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Water and Sanitation in Urban Settlement Communities of the Pacific

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Acronyms and Abbreviations

ADB	Asian Development Bank
CBO	Community-Based Organization
CSO	Community Service Obligation
DFAT	Department of Foreign Affairs and Trade
FS	Fecal sludge
FSM	Fecal sludge management
GDP	Gross Domestic Product
HCC	Honiara City Council
JMP	Joint Monitoring Programme
LICs	Low-income communities
LPCD	Liters per capita per day
MDGs	Millennium Development Goals
NGO	Non-governmental Organization
PCN	People's Community Network
PNG	Papua New Guinea
PVUDP	Port Vila Urban Development Project
KAP	Knowledge, Attitude, and Practice
SDA	Service Delivery Analysis
SW	Solomon Water
UN-Habitat	United Nations Human Settlements Programme

VIP	Ventilated improved pit
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization
WSP	Water and Sanitation Program of World Bank Group's Water Global Practice
WWTP	Wastewater treatment plant

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Executive Summary

Urbanization is occurring rapidly in Melanesia at 3-4% per annum. Due to unaffordable housing in formal areas and migration from rural areas, many people settle on marginal lands without formal legal titles (referred to as “informal settlements” in this report). Informal settlements are growing in number and new settlements are emerging both within and on the outskirts of major cities across the Melanesia region. This is happening at a rate that far outpaces city or regional efforts to plan for or serve them. People living in settlements in the Melanesian capitals of Suva, Port Vila, Honiara, and Port Moresby comprise 20%-45% of the city population and at current urbanization rates by 2023 will be between 30% and 65%.

Information about informal settlements is scarce

Data on informal settlements in Melanesia are scarce, including particularly about water, sanitation, and hygiene services. At the request of the World Bank Group—Water and Sanitation Program and its partners, this report provides a rapid review of water and sanitation services in the informal settlements in and around the capital cities of Solomon Islands, Fiji, Vanuatu, and Papua New Guinea, with a focus on gender, equity, and health impacts. This report also provides high-level regional and country-specific recommendations on how to improve service provision.

Informal settlements lack formal services such as water, sanitation, electricity, waste management, drainage and roads

Characteristics of informal settlements vary within and across Melanesia, but most settlements have inadequate basic services such as water, sanitation, electricity, waste management, drainage, and roads, although the situation in Fiji is better than elsewhere. Settlements are expanding rapidly, as families grow and extended family members from their home islands or villages move in, compounding the health and social problems associated with poor water, sanitation, and hygiene service provision. Water supply is typified by crowded standpipes with an irregular unpredictable supply, low pressure, illegal connections, or unimproved sources such as open wells. A significant proportion of settlement sanitation is provided through shared or private dry pit latrines which are unsanitary and uncovered, or no latrines at all. For urban areas including the formal sewered neighborhoods the use of shared or private unimproved latrines and open defecation is over 40% in PNG, 35% in Vanuatu, 19% in Solomon Islands, and 8% in Fiji, implying proportionally higher rates in the informal settlements where sewerage is unavailable.

Women are impacted most by poor water and sanitation services

The impact of poor water and sanitation services falls disproportionately on women who bear responsibility for all household water and sanitation related tasks such as cleaning, cooking, washing, caring for children and the sick. The burden on women includes time and physical labor required to collect water (often weighing 20-30 kilograms) from water sources and carry water home. The risk of sexual and physical violence from collecting water or defecating away from home late at night or in the early morning is real. Men are the main decision makers and influencers in the household, in settlement community leadership, and in local government.

Utilities are constrained by technical, financial and legal barriers to serve informal settlements

In many cases, water and sanitation services are not extended to informal settlements. Utilities underprovide these services, partly because they do not have a clear obligation to serve informal settlements and in some cities to not have the authority to do so. In the four countries reviewed, no utility or government body had an obligation or budget to provide sanitation services to informal settlements. Where authorization to deliver services does exist, utilities tend not to prioritize extending services because they are technically, legally, and commercially more challenging to serve relative to formal urban communities. Utility investments are also influenced by internal, Government, and donor technical preferences which tend to favor investments in piped water infrastructure systems to formal areas.

In most cases, it is not financially feasible for utilities to extend mains or distribution lines to settlement communities and households under current institutional and financing arrangements. Many utilities struggle to provide acceptable water supply services to existing customer bases (access to piped water on the household premises is 61% in urban Honiara, 96% in Fiji, 51% in Vanuatu and 55% in PNG) and are unable to cope with the pace of urban growth in formalized communities. Challenges are greater for extending services to settlements with insecure land tenure, those in peri-urban areas that may be more remote or outside of formal utility service districts, and those on land that is technically challenging to reach with traditional infrastructure. There is also experience and/or the perception that settlers may vandalize distribution lines for illegal connections, increasing non-revenue water losses. It is also more difficult to collect connection fees and enforce bill payment from settlement customers by relying on traditional customer engagement models alone.

Even where water and sanitation services are provided, settlement households often cannot access them due to land tenure and financial obstacles

When water and sanitation services are available within a community, they can be particularly difficult for many settlement households to access. For settlement residents, securing formal water and sanitation services is challenging due to household financial constraints, unmet land tenure requirements, and in some cases cultural norms. For instance, rural migrants may be accustomed to getting water and sanitation services without payment.

As a result, many households in Melanesia's rapidly growing informal settlements are forced to use ad hoc alternatives—particularly for sanitation—that are poor quality, unsafe and, at times, more costly than utility provided services. Living conditions are consequently degraded within these communities. The public health and environmental costs associated with these missing services are not confined to settlements; they drain resources and create public health hazards and damages that extend into the greater urban areas.

There are some promising efforts to improve water service provision to the settlements, but there are no comprehensive, meaningful sanitation projects

Although most projects that target settlements in the region are uncoordinated and serve a small number of households, there are a few positive efforts in the study countries to improve water service delivery to settlements. These provide examples worth studying further and replicating or scaling where appropriate. Small-scale sanitation improvement initiatives were identified but unfortunately, no study country demonstrated meaningful efforts to deliver sanitation services in settlements or to support comprehensive city-wide fecal sludge management. Even where residents construct improved toilets, virtually none of the waste appears to be safely removed, transported, and treated or reused.

International examples provide tested approaches and lessons that are relevant to Melanesia

The issues found in Melanesian settlements are similar to those in informal settlements in Africa, South America and the Caribbean and Southeast Asia. There are rich examples of approaches that have been adopted by water and sewerage utilities and other stakeholders in the quest to improve services for settlements and low income households. Evidence-based advocacy to government to secure policy and financial commitment for services to settlements is a critical first step.

Solutions and recommendations

Finding solutions to these service shortfalls is challenging. Solutions need to respond to the particular circumstances found in each settlement, and need to be implemented with relatively limited financial and technical resources. This report provides institutional recommendations to motivate further discussion on a next steps agenda. These recommendations include:

- Central Government authorities to establish clear national mandates for service delivery, clarify the organizational authority and their obligations to implement services, and set clear service level targets for settlements
- Stakeholders to incorporate settlements into existing or emerging sector investment plans
- Performance monitoring and evaluation to be associated with payment-based performance incentives
- Partnerships to be explored between Local Government or the water and sewerage utility and NGO's and/or the private sector have some potential

There is considerable scope for development partners to constructively support settlement inclusion through the provision of technical assistance and analysis in key areas which may not yet be a priority for government and which may not yet be within the operating scope of utilities. These areas include: cost benefit analysis of water and sanitation investments; advocacy; policy development and strategic planning; research of technical options and piloting with NGOs and community-based organizations; private sector support; peer-to-peer learning and exposure to international experience; and innovative financing.

Chapter 1.

Introduction

The World Bank Group's Water and Sanitation Program (WSP) engaged Castalia to undertake a review of water, sanitation, and health (WASH) services in informal urban settlements in four countries in Melanesia—Solomon Islands, Fiji, Vanuatu, and Papua New Guinea (PNG). The purpose of this project is to better understand WASH service levels and gaps in the urban and peri-urban informal settlements in these four Melanesian countries. The projects also attempts to identify how material improvements in WASH service delivery can be made in informal settlements, and to share what works well in other countries within the region.

For the purposes of this report, “informal settlements” are defined as:

Informal or unplanned residential areas that have developed outside of the formal urban planning rules of a city, often in physically marginal or peri-urban areas. They are characterized by uncertain or illegal land tenure; minimal or no services such as water supply, sanitation, electricity, and roads; informal employment and low incomes; and lack of recognition by formal governments.¹

1.1 Review Approach and Limitations

The primary research method informing this report is interviews with stakeholders. The authors also relied on available primary data, secondary literature, and observations made in-country. Interviews and settlement visits were conducted in and around the capital cities in Solomon

¹ Dutton, Penny. 2015. *Social Research Findings and Recommendations*. Papua New Guinea: Sanitation, Water Supply, and Hygiene In Urban Informal Settlements. World Bank—Water and Sanitation Program.

Islands, Fiji, and Vanuatu. For the PNG country profile, observations and analysis are based largely on recent comprehensive survey data and in-country investigations conducted by another team from WSP, complementary secondary sources, and some key informant interviews conducted by telephone. Interviewees were engaged to contribute to the situation assessment and identify successful relevant initiatives in the region.

WSP presented the findings of this report at a two-day workshop before the Pacific Urban Forum hosted by United Nations Human Settlements Programme (UN-Habitat). Workshop participants came from all four countries and included stakeholders from local and national governments, non-governmental organizations (NGO), donor agencies, universities, and utilities.

WSP guided participants to begin to develop a “next steps” agenda and action plan for each city and the region at large. The action plans are based on a common understanding that service delivery for informal settlements cannot be meaningfully or efficiently addressed with one-off projects in isolation from city-wide plans for improving service delivery. Participants were encouraged to continue developing and implementing their agenda and action plan after the workshop. WSP also encouraged participants to provide feedback on the report. These suggestions have been incorporated.

It is worth underscoring that data sought for this analysis were often unavailable or unreliable. Data on the settlements were particularly poor quality; with little or no quantitative data available on WASH conditions in settlements. Little information was available to support a rigorous gender analysis. Expert interviews and site visits were used to complement the data available and facilitate a more complete situation assessment.

1.2 Structure of this Report

Section 2 of this report presents a snapshot of the region using selected statistics to compare economic, demographic, and urban development trends across the four countries, their capital cities—Honiara, Suva, Port Vila, and Port Moresby—and the informal settlements in those cities. These statistics provide important context for the subsequent WASH analysis.

This is followed in Section 3 by a cross-country regional analysis focusing on WASH conditions in informal settlements. Section 3.1 presents an overview of people’s access to improved or unimproved water points and toilets using Joint Monitoring Programme (JMP) data. These data represent urban areas broadly, and may not incorporate peri-urban settlements. Section 3.2 compares the scope of water and sewerage utility mandates, activities, and funding for urban service provision in each country. It focuses on the utilities’ efforts to serve informal settlements. Information on the prices that informal settlers pay to receive services relative to their income is also presented.

Sections 3.3 and 3.4 compare WASH service delivery across each city's informal settlements using the IRC Service Level framework, which evaluates access to hardware and the level of service provided. The water and sanitation situation analysis integrates gender issues to the extent possible.

In conclusion, Section 4 presents key findings and high-level recommendations for improving water and sanitation service delivery to informal settlements in Melanesia. These findings and recommendations provide a basis for stakeholders to develop a “next steps” agenda for improving WASH services. These recommendations are relevant to donors, civil society, utility leaders, and Governments in the region.

Detailed profiles for each study country available from the World Bank. Each country profile includes:

- An overview of the informal settlements in each country's capital city,
- A description of WASH service provision in each city, with a focus on services to settlements,
- An analysis of WASH services,
- Country-specific recommendations for how to improve and expand WASH service delivery in informal settlements in Melanesia, and
- A list of key sector-specific stakeholders, with a brief description of their work.

Chapter 2.

Regional Statistics and Context of Settlement Growth

Urban areas throughout Melanesia are changing rapidly. Cities are growing, and an increasingly high proportion of city-dwellers are living in informal settlements. These settlements are difficult to reach using traditional public service delivery approaches, and a lack of service delivery leads to poor outcomes such as public health.

This section presents economic and demographic statistics, and relevant, high-level policy, cultural, and historical indicators across the four study countries. This provides context for understanding the challenges of delivering water and sanitation services in rapidly growing urban areas and informal settlements.

Rapid urbanization and population growth strains the capacity of the Government and utilities

Rapid urbanization, complex land tenure laws, and frequent natural disasters (that are likely to be heightened by climate change) are clear regional trends that directly affect informal settlements. Each of these factors complicates and increases the expense of delivering basic public services.

As illustrated in Table 2.1, Melanesian cities are facing tremendous urban growth that strains cities' financial, physical, and administrative capacities. Growth in informal settlements far outpaces city-wide growth in the study areas. The disparity between settlement and formal urban growth is greatest in the Solomon Islands, where some settlements are growing at an estimated 26% per annum (compared to city growth of 2.7%).

TABLE 2.1: COMPARISON OF ESTIMATED POPULATION DATA

	Population (City, 2013)	Estimated Population (Settlements)	Annual Population Growth Rate (City)	Annual Population Growth ^a (Settlements)	Settlements as Percent of City Population as of 2013	Settlements as Percent of City Population by 2023 ^b
Honiara, Solomon Islands	64,600	22,600	3%	6% to 26%	35%	64%
Suva, Fiji (Greater Suva Area)	244,000	50,000	2%	8%	20%	31%
Port Vila, Vanuatu	44,000	15,400	4%	3% to 12%	35%	43%
Port Moresby, PNG	500,000 to 700,000	225,000 to 315,000	2%	5% to 8%	45%	56%

Source: World Bank Databank, Secretariat of the Pacific Community Data, National Census Data, UN-Habitat Urban Profiles, and *Social Research Findings And Recommendations, Papua New Guinea: Sanitation, Water Supply, and Hygiene in Urban Informal Settlements* World Bank—Water and Sanitation Program (2014)

Note: The figure for estimated settlement population and the population growth rates were taken a range of resources (e.g., the latest census). The figures are from 2008 or later, depending on the source. Figures assume current growth rates remain constant for the next ten years.

^a Due to data limitations, the growth rate for Suva is for peri-urban areas (rather than just settlements).

^b These figures are calculated by multiplying the city population growth rate to the city population in 2013, less the population of the settlements. The settlement population growth rate is applied to the settlements. These calculations assume the current growth rate for the city and settlement for the next ten years. When there is a range of population growth rates, the average of the growth rates is used.

Not only is there growth in the total number of people or proportion living in settlements, but also the number of settlements e.g. Port Moresby has around 99 settlements; the Greater Suva Area has more than 100. Keeping up with where these settlements are and their leadership status is difficult and registers of settlements are generally not kept. Settlement growth crosses administrative boundaries, from formal cities into peri-urban and rural districts. The associated need to coordinate services across jurisdictions and agencies makes strategic planning, funding and investment difficult. Inconsistently enforced or interpreted land tenure laws, missing records, and lengthy dispute processes further complicate planning efforts, as does disagreement about the number, names and boundaries of settlements. These factors particularly undermine the utilities' ability to develop and execute long-term investment and expansion plans given the capital-intensive nature of utilities. Only WAF monitors service provision to settlements and number of settlers. For others, data still need to be collected on settlement numbers and populations for planning purposes.

Informal settlements are difficult to serve due to geographic and technical barriers

Informal settlements are technically more difficult to serve than formal areas. Settlements tend to be located on steep slopes or in flood prone areas with high water tables, making the settlements less attractive for formal development. The geography of the settlements is described in more detail in Section 4.1 of this report.

Even where settlements are located in non-marginal land, they tend to have developed prior to installation of drainage, roads, and other basic infrastructure. Many settlements lie outside existing utility service boundaries and away from existing water mains or sewer lines. These technical factors further complicate and increase the expense of extending WASH service provision to cover these areas.

The four study countries have different economic circumstances

The economic circumstances in each of the four study countries vary significantly, which affects the ability of the Government to provide services. As shown in Table 2.2, the Fijian economy is much stronger and more diversified than other countries in the region. As a result, Fiji residents and the Fiji Government are less financially vulnerable relative to other Melanesian countries. Higher household incomes improve residents' relative ability to pay for household-level WASH infrastructure and services from both informal and formal service providers. The increased ability to invest in and subsidize improved WASH services can create a virtuous cycle, minimizing the costs and health burdens associated with missing or poorly delivered services. This allows residents to invest more time in productive activities.

TABLE 2.2: ECONOMIC STATISTICS

	GDP (US\$) from 2013	GDP Per Capita (US\$) 2013	Annual GDP Growth (%) 2013	Major national industries
Solomon Islands	\$1.10 billion	\$1,954	3.0%	Services, agriculture, fishing, forestry
Fiji	\$3.86 billion	\$4,375	4.6%	Forestry, minerals, fishing, retail, finance, tourism, construction, manufacturing
Vanuatu	\$0.83 billion	\$3,277	2.2%	Agriculture, forestry, fishing, tourism
PNG	\$15.29 billion	\$2,088	5.4%	Natural resource extraction, services

Source: World Bank Databank, Fiji Budget Address

Settlements do not have basic infrastructure such as drainage, roads, and housing, which harms public health

The four cities do not yet have adequate resources to provide complementary basic infrastructure services to rapidly growing settlement populations. Cities inadequately invest in basic services like drainage and solid waste management (depicted in Figure 2.1).

The lack of complementary infrastructure services exacerbates negative health impacts of missing WASH services, particularly in densely populated areas such as the inner city settlement of Segani (Konedobu), depicted in Figure 2.2 below. For example, many settlements do not empty their pit toilets, causing the toilets to overflow. The associated environmental and public health problems are compounded in settlements without drainage because these face flooding problems.

FIGURE 2.1: POOR SOLID WASTE MANAGEMENT AND DRAINAGE IN LORD HOWE SETTLEMENT, HONIARA



FIGURE 2.2: SEGANI (KONEDOBU) SETTLEMENT HAS HIGH POPULATION DENSITY



Source: *Social Research Findings and Recommendations, Papua New Guinea: Sanitation, Water Supply, and Hygiene in Urban Informal Settlements*, World Bank—Water and Sanitation Program (2014). Photo by Penny Dutton.

The lack of adequate water and sanitation services causes and compounds negative public health outcomes. These health problems extend beyond the boundaries of the settlement, and, as one official from the Ministry of Health in Solomon Islands stated, “diseases have no boundaries.” However, there is little quality data about health in the settlements. Table 2.3 contains country-wide health statistics that reflect the relative quality of life among the countries’ poorest residents.

TABLE 2.3: HEALTH STATISTICS

	Mortality rates for children under five (per 1000 live birth) as of 2012	Life Expectancy (years) as of 2012	Incidence rate of diarrheal diseases (per 1000 population) as of 2002
Solomon Islands	30	67.5	977
Fiji	24	69.7	772
Vanuatu	17	71.4	892
PNG	61	62.3	881

Source: WHO Country Profiles, World Bank Databank, and WHO and SOPAC. 2008. *Sanitation, Hygiene, and Drinking Water in the Pacific Island Countries: Converting Commitment into Action*. World Health Organization.

FIGURE 2.3: WOMEN AND CHILDREN COLLECTING WATER IN PNG



Source: *Social Research Findings and Recommendations, Papua New Guinea: Sanitation, Water Supply, and Hygiene in Urban Informal Settlements*, World Bank—Water and Sanitation Program (2014). Photo by Penny Dutton.

Women and children are particularly vulnerable to the negative health impacts of poor service provision

When families lack access to an adequate supply of water, women and children are the most likely to bear the economic and financial burden of seeking alternative water supply sources (this is described in more detail in Section 4.2). Figure 2.3 depicts women and children from PNG collecting water at a community tap. Women in poor households are the least able to

cope with the lost income from illnesses and are often responsible for caring for ill household members. In the four Melanesian countries women are primarily responsible for household activities such as washing, food preparation, and bathing children.

Political and cultural factors affect countries' abilities to deliver basic services

In addition, other political and cultural factors reflect and intensify a country's ability to deliver basic services to growing urban populations.

In the Solomon Islands some officials view settlements as temporary and believe access to services encourages permanency and settlement growth. Policies, exemplified by the government's response to flooded settlements in 2014, are that settlers should be encouraged to go return to their rural homes. Similarly in Papua New Guinea, forced evictions from some Port Moresby settlements have occurred in the past and there is an attitude by some in government that settlers are trouble makers and should go back to their village. Despite the unfeasibility of this response – many settlers are second or third generation and would have difficulty adapting to or being accepted back into village life – these view are a constraint to expanding services in settlements.

By contrast, Fiji's national Government has a progressive policy perspective to dealing with the challenges of urbanization, and sees settlers as important contributors to society. As a result, Fiji's government agencies have made available more financial resources to improve conditions in the settlements relative to the other countries in the study.

Cultural diversity of settlements is also a deterrent to service provision. The Solomon Islands is made up of 90 islands with over 70 unique languages. The country has experienced long-standing and recent ethnic violence, and tensions remain divisive within the city and in Government, impairing efforts to proactively plan for growth and development.

PNG has the largest portion of its urban population living in settlements. Its population is also diverse, with 800 known spoken languages.

In Honiara, Port Moresby and Port Vila, heterogeneous settlements are home to many different community clusters based on island or village of origin. Often these groups are in competition with each other, and in some cases in violent conflict.

In Vanuatu the governance structure of the settlements depends on the type of land tenure, but most settlements have a chief system that is affiliated with leadership in the home islands. In Port Moresby local government councillors are responsible for settlement areas but representation is not always effective and clan leaders hold sway.

Delivering settlement services requires the involvement of formal local leaders, as well as negotiating with many different clan leaders. This need for intense community engagement plus the violent conditions in some settlements is a challenge to participatory community approaches, and complicate efforts by the Government, utility, and civil society to improve service delivery. The cultural complexity of many settlements adds to the reluctance of government and service providers.

Chapter 3

Cross-Country Water and Sanitation Analysis

This section looks across capital cities in the four study countries to provide a quick snapshot of estimated access using Joint Monitoring Programme (JMP) data for urban areas. It then reviews primary water and sanitation service providers in each city, with a focus on utilities and the costs of services. Finally, the section reviews government and utility programs designed to be pro-poor or to reach settlement residents specifically, and section provides an analysis of the water and sanitation service levels in the settlements of each study country capital.

3.1 Formally Reported Urban Water and Sanitation Access Rates

JMP data give a hardware-oriented count of people's access to improved or unimproved water supply or sanitation facilities.

Variation in reported access across countries reflects actual differences in service access, but may also reflect differences in how each country defines its "urban" population. For example, countries may report access in peri-urban settlements that lie beyond formal city limits with rural access data. Based on interviews, literature, and observations within each country, JMP figures appear to overestimate actual access. In all cases, informal settlements in urban or peri-urban areas will have much lower actual access rates than the general urban populations.

Water access

Table 3.1 presents JMP data on urban water access for each country. This assessment accounts for access to water but does not consider quality or quantity dimensions, such as how often water is supplied or the quality at point-of-collection or point-of-use.

TABLE 3.1: URBAN WATER ACCESS ESTIMATES FROM JMP DATA 2012

	Solomon Islands	Fiji	Vanuatu	Papua New Guinea
	Urban (%)	Urban (%)	Urban (%)	Urban (%)
Piped onto premises: point of use located at the household, providing piped water	61	96	51	55
Other improved source: public taps, standpipes, tube wells, boreholes, or protected wells, springs or collected rainwater	32	4	47	33
Unimproved: unprotected dug well or spring, carted tank or drum, raw surface water, bottled water, surface water	7	0	2	12

Source: WHO/UNICEF (2014) *Progress on Drinking Water and Sanitation 2014 Update*

Fiji stands out as a clear leader in reaching urban households with piped, treated water services (with 95% access reported). All other utilities appear to struggle to connect even formal urban households with piped water; expanding service to difficult-to-reach settlements would predictably be a lower priority for utilities striving to meet cost-recovery obligations. To meet water supply access there is a substantial infrastructure investment backlog, with the need to invest in new production, treatment, transmission, distribution and storage and institutional support to improve the efficiency of operations. The infrastructure backlog is a limitation even in formal urban areas, and partly explains the reluctance to invest and prioritize limited funds for informal areas. A recent study in PNG by the World Bank estimated that to meet 2030 access targets for improved water supply in urban areas, US\$8 million is needed to be spent on infrastructure every year until 2030, with a further US\$2 million on operations and maintenance.²

Actual rates of access in informal settlements vary significantly across the countries. Settlement residents in Fiji and PNG benefit from more proactive utility outreach and services than those in Vanuatu and Solomon Islands (this is discussed later in this section). Residents without access to piped water on-site or within the community typically access water from open wells, boreholes, collected rainwater, or surface water sources.

Sanitation access

Table 3.2 presents JMP data on urban sanitation access. Fiji and Solomon Islands appear to lead the region in access to urban sanitation facilities. The JMP sanitation assessment considers waste containment hardware (toilets, pits, and tanks), but not conveyance and treatment services. As such, it does not account for the fate of human waste after use.

Based on the rapid assessments made for this report, these JMP data appear to illustrate an overly optimistic situation for urban areas inclusive and exclusive of peri-urban settlements (though data accuracy likely varies significantly by country). In comparison to the water access

² World Bank WSP (2013), *Water Supply and Sanitation in Papua New Guinea—Turning Finance into Services for the Future*.

data, sanitation access data may be overestimated because some peri-urban settlements are likely classified as part of rural areas. Based on literature, interviews, and observations for this report, access to sanitation facilities in settlements would likely indicate a uniformly unimproved situation for nearly all settlement residents across all countries.

Settlement residents in all four study countries tend to rely on shared and unimproved facilities, such as hanging toilets that are “straight-piped” to drains, streams or pit latrines that tend to fill and flood regularly. These toilets often lack a sanitary slab. Waste removal, conveyance and treatment are effectively absent in effectively all settlements with very few exceptions.

TABLE 3.2: URBAN SANITATION ACCESS ESTIMATES FROM JMP DATA 2012

	Solomon Islands	Fiji	Vanuatu	Papua New Guinea
	Urban (%)	Urban (%)	Urban (%)	Urban (%)
Improved facilities^a: human excreta hygienically separated from human contact (e.g. sewers, composting, septic, VIP)	81	92	65	56
Shared facilities: two or more households share a single facility	N/A	4	33	9
Other unimproved: bucket or hanging latrines; no sanitary platform, no effective waste containment	10	4	2	31
Open defecation: no facilities	9	0	0	4

Source: WHO/UNICEF (2014) *Progress on Drinking Water and Sanitation 2014 Update*

Note: Solomon Islands data for “improved facilities” includes figures for “shared facilities.” Statistics separating the shared and improved facilities are unavailable.

^a WHO, and UNICEF. “Improved and Unimproved Water and Sanitation Facilities Categories.” WHO / UNICEF Joint Monitoring Programme. Accessed February 18, 2015. <http://www.wssinfo.org/definitions-methods/watsan-categories/>.

3.2 Service Providers and Associated Service Costs

This section describes the main water and sanitation service provider in each main city. Then, it describes the associated formal and informal service delivery costs to informal settlements.

How a utility interprets its service mandate and legal requirements strongly influences the extent they will provide services to informal settlements

An important starting place for understanding service provision in settlements is to evaluate utilities’ purview and facilities available to provide sanitation and water services city-wide. If a utility’s purview is limited to providing only piped sanitation services (for instance sewers), it is unlikely utilities will be able to serve settlements with sanitation services in the short or medium-term, if ever. Additionally, if utilities are required to incorporate land tenure requirements into connection or service conditions, they are unlikely to address settlement needs meaningfully.

Other service providers

Other actors—users, NGOs, municipalities, private service providers—occasionally provide ad hoc water or sanitation services. These efforts are discussed in the sections below.

Table 3.3 presents an overview of utility service mandates across the four study countries. Water Authority of Fiji (WAF) is the only utility providing water services extensively to settlement customers and the only utility in the four countries to operate both sludge and wastewater facilities.

TABLE 3.3: OVERVIEW OF UTILITY SERVICES

	Geographic Area Served	Services Provided (Water/Sanitation)	Purview for Piped and Non-Piped Sanitation?	Service to informal settlements?	Wastewater or Sludge Treatment Facilities?
Solomon Islands (Solomon Water)	Urban areas across the country	Water and Sanitation	Piped only	Water provided to few informal areas; sewerage only for formal areas.	No. Untreated septage sludge disposed at local dump; sewerage piped to coast.
Fiji (Water Authority of Fiji)	Entire country	Water and Sanitation	Piped only	Water provided to informal areas; sewerage only for formal areas.	Yes. FS and wastewater facilities.
Vanuatu (UNELCO)	Port Vila	Water	Neither	Water provided to some informal areas; no sewerage in Vanuatu.	No. Untreated FS disposed at local dump; a formal facility under construction. ^a
PNG (Eda Ranu)	Port Moresby	Water and Sanitation	Piped only	Water provided in some informal areas; sewerage provision only for formal areas.	Yes/No. Wastewater treatment plant/septage disposed at local dump.

Source: Pacific Water and Wastewater Association Benchmarking Report (2012) and interviews

^a The Port Vila Urban Development Project (PVUDP) is in the process of building a sludge treatment plant at the Bouffa dumpsite, where sludge is currently dumped. No clear plans have been finalized for managing or financing the plant. Although it is expected to be operated and maintained by the Vanuatu Department of Mines, Geology, and Water Resources, or a private operator.

To put the scope of utility access in context, basic operational data for each country are provided in Table 3.4.

Because informal settlements cross administrative boundaries and are growing rapidly (that is, they often straddle a line between urban and peri-urban) having flexible service area boundaries enables the utility to serve settlement communities more efficiently. WAF's mandate to provide

services is nationwide. It is not restricted by administrative boundaries, but rather by limited financing and organizational capacity for network expansion. This is also reflected in the broad mandate of Water PNG.

In contrast, Solomon Water, UNELCO, and Eda Ranu have strictly defined service areas that largely correspond to city boundaries. Changes to the service area boundaries of these utilities appear to be dictated by political or economic motivations, rather than based on assessment of residents' need or strategic growth plans. This disadvantages informal settlements, which often have little political or economic voice. For example, Solomon Water recently expanded its service area to incorporate the airport and a new housing division, but large and growing peri-urban settlements continue to fall outside of the utility's service area despite tremendous need for service.

In some cases, service area boundaries may not be an important obstacle to serving settlements; rather, utility requirements for formal land tenure documents as a precondition for accessing services pose a bigger challenge. This is discussed further in this section.

Although utilities have different purviews and legal restrictions on providing services to formal areas, there is greater variation in how utilities serve informal settlements. Settlement engagement efforts appear to also be influenced by a utility's overall capacity for innovative programming, and a utility's general attitude about the settlement residents (for example, are settlers perceived to be associated with illegal breakages and low bill payment rates, or are settlers perceived to be a growing customer base and service to them an important part of the utility's mission?). These issues are interlinked. For example, how utilities address land tenure requirements in their connection criteria, pro-poor outreach, pricing and payment policies, and hardware options can affect settlement residents' ability to access and retain formal utility services.

TABLE 3.4: NATIONAL WATER SUPPLY AND SANITATION ACCESS BY UTILITIES

	Population (,000) 2013	GNI Per Capita (US\$) 2013	No. of utility connections		Population Covered by utilities			
			Water	Sewerage	Water	% of population	sewerage	% of population
Solomon Islands	561.0	\$1,272	8,062	916	56,511	10%	6,412	1%
Fiji	858.0	\$4,293	141,025	28,204	609,938	71%	132,559	15%
Vanuatu	264.7	\$4,606	7,308	N/A	30,869	12%	0	0%
PNG	7,059.7	\$2,898	94,715	17,618	739,571	10%	154,177	2%

Source: Pacific Water and Wastewater Association Benchmarking Report (2013). Note: PNG includes Eda Ranu and Water PNG

Response to challenge of providing formal water services to settlements

The utilities in this study demonstrate a range of water service delivery responses to the growing settlement challenge. The settlement growth rates alone are overwhelming for many utilities given that most have not yet been able to service all formal areas with functional distribution infrastructure. In many cases, utilities struggle to provide their current customer base with service given limited staff, water supplies, infrastructure, and high electricity costs. In addition to the added numbers of potential customers, utilities are faced with finding new technical and outreach modes for these communities, legal restrictions related to tenure, and often administrative boundary issues as noted above.

BOX 3.1: COMMUNITY TAPS TO CIRCUMVENT LAND TENURE REQUIREMENTS IN PORT MORESBY

In order to provide water to settlers with uncertain land tenure, Eda Ranu installs community taps in some communities under a Community Service Obligation (CSO). CSOs seem to be issued on a case-by-case basis. Community eligibility and CSO terms are unclear. Taps are installed based on a Memoranda of Understanding between Eda Ranu and a community organization within each settlement. Community leaders or organizations are responsible for managing the water point, collecting funds from residents, and paying the utility; the transfer of funds from households to the utility does not consistently happen. Eda Ranu hopes to gain some revenue and avoid some network damage by formalizing water points given high rates of illegal line breakages and the associated water wastage and contamination.

FIGURE 3.1: COMMUNITY TAPS IN PORT MORESBY



Source: *Social Research Findings And Recommendations, Papua New Guinea: Sanitation, Water Supply, and Hygiene in Urban Informal Settlements* World Bank—Water and Sanitation Program (2014), Photo: Penny Dutton

Eda Ranu and Solomon Water are both experimenting with initiatives to improve service to settlements and both list land tenure documentation as a necessary condition for approving household water connections. It is unclear whether this is an internally or externally imposed connection criteria. Eda Ranu is attempting to provide services through community standpipes instead of household connections, as described in Box 3.1. Eda Ranu also experimented with a pilot project for prepaid water meters, but this was cancelled due to technical issues with the meters and payment cards. The option of private providers or on-site water vendors was also explored by Eda Ranu, including studying private vendor systems in Manila, however this approach has since been abandoned due to challenges with community acceptance of the approach.

Solomon Water is just starting to review its outreach efforts to settlements. A small number of isolated attempts were made to extend water to a peri-urban settlement by engaging informal settlement leaders to on-sell water to community members on per-bucket basis. This effort was largely unsuccessful because connected households either could not collect from users or did not remit payment to Solomon Water. Solomon Water is hoping to design a better outreach program based on an improved internal understanding of the different determinants of communities' willingness and ability to pay for services. The utility hopes to design interventions that deliver services and generate revenue.

New data on non-revenue water (NRW) losses recently indicated that illegal line breakages in settlements played a very small role in the utility's NRW problems (80% were leakages, only 10% were illegal connections). According to the internal investigation, some settlement communities, however, were finding ways to tap into water illegally, and NRW was very high in these areas. These data and the possibility of other settlements replicating the illegal breakage example increased the utility board's willingness to engage settlements more proactively as potential customers.³

WAF has an established alternative institutional and hardware approach to serving settlement customers in Suva. This approach, as described in Box 3.2, allows WAF to sidestep land tenure requirements, shifting the responsibility of community-based illegal breakages more to customers, and to reduce staff meter reading time and risks.

In PNG, the Government can require the utility to provide water to communities by introducing a CSO and subsidies. SW supplies two communities (Auki and Tulagi) with water under CSOs, and both of which were issued on a case-by-case basis, neither of which are settlements. The exact terms of the CSOs are unknown. This stop-gap arrangement may be counter-productive in the long-term if utilities opt to only serve settlements with CSOs, rather than innovating to improve service delivery to all settlements.

³ Interview with SW

BOX 3.2: REACHING SETTLEMENT RESIDENTS AS CUSTOMERS IN FIJI

WAF places customer meters at the edge of a settlement rather than at the customers' household. The household then installs distribution piping from the meter. This reduces WAF's meter-reading costs and infrastructure risk and places more responsibility on the household and community to monitor water theft. However, households use PVC pipes to transport water between the meter and their home; these pipes are vulnerable to damage, contaminating water at the point-of-use.

WAF has also established a clear arrangement for circumventing land tenure requirements for water connections. WAF allows customers to submit government-issued identification credentials and can provide "temporary water connections" with formal permission from the Department of Housing and/or the landowners.

FIGURE 3.2: WATER METERS AT THE EDGE OF A SETTLEMENT IN SUVA**Sanitation service provision is largely ignored in the settlements**

Most Melanesian cities have only partial access by sewer networks if any,⁴ and any utility investments to expand sewerage networks tend to prioritize formal customers rather than extending access to informal areas. Municipalities may provide non-networked sanitation services, but generally leave such services to one-off projects by NGOs and the private market. In settlements, this means sanitation hardware is informal, inappropriately designed, and not functioning to provide meaningful public health or environmental protections. Effectively, almost 100% of residents' waste is discharged within or nearby the settlement communities, posing clear health risks to those communities and the capital cities broadly (as discussed further in Section 3.4).

⁴ SW estimates 5 to 10% access in Honiara, WAF estimates 98% sewerage access in urban areas, Vanuatu has no piped sewerage at all, and Eda Ranu estimates 49% access in the National Capital District.

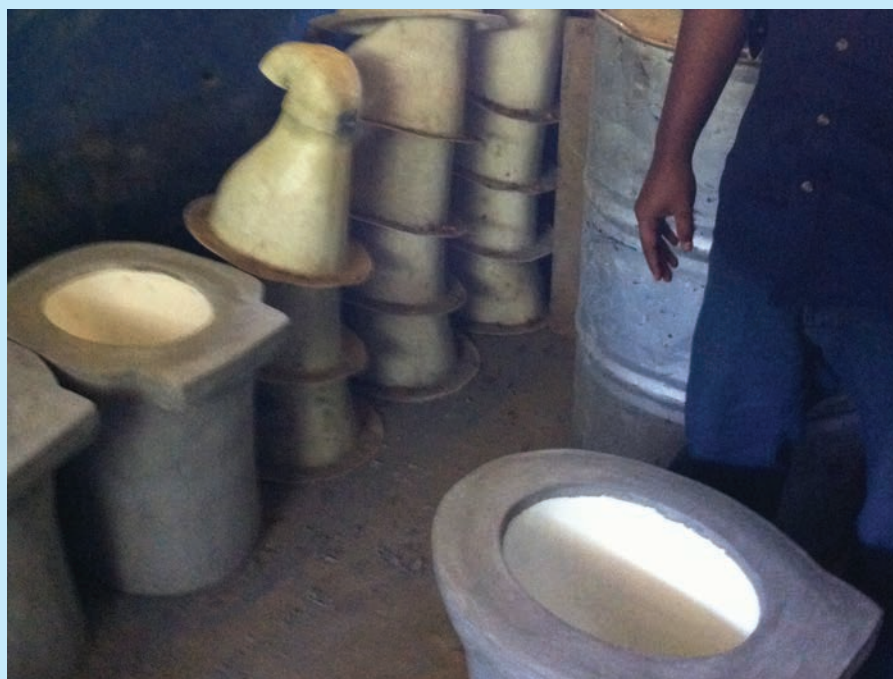
In comparison to water service provision, utilities appear to largely ignore sanitation service provision. For instance, no government or utility entity in Vanuatu is required to provide sanitation services to any customer segment in the city. No formal sewers exist, and septic sludge is not treated and is typically dumped in drains, streams, or at Port Vila's Bouffa dump site.

In Honiara, Solomon Water provides piped sewerage to a small portion of the central city, but has not expanded its network for decades and has no plans to do so in the future. SW has no wastewater or sludge treatment facilities. Piped sewage is discharged directly into coastal outfalls. Collected septage is currently disposed of at the local dump or illegally dumped elsewhere. Honiara City Council (HCC) attempts to meet some demand by managing a vacuum truck and providing a septage dump site at the local solid waste dump. HCC also produces and sells toilet and sanitation platform hardware for low income consumers including settlement residents. World Vision is currently a major buyer and helps to distribute products to settlement customers (described in more detail in Box 3.3). Private septage collectors reportedly operate in the city as well, but may or may not use the dump for disposal and likely only serve middle or higher income households or businesses.

BOX 3.3: HONIARA CITY COUNCIL AND WORLD VISION HELP EXTEND SANITATION PRODUCTS TO SETTLEMENT RESIDENTS

In the Solomon Islands, Honiara City Council (HCC) manufactures low-cost fiberglass latrine slabs and toilet pedestals and sells them to the public. These products often sell out, indicating high demand, and HCC is able to sell them above cost, making a small profit. Settlement households can afford these products, but often cannot pay to transport them. A World Vision project to install toilets in settlements works with providers to build entrepreneurship and skills. World Vision does not subsidize toilet construction (except for households with special needs), but it does subsidize the cost of transporting construction products, including the HCC slabs and pedestals. This generates additional demand for the HCC program.

FIGURE 3.3: LATRINE SLABS FOR SALE BEHIND HCC BUILDING



In Port Moresby, Eda Ranu provides some formal areas with piped sewerage services but takes no responsibility for non-networked sanitation. Septage sludge collected by private vacuum truck operators is disposed of in open areas, at the local solid waste dumpsite, or illegally into Eda Ranu sewer manholes. The utility reportedly would accept sludge at its wastewater facilities for a fee, but this does not happen in practice. The National Capital District Commission (NCDC) in Port Moresby plans to trial a decentralized community-scale septic tank in a non-networked settlement area. It is unclear if this is an isolated project or if NCDC is considering taking up sanitation service provision more strategically or substantially.

FIGURE 3.4: INTERIOR OF A TYPICAL DRY PIT TOILET IN PNG



Source: *Social Research Findings And Recommendations, Papua New Guinea: Sanitation, Water Supply, and Hygiene in Urban Informal Settlements* World Bank—Water and Sanitation Program (2014), Photo: Penny Dutton

Where authorization exists to provide sanitation services and investments are being made in network extensions, utilities are unlikely to extend infrastructure to high risk, challenging settlement communities given remaining demand in lower risk urban communities. None of the utility's strategic plans require or set meaningful settlement-related sanitation goals. Even WAF—which leads the region in sewerage access—has extremely low targets for improving sewerage services (increasing access in Suva from 40 to 45% by 2017). No targets exist for improving non-networked sanitation services in the city, less so in settlements. Similarly, SW's strategic plan for Honiara does not include any goals for improving sanitation services for settlements or otherwise.

3.2.1 Paying for water and sanitation

Where utilities are able to serve settlement households, many households will struggle to pay for connections and utility services. Governments at all levels may step in with subsidies on a case-by-case basis. Some utilities have established pro-poor pricing initiatives to address this challenge more comprehensively. These pro-poor strategies address issues of ability and willingness to pay for services within settlements. Most of this effort is oriented toward water services since sanitation services are rarely provided by utilities.

The policies and programs to facilitate service delivery to informal settlements are summarized in Table 3.5.

TABLE 3.5: UTILITIES' SETTLEMENT ACCESS AND PRO-POOR POLICIES

	Do utilities require legal land tenure to provide a connection?	Are there pro-poor initiatives to help pay for services? ^a	Regularly-funded subsidies for the poor?
Solomon Islands (Solomon Water)	Yes	Over-due bill payment plan in lieu of automatic disconnections	None
Fiji (WAF)	No. Department of Housing and/or landowners can approve temporary water connections	Over-due bill payment plan Low-income customers qualify for a bill waiver Connection fees can be paid by instalments	Subsidized tariffs 50L of free water per person per day if household income <US\$15,000
Vanuatu (UNELCO)	Yes	Over-due bill payment plan	Article 29 Water Special Fund, though currently unused
PNG (Eda Ranu)	Yes, but Government has obligated some services to settlements by CSO	Over-due bill payment plan Bulk tariffs at community standpipes, case-by-case	Government subsidies on a case-by-case basis

^a All the utilities offer increasing block tariffs. This tariff structure is often considered a way to protect the poor because it charges lower rates to users who use less water (who are often low-income). However, this tariff structure actually disadvantages settlers because they usually share water taps, quickly pricing them to the most expensive tier.

Source: Utility websites and interviews

Other than overdue bill payment plans, Solomon Water and UNELCO do not offer pro-poor initiatives to help pay for services, nor does any stakeholder in Solomon Islands or Vanuatu regularly fund subsidies for the poor. However, as described previously, SW recently received a small amount of funding to explore settlement service delivery modes including more appropriate pricing options. The project started shortly before the consultancy interview, so details were not available. The utility seemed to be willing to consider partnering with groups like World Vision that have experience and expertise working in the settlements.

In Vanuatu, the "Water Special Fund" has been set-up to help low income households access water but has not been used yet. This is described in more detail in Box 3.4.

BOX 3.4: FUND TO HELP LOW INCOME HOUSEHOLDS ACCESS WATER IN VANUATU

In Port Vila, one vatu from every cubic meter of water sold goes into the “Water Special Fund,” which was set up by Article 29 from the Contract for the Management and Operation of the Water Supply Service in Port Vila. The Fund “contributes to the construction of new water connections for the benefit of low income earners” and “under take other works... to ensure and preserve [water supply sources].” This fund is held by UNELCO and can be directed by the Government. According to the Utility Regulatory Authority, the fund can legally be used to help settlement residents’ access water via private or communal standpipes; however, the fund has only been used to maintain water supply sources so far, and has not been used to help low-income households yet.

Both Fiji and PNG have pro-poor pricing and programming designed to engage and retain poor water customers, including settlement households. The utilities in these countries are also tailoring their outreach efforts, bill payment plans, and connection fees to better engage this customer segment.

WAF offers the lowest water tariffs in the region (described in Table 3.5). These tariffs are highly subsidized, but WAF is in discussions with the Government of Fiji to adjust its tariff schedules to reduce dependency on government transfers and to cross-subsidize low residential tariffs from other market segments. WAF also plans to provide “poor” households (earning less than FJ\$30,000 [US\$15,000] per year) up to 91,250 liters of free water. WAF allows connection charges to be paid in instalments (with 60% upfront, and the remaining balance paid over the rest of the year). WAF also makes payment easy through a variety of methods such as by mobile phone, banks or in person.

Meanwhile, Eda Ranu is trying to improve payment rates in the settlements by engaging each community’s Water Committee. The utility is considering offering incentive payments to the Water Committees to ensure payments are made fully and on-time. Eda Ranu has also worked with communities to replace illegal connections with legal community connections (although no information is available on the success or sustainability of this initiative). However research in Port Moresby suggests paying water bills to water utilities is the preferred payment method as the money is seen as going straight to the service provider as a direct payment for the service. While a few households were comfortable paying the water committee, partly due to their presence in the community, many were not and expressed a strong distrust of the water committee’s ability to manage the finances honestly and without misuse – a conclusion arrived at from past experience.

In some cases, Eda Ranu has also reduced the fees that informal settlements have to pay for water and helped them to develop payment plans for outstanding bills. These subsidized connections yield more revenue than the status quo of illegal or turned off connections, and may establish a precedent for charging higher tariffs in the future once the population becomes used to using and paying for formal services. Once familiarity with paying for water is established there is also scope to increase charges as service levels improve for example, moving from standpipes to household connections.

Furthermore, only Eda Ranu offers a bulk tariff for connections to shared water points. In the other countries, increasing block pricing structures tend to perversely penalize the poorest, as

a single connection that is shared by multiple households quickly moves the water tariffs to the highest, most expensive level. Communal, shared water taps from Blacksands Settlement in Vanuatu which attract the highest tariff rate are depicted in Figure 3.5.

FIGURE 3.5: SHARED WATER TAPS IN BLACKSANDS SETTLEMENT IN VANUATU



TABLE 3.6: TYPICAL WATER AND SANITATION TARIFFS FOR CONNECTED HOUSEHOLDS

	Average Monthly Settlement Household Income (USD)	Water Tariff for 7,500 Liters (USD)	Sewage Tariff for 7,500 Liters (USD)	Water Tariffs as Percentage of Household Income ^a	Water and Sewerage Tariffs as a Percentage of Household Income ^b
Honiara, SI (Solomon Water)	\$83	\$21.70 ^c	\$12.24 ^d	27%	41%
Suva, Fiji (WAF)	\$293 to \$456	\$2.45 ^e	\$1.50 ^f	<1%	1%
Port Vila, Vanuatu (UNELCO)	\$103 ^g	\$24.13 ^h	N/A	23%	23%
Port Moresby, PNG (Eda Ranu)	\$455	\$7.78 ⁱ	\$2.84 ^j	<2%	2%

Source: Utility websites, interviews, and *Social Research Findings And Recommendations, Papua New Guinea: Sanitation, Water Supply, and Hygiene in Urban Informal Settlements* by Penny Dutton, World Bank—Water and Sanitation Program (2014)

Notes: The water and sewerage tariffs as percentage of household income calculation is theoretical, as water and sewerage services are not always provided to settlement households.

^a Assuming a five-person household consuming 50L per person per day (about 7,500 liters of water).

^b Assuming 7,500 liters of water and wastewater.

^c This figure includes the US\$6.31 base charge (which covers water and wastewater), plus the tariff of USD\$0.79 per 1,000 liters.

^d This figure includes the US\$6.31 base charge (which covers water and wastewater), plus the US\$0.41 charge per 1,000 liters. If a household has a water and sewerage connection, it would only pay the base charge of US\$6.31 once per month.

^e This figure includes the US\$0.75 fire charge (flat rate), plus the tariff of US\$0.076 per 1,000 liters.

^f This figure includes the US\$0.75 fire charge (flat rate), plus the tariff of US\$0.10 per 1,000 liters. If a household has a water and sewerage connection, it would only pay the base charge of US\$0.75 once per month.

^g This is the average monthly household income for the lowest decile in urban Vanuatu. (See: Table 2-3 <http://www.vnso.gov.vu/index.php/component/advlisting/?view=download&fileId=2006>).

^h This figure includes the US\$7.79 quarterly base charge (for a 15 mm meter, which is typical for domestic consumers), plus the tariff of US\$0.62 per 1,000 liters.

ⁱ This figure includes the US\$1.94 monthly charge, plus the US\$0.39 per 1,000 liter tariff. It does not include the US\$23.28 annual fee.

^j This figure includes the US\$1.94 monthly charge, plus the US\$0.12 per 1,000 liter tariff. It does not include the US\$23.28 annual fee.

Table 3.6 indicates households' relative ability to pay for formal, monthly water and sewerage services. The table calculates the cost of 7,500 liters of water (50 liters per person per day for a family of five) and calculates the cost as a percentage of household income (excluding connection fees). It also calculates the cost of sewerage for 7,500 liters, and the cost of both water and sewerage as a percentage of household income. Solomon Water and UNELCO water services appear to be both the highest priced and the least affordable to settlement households. In contrast, WAF and Eda Ranu have heavily subsidized water tariffs and other targeted subsidy programs for the poor.

In practice, many settlement households face additional barriers to connecting to utility-supplied water. As an alternative, they tend to rely on water from surface supplies, rainwater catchment (as shown in Figure 3.6), or shallow wells that are more likely to be contaminated.

FIGURE 3.6: RAINWATER CATCHMENT CONTAINER IN BLACKSANDS SETTLEMENT IN VANUATU



Households may buy water by the unit from private vendors at even greater expense. The way water is resold and the consequent charge varies significantly between settlements both within and across the countries. In Burns Creek settlement in Solomon Islands, around 360 households rely on water from two formal water connections. The households who monitor these connections charge SB\$5 [US\$0.65] for a wheelbarrow-load of filled water containers. In Blacksands Tongariki in Vanuatu, settlers were observed re-selling water from UNELCO. One drum of water was sold for VT100 [US\$10].

FIGURE 3.7: DRUM OF PURCHASED WATER IN PORT VILA

Meanwhile, in PNG, researchers observed Segani settlement households paying K10 [US\$3.84] per month from a community managed public tap stand. This effectively leads to a cost of between K3.79 to K100 [US\$1.53 to US\$40.39] per 1,000 liter that is significantly higher than Eda Ranu's rate of K1 [US\$0.38] per 1,000 liters (for the first 15,000 liters per month).

Table 3.7 helps us to understand one-off costs for water and sewerage connections and the cost to desludge a septic tank. Costs of installing fixed hardware like pit latrines or septic tanks should be available soon from forthcoming research.⁵

TABLE 3.7: COST OF CONNECTION FEES AND DESLUDGING

	Water Connection Fee (USD)	Sewage Connection Fee (USD)	Price to Desludge a Septic Tank (USD)
Honiara, SI (Solomon Water)	\$125 to \$450 ^a	N/A ^b	About \$65
Suva, Fiji (WAF)	\$150 to over \$500 ^c	\$185 to \$235	About \$150
Port Vila, Vanuatu (UNELCO)	\$94 to \$780 (Estimated)	N/A	About \$200
Port Moresby, PNG (Eda Ranu)	\$383	\$388	About \$450

Source: Interviews, utility websites

^a SW website cites the \$125.98 fee, but interviews indicated connection fees could be as high as \$450.

^b SW has no plans to expand its network, and has not for decades.

^c It costs US\$10.97 for application fee. It costs about US\$140 to connect to an existing meter, about US\$170 to US\$200 to connect to a mainline on the same side of the street, and over US\$500 if the connection must cross the road to access a mainline.

⁵ Live and Learn Environmental Education has a multi-year grant to improve sanitation product and service markets for urban areas in the four study countries. The first phase of that research included a sanitation marketing survey that evaluated private sector sanitation product and service prices. The report is anticipated by mid-2015.

Across all the study countries, water and sewerage connection fees are high relative to the income of most settlement households. In Vanuatu and Fiji, the connection fee depends on the location of the household (for example, whether the connection will have to cross a road). Some of the connection fees published on utility websites do not correspond with the connection fees cited during interviews. This discrepancy could be due to hidden formal or informal costs. WAF is the only utility that explicitly offers payment plans for connection fees.

Desludging fees are also prohibitively high for most low-income households, which partially explain why many households do not appropriately maintain their toilet systems. Desludging companies from each city quoted a range of prices, which were largely dependent on the location of the household. The price listed was for a typical home in the city (that is, formal or informal households in urban areas), and is the average of the given range.

3.3 Summary of Water Supply in Settlements

This section looks at water supply access and services in settlements using the IRC Service Level framework to convey the level of services residents use, rather than just the infrastructure available to them.⁶ Service-level indicators capture user-oriented factors like accessibility, water quality, crowding, and other dimensions described in Table 3.8.

TABLE 3.8: APPROACH TO IRC FACTORS

	Accessibility	Quality	Quantity	Reliability
High	People spend less than 30 minutes per day accessing water	High levels of treatment, good quality water	At least 60 liters per capita per day	Continuous (24/7) service on-demand
Intermediate	Peoples spend at most 30 minutes per day accessing water	Some treatment, acceptable quality water from an improved source	At least 40 liters per capita per day	Service the majority of the time
Basic	People spend at most 30 minutes per day accessing water	Untreated, acceptable quality water from a point source, including wells, boreholes, or gravity systems	At least 20 liters per capita per day	Frequent service shortages
Sub-standard	People spend over 30 minutes per day accessing water	Untreated, poor quality water from an unimproved or insecure source	Less than 20 liters per capita per day	Service shortages the majority of the time
No-Service	Water sources are very distant and time-consuming to access	Poor quality water from an unimproved or insecure source, if any	Less than 20 liters per capita per day, if any	No service the majority of the time

Source: Potter, Alana, Mekala Snehathatha, Charles Batchelor, Andre Uandela, Arjen Naafs, Catarina Fonseca, and Patrick Moriarty. 2015. *Assessing Sanitation Service Levels*. IRC International Water and Sanitation Centre.

Note: Sub-standard services are considered an improvement over no-service, but fail to meet the basic standard on one or more criteria.

⁶ Potter, Alana, Mekala Snehathatha, Charles Batchelor, Andre Uandela, Arjen Naafs, Catarina Fonseca, and Patrick Moriarty. 2015. *Assessing Sanitation Service Levels*. IRC International Water and Sanitation Centre.

While service to settlements is highly variable, Table 3.9 represents our best estimation of the overall situation in both urban and peri-urban settlements based on data, reports, and interviews.

TABLE 3.9: WATER SUPPLY SERVICE LEVEL RATING FOR INFORMAL SETTLEMENTS

Factor	Honiara, Solomon Islands	Suva, Fiji	Port Vila, Vanuatu	Port Moresby, Papua New Guinea
Access: Based on minutes per round trip; number of users per day	No-Service	Intermediate	Basic	Sub-standard
Quality: Based on regular testing meeting national norms and user perception of quality	No-Service	Basic	Basic	Sub-standard
Quantity: Liters per capita per day	Sub-standard	Intermediate	N/A	Sub-standard
Reliability: Considered improved if works most or all of the time	Sub-standard	Basic	Basic	Sub-standard
Overall Rating	No-Service	Intermediate/ Basic	Basic	Sub-standard

In urban areas of Honiara, non-tenured residents may share piped water with neighbors if they are unable to secure household connections. In peri-urban settlements, however, residents appear to rely almost exclusively on shallow wells (near the home, shown in Figure 3.8) and surface water (farther from the home). From the in-country visit, wells seem to be lined with two to three 50-gallon drums with stone bottoms. Households share wells, but prefer to have their own well as soon as they can afford the drums. Wells reportedly produce adequate water for most of the year. In the driest seasons, women collect from a nearby river that is contaminated. The river is used year-round for laundry, bathing, and defecation. Interviewees stated that many wells are at risk from being contaminated because they are located close to hand-dug pit latrines. These wells were insecurely covered by a sheet of metal. According to resident interviews and World Vision staff, boiling or other forms of water treatment is not commonly practiced.

Many settlements in the Greater Suva Area of Fiji, by comparison, seem to have access to piped utility water that ran “most” of the time within or next to homes. In these settlements, storage containers (which are needed due to intermittent service) or broken PVC distribution lines may compromise the quality of utility water. In newly-established peri-urban areas, settlements cannot connect to WAF services if they are too far away from an existing main, causing settlers to resort to springs and collected rainwater. WAF views these communities as potential customers; consequently, residents are more likely to get formalized services soon relative to peri-urban residents in the other countries.

FIGURE 3.8: SHALLOW WELL LINED WITH DRUMS IN BURNS CREEK NEAR HONIARA

In Port Vila, some settlements with land tenure benefit from shared standpipes. Standpipes require women and children to hand-carry water and often pay for water on a per-container basis. Long queues and intermittent service are common.⁷ Settlers complement UNELCO water regularly with rainwater or shallow wells, which is consistently low quality due to unsafe storage containers and missing sanitation services. Likewise, piped utility water is likely contaminated at the point-of-use due to household collection/storage container contamination (as depicted in Figure 3.9, a fridge was used as a makeshift water storage container in Blacksands Settlement in Vanuatu). Water treatment at the point-of-use is reportedly rarely practiced.

FIGURE 3.9: MAKESHIFT WATER STORAGE CONTAINER FROM BLACKSANDS SETTLEMENT IN VANUATU

⁷ Wan Smolbag. Port Vila Urban Development Project, KAP Research Report. Port Vila, Vanuatu, 2014.

Port Moresby settlements are perhaps most extensively served by utility water, though much of it seems to be with illegal connections resulting in non-revenue water for the utility or standpipes. Residents (primarily women and children) usually complement their collection of utility water from standpipes with rainwater or surface water due to long waits at standpipes and interrupted service. Non-piped water is used for bathing, dishwashing, and laundry. Water quality is consistently low at point-of-use due to poor network integrity from illegal connections, intermittent water flow, and from contaminated collection/storage containers.

3.4 Summary of Sanitation in Settlements

The IRC Service Level framework is used here to evaluate sanitation. While the JMP data presented in Section 3.1 evaluate whether or not a resident has access to a toilet, the IRC Service Level framework incorporates the level of service the user has at that toilet. The IRC Service Level framework assesses factors like crowding, cleanliness, and ease of access (for example is it locked at nights or difficult to access for children or disabled residents). The framework also includes indicators related to quality and safety of waste containment and disposal.

IRC proposes a four-parameter assessment tool to evaluate service sanitation service levels covering accessibility, use, reliability, and environmental protection. This report adds a fifth parameter to capture hygiene. The rating approach used for four parameters is described in Table 3.10. Hygiene is generally rated based on whether hand-washing stations appeared to be visible, functional and used at or near toilets.

TABLE 3.10: APPROACH TO IRC FACTORS

	Accessibility	Use	Reliability	Environmental Protection	Hygiene
Improved	Each family dwelling has one or more toilets in the compound; easy access for all family dwellings	Facilities used by all household members	Regular or routine O&M (including pit emptying) service requiring minimal effort; evidence of care and cleaning of toilet	Non problematic environmental impact/safe disposal and re-use of safe by-products	Hand washing place with constant supply of water and soap
Basic	Cement or impermeable slab at national norm distance from households (per household or shared)	Facilities used by some household members	Unreliable O&M (including pit emptying) requiring high-level of user effort; evidence of care and cleaning of toilet	Non problematic environmental impact/safe disposal	Hand washing place with water (irregular)
Limited	Platform without impermeable slab separating faeces from users	No or insufficient use	No O&M (e.g., pit emptying) taking place, and no evidence of cleaning or care for the toilet	Significant environmental pollution, increasing with increased population density	No hand washing place
No-Service	No separation between user and feces, e.g. open defecation				

Source: Potter, Alana, Mekala Snehalatha, Charles Batchelor, Andre Uandela, Arjen Naafs, Catarina Fonseca, and Patrick Moriarty. 2015. *Assessing Sanitation Service Levels*. IRC International Water and Sanitation Centre.

Note: The study team developed the hygiene parameter and respective service levels for this report.

Across all study countries, sanitation services in settlements tend to be uniformly limited or missing. The assessment in Table 3.11 represents our best estimation of the overall situation in both urban and peri-urban settlements based on data, reports, observations, and interviews.

TABLE 3.11: SANITATION SERVICE LEVEL RATING FOR SETTLEMENTS

Factor	Honiara, Solomon Islands	Suva, Fiji	Port Vila, Vanuatu	Port Moresby, Papua New Guinea
Access: Number of toilets per household. Distance from household to toilet	Limited	Basic	Limited	Limited
Use: Safe access to facilities at all times for all members of a household	Basic	Improved / Basic	Limited	Limited
Reliability: Superstructures and substructures are maintained, operating	Limited	Basic	Limited	No-Service
Environmental Protection: Non-sewered toilets at least 15 meters from water sources; waste safely disposed of or re-used	No-Service	No-Service	No-Service	No-Service
Hygiene: Hand-washing facilities	No-Service	Basic	Basic	No-Service
Overall Rating	Limited	Basic	Limited	No-Service

In the three settlements visited by the assessment team in Honiara, there appeared to be many shared toilets within a reasonable proximity. These toilets were often shared by multiple households, and some had improved user interface such as a cement base or even a fiberglass pedestal commode. These tend to be hand-dug pits that fill up quickly due to high water tables. Pits are covered when full, and toilets are re-dug when space permits (this happens more often in peri-urban settlements than urban settlements). Figure 3.11 depicts a cluster of pit toilets, two of which are full and abandoned and one of which is working. Some toilets were unimproved hanging toilets. No hand-washing stations were visible, which is likely due to the lack of water.

Toilet facilities in the Greater Suva Area are often shared by families living within the same household, but not by other households in the community. Relative to other study countries, residents had greater financial means to improve and maintain superstructures, and have access to piped water to facilitate pour flush toilets and hand washing. Waste, however, is consistently handled unsafely, either with straight pipes to nearby streams or to shallow underground containment structures with inadequate storage or drainage. Hanging toilets are not uncommon. In settlements with regular flooding and standing water, toilet facilities are often elevated and may be frightening or unsafe for children.

FIGURE 3.10: CLUSTER OF FUNCTIONING AND CLOSED PIT TOILETS IN BURNS CREEK NEAR HONIARA



Note: The photo on the left depicts a cluster of pit toilets. Two of these are full and abandoned, and one is functional. The functional pit toilet is enclosed by tin in the background. The interior of this pit toilet is shown on the right. One appears to be under construction in the foreground. The white wall is a private toilet with septic system. These toilets are between 15 and 20 meters from a shallow well.

BOX 3.5: ADB COLLABORATES WITH NGOS TO UPGRADE SETTLEMENTS

The Asian Development Bank (ADB) is currently funding the Port Vila Urban Development Project (PVUDP).

One activity of the PVUDP is to install multi-purpose, multi-user (MPMU) sanitation facilities (including toilets, washing, and bathing facilities) in several informal settlements. ADB engaged Wan Smolbag (a domestic NGO) and World Vision to undertake community consultations to decide which settlements should receive MPMU facilities. The ADB selected communities based on need and willingness of the constituents to contribute to the capital cost and maintenance of facilities. Informal settlements with known land tenure conflicts were not considered.

Implementation is scheduled for 2015. For some communities, PVUDP will refurbish existing MPMU facilities; it is unknown who originally built these existing facilities. In other communities, PVUDP will build new facilities or provide materials to communities so they can construct their own semi-private facilities. World Vision will help these communities to establish management strategies. No formal city authority is expected to be involved moving forward.

FIGURE 3.11: CURRENT TOILET FACILITIES IN BLACKSANDS SETTLEMENT



Port Vila settlement communities use community-managed toilet blocks more often than other study countries. The Port Vila Urban Development Project (PVUDP) is one notable project that plans to build multi-user, multi-purpose toilet blocks in the settlements in Port Vila. The PVUDP is described in more detail in Box 3.5, and is an example of how donors can collaborate with NGOs and other stakeholders to advocate for the settlements and include them in the urban agenda.

Other than the PVUDP, there are no other sanitation projects focussed on informal settlements currently in progress. According to the PVUDP Knowledge, Attitude, and Practice (KAP) report, most informal settlement households rely on pit or long-drop toilets (known locally as “bush toilets”), septic tanks, or openly defecate. Few settlement households have their own “improved” toilets, ventilated improved pit (VIP) toilets, or water-sealed toilets. A little over half of settlement households surveyed (54%) found it difficult to use community toilets because of wait times, and 63% of respondents said the facilities are not maintained and unclean.⁸ Children, disabled people, and sometimes adults resort to open defecation because community toilets are dirty, closed, or physically difficult to access.^{9,10} Waste is consistently unmanaged.

In Port Moresby, when available, toilets tend to be close to homes and shared with multiple families. Based on a recent WSP-World Bank Group study, the vast majority (95%) of toilets are 50 meters or less from the household, and about half of those were less than ten meters away.¹¹ Still, many people report resorting to open defecation because of fear or disgust of poor toilet conditions or general inaccessibility. About 8% of households reportedly practiced open defecation according to a survey of settlements in Wewak and Port Moresby.¹² Within households, children, elderly, and the disabled more frequently resorted to open defecation. Open defecation exposes women and children, which is reported to make them vulnerable to violence or abuse.¹³

Pit toilets in Port Moresby settlements are generally covered over when full. Open-bottom and/or unlined pits and hanging toilets discharge waste into the open environment or into groundwater; in low lying areas, waste flows into communities during flooding or heavy rains. Hand-washing facilities are not available at toilets and hand-washing after defecation is not reportedly practiced otherwise.

⁸ Wan Smolbag. *Port Vila Urban Development Project, KAP Research Report*. Port Vila, Vanuatu, 2014.

⁹ Interview with PVUDP Management Team

¹⁰ Observation during site visit

¹¹ *Social Research Findings And Recommendations, Papua New Guinea: Sanitation, Water Supply, and Hygiene in Urban Informal Settlements* by Penny Dutton, World Bank--Water and Sanitation Program (2014)

¹² *Social Research Findings And Recommendations, Papua New Guinea: Sanitation, Water Supply, and Hygiene in Urban Informal Settlements* by Penny Dutton, World Bank--Water and Sanitation Program (2014)

¹³ *Social Research Findings And Recommendations, Papua New Guinea: Sanitation, Water Supply, and Hygiene in Urban Informal Settlements* by Penny Dutton, World Bank--Water and Sanitation Program (2014)

Chapter 4

Key Findings and Recommendations in Melanesian Settlements

While settlement communities and their respective service levels differ across the region, all informal settlements in Melanesia face significant shortfalls in the provision of WASH services. The reasons for this are multi-faceted and complex; there are country- and city-specific legal, institutional, financial, and cultural barriers.

This section describes key findings and provides high-level recommendations that stakeholders can use as a starting point to develop a next-steps action agenda.

4.1 Reasons for Inadequate WASH Service Delivery in Informal Settlements

This section summarizes the main common features that lead to inadequate WASH services in Melanesia's WASH sector, which are used to target the recommendations made in Section 4.2.

1. The political motivation to ensure adequate WASH service access in informal settlements is weak and, in some cases, implicitly adverse

- **There is little actionable research about the scale and nature of the challenge in settlements** in each country, particularly as it relates to the economic and public health of capital cities. Trend data describing population growth, service access, health, and incomes in settlement are needed, but existing data are weak or non-existent. Government decision makers do not consistently make (or highlight) the connection

between WASH services in settlements and urban public/environmental health. This is despite the fact that missing WASH services could have significant public health and environmental consequences in densely populated urban areas, unless service levels are improved quickly.

- **Settlement residents do not effectively express their demand for improved WASH services.** Settlement residents do not have an active voice in Government to advocate for improved water and sanitation. Many settlers are recent arrivals and do not have local voting rights or representation given their informal residence. Settlements also tend to be outside of or straddling administrative units, so the target of any advocacy efforts is unclear or fragmented. Residents are often financially insecure and do not have the time or resources to engage in advocating for community improvements. Residents are likely to prioritize sending any spare financial resources to their home villages, rather than upgrading the living conditions within insecure settlements that are considered temporary residences.
- **There is little advocacy for settlement improvements among NGOs and civil society organizations.** Few NGOs or civic organizations actively improve or advocate for WASH services in informal settlements in the study countries, with the exception of Solomon Islands (where World Vision, UNICEF, and LLEE are all actively engaged). External parties like international donors inconsistently advocate for service improvements to urban settlements. Donors also have a history of prioritizing WASH investments either in rural areas or for large-scale piped infrastructure works in formal urban areas that do not tend to benefit poor communities. Development partners appear to prioritize improving formal urban environments and major infrastructure, under the assumption that informal and formal areas of the city are disconnected, or that work in formal areas will eventually be “completed” at which point work in settlements should begin.

A strong national advocate can play a powerful role in improving the situation in the settlements. In Fiji, People’s Community Network (PCN), a national NGO, has persistently pushed its advocacy message, described in more detail in Box 4.1.

2. National targets, policy environments, and financial or organizational capacity are not in place to support meaningful service provision to settlements now or in the future

- **National targets and monitoring methods exclude or inadequately incorporate settlement needs and growth.** Utility performance and nationally-reported JMP data clearly exclude service provision to peri-urban areas. National-level performance targets for urban development appear to be based on formal city boundaries and disregard how quickly urban landscapes are changing and growing. This detracts from decision makers’ and planners’ ability to assess existing situations accurately and to plan accordingly.

BOX 4.1: STRONG NATIONAL ADVOCATES CAN COLLABORATE WITH THE GOVERNMENT TO IMPROVE WASH IN INFORMAL SETTLEMENTS

In Fiji, PCN is a national NGO that has been able to successfully demand services on behalf of the settlements. PCN has played a strong role in getting the Government of Fiji to be more proactive and supportive about integrating the settlements into formal areas. This has led to projects like Lagilagi, a joint project with PCN and Department of Housing to move settlers from Jittu Estates off vulnerable lands and into low-cost housing (depicted in Figure 4.1).

The joint work between PCN and the Government of Fiji is a useful example of how a strong national advocate could facilitate collaborative efforts among stakeholders to improve WASH conditions in settlements.

FIGURE 4.1: LAGILAGI HOUSING FOR SETTLERS



- **The wantok system discourages systematic, fair provision of water and sanitation services.** The wantok (translated literally as “one-talk”) system is prevalent at all levels of Government in Solomon Islands, Vanuatu, and PNG. The wantok system is an unwritten, entrenched patronage system, where residents who speak the same language care “look out” for one another. The wantok system favors certain groups. For instance, residents may receive favors from politicians from the same wantok, while residents without wantok connections may be disadvantaged. The system undermines efficient political and economic processes and hinders systematic provision of services. The system prevails even at very local community levels of organization and appears to create a culture of dependence that undermines individuals’ or households’ sense of agency and responsibility.
- **Utilities are not obliged to and are sometimes restricted from serving settlements.** Utilities are typically the primary providers of water and sanitation services in urban areas. Utilities may be restricted from or not obligated to serve communities without formal land tenure or those located outside formal, but often out of date, service area boundaries.

Where utilities are responsible for sanitation services, there are effectively no activities or investments extended to settlements because of an almost universal exclusive focus on expanding traditional piped sewer systems. This narrow focus disadvantages informal settlements, many of which are likely to be best served through non-piped solutions.

- **Utilities tend to lack the financial and technical capacity or revenue motivation to extend equitable services to urban settlements.** Utilities strive to (and are sometimes required to) cover costs. Settlement residents are perceived to be low-paying customers who contribute to non-revenue water problems. Little or no research exists to support the testing or application of more appropriate, effective service delivery models (institutional or technical). Utilities also tend to under-invest in public good aspects of service delivery (such as waste treatment and disposal), and do not extend services to the most challenging communities unless well-designed equity measures are built into performance monitoring and payments.
- **Where utilities are not required to provide sanitation services, no alternative authority steps in to fill the void.** Some authorities in the region have expressed interest in developing a comprehensive national sanitation policy and want an agency to be clearly responsible. For instance, several stakeholders in Vanuatu expressed frustration at the lack of collaboration on strategic plans to improve sanitation in the country and the need for a sanitation policy.

NGOs and municipal authorities may attempt to fill gaps in an ad hoc manner. Projects in non-networked urban and peri-urban settlement communities are often isolated pilot projects or promote behavior change without addressing the missing community scale infrastructure and services required to enable behavior change or public good outcomes.

In the absence of guidelines, incentives or enforcement, private markets for sanitation services remain underdeveloped. The limited products and services provided do generate household-level benefits. However, this does not ensure equitable or socially optimal service provision because sanitation products and waste removal services are out-of-reach for low-income households.

3. The characteristics of rapidly growing informal settlements complicate effective WASH service delivery, and increase the cost of installing appropriate infrastructure at a household level retroactively

- **Settlement households are financially insecure, often mobile, and face tenuous relationships with landlords.** These characteristics undermine households' ability and inclination to demand property improvements or services from landowners, land managers, or community representatives.
- **Settlers may be unaccustomed to receiving and paying for water or sanitation services via direct utility relationships.** While many settlers have ability-to-pay constraints, some settlers have the ability to pay but are not willing to pay utility bills. Residents may perceive water to be a free commodity, as it was in their rural communities. They may expect local leaders to provide water as a "favor" as seems to be common in Solomon Islands. Intermediaries may illegally provide utility water to communities where residents are unable to establish direct customer relationships with the utility.
- **Settlements lack important complementary infrastructure** (such organized streets, drains, housing, roads etc.) and basic services (solid waste collection, flood management, etc). These facilities are often required to protect functional water and sanitation infrastructure assets in a cost-effective manner with minimal land impacts. The services delivered from these assets should be coordinated.
- **Settlements are often established on low-value and marginal land like steep slopes or coastal and riparian flood plains.** These areas tend to have high water tables and are prone to natural hazards and traditional infrastructure systems tend to be inappropriate. As a result, they are technically challenging to serve and many utilities do not yet have the technical capacities in-house to deal with these features. Hazards are also increasing with climate change and natural system degradation. For instance, settlers in the Wailea settlement outside of Suva stated that seasonal floods rise higher each year, now regularly entering homes due to mangrove degradation and increasing storm surges.
- **Settlement WASH problems reflect larger challenges associated with the absence of regional planning and strategic growth plans and implementation efforts.** Without integrated, regional investment plans that reflect growth, Governments will remain unable to protect settlers in hazard zones, ensure growing populations have a place to live, and invest in the right level of basic services in the right places. Evicting

settlers is not a long-term solution because evicted settlers quickly resettle, as was the case in Solomon Islands (described in more detail in Box 4.2). Low-income urban housing is already exceedingly under supplied and rural urban migration appears to be increasing.

BOX 4.2: EVICTING SETTLERS DOES NOT WORK AND IS NOT A PERMANENT SOLUTION

In Solomon Islands, authorities tried to evict settlers near the Matanika River. Authorities were unable to enforce these evictions, and settlers returned to the same area to rebuild. These homes were rebuilt after the recent floods and are depicted in Figure 4.2. Authorities mistakenly believe that withholding WASH services discourage settlement formation.

FIGURE 4.2: RE-BUILDING HOMES ALONG THE MATANIKA RIVER IN HONIARA AFTER THE FLOODS



4. No Government, utility, or private sector entity is incentivized to test the technical and service delivery innovations needed to address the challenges in settlement communities, particularly for sanitation service delivery

- **Internationally-identified solutions should be adapted to local contexts and tested in each country.** Some technical and institutional progress is being made internationally to address WASH in settlements. These successes must be identified and adapted to local situations. However, this requires resources and incentives that are currently inadequately provided through conventional service tariffs. Many benefits are likely to accrue through public health and environmental improvements, which are not directly factored into utility tariffs in most countries.

- **NGOs develop projects to test innovations without active collaborative partners in Government.** Efforts to this end are extremely limited in Melanesia, particularly in sanitation. The impact from these efforts is further limited if NGOs are unable to plan and implement projects in collaboration with a government entity responsible for implementing services in settlements in the long run. This may be because no clear Government or utility partner exists, no entity is willing to partner with the NGO, or the NGO prefers to work independently. Regardless of the reason, an important opportunity is lost to build up institutional capacity and to monitor, evaluate, document, and scale-up promising initiatives.
- **Stakeholders interpret their responsibilities to deliver sewerage services separate from a responsibility to ensure adequate and safe sanitation** (regardless of what technology is used to deliver that outcome). This reduces planners' ability to design systems that integrate a portfolio of sanitation solutions to solve diverse situations in urban areas. This also inappropriately signals that all non-sewered options are "temporary fixes," undermining businesses', households' and governments' incentives to invest in sustainable alternative solutions.

5. Settlement residents resort to poor quality and/or expensive alternatives, too often at the expense of their own health and a utility's assets

- **Women and children bear the greatest cost of underprovided WASH services.** Women and children tend to be responsible for fetching water when it is not supplied near their home—often involving long hours and many trips. For example in Port Moresby some women were spending three hours every day collecting water from standpipes or illegal connections – not always due to long distances getting to a water point but from low pressure and queues at taps. This is a large loss of time which could be better spent in productive work. Carrying 20-30kg loads of water each trip (sometimes three trips per day) is also detrimental to women's health and wellbeing. Some women in settlements have been doing this daily for 15 to 20 years. Sometimes women must collect water at night and they feel unsafe making the journey when it is dark. There are many cases of rape, violence, and harassment of women when collecting water or defecating in early mornings or at night. Women and children in settlements are unlikely to have formal employment where they can access alternative services during the day. Women are most responsible for caring for sick family members including those affected by waterborne diseases. Consequently the time when water sources and toilets are needed close to home for washing and toileting they are not and the burden for women is increased. In all four countries women have a lower status than men and lack public representation at all levels. For example only 4% of local councillor positions were held by women in Vanuatu and nearly all settlement leaders are men, with no female representatives in parliament.
- **Many settlers are paying for informal WASH goods and services through alternative providers, which is a lost revenue opportunity for utilities.** As informal populations grow, the need for water services grows accordingly. Informal entrepreneurs fill gaps in

the market if formal services are not offered. Increasing reliance on these community-scale entrepreneurs creates further public health risks. Utilities are often unable to mobilize resources for long-term cost-avoidance strategies (for example to address challenges that might undermine the long-term viability of their investments) or to innovate their service delivery approach to reach residents in unserved settlements. Regulatory mandates for improving service in settlements and coordinated public investments—either through subsidies, financing, or both—are required to strengthen utilities and promote equity, public health, and positive environmental outcomes.

- **In the absence of adequate services from regulated formal providers—utilities or vendors otherwise—households cope using ad hoc, often unsafe practices.** Households must transport and store water when service is not consistent or convenient. Informal storage systems and low quality shared connections contaminate utility water at the point-of-use due to mould and bacteria, as depicted in Figure 4.3. When utility water is not available or adequate, surface water sources and accessible ground water supplies are used. These tend to be contaminated by poor management practices and by missing or inappropriate sanitation systems.
- **Complementary infrastructure, especially wastewater, is missing or underprovided.** When utilities or informal providers address the immediate water demands of a community in an unplanned manner, complementary services like graywater or blackwater drainage and treatment are not installed. This detracts from the potential health gains achievable from clean water supply by exacerbating other disease risks such as increasing standing water for disease vectors like mosquitos and spreading fecal pathogens.

FIGURE 4.3: HOUSEHOLD INFORMAL COLLECTION POINTS AND COLLECTION CONTAINERS IN PNG



Source: *Social Research Findings and Recommendations, Papua New Guinea: Sanitation, Water Supply, and Hygiene in Urban Informal Settlements*. World Bank. Water and Sanitation Program (2014), Photo: Penny Dutton

4.2 International Experience

Many of the issues experienced in the four Melanesian countries are similar to issues faced in other peri-urban and informal settlements in Africa, South America, Central and Southeast Asia. Lessons learned from these settings are relevant to the Pacific.

The following examples typify the rich international experience that exists in this subsector:

Mozambique: Improved service delivery in formal and informal urban areas: The World Bank Group has been supporting water sector investments through a series of projects that have had both institutional and infrastructure activities embedded. Investments have been planned in an integrated manner, considering water resource and technical requirements, financial sustainability and institutional models for operations. A national water utility was created with a flexible geographical mandate to overcome the issue of settlements crossing jurisdictional boundaries. Land tenure documentation is not a requirement for connection and service provision. Support to create a commercial/business oriented culture has resulted in settlement residents being viewed as potential new customers, rather than an obligation or burden. Support to the Central Government level to ensure that expansion of water supply services is a key Government priority has resulted in this regularly included in the Government's national development plans and key objectives/targets are established in national policy. A trial of targeted subsidies for low-income households to reduce the connection fee barrier has been very successful, and institutionalized by the regulator, which has reduced the household connection costs. The utility has a policy of increasing household connections, and slowly removing standpipes in peri-urban settlements that have been difficult to manage through community management. Increasing the household connection density reduces the amount of illegal tapping and benefits the household. Data have shown that the amount of sharing (individual household connections) has been declining significantly as connection density has increased. This also reduces the risk of these customers being charged more due to high consumption under a block tariff. Experience has also shown that some assumptions around ability of settlers to pay were incorrect: low income households have generally understated/under declared household incomes, and actual payment records for low-income households compared to other customers found that the low-income households have respect for the connection and are not the main contributors to the utility's collection challenges. The utility also has spent considerable efforts making it easier to pay, including payment offices in close proximity to the settlements and establishing systems for people to pay on weekly or bi-weekly basis (e.g. using mobile phone credit), rather than end of the month payments, which can be problematic. The utility has experienced vandalism of assets including damaged water meters, and taps being stolen. This can be a complicated problem and requires social/educational programs and political intervention.

Benin, Rwanda and Haiti water supply: Positive results in Africa (Rwanda, Benin) and more recently in Haiti were obtained after delegating operation and basic maintenance to locally created and trained operators for water supply systems. These operators can be

entrepreneurial individuals from the community that aim to cover O&M costs, connect new clients (either household connections or public standpipes/kiosks) and generate extra revenue for themselves. Some of them can manage more than one system and live from that, others manage a system and complement this with other sources of revenue. In this model:

- Network expansion and investments in infrastructure are the responsibility of the utility, as is monitoring of the operators' performance. Users' associations are created to represent the user's interest and close the "accountability loop";
- The operator signs a contract with the utility for service delegation and individual contracts with users and collects payments based on the volume of water consumed. The model replaced community-managed systems after years of financially unsustainable service, the infrastructure deteriorating due to lack funds for maintenance;
- In Africa and Haiti, local entrepreneurs were preferred to firms from the bigger cities, because of their existing connection with the community (trust is easier to establish) and also because firms from outside the communities, sometimes utilities saw little economic opportunity in operating these smaller water supply systems.

A learning from Haiti and Benin was that governments and utilities need to understand as a first step the limits and opportunities of the innovative solutions already in place or recently developed either by utilities, NGOs or the communities themselves. In places where they work, support them and their implementers by providing training and encouraging entrepreneurial locals to participate, while monitoring the quality and sustainability of service provision. In places where they do not work or are unsustainable, encourage the switch to other solutions based on adaptations of international examples. There may not be one solution and different management models may exist in parallel.

Zambia Copperbelt vandalism reduction in Low Income Communities: The Nkana Water and Sewerage Company has dealt with its water theft and vandalism and theft of meters, pipes, and manhole covers through an integrated approach. This approach involves: improving customer and utility relations by developing an association with the Ministry of Health through a shared sanitation program; organizing visits for community leaders to sewerage and water treatment works to help them understand the utility's work and the challenges that it faces; and investing in community engagement; increasing the community's sense of ownership by introducing the requirement for each household to make a financial contribution to construction costs; strengthening law enforcement to ensure perpetrators are held to account. This includes working with police to help them to understand the law in this area, and the training of prosecutors within the utility.

Kenya: Delivering water and sanitation services in informal settlements: The Nairobi City Water and Sewerage Company is servicing informal settlements through: bulk water to 'kiosks'; house connections; sanitation blocks; and sewerage connections – working in partnership with NGOs.

Lessons learned include:

- Community involvement and participation opens the door to success
- A sense of ownership by the community ensures sustainability
- Partnerships make implementation easy through synergies
- The results of reducing illegal connections and unaccounted for water are increased revenue
- Buy-in from employees is needed to provide pro-poor services.

South Africa: eThekweni utility community ablution blocks (shared facilities): This example points to creating affordable and clean shared facilities (as a first step towards another solution) in peri-urban areas. This example could alleviate some of the challenges described in Melanesia such as rental arrangements, financial insecurity, and mobility, however community ablution blocks need to consider ethnic relationships in settlements and security for women. See <http://www.susana.org/en/resources/case-studies/details/792>.

4.3 Recommendations for Improving WASH Services to Informal Settlements

Finding solutions to the service shortfalls identified in this report is challenging. Solutions need to respond to the particular circumstances found in each settlement, but need to be implemented with relatively limited financial and technical resources.

The recommendations presented focus on institutional changes (rather than specific technical solutions). These recommendations aim to motivate further discussion on a next steps agenda.

Central Government authorities should establish clear national mandates for service delivery, clarify the organizational authority and their obligations to implement services, and set clear service level targets for settlements

Each study country should start by establishing clear national mandates for service delivery, along with performance incentives and resources to achieve specific targets for service delivery. Targets for WASH service provision in urban areas should explicitly incorporate improvements to the services delivered in informal settlements. Targets must be based on research and data that reflect the current access rates in settlements, their rate of growth, and the particular challenges of providing WASH services in these communities.

Targets should emphasize WASH outcomes (access, cost and environment), while also incorporating process indicators like stakeholder engagement (specifically achieving meaningful engagement with women and children). Equity and public health indicators should also be made explicit.

Regulatory and monitoring authorities should be distinguished from the agency responsible for implementing WASH improvement programs. The authorities responsible for achieving targets and those responsible for monitoring performance and progress need to be identified and funded to ensure that evaluation efforts are meaningful and can inform future decisions.

Organizations responsible for achieving outcomes may or may not be the exclusive executing agencies. Public-private partnerships and coordinated regional planning and implementation should be considered among the options.

Incorporate settlements into existing or emerging sector investment plans, based on actionable research

A stakeholder-driven research program is needed to help funders, regulators and implementers better reach unserved or underserved communities with both water supply and sanitation services. A focus should be on developing, testing and implementing service delivery strategies for high risk areas that are difficult to reach with existing technologies and service delivery models. Researched strategies should be designed to address the immediacy of need as well as the long-term nature of the challenge, moving away from stop-gap solutions for non-networked and informally settled communities. Sanitation research should result in a financially viable and actionable list of post-containment waste management options including reuse.

Research should identify and vet emerging technology options and opportunities for public private partnerships around for products and service delivery. This research should explicitly evaluate strategies for their ability to achieve public-good outcomes within settlements.

Research should also identify and vet financial tools that could be used to fund service delivery to unserved and disadvantaged customer segments and communities. CSOs and tariff structures that allow for cross-subsidies among customer segments are two tools to consider. Building demand for sanitation services in coordination with developing a stronger supply chain for settlement-oriented goods and services may require financial tools like advance purchase agreements and targeted consumer subsidies for pre-qualified products and services.

Utilities and settlement residents should collaborate to identify a list of barriers to improving WASH services. Action research can help stakeholders identify workarounds for known obstacles like land tenure requirements (for example WAF's edge of settlement meter solution), and intermediaries who unreliably remit collected water fees to utility providers (for example moving to mobile phone-based billing and payment).

National Governments should require and fund the implementation of agencies' short, medium, and long-term investment plans for reaching settlements.

Performance monitoring and evaluation should be associated with payment-based performance incentives

Tremendous innovation is required to meet the new and constantly growing and evolving WASH needs of settlement communities. Many cities around the world are developing practical approaches to address similar challenges. Incentives are missing for service providers in Melanesia to plan for and respond to that pace of change—particularly in sanitation—with situation-appropriate options. Outcome-oriented performance incentives can both resource and motivate implementers to identify and invest in the best technologies and capacity building opportunities to achieve established performance targets.

Revenue incentives may already exist for some utilities simply based on the size and growth rate of settlements. However, this revenue opportunity could become a liability if infrastructure is damaged or non-revenue water losses increase. Donors and utility boards should support service providers to model the potential risks and benefits (for example increased revenue, costs avoided and system-wide pressure improvements) of different settlement service delivery scenarios in the medium and long-term.

Utilities in other regions have established divisions charged with developing and implementing service provision schemes for underserved communities. Utilities in study countries should consider this approach. Performance incentives within the utility could also be used to improve performance of such programs toward established service delivery and tariff collection targets.

Technical assistance to support recommendations

There is considerable scope for development partners to constructively support settlement inclusion through the provision of technical assistance and analysis in key areas that may not be a current priority for government and which would ordinarily be outside the operating scope of utilities. These areas include:

- further analysis on quantify the costs and define economic benefits associated with investments in improved water and sanitation services;
- advocacy to government using evidence from analysis and previous international experience;
- policy development for WASH services to settlements and the development of sanitation and water supply guidelines for services including the role of subsidies;
- strategic planning for city water supply and sanitation services;
- private sector engagement both for water supply (operations, maintenance, management) and sanitation (including the development of affordable sanitation products for settlements);
- technical research and piloting of viable options to support low cost water supply and sanitation for settlements including non-piped water solutions;
- facilitating peer-to-peer learning and networking on improving commercial management of utilities and increasing viability for reaching settlements. Existing networks such as PWWA could also be strengthened.
- developing behavior change communication materials based on research for sanitation and hygiene; and improving customer information and engagement for water supply.

Explore innovative financing mechanisms to encourage alternative service provision solutions

As part of investment programs, development partners can negotiate the inclusion of settlement areas within service areas or select pilot settlements for action research.

Financing options such as Output-Based Aid should be explored for water supply. Under an OBA scheme the service provider bears the performance risk—this means that service providers pre-finance the outputs before being reimbursed by the OBA subsidy upon independent verification that pre-agreed outputs have been delivered. In the water sector these outputs are generally working connections, often demonstrated through billing or collections records.

For sanitation, the option of household micro credit paired with a sanitation markets initiative may seem viable.

The Pacific Region Infrastructure Facility (PRIF) is multi-development partner coordination, research and technical facility which supports infrastructure development in the Pacific. PRIF Members include: Asian Development Bank (ADB), Australian Development of Foreign Affairs and Trade (DFAT), the European Union and European Investment Bank (EU/EIB), Japan International Cooperation Agency (JICA), New Zealand Ministry of Foreign Affairs and Trade (NZMFAT), and the World Bank Group.



