Service Delivery Assessment
July 2013

Water Supply and Sanitation in Papua New Guinea

Turning Finance into Services for the Future

Department of National Planning and Monitoring

Department of Health

water png

EDA RANU
OUR WATER

WaterAid

THE WORLD BANK

wsp
water and sanitation program

This report is the product of extensive collaboration and information sharing between many government agencies, and Papua New Guinea organizations. The Department of National Planning and Monitoring, Department of Health, Water PNG, and Eda Ranu have been key partners together with WaterAid and the Water and Sanitation Program in analyzing the sector. The authors acknowledge the valuable contributions made by the European Union's Rural Water Supply and Sanitation Program, World Bank Country Management Unit, Asian Development Bank, Department of Implementation and Rural Development, Office of Urbanisation, National Statistical Office, Treasury, Independent Public Business Corporation, Japan International Cooperation Agency, World Vision, and PNG Sustainable Development Program.

The Task Team Leader for the Service Delivery Assessment in East Asia and the Pacific is Susanna Smets. The following World Bank staff and consultants have provided valuable contributions to the service delivery assessment process and report: Isabel Blackett, Penny Dutton, U-Primo Rodriguez, Trevor Nott, and Almud Weitz; as well as the following WaterAid staff: Rick Steele and James Wicken. Charles Feinstein, Sector Manager, Energy and Water, East Asia and Pacific Region, World Bank, and Laura Bailey, Country Manager, Papua New Guinea, World Bank, peer reviewed this report.

Water Supply and Sanitation in Papua New Guinea

Turning Finance into Services for the Future

Strategic Overview

Papua New Guinea's (PNG's) basic water supply and sanitation needs are large. Today, an estimated 4.2 million Papua New Guineans—which is 61% of the population—do not have access to safe water, and approximately 3.8 million people, or 55% of the population, do not have access to improved sanitation.

With a backdrop of high population growth and declining coverage rates, over the last two decades, the absolute number of people without access to water supply and sanitation has grown by 73% for improved sanitation and 67% for safe water. The Millennium Development Goal targets for water supply and sanitation are out of reach, and unless there is significant increase in investment and profound sector reform to address bottlenecks, so are the less ambitious national targets set in the Medium Term Development Plan for the year 2030.

The benefits to PNG of increased access to water and sanitation are significant: improved health of people through reduction in diarrhea, malnutrition, and stunting; increased time and household income through safe and convenient water supply; greater productivity leading to economic development and higher rates of gross domestic product; and business and tourism development.

However, water and sanitation are given a low priority in the country. The rural sanitation and rural water supply subsectors are especially overlooked and are in most need of government and external support because more than 90% of people without access to services live in rural areas. The growing peri-urban areas in larger towns and cities are also unserved and deserve immediate attention. Urban settlements, especially in Port Moresby, have a grim future of health and living conditions given the increasing in-migration driven by the boom economy and PNG's legal restrictions that prohibit new water connections from being established on land without formal title.

The key bottlenecks that currently impede progress in PNG's water and sanitation sector are the overall framework for service delivery (the enabling environment) and implementation. Bottlenecks in the enabling environment include a lack of policies that clearly articulate a vision, targets, and approaches for water and sanitation; unclear institutional roles in the sector; and lack of budget mechanisms for allocating and tracking expenditures to rural and urban water and sanitation. Implementation bottlenecks include insufficient finance allocated to the sector, weak monitoring systems, and a scarcity of qualified technicians and managers. Contextual factors such as political volatility, poor access from a lack of roads, no electricity, customary land ownership, and ethnic conflict also hamper progress.

To achieve government water supply and sanitation access targets for 2030, an average of US$31 million each year will need to be spent on water supply and US$70 million per year on sanitation. In addition, US$22 million per year will be needed to finance operation and maintenance of current and future infrastructure. In recent years, investment in the sector has averaged 0.3% of gross domestic product—just a third of the internationally recognized minimum allocation of 1%.

This Service Delivery Assessment was conducted as a multistakeholder process under the leadership of the government of PNG. Agreed priority actions to tackle PNG's water supply and sanitation challenges have been identified to ensure that finance is effectively turned into services.

The agreed priority actions to tackle these challenges and to ensure that finance is directly turned into services are as follows:

Sector-wide

- Urgently reform institutional arrangements for water and sanitation to achieve clear and separate responsibilities for all functions.
- Urgently develop a comprehensive sector policy covering all subsectors.
- Urgently increase investment in water and sanitation, especially in the rural sector.
- Develop a comprehensive capacity-building plan for all levels (national, provincial, district, local level government, utility, and community) and within all strata (decision makers, managers, technicians, and users) in the private and public spheres.
- Improve sector coordination, data collection, and monitoring.

Rural Water Supply

- Increase the capacity of provincial, district, and local level governments to plan and manage rural water supply development.
- Establish a national technical unit responsible for rural water supply.
- Improve financing procedures for decentralized expenditure on rural water.
- Conduct an inventory of rural water schemes and determine functionality and rehabilitation needs.
- Prioritize provinces or rural communities for targeted support.

Urban Water Supply

- Develop a comprehensive subsector 5-year investment plan for new works and rehabilitation/replacement of existing infrastructure.
- Urgently finalize and implement Community Service Obligations (CSOs), which adequately compensate for services in unprofitable areas.
- Separate operator and regulator functions.
- Establish criteria for prioritization of district town water supply.
- Promote private sector involvement in water supplies, particularly for informal and peri-urban (settlement) areas, where government is constrained by land ownership.

Rural Sanitation and Hygiene

- Develop a coherent approach for sustainable sanitation and hygiene promotion based on current initiatives.
- Establish and resource a dedicated nationwide rural sanitation and hygiene program with staff and budgets. The National Department of Health should be the national coordinating agency to support implementation by local level governments.
- Where possible, use data, for example, from Department of Implementation and Rural Development, to target priority areas where sanitation access is low.

Urban Sanitation and Hygiene

- Develop an urban sanitation strategy that includes a range of sanitation options and involves a range of private and public service providers.
- Develop alternatives to high-cost sewerage-only approaches.
- Improve urban septage collection, treatment, and monitoring.

Contents

Acronyms and Abbreviations

ADB	Asian Development Bank
CAPEX	Capital expenditure
CSO	Community Service Obligation
DHS	Demographic and Health Survey
DSIP	District Services Improvement Program
EU	European Union
JMP	Joint Monitoring Programme (for water and sanitation by United Nations Children's Fund and World Health Organization)
LLG	Local level government
MDG	Millennium Development Goal
MTDP	Medium Term Development Plan
NCD	National Capital District
NCDC	National Capital District Commission
NDOH	National Department of Health
NRW	Non Revenue Water
O&M	Operation and Maintenance
PNG	Papua New Guinea
RWSSP	Rural Water Supply and Sanitation Program
SDA	Service Delivery Assessment
SOE	State-Owned Enterprise
VIP	Ventilated Improved Pit
WASH	Water supply, sanitation, and hygiene

1. Introduction

Water and sanitation Service Delivery Assessments (SDAs) are being carried out in eight countries in the East Asia and the Pacific region under the guidance of the World Bank's Water and Sanitation Program and local partners. This regional work, implemented through a country-led process, draws on the experience of water and sanitation SDAs conducted in more than 40 countries in Africa, Latin America, and South Asia.[1]

An SDA analysis has three main components: a review of past water and sanitation coverage, a costing model to assess the adequacy of future investments, and a scorecard that allows diagnosis of bottlenecks along the service delivery pathway. SDA's contribution is to answer not only whether past trends and future finance are sufficient to meet sector targets for infrastructure and hardware but also what specific issues need to be addressed to ensure that finance is effectively turned into accelerated and *sustainable* water supply and sanitation service delivery. Bottlenecks can in fact occur throughout the service delivery pathway—all the institutions, processes, and actors that translate sector funding into sustainable services. Where the pathway is well developed, sector funding should turn into services at the estimated unit costs. Where the pathway is not well developed, investment requirements may be gross underestimates because additional investment may be needed to "unblock" the bottlenecks in the pathway.

The scorecard looks at nine building blocks of the service delivery pathway, which correspond to specific functions classified in three categories: three functions that refer to enabling conditions for putting services in place (policy development, planning new undertakings, budgeting), three actions that relate to developing the service (expenditure of funds, equity in the use of these funds, service output), and three functions that relate to sustaining these services (facility maintenance, expansion of infrastructure, use of the service). Each building block is assessed against specific indicators and is scored from 0 to 3 accordingly. The scorecard uses a simple color code to indicate building blocks that are largely in place, acting as a driver for service delivery (score >2, green); building blocks that are a drag-on service delivery and that require attention (score 1–2, yellow); and building blocks that are inadequate, constituting a barrier to service delivery and a priority for reform (score <1, red).

The SDA analysis relies on an intensive, facilitated consultation process, with government ownership and self-assessment at its core.[2] Following a scoping mission for potential Water and Sanitation Program support to water supply, sanitation, and hygiene in Papua New Guinea (PNG) in 2011, the idea of conducting an SDA was first discussed at a National Water Supply, Sanitation and Hygiene (WASH) conference in PNG in November 2011. Conference participants used their perceptions of the four subsectors—rural water, rural sanitation, urban water, and urban sanitation—to complete a scorecard exercise to rank the performance of subsectors. Through the SDA process, an evidence-based participatory analysis has been conducted to better understand what undermines progress in water supply and sanitation and what the government of PNG can do to accelerate progress. A series of meetings and urban and rural subsector workshops with core stakeholders during 2012, together with reviews of reports and budgets, has provided the information for this SDA. Annex 1 and footnotes reference the sources of evidence.

[1] For example, refer to the Africa CSO synthesis report available at http://www.wsp.org/sites/wsp.org/files/publications/CSO-Synthesis-Report.pdf.

[2] The SDA process took place in 2011/2012 and used the Joint Monitoring Data of 2012. At the time of writing this report, the 2013 update of the Joint Monitoring Program was not yet available.

This analysis aims to help PNG assess its own service delivery pathway for turning finance into water supply and sanitation services in each of four subsectors: rural and urban water supply and rural and urban sanitation. Specific priority actions have been identified through consultation with government and other sector stakeholders. This report evaluates the service delivery pathway in its entirety, locating the bottlenecks and presenting the agreed priority actions to help address them.

The Water and Sanitation Program and WaterAid, in collaboration with the government of PNG and other stakeholders, produced this SDA report.

Figure 1.1 Map of Papua New Guinea

2. Sector Overview: Coverage and Finance Trends

Coverage: Assessing Past Progress

PNG's total population in 2010 was 6.9 million, of which 6.0 million people (87%) lived in rural areas and 0.9 million (13%) lived in urban areas.

The most recent official source of coverage data for water and sanitation comes from the 2009–10 Household Income and Expenditure Survey.[3] Nationally, 26% of households had a piped water connection (of these, only 12% were household or yard connections) and 12% accessed rainwater. The majority of households (54%) obtained water from other unprotected sources, such as ponds/lakes, rivers, or streams (41%); unprotected springs (8%); and unprotected wells (5%). The disparity between rural and urban household water access is significant. Urban households are nearly five times more likely to have access to piped water (74%) compared with rural households (16%), and the majority of these urban households enjoy the convenience of a household or yard connection, rather than a communal standpipe facility found in rural areas. However, the two major water utilities—Eda Ranu and Water PNG—provide services to only about 9% of the total PNG population.

According to the 2009-2010 Household Income and Expenditure Survey, for sanitation, the majority of PNG households (76%) use basic unimproved toilets such as pit latrines without slabs (58%), closets over the sea or river (3%), and 11% have no toilet at all. Access to pour-flush toilets is low (12%). There is a large difference in sanitation access between rural and urban households. About 13% of households in rural areas are defecating in the open, compared to 2% in urban areas, while 3% of rural households have flush toilets compared to 55% of households living in urban areas. Sewerage coverage by Water PNG and Eda Ranu is estimated at 20 and 40% of their respective operational areas, which, as mentioned earlier, account for a small proportion of the PNG population and not all urban areas.[4]

The Joint Monitoring Programme (JMP; of the United Nations Children's Fund and World Health Organization) estimates for 2010[5] indicate that only about 40% of the PNG population had access to improved drinking water sources and only 45% had access to improved sanitation facilities.[6] People living in urban areas are much better off in terms of access to improved drinking water sources (77%) and improved sanitation facilities (71%) compared with those living in rural areas (33% for improved water and 41% for improved sanitation).

JMP data show that the proportion of the PNG population with access to improved drinking water sources and sanitation facilities declined slightly between 1990 and 2010 (figure 2.1). With an annual population growth rate of 2.8%, PNG increased its population by 2.7 million between 1990

[3] Government of Papua New Guinea, National Statistical Office. 2012. *Papua New Guinea Household Income and Expenditure Survey: Summary Tables*. Port Moresby, Papua New Guinea: National Statistics Office.

[4] As reported by staff of Eda Ranu and Water PNG. Dutton, P. 2011. PNG Scoping Mission for WSP Support to Water Supply, Sanitation and Hygiene. Water and Sanitation Program (WSP) (available upon request from WSP Indonesia, Jakarta).

[5] JMP (of the United Nations Children's Fund and World Health Organization) collects data from PNG-based sources (for example, 2006 DHS) and uses the information to generate estimates of the population that have access to improved and unimproved facilities.

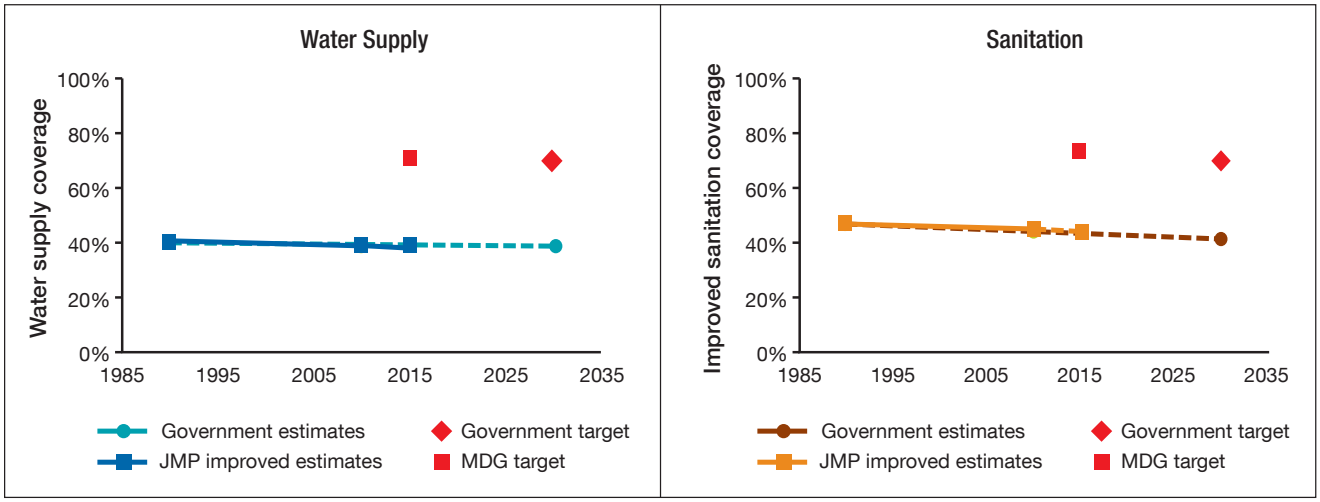
[6] JMP (Joint Monitoring Programme) for Water Supply and Sanitation. 2012. *Estimates for the Use of Improved Drinking Water Sources*. Updated March 2010, Papua New Guinea. WHO/UNICEF. Available from wss.info.org; JMP (Joint Monitoring Programme) for Water Supply and Sanitation. *Estimates for the Use of Improved Sanitation Facilities*. Updated March 2010, Papua New Guinea. WHO/UNICEF Available from wss.info.org. The primary source of data is the 2006 DHS. JMP assumes that 50% of all wells and 50% of all springs counted in the 2006 DHS are improved water supply under the JMP definition. JMP assumes that 50% of traditional latrines referred to in the 2006 DHS are improved latrines under the JMP definition.

and 2010, but only 1.1 million people gained access to improved sanitation and 1.0 million people gained access to improved drinking water during the period. This means that more people are without water supply and sanitation today than they were two decades ago.

Government targets for access are conservative compared with the Millennium Development Goals (MDG), which aim to achieve 70% access to water and 70% access to improved sanitation by 2015. The government expects to achieve these same targets 15 years later than MDG commitments (figure 2.1).[7] Water and sanitation targets stated in the PNG Medium Term Development Plan (MTDP) for 2011–2015[8] are highly aggregated and do not provide separate targets for rural and urban areas. Water PNG, which is mandated responsibility for all water supply and sewerage systems in the country except the National Capital District (NCD), translated these targets into a vision of "100% coverage of access to safe water and sanitation in all provincial towns and 85% of all district towns" by 2030.[9]

Because of the decline in access for both water and sanitation and the inability to keep pace with rapid population growth, PNG will fall well short of its MDG targets for both water and sanitation. Unless there is significant and urgent investment in sustainable water supply and sanitation, the country is also unlikely to meet its own national targets to 2030 (figure 2.1). A projection of past and current coverage trends suggests that access to improved facilities will continue to decline, with lower access rates in 2030 compared with 2010. Already, diarrhea- and water, sanitation, and hygiene (WASH)–related illnesses are a leading cause of mortality in PNG, especially for young children. Declining water and sanitation access rates pose a significant public health threat, and more outbreaks such as the cholera outbreak in 2009–10 can reasonably be anticipated.

Figure 2.1 Progress in Water Supply and Sanitation Coverage



Source: JMP (2012).
Note: Broken lines represent projections.

[7] Government targets have a pattern similar to the MDG, albeit with a different base year (2010). In the case of water supply, the government targets for 2030 (70%) effectively cut in half the proportion of the 2010 population that did not have access to improved facilities. The 2030 government targets also imply reducing the proportion of the population that did not have access to improved sanitation facilities in 2010 by about 46%.

[8] Department of National Planning and Monitoring. 2010. Papua New Guinea Medium Term Development Plan 2011–2015. Port Moresby, Papua New Guinea: DNPM. These targets are consistent with the Strategic Development Plan from Department of National Planning and Monitoring. 2010. *Papua New Guinea Development Strategic Plan 2010–2030*. Port Moresby, Papua New Guinea: Department of National Planning and Monitoring.

[9] Water PNG. 2012. *Water PNG Strategic Master Plan 2012–2030*. Port Moresby, Papua New Guinea: Water PNG; Water PNG. 2012. *Water PNG Medium Term and Corporate Plan Priorities 2012–2015*. Port Moresby, Papua New Guinea: Water PNG.

Investment Requirements: Testing the Sufficiency of Finance

Because the MDG year is imminent, the analysis has focused on assessing the investment required to meet national targets for 2030, using 2010 as a base year. In the absence of separate rural and urban targets, the government's national level target for 2030 has been apportioned to the subsectors to derive rural and urban targets.[10] Table 2.1 presents the estimated targets for all four subsectors.

The estimate of investment requirements is based on access rates, water and sanitation targets, population data, unit costs of facilities and lifespan, and presumed technology mix using the following assumptions, which are detailed in Annex 2.

- Annual population growth rates used are 2.9 and 2.1% for urban and rural areas, respectively.[11] Population growth is expected to continue at high levels during the period of analysis.[12]
- Unit costs of technologies were estimated from information provided by resource persons from Eda Ranu and the Rural Water Supply and Sanitation Program (RWSSP) of the European Union (EU).
- The future technology mix for PNG assumes that the majority of urban households with access to improved facilities in 2030 are connected to piped water supply and sewerage facilities provided by Eda Ranu, Water PNG, and other service providers. (Other lower-cost sanitation technologies are possible in urban areas, but these do not have political support yet in PNG). Rural water and sanitation are assumed to be of simple technology.[13] For sanitation, this is typically dry pit latrines, particularly ventilated improved pit (VIP) latrines, and for water, gravity-fed water schemes to a shared standpipe or household rainwater collection.

The investment requirements are calculated on an annual average basis using the SDA costing tool. These represent the necessary expenditures not only for new facilities but also for replacing existing facilities (replacement costs). The amounts capture hardware costs only.

To calculate gaps in investment, the study estimated investments for 2012 to 2014 from various potential financing sources, government, donors, and households, to derive an average annual anticipated investment per subsector (based on this 3-year average). This was a difficult task.

Anticipated government investments were drawn from the 2012 National Budget, and for 2013 and 2014, the MTDP for 2011–2015. There are three sources of uncertainty in the MTDP data. First, although anticipated investments in the MTDP distinguish between water and sanitation, these do not disaggregate between investments to rural and urban areas. Second, the projected investments for water are lumped together with investments for postal services. Third, the government of PNG will construct a sewerage project in Port Moresby from 2013 to 2016. Funded mostly through a loan from the Japan International Cooperation Agency, the overall budget for this activity (US$105.8 million, or K280 million), less the allocation for 2011 (US$7.4 million, or K19.6 million) and assuming that the remainder is distributed evenly between 2013 and 2016, is larger than the total allocation for sanitation (and postal services) in the MTDP.[14] These difficulties are addressed by apportioning allocations for rural and urban regions on the basis of historical allocations (2009–2012), particularly development expenditures on water and sanitation in the 2011 and 2012 National Budgets. Second, it is assumed that 90% of the planned investments for water and postal services will be allocated to water.

[10] The 2030 government targets suggest a 50% reduction in the proportion of the 2010 population that did not have access to improved water sources. The application of this formula to urban areas, where 87% of the population had access to improved facilities in 2010, led to a target of 94% in 2030.

[11] UN (United Nations). 2012. UNData: Papua New Guinea. Available from http://data.un.org/CountryProfile.aspx?crName=Papua%20New%20Guinea.

[12] According to United Nations, a medium-growth-rate scenario for 2010–30 ranges from 2.17% in 2010 and declines to 1.79% by 2030. A high-variant scenario suggests that PNG's annual population growth rate could still be as high as 2.17% in 2030 (data generated from http://data.un.org/Data.aspx?d=PopDiv&f=variableID%3A47.

[13] These are estimates using the PNG Demographic and Health Surveys shown in two JMP publications (see note 5).

[14] The kina values were converted to US dollars using the Bank of PNG 2011 exchange rate of K2.65 to US$1.

The government's District Services Improvement Program (DSIP) funding for infrastructure of K1 million (US$0.38 million) per each of 89 districts over the 5-year period 2008–2012 was not included in the analysis because of the lack of information on how this money is apportioned to water and sanitation.

There is little information about the few donor commitments for the years 2012 to 2014. The only known significant donor commitment in the national budget is Phase II of the RWSSP-EU. The program, which began in 2006, ended in September 2012. There are two external projects included in the analysis, which are off budget or not included in the national budget. The first is a water supply and sewerage project in Daru that is funded by dividends from Ok Tedi mine through the not-for-profit, limited-liability company PNG Sustainable Development Program Ltd. With a budget of K52 million (US$23.5 million), the project is expected to be completed by 2014.[15] The other is the proposed Asian Development Bank (ADB) Towns Water Supply and Sanitation Project for 2013–5, with an expected budget of US$31 million.[16] The only information on private and nongovernment organization (NGO) spending comes from the PNG Sustainable Development Program because data on NGOs are not available. Annex 2 provides explanations for the assumptions about phasing and allocations to the four subsectors.

Table 2.1 shows the annual capital expenditure (CAPEX) requirements and anticipated investments needed to meet the government's 2030 targets for water supply and sanitation. CAPEX requirements of US$31 million, on average, for every year from now until 2030 are needed to meet the government targets for access to improved water supply, and about US$70 million every year for sanitation. A large proportion of the required investment in water supply is for rural areas (US$22 million per year) because of the low access to improved facilities in 2010 compared with the target, relatively large costs for replacing many facilities that are expected to wear out during the period of analysis (US$15 million per year), and the relatively large projected population in rural areas. To achieve the government's 2030 targets for rural areas, an estimated 201,000 people will need to gain access to improved water supply every year until 2030, whereas every year during the same period, an estimated 184,000 people will need to gain access to improved sanitation. This

Table 2.1 Coverage and Investments Figures

	Coverage		Target	Population requiring access	Annual CAPEX requirements to 2030		Anticipated public CAPEX 2012 -2014			Assumed household expenditure	Annual surplus (deficit)
	1990	2010	2030		Total	Public	Domestic	External	Total		
	(%)			('000/year)	(US$ million/year)						
Rural water supply	32	33	66	201	22	20	7	2	8	1	-13
Urban water supply	89	87	94	34	8	7	2	10	12	2	5
Water supply total	**41**	**40**	**70**	**235**	**31**	**27**	**9**	**12**	**21**	**3**	**-8**
Rural sanitation	42	41	68	184	12	3	3	0	3	9	0
Urban sanitation	77	71	84	34	58	49	15	11	25	5	-28
Sanitation total	**47**	**45**	**70**	**218**	**70**	**52**	**18**	**11**	**29**	**14**	**-27**

Source: JMP 2012. SDA costing.
Notes: Columns may not add up because of rounding. Annual surplus/deficit calculated as follows: anticipated CAPEX plus household expenditure minus annual CAPEX requirements.

[15] Personal communications with Aloysius Aihi, Lawrence Stephens, and Ronnie Akis of PNGSDP.

[16] Asian Development Bank. 2012. Country Operations Business Plan—Papua New Guinea 2013–2015 (draft); personal communication with Aaron Batten of the ADB. Also see Water PNG (2012).

is roughly six times as many people per year for rural water supply and more than five times as many people for rural sanitation who gained access to rural services in the last two decades. Urban areas (US$58 million) account for most of the share of required sanitation investments, which is driven by the assumption that most of the households in urban areas are expected to have private sewer connections by 2030. What this investment requirement analysis illustrates is the importance of looking into lower-cost technologies for reaching the country's targets in 2030.

With long-term funding unknown, the SDA analysis has examined financial commitments for the next 3 years (2012–2014) and used them as a basis for extrapolation to calculate the average annual anticipated funding needs of sector financing. The annual budget requirements in the longer term (2015–2030) will continue to increase if allocations do not go up immediately.

As shown in Table 2.2, to reach 2030 targets, the total investment required from 2011 to 2030 is approximately US$2 billion. More than half of this amount (58%) is for urban sanitation.[17]

Table 2.2 Total Investment Required 2011–2030

Subsector	Total investment (US$ million)
Rural water supply	444
Urban water supply	169
Water supply total	**613**
Rural sanitation	241
Urban sanitation	1,156
Sanitation total	**1,396**
Total investment	**2,009**

Source: SDA costing.

The gaps between required and anticipated public and assumed household investment for water supply and sanitation between 2012-2014 are depicted in figure 2.2. Current anticipated annual public investments for sanitation (US$29 million per year) are about 41% of the required annual public investments (US$70 million) to meet the government targets. Even with the assumed user contributions of about US$14 million per year, public investments would have to almost double if sanitation targets in 2030 were to be met. In rural areas, where anticipated public investments for sanitation are quite low (US$3 million per year) and there is no comprehensive approach and resources in place for eliciting such household investment through demand creation, it is unlikely that households will actually invest in toilets.

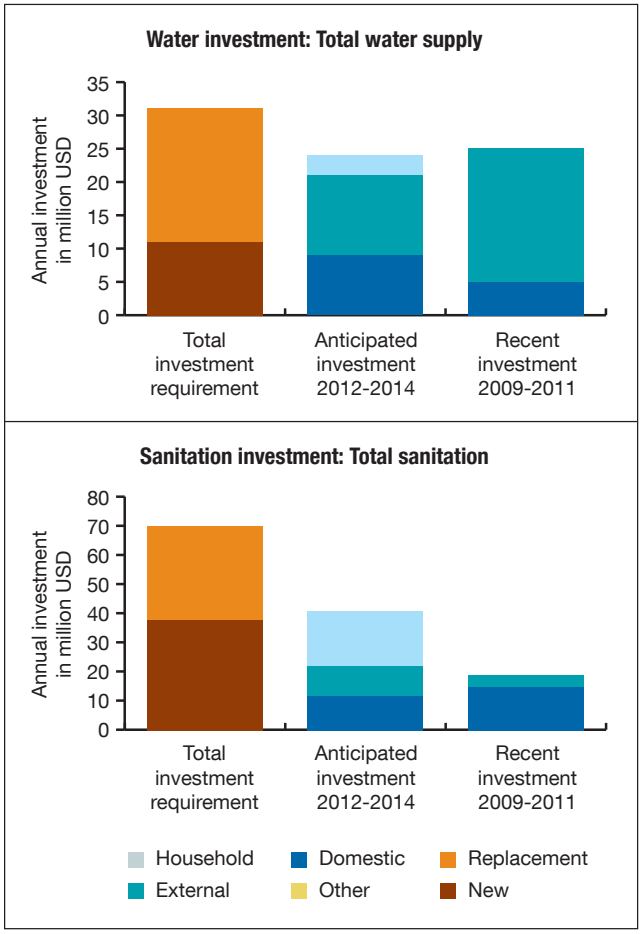
Although there is lack of information on the actual amounts spent by households on sanitation in recent years, the fact that sanitation coverage in rural areas is low and has not changed much over the past 20 years indicates that having a toilet is not a priority in household budgets and that affordable and aspirational sanitation options are not readily available. For urban areas, although anticipated public investments are relatively high, the affordability and willingness to pay of households in flush toilets and sewer connections are equally contentious, especially when evaluated against the decline in access to improved sanitation facilities over the past two decades.

In general, anticipated annual public investments in urban areas should also be interpreted with care because these represent a few large investment projects with a focus on upgrading collection systems and expanding treatment facilities in Daru and Port Moresby only, without necessarily leading to large numbers of unserved people being connected to the sewer systems. The sanitation component of the PNG Sustainable Development Fund project in Daru, which accounts for about 2% of the urban population, explains approximately 30% of projected expenditures for

[17] Investment requirements use 2012 prices.

the subsector. Moreover, most of the government funds (about US$15 million per year from 2012 to 2014) are likely to be allocated to the sewerage project in the capital, Port Moresby, which accounts for about one-third of the urban population. This means that very little funds are left for other urban areas of the country.

Figure 2.2 Required Versus Anticipated (Public) and Assumed (Household) Expenditure



In addition to the annual investment requirements presented in Table 2.1, approximately US$20 million per year will be required to finance the operation and maintenance (O&M) of current and future infrastructure (Table 2.3). This breaks down as US$5 million per year for water supply, with the implicit assumption that in urban areas, this will be recovered from users through the water bill, with cross-subsidization between profitable areas and urban areas operating at a loss. Where facilities are maintained by utilities, the question is whether revenues are enough to support O&M expenditures. A major issue in this regard is the collection of fees from beneficiaries. For example, Eda Ranu in Port Moresby estimated its non revenue water (NRW) (from illegal connections and tariff collections) for 2009 to 2011 to be about 50% of total water production.[18] It is unclear how O&M for rural water will be funded, but in the past, this has been left to rural communities to finance.

Annually, O&M costs for sanitation are estimated at US$15 million. For facilities that are maintained by households, for example, private pit latrines, the issue is the extent to which costs will put pressure on household finances.

Table 2.3 Annual O&M Requirements

Subsector	O & M (US$ million)
Rural water supply	3
Urban water supply	2
Water supply total	**7**
Rural sanitation	1
Urban sanitation	14
Sanitation total	**15**

Source: SDA costing.
Note: Totals may not add up because of rounding.

[18] Eda Ranu. 2012. *Business Operational Plan*. Port Moresby, Papua New Guinea: Eda Ranu.

3. Reform Context

Since its independence in 1975, PNG's WASH sector development has been focused largely on urban services. In 1986, the National Water and Sewerage Act established the PNG Waterboard (now Water PNG) as a government-owned business to provide urban water and sanitation services on a commercial basis while promoting water and sanitation in rural and peri-urban areas on a self-help basis. The Act restricts Water PNG from being involved in noncommercial activities unless the government or others make funding directly available. The state-owned enterprise (SOE) model of service delivery has continued in 1996, with Eda Ranu being given responsibility for delivering profitable metered water and sewerage to businesses and residents in the nation's capital, Port Moresby.

After PNG gained its independence, rural water schemes developed under colonial times were handed over to provincial governments and local level governments (LLGs), but without technical expertise or funding for upgrading, repair, or expansion of services. Decentralization of responsibility and funding of water supply and sanitation services to provincial governments and LLGs since the 1995 Organic Law has meant that subnational government is permitted to develop its own water and sanitation infrastructure, but there is little evidence of this happening. This has resulted in the majority of rural dwellers continuing to access water from natural resources such as rivers, creeks, and shallow wells and to use traditional pit latrines or open defecating. This deconcentration saw a reduced role for the Department of Health and Department of Works, who had been primarily responsible for the development of water supply and sanitation services.

In 2008, the government introduced the DSIP, which, through the PNG National Budget, provides K1 million (US$0.38 million) per district over 5 years for infrastructure to alleviate disparities in districts and rural communities. No earmarked allocation is made for water and sanitation, and monitoring expenditure on sustainable water and sanitation does not occur.

PNG has not introduced any framework or policy to guide all facets of the water and sanitation sector. In the absence of an overarching ministry responsible for formulating policy, the National Executive Council tasked Water PNG to develop a National Water Policy in 2005. However, the National Executive Council never took forward the policy and recommendations for establishing an apex National Water Authority, with separate functional areas. In 2011, a task force led by the Department of National Planning and Monitoring was established to revisit the WASH policy, but progress has been slow despite the urgent need to set a vision and define institutional roles. Most recently, support from development partners is helping to facilitate development of a WASH policy.

Although PNG's Medium Term Development Strategy (2011–2005) recognizes the low ranking of PNG for water and sanitation access, its targets for coverage of water and sanitation are aspirational and do not differentiate between rural and urban areas. Operational plans are yet to be developed to guide efforts and establish agency responsibilities. The National Health Plan 2011–2020 mentions water supply and sanitation objectives to reduce the incidence of diarrheal disease. However, it does not identify a process to ensure

progress in this area, nor does it recognize the linkages between WASH and malnutrition. Further evidence of the low priority given to water supply and sanitation is highlighted in the government's choice of minimum-priority activities. The national government introduced these minimum-priority activities in 2009 to encourage provincial governments to prioritize effective and targeted service delivery outcomes at the district and rural levels, and funding and monitoring frameworks support these activities. Of these 11 activities, none includes the basic needs of water supply or sanitation.[19] A recent nationwide cholera epidemic between 2009 and 2011 perhaps best emphasizes neglect of the sector. This crisis produced only short-term responses to contain the epidemic and has not delivered sector reform.

Since 2007, work has begun in the urban sector to develop mechanisms that will assist urban water and sanitation SOEs to operate in a competitive and transparent environment. The Independent Public Business Commission is developing a public-private partnership policy framework and arrangements for Community Service Obligations (CSOs). The CSO mechanism would permit SOEs to support the noncommercial aspects of their business, including service delivery in rural areas; however, sufficient government finance would also need to back this up. Progress in achieving clear guidance in both these areas has been slow.

Milestones in PNG's water supply and sanitation sector reform are summarized in Table 3.1

Sections 4 to 6 highlight progress and challenges within the WASH sector across three thematic areas—the institutional framework, finance, and monitoring and evaluation. The scorecards for each subsector are presented in their entirety in Sections 7 to 10.

Table 3.1 Key Dates in the Reform of the Sector in PNG

Year	Event
1975	National Independence
1982	Water Resources Act
1986	National Water and Sewerage Act
1987	PNG Waterboard (later Water PNG) established with responsibility for providing water and sanitation services in urban areas and promotion in rural areas.
1996	NCD Water Supply and Sewerage Act gives responsibility to NCDC for Port Moresby water and sewerage
1996	Eda Ranu takes over responsibility for NCDC water and Sewerage
1997	National Health Administration Act gives powers to provincial governments to make laws on rural water supply and environmental hygiene
1998	Organic Law on Provincial Governments and LLGs. LLGs may now make laws on the provision of water supply.
2007 to present	Government reform process to support SOEs to perform and deliver goods and services in an environment of comprehensive competition and consumer protection regulation
2008	DSIP introduced in the National Budget to contribute K1.0 million for infrastructure per 5 years per district
2009	Handbook on the Determination of Service Delivery Functions and Responsibilities for Provincial and Local-Level Government provides limited clarification of subnational responsibility for WASH (under the Health Sector)
2009–11	Nationwide outbreaks of cholera

[19] National Economic and Fiscal Commission (NEFC), 2010. Annual Fiscal Report - 2010. Government of Papua New Guinea. Minimum priority activities include education, agriculture, health facilities, and transport infrastructure.

4. Institutional Framework

Priority actions for institutional framework

- Urgently reform institutional arrangements for water and sanitation to achieve clear and separate responsibilities for all functions.
- Develop a comprehensive sector policy covering all subsectors.
- Develop a comprehensive capacity-building plan for all levels (national, provincial, district, LLG, utility, and community) and within all strata (decision makers, managers, technicians, and users) in the private and public spheres.
- Develop a sector strategy and financing plan to achieve updated national targets.
- Improve sector coordination, data collection, and monitoring.

Currently, PNG's WASH sector is fragmented and uncoordinated with lack of clarity of roles and gaps in responsibility. The absence of any sector policy that would help define responsibilities exacerbates this situation, and this means that legislation and historical practice are the main guidelines for roles.

Because there is no lead government ministry for water and sanitation, nor designated water and sanitation departments within other ministries, Water PNG holds the unusual position of being the de facto sector leader, as well as being an SOE and a utility.

Water PNG has responsibility to "ensure provision of safe, reliable and sustainable water and sanitation services" in urban areas outside the capital district, including provincial and district towns. Eda Ranu is responsible for providing water supply and sewerage services to the NCD, and Goroka Urban Authority manages the Goroka water supply and sewerage system. The terms of the contract between the state (through Independent Public Business Commission) and the SOEs of Water PNG and Eda Ranu and their respective governing legislation determine the organization of the urban water supply and sanitation subsector, as well as its targets, resources, and strategies. Whereas formal urban residents in serviced towns are well catered for, an increasing number of people in peri-urban and informal settlements are not serviced because of an unclear mandate and lack of experience by service providers in approaches to informal communities, as well as rapid population growth in these locations.[20]

Water PNG is also responsible for promoting water and sanitation on a self-help basis in rural and peri-urban areas, but the meaning of *promoting* has never been defined. The expectation that Water PNG should be providing support to the rural sector is in conflict with its commercial role to deliver a return to investors, resulting in the rural sector being ignored. Although provincial and district governments are permitted to develop their own water supplies and sanitation, this rarely occurs, particularly for sanitation. With no national policy, guidelines, or rural targets or plans in place,

[20] Feedback from Urban SDA Subsector Workshop, March 2012.

service delivery in rural areas falls to NGOs, resource companies, and exceptional local governments, who might have an interest in a particular location. Although NGOs have a long history of establishing village water supply systems, these have been ad hoc, not coordinated with government, and the location and extent to which these schemes are still operating is unknown.

To further complicate its institutional role, Water PNG is both a water and sewerage service provider and technical regulator and licenser, being "player and referee" at the same time. It also sets standards for materials and equipment used in water supply and sanitation. Financial regulation is relatively strong in the urban sector through Independent Public Business Commission regulation of SOEs, whereas the Independent Consumer and Competition Commission establishes and enforces the ground rules for competitive operation of the SOEs, including endorsing tariffs.

The National Department of Health's (NDOH) role is to develop policy at the national level and provide technical assistance and advice to provincial environmental health officers through its Environmental Health Division. It does not have any direct control over provincial environmental health officers because they come under the jurisdiction of each provincial government. The NDOH lacks the resources to monitor and enforce drinking water quality and sanitation standards (septic tank regulations and standards for onsite sanitation such as VIP latrines) delegated to it through the Public Health Act. A lack of budget, staff capacity, and resources, as well as a disconnect in its role between the national level and the local government level, where project investments and service delivery are supposed to take place, hamper NDOH's impact.

Because of the absence of clearly delegated roles or an overall ministry or government department responsible for water, sanitation, or both, there is a lack of leadership and coordination at the sector and subsector levels. The requirement to make a return for investors and to work only in the legally settled areas constrains SOEs. And although it is possible to put services in less profitable areas through internal cross-subsidization, there is no requirement by mandate and no incentive to serve areas with low commercial potential. The issue of who owns the assets and who is responsible for maintenance in the rural sector is unclear. A policy to unite the sector and define roles and clarify responsibilities is urgently needed.

Development partners currently play a minimal role in water and sanitation, and there is no sector leader. During the 1980s and 1990s, bilateral development partners AusAID, Japan International Cooperation Agency, and NZAid and multilateral organizations such as the ADB were largely developing the urban sector and mostly water supply. Since mid-2000, donor contributions to the sector have declined in favor of health and education, whereas national priorities have shifted to supporting the development of a booming mining and resources sector with roads and ports and other higher-priority infrastructure. Minimal new investment has been channeled to the water and sanitation sector, largely because of the sector's low national priority and institutional fragmentation and the nation's political volatility. In the last 3 years, the EU has been the only donor of significance, but support has been limited to investments in rural water and sanitation projects, reaching just 4% of the rural population and three district towns.

Nonstate actors—churches and both domestic and international NGOs—have been important for supporting water supply developments in rural areas, but these have been limited to specific geographic areas and dependent on unreliable funding streams. NGO activities are often "under the radar" and not coordinated in a sector approach. More recently, the resources sector has begun to make water and sanitation investments, but these are limited to its direct project locations such as pipeline corridors.

External support to the sector is only via standalone projects. The sector lacks a coordination mechanism for invest-

ments and technical experience, although the emerging National Water, Sanitation, and Hygiene Committee could play a role in this. Originally, the National Water, Sanitation, and Hygiene Committee was an official government coordination entity established during the drought of 1990s and reformed during the cholera outbreaks. However, in practice, the National Water, Sanitation, and Hygiene Committee is not yet operating as an official coordinating mechanism. There are no WASH technical working groups operating in PNG or other forums for coordination between stakeholders.

A critical constraint in the sector is a shortage of human resources to deliver increased output in water and sanitation. Utilities already identify urgent skill shortages, which are holding back the sector, such as specialized engineers, technicians, and managers. NDOH has few personnel to assist in the implementation of any project or insufficiently trained staff in sanitation promotion. Provincial governments and LLGs have few skills in the operation and planning of water and sanitation.

Current staffing in the sector is estimated to be around 1,100 people. If the MDG targets were to be met, an additional 7,600 people would be required, including 1,190 engineers, 4,140 technical staff, 1,760 staff in management and finance, and 520 staff in social development/hygiene promotion.[21] To meet the government's 2030 targets, a lesser but still significant increase in human resources is necessary.

The capacity of existing training institutes in PNG is not sufficient to deliver human resources in the quantities needed. Until 2000, the Department of Works has provided water and sanitation training courses at their training center, but this center is now closed and mothballed. Lae Unitech and Madang Divine Word University provide some technical training, but the throughput is not enough. A range of training is needed, and this might be delivered through international short courses, for example, through the Japan International Cooperation Agency, overseas and domestic degree courses, and other technical training in PNG. Considerable effort is needed to gear up PNG training institutions with trainers, curricula, and classrooms to deliver the throughput of trainees required.

[21] Dwan, P. 2012. *Mind the Gap: Papua New Guinea.* Draft research report. Melbourne: WaterAid Australia.

5. Financing and Its Implementation

Priority actions for financing and its implementation

- Urgently increase investment in water and sanitation especially in the rural sector.
- Develop an overall financing strategy for the sector.
- Develop separate budget items for urban water, urban sanitation, rural water, and rural sanitation to enable effective monitoring of subsector expenditure.

Investment Planning

A considerable challenge to financing WASH is that the sector targets are not supported by investment planning or by an operational plan. The current confused institutional framework and lack of sector leadership prevent an overall investment plan from being prepared for the sector. Whereas most public and donor finance is on budget, financing through NGOs and resource companies is off budget and not formally reported.

Budget Transparency

An improvement in the PNG national budget system since 2011 is that budgets now clearly indicate development expenditures for water and sanitation, by project. Some of the projects presented can also be linked to the provincial budgets. A breakdown of the funding sources (as in table 5.1) is also provided in the budget. However, the development budget does not differentiate between water and sanitation, nor does it differentiate between rural and urban investments. Without this level of disaggregation, it is difficult to account for expenditure and to evaluate if the spending is being effective at delivering services in each subsector.[22]

PNG lacks information on recurrent spending for water and sanitation and spending in rural and urban areas. Only NDOH has a budget line item for recurrent spending on water and sanitation. It is very difficult to get information for the provinces and districts because there are no separate line items for water and sanitation.[23]

Utilization of Budgets

Because development expenditures for WASH did not really appear in detail until the 2011 budget, it is very difficult to know whether the budget allocation is in fact being spent. The overall government budget is generally utilized only by 60%, and it is likely that water and sanitation budgets are not utilized fully.[24] There is some information on the provincial development budgets, but this accounts for a very small proportion of the allocations. For example, the items appearing in the 2011 provincial budgets indicate a planned spending of US$5.2 million for 2010. This is only approximately 13% of the total allocation for water and sanitation that appears in the national budget. District spending on water and sanitation is not available and difficult to track.

[22] For the SDA analysis, the proportion allocated between water and sanitation was derived by asking those directly involved in each project to make an estimate.

[23] Field visits to provinces may be required to obtain a sense of recurrent spending on WASH, as well as capital expenditure.

[24] Personal advice from ADB Country Representative Charles Andrews during an SDA Urban Sector Workshop, March 2012.

Budget Adequacy

Historical allocations of government and donors to water and sanitation investments have been inadequate. This is because of the lack of prioritization and limited local budget execution and implementation capacity. The absence of any noticeable improvements in access rates between 1990 and 2010 is indicative that funds allocated to the sector have been insufficient to keep up with population growth.

Government and donor allocations on water and sanitation are, in nominal terms, substantially higher in 2010–2012 compared with 2006–2009 (table 5.1). Higher government direct financing of water and sanitation investments mostly caused this scenario. Despite higher spending in recent years, investments in the sector continue to be around 0.3% of gross domestic product, which is just a third of the internationally recognized minimum allocation of 1%. Anticipated allocations in the medium term are expected to be inadequate to meet the required investments to achieve subsectoral targets (see section 2).

Table 5.1 Allocation of Development Expenditures for Water and Sanitation, 2006 to 2012

	2006	2007	2008	2009	2010	2011	2012
Total development budget (US$ million)	19	6	22	21	40	31	34
Government direct financing	5	4	4	3	16	17	21
Loans	9	2	5	11	13	4	4
Grants	5	1	12	7	12	11	10
Proportion of GDP (%)	0.3	0.1	0.3	0.3	0.4	0.3	na

Source: Authors, using data from PNG National Budget for 2011 and 2012; ADB Key Indicators; World Development Indicators.
Note: GDP = gross domestic product, na = not applicable.

6. Sector Monitoring and Evaluation

Priority actions for sector monitoring and evaluation

- Introduce a comprehensive and coherent sector monitoring framework.
- Conduct studies to enable informed decisions on water and sanitation strategies, for example, on functionality of water supplies, sanitation approaches, and hygiene promotion methods.
- Set up multistakeholder annual reviews to monitor past progress and agree on future objectives.

One of the difficulties in assessing service delivery in PNG is the limited reliable past and recent baseline data for monitoring the sector. The main sources of data are the Demographic and Health Surveys (DHSs) from 1996 and 2006, which form the basis of JMP projections. However, those working in the field consider the JMP estimates of rural improved sanitation coverage as overstated.[25] The recent national Household Income and Expenditure Survey (2009/10) has adopted the same definitions for improved water and sanitation as the JMP and will provide the most up-to-date estimate of access based on a sample of the country, when it is analyzed by JMP and included in the next JMP update. There were no questions on WASH in the 2010 National Population Census. In other countries, the census provides a comprehensive and accurate picture of access by location and can be used to develop sector strategies and to prioritize interventions.

A national asset register or inventory of rural water supply schemes does not exist, and there is no obligation or mechanism for service providers or implementers, especially NGOs and resource companies, to register schemes when they are built. No studies could be found on the performance and functionality of rural water supply systems. It is possible that rural water supply systems built in the past have ceased working, but the extent and reasons for this are undocumented. Similarly, studies of sanitation access and hygiene behavior are not available, so a baseline from which to evaluate progress is missing. A District Implementation and Management System, through the Department of Implementation and Rural Development, is gathering district-level information on infrastructure and projects so this could form a baseline in the future.[26]

The reporting requirements of SOEs to shareholders in the urban water sector are driving better monitoring such as NRW and number of connections. Utilities are also using international industry standard indicators to benchmark their performance. Less is known about urban sanitation outside sewerage systems because there is no system in place to collect data on septage management or septic tank operators, for example.

There is no joint sector review in PNG for water supply and sanitation, although this would be desirable according to sector stakeholders. A National Water and Sanitation Conference in 2011 (convened by development partners) highlighted considerable interest in participating in sector

[25] Reported by RWSSP staff on several occasions from their field work in 400 sites.

[26] Personal communication with Kenny Lessa of Department of Implementation and Rural Development, who stated that 2011 information is being compiled by the National Research Institute and will be available in mid-2012.

evaluation and information sharing on lessons learned and successful approaches. The National Water, Sanitation, and Hygiene Committee could have a coordinating role to share information in the future.

The one sector component where both financial and output performances are monitored and evaluated is international development assistance. This is largely because of donors' own financial accountability requirements, not because of demand from the PNG government. International development assistance for water supply and sanitation has a high visibility because it usually takes place at government-to-government level and is coordinated through the Department of National Planning and Monitoring, although the department's online register of development assistance has not been updated because of lack of resources.

There is no single or apex civil society organization monitoring WASH project execution, largely because there has been so little activity in recent years, and the sector is uncoordinated.

As a new full member of the East Asia (and Pacific) Ministerial Conference on Sanitation and Hygiene,[27] PNG's deficit in sanitation sector monitoring and evaluation is being brought into sharp focus. At the next meeting of the East Asia (and Pacific) Ministerial Conference on Sanitation and Hygiene in 2014, PNG will be expected to contribute regional progress results and its achievement will be scrutinized at a high level.

[27] PNG government representatives attended the Third East Asia Ministerial Conference on Sanitation and Hygiene in September 2012 as observers but were voted, during the conference, to become full active members of the regional conference.

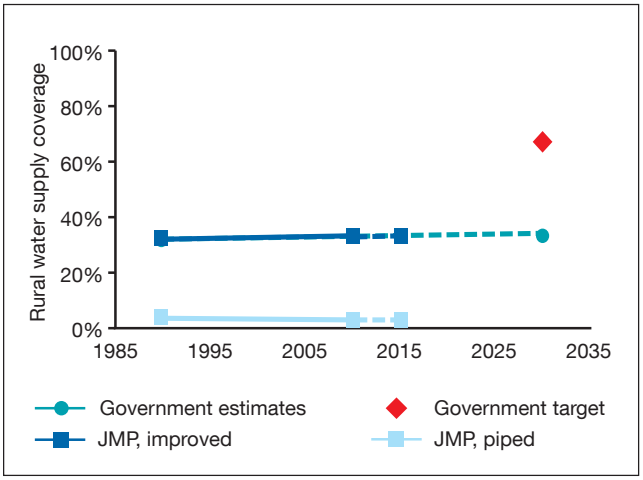
7. Subsector: Rural Water Supply

Priority actions for rural water supply

- Increase the capacity of provincial, district, and local level governments to plan and manage rural water supply development.
- Establish a national technical unit responsible for rural water supply.
- Improve financing procedures for decentralized expenditure on rural water.
- Conduct an inventory of rural water schemes and determine functionality and rehabilitation needs.
- Prioritize provinces or rural communities for targeted support.

As of 2010, only about a third of the rural population of PNG had access to improved water supply (figure 7.1). On the basis of information from the 2006 DHS, from which JMP data are based, nearly a fourth (24%) of the rural population source their water from springs, and only about 10% have access to piped water (private and shared). There has been little change in coverage rates over the last 20 years, with the proportion of the population that had access to improved water supplies in 2010 only about 1 percentage point higher than in 1990, but the absolute number of people without access has risen by 67%. Unless significant investments are made in the coming years, the country is destined to miss the estimated government target of 66% access by 2030. This target, which is already conservative by MDG standards, requires a 1.7 percentage point increase per year from 2011 to 2030. Given an assumed population growth rate of 2.1% per year for rural areas in the country, government targets can be met if about 201,000 people in rural areas gain access to improved water supplies in each year, which is about five times higher than the number of people who gained access on an annual basis in the past two decades.[28]

Figure 7.1 Rural Water Supply Coverage



Source: JMP 2012. SDA costing.
Note: The government targets do not distinguish between rural and urban water supply. As mentioned in section 2, the government targets effectively assume a reduction by 50% of the households that did not have access to improved water supply in 2010. The authors also used these proportions in an estimate of the government target for rural water supply.

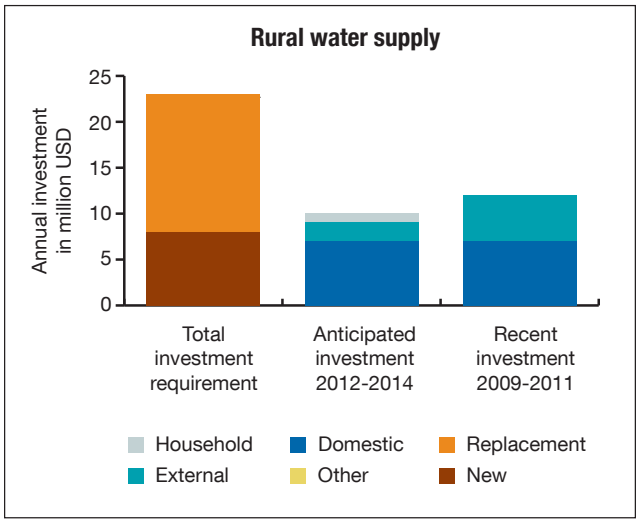
An estimated US$22 million per year in CAPEX is required to meet the 2030 rural water supply target (figure 7.2). An additional US$3 million per year (see section 2) is also

[28] About 850,443 people gained access in rural areas between 1990 and 2010. Divided by 21 years, this amounts to about 40,450 persons a year.

needed for O&M expenditures. This implies total financing requirements of US$25 million per year. The financing requirement is a conservative estimate, as the costs of delivering services—project management and transport—were not included in the computation of required investments.

Using the next 3 years as an indication of the anticipated average rural water supply financing situation, the analysis shows that US$9 million per year is available from public (domestic and external) and household sectors. This implies a CAPEX deficit of about US$13 million per year during the period. Allocations for the past 3 years (2009–2011) or recent investments were almost evenly divided between the government and external sources (for example, donors), whereas anticipated investments are likely to be sourced more from the government.

Figure 7.2 Rural Water Financing (Required, Anticipated, and Recent)



Source: SDA costing.
Note: Recent and anticipated investments refer to average annual allocations from 2009–11 and 2012–4, respectively. Allocations, rather than actual expenditures, were used to depict recent investments because of the lack of data on the latter.

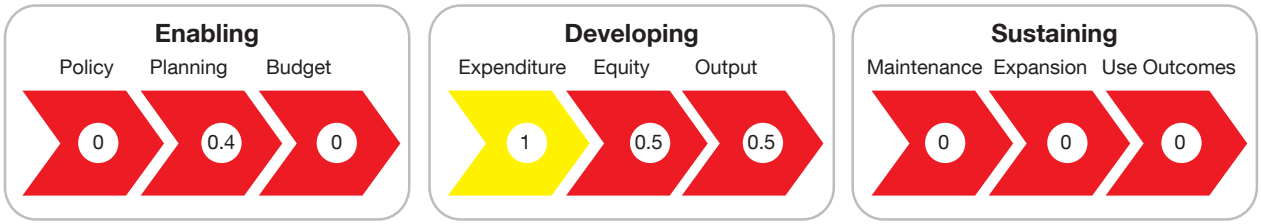
Figure 7.3 shows the scorecard results for the rural water supply service delivery pathway. The low scores for rural water supply, in general, reflect the low priority given to the subsector, the lack of a large-scale government-backed program to increase access to water, the absence of monitoring systems, and the lack of policy. The enabling environment scores highlight the need for specific rural water supply targets and, in particular, greater clarity over institutional responsibility for implementation of rural water supply. Although Water PNG has the mandate to promote water supply in rural areas, it is unclear what this covers. A different skill set of staff would be required for rural work compared with their current urban focus. LLG lacks clear direction, skills, and resources to increase water supply access, hence the lack of progress in the subsector.

The total financing available for the subsector is far below what is required to meet the government's targets. Money going directly into the sector is from donors such as EU. Although some DSIP funds are earmarked for rural water supply, it is unknown how many schemes are built from this money and how effectively they are working. For DSIP funding, district plans and proposals have to be approved by the Joint District Planning and Budget Priority Committees (chaired by the local Member of Parliament) and aligned to the MTDP. The district-wide planning and budgeting process is supposed to take a participatory, bottom-up approach, although the quality of this participation varies. It is not specifically conducted for rural water supply and a demand driven approach to rural water supply is not well developed.[29]

Other challenges that are symptomatic of the low priority given to rural water supply are the lack of a coordinated approach to planning involving different tiers of government, development partners, and nonstate actors; budgets that are transparent and clear; and the absence of any monitoring and evaluation to improve rural water supply implementation. A positive score is found for expenditure

[29] Mondiai G. and Hinton R. 2008. *Rural Water Supply Governance Research Conducted in Three Oxfam Partner Areas.* Goroka: Oxfam Highlands Programme.

Figure 7.3 Rural Water Supply Scorecard



in the developing pillar, yet this is a result of high budget utilization by donor projects. For example, the RWSSP-EU was able to spend its budget, indicating high demand for rural water supply and few bottlenecks for execution of this particular donor project.

Under the sustaining pillar, the lack of activity in the subsector makes an assessment of the maintenance and expansion building blocks difficult. There is a critical lack of basic data, as well as the information systems necessary, to capture the current situation of rural water supply, although experts in the sector assume that many schemes are not functioning. An inventory of schemes and their functionality is urgently needed, as are studies on access to spare parts as the remoteness of rural communities in PNG indicates this is a problem.

Of the priority action areas identified by stakeholders, the following actions were the most important according to stakeholders:

1. **Increase the capacity of provincial, district, and local level governments to plan and manage rural water supply development.** As part of water supply policy development, capacity needs for the rural water sector need to be defined. A national technical unit that coordinates the knowledge and skills of Water PNG, Eda Ranu, and NDOH needs to be established to support rural water supply development at the district level. To improve district-level delivery of water supply services, clear quality rural guidelines and procedures need to be established for contracting work to ensure that it is carried out effectively. This is a task for the Department of Implementation and Rural Development or the Department of National Planning and Monitoring.
2. **Improve financing procedures for decentralized expenditure on rural water.** Existing sources of finance, for example, DSIP, need to be earmarked for rural water supply. Updated district data can be used to identify needs and improve the quality of district plans so that budgets are tied to identified needs. Coordination between funding sources such as government and donors needs to be improved, in particular avoiding the situation where donors go straight to implementation at rural areas without coming through line agencies. Government also needs to work closely at rural level and support district administration.

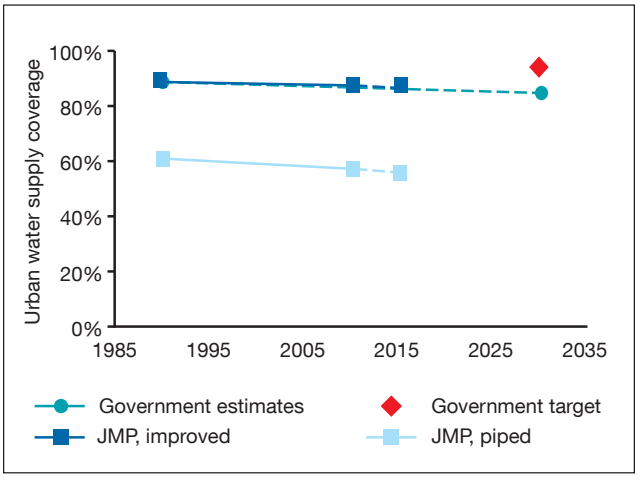
8. Subsector: Urban Water Supply

Priority actions for urban water supply

- Develop a comprehensive subsector 5-year investment plan for new works and rehabilitation/replacement of existing infrastructure.
- Urgently finalize and implement CSOs that adequately compensate for services in unprofitable areas.
- Separate operator and regulator functions.
- Establish criteria for prioritization of district town water supply.
- Promote private sector involvement in water supplies, particularly for informal and peri-urban (settlement) areas where government is constrained by land ownership.

Approximately 87% of the urban population had access to improved water supply in 2010 (figure 8.1). Although impressive in comparison with households living in rural areas, this needs to be viewed with caution. On the basis of the 2006 DHS, 58% of urban households have individual connections. Significant sections of the population still rely on shared piped water sources (12%), rainwater (12%), wells (6%), and surface water (3%). The proportion of the urban population that had access to improved water supply in 2010 was actually lower than that in 1990, suggesting a failure to increase access by amounts that will at least keep pace with population growth and urbanization. The faster growing peri-urban areas are a large, unserved group.[30] The 2030 target is for 94% of urban households to have access to improved water supply. This requires about 33,721 persons per year in urban areas to gain access to improved water supply between 2011 and 2030. This is more than three times the average number of persons (9,085 persons) who gained access on an annual basis between 1990 and 2010. If current trends continue, the country will most certainly fail to meet this target.

Figure 8.1 Urban Water Supply Coverage



Source: JMP 2012. SDA costing.
Note: Government targets do not distinguish between rural and urban water supply. As mentioned in section 2, the government targets effectively assume a reduction by 50% of the households that did not have access to improved water supply in 2010. The authors also used these proportions to estimate the government target for urban water supply.

The main piped water service providers are Eda Ranu in the NCD and Water PNG for 14 of 20 provincial centers and three district centers (of approximately 80 potential district

[30] Urban SDA Subsector Workshop, March 2012.

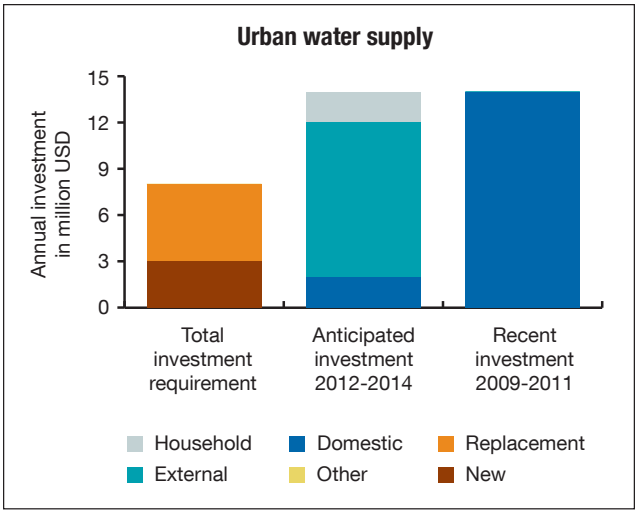
towns). The town authority manages Goroka. In 2000, Eda Ranu and Water PNG covered about 66% of the urban population, which is just 9% of the nation's total population.

CAPEX required to meet the 2030 urban water supply target is estimated to be about US$8 million per year (figure 8.2).[31] An average additional US$2 million per year is also needed for the O&M of existing and new facilities (see section 2). Anticipated public (domestic and external) investments for 2012 to 2014 are about US$12 million a year, which exceeds the annual requirements for capital investments. An additional US$2 million per year in user investments is assumed to be leveraged by this public investment, which makes the excess over required investments even larger. However, these estimates are deceptive. Approximately 64% (US$8 million per year) of anticipated public investments are intended for a water supply project in Daru, an urban center that accounted for approximately 2% of the urban population in 2000. This project has a per capita investment of US$440, compared with US$95 used for calculating investment needs. This means that the remaining US$4 million per year in anticipated public investments will have to be allocated to about 98% of the urban population. Hence, there is actually a deficit of roughly US$3 million per year in public CAPEX for the remainder of the urban population. The extent to which the assumed user investments can cover this gap depends on the extent to which urban households will actually invest in water supply facilities.

Meeting O&M expenditures could also be a challenge. The experience of Eda Ranu, for example, which, by its own estimates, has 55% NRW, implies that significant changes must also take place in serving and collecting tariffs from users. This NRW is mainly from illegal connections and nonbilled water, rather than from leakage and physical water loss.[32] Eda Ranu is interested in reducing NRW and, with support from development partners, has had technical exchanges with water utilities and private providers from the Philippines to learn about alternative service delivery models for low-income and informal settlements. It is currently piloting water vending contracts with settlements in Port Moresby.

The service delivery pathway for urban water has bottlenecks in the enabling environment (figure 8.3). Although urban utilities Water PNG and Eda Ranu have well-defined roles, improvements could be made to the overall subsector focus, such as developing an investment plan that takes into account rates of return, sources of finance, and current levels of service for all urban areas; coordination of all fund flows to the subsector; and an annual subsector review rather than individual project reviews. In terms of the budget, it is not possible to easily differentiate between urban and rural budget allocations, but as the calculated annual funding shortfall shows, and as reported by stakeholders, urban water supply is underfunded.

Figure 8.2 Urban Water Financing (Required, Anticipated, Recent)

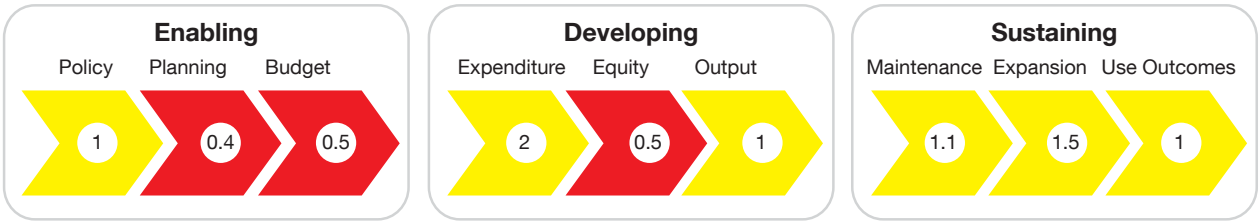


Source: SDA costing.
Note: Recent and anticipated investments refer to average annual allocations from 2009–11 and 2012–4, respectively. Allocations, rather than actual expenditures, were used to depict recent investments because of the lack of data on the latter.

[31] The authors were not able to obtain all the necessary cost data to calculate urban water financing needs. With more accurate and recent data, this deficit may prove to be significantly higher.

[32] Eda Ranu has staff responsible for metering and tracking NRW and its causes.

Figure 8.3 Urban Water Supply Scorecard



Under the "developing" pillar, in particular, the equity building block requires strengthening. At present, there is no framework or criteria for the equitable allocation of funds between urban areas—a factor that is important for the prioritization of limited budget across more than 80 unserved district towns that require water supply services by 2030. At the local level, the major utilities do conduct some consultation with local communities; however, this process is not codified in any way or systematically implemented. Up until recently, donor projects were the driver of efforts at reducing inequality of access to urban water. A promising development is Eda Ranu's plan to serve informal settlements through local water vending agreements.

The sustaining pillar of the urban water service delivery pathway has positive attributes. There are opportunities for service sustainability owing to the relative autonomy of water utilities in decision making and investment. Although the slow pace of new connections constrains user outcomes, those who do have piped water access enjoy 24-hour supply.

Of the priority action areas identified by stakeholders, the following actions were the most important according to stakeholders:

1. **Develop a comprehensive subsector 5-year investment plan for new works and rehabilitation/replacement of existing infrastructure.** More detail is required on investment feasibility than what is included in the current rolling plan. For new works, investment plans should include information about key issues for urban water supply, for example, sources of water, technical options, cost and cost recovery, population growth, provincial government and LLG development plans, land issues, security/law, and order. Water PNG and consultants can undertake this work, but it would require funding.
2. **Finalize and implement CSOs that adequately compensate for services in unprofitable areas.** Currently, only 5 or 6 of 17 provincial towns' water supplies are commercially viable. Some provincial towns may become more viable in the next 10–20 years, but other town water supplies will always cost more to provide than any revenue collected (for example, Daru and Kundiawa). Stakeholders want the government to finalize the CSO arrangements as soon as possible so they can have a clear direction on their roles and responsibilities. CSOs should make specific reference to water (and sanitation) for clarity, rather than a generic CSO policy. The government should set and maintain a deadline for finalizing CSO arrangements and informing stakeholders.

9. Subsector: Rural Sanitation and Hygiene

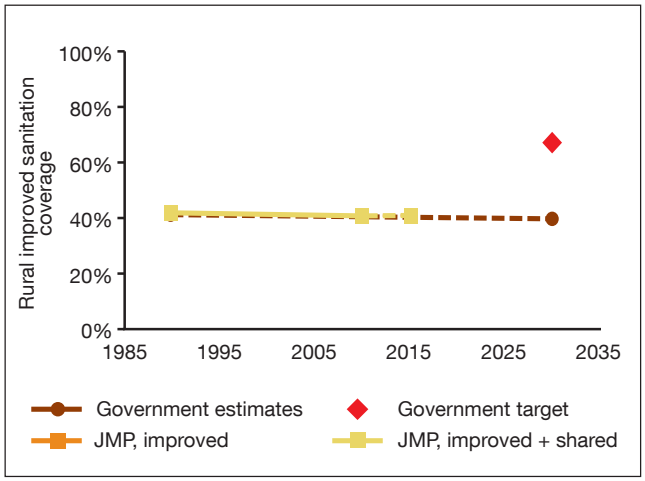
Priority actions for rural sanitation and hygiene

- Develop a coherent approach for sustainable sanitation and hygiene promotion based on current initiatives.
- Establish and resource a dedicated nationwide rural sanitation and hygiene program with staff and budgets. The National Department of Health should be the national coordinating agency to support implementation by LLGs.
- Where possible, use data, for example, from Department of Implementation and Rural Development, to target priority areas where sanitation access is low.

Data from JMP show that only about 4 of 10 (41%) people residing in rural areas had access to improved sanitation facilities in 2010 (figure 9.1). Based on information from the 2006 DHS, the most common improved sanitation facility is a pit latrine, with pour-flush toilets available to only about 2% of the rural population. There has been a slight deterioration in coverage rates over the last two decades, with access to improved sanitation declining by 1% between 1990 and 2010. In absolute terms, this means that the number of people without access to an improved facility has grown by 58% during the period.

The government target is that about 68% of the rural population will have access to improved sanitation facilities by 2030. This requires about 184,435 persons per year in rural areas to gain access to improved sanitation between 2011 and 2030, or almost four times more than the average number of persons (46,482 persons) who gained access on an annual basis between 1990 and 2010. Unless sizeable investments are made in the coming years, the country will fall short of the government's target of 68% access to improved sanitation facilities by 2030.

Figure 9.1 Rural Sanitation Coverage



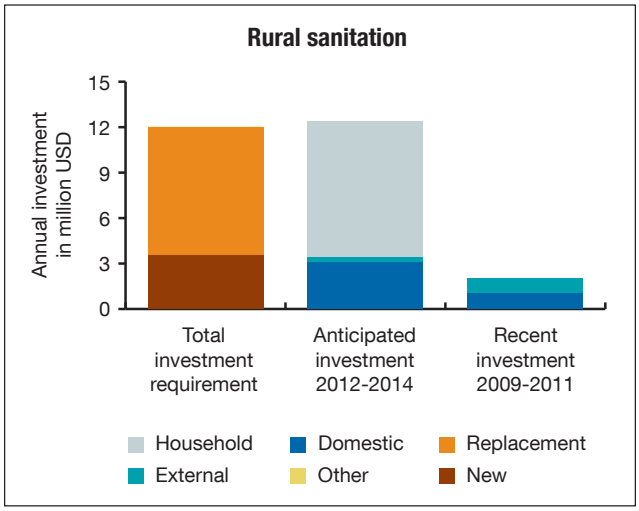
Source: JMP 2012. SDA costing.
Note: The government targets do not distinguish between rural and urban water supply. As mentioned in section 2, the government targets effectively assume a reduction by 46% of the households that did not have access to improved sanitation in 2010. The authors also used this proportion to calculate the government target for rural sanitation.

CAPEX required to meet the 2030 rural sanitation target is estimated to be about US$12 million per year (figure 9.2). An additional US$1 million per year is also needed for O&M expenditures. Public (domestic and external) and

user (households) investments for rural sanitation are anticipated to be US$3 million and US$9 million per year, respectively. Compared with CAPEX requirements, this implies a small surplus of less than US$1 million per year.

A relatively large share of sanitation investments is assumed to come from households because there is no government policy or provision of hardware subsidies. This expectation poses a major challenge because the burden of sanitation financing is likely to be heavy, especially on the poor.[33] The estimated investment requirements, and consequently, the burden on rural households, are conservative because the requirements were calculated using mostly lower-cost technology such as pit latrines. Replacement cost becomes important as low-cost sanitation technologies need to be replaced more frequently because they tend to be less durable or to have smaller pit sizes. If the technology mix is adjusted to include a greater proportion of households with pour-flush toilets, then the financial burden on rural households is increased, unless a targeted subsidy policy would help lift affordability constraints and incentivize households to invest. The software costs to motivate households to invest in sanitation were also not included in the computation of required investments. These would include human resources, training, behavior change communication, transport, supervision, and monitoring costs.

Figure 9.2 Rural Sanitation Financing (Required, Anticipated, Recent)



Source: SDA costing.
Note: Recent and anticipated investments refer to average annual allocations from 2009–11 and 2012–4, respectively. Allocations, rather than actual expenditures, were used to depict recent investments because of the lack of data on the latter.

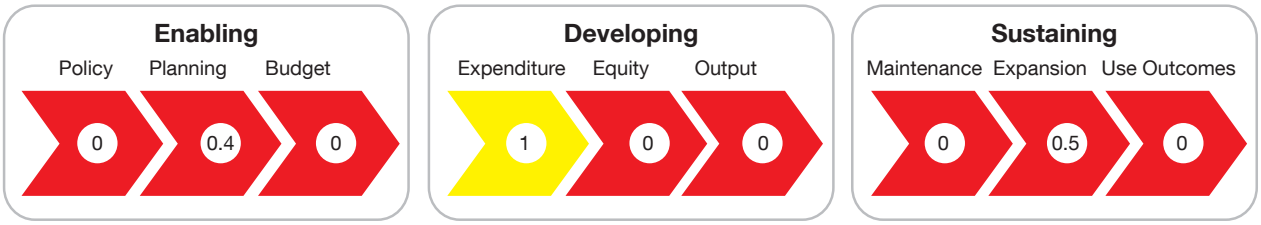
Rural sanitation is struggling in nearly every aspect of the service delivery pathway (refer to figure 9.3). Despite the majority of Papua New Guineans living in rural areas, both government and development partners ignore basic sanitation. Within the enabling pillar, there is no rural sanitation policy or distinct targets in MTDP. Institutional responsibility for rural sanitation is poorly defined and ambiguous, resulting in no agency taking the lead. Investment in the subsector falls well below what is required, and funding will dramatically decline as the 7-year RWSSP-EU ended in 2012.

Although no official policy is in place, it is assumed that households will finance the majority of the cost of their own latrines. However, there is no major program, not from government, donors, or civil society, to promote sanitation and hygiene to elicit this near 100% household investment. The lack of a comprehensive program approach to change current household behaviors is a key bottleneck to unlocking household investment potential. The "Healthy Islands" approach adopted as the national hygiene and sanitation methodology is seriously underfunded and reaches less than 5% of the country.[34] Some NGOs and the RWSSP-EU have used the Participatory Hygiene and Sanitation Transformation approach, but not systematically. Environmental health officers have little training, and there are no funds for mobilization and outreach to rural households to create demand for sanitation.

[33] Useful insights on the extent of poverty in PNG are found in (1) Cammack, D. 2008. *Chronic Poverty in Papua New Guinea*. Manchester, UK: Chronic Poverty Research Center, School of Environment and Development, University of Manchester and Gibson, J., G. Datt, B. Allen, V. Hwang, M. Bourke, and D. Parajuli. 2004. *Mapping Poverty in Rural Papua New Guinea* (unpublished manuscript). Available from http://sedac.ciesin.columbia.edu/povmap/downloads/methods/PEB_Poverty_Mapping(Papua%20New%20Guinea).pdf.

[34] Estimated by NDOH and RWSSP staff during the Rural Water and Sanitation workshop, June 2012.

Figure 9.3 Rural Sanitation Scorecard



Budget utilization of externally funded projects is good and provides a positive point in the service delivery pathway. RWSSP-EU was able to spend its budget for rural sanitation, indicating considerable demand for rural sanitation and no major bottlenecks in implementation capacity within the boundaries of project execution. This program's successful use of low-cost Community-Led Total Sanitation to transform rural household to adopt sanitation has potential for scaling up to a national program, provided that the government, development partners, or both, continue funding for training and facilitation. The subsector has little private sector participation and there are no incentives to stimulate the private sanitary supply market.

Of the priority action areas identified by stakeholders, the following actions were the most important according to stakeholders:

1. **Develop a coherent approach for sustainable sanitation and hygiene promotion based on current initiatives.** All three current approaches (Healthy Islands, Participatory Hygiene and Sanitation Transformation, and Community-Led Total Sanitation) can complement each other and have different strengths; for example, the Healthy Islands approach is holistic and includes waste management and aims for household level of change. Community-Led Total Sanitation is a promising way to promote sanitation and use of latrines. A national approach that integrates the current approaches and is appropriate for the country's unique settings and regions needs to be formulated. In developing a coherent approach, it is necessary to cost out different sanitation models to develop a cost-effective sanitation approach for the whole country.
2. **Establish and resource a dedicated nationwide rural sanitation and hygiene program with staff and budgets.** Existing structures can support a national program, but resources are needed for capacity building to support implementation. Existing but inactive village health volunteers need to be retrained, motivated, and mobilized, with LLG staff trained and supported to take ownership of the program in their area. NDOH should be the main entity in the program but will need staff, training, resources, and budget to support others to implement sanitation and hygiene promotion. Budgets are needed for human resource development and to support motivation, knowledge sharing, and monitoring, rather than for hardware.

10. Subsector: Urban Sanitation and Hygiene

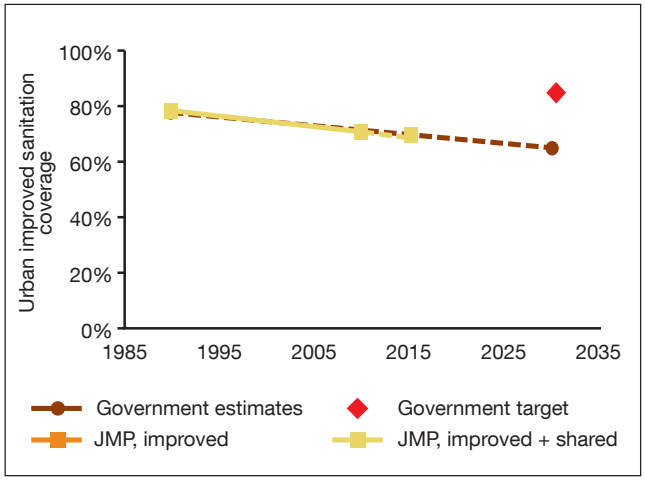
Priority actions for urban sanitation and hygiene

- Develop an urban sanitation strategy that includes a range of sanitation options and involves a range of private and public service providers.
- Develop alternatives to high-cost sewerage-only approaches.
- Improve urban septage collection, treatment, and monitoring

By JMP estimates, 71% of the urban population had access to improved sanitation in 2010 (figure 10.1). Although seemingly impressive when compared with rural areas, these estimates must be viewed with caution for two reasons. First, the 2006 DHS indicates that only about 40% of all urban households had access to private pour-flush toilets. Other households had traditional pit latrines (35%), shared flush toilets (7%), other improved latrines (8%), facilities that dispose to the sea or river (3%), and bucket toilets (1%) or had no facilities (5%). People living in informal urban settlements are the least likely to have improved sanitation and are commonly ignored. Second, there is the decline of 6 percentage points in access to improved sanitation between 1990 and 2010. In absolute terms, the number of people without access to improved sanitation has increased by 73%—from an estimated 143,439 in 1990 to 248,612 in 2010.

The country is off-track in meeting the urban sanitation target of 84% by 2030. Meeting this target requires about 33,538 persons gaining access to improved sanitation each year between 2011 and 2030. This is more than five times higher than the rate of annual increase (6,117 persons per year) reported for 1990 to 2010.

Figure 10.1 Urban Sanitation Coverage



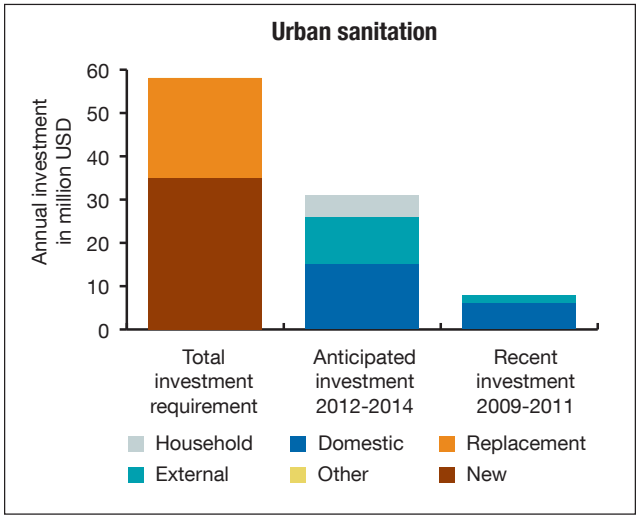
Source: JMP 2012. SDA costing.
Note: The government targets do not distinguish between rural and urban water supply. As mentioned in section 2, the government targets effectively assume a reduction by 46% of the households that did not have access to improved sanitation in 2010. The authors also used this proportion to calculate the government target for urban sanitation.

To meet the 2030 urban sanitation target, approximately US$58 million is needed per year for CAPEX (figure 10.2). An additional US$14 million per year is also required for O&M of the sanitation facilities (see section 2). Anticipated public (domestic and external) investments are about US$25 million per year, and assumed CAPEX of households

is US$5 million per year. This implies a CAPEX deficit of about US$28 million per year.

The estimates for the CAPEX deficit might actually be more optimistic than it truly is. First, there is uncertainty on the amount of assumed household investment in the period of analysis. The absence of historical information on household expenditure on sanitation facilities makes it difficult to draw conclusions, and the decline in the proportion of households with access to improved sanitation is indicative of the position of sanitation in the hierarchy of household budgets. Unit costs estimated at US$1,030 per person for sanitation investment, are too much of a financial burden for urban households. Second, the bulk of the anticipated public investments are likely to be allocated to sewerage projects commencing in 2013 in Port Moresby and Daru. These projects distort the impact of spending on sanitation for access and mask the potential underinvestment that could be taking place in other urban areas in PNG. For the residents of Port Moresby, the project also does not necessarily translate to greater access to improved sanitation and largely represents an upgrade in collection and expansion of treatment facilities for people who are already connected to existing sewerage systems.[35] At most, 1,500 new connections can be expected, but households not connected to the existing network will need to invest in private facilities (for example, water flush toilets) and connect to the sewerage network to directly benefit from the sewerage system. Lastly, it may be difficult to collect fees and tariffs for new sewer systems to meet system O&M expenditures.

Figure 10.2 Urban Sanitation Financing (Required, Anticipated, Recent)



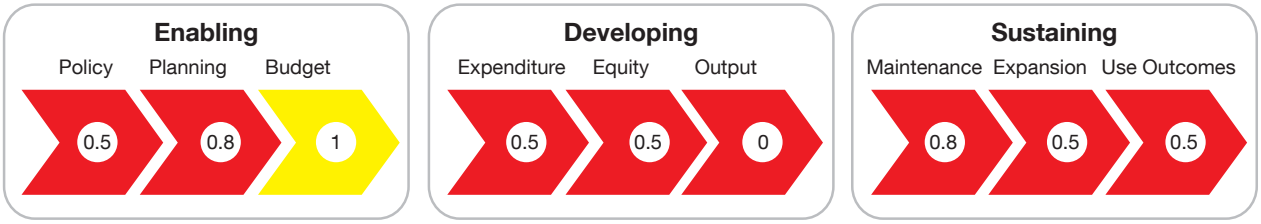
Source: SDA costing.
Note: Recent and anticipated investments refer to average annual allocations from 2009–11 and 2012–4, respectively. Allocations, rather than actual expenditures, were used to depict recent investments because of the lack of data on the latter.

The urban sanitation service delivery pathway has a weak enabling environment (figure 10.3). As with urban water supply, responsibilities in the subsector are defined partially through the National Water Supply and Sanitation Act, except for that of technical regulator. An urban sanitation policy to guide the whole subsector is urgently required. Much of the focus for urban sanitation is on sewerage systems provided by Water PNG and Eda Ranu, which are expensive to install and maintain. This technology choice means that only the cities of Port Moresby, Lae, and Mt Hagen have access to fully reticulated sewage system. Other provincial urban towns such as Kimbe, Madang, Alotau, Kundiawa, Rabaul, and Popondetta have a limited sewage reticulation network serving the central business district, the major institutions, and hospitals. Other alternatives for improved sanitation, such as household septic tanks and improved pit toilets, are commonly used outside the sewered areas and are left up to individual households and the private sector. However, more could be done to stimulate their uptake.

In the service delivery pathway, the "output" block under the "developing" pillar scores low because there is slow delivery of sanitation owing to a reliance on expensive sewage systems. The absence of monitoring of uptake of other improved sanitation forms (septic tank, VIP latrines, and others) means that there is no information on alternative technologies. The amount of fecal waste from any form of

[35] Reported by the chief executive officer of Eda Ranu as 1,000–1,500 new connections, but total beneficiaries of the sewerage system improvements 35,000–40,000 households.

Figure 10.3 Urban Sanitation Scorecard



sanitation that is treated is also unknown. In urban areas where there are no treatment facilities, dumping of untreated sewage or septage to the local environment is certain to take place. The whole urban sanitation subsector is not routinely monitored and reported against.

User fees are charged for connection and discharge to the sewage system, and sewerage revenue can be ring-fenced for O&M of sewerage infrastructure. However, less than 50% of urban fecal waste is collected and treated, treatment plant discharge standards are not routinely monitored, and no assessment of climate change and disaster risk management has been undertaken for the urban sanitation subsector. The extent of private sector involvement in sanitation is unknown but is believed to be low. There are no government incentives or initiatives to stimulate private sector involvement in sanitation in urban and peri-urban areas.

Of the priority action areas identified by stakeholders, the following actions were the most important according to stakeholders:

1. **Develop an urban sanitation strategy that includes a range of sanitation options and involves a range of private and public service providers.** The first step in developing an urban sanitation strategy is to better understand the current situation. Proper research and surveys are needed to gather information about the current situation throughout the country. This includes interviewing people about their needs and preferences and practices so that sanitation options will be acceptable. Based on the results of the research, sanitation alternatives to sewerage systems can be piloted. The information would enable Eda Ranu and Water PNG to develop new sanitation initiatives that complement existing services.
2. **Improve urban septage collection, treatment, and monitoring.** A first step in improving urban septage management is to clearly define the roles and responsibilities for septage management and regulation enforcement because government and utility responsibilities are currently unclear. This would be a task for all stakeholders, including the Department of Provincial and the Local Government Affairs.

11. Conclusion

Only about 40% of PNG people have access to safe water, and only 45% have access to safe sanitation, with this level of access declining in the last two decades. The government target aims for 70% access in both water and sanitation by 2030. To achieve these access targets for 2030, an average of US$31 million each year will need to be spent on water supply and US$70 million per year on sanitation, as well as US$22 million per year to finance O&M of current and future infrastructure. Anticipated short-term financing is already considerably below the amount required.

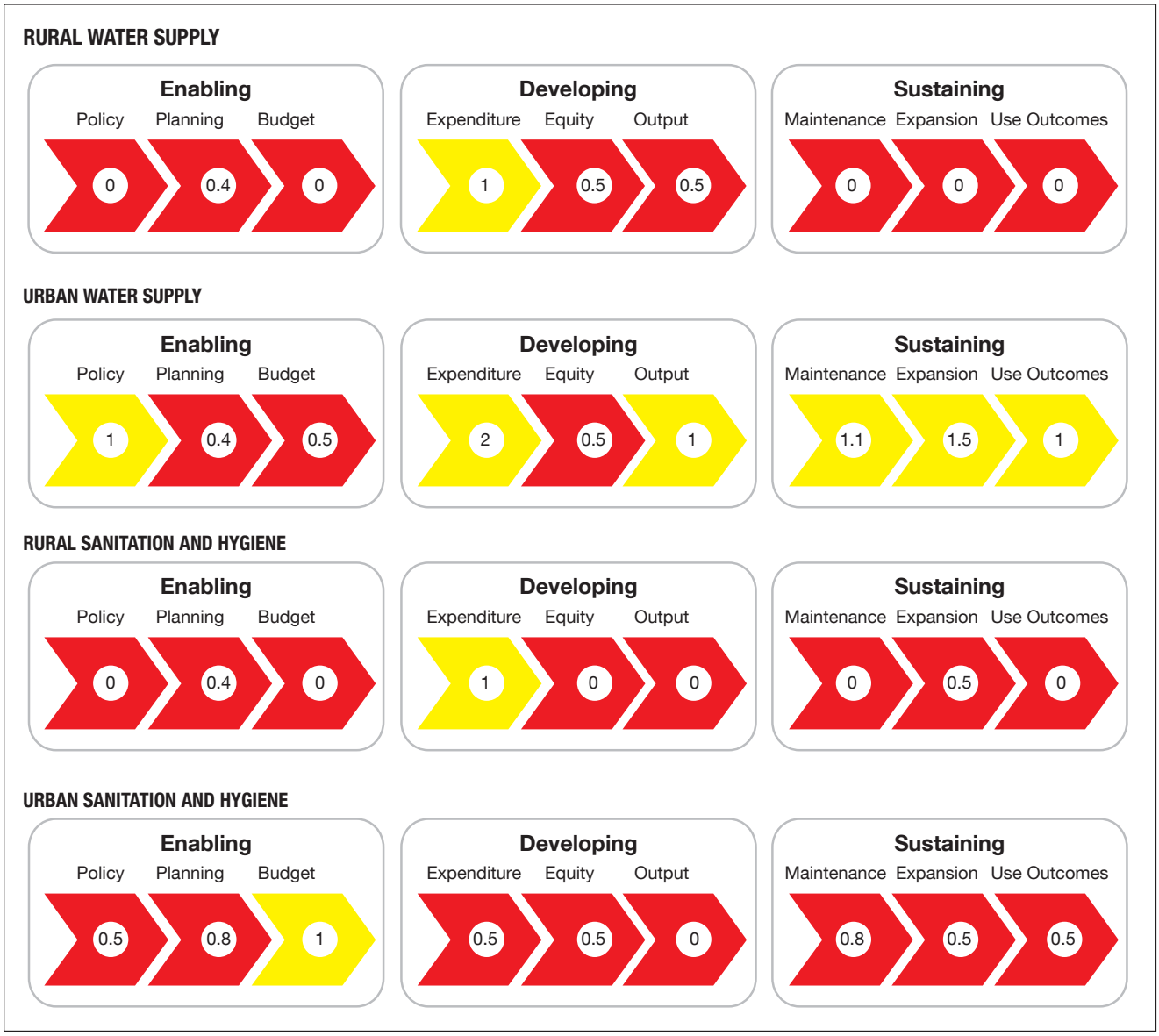
Lack of money for capital works is not the only constraint in the sector. PNG performs poorly in the "enabling" service delivery pillar, with all subsectors scoring low because of lack of policies that articulate a vision and approaches for water and sanitation, lack of official subsector targets, and gaps in institutional roles, particularly in the rural subsector, whereas lack of investment plans and budget cloudiness inhibit tracking of financial allocations to the sector (refer to figure 11.1). Further along the service delivery pathway, PNG's scorecard reflects the extreme challenges that the sector now faces to develop new services efficiently and sustainably. PNG's scores in "developing" services, which relate to expenditure of funds, systems for allocating them equitably, and securing value-for-money outputs, are low for the rural sector. Implementation bottlenecks include insufficient finance allocated to the sector, weak monitoring systems, and a scarcity of qualified technicians and managers. Except for urban water supply, scores for sustaining services are poor for all subsectors, especially with regard to O&M, markets for WASH goods and services, expansion and uptake of new services, and user outcomes. Contextual factors such as political volatility, poor access from a lack of roads, no electricity, customary land ownership, and ethnic conflict also hamper progress.

Recommendations on priority actions to tackle these bottlenecks include the most urgent needs in the sector:

- Reform institutional arrangements for water and sanitation to achieve clear and separate responsibilities for all functions.
- Develop a comprehensive sector policy covering all subsectors.
- Increase investment in water and sanitation especially in the rural sector.

Without significant government intervention, the decline in access is likely to continue owing to the sector's low priority and declining functionality of infrastructure, combined with a high population growth. Rural sanitation and rural water supply subsectors are especially overlooked and are in most need of government and external support because more than 90% of people without access to services live in rural areas. Growing peri-urban areas in larger towns and cities such as urban settlements in Port Moresby and Lae are also unserved and need immediate attention.

Figure 11.1 Subsector Scorecards



Annex 1: Scorecard and Evidence for Scoring

The following table presents the scores and evidence for each service delivery indicator. Each indicator can score 0, 0.5 or a maximum of 1. These scores are combined to form a total score for each of the nine service delivery building blocks — policy, planning, budget, expenditure, equity, output, maintenance, expansion, user outcome. The overall building block scores for each subsector are presented in the relevant subsector sections of the report.

Areas of evidence for assessment	Question	Score	Explanation for score	Source of evidence
RURAL WATER SUPPLY				
ENABLING				
Sector targets	Are there RWS access targets in the national level development plan?	0	No separate rural water targets in development plan	MTDP 2011–5; Vision 2050
Sector policy	Is there a rural water policy that is agreed by stakeholders, approved by government, and publically available?	0	Draft policy prepared by Water PNG but not agreed by all stakeholders.	Draft policy; rural water workshop
Institutional roles	Are the institutional roles of rural water subsector players (national/state & local government, service provider, regulator, etc.) clearly defined and operationalized?	0	Water PNG has role to “promote” rural water supply. The Department of Health has responsibility for "purity of water" in Public Health Act 1973. LLGs may make laws on provision of water supply. Generally poorly defined and unclear, indistinct roles	Water and Sewerage Act 1986; Public Health Act 1973; Organic Law 1995
Fund flow coordination	Does the government have a process for coordinating multiple investments in the subsector (domestic or donor, e.g., national grants, state budgets, donor loans and grants, etc.)?	0	No central funds coordination, although some coordination at provincial level	Rural water workshop
Investment plan	Is there a medium-term investment plan for rural water based on national targets that is costed, prioritizes investment needs, and is published and used?	0	No investment plan for rural water exists	Meetings and rural water workshop
Annual review	Is there an annual multistakeholder review in place to monitor subsector performance, to review progress, and to set corrective actions?	0	No annual review to monitor rural water planning and performance	
HR capacity	Has an assessment been undertaken of the human resource needs in the subsector to meet the subsector target, and is the action plan being implemented?	0.5	International Water Association (IWA) Human Resource (HR) study of March 2012. Report is in draft format only	WaterAid (March 2012), Mind The Gap: Papua New Guinea (HR Study)
Adequacy	Are the public financial commitments to the rural water subsector sufficient to meet the national targets for the subsector?	0	Financial analysis	SDA financial analysis

Areas of evidence for assessment	Question	Score	Explanation for score	Source of evidence
Structure	Does the budget structure permit the investments and subsidies (operational costs, administration, debt service, etc.) for the rural water sector to be clearly identified?	0	Not in budget	National budget
Comprehensive	Does the government budget comprehensively cover domestic and official donor investment/subsidy to rural water?	0	Most of financial flows in budget is urban; difficult to see in rural sector	National budget
DEVELOPING				
Utilization of domestic funds	What percentage of domestic funds budgeted for rural water are spent (3-year average)?	0	Unknown; very low utilization of DSIP <25%	Water PNG report
Utilization of external funds	What percentage of external funds budgeted for rural water are spent (3-year average)?	1	RWSSP, for example, claims that it spends all allocated budget.	Personal communication with RWSSP program manager
Reporting	Is rural water expenditure versus budget audited and reported on in a consolidated format for all sources of domestic and official donor expenditure?	0	Not reported	National budget
Local participation	Are there clearly defined procedures for informing, consulting with, and supporting local participation in planning, budgeting, and implementing for rural water developments?	0.5	This is for developments by donors and non state sectors (NSAs), as government is not developing rural water supply.	Rural water supply workshop
Budget allocation criteria	Have criteria (or a formula) been determined to allocate rural water funding equitably to rural communities and is it being applied consistently?	0	No criteria exist	Expert opinion from Rural Water Supply Workshop
Reducing inequality	Is there periodic analysis to assess whether allocation criteria and local participation procedures set by government have been adhered to and are reducing disparities in access?	0	No system for prioritizing which provinces or rural communities receive priority support	Rural water supply workshop
Quantity	Is the annual number of new systems built (and systems replaced) sufficient to meet sector targets (including output by government directly as well as through contractors and NGOs)?	0	Rural water supply schemes (known) are not keeping up with sector targets. RWSSP estimates reaching just 4% of rural population	RWSSP meetings; rural water supply workshop
Quality of water	Are there drinking water quality standards for rural water and are all new installations tested?	0.5	Public Health (Drinking Water) Regulation 1984 exists, based on WHO criteria. Testing is meant to be done by environmental health officers, but capacity is weak and there are few testing centers within timely distance of new schemes.	Public Health (Drinking Water) Standards 1984. Rural water supply workshop.
Reporting	Is the number of new schemes and their locations reported in a consolidated format each year?	0	No reporting of new schemes; schemes built by NGOs especially are under the radar of government	Meetings
Sustaining				
Functionality	Are there regular asset register updates of rural water infrastructure, including their functional status?	0	No national register of water systems	Rural water workshop
Cost recovery	Is there a national policy on O&M costs and are O&M costs known and covered from subsidies and/or user fees?	0	No policy	Rural water workshop
Spare parts chain	Is there a system defined for spare parts supply chain that is effective in all places?	0	No system defined	Rural water workshop
Management of disaster risk and climate change	Do rural service providers have plans for coping with natural disasters and climate change?	0	No	Rural water workshop

Areas of evidence for assessment	Question	Score	Explanation for score	Source of evidence
Investment support	Are piped systems in rural areas recognized as management entities and given technical and financial support to expand their systems either by government or larger utilities?	0	No formalization of schemes or assistance given	Rural water workshop
Plans	Are there scheme-level plans for the expansion of piped systems in rural areas?	0	No plans for expansion	Expert opinion
Investment finance	Are expansion costs for rural water being covered by user fees and/or public grants?	0	Unknown	
Subsector progress	Is the subsector on track to meet the stated target?	0	Unknown	
Equity of use	What is the ratio of improved drinking water access between the lowest and highest quintile in rural areas?	0	Unknown.	
Quality of user experience	Of the households using an improved drinking water source, what proportions are using piped drinking water in the dwelling and yard/plot?	0	The number of rural households (HH) with piped water (PW) connection is estimated to be tiny. RWSSP's 300 schemes all were standpipes serving typically three to four households. Household Income and Expenditure Survey indicates that 2.4% of 35.2% (improved) have PW to HH.	Rural water supply workshop, RWSSP, Household Income and Expenditure Survey
URBAN WATER SUPPLY				
ENABLING				
Sector targets	Are there urban water supply (UWS) access targets in the national level development plan?	0.5	No specific targets for urban water in development plan. Water PNG targets are 100% coverage of provincial towns and 85% district towns by 2030.	MTDP 2011–5; Vision 2050; Water PNG Strategic Master Plan 2012–30
Sector policy	Is there an urban water policy that is agreed by stakeholders, approved by government, and publicly available?	0	No urban water sector policy	Meetings and all workshops
Institutional roles	Are the institutional roles of urban water subsector players (national/state & local government, service provider, regulator, etc.) clearly defined and operationalized?	0.5	Roles of urban service providers defined through legislation, but role of technical regulator not clear and roles of local government not explicit.	National Water and Sewerage Act; NCD Water and Sewerage Act; feedback from meetings and urban water workshop
Fund flow coordination	Does the government have a process for coordinating multiple investments in the subsector (domestic or donor, e.g., national grants, state budgets, donor loans and grants, etc.)?	0	There is a process for individual donor projects but no process for multiple funding sources.	Urban water workshop
Investment plan	Is there a medium-term investment plan for urban water based on national targets that is costed, prioritizes investment needs, and is published and used?	0	Service providers such as Water PNG have a capital investment plan, but this is not costed. Investment plan for whole urban water sector does not exist.	Urban water workshop
Annual review	Is there an annual multistakeholder review in place to monitor subsector performance, to review progress, and to set corrective actions?	0	Only reviews and monitoring at an individual project level particularly for donor funded projects. There is no overall sector review.	Urban water workshop
HR capacity	Has an assessment been undertaken of the human resource needs in the subsector to meet the subsector target and is the action plan being implemented?	0.5	IWA HR study of March 2012. Report is in draft format only.	WaterAid (March 2012), Mind The Gap: Papua New Guinea (HR Study)
Adequacy	Are the public financial commitments to the urban water subsector sufficient to meet the national targets for the subsector?	0	Urban sector profoundly underfunded	Urban water workshop (ADB)

Areas of evidence for assessment	Question	Score	Explanation for score	Source of evidence
Structure	Does the budget structure permit investments and subsidies (operational costs, administration, debt service, etc.) for the urban water sector to be clearly identified?	0	Budget lines show some WASH expenditure, but there is no differentiation between urban and rural.	Urban water workshop; financial analysis
Comprehensive	Does the government budget comprehensively cover domestic and official donor investment/subsidy to urban water?	0.5	Large donor projects appear to be on the budget and some domestic budget but generally unclear.	Financial analysis; National budget
DEVELOPING				
Utilization of domestic funds	What percentage of domestic funds budgeted for urban water are spent (3-year average)?	0.5	Difficult to ascertain level of utilization from Water PNG and Eda Ranu (ER) records. Only 1 year of data available form National Budget, which showed 87% utilization, but it is unclear if this is a consistent figure. Government budget utilization generally 60% (ADB)	National budget; government records as cited by ADB at urban water workshop
Utilization of external funds	What percentage of external funds budgeted for urban water are spent (3-year average)?	1	No external investment in the sector in the last 3 years; however, the last ADB Provincial Towns Project showed a utilization of 80%.	ADB Project Towns Completion Report 2010
Reporting	Do urban utilities (national or three largest utilities) have audited accounts and balance sheet?	0.5	Audited, but not in a timely way. Annual reports not prepared in time and auditing not available—underresourced.	Water PNG (WPNG) meeting
Local participation	Are there clearly defined procedures for informing, consulting with, and supporting local participation in planning, budgeting, and implementing for urban water developments?	0	Water utilities do consult with local communities, but it is not codified anywhere. No evidence of clearly defined procedures for this.	Urban water workshop
Budget allocation criteria	Have criteria (or a formula) been determined to allocate urban water funding equitably to urban utilities or service providers and among municipalities, and is it being consistently applied?	0	No known criteria or formula for allocating funding based on equity basis. Funding allocated on most profitable location, e.g., Kerema.	Water PNG meetings; urban water workshop
Reducing inequality	Have urban utilities or service providers (national or in three largest cities) developed and implemented specific plans for serving the urban poor?	0.5	Eda Ranu has plans to serve settlement areas through vending agreements where there is high NRW. No formal plan across the sector.	Eda Ranu meetings
Quantity	Is the annual expansion of HH connections and stand posts in urban areas sufficient to meet the subsector targets?	0	Unknown but unlikely	
Quality of water	Are there drinking water quality standards for urban water that are regularly monitored and the results published?	0.5	Drinking water standards exist based on WHO but monitoring only done in some locations due to logistic problems.	Personal communication with Water PNG
Reporting	Is the number of additional household connections made and stand posts constructed reported on in a consolidated format for the nation each year?	0.5	Major urban utilities ER and WPNG do have a list of customers and new connections.	Urban water workshop
SUSTAINING				
Functionality	What is the weighted average percentage of NRW across urban utilities (national or three largest utilities) (last 3 years average)?	0	Weighted WPNG 63% vs. ER 37% of nationwide water connections = 50% NRW. Water PNG reports 38% NRW on average; Eda Ranu, 55%.	Urban water workshop; meetings with utilities; Pacific Water and Wastes Association (PWWA) benchmarking report 2011

Areas of evidence for assessment	Question	Score	Explanation for score	Source of evidence
Cost recovery	Are all O&M costs for utilities (national or three largest utilities) being covered by revenues (user fees and/ subsidies) (last 3 years average)?	0.5	Eda Ranu 2009–11 operating ratio of 1.16. Water PNG suggest that they have enough revenue to cover O&M.	Financial statements from Eda Ranu; verbal advice from Water PNG
Tariff reviews	Are tariff reviews regularly conducted using a process and tariffs adjusted accordingly and published?	1	Utilities conduct their own reviews and apply to Independent Consumer and Competition Commission for approval. Can adjust for consumer price index. Appears to be a regular review—annually	Meetings with utilities; Independent Consumer and Competition Commission Web page
Management of disaster risk and climate change	Do utilities (national or three largest utilities) have plans for coping with natural disasters and climate change?	0	Climate change and disaster risk not yet assessed	Urban water workshop
Autonomy	Do utilities or service providers (national or three largest) have operational decision-making autonomy in investment planning, HR, finance (separate balance sheet), and procurement management?	0.5	Investment plans need to be approved by the Independent Public Business Commission but generally free to undertake HR, procurement, etc. Expenditure over K1 million needs approval.	Urban water workshop
Plans	Do service providers (national/state or 3 largest utilities) have business plans for expanding access to urban water?	0.5	Business plans prepared but not costed for Water PNG	Water PNG Corporate Plan 2012-2015
Borrowing	Are utilities allowed by law to access and are they accessing commercial finance for expansion?	0.5	SOEs are able to borrow but do not do so. Borrowing function is usually controlled by government.	Water PNG at urban water workshop
Subsector progress	Is the subsector on track to meet the stated target?	0	Not on track	JMP scores and financial analysis
Equity of use	What is the ratio of improved drinking water access between the lowest and highest quintile in urban areas?	0	Unknown	
Quality of user experience	What is the average number of hours of service per day across urban utilities (weighted by number of HH connections per utility)?	1	24-hour service widely available as the standard	Utilities
RURAL SANITATION AND HYGIENE				
ENABLING				
Sector targets	Are there rural sanitation and hygiene (RSH) access targets, for households and/or communities, in the national level development plan?	0	No separate rural sanitation targets in MTDP 2011–5 or any other document. Subsector has not been a focus.	MTDP 2011–5; Vision 2050
Sector policy	Is there a rural sanitation policy that is agreed by stakeholders, approved by government, and publically available?	0	No operational policy	
Institutional Roles	Are the institutional roles of rural sanitation subsector players (national/state & local government, service provider, regulator, etc.) clearly defined and operationalized?	0	Some defining of roles, e.g., NDOH; provincial governments (PGs) (deliver education and awareness; make laws on environmental health) but often poorly defined and ambiguous.	Public Health Act; Determination of PG and LLG service delivery functions, 2009
Fund flow coordination	Does government have a process for coordinating multiple investments in the subsector (domestic or donor, e.g., national grants, state budgets, donor loans and grants, etc.)?	0	No evidence of coordination on rural sanitation at the national level	

Areas of evidence for assessment	Question	Score	Explanation for score	Source of evidence
Investment Plan	Is there a medium-term investment plan for rural sanitation based on national targets that is costed, prioritizes investment needs, and is published and used?	0	No such national plan exists; a few local governments may have their own plans, but location unknown.	
Annual review	Is there an annual multistakeholder review in place to monitor subsector performance, to review progress, and to set corrective actions?	0	No multistakeholder review of national sanitation progress	Rural sanitation workshop
HR capacity	Has an assessment been undertaken of the human resource needs in the subsector to meet the subsector target and is the action plan being implemented?	0.5	IWA HR study of March 2012. Report is in draft format only.	WaterAid (March 2012), Mind The Gap: Papua New Guinea (HR Study)
Adequacy (of financing)	Are the public financial commitments to the rural sanitation subsector sufficient to meet the national targets for the subsector?	0	No spending on rural sanitation promotion (Healthy Islands covers less than 5% of country)	Personal communication with the Department of Health
Structure	Does the budget structure permit investments and subsidies (operational costs, administration, debt service, etc.) for the rural sanitation sector to be clearly identified?	0	No allocation for rural sanitation or promotion in national budget.	National budget
Comprehensive	Does the government budget comprehensively cover domestic and official donor investment/subsidy to rural sanitation?	0	Rural water supply not identified in budget	National budget
DEVELOPING		0		
Utilization of domestic funds	What percentage of domestic funds budgeted for rural sanitation are spent (3-year average)?	0	Poor information on what is spent on sanitation	Rural sanitation workshop
Utilization of external funds	What percentage of external funds budgeted for rural sanitation are spent (3-year average)?	1	All RWSSP sanitation and hygiene budget utilized	Report from RWSSP on expenditure
Reporting	Is rural sanitation expenditure versus budget audited and reported on in a consolidated format for all sources of domestic and official donor expenditure?	0	Expenditure at LLG unclear	
Local participation	Are there clearly defined procedures for informing, consulting with, and supporting local participation in planning, budgeting, and implementing for rural sanitation developments?	0	A variety of procedures and processes used for local participation by NGOs, including Community-Led Total Sanitation, but not adopted by Government Healthy Islands applies to <5% of developments	Rural sanitation workshop
Budget allocation criteria	Have criteria (or a formula) been determined to allocate rural sanitation funding equitably across rural communities and is it being applied consistently?	0	No budget allocation criteria for funding developed	Rural sanitation workshop
Reducing inequality	Is there any (periodic) analysis carried out to assess disparities in access and are measures (policy or programmatic actions) to reduce inequalities taken as a result?	0	No analysis done—no funding and no allocation criteria	
Quantity	Is the annual expansion of rural households gaining access to safe sanitation sufficient to meet the subsector targets?	0	No	Financial and target analysis
Capacity for promotion	Is there enough capacity—staff, expertise, tools, materials—to deliver a sanitation program at scale, using tailored community-based and/or other approaches?	0	The Healthy Islands approach has the potential to be used at scale, but there is insufficient budget allocation for this to train personnel and support fieldwork. Manpower is probably sufficient.	Rural sanitation workshop

Areas of evidence for assessment	Question	Score	Explanation for score	Source of evidence
Reporting	Does the government regularly monitor and report on progress and quality of rural sanitation access, including settlement-wide sanitation, and disseminate the results?	0	No monitoring or reporting of rural sanitation carried out	Rural sanitation workshop
SUSTAINING				
Supply chain	Does the supply chain for sanitation products meet household needs (ready availability, quantity and cost), satisfy government standards and reach to unserved areas?	0	Remote areas are very difficult to access.	Rural sanitation workshop
Private sector capacity	Is there sufficient mason/artisan/small business capacity to meet household needs (quantity, quality and cost)?	0	Only isolated examples of private sector participation in sanitation	Rural sanitation workshop
Private sector development	Does the government have programs to promote and guide the domestic private sector and facilitate innovation for the provision of sanitation services in rural areas?	0	No government support to private sector sanitation businesses	Rural sanitation workshop
Management of disaster risk and climate change	Do local government or rural service providers have plans for coping with natural disasters and climate change?	0	No action	Rural sanitation workshop
Support for expansion	Are expenditures at the local level in line with the national sanitation policy and are they sufficient to achieve national targets?	0	Money through DSIP could be used for sanitation promotion, but it is unclear how this is spent and not likely to be sufficient. Lack of funding at PG level for resource mobilization	Rural sanitation workshop
Incentives	Has government (national or local) developed any policies, procedures, or programs to stimulate uptake of rural sanitation services and behaviors by households?	0.5	The Healthy Islands approach includes sanitation promotion but is implemented in less than 5% of the country.	NDOH; RWSSP; Rural sanitation workshop
Behaviors	Is the government generating and using evidence to monitor and analyze household sanitation behavior change and take action to improve sustainability?	0	No evidence of government undertaking or supporting behavior research	Meetings and discussions with donors, NGOs, government
Subsector progress	Is the subsector on track to meet the stated target?	0	Not keeping pace with population growth	Analysis
Equity of use	What is the ratio of improved toilet access between the lowest and highest quintiles in rural areas?	0	Unknown	
Hygienic use of quality facilities	What percentage of people living in rural areas use improved toilet facilities (excluding shared facilities)?	0	Estimated 42% using improved toilets according to JMP and adjusted from DHS figures	DHS 2006
URBAN SANITATION AND HYGIENE				
ENABLING				
Sector targets	Are there urban sanitation and hygiene (USH) access targets (household level and sewerage/septage management) in the national level development plan?	0	No separate urban sanitation targets in MTDS or other plans.	MTDP 2011–5; Vision 2050
Sector policy	Is there an urban sanitation policy that is agreed by stakeholders, approved by government, and publically available?	0	No urban sanitation sector policy	Meetings and all workshops
Institutional Roles	Are the institutional roles of urban sanitation subsector players (national/state & local government, service provider, regulator, etc.) clearly defined and operationalized?	0.5	Roles of urban service providers defined through legislation but role of technical regulator not clear, and roles of local government not explicit.	National Water and Sewerage Act; NCD Water and Sewerage Act; feedback from meetings and urban sanitation workshop

Areas of evidence for assessment	Question	Score	Explanation for score	Source of evidence
Fund flow coordination	Does government have a process for coordinating multiple investments in the subsector (domestic or donor, e.g., national grants, state budgets, donor loans and grants, etc.)?	0.5	The provincial investment program (PIP) process is a system of government for coordination but is not fully utilized.	Urban sanitation workshop
Investment plans	Is there a medium-term investment plan for urban sanitation based on national targets that is costed, prioritizes investment needs, and is published and used?	0	Sanitation plans for urban areas missing. Some plans exist but are not costed. According to stakeholders, planning is not done because there is no money for implementation.	Urban sanitation workshop
Annual review	Is there an annual multistakeholder review in place to monitor subsector performance, to review progress, and to set corrective actions?	0	No annual review process for urban sanitation performance	
HR capacity	Has an assessment been undertaken of the human resource needs in the sub sector to meet the subsector target and is the action plan being implemented?	0.5	IWA HR study of March 2012. Report is in draft format only.	WaterAid (March 2012), Mind The Gap: Papua New Guinea (HR Study)
Adequacy	Are the annual public financial commitments to the urban sanitation subsector sufficient to meet national targets for the subsector?	0	Government spending focus is on sewerage systems not other sanitation. Port Moresby (POM) sewerage is the only pipeline project, but this is for improvement of existing services and distorts the urban sanitation spending.	Financial analysis; budget
Structure	Does the budget structure permit investments and subsidies (operational costs, administration, debt service, etc.) for the urban sanitation sector to be clearly identified?	0.5	Budget shows some development expenditure	National budget
Comprehensive	Does the government budget comprehensively cover domestic and official donor investment/subsidy to urban sanitation?	0.5	Donor funds shown in budget	Financial analysis; budget
DEVELOPING				
Utilization of domestic funds	What percentage of domestic funds budgeted for urban sanitation are spent (3-year average)?	0.5	Difficult to ascertain level of utilization from Water PNG and Eda Ranu records. Only 1-year of data are available form national budget, which showed 87% utilization, but it is unclear if this is a consistent figure. Government budget utilization generally 60% (ADB)	National budget; government records as cited by ADB at urban water workshop
Utilization of external funds	What percentage of external funds budgeted for urban sanitation are spent (3-year average)?	0	Not aware of any external project utilization in last 3 years. POM sewerage utilization unknown. Other budgeted projects with no idea on how it is utilized, especially 2011 and 2012.	
Reporting	Is urban sanitation expenditure versus budget audited and reported on in a consolidated format for all sources of domestic and official donor expenditure?	0	Unclear reporting for all sources of domestic flows	Financial analysis
Local participation	Are there clearly defined procedures for informing, consulting with, and supporting local participation in planning, budgeting, and implementing for urban sanitation developments?	0.5	Local participation involves informing the public and using a procedure for them to apply for connection to sewerage system.	Urban sanitation workshop

Areas of evidence for assessment	Question	Score	Explanation for score	Source of evidence
Budget allocation criteria	Have criteria (or a formula) been determined to allocate urban sanitation funding equitably to urban utilities or service providers and among municipalities and is it being consistently applied?	0	No known criteria or formula for allocating urban sanitation funding based on equity basis	Water PNG meetings; urban workshop
Reducing inequality	Do local government or urban service providers (national or in 3 largest cities) have specific plans or measures developed and implemented for serving the urban poor?	0	No plans to target urban poor	Personal communication with Eda Ranu and Water PNG
Quantity (access)	Is the annual expansion of urban households gaining access to safe sanitation sufficient to meet the subsector targets?	0	Unknown who has what type of sanitation; urban sanitation left to individual households to deal with	Urban sanitation workshop
Quantity (treatment)	Is the annual increase in the proportion of fecal waste that is safely collected and treated growing at the pace required to meet the subsector targets (for both onsite and sewerage)?	0	Private operators may use Water PNG treatment facilities where these exist or else dump waste in environment. Little known about fecal waste collection and treatment outside sewerage system	Urban sanitation workshop
Reporting	Are there procedures and processes applied on a regular basis to monitor urban sanitation access and the quality of services and is the information disseminated?	0	Unclear who would do monitoring	
SUSTAINING				
Collection and treatment	What is the proportion of total fecal waste generated that gets safely collected and treated?	0	Proportion of waste generated that is treated is unknown but is believed to be less than 50% due to lack of treatment facilities in urban centers.	Water PNG Corporate Plan 2012–5
Cost recovery	Are O&M costs of treatment systems (beyond household level facilities) assessed/known and fully met by either cost recovery through user fees and/or local revenue or transfers?	1	Sewerage fees collected and shown separately in finances. Fees cover O&M.	Eda Ranu, Water PNG advice
Discharge	Are there norms and standards for wastewater discharge for septage and sewerage treatment plants that are systematically monitored under a regime of sanctions (penalties)?	0	Unknown	
Management of disaster risk and climate change	Do local government or service providers (national or in three largest cities) have plans for coping with natural disasters and climate change?	0	No assessment of climate impacts or disaster risks yet	Urban sanitation workshop
Uptake	Has government (national or local) developed any policies, procedures or programs to stimulate uptake of urban sanitation services and behaviors by households?	0	No known incentives or stimulants to increase uptake of urban sanitation	Urban sanitation workshop
Plans	Do government/service providers have business plans for expanding the proportion of citywide fecal waste that is safely collected and treated?	0.5	Eda Ranu and Water PNG have plans for increasing collection of fecal waste through sewerage systems. Costing is very general.	Water PNG Corporate Plan 2012–5; Water PNG Strategic Development Plan 2012–30
Private sector development	Does the government have ongoing programs and measures to strengthen the domestic private sector for the provision of sanitation services in urban or peri-urban areas?	0	No known programs to stimulate private sector development	Urban sanitation workshop
Subsector progress	Is the subsector on track to meet the stated target?	0	No	JMP and financial analysis
Equity of use	What is the ratio of improved toilet access between the lowest and highest quintile in urban areas?	0	Unknown	
Use of facilities	What percentage of people living in urban areas use improved toilet facilities (excluding shared facilities)?	0.5	Estimated 77% using improved toilets according to JMP and adjusted from DHS figures	DHS 2006

Annex 2: Assumptions and Inputs for Costing Model

This annex describes the key inputs that were used to generate estimates of the required expenditures to meet government targets and anticipated CAPEX from 2012 to 2014. It discusses the sources, adjustments, and assumptions of the following information: exchange rates, demographic variables, sector-specific technologies, and spending plans.

Exchange rates

PNG kina amounts were converted into US dollars using yearly rates from the United Nations Currency Exchange Database (www.un.org/Depts/treasury) and Bank of PNG. Projections from 2013 onward use the 2012 exchange rate in the absence of any government projections.

Demographic variables

Two sets of demographic variables are needed in the model. The first represents rural and urban population estimates or projections for 1990, 2010, and the target year (2030). Combined with existing and target coverage rates for water and sanitation, this information assists in the calculation of the number of people who will be needing access to improved facilities from 2010 to the target year. The second set of information refers to the average size of households. This is used to convert costs of facilities, which are generally expressed on a per household basis, into per capita terms.

Table A2.1 shows the key demographic variables used in the analysis. Population data for 1990 and 2010 were taken from the World Development Indicators of the World Bank (2012). The rural and urban populations for 2030 were then calculated by the application of projected population growth rates from the United Nations (2012). Information on average household sizes was drawn from the 2009–10 Household Income and Expenditure Survey (National Statistics Office, 2012).

Sector-specific technologies: Water

Information on sector-specific technologies is essential in the calculation of investment requirements and its components. Table A2.2 presents information on the expected household distribution, costs, and lifespans of key water supply technologies. The options included were based on the technologies reported in the 2006 DHS (JMP, 2012a).

Table A2.1 Demographic Variables and Access Targets

Region	Population in millions			Average household size, persons/household
	1990	2010	2030[a]	2009–10
Rural	3.5	6.0	9.1	6.2
Urban	0.6	0.9	1.5	7.7
National	4.2	6.9	10.6	not available

[a] *Annual population growth rates used were 2.9 and 2.1% for urban and rural areas, respectively.*

Table A2.2 Selected Information on Water Supply Sources

Option	Distribution of facilities (2010, %)[a]		Projected distribution of facilities (2030, %)[a]		Unit capital cost (US$/capita)	Lifespan (years)
	Rural	Urban	Rural	Urban		
Piped into yard	10	67	0	90	82	20
Piped into neighborhood	21	14	55	10	9	10
Water well in yard	3	1	2	0	31	10
Public well	8	2	3	0	6	10
Spring	37	2	10	0	95	18
Rainwater	21	13	30	0	90	18

[a] *As a share of households with access to improved facilities.*

Table A2.3 Selected Information on Sanitation Technologies

Option	Distribution of facilities (2010, %)[a]		Projected distribution of facilities (2030, %)[a]		Unit cost (US$/capita)	Lifespan (years)
	Rural	Urban	Rural	Urban		
Sewerage and treatment	0	21	0	70	899	25
Individual flush toilets	3	33	5	20	49	25
Shared flush toilets	2	10	2	0	27	17
Improved pit (VIP and others)	7	11	7	0	35	10
Pit latrine with slab	89	24	86	10	15	10

[a] *As a share of households with access to improved facilities.*

The distribution of water supply technologies for 2010 were based on the shares indicated in the 2006 DHS (JMP, 2012b). However, recognizing that the distribution of technologies between 2006 and 2030 are most likely to be different and that there is no document that provides solid information for the target year, the proportions for 2030 were based on the opinions of experts in a workshop held in September 2012.

Unit capital costs represent expenditures for materials and labor used in the construction of the different facilities. On the other hand, lifespan represents the projected number of years before a facility is fully replaced. Information on these facilities was generally drawn from a consultation with experts from the RWSSP-EU and Eda Ranu. Most of the estimates were further validated in a workshop held in September 2012 in Port Moresby.

Sector-specific technologies: Sanitation

Table A2.3 presents information on the expected household distribution, costs, and lifespans of key sanitation technologies. The options included were based on the technologies reported in the 2006 DHS (JMP, 2012a).

Similar to water supply technologies, the distribution of sanitation options for 2010 were based on the shares indicated in the 2006 DHS (JMP, 2012b). However, with the recognition that the distributions of technologies between 2006 and 2030 are mostly likely to be different and that there is no document that provides solid information for the target year, the proportions for 2030 were based on the opinions of experts in a workshop held in September 2012.

Experts in the sanitation sector initially drew information on unit capital costs and the lifespan of facilities from estimates. As with water supply, these experts were staff of the RWSSP-EU and Eda Ranu. In the case of the costs of sewer facilities, these were based on the allocations of the PNG Sustainable Development Program for such facilities in Daru.

Spending plans

Population projections and sector-specific data are key ingredients in the computation of investment requirements for water supply and sanitation. To get a sense of how allocations for short- to medium-term measure against investment requirements, planned investments of the government, donor agencies, NGOs, and private institutions from 2012 to 2014 were obtained from published documents and interviews. An attempt was also made to project the contribution of households or users in water and sanitation investments.

Apart from the expected difficulties associated with collecting information from various sources, three other challenges were confronted in the process. The costing tool uses information on only hardware costs (for example, construction costs of facilities) and excludes software costs (for example, training and awareness programs). Moreover, such information must be disaggregated among the four sectors (that is, rural water supply, urban water supply, rural sanitation, and urban sanitation) and, in the case of multiyear projects, for each year. However, the disaggregation desired for the analysis is not always readily available, or even known, for projects. In these instances, the study team consulted project implementers and other experts to seek further documents or make educated approximations.

Table A2.4 shows the projected average annual spending of key stakeholders from 2012 to 2014. Government investments were taken from the 2012 National Budget (Volume 1) and the MTDP (DNPM, 2010). Donor contributions represent allocations of the RWSSP-EU for 2012, Japan International Cooperation Agency loan component of the Port Moresby sewerage project, and the ADB Towns Water Supply and Sanitation Project for 2013–2015. The ADB project is still in its preparatory stage, and the scope will not be known until ADB officials meet with Water PNG and the government in September or October 2012.[36] The analysis assumed that US$11 million of the project budget will be used in 2013–2014, of which 38% will be allocated to sanitation based on historical expenditure patterns.[37] This entire amount is as-

Table A2.4 Anticipated Public Investments (Average From 2012–2014)

Sector (in US$ million)	Government	Donors	NGOs & private sector	Total
Rural water supply	6.6	1.9	—	8.4
Urban water supply	2.0	2.3	7.8	12.1
Rural sanitation	3.1	0.3	—	3.4
Urban sanitation	14.9	2.7	7.8	25.4

[36] The amount includes US$1 million for project preparation.

[37] The assumption on the proportion of budget allocated to sanitation is derived using the proportion of actual expenditure on water supply and sanitation on the recently completed ADB PNG Provincial Towns Water Supply and Sanitation Project. The US$11 million included in the analysis covers the project preparation budget (US$1 million) in 2013 and one-third of the funds for the project proper in 2014. The analysis assumes that the project will be completed by 2016 instead of 2015 because the project preparation period is expected to last from 6 to 9 months. Basic information on the project was drawn from personal communications with Stephen Blaik of the ADB.

sumed to be for urban areas. Investments of NGOs and the private sector capture only PNG Sustainable Development Fund water supply and sewerage project in Daru.

The overall approach to calculating average anticipated public investment was to calculate annual average needs, minus an "expectation" of average annual investment based on data collection from 2012–2014 allocations, which is then reflected in an "average annual" anticipated investment rate. The assumption is that the next 3 years' investment is used as an "overall expectation," which is then extrapolated to future years.

The planned spending of users is computed by specifying the proportion of investments that the authorities believe households should contribute. This could be an expressed policy, supported by documentation. In the absence of such a policy, however, the approach would be to consult experts in the water and sanitation sector. It is through this consultation process (September 2012 workshops) that the user shares for urban and rural water supply were obtained (see table A2.5). In the cases of rural and urban sanitation, the consultation process did not yield clear percentages that can be used in the analysis. Hence, the approach used in the analysis is to assume a share that the household is likely to contribute for different technologies. The weighted averages of the contributions were calculated and then used as values in table A2.5. The assumed contributions of the households for investments in water supply facilities are as follows: piped into yard (20%), piped into neighborhood (0%), water well in yard (100%), public well (0%), spring (0%), and rainwater (0%). On the other hand, the assumed shares of households for sanitation facilities are as follows: sewerage (13%), own flush toilet (100%), shared flush toilet (100%), improved latrine (100%), and improved pit latrine (100%).

Table A2.5 Share of Users in Capital/Development Costs

Sector	Rural (%)	Urban (%)
Water	10	20
Sanitation	75	71

References

Asian Development Bank. 2012. *Country Operations Business Plan—Papua New Guinea 2013–2015* (draft)

Cammack, D. 2008. *Chronic Poverty in Papua New Guinea.* Manchester, UK: Chronic Poverty Research Center, School of Environment and Development, University of Manchester

Department of National Planning and Monitoring. 2010. *Papua New Guinea Development Strategic Plan 2010–2030.* Port Moresby, Papua New Guinea: Department of National Planning and Monitoring.

DNPM (Department of National Planning and Monitoring). 2010. *Papua New Guinea Medium Term Development Plan 2011–2015.* Port Moresby, Papua New Guinea: DNPM.

Dutton, P. 2011. *PNG Scoping Mission for WSP Support to Water Supply, Sanitation and Hygiene.* Jakarta: Water and Sanitation Program (WSP)

Dwan, P. 2012. *Mind the Gap: Papua New Guinea.* Draft research report. Melbourne: WaterAid Australia.

EdaRanu. 2012. *Business Operational Plan.* Port Moresby, Papua New Guinea: EdaRanu

Gibson, J., G. Datt, B. Allen, V. Hwang, M. Bourke, and D. Parajuli. 2004. *Mapping Poverty in Rural Papua New Guinea* (unpublished manuscript). Available from http://sedac.ciesin.columbia.edu/povmap/downloads/methods/PEB_Poverty_Mapping(Papua%20New%20Guinea).pdf.

JMP (Joint Monitoring Program). 2012a. "Estimates for the Use of Improved Drinking Water Sources." Available from wss.info.org.

JMP (Joint Monitoring Program). 2012b. "Estimates for the Use of Improved Sanitation Facilities." Available from wss.info.org.

Mondiai G. and Hinton R. 2008. *Rural Water Supply Governance Research Conducted in Three Oxfam Partner Areas.* Goroka: Oxfam Highlands Programme

National Economic and Fiscal Commission (NEFC), 2010. *Annual Fiscal Report - 2010*. Government of Papua New Guinea

National Statistics Office. 2012. *2009–2010 Papua New Guinea Household Income and Expenditure Survey: Summary Tables.* Port Moresby, Papua New Guinea: National Statistics Office.

UN (United Nations). 2012. "UNData: Papua New Guinea." Available from http://data.un.org/CountryProfile.aspx?crName=Papua%20New%20Guinea.

Water PNG. 2012a. *Water PNG Strategic Master Plan* 2012–2030. Port Moresby, Papua New Guinea: Water PNG

Water PNG. 2012b. *Water PNG Medium Term and Corporate Plan Priorities 2012–2015.* Port Moresby, Papua New Guinea: Water PNG.

World Bank. 2012. "World Development Indicators." Available from http://data.worldbank.org/indicator/SP.POP.TOTL.