



Private boreholes for Nairobi's urban poor: The stop-gap or the solution?



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ABSTRACT

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Self-supply boreholes are prominent in urban poor settlements, often due to utilities' inability to keep pace with demand in addition to common failures to direct public water to where it is most needed in terms of health and welfare. A study in Nairobi's low-income settlements has found that boreholes represent an expensive but 'least bad' coping strategy, though at the expense of groundwater resources declining at an average annual rate of 3 m. Results showed 42% of respondents depend on boreholes within 100 m of households, constructed at an average capital cost of US\$ 27,500 for a 230 m deep borehole. Water tariffs and quality standards were not enforced, with the average price to consumers (~US\$3/m³) over ten times the nationally approved lifeline tariff for piped water, and recorded *Escherichia coli* counts and fluoride levels up to 214/100 ml and 9.4 mg/l respectively, significantly over WHO standards. Investigating the longer term implications, this paper concludes that the overall water supply demand shortfall could be greater and last longer than anticipated with consequential impact on access by the poor to adequate water quantities. Therefore, over-abstracting groundwater, a source that cannot be easily diverted to higher income consumers, may be the default solution for the poorest for longer than is reasonable, let alone desirable.

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Introduction

Self-supply boreholes can be found in most urban poor settlements often due to the utility's inability to keep pace with the growing demand, in addition to common failures to direct public water to where it is most needed in terms of health and welfare (Bakker & Kooy, 2008; Cross & Morel, 2005; Mulenga & McGranahan, 2011). In the continually evolving dynamics of urbanisation, private boreholes are now proving vital to the provision of urban water-supply in many low-income settings, despite echoes from the literature that investments in management and governance of groundwater resources have typically been neglected (Foster, Tovey, & Tyson, 2011; Foster & Tuinhof, 2005, pp. 1–6; McDonald et al., 2011).

Over the next 20 years, Sub-Saharan Africa's urban population is expected to double (UN-Habitat, 2003) and urban population growth rates will continue to be the highest in the world at 3.9% per

year (Jacobsen, Webster, & Vairavamorthy, 2012). The urbanisation trend has been described as virtually synonymous with slum growth (UNFPA, 2007) with statistics indicating 72% of Sub-Saharan Africa's urban population currently lives in slums associated with inadequate services, unsanitary conditions and overcrowding (UN-Habitat, 2003). In Nairobi, Kenya, one of the most important economic hubs of the continent, unofficial figures estimate that 60% of residents live in areas interchangeably described as slums, informal and low-income settlements which constitute only 5% of the residential land and do not have adequate access to affordable, safe drinking water (Gerlach, 2006, pp. 1–15). The neediest urban poor residents are forced to spend long hours queueing for and carrying water which is not tested for subsequent potability, paying 5 to 20 times more than the tariffs charged by formal providers through metred household connections (Ministry of Water & Irrigation, 2007). Water supply in the settlements is also highly unreliable, a few hours per day on average, and water shortages are common, increasing the health burden. Water, a basic necessity, is transformed into a valuable commodity for those fortunate enough to get their hands on it.

Poor service provision to low-income settlements has largely been attributed to the limitations faced by the utility in revenue

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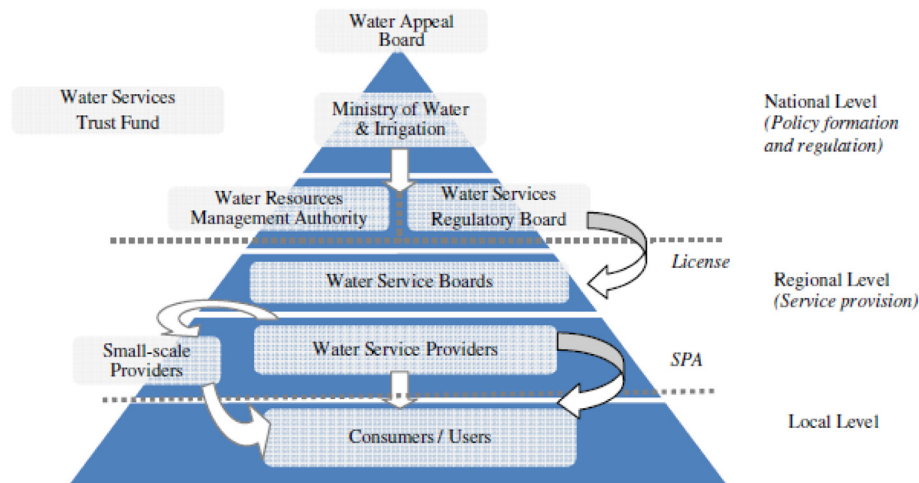


Fig. 1. Institutional framework for water supply in Nairobi (Source: Adapted from NCWSC, 2011).

collection (Gerlach & Franceys, 2010). In understanding the overall context of water supply in Nairobi, this study provides a snapshot of utility service provision to the estimated 40% higher-income consumers said to have access to clean and safe water.

This paper predominantly targets low-income consumers to interrogate the longer-term impacts of the growing trend of private boreholes when applied in Nairobi's complex urban environments, whether as 'transitional stop-gap' to utility provision, an ultimate solution or; simply an expensive diversion of resources from where they are really needed.

Overview of water services provision in Kenya

Institutional framework

The poor performance of utilities in Kenya historically has largely been attributed to ineffective management and inadequate provision for operation and maintenance hindering the desire to achieve self-sustainability, impacting mainly on the low-income consumers (Ministry of Water & Irrigation, 2007). To tackle this, the GoK commenced water sector reforms provided for in the Water Act 2002, defining the key sector roles under the Ministry of Water & Irrigation (MW&I). In the context of Nairobi the Water Service Provider, Nairobi City Water & Sewerage Company (NCWSC), specifies the terms and conditions of service provision to consumers, as well as the applicable performance targets.

Under the Water Act 2002, the right to provide water services relevant to small-scale providers (SSP's), which includes borehole self-supply, is regulated by the provisions of Clause 56. (1). The Clause states that any persons providing water services to more than 20 households or supplying more than 25,000 l of water per day for domestic purposes without a valid licence is committing an offence (Ministry of Water & Irrigation, 2002). Considering the characteristically high population density in low-income settlements, privately owned self-supply boreholes are likely to be in breach of this clause (though the higher-income self-suppliers may be acceptable). Fig. 1 summarises the institutional framework for water service provision in Nairobi.

Prompted by Kenya's new constitution, a Draft Water Bill 2012 that segregates the key sector roles and functions by regulation has been published and is pending enactment by parliament to repeal the Water Act 2002. Although the key sector roles remain, albeit some transferred to different entities, notably under this Draft Bill the provision of water licence requirements relating to SSPs is no

longer determined by number of households served and quantities sold, suggesting that a licence to provide water services would become mandatory to all services providers, whether operating as an organisation or an individual, regardless of coverage (Ministry of Water & Irrigation, 2012).

Nairobi's main sources of water

NCWSC is reported to supply about 555,000 m³ per day of water to the city from four main collection sources summarised in Table 1 for a population currently estimated to be over 3½ million (Patel, Egis Bceom International, & MBP+Partners Consulting Engineers, 2012). This bulk water-supply is especially unreliable during periods of drought and is also endangered by reservoir siltation associated with catchment deforestation. The supply problem is further aggravated by the poor state of the distribution system, which results in about 42% non-revenue water (NRW) (Water Services Regulatory Board, 2011). NRW results from a combination of physical losses (leakages) and commercial losses (illegal connections/water theft, unmetered public consumption, metring errors and unbilled metred consumption).

In the low-income settlements service delivery varies. Approximately 22% of residents have a legal NCWSC household connection, while an estimated 75% purchase their water from SSP's at water kiosks operated by NGO's, CBO's (community based organisations) or individual entrepreneurs, in some cases intermediated via delivery from pushcart vendors (Ruhii et al., 2009). Water kiosks are the main distribution points of water and usually consist of a tap with or without a water tank from which customers collect water in 20 l yellow jerry cans (23 l when full).

Prior to 2009, the water sector had not seen a tariff adjustment for almost 10 years. The published 2009/10 tariff structure is shown in Table 2. The sustainability of the entire water value chain is entirely dependent on payment by customers with household-level

Table 1
Nairobi's main sources of surface water (Source: Patel et al., 2012)

Source	Output in m ³ /day
Thika Dam – Mwangi Intake System	415,000
Sasumua Dam	68,400
Ruiru Dam/Kabete Water Works	21,700
Kikuyu Springs	4800
Self-supply boreholes (estimate)	45,000

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