

Water supply models for PNG's peri-urban villages and informal settlements – A Discussion Paper



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1 Background

This paper highlights the challenges of delivering water supply services to Papua New Guinea's urban informal settlement and peri-urban areas, and documents potential models and action to respond to these challenges. The paper has been prepared by synthesizing field research, reviewing reports and conducting interviews with relevant stakeholders. Experiences from 25 countries have also been reviewed.

2 PNG Urban water situation

On the surface, PNG's figures for urban access to at least basic drinking water appears good - 86% in 2017, an increase from 83% in 2000. (refer Table 1)¹ However these figures do not provide an insight into the conditions around accessing a basic level of water supply and mask the situation for those living in informal settlements, peri-urban areas, and urban villages.

Table 1 PNG Urban water supply access 2000 and 2017

| Urban water supply access | 2000 | | 2017 | |
|--|------|---------|------|-----------|
| Urban population | 13% | 724,360 | 13% | 1,072,630 |
| At least basic | 83% | 601,219 | 86% | 922,461 |
| Limited service (more than 30 minutes) | 4% | 28,974 | 4% | 42,905 |
| Unimproved | 11% | 79,680 | 3% | 32,180 |
| Surface water | 2% | 14,487 | 7% | 75,084 |

Source: JMP 2019

An examination of the proportion of the urban population using improved water supplies is more revealing. While there has been a small improvement in the number of urban households with water available on the premises between 2000 and 2017, more than half the households have to collect water away from the house (refer Table 2). Access to piped water has declined since 2000, and the proportion of non-piped water has tripled from 10% in 2000 to 34% in 2017.

Table 2 PNG Urban population with improved water supply 2000 and 2017

| Proportion of urban population using improved water supplies | 2000 | 2017 |
|--|------|------|
| Safely managed | - | - |
| Available on premises | 43% | 44% |
| Available when needed | 87% | 89% |
| Free from contamination | - | - |
| Piped | 76% | 55% |
| Non-piped | 10% | 34% |

Source: JMP 2019

3 PNG's Urban Challenge

3.1 Urban population growth

PNG's population is growing rapidly, currently estimated at 8.8 million and predicted to increase to 13.9 million by 2050.² PNG towns are experiencing growing urbanisation as people migrate from rural areas seeking employment opportunities. An estimated 13.3% of the 2020 population lives in urban areas, with this proportion expected to nearly double by 2050 to 24%. The urban population is likely to be higher if peri-urban areas are counted. PNG's urbanisation rate is 2.3%. Port Moresby, with a population of approximately 860,000 people, is said to be the fastest growing city in the Pacific outside of Australia and New Zealand.³

¹ WHO UNICEF Joint Monitoring Program for Water Supply, Sanitation and Hygiene, 2019. Progress on household drinking water, sanitation and hygiene | 2000-2017: Special focus on Inequalities. New York: United Nations Children's Fund (UNICEF) and World Health Organization (WHO). <https://washdata.org/>

² United Nations 2018. World Urbanisation Prospects

³ ADB, 2020. Papua New Guinea: Support for Water and Sanitation Sector Management. TA-9298 PNG: Peri-Urban Water, Sanitation, and Hygiene.

3.2 Settlements

Informal settlements and peri-urban areas are common in nearly every urban centre in PNG, with Port Moresby and Lae having sizable informal populations.⁴

Port Moresby in 2010 was estimated to have 20 planned or formal settlements and 79 unplanned settlements (of which 32 are on state land and 47 on customary land), with 45% of the city's population living in informal settlements.⁵ More recently the number of settlements in Port Moresby is estimated at 114, with over 400,000 people in Port Moresby living in informal settlements and urban villages.⁶ In the coastal city of Lae, it is estimated over 50% of the city's population lives in settlements, with migrants coming primarily from Mamose, the New Guinea islands and Highlands Region. According to the District Administrator, in Wewak, 40-50% of the population lives in settlements, while in Goroka the proportion is as much as 60%.⁷

Squatters and settlements have become a 'permanent' feature of the PNG urban landscape. Especially in Port Moresby, many settlements are long established – some since the 1950s. Historically settlement growth has been due to high migration from rural areas in search of an urban life, increased population growth, and the lack of formal and affordable land and housing to match this population increase. Settlements are not always densely populated but households are often over crowded with an average household size of 8.4, and up to 25% of households with 10-30 occupants.⁸ Provincial capitals such as Wewak have more homogenous populations, whereas in Port Moresby settlers are ethnically diverse, coming from all over the country, and adhering to clan divisions. Clan leaders may have influence with their own community but not with others in the same settlement.

Within Port Moresby there are a number of urban villages occupied by the original inhabitants of the land on which the city stands. The customary landowners of Port Moresby are the Motu Koitabu people and there are eight main villages within the city boundary, these include Hanuabada, Tatana, Baruni, Korobosea, Mahuru, Kira Kira, Vabukori, and Pari, as well as Poreabada on the outskirts of the city. Recent estimates of the population of Motu Koitabu people in Port Moresby range between 40,000 to 50,000 with around 20,000 to 30,000 people living in the 'Big Village' of Hanuabada.⁹

One advantage urban villages have over settlements is their representation by one leadership body. The Motu Koitabu Assembly (MKA) is a special authority that exists in the NCD to represent the interests of urban village residents. MKA councillors are responsible for promoting development within urban villages. Governance in urban villages is stronger than in settlements. Leaders are recognised and do have some authority when dealing with the management and payment for services.

Settlements in PNG generally have the following common characteristics:

- Unplanned / no formal planning / no legal household section/allotment numbers
- Residents have no recognised legal land tenure (except urban villages)
- Housing is frequently makeshift or semi-permanent
- Very poor or non-existent services – water, sanitation, electricity, health, education, solid waste
- Informal irregular low paid employment is common (although some residents are government workers)
- Economically and financially dependent on the urban area.

⁴ Dutton P & Pigolo G., 2014. *Papua New Guinea: Sanitation, Water Supply and Hygiene in Urban Informal Settlements*. WSP, World Bank

⁵ UN-Habitat 2010, *Papua New Guinea Port Moresby Urban Profile*, United Nations Human Settlements Programme.

⁶ Marshall, K. 2020. *TA-9298 PNG: Peri-Urban Water, Sanitation, and Hygiene (WASH) Advisor. Final Report: Assessment of Barriers and Enablers and options for delivery of improved WASH in Settlements in Papua New Guinea. February 2020, Asian Development Bank*

⁷ UN-Habitat 2010, *Papua New Guinea Goroka City Profile*, United Nations Human Settlements Programme.

⁸ Dutton P & Pigolo G., 2014. *Papua New Guinea: Sanitation, Water Supply and Hygiene in Urban Informal Settlements*. WSP, World Bank

⁹ Marshall, K. 2020. *TA-9298 PNG: Peri-Urban Water, Sanitation, and Hygiene (WASH) Advisor. Final Report: Assessment of Barriers and Enablers and options for delivery of improved WASH in Settlements in Papua New Guinea. February 2020, Asian Development Bank*

4 Settlements and water supply services

4.1 PNG WASH Policy

The National WASH Policy 2015-2030 was formulated to provide a framework to substantially improve access to water and sanitation services and to change hygiene behaviours, including in underserved peri-urban settlement areas. The WASH Policy sets the ground rules, scope and targets for urban water supply.

The policy defines an urban area inclusive of settlements and peri-urban areas:

The urban environment includes areas within the legally gazetted town boundary as well as urban settlements and urban villages which may be part of the broader peri-urban environment but are economically and socially dependent of the gazetted urban area.¹⁰

The WASH Policy sets a target for 2030 that in urban areas, 95% of the population has access to a safe, convenient and sustainable water supply.

Some important statements in the policy are:

- Access to safe water is regarded as a human right
- The right to safe water does not imply the right to free services
- Water supply should not be considered in isolation from improved sanitation and long term hygiene behaviour change
- The significant role that women and girls play in the provision and management of household water and in promoting improved hygiene and sanitation practices is recognized
- Partnerships between service providers, both government and non-government are essential for effective and sustainable service delivery
- The delivery of services will adhere to strict minimum standards.

Urban service standards are defined as:

- For household piped water, the minimum service delivery norms are 150 litres per capita per day (l/c/d) continuous supply with a service pressure of 60 Kpa;
- For standpipes and hand pumps, the designs should accommodate for 50 l/c/d with a maximum of 50 users per water point no further than 150m from the household.

Appropriate operation and maintenance procedures and schedules for urban systems need to be developed during construction.

The WASH Policy's recognition of informal settlements and peri-urban areas and their need and right to be served is a powerful new tool for promoting the WASH agenda. However PNG lacks cohesive, inclusive and sustainable models for water supply in these areas. The policy is also based on the assumption that there are adequate resources and capacity to implement it in parallel with the relevant legislations.¹¹

4.2 Urban responsibility for water

Urban authorities include Town Councils, urban LLGs, and city authorities in the major urban areas of PNG eg. Lae City Authority and National Capital District Commission (NCDC) in Port Moresby. The role of city authorities in central urban planning and development of formal settlement areas, and to some extent service delivery of WASH in markets, transport and public areas is somewhat defined. The role of Town

¹⁰ National WASH Policy

¹¹ Kutan, L and Sofo, R. 2020. Urban Water Supply in Papua New Guinea: Overview of the Challenges. Discussion Paper No. 173. The National Research Institute: Port Moresby

Councils, and Urban LLGs in WASH provision is poorly defined, with the Department of Local Government is unable to provide guidance.¹²

The **Department of Health** (NDOH) has the role of supporting organisations and communities by promoting improved hygiene behaviour and the use of low technology toilet facilities through the promotion of the “healthy islands” approach. At present, NDOH is inactive in PNG settlements, and is stretched in delivering basic health services to rural areas throughout the country. PNG WASH service delivery models were developed in 2019, focussing on rural areas. It is noted that the WASH policy is blind to urban and rural context for health professionals and responsibilities are the same in both contexts.¹³

The **WASH PMU**, located within the Department of National Planning and Monitoring (DNPM), has responsibility for coordinating WASH, including through a WASH Task Force (Chaired by the Secretary of DNPM) and subcommittees. A peri-urban WASH committee was set up as one of the sub committees of the PMU, and has met about three times, although not during COVID-19.¹⁴ The PMU has effectively not been functioning since late 2019 and throughout the COVID-19 pandemic.

The **Office of Urbanisation**, within the Department of Community Development, prepared the National Urbanisation Policy 2010-2030, which for settlements, advocates a “sites and services” upgrading approach. One of four pilots it is undertaking is customary land registration and development in Taurama Valley settlement in Port Moresby. However the Office has few resources and capacity, and government support for the Policy has been erratic.¹⁵ The Office of Urbanisation is theoretically responsible for coordinating all urban development planning, although they do not appear to be fulfilling that role at the present time. They are currently waiting for their Act to be passed which will give them greater power in terms of the coordinating role they should play.¹⁶

A **National Water, Sanitation and Hygiene Authority (NWSHA)** was intended to be created following the WASH Policy. The NWSHA’s role with respect to urban WaSH service delivery was to include: providing support to existing and new operators to extend service provision to new urban areas by identifying potentially commercial locations and assisting with funding sources and appropriate service provision approaches; developing and implementing strategies with service providers to serve the poor and urban settlements (through CSO and other funding); supporting new approaches for peri-urban settlements; assisting SOEs and other service providers with issues of non-payment and non-revenue water reduction; and supporting new operators to provide water and sanitation services to urban customers. It is understood that legislation has been prepared for the establishment of NWSHA, but this has not been presented to parliament due to ongoing internal deliberations.

4.3 Water Supply providers

Until September 2020 PNG had two water supply utilities: Eda Ranu (responsible for National Capital District) and Water PNG (operating in 14 Provincial towns, and 9 district towns, with two other water supply systems under development).¹⁷ Following abolishment by parliament, Eda Ranu will be amalgamated with Water PNG, with all staff and assets, contracts and debt, transferring to Water PNG, under the government control of Kumul Consolidated Holdings. The Government acknowledged that this amalgamation was part of a reform under the WASH Policy to have a single state owned entity which would provide efficient and quality service and access to these services in more locations across PNG.¹⁸ For the last two or so years both utilities had the same CEO, and were both part of Kumul Consolidated Holdings.

The only independent urban water supply is operated by Goroka Town Council for Goroka in Eastern Highlands.

¹² Pers con Mark Wolfsbauer, 4/8/2020

¹³ Pers con Mark Wolfsbauer, 4/8/2020

¹⁴ Pers con Ken Marshall, 19/8/2020. Clara Momoi is the chair of the committee.

¹⁵ Dutton, P et al 2014

¹⁶ Marshall, K 2020

¹⁷ Email from Rachel Ivai, Water PNG, 12 August 2020.

¹⁸ “Eda Ranu Abolished”. Post Courier, September 9, 2020.

Responsibilities for water and sewerage services in urban areas have been established by law under the NCD Water and Sewerage Act 1996 and National Water Supply and Sewerage Act of 1986. The National Water Supply and Sewerage Act will be amended to absorb Eda Ranu.¹⁹

Both utilities have international benchmark monitoring of percent and volume of non revenue water (NRW), metered water sold, staff per customers served, operating cost per m3 of water sold, etc. These are updated and published through the IBNET (<https://www.ib-net.org/>). Through the Pacific Water and Wastewater Association, PNG utilities are held accountable to their regional peers and compete for best performance.

4.4 Development Partner activities

Current and near future activities of development agencies with utilities and urban water supply include:

World Bank

- Extending water supply service to five to six new towns for Water PNG.

DFAT (through ESIP, Water for Women, and COVID-19 response programs)

- Supporting the Port Moresby water and sewerage masterplan, which includes technical assessment of supplying urban and peri urban areas
- Infrastructure upgrades in Pari settlement (Port Moresby)
- Draft communication campaign design to increase bill paying (Wewak)
- WASH Data collection in urban areas (Wewak)

ADB

- Design of improved water supply (via standpipes) to Tete settlement, Port Moresby
- Feasibility studies for new town water supply (Vanimo and Kerema)
- Working with utilities to prepare pandemic safety plans
- Groundwater assessment across PNG (desk based assessment)²⁰

Issues experienced by development agencies in implementing urban water or WASH projects include:

- The high cost of doing business in PNG. World Bank notes the cost ratio for water supply design is US\$1,500 per beneficiary, and up to US\$2,000 in some small towns, compared to original estimates of US\$800, and compared to other countries which average US\$200.
- Irregular response from government, and lack of driving the WASH agenda
- Lack of information on water resources. This results in a lengthy and expensive process to find water for every urban area
- The enormous scale of the number of urban areas nationally requiring safe water services. Of the more than 80 district towns only none have formal water supply systems.
- There is no strategy and lukewarm interest from utilities in tackling settlements/peri-urban areas.

¹⁹ "Eda Ranu Abolished". *Post Courier*, September 9, 2020.

²⁰ Request from Water PNG - assess which towns have more viable water resources (ongoing).

5 Supplying water to PNG settlements

5.1 Typical water situation in settlements

Water supply to settlements is generally by self supply (wells, bores, surface water), illegal connections to a piped network (directly or through vendors), or a limited piped supply installed as the result of political support from the local member.

Typically funding from politicians appears around election time, and is done as a CSO commitment and usually includes a pipeline from an existing service point, and one or two water points in a community, with an expectation of management by the community. Payment of K100,000 goes to the utility to provide a limited service, residents consider a service has been “provided” by government, but no one pays for it and ongoing maintenance and sustainability is not addressed.



A poorly planned connection provided by local MP does not provide much service improvement for women who have to walk long distances and wait to fill containers



Few water points and low pressure results in a lot of wasted time

The approach puts the utility in a vicious cycle to provide water, give a low service level and people never pay. For example in Segani settlement, Port Moresby, Eda Ranu installed additional standpipes in late 2013 (previously only two with irregular supply) however by 2014 only four out of five water points were working due to low pressure. This places extra demand on existing standpipes, resulting in delays and queueing. In Tete settlement in Port Moresby, a tap was installed for use by between 3,000-8,000 people, at the end of a system, guaranteeing low pressure for all but one hour a day. This caused very long queues for women and children waiting to collect water, leading to conflict and assaults arising from queueing practices.²¹

5.2 Community Management Model

In PNG the typical approach to settlement water supply has been a community management model. Eda Ranu’s process in dealing with water supply consumption in peri-urban areas has been through the establishment of water committees in villages and settlements, formalized through an MOU between Eda Ranu and the water committee. The committee’s role was to monitor the water supply into the community and collect fees from community users and pay bills to Eda Ranu.

This model has resoundingly failed in PNG. Service shortcomings notwithstanding, this approach has seldom included sufficient work on organising the community to manage and pay for the water provided, especially in settlements where people come from many different places and do not necessarily trust those

²¹ Pers con Ken Marshal, 19 August 2020

from other provinces. Over the years these MOUs have not been honoured. Eda Ranu stated that from 105 settlements and villages only two settlements (Oro/ATS and Faole) and three villages (Porebada, Kouderika, and Roku) paid their water bill through their water committees.²²

Settlements in Port Moresby are difficult places to work. There is a lack of information regarding the population, the geography, the services, and no available maps. In addition, there are many practical, logistical, and security challenges to overcome.

Marshall K, and Momo C. 2018. Voice, Choice, and Babies Poop, A WASH Household Survey of Tete Settlement in Port Moresby, Papua New Guinea. Consultants Report - May 2018. Asian Development Bank

5.3 Non Revenue Water

Failure to pay for water is one of the biggest challenges of financial sustainability for PNG utilities. Eda Ranu in the past estimated NRW at 60-70% of total water produced, due to illegal connections within the state-leased properties and unbilled supply to settlements and traditional villages.²³

Where the utility has entered into an agreement to supply water to a community, unpaid “community” water bills mount up to a point where Eda Ranu or Water PNG has no choice but to disconnect the service. Many times, when this happens the account is paid up to date by the local Member of parliament or a prominent person. In 9 Mile settlement a local politician allegedly paid K100,000 for water to be connected in early 2014, after the community was presented with a bill from Eda Ranu for K87,222. Prior to the 2020 MOU between Eda Ranu and MKA, MKA villages had collectively racked up K975,000 in unpaid water bills.²⁴

Utilities are also losing revenue to alternative suppliers such as informal vendors and on sellers. By *not* supplying water to customers in settlements and urban villages, in Port Moresby alone K5 million in revenue is lost every year.²⁵

Water PNG (and Eda Ranu previously) as a State Owned Enterprise (SOE), has a “Community Service Obligation (CSO)” to provide water for poor communities. The CSO includes a mechanism for Water PNG/Eda Ranu to be reimbursed for fulfilling these obligations. The CSO could allow WASH projects to be undertaken in even the poorest communities without negatively impacting the financial performance of the utility however this mechanism has so far not operated effectively, and funds spent by utilities have not been recovered from government. Reasons for this may include limited understanding of the CSO framework and application process, a lack of willingness to exercise it due to either the low likelihood of receiving funds or the lack of appropriate administration procedures.²⁶

5.4 The cost of water

Connections

Until very recently charges were levied for water connections, however Water PNG’s website shows that standard connections are now free.²⁷ (See table 3)

²² Eda Ranu, 2012. briefing note,

²³ Eda Ranu, 2012. briefing note,

²⁴ MOU between Eda Ranu and Motu Koitabu Assembly, draft 2020

²⁵ Pers con Ken Marshall

²⁶ Marshall, K 2020.

²⁷ PNG Website visited 27 November 2020

Table 3 Water PNG connection charges

| Connection Fees | |
|---------------------------------|---------|
| Standard Connections - Water | Free |
| Non Standard Connection - Water | At cost |
| Reconnection – Water | At cost |

The definition of a non-standard connection is unspecified, however this is likely to relate to the distance between the tap and the main pipeline. Previous connection costs in Wewak were K200 for a standard connection. Eda Ranu did occasionally provide household connections to houses with no legal tenure, but on a case by case basis and where formal employment and a bank account could be substantiated by customers willing to hand over K800 upfront for the connection charges.²⁸

The requirement for legal tenure has been a barrier for utilities in the past. Gaining formal ownership is still a time consuming and unpredictable process and so other forms of “verification” to obtain a connection should be considered. This could include the Electoral Roll or the development of a certified list of residents that is validated by a settlement committee and signed off by a government department, such as NCDC.

Consumption

Water PNG has a water tariff which is applied nationally and regulated by the Independent Consumer and Competition Commission (ICC). The tariff is a stepped tariff with a higher volumetric charge for consumption over 15 kL (see Table 4). Details of the charges and an example are provided on the Water PNG website www.waterpng.com.pg.

Table 4 Water PNG Tariff structure

| Volume category | From | to | Rate per kL (kina) |
|-----------------|-------|------|--------------------|
| Band 1 | 0.1kL | 15kL | 1.50 |
| Band 2 | >15kL | | 8.00 |

Source: Water PNG

For a typical household of 8 people consuming the generous PNG WASH Policy minimum quantity of 150 litres per capita day, the total volume of water consumed in a month would be 36,000 litres or 36.9kL. Water PNG’s monthly charge for the typical household would be:

| | |
|---------------------------------|------------------------|
| First 15.0kL @ Band-1: 15xK1.50 | = K22.50 |
| Next 21.0kL @ Band-2: 21xK8.00 | = K168.00 |
| The total charge would be: | = K190.50 |
| Plus 10% GST: | = K209.55 (AUD =80.93) |

In all likelihood, consumption in settlements would be less than 150 litres per capita day due to low incomes and self regulation of water use, and few water demanding appliances.

In settlements many households already pay for water including paying someone who controls an illegal connection K2 per bucket or K2 per load of containers or K2/K5 per day in 8 Mile and 9 Mile, to K10 per month from community managed public tap stands in Segani, to monthly (or more infrequent) payments through formalized water billing for a shared tapstand from Water PNG in Wewak. The small volumes of water purchased disguise the exorbitant price per kL paid by settlers – from K3.79 to K200.²⁹ In the Motu Koita village of Pari, water carts are selling utility water to individual households on a daily basis with costs of 1-2K for 20 litres or 250k for 5000 litres, equating to K50-K100 per kL.³⁰ In Tete settlement people pay

²⁸ Marshall, K ...

²⁹ Dutton, P et al 2014

³⁰ WaterAid, 2020. Water Supply Infrastructure Assessment, Pari Village, National Capital District June 2020.

K2 for 10 litres, equivalent to K200 per kL.³¹ Put another way, if the typical household consuming 36 kL of water in the above example were to pay these inflated rates, their bill would be K7,200 per month.



Women are vulnerable to gender based violence while collecting water. The time and energy expended to collect water is at the detriment of economic productivity and domestic life.

While it is apparent that some vendors are making a lot of money from onselling water, there are risks with poor control over the quality of the water through the informal distribution network. The hidden costs is also in the physical burden and time involved in waiting for and collecting water which largely falls to women. The distance to the water point, low water pressure, queues and waiting times, as well as personal safety to and from the water point, multiplied by several trips per day, result in a very poor service. In Port Moresby, especially in the dry season, water collection can typically take two hours, but up to four or five hours for some households due to distance and waiting time.³²

There is no special consumption rate for “official” shared connections, nor a special rate for settlements from Water PNG, however the former Eda Ranu was charging water from

standpipes at a flat rate of K1.00/kL, with most “community” accounts negotiated and agreed an MOU that included a standard rate of K1.00/kL. An MOU with Eda Ranu for MKA villages offers a wholesale rate of K0.80 to the bulk meter. It is important that any shared connection such as standpipes be charged at a flat rate to avoid high charges resulting from the quick step up to the next tariff band.

5.5 Billing and Payment

The billing systems of Water PNG and the former Eda Ranu are outdated and not convenient for consumers, especially those living in settlements and low income earners. For example in Wewak, bills are usually printed in the Water PNG office but for about a year this system has been broken and handwritten bills are sent to Port Moresby, entered into the system manually, then the bills are printed and physically brought back to Wewak for distribution. Meter reading and bill delivery is by hand, however bill payment requires a trip to the Water PNG office (and Eda Ranu’s previously). This is quite a distance for most settlement residents and takes time and costs money. Eda Ranu was considering ways to alleviate this constraint by establishing a satellite payment office/kiosk closer to settlement residents and/or developing a mobile collection service to visit settlements with armoured vehicles.³³

Paying bills on time is a considerable problem even for non-settlement consumers. In Wewak, as many as 80% of households do not pay their bills on time, creating cash flow issues for Water PNG; preventing repairs and maintenance and affecting the whole system; and increasing disconnection for households that have accumulated very high debt.³⁴ The bill payment terms are clear but disconnection is not strictly enforced and usually a negotiation process occurs if debts are too high.

³¹ Marshall, K and Momoi C, 2018. *Voice, Choice, and Babies Poop, A WASH Household Survey of Tete Settlement in Port Moresby, Papua New Guinea. Consultants Report - May 2018. Asian Development Bank*

³² Dutton P et al 2014

³³ Marshall, K 2020, *plus pers con 19 August 2020*

³⁴ WaterAid, 2020. *Water PNG Wewak - Water Supply Billing Behaviour Change Communications Strategy*

Research in Port Moresby and Wewak settlements has consistently indicated that consumers prefer to pay water bills to water utilities as the money is seen as going straight to the service provider as a direct payment for the service, even though consumer understanding of how the money is used may be missing. There have been problems of money disappearing in the past when payment have been made to community groups or water committees, or the water committee may not have the power to enforce water payments in a collective situation. For example in Segani settlement, Port Moresby, Eda Ranu installed a piped water system with standpipes (some no longer functioning). Households are billed K10 per month through a well organized water committee, which publicly displays the amount owing for each household. However some ethnic groups refuse to pay for water, and the water committee has no influence over these groups.



Despite public monitoring of water bill payments, some households still refuse to pay

Wewak consumers supported paying their water bill through banks and Easipay³⁵ because these methods provided a receipt as evidence of payment, and the money would be safely used for the purpose intended. In Wewak, where there had been some slow billing and disconnections, Easipay was thought to be better for avoiding disconnections as the current bill could be paid on time and access retained.

Systems such as Easipay and prepaid meters may encourage smaller more regular payments, and could be more convenient than travelling to the Water PNG office to make a payment.

5.6 Service level Preferences

Households in settlements in Port Moresby and Wewak have consistently indicated a preference for household connections.³⁶

Most households were interested in having a household connection with a meter for the following reasons:

- do not have to share with others; avoid conflict and disputes over water usage
- reduced cost – can control the water usage and pay for what is used
- convenient and easy access for household water use;
- more private, healthier and safer; can use night and day; avoid vandalism of tap stands, and avoid others claiming the supply and selling water
- saves time; tired of walking long distances.

Even households with illegal connections wanted a better, reliable service, stating they want to “go straight” and pay for a good service. There is a general sense that settlements and urban villages had “learned their lesson” from the past when water had been supplied but was cut off due to non-payment and were willing to pay for a good service.³⁷

³⁵ Easipay is a prepaid method of paying for electricity supplied by PNG Power via a Digicel mobile phone. Consumers can make a minimum K15 payment against their meter number. The advantage is that consumers can check their balance, pay small amounts at a time, buy units 24 hours a day, make payments without visiting the PNG power office or agent, and avoid disconnection.

³⁶ WaterAid 2019. Wewak District Baseline Survey, Urban WASH Report, Wewak Urban LLG

³⁷ Dutton P & Pigolo G., 2014. Papua New Guinea: Sanitation, Water Supply and Hygiene in Urban Informal Settlements. WSP, World Bank; Marshall K, and Momoi C. 2018. Voice, Choice, and Babies Poop, A WASH Household Survey of Tete Settlement in Port Moresby, Papua New Guinea. Consultants Report - May 2018. Asian Development Bank; Discussions with MKA re Pari village

6 Previous and current innovation in urban water in PNG

There has been some interest from senior staff in Water PNG, and Eda Ranu in particular, to investigate the issue of informal settlements, but the commitment to action has been limited. It is difficult for utilities to push the issue and become champions as they do not have the resources, or time, or the pressure and support from government. There is little incentive for Water PNG to work in settlements, except if some improvement in no-revenue water can be realized, or there is an appreciation of the economics and loss of income from *not* supplying settlements.

Past actions or pilots to break from the community management model have been poorly or not documented, not comprehensively executed (eg. limited community consultation) and not independently evaluated for lessons learned.

Private vendor model

Around 2009 Eda Ranu considered a water vending model to serve NCD-approved settlements and MKA urban villages. This model meant that a private organisation could take responsibility for managing water supplied to villages and settlements, and collect and pay monthly bills, do repairs and maintenance, improvements and upgrading works, and make disconnections for non-payment of bills.³⁸ In 2012 WSP-World Bank facilitated a visit to PNG by the Philippines Association of Small Scale Water Providers to share experiences of small scale water providers in informal settlements, particularly in Manila with Eda Ranu and Water PNG. WSP-World Bank also hosted a study tour for three Eda Ranu staff and three community leaders to the Philippines to observe different models of private water suppliers and utilities and how they work together to deliver water to settlements and peri urban areas in Manila.³⁹ The findings and recommendations from the study tour were that:

- the partnership between Eda Ranu and the community needed to be enhanced
- one or several business models for small scale providers could be considered for scale up in PNG
- Eda Ranu needs to organize a capacity development team of institutional, financial and technical experts to work with the community in preparation for a successful water vending
- Preparation of institutional set up is very important to make the business models work
- More support should be given to Eda Ranu until a pilot project is implemented and tested.

The water vendor model was not taken further by Eda Ranu, potentially due to changes in management, and a belief that the model would ultimately not work.

Tete settlement

The ADB is funding a water supply project in Tete settlement in Port Moresby which includes new water supply infrastructure, management of water supply via newly formalized community WASH committee/s, and community awareness. Although not officially called a pilot, it is anticipated that this will be a model for community-managed water supply in urban informal settlement areas. The delivery arrangements are standpipes provided in accordance with the WASH policy (1 to every 5 households/50 people), resulting in 63 standpipes in the settlement. It is proposed that each household pays a fixed rate for water, regardless of consumption, and this is based on a monthly bill to the household, issued by Eda Ranu. Each tapstand would be metered for consumption monitoring purposes only, not for billing.

To overcome the issues of unwillingness to pay because the service is poor, the Tete pilot intends that the service levels be the same as rest of city with a guarantee that residents have water to the same standard of service as other customers in Port Moresby. Eda Ranu would continue its usual functions of operations and maintenance (to ensure service levels are sustained), billing, tariff setting, but delegate some of the community relations functions to the water committee. The expectation is that if 70-80% of money is

³⁸ Eda Ranu 2009, *Draft Memorandum of Understanding Relating to Provision of Water Supply services to Settlements and Villages in NCD by Water Vending*

³⁹ WSP-World Bank, 2012. *Small Scale Domestic Water Suppliers in Papua New Guinea: Study Tour in Manila. April 22-25, 2012*

collected then that model can be used in other settlements, ultimately contributing significantly to revenue improvement for the utility.

There was no analytical process for selecting Tete as a pilot site, ie. no selection criteria, so its potential as a scalable model may be questionable. However, given ADB's support to the project, the outcome will be documented and lessons learned available for review. Project implementation has been delayed due to COVID-19. It is assumed that Water PNG will take over responsibility for the project from the former Eda Ranu.

MK villages, Pari demonstration

In response to escalating debt and poor service across nine MKA village, Eda Ranu and MKA drafted a MOU proposing an arrangement where MKA would take responsibility for water supply billing, and ongoing operations and maintenance of the piped water supply within Motu Koita villages. As part of this MOU it was agreed that MKA would negotiate and pay down some of the outstanding debt to Eda Ranu, while Eda Ranu would guarantee water supply production and distribution to MK villages up to the bulk meter, at a quantity of 90 litres per capita day.

While this delegated management model of service suits Eda Ranu, since it hands over all responsibility beyond the bulk meter, it places a very large responsibility on MKA (refer Table 5). Without institutional, governance and technical support, this delegated management model is likely to fail.

Table 5 Roles and responsibilities for MK village water supply

| Function (as per MOU) | Responsibility | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| | Eda Ranu | MKA | Regulator | Customer |
| Asset ownership | | <input type="checkbox"/> | | |
| Asset renewal | | <input type="checkbox"/> | | |
| Provision of bulk water <2700 L/p/month | <input type="checkbox"/> | | | |
| Operation and maintenance (source and mains) | <input type="checkbox"/> | | | |
| Operation and maintenance (internal reticulation, standpipes) | | <input type="checkbox"/> | | |
| Tariff setting (bulk water supply) | | | <input type="checkbox"/> | |
| Tariff setting (retail supply) | | <input type="checkbox"/> | | |
| Payment of bulk water tariff | | <input type="checkbox"/> | | |
| Customer revenue collection at standpipes | | <input type="checkbox"/> | | |
| Payment for water | | | | <input type="checkbox"/> |
| Customer/community relations | | <input type="checkbox"/> | | |
| Staff/vendor/operator management | | <input type="checkbox"/> | | |
| Reporting illegal connections, vandalism | | | | <input type="checkbox"/> |

WaterAid has developed a concept to trial the governance arrangements for a demonstration in Pari village, since under ESIP, WaterAid has been working with MKA to undertake upgrades of Pari's piped water network (south of the bulk meters), boosting water pressure, storage capacity and reliability. MKA is insistent on a prepay arrangement so as to avoid huge debts in future.

The proposed delivery mechanisms for water in Pari are a combination of staffed water kiosks and prepaid household supply for those who already have reticulated water supply. If the demonstration is successful it can be scaled up to other MK villages.

The demonstration is delayed pending financing. The status of the MOU is unclear given the merger of Eda Ranu and Water PNG, although it is assumed (but not guaranteed) that Water PNG will take on the responsibility.

7 Global examples and lessons learned

7.1 Common characteristics of settlements

Informal settlements exist in most continents. Examples of supplying water to low income areas have been reviewed from 25 countries in Africa, South East Asia, and South America.

The challenges to achieving full coverage of water services in cities are diverse and well documented. Recurring themes include those familiar in PNG:⁴⁰

- Rapid population growth set against a huge backlog of residents waiting to access services and, in many cases, increasing inadequacy of existing bulk water production.
- Vicious cycles of ageing infrastructure, water losses, declining service, low levels of revenue collection, inadequate maintenance of existing networks and very limited investment in network extension.
- High upfront connection costs leaving low-income consumers to rely on expensive, unregulated alternatives even when living in networked areas.
- Inadequate incentives for official service providers to prioritise services to low-income households, and a perception that they are unable or unwilling to pay.
- A failure to stimulate innovation or capitalise on innovations by the local CSOs, community organisations, (informal) private sector providers and households themselves, which in reality provide access for many low-income residents.
- Low political priority attached to services for low-income populations, and in some cases a deliberate policy not to serve informal or new peri-urban settlements in an attempt to control urban expansion.

7.2 The central role of utilities

Several learnings have emerged which are directly relevant to PNG's informal urban areas:

Utilities are key to delivering sustainable water services.

As official service providers in an urban area, utilities may have the task of serving low income or informal areas in their mandate but are reluctant to do so for various reasons, whether it is a belief that it will be a cost burden to the organisation, a belief that people will not pay for water, or uncertainty about how to approach and overcome the challenge.

A city wide strategy to improving services may be an entry point. Some professionalised utilities have recognised the large customer base represented by low-income populations, and have been able to develop new approaches to serve them (e.g. Uganda's National Water and Sewerage Corporation which has established pre-paid kiosks in low-income areas). Where utilities struggle with lower capacity or find it difficult to engage low-income communities directly, there is good evidence of the potential for partnerships to enable change eg. with small scale informal providers, civil society organisations, or even settlement organisations (Thailand).

The drive for pro-poor reform can come from different stakeholders within the city, but the engagement of official service providers with a mandate to implement at city scale is critical for city-wide impact.
WSUP, 2013

⁴⁰ WSUP, 2013. *Getting to scale in urban water supply – Topic Brief*

Reducing NRW can be a strong argument to convince utilities to serve settlements and low income areas.

Utilities can reduce NRW by replacing illegal connections with legal ones. This not only generates additional revenue, but also reduces the amount of water wasted by leakage at poorly made illegal connections. For example, Nairobi City Water and Sewerage Company was primarily motivated to serve the poor to reduce NRW. NRW declined from 62% to 39% and the company’s revenue increased.

Utilities may need support to improve their performance.⁴¹ This could include:

- improving the benchmarking system so that performance monitoring is improved and tracking of NRW can occur
- building the capacity of the utility to serve the poor – through training, but also short term placement of staff within organisations that are serving the poor well eg. telecommunications companies
- motivating utility staff to serve the poor – setting targets, celebrating achievements, rewarding staff if targets are achieved
- improving the technical skills of service providers including balancing pressure and flow capacity for distribution and production.

Establishing a unit or department within the utility which is dedicated to settlement water supply can help bring focus and specialisation.

Options for these units compared with a mainstreaming approach are presented in Table 6 and include: ⁴²

1. Dedicated, stand-alone Low Income Community (LIC) unit with operational function;
2. Dedicated, stand-alone LIC unit with advisory function;
3. ‘Mainstreaming’ approach in which responsibilities for serving LICs are distributed throughout the utility’s operational units.

Table 6 Models and examples of Low Income Community service delivery

| Organisational structure for LIC service delivery | Description of approach | Adopted by |
|---|--|--|
| Operational LIC unit | Full responsibility for service provision to low-income communities is concentrated within a dedicated LIC unit which takes direct responsibility for management of investment, service provision and revenue collection within low-income districts | Lusaka Water and Sewerage Company (LWSC, Zambia), National Water and Sewerage Corporation (NWSC, Uganda) (44 towns) |
| Advisory LIC unit | A LIC unit is set up in a supporting role, with responsibilities including developing and testing appropriate service delivery models and advising operational units on models to adopt. | Nairobi City Water and Sewerage Company (NCWSC, Kenya), Dhaka Water Supply and Sewerage Authority (DWSA, Bangladesh), Dar es Salaam Water Supply and Sanitation Authority, (DAWASA, Tanzania), Ghana Water Company Limited (GWCL, Ghana) |
| Mainstreamed LIC responsibilities | Skills and responsibilities for serving LICs are distributed across the utility’s operational departments. | Manila Water Company (MWC, Philippines), Phnom Penh Water Supply Authority (PPWSA, Cambodia), Jiro Sy Rano Malagasy (JIRAMA, Madagascar), Águas da Região de Maputo (AdeM, Mozambique). |

Source: WSUP, 2015. Stand-alone unit or mainstreamed responsibility: how can water utilities serve low income communities?

LIC units have been established in some utilities but may be called other names: ‘Informal Settlements Department’ in Nairobi; ‘Peri-Urban Department’ in Lusaka; ‘Community Liaisons Unit’ in Dar es Salaam;

⁴¹ WSUP, 2013. *Getting to scale in urban water supply – Topic Brief. Water and Sanitation Services for the Urban Poor*

⁴² WSUP, 2015. *Stand-alone unit or mainstreamed responsibility: how can water utilities serve low-income communities?*

'Pro-Poor Branch' in Kampala; 'Community Programme and Consumer Relation Division' in Dhaka; or 'Low Income Consumer Support Unit' in Ghana.

There are pros and cons with the three different methods. A mainstreaming approach can be effective to roll out a wide strategy to serve the poor eg. Manila and Phnom Penh. A dedicated unit may be more useful as a stepping stone, where a utility is only starting to address the challenge of providing services to low-income communities. A LIC unit can play a catalytic role and act as a transitional department.

The three most important requirements for effective service delivery to LICs are:

1. corporate commitment – top management supports service delivery for LICs and inculcates this in the rest of the organisation;
2. clear roles and responsibilities - the roles and responsibilities of those involved in delivering the strategy must be clear, consistent with other departments, and understood throughout the utility and by relevant stakeholders;
3. clear plans and Key Performance Indicators (KPIs) - Short, medium and long-term objectives for serving LICs must be clear and fully integrated with the utility's wider strategies. Well-focused KPIs must be devised including metrics to assess i) contributions of low-income areas to total revenues, ii) NRW, and iii) consumer satisfaction.

Other important features include adequate resources and power, and a balance of technical and community staff.⁴³

7.3 Careful selection of management models for delivery of water supply

Three relevant models for delivery of water services to urban areas are selected for further analysis.

Direct supply by a utility

The utility is responsible for infrastructure, O&M, billing, community engagement, asset replacement and all services related to the delivery of water supply. The disadvantage is that this approach may stretch utility staff resources.

Delegated management

Delegated management in urban water supply is when a public utility delegates a number of its functions, typically operation, maintenance, new connections or revenue collection to a third party, often a private company, an NGO, CBO or similar.⁴⁴

Experience from Kumasi in Ghana, Naivasha in Kenya and Maputo in Mozambique has shown that the most successful and sustainable examples of delegated management are found where:

- 1) contractual arrangements are well defined and are clear about ownership, management, operation and maintenance responsibilities;
- 2) the service provider is locally centred and close to their customers;
- 3) systems are financially sustainable at affordable prices;
- 4) there are financial incentives in place for the delegated operator to improve performance; and
- 5) the regulatory and policy regime is supportive and protects the interests of the utility, operator and consumer.

To achieve these conditions it is important to provide technical and capacity building support to both the utility and the delegated operator.

⁴³ WSUP, 2015 *Stand-alone unit or mainstreamed responsibility: how can water utilities serve low income communities?*; WaterAid, 2009. *Water utilities that work for poor people: Increasing viability through pro-poor service delivery*

⁴⁴ WSUP, 2012. *Delegated management of water and sanitation services in urban areas: experiences from Kumasi, Ghana*

Typical technical assistance provided to delegated operator includes financial modelling, leakage reduction, metering, contract negotiation and investment planning (Maputo, Mozambique.)⁴⁵ It is important that the utility understands the benefit of the arrangement to them, namely reduced non-revenue water and an increased customer base, leading to increased revenue. A key lesson is that lines of responsibility and incentives within delegated management arrangements take time to become clear, so it important to build to build in scope for the contract to be modified, as experience and learning unfolds.

Examples of delegated management

Delegated management enables fair pricing Maputo (Mozambique): The main utility (AdeM) provides bulk supply to a small operator (EMA). The tariffs are set carefully – individual households pay a connection fee and a volumetric tariff. Water kiosks just pay a volumetric tariff but it is higher than for house connections. EMA has a ‘pure bulk supply’ contract, under which it has full responsibility for the customers in its service area, including operation and maintenance, and billing/collection.

Delegated management reduces illegal connections Lusaka (Zambia): Small community providers have been used. The buy-in from community is good – they respect a local provider. There are few illegal connections because they are quickly found out.

Delegated management empowers the community Nairobi (Kenya): Kiosk operators supply water to the market at a small margin. These kiosk operators are forming representative associations. Through these they can raise issues with the water company.

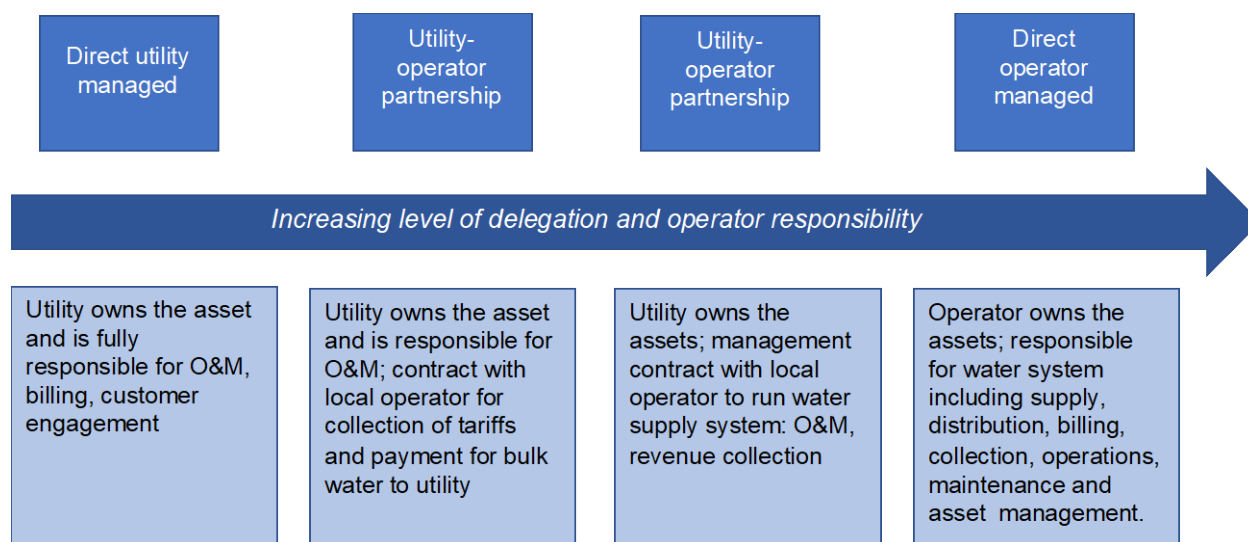
WSUP, 2009. How can water and sanitation services to the urban poor be scaled up?

Community management

Community management of collectively-used water schemes can be difficult for various reasons, including the lack of long-term commitment by NGOs, social cohesion, technical and management capacity, and financial resources. Deterioration of water supply infrastructure is a typical outcome (slums of Côte d’Ivoire, peri-urban settlements in Dar es Salaam).

The progressive nature of water supply contract options, from direct utility management to direct operator or community management is shown in Figure 1.

Figure 1 Water supply contract options



⁴⁵ WSUP, 2013. *Getting to scale in urban water supply: Topic Brief*

Source: Author, based on WSUP, 2012

The different contract arrangements are compared in table 7.

Table 7 Comparison of management contracts

| | What is it | Pros | Cons |
|----------------------------------|---|---|--|
| Utility direct management | Utility provides water supply services directly | Utility is the high profile public face, often trusted. Expertise and experience in managing water supply systems including water resource development. | Utility may not have the staff or resources to extend to settlements |
| Delegated management | Potential involvement of private companies, NGOs, CBOs, User Associations or Water Trusts. Entity supplies water from utility source, provides household connections, shared standpipes or commercial kiosks; potentially responsible for a range of services - billing, revenue collection and maintenance | Close to and engaged with customers. Trusted. | Low technical capacity and low financial capital. May be risk averse and not willing to invest in expansion or upgrades. Requires utility commitment |
| Community management | local community groups or "community-based organisations" (CBOs) form operational partnerships with international NGOs that facilitate technical and financial resources where available. Eg. Dar es Salaam, Tanzania; Dhaka Bangladesh | Alternative in the absence of others Gets around land tenure issue | Community unlikely to have the required technical skills. Requires investment in constant/permanent training and capacity building of all actors especially community groups. Social hierarchies and dominance, potential for abuse of power by community leaders May not serve everyone Requires social cohesion Requires NGO as guarantor for establishment and ongoing operation Limited scale, and replication |

Introducing a new contractual arrangement to a utility can require committed advocacy, and may involve reversing decades-old institutional processes. Demonstration of delegated management arrangements may help convince utilities of their value.

When deciding which contract arrangement, two fundamental questions which need to be resolved are:

- Who owns the assets?
- Who is responsible for maintenance, repairs and asset replacement?

Financial responsibility will become clearer if these questions are addressed.

7.4 Appropriate technical options and delivery models

Extending piped services

Extension of existing piped water service is the preferred approach to delivering water supply to settlement because it mainstreams settlements in networked water infrastructure system which requires good governance, substantial financial investment, and requires a long-term commitment by government to system maintenance.⁴⁶ This is in contrast to the historical push by development banks for private sector

⁴⁶ Mitlin, D., V.A. Beard, D. Satterthwaite, and J. Du. 2019. "Unaffordable and Undrinkable: Rethinking Urban Water Access in the Global South." Working Paper. Washington, DC: World Resources Institute. Available online at www.citiesforall.org.

involvement in water supply, including corporatisation of utilities, which did not improve access for the urban under-served, and became a pretext for government to reduce investment in water supply (eg. Zambia, Kenya).⁴⁷

An example of system extension is from Nairobi City Water and Sewerage Company (NCWSC), which extended water supply to thousands of people living in settlements. Features of the approach included:

- ISD unit leading
- support from partners like World Bank and WSUP
- a connections promotion model, which utilised a team of locally hired sales promoters, NCWSC sociologists and customer care personnel to trigger applications and investment in formalising water connection
- fast tracking and monitoring of applications for connections to deliver within the timeframe of the utility charter
- post connection monitoring of services to new customers
- accompanying reduction of informal water vending and large scale disconnection of illegal connections.

NGOs have played a key role in extending water supply networks to settlements perceived as illegal and denied service by utilities to connect eg. Kathmandu, Nepal and Dhaka, Bangladesh.⁴⁸

Even where the networks are in place, uptake of water connections in informal settlements cannot be taken for granted. Utilities must overcome multiple challenges to stimulate demand, including striking the right balance between affordability and financial viability in setting tariffs; engaging with landlords (including absentee landlords) to promote investment in new connections; and building trust in the utility among the low-income customer base.

WSUP, 2018. A journey of institutional change-Extending water-services to Nairobi's settlements. Water and Sanitation for the Urban Poor

Service delivery models

Where a utility is willing to supply water to a settlement, various models are possible. Non networked models such as a borehole or other service outside of the utility are not considered here as the utility-led piped water supply model is most likely for PNG.

Any service provision should be combined with upgrading of the network.

Network upgrading means that the newly connected settlement gets a good standard of water supply (and people are more likely to pay for it), but it also benefits the utility and customers outside of the settlement.

Service delivery can include the gold standard of household connections, communal water points, water vending or a combination of all three (refer to Table 8).

Household connections provide the highest level of service for customers and are the most convenient and cost effective for customers. The negatives are the additional cost of reticulation, cost of meters, increased maintenance requirements, and billing for every household.

Shared connections eg. communal stand pipe, provide a lower cost solution. If enough standpipes are installed then waiting times are reduced and manageable. The risk is contamination of water between the

⁴⁷ Dagdeviren H. and Robertson, S. 2009. 'Access to Water in the Slums of the Developing World'. Working Paper No. 57. International Policy Centre for Inclusive Growth United Nations Development Programme; Mitlin, D., V.A. Beard, D. Satterthwaite, and J. Du. 2019. "Unaffordable and Undrinkable: Rethinking Urban Water Access in the Global South." Working Paper. Washington, DC: World Resources Institute. Available online at www.citiesforall.org,

⁴⁸ ABD, 2002. *Beyond Boundaries: Extending Services to the Urban Poor*. Asian Development Bank

standpipe and house, particularly from unclean containers. Standpipes may be an interim solution if communities aspire to household connections and are willing to pay for them.

Table 8 Comparison of service delivery models

| Delivery mode | Metering | Charging arrangement | Requirements | Pros | Cons |
|-------------------------------|----------------------------------|----------------------|--|--|---|
| Household connection | unmetered | Flat rate | Requires a system of billing households for their flat fee | Consumer acceptance, convenience, water quality, personal safety | Not equitable as larger users do not pay their share. No incentive to conserve water |
| | metered | Post paid | Requires a meter reading and billing system, convenient method for customers to pay bills | Consumer acceptance, convenience, water quality, personal safety. Consumer can regulate water use. Encourages water conservation. | Cost, sophistication of system, extra workload servicing meters |
| | | Pre paid | Requires a prepaid meter, customer access to credit facilities, consistent water pressure | Consumer can regulate water use and budget, no debt, pay for what is used and no subsidizing of others | Requires payment system. Meter variability (due to water pressure). Hi installation cost. Short lifespan of meters |
| Communal water point | Unmetered tap stand | Flat rate | Requires a fixed fee eg. per month or week; a method of collecting fees from households | Consumer can use as much water as they want; cost of water is known | Water losses, promotes water wastage |
| | Prepaid metered tap stand | At communal rate | Requires a communal meter, available credit for households to purchase. Typically 20-50 households with a token or smartcard loaded with credit. | Convenient, households can manage water use according to budget, easy for children to use | Service burden of meter system, inaccuracy of meters, installation cost |
| | Kiosk | At communal rate | Requires location to maximise use and ensure financial viability, requires operating staff, method for payment | Customers pay for water used at the time of collection. Kiosk can provide other services such as advice, hygiene and sanitation products | Hours of operation may not be 24 hours. Kiosk operator may deal with large amounts of cash. Risk of poor management. May be hijacked by local gangs |
| Formalise water vendor | Central point or mobile delivery | At vendor rate | Requires adequate supply of utility water to meet demand | Provides job for existing vendor, Could include deliveries, vendors may offer flexible payment to certain customers | Risk to quality of water, water vending may have been illegal, vendors may compete rather than collaborate, price may be higher than official |

| | | | | | |
|--|--|--|--|--|------------------------------------|
| | | | | | rate due to vendor operating costs |
|--|--|--|--|--|------------------------------------|

Kiosks

Kiosks can provide an alternative to a communal tap stand with added features such as a small store or community hub.

Women in low income urban neighbourhoods in Honduras developed and managed their own licenced water vending stations in response to unreliable expensive water provided by water vendors. Benefits included lower and fixed water prices and the provision of part-time employment for poor single women with children.⁴⁹ In Kenya, water kiosks were associated with an informal service delivery – due to poor management, variable water quality, high prices, and hijacking by local gangs. This situation was turned around through a project in collaboration with the utility to install new kiosks with dedicated trained managers.⁵⁰ Zambia has developed a system of water kiosks operated by formal water providers, serving a large population in low income areas. Kiosks are close by (5 minutes walking), water is priced the same as household water and monitored by the water regulator. Kiosks are designed to display information materials including bulletin, posters on HIV/AIDS prevention. They are also used for commercial activities such as selling health products (condoms and soap) and groceries (candles), and tailor shops.⁵¹

Lessons learned about kiosks include the need to identify locations that maximise usage and thus ensure financial viability. The number of customers – their average daily consumption and their ability and willingness to pay – should be studied. Involving the community in selection of sites has been shown to improve their sense of ownership and prevent vandalism. Formalising contracts with kiosk managers and ensuring they are trained in the operation and management are essential. Clear signposting and offering items for sale can substantially increase usage of some kiosks.

7.5 Increase opportunity for revenue

Lessons have been learned on ways to increase revenue including easier payments.⁵²

Eliminate barriers to connect

Connection fees are a substantial barrier for low income households to connect to piped water supply as it is challenging for them to amass the required fee. The costs of connection (to the utility) can be incorporated into project costs or amortised through tariffs over a long period of time.

Barriers around proof of land ownership need to be eliminated. Document requirements should be realistic and achievable.

Make it easy to pay the bill

If utilities and operators want to be paid for supplying water they need to make it easy. For settlement communities this could include more frequent billing eg. weekly, more places to pay eg. through small local shops and vendors, or easier ways to pay such as phone credit or online banking.

Prepaid meters are often seen as the panacea to ensuring payments are received from customers, without due consideration given to the payment system required.⁵³ A prepayment system comprises the prepaid dispensing devices, the technology required to load and transfer credit, a database recording customer purchases and metered consumption, and ongoing engagement with customers. A network of credit vendors is needed to sell prepaid credit or “top-ups” to customers (or, a mobile phone payment system, also incurring charges). Integration with postpaid revenue management is vital but this integration is more

⁴⁹ Kjellen, M and Mcgranahan, G, 2006. *Informal Water Vendors and Urban Poor. Human Settlements. Discussion Paper Theme Water-3. IIED.*

⁵⁰ GDI, 2015. *Case Study: Using the Water Kiosk to Increase Access to Water for the Urban Poor in Kenya*

⁵¹ GTZ, 2009. *Case study: water kiosks*

⁵² ODI/SOAS, 2012. *Strengthening pro-poor targeting of investments by African utilities in urban water and sanitation: - the role of the International Development Association of the World Bank. Case studies from Ghana, Burkina Faso and Tanzania. WaterAid*

⁵³ Heymans, C., Eales, K., Franceys, R., 2014. *The Limits and Possibilities of Prepaid Water in Urban Africa, Lessons from the Field. WSP-World Bank*

difficult and costly in terms of investment required (staffing and/or computer billing upgrades) or efficiencies foregone, than is often assumed. Regular monitoring is required to track faults, exceptions, and real-time consumption against prepaid sales.

The cost-recovery potential of prepaid meters is not straightforward. Prepaid meters bring their own set of problems: the high cost of installation; the fact that meters can develop faults that deliver free water or can be bypassed or vandalized when monitoring and follow-up action are neglected, which opens the way for high NRW losses; technical shortcomings, including inaccurate readings when water pressure is variable; and so on. In addition, the opportunity cost of big investments is high, as the real working life of prepaid meters is only about 5–7 years, compared to the estimated 15 to 20 years for conventional meters.⁵⁴



Various devices can be used for credit such as e-tokens, and smart cards



Prepaid tap stands are easy for children to use. Recent models include solar panels.

Prepaid water systems are not a technical magical wand to fix underlying management issues in the delivery of urban water supply.

A prepayment system differs significantly from conventional systems in that success is contingent on having, first, an effective vending system that allows customers to buy credit.

Heymans, C. et al, 2014. The Limits and Possibilities of Prepaid Water in Urban Africa, Lessons from the Field. WSP-World Bank

7.6 Other considerations

Increase awareness on the rights of the urban poor

Lessons learned include the need to, after convincing utilities on the rights of settlement communities to access water supply, advocate to politicians, city planners and then the media. The role of advocacy is likely to fall to NGOs and development partners in the first instance.

Demonstration to scale

An approach adopted by WSUP is demonstrating approaches as “intervention models”.⁵⁵ This means that the demonstrations are as real as possible, of mutual benefit to low-income customers and service providers, they are financially viable in themselves or enhance the financial viability of the service provider, permit scaling up, and ensure sustainability. Piloting in isolation from the utility, say with a small independent provider, is not a mainstream approach and will not be scalable. Demonstration of new approaches needs to be done in collaboration with service providers, together with the provision of relevant capacity building and promotional activities. This is followed by evaluation (to assess the viability of the model and indicate any refinements) which is intended to trigger uptake by service providers and the release of financing for scale-up.

⁵⁴ Heymans, C., Eales, K., Franceys, R., 2014. *The Limits and Possibilities of Prepaid Water in Urban Africa, Lessons from the Field.* WSP-World Bank

⁵⁵ WSUP 2013.

Development partners and NGOs have a role to play

Donors and external agencies can play vital roles in brokering partnerships, providing technical and strategic support, resourcing the initial costs of pro-poor initiatives, and making the case for a pro-poor agenda in policy discussions.

NGOs and technical advisory agencies can play a critical role in supporting utilities and communities including through demonstrations. Skills can be shared in business planning, financial modelling, leakage reduction, metering, contract management, investment planning, and community engagement.

Where a development partner or NGO can bring budget for implementation, even at relatively small scale, this has helped it to engage partners at the mobilisation stage, and generate good will and enthusiasm for services to settlement areas.

8 Relevance for PNG

Lessons learned from other countries are very relevant to PNG, with many of the issues similar or the same as PNG. Therefore these lessons should not be ignored but drawn on for PNG's approach to water supply in settlements and urban villages.

The PNG WASH Policy legitimizes provision of water supply to settlements, urban villages and peri-urban areas. The Policy should be used as a tool or stick to advocate for water supply services.

Substantial groundwork has already been laid with Eda Ranu, through ADB Tete settlement engagement, on the need to supply water to settlement areas, and the economic benefits for the utility. Given that the CEO of the former Eda Ranu is also the same CEO as Water PNG means that this appreciation of the issue will be carried forward by management.

However Water PNG staff are very busy and not inclined to pursue the very challenging work of providing water supply to settlements. A dedicated settlements unit may help. This may require support from development partners to fund 1-2 positions initially to establish the unit so it can gain acceptance, credibility and experience, and demonstrate hard evidence of the financial benefits.

In the absence of NWSHA, and the inaction of the WASH PMU, there is a vacuum in government support for urban water supply to settlements. The gap created by the absence of a champion in Government may need to be initially filled by development partners in order to keep up momentum. There is no one else pushing for water supply to settlements. As part of advocacy and information, politicians, urban authorities such as NCDC, and the media need to be brought in to the sphere of influence.

In PNG the most feasible method of providing water supply to settlements is through extension of the existing network. However this means that water resource capacity in smaller towns will probably need to be augmented and ailing networks will need rehabilitation, meaning large scale investment is required. Most of the water infrastructure networks in the country were constructed during the pre-and post independence era.⁵⁶ For example in Wewak the water supply system is old and failing and would require upgrading in order to deliver water to additional households at the prescribed service levels.

Infrastructure investment will be needed from development partners. Financing demonstrations, together with real evidence of the gains in revenue to Water PNG and the economic benefits to settlement households (women in particular) should be monitored and publicized.

More government funding is needed. The CSO for serving the poor needs to be activated. This may require external support to prepare and shepherd an application through the system (combined with advocacy). Ad hoc funding from politicians for water supply should be channelled through more appropriate funding pools

⁵⁶ Kutan, L and Sofo, R. 2020. *Urban Water Supply in Papua New Guinea: Overview of the Challenges. Discussion Paper No. 173. The National Research Institute: Port Moresby*

or combined with CSO or donor funding to leverage the impact of any investment. Politician funding should support planned developments, not ad hoc short term fixes which will create headaches for Water PNG in the future.

Demonstrations of urban water supply must be documented and shared and lessons learned and other evidence made available. Demonstrations should heavily involve and inform the Peri-urban WASH committee.

Considerable investment in training and capacity development of utilities, and delegated managers such as MKA are needed. This should be systematized to avoid reinventing the wheel with each new demonstration or scaling up. Long term support mechanisms will be needed, such as NGO or consultant support, in order to make sustained changes.

If prepaid meters are to be applied in any PNG town then scale is important. For example a small trial in a settlement would not be cost effective to amortise the cost of the software in particular. For PNG meters would cost around US\$300 (K1,000) per connection and a minimum of 200 units would be needed to be cost effective. Discussions with Eda Ranu about trialing prepaid water meters have been ongoing for the last five years.⁵⁷ The institutional issues accompanying prepaid meters eg. financial and credit systems, would require considerable effort.

Other options such as smaller more frequent repayments should be considered, or using mobile phone banking.

The use of kiosks as a water hub should be explored, with formal management arrangements in place. Kiosks fit well with the PNG concept of small local stores and are an opportunity for women to get economic benefits.

⁵⁷ *Pers Con, Peter McKenzie, AD Riley, 25 August 2020*