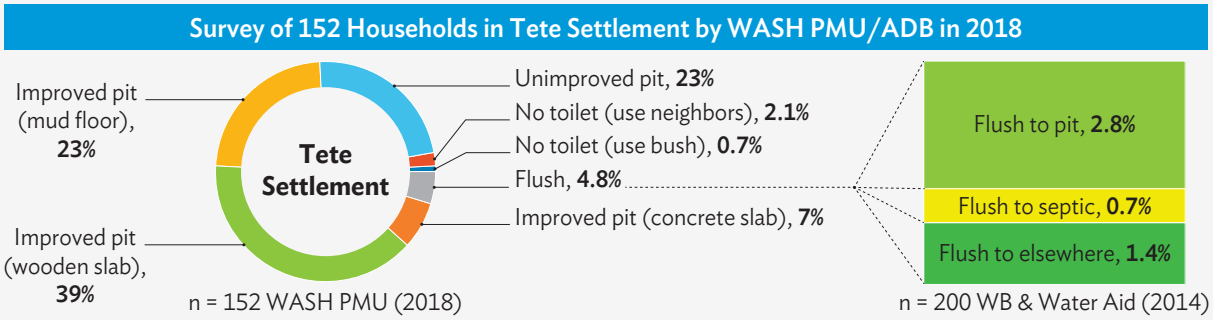
Vanimo, West Sepik Province	
Survey size	 (344 HHs)
Estimated settlement population	11,000 people
Average HH size	7.1 people
Housing quality	Mix of permanent and semi-permanent
Perceived ownership of land and house	52%
Female education	
HH weekly income <K100 (<$29)	40%
Water supply service	Rainwater primary source, complemented by open dug wells and springs
Payment for improved water service	51.7% willing to pay K20 ($5.80)/week for clustered service
Sanitation condition	80% access to basic toilet, 20% practice OD 

$ = United States dollars, HH = household, K = Papua New Guinea kina, OD = open defecation, WASH = water, sanitation, and hygiene, WPNG = Water PNG.

Note: $1 = K3.42 (as of March 2020 rate).

Source: Authors.

Figure 2: Distribution of Latrine Types in Tete Settlement



PMU = Project Management Unit, WASH = water, sanitation, and hygiene, WB = World Bank.

Source: ADB.

Tete Settlement is made up of about 1,000 households that are living in a mix of permanent and semi-permanent structures.[12] While 90% of the respondents claim to own the land (though it is state land), eviction by government remains to be a serious threat to almost half of the residents. Lack of land tenure has reduced the willingness of residents to upgrade their houses and improve their living conditions. The entire population relies only on a single communal standpipe that operates intermittently as a primary source for water supply. Handwashing facilities are rare and infant feces are not managed well (Figure 2).

Kerema and Vanimo Settlements. Similar tenure conditions describe the informal peri-urban town settlements in Kerema and Vanimo, where 40% of settlers do not pay rent to the traditional owners of the land. Complementary water sources (rainwater tanks, open dug wells, and springs) are common; however, the overall water quality is not safe for drinking. Sanitation and hygiene facilities are commonly substandard, which explains the high incidence of waterborne diseases and related illnesses. A majority of the households in the settlements have functional on-site facilities located within their yard but are unsafe and of poor quality.

Box 2: Insights on Payment for Water, Sanitation, and Hygiene Services

Behavior toward payment for water services differ across the surveyed settlements. In Tete, households spend an average of K100 ($29) per month on water sourced from multiple sources. This contrasts to the provincial towns of Kerema and Vanimo, where settlement communities get their water supply for free from rainwater, springs, and dug wells. A willingness-to-pay survey confirms that Kerema and Vanimo residents would pay K10–K50 ($3.00–$14.50) per month for water provided that current levels of service (availability and quality of water) are improved. In Tete settlement, reliance on a community management approach (i.e., water committees) to fees collection has not worked well in the past and is deemed to be challenging in the future. The history of mistrust among settlement residents and corruption by local administrators point to households' preference for paying directly to Eda Ranu. This baseline information can guide Eda Ranu and the National Capital District Commission in proactively finding solutions in providing water, sanitation, and hygiene (WASH) services to settlement residents and developing a system that promotes reliable water services and encourages settlement residents to pay for water.

Source: Authors.

[12] ADB. 2018. *Voice, Choice, and Babies' Poop: A WASH Household Survey of Tete Settlement in Port Moresby, Papua New Guinea.* Consultant's report. Manila (TA 49454-PNG).

Box 3: Addressing the Gender Gap in Papua New Guinea

Lack of clean water and inadequate sanitation facilities are among the leading causes of morbidity among children through diarrhea and other waterborne diseases, while poor water, sanitation, and hygiene (WASH) in schools impacts school attendance particularly for girls and female teachers. Women would greatly benefit from improvements in water and sanitation facilities coupled with awareness-raising on good hygiene practices. Women lose more productive time than men in collecting water. Their role in looking after children and the elderly is further challenged by the lack of safely managed water and sanitation facilities. The lack of adequate washing facilities and decent toilets has negatively impacted menstrual hygiene in these communities. Improper disposal of sanitary pads or cloths, which are often dumped in the toilet or burned, add up to unhygienic environment. Many women using outdoor washing facilities or dilapidated toilets have their privacy compromised. Improved access to water may also improve security for women, with 11% of females in Papua New Guinea reporting that security concerns affect their willingness to walk to fetch water (compared to 4% of males).[a]

[a] Government of Papua New Guinea, National Statistics Office. 2010. *Household Income and Expenditure Survey 2009–2010.* Waigani.

Source: Authors.

▲ **Women collecting water in Tete settlement, Port Moresby** (photo by K. Marshall).

PNG's National WASH Policy emphasizes women's contributions in the provision and management of household water. Fundamental policy principles explicitly state that *"The significant role that women and girls play in the provision and management of household water and in promoting improved hygiene and sanitation practices is recognized. The different gender roles and needs of men and women must be considered when planning, implementing and monitoring WASH strategies, programs and projects. WASH activities will take into account the specific requirements of disadvantaged and marginalized groups, including the very poor, women, infants and children, the elderly people with disabilities."*

Government of Papua New Guinea, Department of National Planning and Monitoring. 2015. *National Water, Sanitation and Hygiene (WASH) Policy 2015–2030.* Port Moresby.

Strategy 2030, the long-term strategic framework of ADB, highlights accelerating progress in gender equality as one of the seven operational priorities for achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific. ADB will support targeted operations to empower women and girls, gender mainstreaming that directly narrows gender gaps, and operations with some gender elements that incorporate a few gender equality actions in the design and implementation of ADB projects and programs. At least 75% of the number of ADB's committed operations (on a 3-year rolling average, including sovereign and nonsovereign operations) will promote gender equality by 2030.

▲ **Settlement housing in Kerema** (photo by K. Marshall).

▲ **House in Tete settlement, Port Moresby** (photo by K. Marshall).

Box 4: Threat of Climate Change and Natural Disasters in Papua New Guinea

Papua New Guinea (PNG) is vulnerable to the effects of climate change and severe geohazards like droughts, floods, storm surges, earthquakes, landslides, and sea level rise. Droughts are increasingly affecting both urban and rural communities as water sources are increasingly becoming vulnerable to the negative effects of El Niño events. Flooding in the highlands region is experienced during the monsoons, where average rainfall can reach 10,000 millimeters. In the lowlands, heavy erosion and sedimentation have taken its toll on agricultural productivity and downstream settlements. The 7.5-magnitude earthquake in February 2018 left 160 people dead and with over 50,000 people displaced, affecting over half a million people in the provinces of Hela and Southern Highlands.[a] These natural disasters have the potential to disrupt and paralyze delivery of basic social services as critical water and sanitation infrastructure is damaged, further diverting resources away from service upgrade or connecting the unserved to emergency disaster response and reconstruction efforts.

To help mitigate climate and natural disaster impacts in PNG, government and local authorities need to practice integrated water resources management principles to secure water resources and protect essential services to operate water supply, on-site sanitation systems, and sewage treatment. Efforts to increase disaster resilience can include integration of disaster risk management and climate change adaptation actions in national policy frameworks and institutional arrangements. Utilities and communities need to work together in developing appropriate sanitation infrastructure systems that are able to withstand more extreme weather events such as severe droughts, cyclones of greater intensity bringing catastrophic floods, and more tidal inundation during high tide events. Public awareness and behavior change communication campaigns to inform consumers on drought management strategies, water conservation, and disaster preparedness are essential soft interventions for communities to adapt and be more resilient to the impacts of climate change.

[a] H. Davidson. 2018. Papua New Guinea Earthquake: Death Toll Rises as Disease Threat Grows. *Guardian*, 14 March. https://www.theguardian.com/world/2018/mar/15/papua-new-guineaearthquake-death-toll-rises-disease-threat-grows.

Source: Authors.

Women colleting water in Tete settlement, Port Moresby

Photo by K. Marshall

FECAL SLUDGE MANAGEMENT DEMAND AND SUPPLY ANALYSIS

ADB has been supporting diagnostic and awareness-raising activities on fecal sludge management (FSM) in Papua New Guinea (PNG), with the long-term goal of developing an operational framework within the broader context of inclusive urban sanitation. The support has focused on the effective management of fecal sludge in unplanned settlements and how citywide sanitation service chain components can be organized by authorities and service providers to improve living conditions and dignity of settlement populations, and improve environmental health. In growing urban centers like Port Moresby, where informal settlements are a permanent feature of the urban landscape and sewerage coverage is low, improving FSM is a "no regret" action. While FSM may not be an immediate priority in smaller cities and towns, urbanization rates nationwide are growing, and the sanitation service chain thus becoming increasingly relevant.

The **broad objective of FSM** is to ensure that fecal material collected from on-site and decentralized sanitation facilities is handled in a way that protects both public health and the environment. The objective of treatment is to convert potentially harmful fecal sludge and septage into inoffensive products prior to disposal into the environment, or in some cases converted into reusable products.[13]

The Sanitation Service Chain (Figure 3) sets out the interlinked steps required to deliver inclusive urban sanitation. For sewerage systems, the emptying and transport functions are combined through a piped sewer network, while on-site systems are emptied by a combination of mechanical or manual excavation, with the septage being transported to treatment facilities by road. This service chain is adopted as an operational framework for analyzing how fecal waste is physically captured, contained, and then transported for treatment and disposal in urban and peri-urban communities.

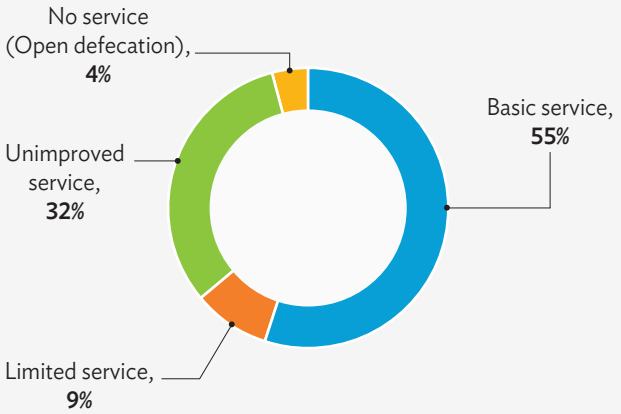
Figure 3: The Sanitation Service Chain

Source: Adapted from Bill & Melinda Gates Foundation (BMGF). 2015. Building demand for sanitation—a 2015 portfolio update and overview—Water, sanitation, and hygiene strategy. June. BMGF, Seattle, Washington, United States.

[13] K. Tayler. 2018. *Fecal Sludge and Septage Treatment: A Guide for Low- and Middle-Income Countries.* Rugby, Warwickshire, UK: Practical Action Publishing Ltd.

Mapping Fecal Waste Flow in Urban Areas

Figure 4: Urban Sanitation Access Rate in Papua New Guinea, 2015



Source: UN JMP from World Health Organization–United Nations Children's Fund. 2015. *Joint Monitoring Programme for Water Supply, Sanitation and Hygiene*.

The 2015 JMP report estimates that 4% of the urban population have no access to a sanitation service (practice open defecation), 32% have access to an unimproved sanitation service (utilize unimproved facilities), 9% have access to a limited sanitation service (utilize an improved sanitation facility but shared by two or more households), and 55% have access to a basic service (household accessing their own improved sanitation facility). The recent FSM study by ADB in Port Moresby projects that of the 55% of the population within Port Moresby accessing a basic sanitation service, it is estimated that 20% utilize flush toilets connected to sewers, another 21% use flush toilets connected to septic tanks, while the remaining 9% use improved dry pits and 5% use other forms of containment (i.e., bucket latrines).

Breakdown of Basic Sanitation Service in Urban Papua New Guinea (55%)

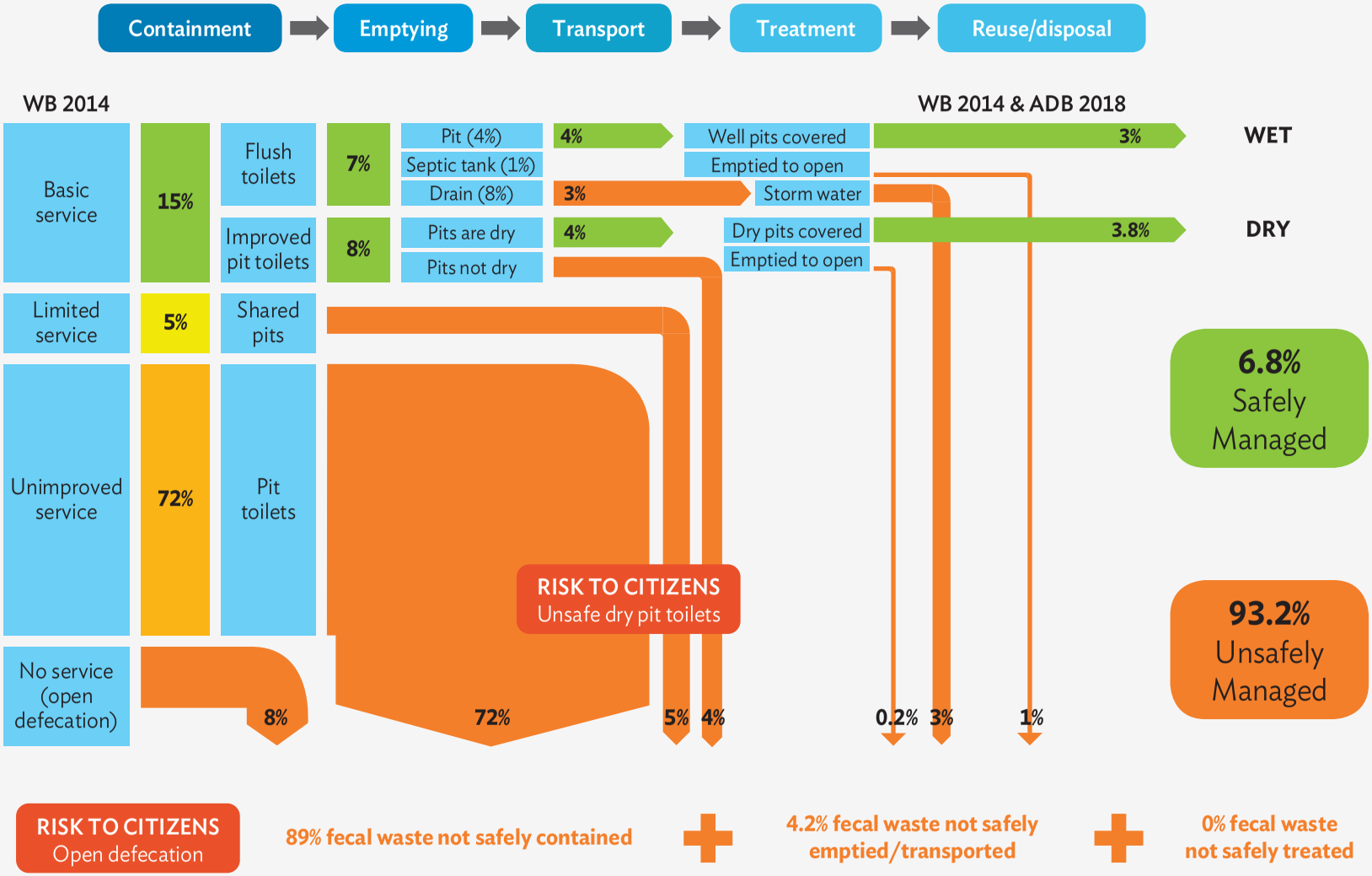
A study supported by ADB assessed the flow of fecal waste specifically in the **informal settlements of Port Moresby** using previous data from a World Bank study and combining it with the recent Tete Settlement survey results. It estimated that 8% of informal settlements have no access to a sanitation service (defecate in the open, in a bag, or a drain), 72% have access to an unimproved sanitation service, 5% have access to a limited sanitation service (improved but shared facility), and 15% have access to a basic sanitation service (improved facility).[14]

Only 6.8% of the urban population residing in informal settlements can be considered to have access to a "safely managed" sanitation service.

Only 6.8% of the urban population residing in informal settlements can be considered to have access to a "safely managed" sanitation service. Major risks in settlements occur where there is unsafe containment of fecal waste, noting that 89% of the population are using dry and wet pits. A further risk is exposure to unsafe emptying and transportation of wastewater, with 4.2% of the population using flush toilets.

[14] ADB. 2018. *Fecal Sludge Management in Port Moresby*. Consultant's report. Manila (TA 49454-PNG).

Figure 5: Fecal Waste Flow Diagram in Papua New Guinea Settlement Areas (ADB 2018)



ADB = Asian Development Bank, WB = World Bank.

Source: UN JMP from World Bank Group. 2014. *Papua New Guinea: Sanitation, Water Supply and Hygiene in Urban Informal Settlements.* Washington, DC.

Understanding the Fecal Sludge Management Market in Port Moresby

45%
reside in informal settlements

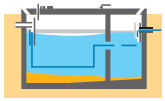
An estimated 45% of the population of Port Moresby reside in informal settlements. Very few settlement households have individual piped water connections, reducing the likelihood of the use of flush toilets. Most households rely on pit latrines while a few depend on public toilets connected to septic tanks or storm water drains. The quality of fecal containment within dry pit toilets is poor due to ineffective or no pit lining and exacerbated by hydrogeological conditions (e.g., high water table). The quality of fecal containment within dry pit toilets is extremely poor and emptying of dry pit latrines in PNG is rare.

10%
of rely on septic tanks

Port Moresby is less dependent on septic tanks compared to the rest of the country. Only 10% of the households in the capital rely on septic tanks as compared to **21% nationally**, mainly due to sewerage network coverage in the capital. While septic tanks are commonly used for containment of fecal waste, its treatment efficiency is diminished where there are poorly designed leach drains and irregular desludging, both common in PNG.

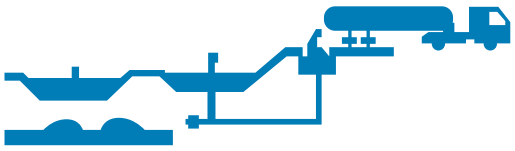
8
privately operated

75–150
emptied per week



Neither Eda Ranu nor Water PNG offer desludging services and only a handful of private companies provide the service with a combined fleet of 8 tanker trucks, ranging from 3 to 4 cubic meters capacity. Collectively, these desludging entrepreneurs empty a maximum of 75 septic tanks per week during the dry season and 150 septic tanks per week in the wet season. **Over half of the septic tanks are never emptied because they are not filling-up**, indicating that they are not functioning as effective containment and primary treatment facilities. The relatively higher demand for desludging during wet months suggests that tanks are collecting stormwater and excessive gray water. Overall, these technical and operational deficiencies will have to be corrected, including raising household awareness on the importance and benefits of FSM services.

?
operators tipping at STP



It is uncertain how many septage haulers are actually tipping fecal waste at Eda Ranu-operated sewage treatment. The risk of dumping untreated septage directly into the environment is relatively high in the absence of a manifest and registration system governing sludge tanker operations. Appropriate regulation will need to be developed and enforced to carefully track the flow of septage from collection to treatment, including but not limited to the efficient operation and maintenance of sewage treatment plants.

FSM = fecal sludge management, HHs = households, PNG = Papua New Guinea, STP = sewage treatment plants.
Source: Authors.

Woman at her home in Vanimo

Photo by K. Marshall

◀ **Stakeholder discussion in Port Moresby** (photo by E. Galing).

SERVICE DELIVERY ASSESSMENT

The National WASH Policy sets out a clear framework for the implementation of sustainable WASH services with a statement on broad roles and responsibilities for all key WASH stakeholders and partners. Improved coordination between the key implementation partners, government, and donor agencies around the WASH policy has been a significant achievement by the Government of Papua New Guinea. Sector coordination has aimed to address the risk of institutional fragmentation caused by multiple overlapping initiatives working within an institutional framework that is poorly defined and with agencies which have limited capacity.

The responsibilities for the safe management of sanitation are yet to be agreed and approved by key government agencies as proposed in the current National Water, Sanitation and Hygiene Authority (NWSHA) legislation. Given the complex nature of these arrangements and the lack of clarity on institutional roles and responsibilities, the proposed operational FSM framework will have to strengthen the current enabling environment to promote respective mandates of relevant authorities and incentivize the participation of service providers.

▶ **Stakeholder discussion in Bialla** (photo by E. Galing).

Figure 6: Institutional Landscape for Fecal Sludge Management

NATIONAL

Department of National Planning and Monitoring

DNPM

- Leads policy coordination and development planning
- Implementation of National WASH Policy
- Overall sector oversight via the WASH PMU
- Responsible for urban, peri-urban, and rural sanitation planning and development, including FSM

Department of Works

DOW

- Development and enforcement of national building and infrastructure standards
- Construction of sanitation facilities and training of builders and plumbers

Department of Agriculture and Livestock

DAL

- Development of organic fertilizer standards and approval process to ensure fecal waste safety for commercial use as fertilizer

Department of Health

DOH

- Policy and standards development on environmental health
- Issuance of public health regulations and sanitation standards on toilet and septic tanks, drains, sewer, and wastewater

Department of Environment and Conservation

DEC

- Development and enforcement of environmental policies and regulations, including fecal waste and wastewater discharges
- Mandated by the Conservation & Environmental Protection Authority (CEPA) Act, responsible for environmental protection, issuance of clearances and licenses on wastewater discharges

Provincial / Local Level Government

PA Provincial Administrations

LLG Local Level Government

- LLGs are responsible for water supply and sanitation and have joint responsibility with provincial administration for roads, waste disposal, health and environmental protection, economic promotion, and tourism

National Capital District Committee

NCDC

Service Level

Eda Ranu

- Mandated under the NCDC Act, responsible for planning, design, construction, management, and tariff charges on water supply and sewerage in Port Moresby

Water PNG

- Mandated under the National Water and Sewerage Act, responsible for planning, design, construction, management, and tariff charges on water supply and sewerage in provincial and district town centers

Septic Sludge Operators

- Provide desludging and transport services for households and institutional on-site sanitation facilities on commercial basis

DDA = District Development Authority, FSM = fecal sludge management, HHs = households, PMU = Project Management Unit, WASH = water, sanitation, and hygiene.

Source: Authors.

Department of Provincial and Local Government Affairs

DPLGA

- Mandated by the Organic Law on Provincial Governments and Local Level Governments to have statutory responsibility for all matters relating to local governance
- Oversight on the execution of functions by provincial administrations and LLGs delivery of basic services, primarily water and sanitation

Department of Lands and Physical Planning

DLPP

- Mandated under the Physical Planning Act, responsible for physical planning regulation
- Development and implementation of urbanization policy, land use, and land development
- Leads preparation of spatial zoning plans and infrastructure masterplans
- Mandatory acquisition of customary land for the state in urban areas

- Ensure compliance with environmental health standards by residents and tenants
- Responsible for the design and construction of infrastructure in Port Moresby
- Physical planning and development control, including regulation of services (i.e., trade licenses)

HHs

- Generation of fecal sludge and domestic wastewater for proper management
- Customers of FSM services

REFORM ACTIONS

Pursue legislation and establishment of the National Water, Sanitation and Hygiene Authority (NWSHA) to serve as sector apex body

Scale up capacity building of local environment health workers to implement public health regulations on sanitation

Strengthen FSM planning, budget, and expenditure through DDA structure and system, aligned with provincial plans

Strengthen regulatory function and compliance monitoring during construction and operation of sanitation and wastewater treatment facilities

Develop sanitation maps with spatial dimension to improve FSM service delivery; support provincial lands division to acquire and allocate state lands

Strengthen awareness and exercise of FSM responsibility; issuance of building permits for on-site sanitary facilities; improve coordination with utilities

Improve regulatory oversight by authorities and utilities on the technical and operational quality of services provided by private operators

Settlement homes in Kerema

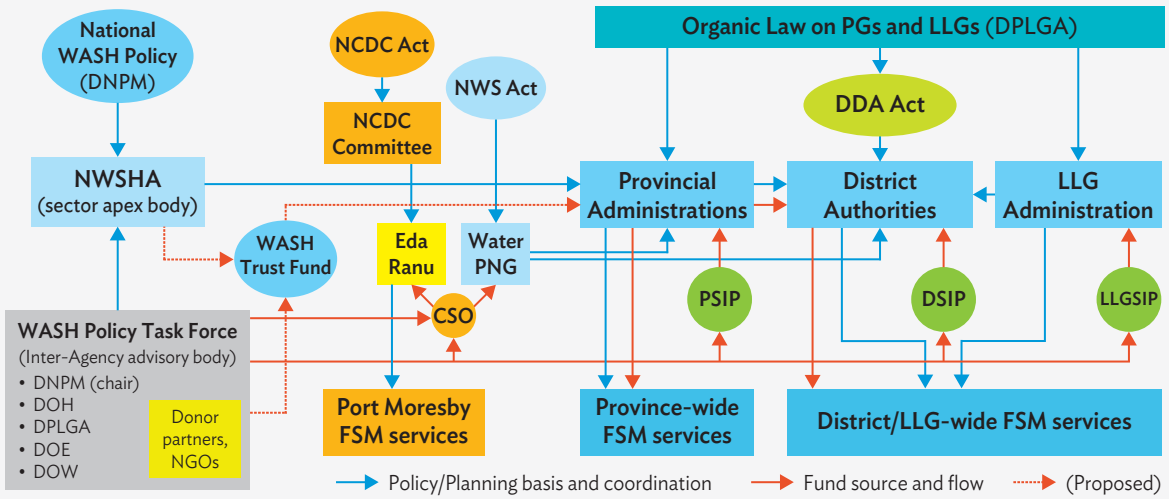
Photo by K. Marshall

Decentralized Service Delivery through District Development Authorities

Responsibility for providing water and sanitation services at the subnational level has evolved with the creation of the district development authorities (DDAs) in 2014 through amendments to the Organic Law on Provincial Government and Local Level Governments 1995.[15] Districts remain as administrative service delivery units of provincial governments but now have significantly expanded roles in planning, resourcing, supporting, and monitoring improved service delivery. A major change has been to replace the former Joint District Planning and Budget Priorities Committees and to give DDAs greater powers to make decisions about resourcing service delivery in the local level government areas which comprise each district. DDAs are deemed to have a critical role in driving service delivery for water and sanitation in the context of the government's decentralization goals set out in the Medium-Term Development Plan 2 2016–2017 (MTDP 2). The service delivery framework under the plan is intended to improve service delivery across the 89 districts and 320 local level government areas, many of which host low-income settlements in remote areas of PNG.

The **District Development Authority** is a possible mechanism for supporting provincial and local level governments to improve their FSM service delivery. The Community Service Obligation (CSO) Policy is intended to incentivize Eda Ranu and Water PNG to service unprofitable areas by providing government funding to cover the utilities' revenue gaps in providing services in mandated service areas, though it has not been applied as intended. The CSO remains an untapped resource to potentially fund FSM services and revenue gaps for utilities. Detailed CSO implementation guidelines by the government remain to be developed.

Figure 7: Fecal Sludge Management

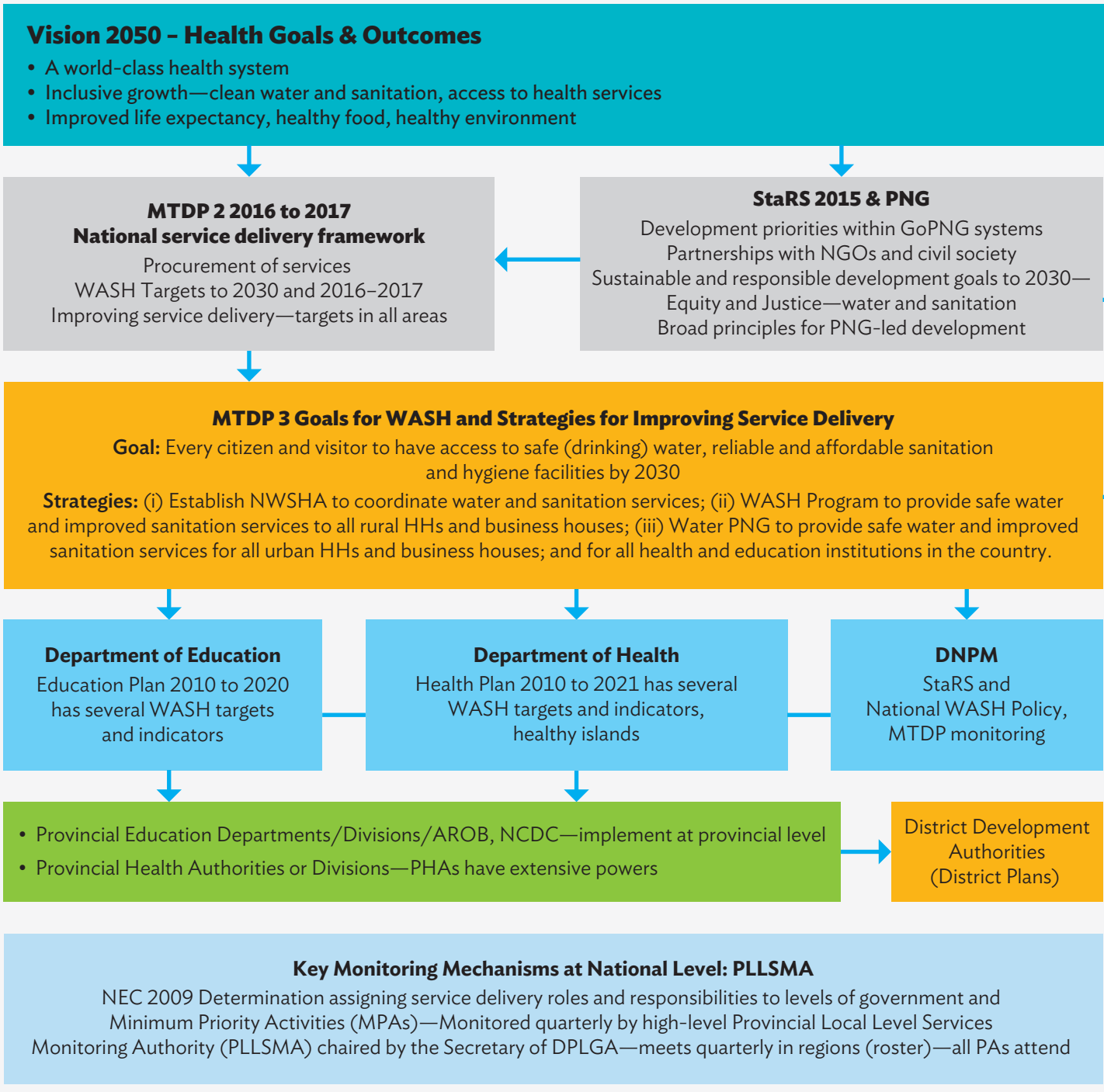


CSO = Community Service Obligation; DDA = district development authority; DNPM = Department of National Planning and Monitoring; DOE = Department of Education; DOH = Department of Health; DOW = Department of Works; DPLGA = Department of Provincial and Local Government Affairs; DSIP = district services improvement program; FSM = fecal sludge management; LLG = Local Level Government; LLGSIP = local-level government service improvement program; NCDC = National Capital District Committee; NGOs = nongovernment organizations; NWS (Act) = National Water and Sewerage (Act); NWSHA = National Water, Sanitation and Hygiene Authority; PGs = provincial governments; PSIP = provincial service improvement program; WASH = water, sanitation, and hygiene.

Source: Authors.

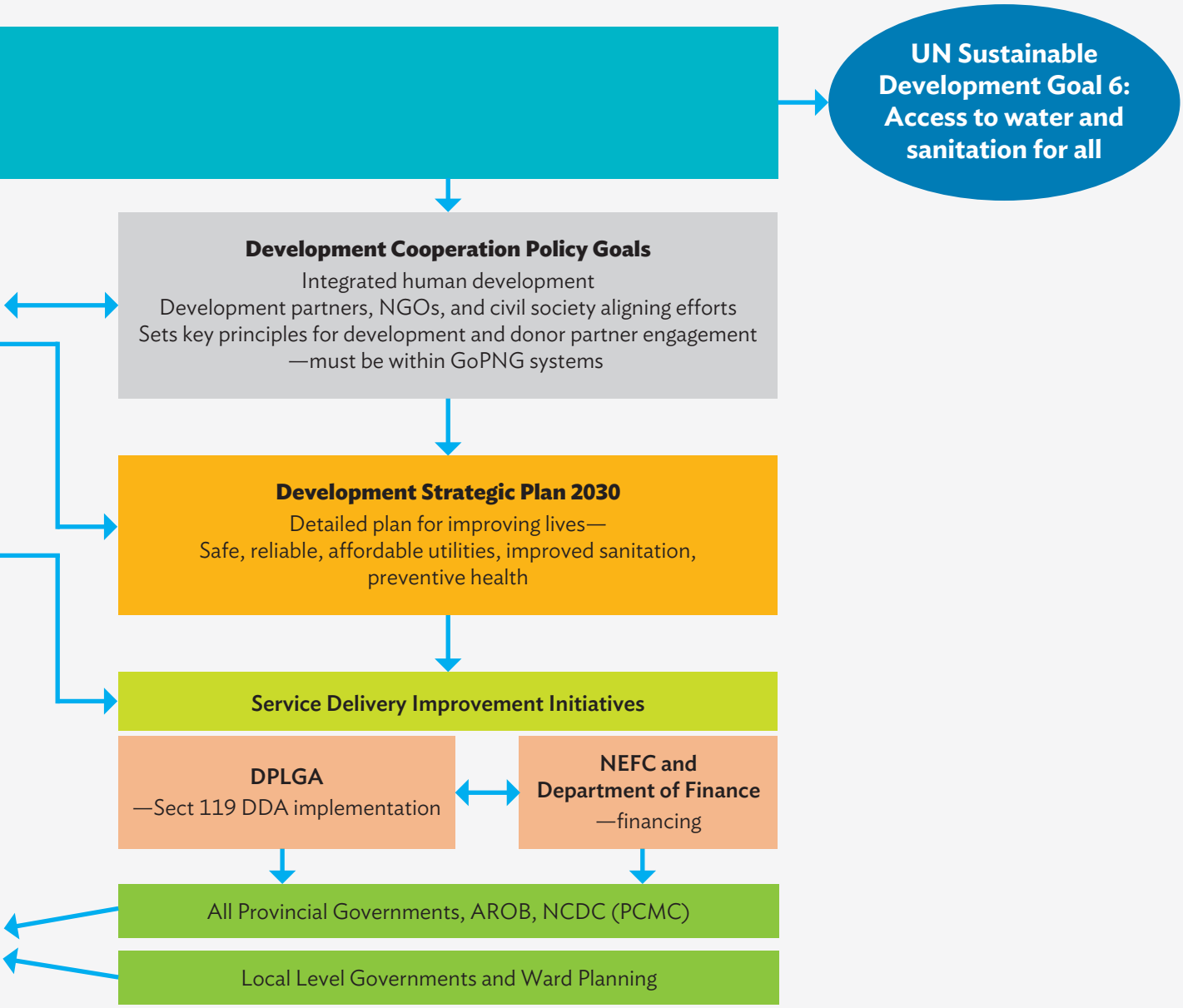
[15] District Development Authority Act of 2014. Explanatory Memorandum for the District Development Authorities Act 2014. Papua New Guinea.

Figure 8: Service Delivery Framework for WASH



AROB = Autonomous Region of Bougainville, DDA = District Development Authority, DNPM = Department of National Planning and Monitoring, DPLGA = Department of Provincial and Local Government Affairs, GoPNG = Government of Papua New Guinea, HHs = households, MTDP = Medium Term Development Plan, NCDC = National Capital District Commission, NEC = National Executive Council, NEFC = National Economic Fiscal Commission, NGOs = nongovernment organizations, PA = provincial administrations, PCMC = Provincial Coordination and Monitoring Committees, PNG = Papua New Guinea, StaRS = National Strategy for Responsible Sustainable Development for Papua New Guinea, WASH = water, sanitation, and hygiene.

Source: Adapted from E. Morgan. 2016. *Implementing the National WASH Policy 2015 to 2030: Supporting GoPNG Leadership and Systems.*



Aligning with GoPNG systems

DNPM has played a strong leadership role in developing many of the high-level policies, coordinating policy implementation, and overall monitoring of the MTDP. The recently approved National Planning and Monitoring Responsibility Act, also being implemented by DNPM, will improve the monitoring of progress and increase the accountability for achieving results, across government (Morgan 2016).

Urban settlement in Kerema, Papua New Guinea

Photo by K. Marshall

PATHWAYS TO INCLUSIVE URBAN SANITATION

The following points provide general guidance on some approaches to achieving inclusive urban sanitation, for consideration of the government and its development partners. As a starting point, these areas are expected to be explored both through ongoing ADB knowledge support technical assistance as well as potential pipeline investments.

Government recognition of the role of sanitation in meeting Papua New Guinea's (PNG) development goals. In recent years, the Government of PNG has progressively made critical policy and strategic actions to achieve its development goals in water and sanitation. In a country where basic sanitation coverage is only 13%, ensuring safely managed sanitation in every household will accelerate the achievement of government's economic and human development goals. A huge task remains in reforming institutions and implementing sector programs effectively. Management of fecal sludge and domestic wastewater, particularly in unplanned settlements, will require key agencies and service providers to exercise essential function and collaborate to promote partnerships to strengthen sanitation service delivery in provincial and district towns. DDAs will be critical service delivery vehicles in implementing provincial and national government development priorities, as well as in establishing citywide sanitation service chain components to improve the quality of life in communities and protect the environment.

Adopt a holistic and adaptive planning and management approach in tackling urban sanitation challenges. Majority of PNG's settlement population still lives in customary societies with strong clan and tribal affiliations. These communities are governed by a system of reciprocity between friendship and kinship groups that require local dialogue and decision-making. Planning approaches need to acknowledge and allow flexibility to work within these existing and diverse structures, identify strengths to leverage from, identify weaknesses and barriers, and implement measures to overcome them. Incremental improvements and adoption of technically suitable sanitation interventions should be developed utilizing local-level planning and implementation mechanisms. It is also essential that strong links are established along the service delivery pathway as priority plans and investments on urban sanitation are identified and allocated with adequate budget and human resource capacity.

Urban sanitation initiatives must prioritize meaningful community participation and engagement. Community participation plays a critical role in the process of local sanitation planning and development as it encourages open dialogue to better understand social structures, cultures, norms, and local knowledge. Improved engagement will enhance mutual understanding, respect between locals and service providers, and community ownership, directly improving the potential for interventions to be sustainable. Community representation through local administrative bodies (i.e., homeowners associations) is an effective mechanism to strengthen the sanitation service chain through localized FSM operations. Giving special attention to women's participation and decision-making reinforces gender equity and inclusion, and also provides an enabling environment for sustainability of interventions. Behavior change communications plans and campaign materials will need to be developed to proactively promote safely managed sanitation for low-income communities and increase demand to adopt on-site sanitation solutions.

National program funding should leverage on local counterpart funding in a transparent and efficient manner. Fiscal transfer mechanisms for WASH should be aligned with government's decentralization policy and governance.

In PNG, the services improvement program remains to be an excellent source of public funding for local sanitation investments, provided that there is an accountability mechanism for its use. Previous audit reports confirm the low expenditure (only 4% out of 10% allocation) by provinces and local level governments for water and sanitation projects, thus better utilization of the services improvement program could potentially drive increased spending for local sanitation infrastructure. The NWSHA is envisioned to create and administer a WASH Trust Fund that will pool resources for the sector to provide a sustainable long-term fiscal mechanism to support FSM and other urban sanitation infrastructure. While the government has steadily increased its annual budget allocation for WASH infrastructure development, it will also need to establish mechanisms for systematic disbursement and reporting.

Explore viable business models on urban sanitation. Responsible agencies, supported by academia and research institutions, could explore innovative business models to expand the provision of sanitation services in settlement areas. For example, a business engagement strategy can aid in strengthening customer relations and allow residents to build formal and direct relationships with utilities. The commercial plan of utilities must also consider a viable tariff structure that promotes affordability and flexibility on billing schedules and collection methods, giving due consideration to customer's convenience and preferences for bill payment. The Tete project reveals practical billing, collection, and payment models (mobile-based, trade stores, easipay) that could be further trialed by utilities both at household and block levels.

Pursue technically feasible, sustainable, and resilient solutions. The Department of National Planning and Monitoring (DNPM), Eda Ranu, Water PNG, and relevant agencies can initiate the development of an FSM design manual and standards. Lessons from the previous ADB Provincial Towns Water Supply and Sanitation Project stressed the need for a well prepared and focused project design to warrant good project implementation.[16] Targeting poor families with grant funds and utilization of low-cost technology have significant potential to maximize benefits and improve public health. Challenges associated with land tenure issues being a major barrier to urban sanitation service improvement in PNG will require proactive engagement with Department of Lands and relevant agencies to explore practical solutions. Design and implementation of future sanitation projects and programs should obviously consider lessons from previous and ongoing interventions as well as climate change and disaster resilience considerations.

Promote regional partnerships and cooperation. PNG may leverage on the existing cooperation in the Pacific region. For example, the Pacific Water and Wastewater Association aims to develop expertise in the Pacific for the sustainable management of water and wastewater services by shaping a cohesive, proficient and robust water and wastewater sector. Future initiatives could potentially include facilitating peer-to-peer information exchange among utilities and industry professionals in the urban sanitation field. The DNPM and Eda Ranu can benefit from regional utility peer-to-peer learning to pilot test the development of sector monitoring and evaluation tools for data management and information sharing for improved service delivery.

Strengthen the knowledge and learning base in government programs. Knowledge and lessons must be mainstreamed into country strategies and programs. Engagement of PNG academic and research institutions to support knowledge work in the sector needs to be explored. There is likewise an opportunity to address the human resource capacity gap through the PNG National Training Council consistent with the country's national training framework. The shortage of engineers for WASH initiatives and service delivery requires urgent attention, and the National Training Council may be helpful in addressing this priority and could further strengthen the limited available knowledge resource provided by donor agencies and international nongovernment organizations.

[16] ADB. 2010. *Completion Report: Provincial Towns Water Supply and Sanitation Project in Papua New Guinea.* Manila.

Making Urban Sanitation More Inclusive in Papua New Guinea

This publication summarizes the current status of urban sanitation in Papua New Guinea, highlighting conditions in informal settlements in Port Moresby and peri-urban communities in selected provincial towns. It discusses opportunities to make sanitation more inclusive through the introduction of an operational fecal sludge management framework and offers lessons and practical recommendations for the government and sector stakeholders.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members —49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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