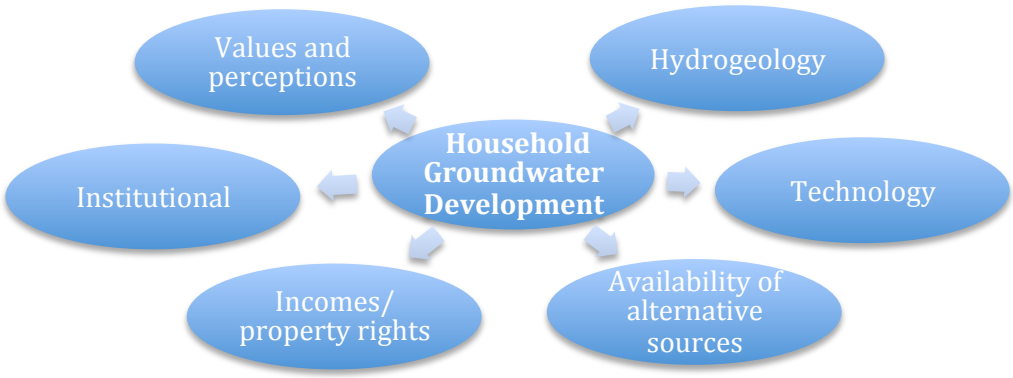
Household Water Demand in Urban Africa: Understanding the potential of groundwater for a sustainable urban future

The rapid growth of urban areas across Africa is creating immense pressure on the provision of sufficient quantities of safe and affordable water. Many urban communities are now exploiting groundwater reserves to meet these needs. Where provision by public authorities is inadequate households are securing their own independent supplies, leading to a proliferation of domestic boreholes. Comprehensive data is scant, but recent studies in Lagos, Nigeria and Accra, Ghana illustrate the scale of the issue. In each it is estimated that less than 20% of the population have direct access to the public water supply[1]. In a recent survey[2], 51% of respondents in Lagos, Nigeria reported that they owned a borehole and a further 36% had shared access to one. In 2010, the IIED[3] estimated that some 269m urban dwellers globally rely on wells and boreholes as their principal source of drinking water. No updated figure exists to shed a light on the situation today.

Whilst the proliferation of domestic boreholes is often blamed on government failure this is only one aspect of a complex interaction of place-based factors (Figure 1). Equally important is the prevailing hydrogeology, technological developments and the availability of acceptable alternatives as well as income levels and property rights. Prevailing values and cultural norms towards different forms of water supply within an urban area further impact on the propensity for households to develop their own boreholes or hand-dug well.

Figure 1 Drivers of domestic borehole proliferation



Source: Healy et al (2018a)

Research in Lagos, Nigeria,[4] has revealed how confidence in the quality of the water available, and the reliability of this water source is almost universal. Respondents believe groundwater supplies to be infinite and of drinking quality. Such underlying assurance underpins the decision of many households to invest in their own development of the groundwater resource.

Whilst there is little doubt that, in the short-term, the development of domestic boreholes is beneficial to individual households, there is less certainty over the collective longer-term effects of

[1] Healy et al (2018a) Resilience in Groundwater Supply Systems: Integrating Resource Based Approaches With Agency, Behaviour and Choice *RIGSS Working Paper*, Cardiff University, UK.
[2] Capstick et al (2017) Findings from a survey of private households in Lagos, Nigeria *RIGSS Working Paper*, Cardiff University, UK.
[3] Grönwall, J., Mulenga, M., McGranahan, G. 2010. Groundwater, self-supply and poor urban dwellers: A review with case studies. London: IIED.
[4] Capstick et al (2017) Op. Cit.

unfettered development. The risk is that over-exploitation may lead to over-abstraction, certainly in some climatic and hydrogeological contexts. Equally, contamination of the groundwater may imperil the groundwater resource, a particular concern with the proliferation of shallow hand-dug wells. A further concern is the distributional consequences of the proliferation of household boreholes. Evidence from South America,[5] as well as anecdotal evidence from African cities, demonstrates how the presence of private domestic boreholes can reduce the revenues of water utilities such that they struggle to provide infrastructures and supplies to resident populations. This most significantly impacts on the urban poor, as they are forced to rely on sources of poor water quality or source clean water at significantly higher cost.

The observed proliferation of private boreholes also brings new governance challenges. Evidence from Lagos,[6] suggests that most borehole owners regard themselves to be responsible for assuring the quality of water emanating from their borehole. In contrast, remarkably few regard this to be the responsibility of government. In practice, this means that there is little or no effective oversight of the primary means of water supply in one of the world's largest mega-cities. This situation appears to be replicated across much of Africa. In a survey of water professionals across the continent[7], almost two-thirds claimed that there was no procedure in place for monitoring the amount of groundwater abstracted from privately owned boreholes. Similarly, 40% stated that there was no procedure for monitoring the quality of the water being abstracted. Where a procedure was reported, nearly a third (31%) report this to be the responsibility of the individual borehole owner.

The exploitation of groundwater reserves to meet domestic water needs is proving critical to maintain the expansion of towns and cities across Africa and is critical to their long-term economic prosperity. Yet, it also raises new and crucial questions about the demands made on groundwater, the long-term sustainability of the resource and the resilience of the communities that rely upon it. Not least it begs the question as to the unintended consequences of unfettered borehole development, the distributional consequences of the trends that we currently witness and the extent to which urban areas themselves might prove resilient to future environmental shocks.

The consequences of the observed proliferation of domestic boreholes are currently poorly understood but are potentially significant. Urgent action is required to remedy our profound lack of knowledge as to the current magnitude (and anticipated trends) in the level of urban self-supply; the condition (and resilience) of the groundwater resource in key urban centres; the substantial economic implications of the revealed trends; how collective perceptions and values are driving the observed transition to privatised and individual water supplies and the implications of this for achieving equitable outcomes and Sustainable Development Goals.

This research note presents a summary of the findings of a workshop undertaken at Cardiff University in March 2018, in association with the GW4 Water Security Alliance, to discuss the challenges emerging in the burgeoning development of groundwater resources in urban Africa. Speakers included: Helen Bonsor (British Geological Survey); Stephen Foster (IAH past president); Jenny Grönwall (Stockholm International Water Institute); Adrian Healy (Cardiff University). For further information please contact:

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Full details of the workshop are available at:

Cardiff University Water Research Institute

[5] Foster et al (2010) Urban Groundwater Use Policy: Balancing the benefits and risks in developing nations. The World Bank.
[6] Capstick et al (2017) Op. Cit
[7] Healy et al (2018b) Perceptions of trends in the development of private boreholes for household water consumption: Findings from a survey of water professionals in Africa *RIGSS Working Paper*, Cardiff University, UK.