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Rural Water in Tanzania

High Investments, Low Returns

BRIEF

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Overview

Tanzania was unable to meet its Millennium Development Goal (MDG) for water by 2015. Joint Monitoring Programme (JMP)[1] figures since 1990 show almost no improvement in overall improved water coverage access, with deficits in rural areas almost twice that of urban counterparts. Latest estimates from the DHS (2016) show that about 52 percent of the population living in rural areas—21.1 million people—lack improved water.

This brief highlights analysis from the Tanzania WASH Poverty Diagnostic (TWPD), particularly examining the slow progress in the rural water sector. The analysis observes trends by region and population groups and examines indicators in the context of the new water targets for the Sustainable Development Goals (SDGs), revealing key service delivery gaps and benchmarks for the rural water sector. This is particularly important for Tanzania because about 90 percent of the bottom 40 percent (B40) of the population reside in rural areas (DHS 2016). The analysis uses a mixture of quantitative and qualitative methods to identify reasons for why so little is improving for poor populations, despite large-scale investments over time. This brief uses very granular analysis to provide a clearer picture of rural water supply deficiencies at the local level, which can be put to practical use for targeting interventions for the most impact.

MDG to SDG Definitions of "Improved" Water Supplies

According to MDG definitions, individuals using protected wells, public taps or standpipes, protected springs, and piped connections to households as their source of drinking water have "improved" water. Unimproved sources include surface water (dams, lakes, streams), unprotected wells and springs, and tanker trucks.

An initial breakdown of coverage by water source for rural residents shows that a large proportion (51.6 percent) are using unimproved sources such as unprotected wells (24 percent) or rivers, lakes, dams, streams, ponds, or irrigation channels (18 percent) for their drinking water supply. Among those who have access to improved water sources (48.4 percent), the first two improved categories are public tap or standpipe (17 percent) and protected wells (15 percent). About 4 percent

HIGHLIGHTS

Tanzania has had slow progress in the rural water sector in the past 20 years. Less than half of the rural population have access to improved water (currently 48 percent), a mere 4 percentage point improvement since 1990.

The majority of rural Tanzanians must travel long distances to collect water. Only 35 percent have access to an improved water source that is within 30 minutes of collection time.

Preponderance of nonfunctioning water points limit sector progress. About 40 percent of all constructed water points in Tanzania are broken and about 20 percent of them break down in the very first year. Most nonfunctional water points are in poorer, rural areas.

Political economy analysis provides insights and recommendations to address institutional and policy-based arrangements that are acting as bottlenecks to progress.

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1. See the WHO/UNICEF JMP website, https://www.wssinfo.org/about-the-jmp/mission-objectives/.

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use piped water from their neighbor, and just 3 percent have access to piped water on their premise (piped into dwelling or to yard or plot).

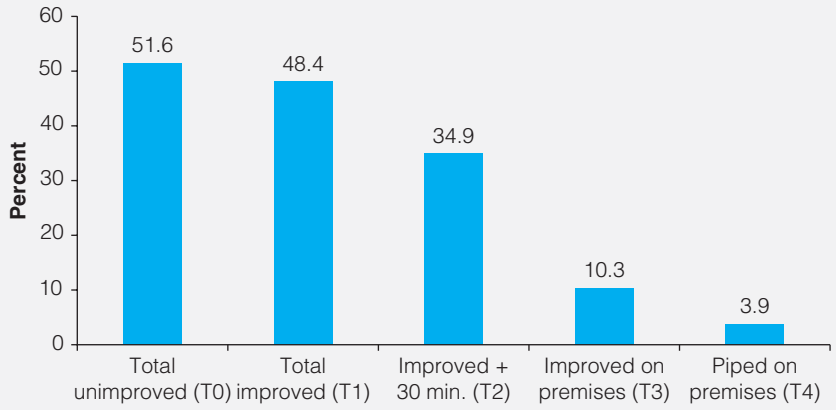
However, the SDG definitions consider other dimensions beyond simple access such as **accessibility**, **reliability** of service, **affordability**, and **quality**. In this brief, we look primarily at questions of access and indirectly at reliability through examining the questions of water point functionality. Due to the lack of sufficient data, information on water quality is not included.

Lack of Accessible Water

The SDG era calls for proximal water access thus drawing the attention of policy makers towards the need to reduce time it takes residents to travel to reach their nearest water source.

Traveling to collect water is an investment of time that could otherwise be spent on other productive activities. In rural Tanzania, among those who have to travel off household premises, the average time for rural households to collect water is about 40 minutes which in fact masks the fact that there are quite a significant number of households in remote rural locations which travel several hours to collect water as can be seen on map 1. Moreover, the burden is overwhelmingly placed on females, who are tasked with water collection responsibilities in about 83 percent of rural households (DHS 2016). SDG-6[2] now aims to reach universal access to improved water sources that are *within* 30 minutes of collection time. Figure 1 shows how coverage figures in rural Tanzania drop from 48 percent down to 35 percent when including this new requirement. When considering access to improved water source that are on a household's premises, the figure further drops to just about 10 percent.

Figure 1: Tiers of Water Supply Access in Rural Areas in Tanzania, 2016



Source: World Bank calculations from DHS 2016.
Note: T0/Tier 0 indicates the lowest level of coverage and as "unimproved" it indicates service not recognized as acceptable by MDG or SDG standards. The tiers are incremental with tier 4 (piped on premises) being the highest available for access.

2. SDG 6.1 "By 2030, achieve universal and equitable access to safe and affordable drinking water for all." For more information see the United Nations' website: https://sustainabledevelopment.un.org/sdg6.

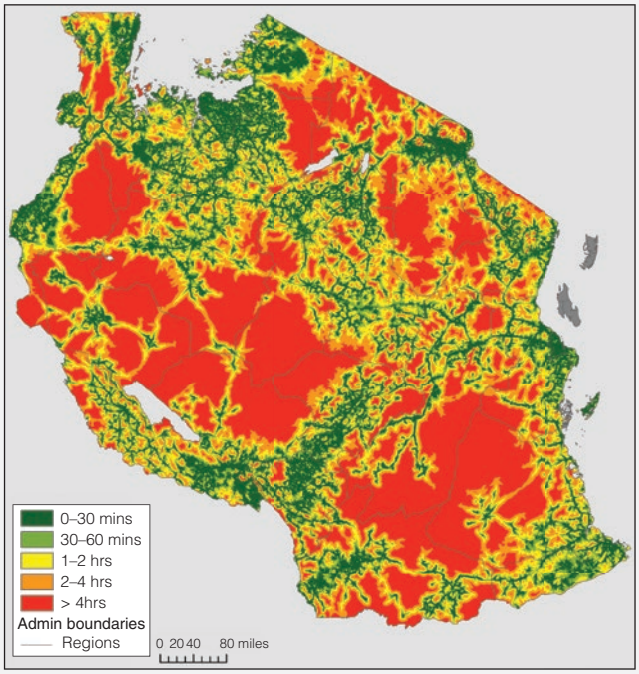
Nonfunctional Water Points

One of the main reasons for low improved water coverage in rural areas is that a large share of the constructed water points are not functional. As part of the TWPD, Water Point Mapping data, collected periodically by Tanzania's Ministry of Water, have been used to first identify the locations of water points and then map them at different levels of aggregation: pixel, district, and regional levels. This mapping exercise is then used to identify where and why water points are nonfunctional due to broken infrastructure failures or as a result of a dry source.

In Rukwa, Lindi, and Singida regions some districts have under 40 percent of all their existing water points functioning. Map 1 displays how long it takes a household to travel to and from a functioning water point. Areas in green indicate where a household can access a functional water point within 30 minutes, whereas areas in red indicate that a household would have to travel more than four hours round-trip to access the nearest functional water point.

Those without access to a nearby functional water point may have to resort to unimproved sources, potentially leading to frequent bacteriological infections and contributing to poor health outcomes. As pointed out earlier, about 52 percent of all rural households in Tanzania retrieve their drinking water from unimproved sources. This analysis shows that in order to increase coverage in rural areas, attention should be given to three related aspects: (a) ensuring the rehabilitation of existing nonfunctional water points where possible; (b) constructing new water points in areas where no water points exist; and (c) based on past experience, learning lessons on water point failure for both new

Map 1: Pixel-Level Mapping of Distance to Functional Water Supply Service Points, Tanzania



Source: WPM data 2016.
Note: Water supply service points include only those with sufficient quality and quantity.

constructions and rehabilitation of existing points so as to improve their sustainability. This three-pronged approach would be a more cost-efficient means of increasing coverage and result in appropriate types of intervention based on the context.

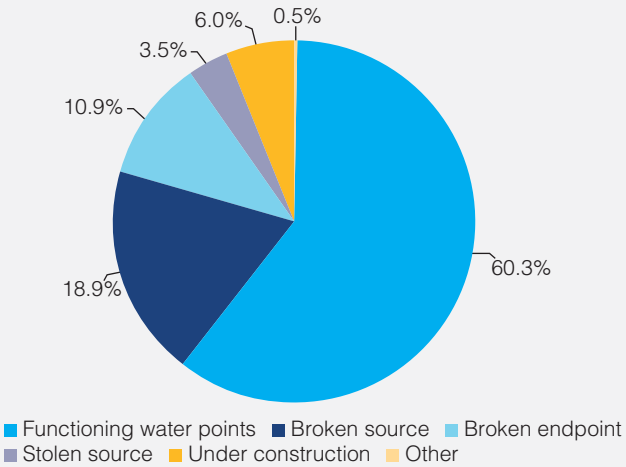
Water Point Functionality Failures

Among the water points that fail, about 20 percent fail in the very first year, and the failure rate increases steadily up to 30 percent by 10 years of operation. Out of all those water points that have ceased to function, 19 percent were non-functional due to a broken engine, pipe, pump, or source damage; 11 percent due to either an out-of-use water tank, broken tap, or a poorly sited tap; 3.5 percent due to either stolen pump or stolen engine; and 6 percent due to being under construction (see figure 2).

Next, we asked what factors could be more important in determining these break downs. To answer this question, a Shapley decomposition[3] was carried out to assess which of a set of observable characteristics, such as hydrological factors, technology choice, promoter type, or management type, could best explain the water point failure, and whether the significance of these factors varied by the age of the water point.

As seen in figure 3, the Shapley decomposition finds that in the immediate run (less than one year after construction), **hydrological factors (56.4 percent)** such as ground water depth, groundwater productivity and geographical location explain the majority of the variance in the likelihood of water point failure. Only then does the type of water pump selected (9.6 percent) factor in as a contributor to explaining the failure rate. Motorized pumps are most likely to fail in the first year of operation. At this stage, the management (whether it be public, private, or donor) explains 9.7 percent of observed failure (light blue).

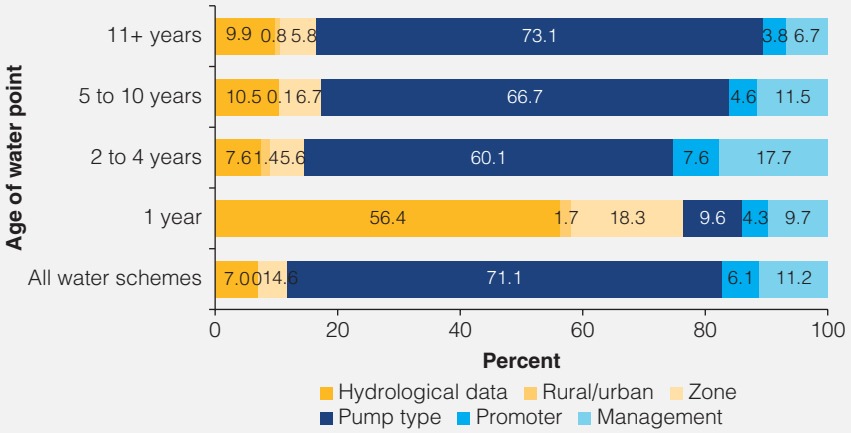
Figure 2: Breakdown of Water Supply Points, by Functionality, 2016



Source: WPM 2016.

3. Shapley decomposition is an econometric estimation technique that enables estimation of the contribution of observable characteristics to the variance in the outcome variable. (For more information see Shorrocks 1999.)

Figure 3: Shapley Decomposition for Reasons of Water Point Failures in Tanzania, 2016



Source: WPM 2016.
Note: Data use definition of *functionality* based on status variability.

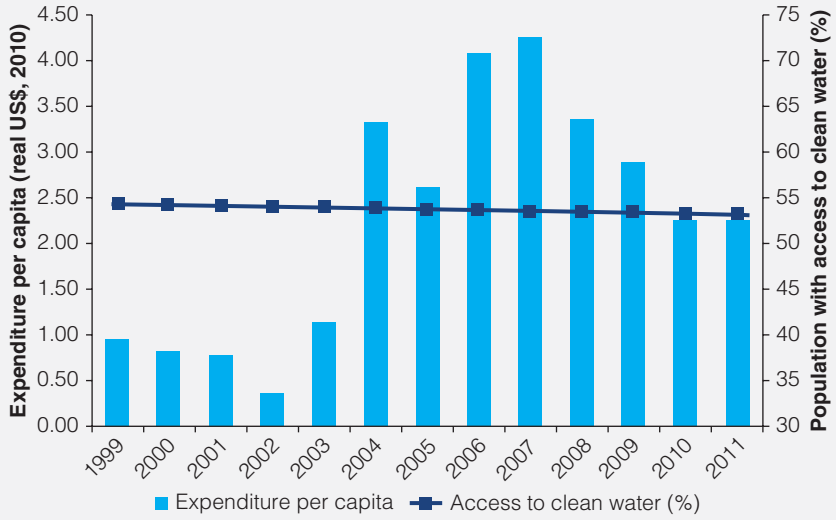
In the intermediate term (two to four years), the importance of the technology choice as reflected in the type of pump being installed dominates, constituting 60 percent of the explanation for breakdown. Management and the promoter also increase in importance to 17.7 percent and 7.6 percent, respectively. The technology type as defined by the pump type increases in importance for the medium and long term to 67 percent and 73 percent, respectively.

Management of the pump holds most importance for pumps between two and four years after construction (17.7 percent) then decreases over time. Management refers to whether the manager or operator of the water point is private, a village committee, or a water board or government. Village committees seem less likely to be able to manage their water points sustainably compared to water boards or governments or private providers. Hydrological and regional factors become less important over time.

Institutional Factors that Explain Lack of Progress in Rural Water

Beyond the immediate context of the water points at the micro-level, the TWPD also identifies broader institutional arrangements and political dynamics that act as bottlenecks for effective implementation in improving the status of rural water services in Tanzania. A study by Carlitz (2016) finds that despite an increasing level of investment in rural water over time, we fail to see an impact in coverage rates. Figure 4 displays this very clearly. Despite the fluctuations in the per capita expenditure on water, in particular increases between 2003 and 2007, coverage rates for the percentage of the population with improved water remained nearly stagnant across the same time period. This is suggestive of the limited sustainability of the water infrastructure constructed year after year which in turn leads to existing stock of net infrastructure just being able to keep pace with expanding rural population.

Figure 4: Spending on Water Compared to Access in Tanzania, 1999–2011



Source: Carlitz 2016.

The study identifies three major institutional barriers to increasing water coverage in rural areas:

- **Limited user participation and voice, leading to a weak accountability mechanisms at user and community levels.** The "voice" of users in the sector is constrained in a number of ways from the village level up to local authorities. First, at the village level, female participation in community-level water committees (COWSOs) seem to be limited, in spite of the importance of women in water collection for the household. A lack of knowledge or desire to confront local authorities seems to constrain the ability for users to make demands on them. It seems that many Tanzanians would choose to use unimproved sources rather than demand accountability for public water provision. This provides another part of the explanation for the high reliance on unimproved sources.

- **Blurring of institutional roles and a tendency to promise free water.** A weakness in compacts between COWSOs and the Local Government Authorities (LGAs) means a limited awareness of both COWSOs and LGAs in terms of their roles and responsibilities. In addition, political motivations lead politicians to focus on construction of new water points (especially around election time) rather than rehabilitating old ones. Political promises of free water would also reduce or eliminate any incentives to pay tariffs.

- **Intergovernmental arrangements.** Political, fiscal, and administrative constraints characterize the subsector's intergovernmental arrangements. Political involvement can distort accountability mechanisms in terms of LGA regulation of COWSOs. Due to the prevailing influence of central government, LGAs do not have complete control over their budgets in order to flexibly administer the delivery of their services.

- **Capacity.** As of September 2016, 1,089 COWSOs had been registered (Carlitz and Boex 2017). Given that Tanzania had approximately 10,000 rural villages,

this accounts for about 10 percent of all villages.[4] COWSOs are often unable to cover the cost of their own operation and maintenance at the community level. This is the most basic constraint at the local level, symptomatic of many of the problems already described. Those that are not yet registered as COWSOs are still Village Water Committees (VWCs) which have their own set of issues relating to their lack of clear mandate and independence from village government. Capacity issues can also help explain the econometric results which demonstrate the importance of the operator in explaining the lack of water point functionality.

A Way Forward: Feasible Interventions to Address Binding Constraints

To improve the maintenance of existing and newly constructed infrastructure for rural water provision the following necessary changes were identified:

- **Promotion of downward accountability.** A commitment by central government to build incentive structures that favor subnational government accountability is recommended. Beyond LGAs, the voice of the user needs to be heard by strengthening the role, participation in and capacity of the COWSOs.

- **Facilitation of smooth financial flows between all levels of government.** Currently financial flows between national and local government are slow and unreliable, hampering implementation on the ground. Financial flows need to be better tracked and monitored between all levels of government to improve trust and speed up delivery.

- **Promotion of a motivation to pay.** Community management is a dominant model that has shown limited success in both Tanzania and other parts of Africa. High hand pump failure rates are frequently associated with weak payment systems (Koehler et al. 2015). The types of political interference aforementioned can interfere with payment schemes. Cooperation toward sustainable water infrastructure maintenance models needs to be promoted.

- **Promotion of incentives for rehabilitation of existing water points.** Construction of new water points is found to be politically much more appealing than the rehabilitation of old ones. The TWPD recommends for the institutionalization of a better incentive structure that favors rehabilitation of water points at levels of government in which it is the most cost-effective and relevant option. Donor intervention should also be shifted towards encouraging the "celebration of maintenance" (Bailey 2015) to help shift norms in the countries in which they operate.

- **Consolidation and more regular use of existing monitoring systems.** Donors have helped to support the creation of the water point mapping system, now housed in the Ministry of Water and Irrigation (MOWI). Next steps are now to consolidate the use of this system, jointly work to improve the quality of data collected, and employ its lessons to policy design.

- **Promotion of policy design based on an appreciation that people's willingness to pay is partially reflected in their ability to pay.** Over 70 percent of rural respondents to an Afrobarometer survey (2014) respond that they have gone without a cash income several times or more in the past year. With this in mind,

4. The remainder are assumed to be less formal entities called Village Water Committees (VWCs).

it is important for national and local policy makers to recognize that full cost recovery in some communities, exclusively from community contributions, is not feasible. Going into more detail, we can note that knowledge of the kinds of services users are more willing to pay for (e.g., productively used water as opposed to water for domestic purposes) could help to structure such policy.

Conclusions

This brief provides an overview of available information, both qualitative and quantitative, on the current state of the Tanzanian rural water sector. One in every two rural Tanzanians still does not have a basic level of improved water service. In the SDG context, when we take into account accessibility considerations, these population ratios drop further to almost one in three for services within 30 minutes. Geospatial mapping reveals that the sparse coverage of accessible *and* functional water points could explain why vast areas of the country lack access to such services.

The analysis presented here highlights the importance of hydrological factors in explaining water point failure, in the first year after construction. It also identifies the importance of management factors in the medium term. In the longer term and throughout, the choice of an appropriate technology is an overriding factor in explaining water point failure and therefore should be considered more carefully when technologies are promoted. The political economy analysis brings us a richer understanding of contextual institutional arrangements which are inhibiting smooth management of water point construction and maintenance. These include a lack of role clarity at lower levels of government; inefficient financial flows; a lack of incentives for maintenance; insufficient use of data for monitoring and limited recognition of local capacity. Each of these issues are difficult to resolve but if addressed, could provide the framework for a transformation of the rural water sector in favor of sustainability in the SDG context.

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About the WASH Poverty Diagnostic Initiative

The WASH Poverty Diagnostic is a global initiative that aims to have local impact by understanding the extent to which the social contract for delivering WASH services is working for all—particularly the poor and vulnerable—and if it not, who is not benefiting and why? The initiative ultimately aims to better understand binding constraints in service delivery and search for solutions that are both technically and politically feasible to overcome them. Results from this initiative are intended to be public goods to inform country-level policy dialogue and programming as well as the methods and frameworks for broader consumption by a variety of specialists. The initiative is led by the World Bank's Water and Poverty Global Practices in close collaboration with the Governance and Health, Nutrition, and Population Global Practices. This initiative also collaborated closely with the UNICEF/WHO Joint Monitoring Programme (JMP).

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