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More Sustainable Systems Through Consolidation? The Changing Landscape of Rural Drinking Water Service Delivery in Uganda

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ABSTRACT: The drinking water services sector in Uganda is in the early stages of a nationally planned transition; it aims to move from a paradigm based on community managed point sources towards one of professional utilities of piped networks. The implementation of this transition was studied in Western Uganda's Kabarole District between 2017 and 2019; a systems approach (building blocks) was used to assess the sustainability of the different service models. The level of services was assessed using household and infrastructure surveys; these were supplemented by a management assessment, key informant interviews and stakeholder workshops. The two utility models present in Kabarole outperformed the community management model, with the existing national utility demonstrating greater maturity and performance than the newer Umbrella utility. The community management model, while relatively well defined in policy and planning frameworks, was poorly implemented, with less than 20% of community management structures operational at water points. The water sector is undergoing a process of consolidation of service delivery under a smaller number of larger providers, a trend that has been observed in other countries as they progress towards universal supply. In this paper, the prospects and risks of the current sector trajectory are discussed, as are the implications for monitoring, regulation and planning systems across the urban–rural spectrum.

KEYWORDS: Utility, service delivery models, systems, community management, Uganda

INTRODUCTION

Drinking water services in much of sub-Saharan Africa are characterised by low reliability, poor water quality, and frequent breakdown and/or abandonment of facilities (Chowns, 2015; Liddle and Fenner, 2017; WHO and UNICEF, 2017). Decades of investments have not achieved the anticipated outcomes; this is attributed by some to a sector that is too heavily driven by outsiders and international organisations which have inadequately developed local and national systems for service delivery (Huston and Moriarty, 2018). Many African nations face the additional challenges of a high rate of population

growth, low tax revenue, weak governance and regulatory systems, all of which hinder progress (Chitonge et al., 2020; Pories et al., 2019).

Increasingly, investments in improving drinking water supply in Africa have focused on strengthening national institutions under government leadership (Huston et al., 2019; SWA, 2010). The Sustainable Development Goal (SDG) agenda, which was set in 2016, embraces national systems building through its 169 targets for 2030; national systems building is seen as the foundation for progress, as demonstrated by the emphasis on economic and institutional development as being core to social and technological progress (WHO and UNICEF, 2017). Sustainable Development Goal 6 sets 2030 as the target for achieving safely managed water and sanitation services for all.

The metrics for evaluating drinking water services delivery are largely agreed as being quality, quantity and availability; however, the means of achieving these targets and the models for planning, provision and maintenance often remain unclear (Moriarty et al., 2013). In theory, drinking water service delivery models in a country are each supported by a legal and regulatory framework and a clear set of roles and responsibilities for actors throughout the service delivery lifecycle (Bey et al., 2014; Huston and Moriarty, 2018); in practice, the range of the various service delivery models remains poorly defined, unregulated and ad hoc (World Bank, 2017).

Community management is the predominant service delivery model for water supply in rural sub-Saharan Africa while in cities a utility model mainly prevails (Adams et al., 2019; Chowns, 2015). As demographics, livelihoods and environmental conditions shift, this bifurcated approach is thrown into question, particularly with regard to rural water supply (Hope et al., 2020; Whaley and Cleaver, 2017). Population densification is making the boundary between urban and rural increasingly ambiguous and is causing a shift in the range of applicability of different models. International actors such as external support agencies or international charities often introduce new models that may not have legal grounding in the country or fit the social context (Whaley and Cleaver, 2017). The implemented services can become a patchwork of overlapping systems, contested mandates, and competing models of service delivery, with starkly different levels of service being delivered within a single geographic area; furthermore, there is a risk that marginalised populations will be neglected if they do not fit any of the models.

We hypothesise that in order to achieve universal access to services, as is called for in SDG 6, there is a requirement for a clear understanding of the range, scope and appropriateness of existing and potential service delivery models in a given context. The vision must detail how the models fit together and must ensure that they collectively provide appropriate services to all. This vision and understanding will allow the sector to progressively improve performance through the modification of existing models or, as required, the introduction of new ones.

This research focuses on Uganda – using Kabarole as a case district – to study the changing landscape of service delivery and assess the ability of the current service models to meet the changing needs of the population. Since the 1990s, with its progressive decentralisation and institutional restructuring, Uganda has been a notable example of a systematic government-driven approach to potable water service delivery (Sinclair, 2004; WHO and UNICEF, 2008). Its population, however, has doubled since then and, as of 2017, more than half of its 43 million people still do not have access to basic drinking water services (WHO and UNICEF, 2017; World Bank, 2019).

In Kabarole, with national-level planning, the regional and national utilities are expanding into rural areas in which community managed facilities are the status quo. Our objective was to assess the implications of this transition for the achievement of universal drinking water services. We analysed the performance and likelihood of sustainability of each service delivery model and assessed the implications of the availability of a mix of models in a single geographic area. We aimed to improve understanding of the situation in Kabarole in order to support district-level planning, provide insights on the decentralised

implementation of national policies in Uganda, and inform wider debates about how water services could be more effectively provided in low-income countries.

THE UGANDAN CONTEXT

Uganda's growing population is young, with 47% under 14 years; it is rapidly densifying and urbanising, though it is still 76% rural. Its overall 3.3% growth rate (5.7% in urban areas) means that its current population of 42.7 million is expected to reach 100 million by 2050. It is in this context that the country's water service delivery needs are evolving (CIA, 2017; World Bank, 2019). While the percentage of the population living in poverty has decreased to 21.4%, per capita gross domestic product (GDP) has also declined since 2015 to its current level of US$1807 (in purchasing power parity) (World Bank, 2019), with an estimated 72% of the population relying on subsistence agriculture (FAO, 2018). Urbanisation and modernisation in cities and small towns, in parallel with the persistence of rural subsistence livelihoods, suggests the need for a diversity of models for public services within the boundaries of a single district.

The Government of Uganda and the Ministry of Water and Environment (MWE) maintain an ambitious set of objectives which includes dynamic sector learning platforms and an annual joint sector review (Eyatu, 2019). The Government of Uganda's Third National Development Plan (2020/21-2024/25) sets targets[1] for increasing access to water supply from 75% to 85% in rural areas and from 74% to 100% in urban areas (National Planning Authority, 2020), with a 2040 vision to achieve 100% access to piped water supply (compared to a baseline of 21% in 2017) (National Planning Authority, 2013). Following the definitions of the WHO's Joint Monitoring Programme (JMP),[2] approximately 81% of the population has access to an improved water source, with 42% meeting the standard for 'basic access', 32% having 'limited access', and a further 7% having 'safely managed' water access (WHO and UNICEF, 2017).

The sector is strongly influenced by international actors and external aid; these have financed sector strengthening and have influenced the choice of service delivery models and the setting of priorities (Danida, 2019). The presence of external NGOs, particularly in the rural sphere, means that a significant portion of the investment in the sector is done 'off budget' and does not go through Ministry of Water and Environment (MWE) or Government of Uganda planning and budgeting systems; these external NGOs thus contribute to service delivery outcomes but do not not contribute to maintenance and development in the same way as do nationally budgeted investments.

Drinking water systems in Uganda

The MWE regularly reviews and adapts sector guidelines, policy, and monitoring frameworks in an effort to overcome the challenges in service quality and reach; in doing so, it shows both leadership and responsiveness to the influence of the external actors who provide financial support to the sector (Danida, 2019). A Community Based Management System (CBMS) model has been institutionalised since 1986, whereby the District Local Government is the authority for planning and implementation of new supplies and is responsible for providing backup support to communities (Kiwanuka and Sentumbwe, 2015). Despite its ubiquitousness, the model is poorly implemented throughout most of the country and has been called a "blueprint for breakdown" for its poor performance in operations and maintenance services (van den Broek and Brown, 2015). In 2019, a new framework for rural water supply operations and maintenance was developed, which outlined reforms to community management; it is being rolled out in 2020/21 (MWE, 2019a).

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[1] Government of Uganda targets are based on increasing access to an improved water source, which is defined as one that is physically protected from contamination.

[2] The Joint Monitoring Programme of the WHO distinguishes three levels of service possible from an improved (uncontaminated) water source: 'limited access' when water is available at more than 30 minutes round trip from the home, 'basic access' when available at less than 30 minutes, and 'safely managed access' when water is available as needed on the user's premises (WHO and UNICEF, 2017).

There are two main utility service providers in Uganda: the National Water and Sewerage Corporation ('National Water'), and six regional utilities called Umbrella Authorities for Water and Sanitation ('Umbrellas') that were formed in 2016. The Umbrellas were created from existing Umbrella Organisations, which played a support role to larger community managed schemes (MWE, 2017). The establishment of the Umbrellas as utilities and an expanded mandate for National Water to serve small towns and rural growth centres (Amayo, 2018) have led to an intensified pursuit of piped water coverage by utilities in rural areas. Many of the small schemes that were previously managed using CBMS have been gazetted (legally transferred) to the Umbrellas, leading to a consolidation of service provision under a smaller number of larger operators. In addition, private sector participation in small town water supply has been encouraged, though this is mostly limited to small-scale contracting for operations and maintenance tasks (Hirn, 2013; Magara et al., 2018).

An estimated 19% of the Ugandan population does not access an improved water source; instead they access surface or ground water directly or purchase water from a local vendor or neighbour (WHO and UNICEF, 2017). Some households and small groups take steps to provide water for themselves in what is known as self-supply (Sutton and Butterworth, 2021; in Uganda, self-supply ranges from very basic (fetching surface water with a bucket) to fairly sophisticated (hand-dug protected wells or rainwater harvesting), the latter being classified as an improved source (Carter et al., 2005). The Government of Uganda does not actively support self-supply, but it is recognised as an option (MWE, 2013).

**Key roles in service provision**

In Uganda, the MWE (Figure 1) is responsible for setting national policies, standards and priorities, and for monitoring and regulation of the drinking water and sanitation sector (Eyatu, 2019). It is designated as the owner of all public water supply assets in the country, though this is at times still debated for schemes that are constructed without ministry financing, such as community point sources developed by international actors, independent politicians, or by the communities themselves (MWE, 2013).

Under decentralisation, the District Local Government (the 'District') is the delegated service authority responsible for planning and coordination, and for ensuring that drinking water services meet standards within its boundary (Government of Uganda, 1997a; Government of Uganda, 1997b; MWE, 2013). The exception to this is in cities and towns, where drinking water services are gazetted to the authority of the utilities by the MWE. In areas not covered by utilities, Districts delegate most functions of service provision to community management structures, although these structures are given little or no resources, back-up or training to perform this role.

To date, there is no independent regulator in Uganda; this has been recognised as an impediment to improving sector performance (MWE and WURD, 2018). The regulatory function is currently fulfilled by the Urban Water Department within the MWE, with a vision to build capacity and eventually establish an independent body. A new department and interim strategy for water utility regulation was established in 2018 and is due for updating in 2021 (Kabirizi, 2018; MWE, 2018). At the district level and for rural services, District Water and Sanitation Coordination Committees are multistakeholder platforms in which civil society organisations and/or subdistrict and district officials can register complaints and hold service providers accountable for performance (Magara et al., 2018).

Ten deconcentrated arms of the MWE, called Technical Support Units (TSUs), provide technical support to communities, to all 134 districts in Uganda, and to utilities (Figure 1). Initially set up as temporary structures to support decentralisation, TSUs play a key role in supporting sector actors and as liaisons with the MWE (Quin et al., 2011; MWE, 2019a). In addition to TSUs, water basin authorities typically span several districts (Water Management Zones) and are responsible for overall coordination and control of water resources management.

Figure 1. Uganda water and environment sector institutional framework.
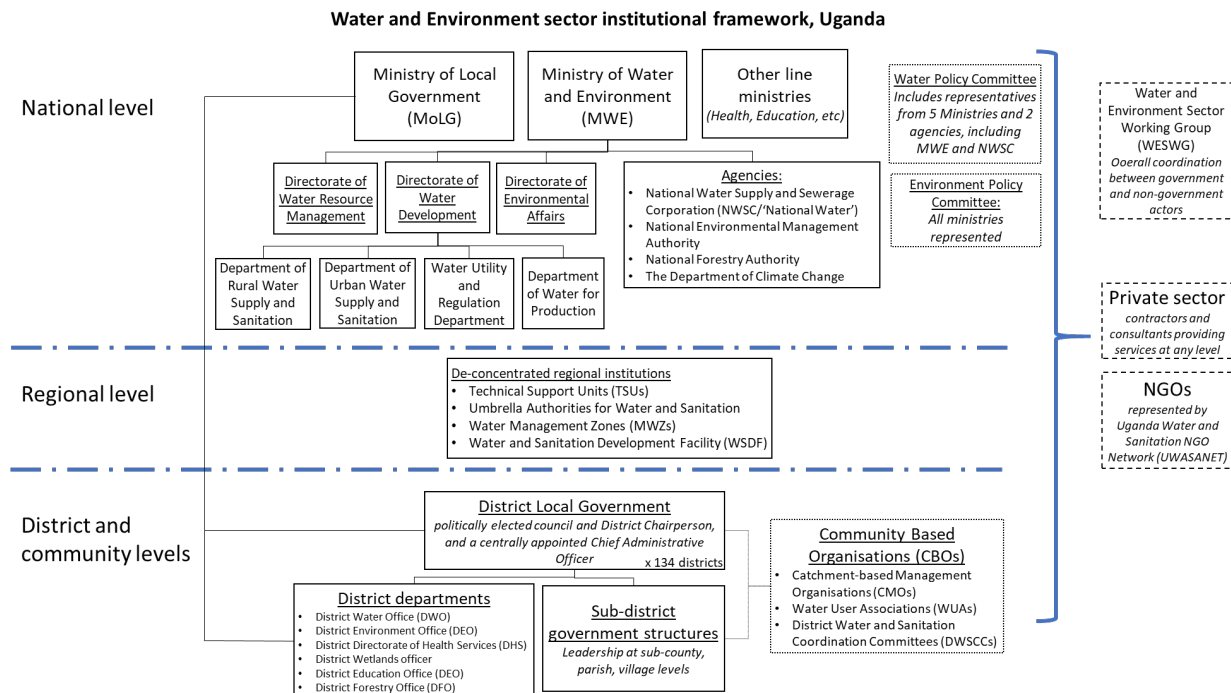
Source: Adapted from Lockwood et al. (2018).

Case study context: Kabarole District

Kabarole is a mountainous district in western Uganda with naturally abundant fresh surface and ground water; it has a land area of 1814 km^2 and, in 2019, it had an estimated population of 341,000 (World Bank, 2019). It experiences two annual rainfall periods, and many climate change projections for East Africa anticipate an increase in precipitation and rainfall and a decrease in severity of drought in the coming decades (Kisakye et al., 2018).

Kabarole has one urban municipality (Fort Portal Town, with a population of 61,000), four urban town councils (total population 46,000) and 11 rural sub-counties (total population 233,000) (Figure 2); Fort Portal Municipality and town councils are zoned as urban, while sub-counties are zoned as rural. Kabarole District Council is primarily responsible for town councils and sub-counties, while Fort Portal Municipality has an independent governance structure.

National data show that the rate of access to improved water sources for residents of Kabarole is above the national average (80% in Kabarole compared to 68% nationally), and the functionality of water schemes is reported as approximately average (82% in Kabarole compared to 85% nationally) (MWE, 2019c); the national data base, however, may overestimate coverage and functionality due to the low frequency of updating and the inclusion of decommissioned water points as active. The main drinking water sources are gravity flow schemes, shallow wells, protected springs and unprotected surface water sources.

The diversity of the landscape and the service delivery approaches in Kabarole District make it well suited for studying the service delivery landscape in Uganda; a strong network of stakeholders – connected in a learning alliance – also makes it a good environment in which to develop improved planning approaches. District stakeholders have developed the Kabarole WASH Masterplan 2018-2030

(Kabarole District Council, 2018), which sets out a vision and framework for the universal provision of Water, Sanitation and Hygiene (WASH) services within the district by 2030.

Figure 2. Kabarole District sub-counties and town councils and the Fort Portal Municipality.
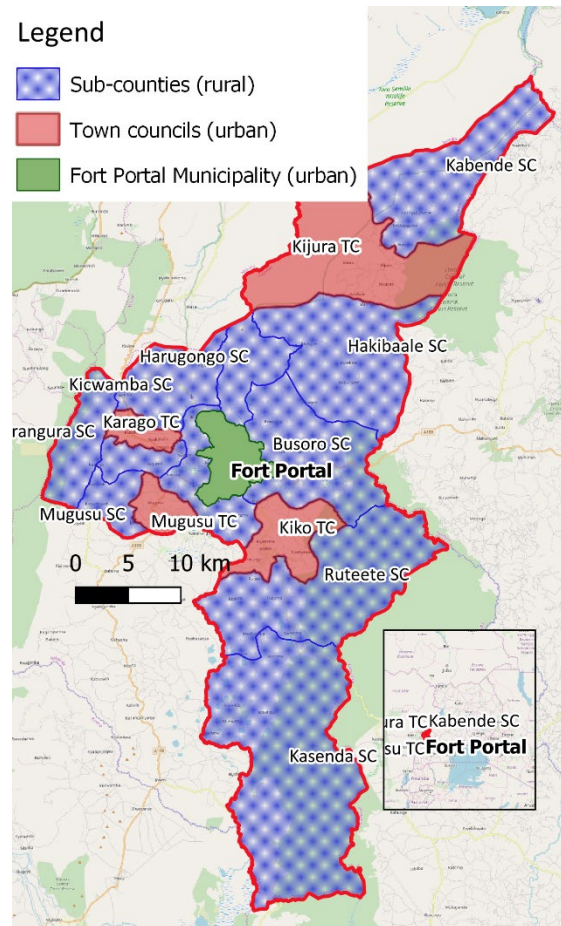
Source: Authors

METHODOLOGY

This research was implemented using mixed methods, in a participatory action research methodology (Feilzer, 2010) that worked closely with a learning alliance (Bogdan and Biklen, 1997; Darteh et al., 2019) composed of 26 district-level WASH stakeholders.[3] The authors are part of IRC (an international and Ugandan NGO) and McGill University, Canada. This research is part of IRC's wider efforts to improve WASH systems in Kabarole and Uganda.

The service delivery system in Kabarole was assessed through an analysis of the services provided (infrastructure study), the level of services received (household and user surveys), and performance of the service delivery models (mixed methods). As some factors affecting service delivery exist beyond the district's boundary, the national-level governance and sector framework in Uganda were also considered using policy and document review, interviews, and multistakeholder workshops.

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[3] The learning alliance included technical and political leaders, NGOs, health extension workers, handpump mechanics, and representatives from the water, health and education offices in Kabarole, some of whom were also interviewed as key informants.

As facilitators of the learning alliance, IRC maintained a dual role as researcher and change agent, focusing on the systematic analysis and use of information to promote *social learning* (Waterson, 2000)*,* improved coordination, and joint planning among stakeholders. Research was collaborative and learning alliance members including the district engineer, handpump mechanics, and public health workers contributed to the design of interviews, surveys and workshops, and to the overall research strategy and analytical approach.

Methods

In 2017 and 2019, service level and asset assessments were undertaken. Research methods were chosen to enable the identification of the service delivery models and the analysis of their performance according to criteria for functionality, reliability, accessibility, affordability, and level of satisfaction of users.
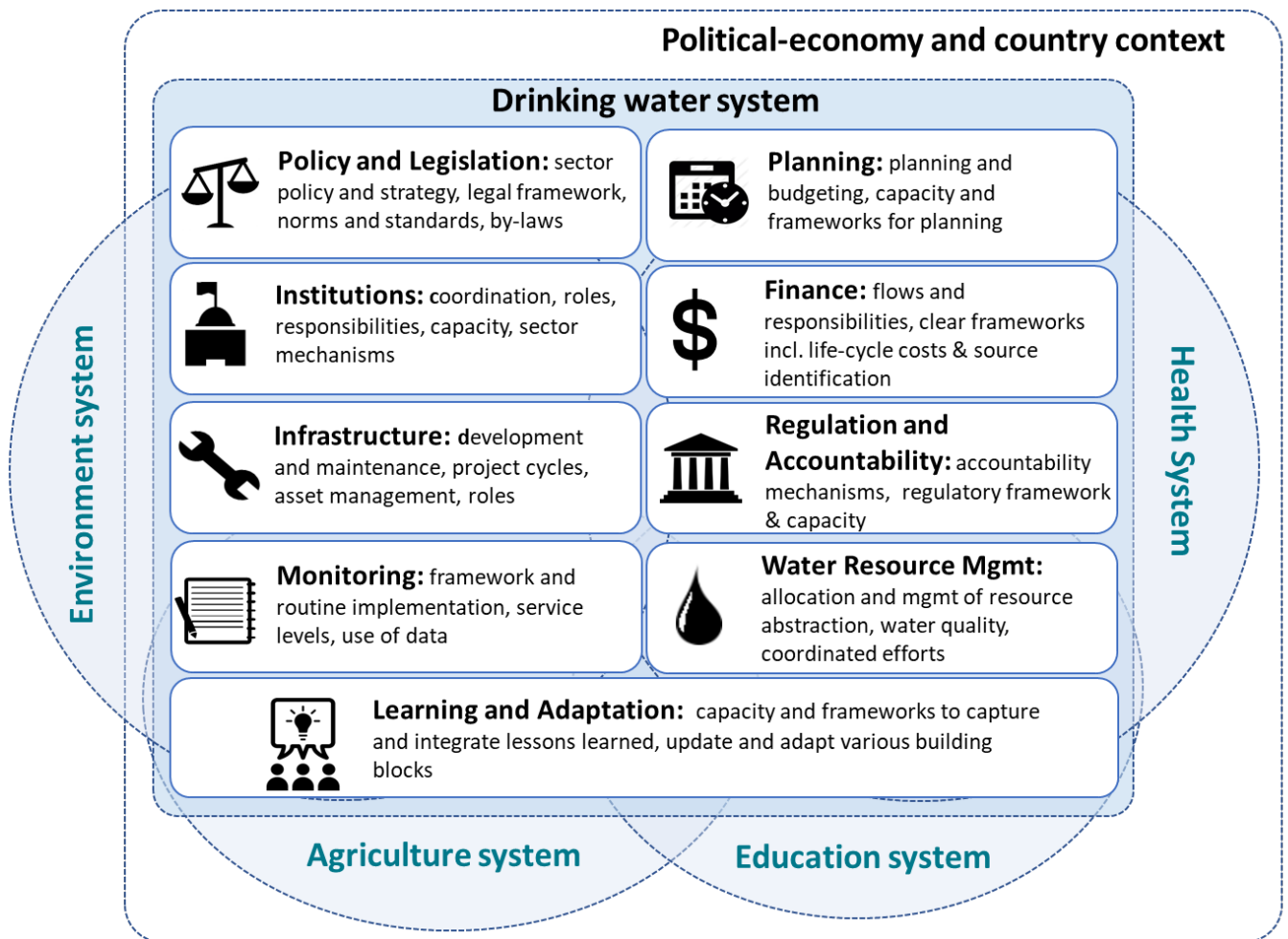
The type and quality of services provided was analysed through an infrastructure survey conducted in 2017 and 2019. Information on the construction, age and condition of infrastructure and on its operation, payment and management was obtained through a census of improved water point facilities (tap stands, deep boreholes, shallow wells, protected springs, rainwater harvesting tanks). A total of 1077 improved water points were mapped in the 2017 census and 1118 in the 2019 census. In 2019, the main components of all 12 piped schemes in the district were also mapped (sources/catchments, reservoirs, pumping stations, treatment infrastructure, break-pressure tanks). The study focused on the performance and supply outside of Fort Portal Municipality, since our aim was to analyse the changing rural landscape in which multiple models (National Water, the Umbrella, and community management) coincide. A Geographical Information System was used to map facility infrastructure and study changing service delivery patterns.

In 2017 and 2019, the overall level of services received was assessed using a household survey that was based on the SDG definitions and methodology (Adank et al., 2018; WHO and UNICEF, 2017). Three-stage stratified random sampling (proportional to the population) was applied at the urban/rural sub-county, parish, and village levels; 2289 households were sampled in 2017 and 756 households in 2019 (for a 95% confidence interval of 2% and 3.5%, respectively). In order to be assured that both methods produced the same results within the margin of error, the household survey results for service levels were triangulated with the infrastructure data by calculating access rates based on a standard number of users per facility.

To complement the quantitative study, we used a review of national sector documents (N = 27), grey and academic literature from Uganda and Kabarole District (N = 61), participant observation, and direct facilitation of district stakeholder workshops (N = 13), national stakeholder meetings (N = 2), and structured and semi-structured key informant interviews (N = 18). Data were coded according to the nine building blocks for drinking water systems in the framework of Huston and Moriarty, 2018: policy and legislation, institutions, infrastructure development and maintenance, planning, monitoring, regulation and accountability, finance, water resource management, and learning and adaptation (Figure 3).

Each service delivery model was assessed against an analytical framework of normative benchmarks for each of the nine building blocks. The framework, presented in Huston and Moriarty (2018) and in Huston et al. (forthcoming), is based on evidence about the factors influencing rural water sustainability and on a previous study of rural water service delivery models in 16 countries (Smits and Lockwood, 2011; World Bank, 2017). The benchmarks were assessed on a Likert Scale (Table 1) and the scores were added to produce a heat map (Figure 8).

Figure 3. A conceptual framework for the drinking water system.

Political-economy and country context

Drinking water system

Policy and Legislation: sector policy and strategy, legal framework, norms and standards, by-laws

Planning: planning and budgeting, capacity and frameworks for planning

Institutions: coordination, roles, responsibilities, capacity, sector mechanisms

Finance: flows and responsibilities, clear frameworks incl. life-cycle costs & source identification

Infrastructure: development and maintenance, project cycles, asset management, roles

Regulation and Accountability: accountability mechanisms, regulatory framework & capacity

Monitoring: framework and routine implementation, service levels, use of data

Water Resource Mgmt: allocation and mgmt of resource abstraction, water quality, coordinated efforts

Learning and Adaptation: capacity and frameworks to capture and integrate lessons learned, update and adapt various building blocks

Environment system

Health System

Agriculture system

Education system

Source: Adapted from Huston and Moriarty (2018).

Table 1. An example of building block scoring statements from the 'regulation and accountability' building block.

Building block	Main subcomponents	Example criteria for benchmarks (each statement scored on a scale of 1 to 5)
Regulation and accountability	Accountability mechanisms, regulatory framework, and capacity	• A regulator for services exists or regulatory functions are delegated to subnational institutions (e.g. through contracts). It is defined who is responsible for paying capital expenditure (CapEx) and capital maintenance expenditure (CapManEx). • The entity equipped with regulatory functions sets 1) tariff regulations and tariff calculation guidelines; 2) service level requirements; and, 3) rules that protect consumers. • The entity equipped with regulatory functions uses monitoring data to guide performance management and apply effective enforcement (incentives, penalties) in the three areas of regulation. • A mechanism is in place for citizens (civil service organisations) to hold service providers to account.

The analysis was iterative and participatory; both raw and analysed data from the household and infrastructure surveys were presented for discussion with learning alliance members including representatives from the District Water Office and the MWE Technical Support Unit, and service providers. The initial results from the benchmark assessment and service level assessments were used to compare the models, to stimulate critical feedback, and to draw out further insight on stakeholder perceptions and on experiences with the models in Kabarole.

RESULTS

We first present the key findings from the national-level assessment in order to frame the detailed analysis of Kabarole District; we then present a summary of results from the service delivery assessment in Kabarole District, followed by an analysis of the service delivery models.

Consolidation of service providers and expansion of utility provision

Traditionally, Uganda saw a clear demarcation between rural and urban areas, with urban areas served by utilities and rural areas by various forms of community management. In rural Uganda, however, there has recently been a clear national trend towards the expansion of utilities and consolidation of service providers. This process of consolidation began in the early 2000s when the previously uncoordinated network of community management groups and small providers were federated through membership in Umbrella Organisations, which offered structured support. A second phase began in 2016 when the Umbrella Organisations were granted service authority status and began taking over direct management of existing piped schemes; the aim was to eventually consolidate all schemes in small towns and rural growth centres under the six Umbrella Authorities for Water and Sanitation (Umbrellas) (MWE, 2017). As of August 2018, a total of 434 piped schemes in Uganda, previously under community management, have been gazetted to the Umbrellas. The aim of this consolidation is to improve financial and service delivery performance – and thus sustainability – through improved cost recovery (improved tariff collection) and more professional management.

The National Water and Sewerage Corporation (National Water) is also undertaking rapid expansion through extending its piped networks and taking over management of existing schemes. National Water, a public parastatal, has been providing domestic water in large cities in Uganda since 1972 and has embraced reforms to progressively improve performance over the past two decades (Schwartz, 2008; Muhairwe, 2009; Amayo, 2018). In 2016, National Water received a mandate to provide services to small towns and rural growth centres (NWSC, 2019); as a result, it has gone from serving 23 towns in 2013 to serving 253 towns in 2019 (MWE and NWSC, 2017; NWSC, 2019). This rapid growth has in part been fuelled by the 100% Service Coverage Acceleration Project (SCAP100), which, between 2017 and 2020, provided financing for 140,000 new household water connections and 20,000 public standpipes (PSPs) in over 12,000 Ugandan villages (21% of the total villages).

The centrally led shift towards utilities and their expansion into rural areas means it is increasingly common to have multiple service delivery models present in a single administrative area. In a series of national dialogues between 2017 and 2019, stakeholders discussed if and how the new Umbrellas, the expanding National Water, and the District Local Governments (and their delegated community management structures) could co-exist and cooperate to achieve the National Vision 2040 goal of piped water supply to all households (National Planning Authority, 2013; MWE, 2017). In 2018, a new department was formed and an interim strategy for water utility regulation was released to help direct utility cooperation (Kabirizi, 2018; MWE, 2018); in 2019, a new National Framework for Operation and Maintenance of Rural Water Infrastructure in Uganda was launched, which aims to improve community management while introducing a more consolidated approach to operation and maintenance (MWE, 2019b).

Water service delivery in Kabarole

Both national-level changes and persistent sector challenges can be observed in Kabarole District. Figure 4 shows the relative proportion of the population accessing limited, basic, and safely managed services (as per JMP definitions), based on household surveys in Kabarole in 2017 and 2019. The situation has improved slightly since 2019 due to an increase in household connections to piped networks, shown in Figure 4 as 'safely managed services'. An improved community water point was reported by 55% of sampled households as being their primary source of water, but only 31% of these could fetch water within a 30-minute round trip (the minimum benchmark for basic access). A total of 33% of households reported using unimproved sources as their primary drinking water source, and about half of these households reported boiling the water prior to consumption.

Services in Kabarole are delivered by five different models, each having several variants (Figure 5); these models are classified in terms of their procurement process, technology type, intended service level, payment mechanisms, and maintenance model (maintenance model definitions are from Lockwood, 2019). There are two versions of utility management, National Water and the Umbrellas, with the Mid-Western Umbrella of Water and Sanitation as the Umbrella present; there are also two versions of community management, Water Source Committees (WSCs) and Water Supply and Sanitation Boards (WSSBs); and there are several variants of self-supply.

Figure 4. Service levels in Kabarole in 2017 and 2019.
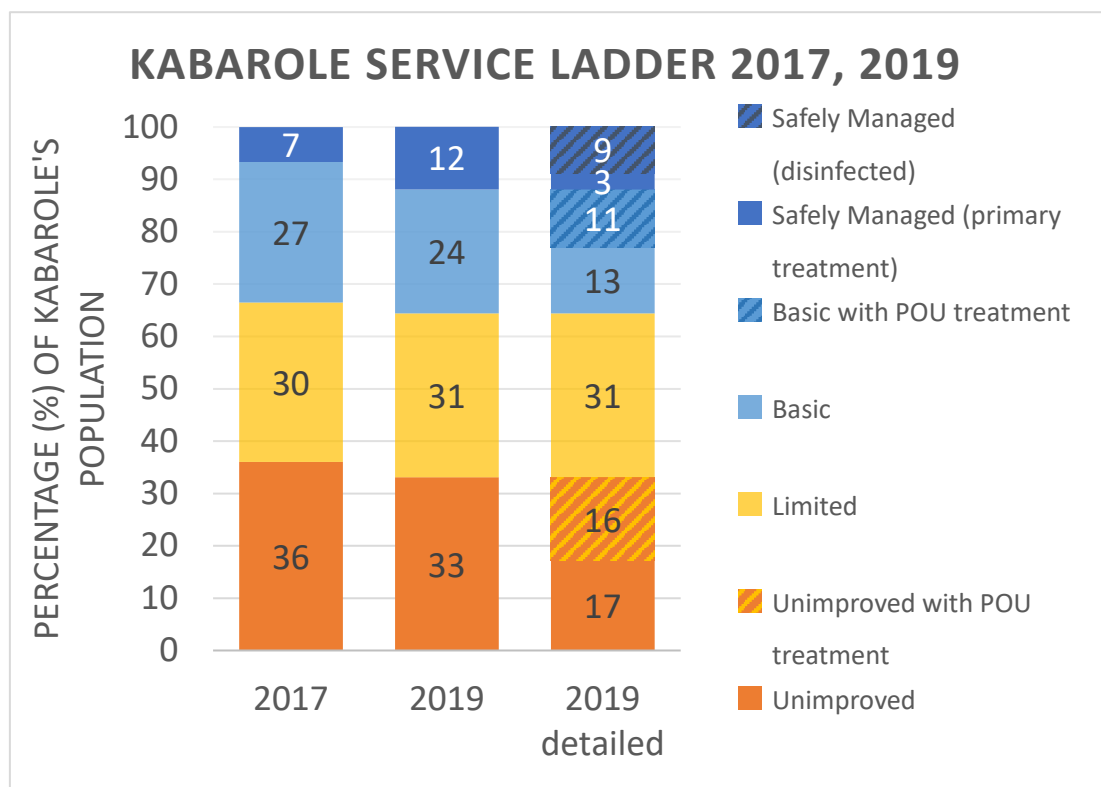
Note: POU = Point-of-use, that is, treatment at the household level (assessed through self-reporting).

Figure 4 uses modified indicators that are based on the JMP definitions for the SDGs. Piped water services in households were assumed to be safely managed; notably, only National Water provides disinfection in the form of chlorination, while the Umbrella and CBMS piped networks provide only primary treatment in the form of a settling tank.

Figure 5. Domestic water service delivery models in Kabarole, with blue lines showing all possible variants.
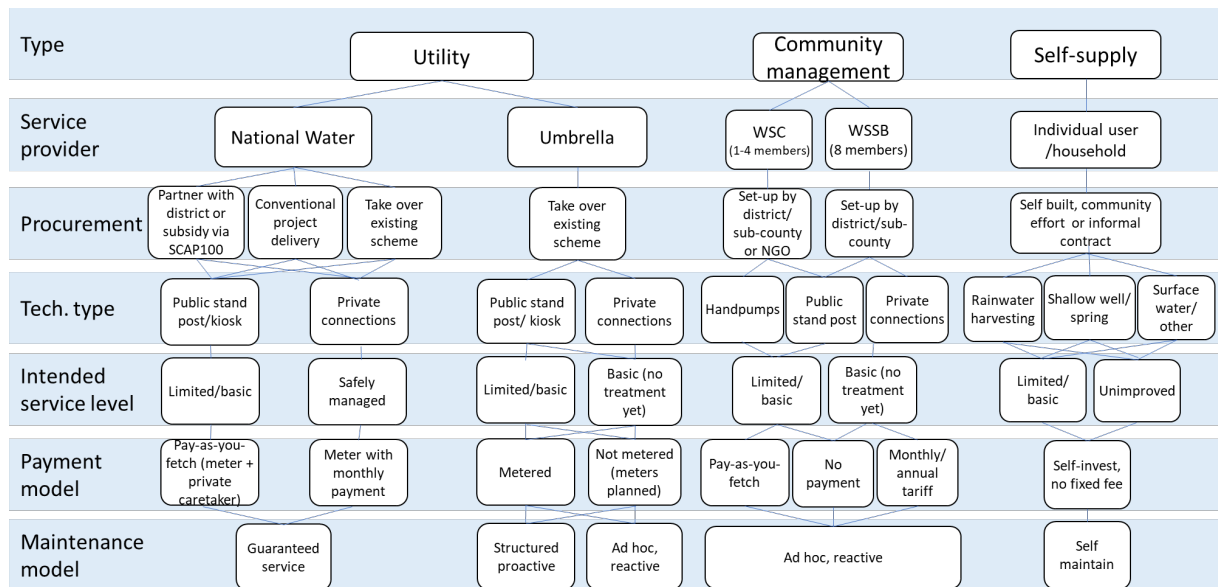
Note: Intended service levels are according to JMP definitions for limited, basic, and safely managed water access (WHO and UNICEF, 2017); private connections on premises are only considered safely managed when water is guaranteed to be treated and free from microbiological and priority chemical contamination; maintenance model definitions are from Lockwood, 2019.

Utility models

National Water is the sole provider for the 61,000 residents of Fort Portal Municipality and for an estimated 31,700 people (11%) in the sub-counties and town councils of the greater Kabarole District; water is provided through a combination of private connections and public standpipes (PSPs). The Umbrella utility manages three schemes, all originally developed under community management; they serve an estimated 14,000 people (4%) through a combination of PSPs, private connections and institutional connections. Two large gravity flow schemes were constructed before 2001 and a third solar-powered scheme was constructed in 2018.

The maps in Figure 6 are from 2017 and 2019; they show the significant expansion of the National Water municipal network and the new presence of the Umbrella. Of the 112 National Water PSPs ('taps') outside the municipality, 89 (44%) have been constructed since 2015. Under the MWE's SCAP100 project (2017-2020), 294 villages in greater Kabarole District (of a total of 510) were targeted for National Water service by 2020. Under SCAP100, a village receives two subsidised PSPs (aimed at vulnerable populations), and interested households or businesses nearby can purchase private connections.

Overall, taps managed by National Water had the highest functionality and reliability, showing 75% functionality compared to 49% and 38% for Umbrella and community managed taps; 85% of taps had not broken down in the past year, compared to 21% of Umbrella taps and 31% of community managed taps. On the day of the survey, 61% of National Water taps were functioning at 100% with no detectable issues, whereas only 31% of other taps were functioning to the same degree.

The performance of schemes under the Umbrella model varied significantly; their performance was highly influenced by the schemes' management legacies prior to being gazetted to the Umbrella. The condition of the schemes at the time of transfer to the Umbrella in 2018 ranged from fair to very poor. The schemes were each managed by a branch unit of the Umbrella that worked towards monthly performance targets for functionality, non-revenue water, and bill collection. Umbrella scheme managers

all reported that resource limitations required them to take a modest and gradual approach to improving scheme performance despite documented knowledge of continuity problems.

Figure 6. Maps of Kabarole in 2017 (left) and 2019 (right) showing water points by type and piped schemes according to their management bodies. (Note the expansion of the National Water and Umbrella service areas.)
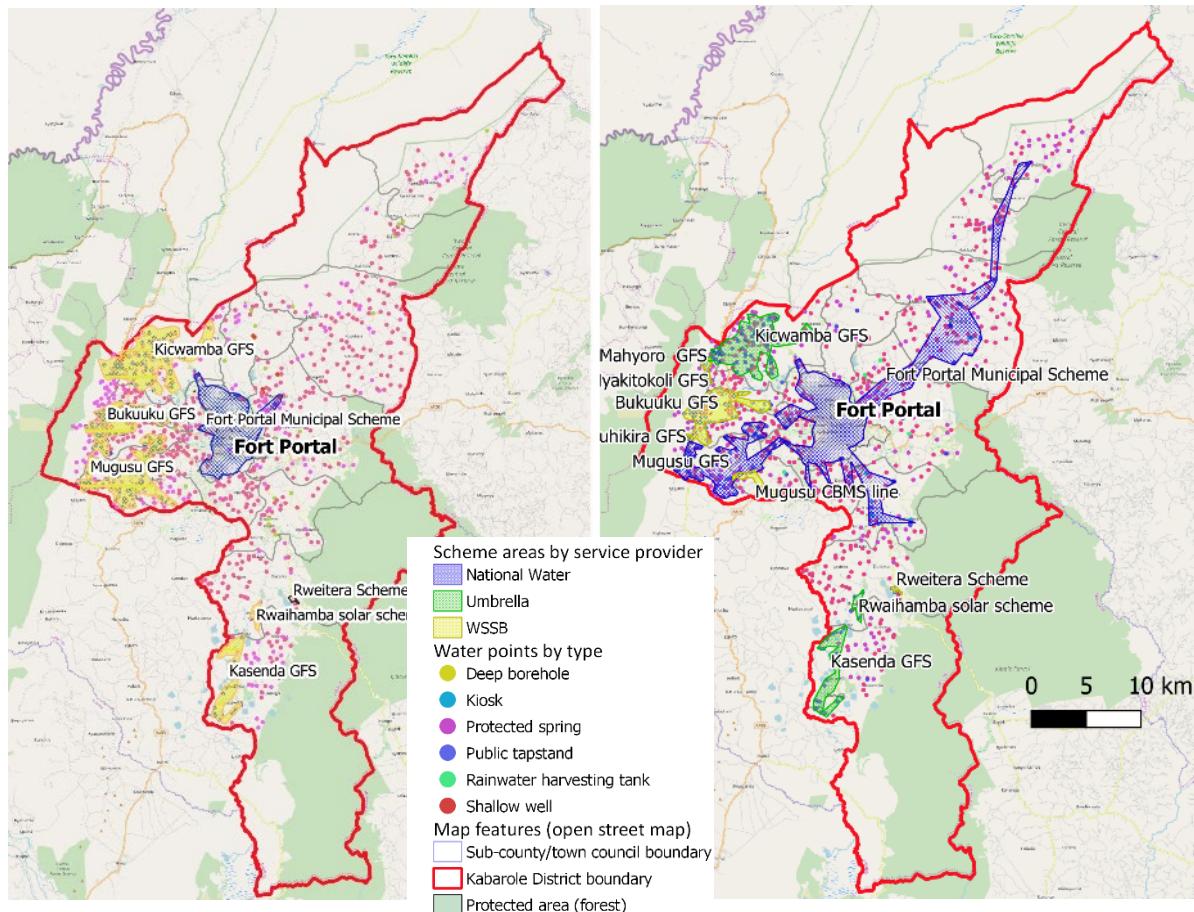
Note: WSSB = Water Supply and Sanitation Board.

Community managed water supply

In 2019, there were 771 water point sources and 135 standpipes under community management, serving an estimated 198,000 people (58% of the total population). Historically, these facilities received all their capital investments from the District's annual budget and constituted the sole means of supply in rural areas. They are a mix of small gravity flow schemes, protected springs, shallow wells (hand dug, less than 15 metres deep) and deep boreholes (drilled, deeper than 15 metres); shallow wells dominated until 2018, when the MWE stopped funding their construction due to concerns about safety and seasonality. The type and functionality of community managed water sources in Kabarole is shown in Figure 7. Many households reported using multiple sources, including a mix of PSPs, community supplies, and unimproved sources.

All water points developed by the District are gazetted for management by Water Source Committees (WSCs); in practice, however, WSCs are not in place for most water points. Of the 771 surveyed water points in 2019, only 210 (27%) had active WSCs and only 92 (12%) had WSCs that had organised maintenance in the past 12 months. Only 39 WSCs (5%) reported having a bank account, despite this

being listed in the MWE's District Implementation Manual as a requirement for WSCs (MWE, 2013). Only 38 out of the existing 210 WSCs in Kabarole reported receiving support, training, or advice from the government in the past 12 months; even so, 547 of the 771 water point operators (76%) reported that a WSC "had been established" and 301 reported having "received training" at some point.

Water Supply and Sanitation Boards (WSSBs) are community structures for managing piped schemes; they have a total of eight members, typically including active and retired public servants who have been selected based on their perceived capacity for management. In Kabarole, seven schemes had been constructed by the District and were intended for management by WSSBs, however our survey found only one WSSB actively managing a scheme. During the two years of this study, the active WSSB was being supported by IRC (independent of this research) as part of a pilot to improve management. Of three schemes constructed by the District between 2017 and 2019, none had an established WSSB; the schemes were also largely non-operational due to disagreements or problems between the District and lower local governments related to design specifications. A fourth scheme, a gravity flow scheme constructed by an NGO in 2017, was being managed by the community in an ad hoc manner, in the absence of a formalised WSSB. Three other schemes did have operational WSSBs but had been gazetted for utility management, leaving the former WSSB with a limited role.

Figure 7. The type and functionality of community managed sources in Kabarole (2019).
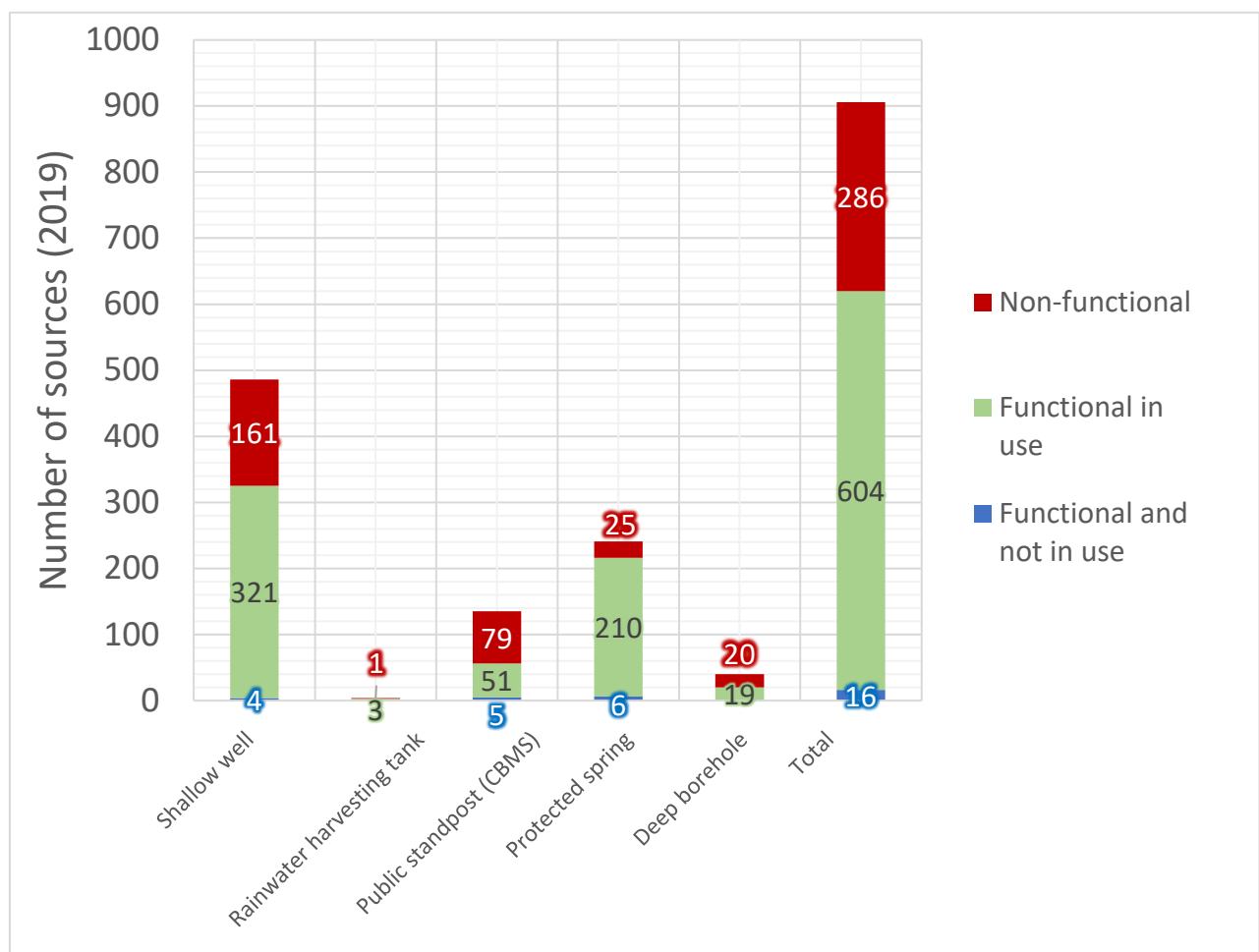
Note: CBMS = Community Based Management System.

Self-supply and unserved households

An unimproved water source was reported by 31% of households to be their primary drinking water option, with the majority reporting that they had no secondary source or alternative options; these households were clustered in specific villages or parishes having a low number of improved supply options. Compared to other households in the district, households using unimproved water were significantly less satisfied with their drinking water situation in terms of distance to source, quality of water, quantity of supply, and overall management.

The term self-supply, as it is used in the literature (for example, Sutton and Butterworth, 2021), normally applies when households make some sort of investment in improving the convenience or safety of their water source. In Kabarole, nearly half of the households using unimproved sources (48%) reported always treating the water prior to consumption, suggesting that many households may be willing or able to invest in improved and safer self-supply options. To date, Kabarole District has not systematically supported or invested in improving self-supply. There may be some households using improved self-supply options, however our household survey results suggest that the majority were using unprotected shallow or surface water sources.

Service delivery systems analysis

When analysed against the nine building blocks for service delivery systems, the National Water model performed the highest, followed by the Umbrella model, with community management and self-supply coming last. The summary results are shown in the heat map in Figure 8, where green indicates that the corresponding building block is well developed and in place, yellow indicates that it is developed but not well applied, and red indicates that the building block is not clearly defined or is non-existent.

The National Water model scored high or very high against 67% of the benchmarks; the indicators that scored low were those for monitoring, data management, and regulation. The policies, roles and practices for National Water are clearly defined and adhered to, however its recent expansion into rural areas that are under the jurisdiction of District Local Governments brings uncertainty with regard to regulation. National Water technically remains accountable to the MWE at the national level but has no legal or regulatory relationship with District Local Governments (MWE and WURD, 2018); this has the potential to create confusion or even conflict with the local officials who are generally responsible for ensuring access within the District's boundaries.

In terms of benchmarks, the Umbrella model scored high or very high for 26%, medium for 41%, and low for 31%. The low and high scores were distributed across the different categories, demonstrating both positive attributes and shortcomings in many categories. Several of the problems with the model were associated with the service authority roles, suggesting that the system for supervision, support and regulation of the Umbrella utility is underdeveloped. Given that the model in its current form is less than five years old, the Umbrella model has had less time to develop and adapt than the National Water model; this may help to explain the poorer development of key building blocks.

Despite over 30 years of iterations for improvement of the community management model in Uganda, both the WSC and the WSSB models received medium or lower scores for over 74% of the benchmarks and scored either low or very low for 33% and 60% of benchmarks, respectively. The highest-scoring categories were legislation and planning, both of which reflect national frameworks more than the decentralised implementation of the model. Monitoring, finance and regulation were weak, as were benchmarks for service provider performance and capacity.

Self-supply scored lowest overall as a service delivery model in Kabarole, as it has not been supported by the District nor promoted by the Central Government. The relative prevalence of self-supply in Kabarole, in part due to the availability of shallow and surface water sources, suggests that the model should be either invested in to improve its safety and regulation, or structurally phased out if it is deemed unfit.

Figure 8. The results of the service delivery assessment for each service delivery model in Kabarole; the bottom row shows the overall score for each building block.

Note: Dark green (a score of 5) indicates that the building block component is in place and is functioning as intended; light green (a score of 4) indicates that a building block is in place and usually functioning as intended; orange (a score of 3) indicates that a building block is in place but not functioning as intended; yellow (a score of 2) indicates that a building block is not in place or is poorly developed; and red (a score of 1) indicates that a building block is not at all developed; white indicates no data or that the building block criterion is not applicable. WSSB = Water Supply and Sewerage Board; WSC = Water Source Committee.

DISCUSSION

The mixing of service delivery models across the urban – rural spectrum in Kabarole make it a good case for studying the wider changes taking place in Uganda. Rising service levels with an increasing number of private utility connections were observed while, at the same time, a large portion of the population is still unreached by any level of improved community facility or relies on a community managed source with ad hoc management and poor reliability.

Towards better performance with consolidation of service providers

The gazetting of community managed piped schemes to the Umbrella and the expansion of National Water to cover small towns and villages reflects a trend of consolidation and professionalisation of service providers. Consolidation in potable water supply has been documented as an important phase of sector maturation in the Netherlands (Zetland and Colenbrander, 2018), the United States (Goodwin and Doeksen, 1984; US Water Alliance and UNC, 2019), France (Franceys, 2019), and India (Hutchings et al., 2017). Proponents suggest it can help access economies of scale and reduce human capacity requirements for water management at local levels (Franceys, 2019; Hope et al., 2020; McNicholl et al., 2019). The Umbrella, while only four years into its role as a utility, has the mandate to take over all piped schemes outside of those gazetted to National Water. It is too soon to tell whether it will have the capacity to deliver this mandate and whether it will result in a significant improvement to the performance of those schemes as compared to performance under community management.

A form of consolidation has recently been planned for point-source management in Uganda. The new National Framework for Operation and Maintenance of Rural Water Infrastructure in Uganda, launched in late 2019, followed upon a series of dialogues about the challenges under the country's current model. The proposed new model, called Community Based Management System Plus (CBMS+), aims to reduce the burden on community volunteers and to professionalise maintenance by transferring responsibility from Water Source Committees to a smaller number of contracted Area Service Providers; under this model, each Area Service Provider would provide maintenance services to all water points within a given geographic area (MWE, 2019b). This transfer of responsibility away from the unsupported community appears appropriate to address the persistent challenges of community management that are documented in this research and elsewhere (van den Broek and Brown, 2015; Chowns, 2015; Hope, 2015).

The proposed CBMS+ model builds on a proof of concept that has been developed in other parts of Uganda (Harvey, 2017) and in Kenya (Goodall and Katilu, 2016). The approach can incentivise rapid and preventative maintenance while increasing access to economies of scale by having a single provider with a performance contract for an entire area (MWE, 2019b; McNicholl et al., 2020). A subsidy mechanism can be built in to the contract between the Area Service Provider and local government in order to ensure services for those who cannot afford the tariff. While such approaches have thus far been primarily promoted by internationally affiliated actors at the scale of up to only a few districts, the move towards a nationwide rural utility service approach in Uganda demonstrates a unique promise to implement the approach at scale.

A transition to higher service levels using piped networks requires increased capacity for service providers – for example utilities – but the costs of maintaining this capacity (and staffing) may be met by economic gains within the model (McNicholl et al., 2019). A 2018 study of 14 operational areas in sub-Saharan Africa found that although piped schemes required higher capital costs for initial construction, they were more likely to operate at a positive working ratio (percent of costs recovered through user payments) than point sources, which failed to achieve cost recovery in all cases even when managed under an area service provision model (ibid). Utilities that cover larger areas, either through large piped networks or multiple schemes, are also able to do direct cross-subsidisation from profitable customers in denser easy-to-reach areas to more costly or difficult-to-reach rural customers (Lockwood et al., 2018; Franceys, 2019); still, a mix of both incentives and enforceable policies will be needed to ensure that an expansion of utilities does not leave vulnerable communities and people behind. All main models in Uganda receive public finance, which offers the potential to develop a joined-up multi-institutional public financing strategy.

Generating effective demand

Even if generous public finance can be secured to cover some of the costs, the ability of National Water and the Umbrella to survive in rural areas will depend on their ability to attract and secure paying customers. In line with other findings from Uganda (Bey et al., 2014; Marshall, 2019; Tsimpo and Wodon, 2018), our household survey found that the majority of residents were willing and able to pay for safe, reliable and formalised (albeit subsidised) services. Residents expressed dissatisfaction at paying for low levels of service that are informally managed, as is the case for most community managed services in which no regular meetings or financial records are kept. This matches 2018 findings from Uganda which found supply-side constraints to outweigh demand constraints as a limitation on installing new household connections (Tsimpo and Wodon, 2018). All four National Water managers interviewed for this research indicated that they experienced high effective demand for new (paid) connections, including in rural areas which previously had free water provided at a lower service level.

The presence of multiple service providers with different policies in a single geographic area can lead to frustration when both free-of-charge and paid services are offered in the same community and when there are conflicting messages about the tariff requirements for households. The price per 20 litres[4] of water varies for each provider: 83 UGX (US$0.022) for National Water domestic connections; 25 UGX (US$0.006) for National Water's subsidised public standposts; 94 UGX (US$0.025) for Umbrella domestic connections; and 50-100 UGX (US$0.013-0.027) for community managed water points that charge collection fees. Only the utilities consistently enforce tariff payment, however, and most community sources only collect money when repairs are needed. In 2019, an estimated 38% of households reported paying for water regularly (about half of these being within the municipality of Fort Portal, served by National Water) and another 28% reported making contributions after breakdowns (the mode of reported contributions is 200 UGX (US$0.054)).

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[4] 20 litres is the typical size of a water collection container from communal sources; it is known as a jerry can.

Utility managers emphasised the importance of professionalism, customer service and enforcement capacity in distinguishing themselves from community managed services for which many customers are unwilling to pay. National Water is a known institution with an established brand and has built a reputation with customers by demonstrating the reliability of its services and by taking a customer-centric approach. It uses internal incentive mechanisms to boost branch performance (Mugisha et al., 2007) and, in Kabarole, offers same-day response to complaints, which is made possible by having adequate capital to stock spare parts. National Water also has the technical capacity to enforce payment by cutting off supply in response to non-payment, which forces out non-paying customers and commands respect for bills.

In contrast, the regional Umbrella utilities are low-maturity institutions established in 2016, which have yet to prove themselves as professional utilities that can provide high levels of service. In Kabarole, they have not yet installed meters on all scheme connections. According to interviews with customers and managers in Kabarole, the Umbrellas are not perceived to have the authority or technical capacity to enforce their own policies or cut off supply to noncompliant customers; community managers also reported challenges in routine tariff collection and community members indicated a lack of trust in community managers being able to responsibly handle collected funds (Marshall, 2019).

Implications of overlapping models

The MWE strategy of coordinating the complementarity of the Umbrellas, National Water, and the proposed area service provision approach (CBMS+) is unclear, as can be expected at this early stage of consolidation. Several interviewees in Kabarole, including District Local Government and utility managers, did not have a complete understanding of the centrally led changes taking place in the sector nor the implications of these changes for district-level planning. Both District Local Governments and the utilities carry service authority roles, and the hierarchy among them is still unclear. The MWE and the deconcentrated arms of the MWE – the Technical Support Units – play a critical role in supporting these entities in better understanding and negotiating centrally led changes, but TSUs support multiple districts and helping actors to adjust will take time.

In other contexts, collaborations between public agencies – sometimes referred to as public – public partnerships – have proven effective as a way to increase water supply efficiency, while avoiding some of the known challenges of public – private partnerships (Silvestre et al., 2018). Accountability to both the public and each other is critical for the success of public – public arrangements, whether they are established centrally or at the municipal level; the presence of two public utilities and the District Local Governments as rural authorities in Uganda presents an opportunity for establishing such an arrangement. Districts, which have a broad mandate to ensure service delivery to all rural citizens unserved by utilities, can form attractive partnerships with utilities which include incentives for the utilities to expand their service areas.

The SCAP100 programme of the MWE and National Water has given National Water a role in extending subsidised first-time access to unserved villages. This builds in the institutional capacity to support underserved areas and builds National Water's public image as a utility offering services even in low-resource areas. In one case in Kabarole, the District and National Water collaborated on a 9.6 km extension to reach a previously unserved village; the District provided the capital expenditure while giving National Water a contract to build, operate and manage the scheme. The legal and technical strategies for joint planning between agencies, however, remain weak, as does the legality of, and ability to enforce, new types of public – public partnership contracts.

Uganda lacks a single authority for regulating all of the country's service providers; because accountability is not clearly held by any individual provider or authority, there is a risk that some users will be left out. While the District is, by default, the rural authority, responsibility at the perimeter of utility piped scheme service areas is blurred. The Umbrella mandate is limited to the service area of

gazetted schemes, as is that of National Water (except when an entire city or town is gazetted). In the current framework, utilities are seemingly able to cherry pick the best schemes and customers, leaving the District responsible for those who are unreached (or unreachable) by piped schemes or those in areas that could easily be reached by extending existing schemes but are not financially viable; this is not inherently problematic but has cost implications for the District. More support for service providers and clarification of their expectations and roles is needed from the MWE and the Ministry of Local Government. Together they are asset owners and duty bearers for ensuring water service delivery to everyone; they are both responsible for ensuring coordinated planning and the prioritisation of reaching underserved groups.

With population densification in Uganda and the expansion of utilities into rural areas, the traditional divide between urban and rural water services planning and models may be reaching its limit. Both National Water and the Umbrella are overseen by the urban department of the Directorate of Water Development; the District's water development efforts are primarily guided by its rural department. To begin to address the challenge of merging urban and rural service provision, the Water Utility Regulation Department was established; its interim strategy (2018-2021) is aimed at improving coordination between service providers and ensuring that customers and vulnerable groups are protected (Kabirizi, 2018; MWE, 2018; MWE, 2019a). The strategy does not, however, cover the entire rural – urban spectrum; it covers only the service areas of piped schemes in small towns and rural growth centres. The next phase of the Water Utility Regulation Department (due in 2021/22) may benefit from the direct involvement of the rural-oriented Technical Support Units and collaboration with Districts, in order to ensure that no areas are left out between urban and rural policy frameworks.

In 2020 and 2021, the MWE District Implementation Manual is set for updating (the current edition is from 2013); this is expected to provide clarification on the role of the Districts in coordinating and planning both community managed rural point sources and utility services. This manual will provide the practical guidelines for implementation at the district level of the new National Framework for Operation and Maintenance of Rural Water Infrastructure in Uganda. It is not clear who will take the role of Area Service Provider; it could be taken on by one of the utilities, by a local association of mechanics, or by a new private sector actor. This choice will have major implications for the ability to cross-subsidise services at the scale of a single service provider.

In a round table discussion held as part of this research, managers for National Water, the Umbrella, and Kabarole District Local Government all expressed a desire to collaborate on the goal of universal access. "We are all working toward the same goals, and we know there is no one at this table who can do it alone. We have to work together", said one utility manager. Efforts have been made by the MWE to promote shared asset-monitoring systems in the form of the Uganda Water Supply Atlas and Utility Performance Monitoring and Information System. Both of these provide online databases that, theoretically, are up to date with information about water supply from utilities and districts across Uganda; in our research, however, some stakeholders were aware of these data sources but none were using it to inform their planning or decision-making.

Study limitations and future work

The research framework included qualitative methods that are subject to research bias; this potential bias was mitigated by including many stakeholders, triangulating findings through use of multiple methods, and by being engaged actors throughout the research process. Overall, we view our largest contribution to be the synthesis and framing of several occasionally conflicting findings and viewpoints within the sector.

The study was limited in its consideration of water quality, water resource management, seasonality, and in its assessment of the details of self-supply. Future work could include more narrowly defined quantitative analyses of certain results, for example cost modelling, assessments of appropriate

technology, and willingness to pay. More financial modelling would be required to determine the optimal blend of models, tariff levels, and public subsidies to optimise investment.

CONCLUSION

A large amount of data and information from different sources and stakeholders was synthesised, enabling a comprehensive analysis of the emerging approach to mixed-model service delivery in Uganda. The increasingly blurred urban – rural boundary and the growing role of utility provision of piped water within the rural landscape in Kabarole shows a slow but accelerating departure from the status quo. In the case of Kabarole, however, a majority of the population outside the municipality still relies on community managed point sources and 31% of households still do not have access to an improved water source.

The drive towards consolidation and professionalisation in Uganda reflects a stage of sector maturation that can also be observed in other countries as part of the transition towards higher performing and more universal service delivery systems. The creation of new management models and consolidation under a smaller number of public providers offers an opportunity to close gaps in service delivery (and improve service levels), but the wider financial, regulatory and planning systems that are needed to manage this transition are still under development. The implications of centrally led changes are yet to be fully understood at the local level, and more support will be needed to enable decentralised actors to understand and play their roles in the new landscape.

The performance of each service provider is affected by demographic factors, by its relationship and interaction with other service providers, by the decisions of authorities and regulators, and by customer demand. Central Government policy and the relative allocations of public finance to each utility and to District Local Governments will have a decisive role in the progressive improvement – or decline – of each service delivery model and its supporting systems.

The progressive reforms in the Ugandan drinking water services sector make it a good case for exploring the practicalities of service delivery model innovation and implementation of change at scale. Documentation and integration of applied research results in Kabarole, and in Uganda overall, may help the sector to adapt more rapidly, while also providing insight and solutions relevant to other countries facing similar challenges. Despite the urgency of the water supply crisis, an iterative process of strategy adjustment, implementation and monitoring is likely to continue for years to come. The good news is that this process seems to be one that the majority of stakeholders in Uganda are prepared to engage with and support.

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