



Beyond the WASH MIS: Unlocking water data ecosystems to boost universal coverage

Executive summary

Pressing challenges affecting the water sector - spanning from equitable access to water security - demand an urgent rethinking in how water is governed and managed. Embracing a systemic approach, alongside the digital revolution, provides us with a powerful catalyst for transformative change, starting by managing data and information differently (Meadows, 1981).

Although data-driven solutions to water management are commonplace in many parts of the world, rural and low-resource areas lack the (digital) infrastructure and (data) capacity to provide WASH services in a targeted and effective way. One in four people around the world lack safely managed drinking water and in Sub-Saharan Africa alone, over 500 million people do not have basic access to clean drinking water, and this situation is expected to deteriorate significantly as the climate crisis deepens (UNICEF/WHO JMP, 2023).

In terms of water infrastructure management, water pumps in rural areas are often governed by a combination of multiple parties, from communities and NGOs to municipalities and private providers. These governance mechanisms constantly change depending on the location of the pumps and prevailing external factors, such as political unrest and lack of access to finance. Low capacity and resources, coupled with low data literacy levels and digital infrastructure, hinders the opportunity to rethink these systems for all levels of governance and embrace a more data-driven approach.

These have been known challenges for many years, yet progress to securing water access in rural areas, and therefore contributing to universal coverage, is severely lacking. Despite global commitments, our progress on water security for all is far too slow, and there are big gaps in service between urban and rural areas. According to the UNICEF/WHO JMP report, two out of three people with safely managed drinking water and three out of five people with safely managed sanitation services live in urban areas. Significant efforts have been made to digitalise water management in order to improve monitoring and therefore WASH access - from establishing data standards like the JMP to developing WASH Management Information Systems (MIS) to improve WASH service delivery and SDG 6 monitoring. However, these efforts are often thwarted by multiple factors, including a lack of alignment between stakeholders, a lack of capacity and a lack of financial resources. These challenges are deeply complex and require significant efforts and time to overcome.

Supporting the development of national digital WASH strategies is a crucial component of UNICEF's approach to advancing digital solutions in the WASH sector. In this policy brief, we outline the need

to unlock national WASH data ecosystems in order to rapidly accelerate WASH data management and improve access to water. This proposed solution allows nations to bring together disparate data systems and processes, gain insights into previously data-sparse rural communities, and improve WASH access and water security for the entire region, bringing us one step closer to achieving SDG 6.

Background

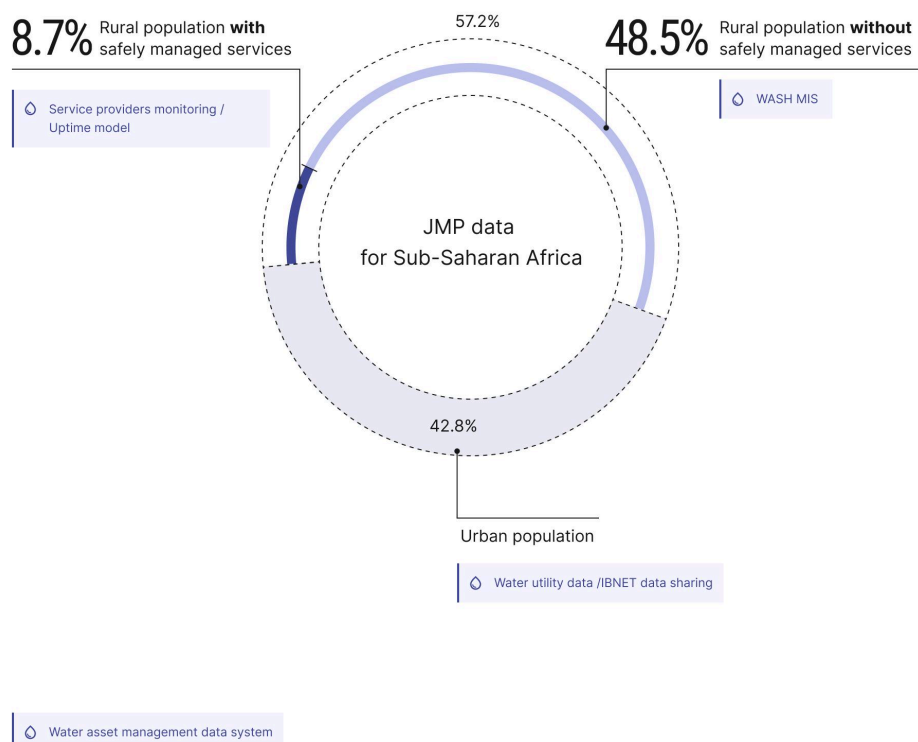
Water security is a term that refers to a society's capacity to have enough water of sufficient quality for survival and to carry out different productive activities. Therefore, a society with water security is in a position to reduce poverty and improve living standards. The increasing concerns to water security are essentially a stark manifestation of the climate crisis. In order to integrate water security and climate resilience in interventions and make the right investment and infrastructure decisions in time, it is crucial to combine existing (and new) data sources for better and more actionable insights. Key insights in an effective data value chain - which covers all of the various steps required to transform raw data into useful insights - will bring sustainable, systemic data-driven solutions that detect maintenance issues early enough, identify better locations for new infrastructure, and ultimately improve WASH service delivery.

Water availability, quality and management of water source infrastructure (pooled together within the broader architecture of water security) are important problems plaguing many rural and low resource areas, from sub-saharan Africa to the Pacific. Though significant strides have been made in installing infrastructure such as hand pumps and wells across rural settings in Sub Saharan Africa, the sustainability of drinking water supply remains a challenge in rural areas of low- and middle-income countries (Foster et al., 2020; Klug et al., 2018). Beyond infrastructure, one of the biggest hindrances to improving WASH access, quality, and security in these areas is the lack of reliable and timely data. While urban areas rely on data systems to inform decision-making and allocate resources efficiently, rural and low-resource areas frequently lack access to comprehensive water infrastructure information, leading to suboptimal decision-making in infrastructure investment and inadequate national WASH coverage.

A number of efforts have been made to boost data and digitalisation in the WASH sector, such as increased data collection efforts and data standards for SDG 6 monitoring. However, these efforts fall short. The [UNICEF SDG6+5 study](#) on WASH monitoring systems in East and Southern Africa found that none of the 21 countries mentioned collect routine data that allow it to fully monitor progress towards the set targets, and no country is on track to achieve universal access to basic services by 2030 for SDG 6 (Mackinnon et al., 2021). A number of digital solutions, such as MIS systems - information systems used for decision-making, and for the coordination, control, analysis, and visualisation of information - have been deployed in recent years to monitor WASH infrastructure. The UNICEF SDG6+5 report identified 22 monitoring systems across 15 countries, and many countries have multiple systems covering different areas of urban and rural areas. The

majority of countries do rely on some form of MIS with only two out of the 22 countries relying almost exclusively on nationwide surveys to monitor WASH access (Mackinnon et al., 2021).

The lack of a single nationwide WASH data ecosystem to bring together various data sources and stakeholders, and establish a national data WASH strategy, results in patchy coverage. The statistics - as can be seen in the figure below - show that a vast portion of the rural population (48.5%) is served by infrastructures that are not captured or monitored within any system if the WASH MIS is not working. Without continuous monitoring, we do not know if this portion of the population has access to improved services.



Costs of not having nationwide data strategies and WASH MIS

1) Fragmented monitoring and unclear roles

The monitoring of the WASH sector is currently fragmented, leading to unclear roles and responsibilities for WASH ministries. It is imperative to establish a shared vision regarding the role of WASH ministries in the data and information chain. Although SDG 6 indicators focus on access at the outcome level (household access), they are insufficient for WASH ministries to deliver timely and reliable data at the infrastructure level for informed decision-making on rural infrastructure investments.

2) Lack of data standardisation

Various stakeholders have (part) of the overview on rural WASH infrastructure, through program monitoring for example. Ensuring consistent data standards and formats is crucial for seamless collaboration and data sharing among diverse international stakeholders. National indicators often lack harmonisation between national data sources and may differ from global WASH service level indicators set by the Joint Monitoring Programme (JMP). Few systems align with JMP indicators for SDG basic services, and some countries lack data systems designed for the SDG era.

3) Lack of data collection, sharing and use

Although targets for things like access to basic water services may have been established and shared between stakeholders, data collection times, protocols and methods are not harmonised between various implementers and data are not shared, or data are lost when a programme ends. In addition, much data collection is still based on cumbersome old-fashioned survey approaches, limiting reach, timeliness and adequate analysis. Although monitoring data are intended for national-level planning and resource allocation, they are not widely utilised due to issues such as data relevance, quality, credibility, and timeliness. A mismatch between data producers and key users, along with a lack of motivation and capacity to interpret and use the data, contributes to low data use. This results in a gap between monitoring data and practical implementation, hindering common actions in the WASH sector.

4) Lack of coordination and cooperation

There is still a lack of trust and cooperation between the main actors in the WASH sector. Programme monitoring by non-governmental actors often stops when programmes end; they don't look at the sustainability of the accountability and monitoring system they put in place as data is not collected after the programme (and most of the time, data is lost). New programmes might implement a new tool without looking at the existing capacities or studies, and despite some common WASH monitoring standards (SDG, WPdx) there is very little sharing of data between WASH ministries and the other actors.

5) Lack of access to and interoperability between systems

New digital technologies and digital maturity development of the main actors of the monitoring of the WASH sector offer opportunities to develop integrated systems with data sharing as a main pillar. Although data is being collected, most of it sits in inaccessible systems or are nonfunctional. As a result, there is a lack of awareness among stakeholders of what data exists, and how it can be used and integrated. The UNICEF assessment found very few monitoring systems open to all stakeholders: either access was restricted to select users or entirely closed. This can be due to administrative policies and hurdles, or due to the design and implementation of the system not facilitating integrability and data sharing - for example where data is collated and analysed in spreadsheets, and there is no clear record of what the most up-to-date information is.

Our proposal: National water data ecosystems to unlock WASH coverage in rural, low resource areas

We are putting forward the urgent need for a national WASH data ecosystem, a country-level WASH monitoring information system that handles both public and private sector data. This system doesn't just describe a data portal, but various components encompassing a strategic data driven approach to water security in rural areas, including:

- Formulation of a national WASH data policy, comparable to road signs and regulations for road users.
- Implementation of backbone technology to manage and harmonise existing WASH data across the country in both urban and rural areas, akin to a well-maintained road surface.
- Identification of a neutral entity to manage and administer the data infrastructure, similar to the role of the Ministry of Transport in certain countries.
- Exploration of business and market options, including financing, revenue streams, and potential clientele similar to the idea of paying toll on the highway for maintenance purposes.

Rather than simply a digital solution, the WASH data ecosystem encompasses data strategies, policies, principles, technologies, systems, administration, governance, and business models. The emphasis is on having a neutral entity that represents all stakeholders without a vested interest in the managed data.

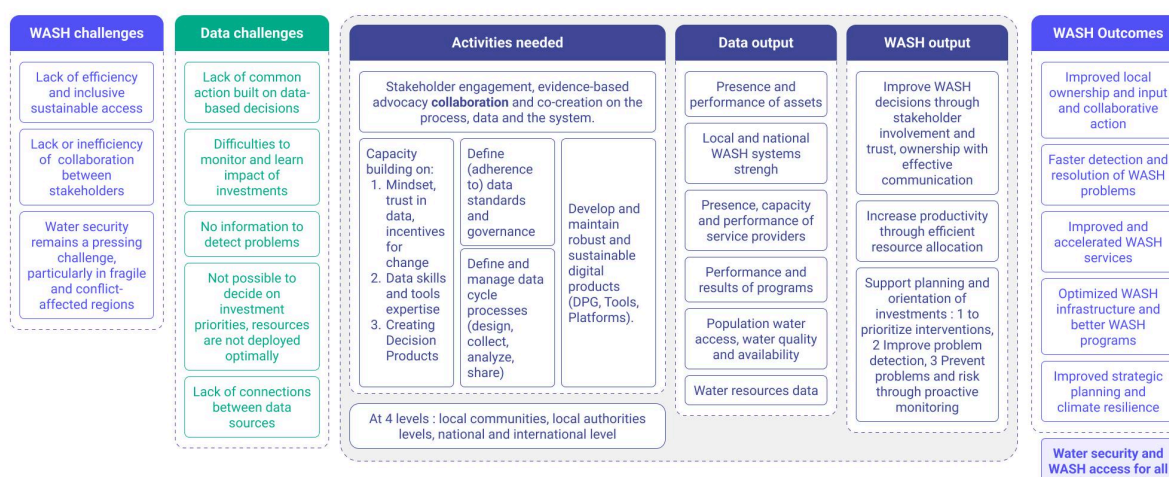
Currently, different development partners, governments, NGOs, research institutes/universities, and the private sector are all investing in the different components (building blocks) of WASH infrastructure. The role of the WASH data ecosystem is to bring all these building blocks together to minimise gaps and duplications. While considered a public good, the initiative won't be entirely free, drawing parallels to road infrastructure where users contribute through road tax, tolls, and licensing fees to sustain the system. The focus is on ensuring the sustainability and effectiveness of the WASH data infrastructure, just as road infrastructure is maintained for the benefit of users.

Our data for WASH impact framework

In order to develop this, we have laid out strategies in our impact framework that we will employ to:

- Foster engagement across all levels, from community to decentralised administration, to national and international levels, and promote collaborative efforts in the development of WASH data in rural areas;
- Support the integration and adaptation of this data into decision-making processes, facilitating tailored capacity building on data and tool skills, fostering mindset and trust; and
- Create and sustain purpose-built digital tools/platforms for widespread use.

These strategies will lead to stakeholders possessing the essential knowledge and tools required to consistently utilise data and decision products for effective decision-making in water security. This, in turn, will lead to improved water security and Water, Sanitation, and Hygiene access for all for SDG6, as can be seen in the figure below.



Benefits

Strengthened underlying country-based digital-WASH systems furthermore will benefit all WASH programmes, regardless of specific areas of focus, by improving the availability, timeliness, quality, and accessibility of WASH data. For governments, civil society, the private sector, and their funding partners, better data can strengthen the management, efficiency, effectiveness, reporting, monitoring, evaluation, and learning of WASH programmes. Better data will also enrich the analysis and use of data and data-driven decision-making.

- Government leaders can better align their ongoing investments and coordinate disparate, technology-based systems to optimise the accessibility of data for use, systems maintenance, and long-term sustainability.
- WASH ministries can leverage the increased quality and availability of WASH data for greater visibility into programmatic impact, including on infrastructure level, and the relative efficacy of different interventions, which will enable better decision-making and allocations of resources.
- WASH programmes, who previously just reported data on indicators, can now leverage digital technologies to play more active roles that influence the organisation of WASH service delivery.

The extending reach of digital technologies is enabling new information and data flows within and among an increasingly diverse set of actors, including frontline WASH workers, government ministries, citizens, delivery partners, and financial intermediaries such as providers of mobile banking and insurance. These new methods of engagement can enable increased transparency, accountability, and action. Beneficiaries can obtain better access to WASH services through a continuum of delivery in which they play an active role. With digitisation, individuals can become more proactive in managing their water security, such as through increased access to, and uptake of, innovation, including digital tools for WASH. They also have more access to information, such as through reminders for WASH access, they can use to improve their own health and well-being.

By aligning investments with national strategies, architectures, and by promoting the use of global goods, donors can realise a number of transformational benefits. These benefits include enabling cost-efficiencies that are fundamental to advancing the Journey to Self-Reliance. More coordinated and harmonised investments in digital systems will accelerate the Journey to Self-Reliance – particularly where host-country resources match these investments, and are amplified by co-investment from other financiers. Additionally, digitisation can ensure that a greater diversity of actors participate in exchanges of data and information. For instance, multi-directional communications (e.g., text messaging and use of digital conversation platforms) can now take place between government ministries and their remote WASH workforce, amongst WASH workers, or between WASH workers and citizens.

Creating a digital environment to promote collaboration and reciprocal value for multiple organisations working on WASH holds incredible potential to bring a fragmented sector together and enable collective intelligence for smart and rapid interventions. The benefits of data sharing against common standards and frameworks will reduce duplication of efforts, support smaller organisations and authorities with limited resources and data to benefit from more mature organisations data and frameworks, allow collective insights to maximise reach and targeting of intervention efforts and optimise reporting to international frameworks like SDG 6.

Conclusion

The proposed WASH data ecosystem transcends a mere digital solution. It encompasses comprehensive data strategies, policies, technologies, governance, and business models, with a focus on neutrality and stakeholder representation. The aim is to bring together diverse building blocks of WASH infrastructure, minimising duplication and ensuring sustainability. While considered a public good, the system will require contributions from users, similar to road infrastructure maintenance.

The outlined activities encompass data stewardship, capacity building, defining data standards and governance, managing data cycle processes, and developing/maintaining digital products. These activities aim to create a collaborative and purpose-driven digital environment, fostering transparency, accountability, and collective intelligence for smart and rapid interventions in the fragmented WASH sector.

Ultimately, this proposal advocates for a transformative journey towards improved water security and Water, Sanitation, and Hygiene access for all, aligning with the global goal of achieving SDG6. The strategic interventions, if implemented, hold the promise of revolutionising WASH ecosystems and improving the lives of millions.

References

Foster, T., Furey, S., Banks, B., & Willetts, J. (2020). Functionality of handpump water supplies: A review of data from sub-Saharan Africa and the Asia-Pacific region. *International Journal of Water Resources Development*, 36(5), 855–869. [Link](#)

Klug, T., Cronk, R., Shields, K. F., & Bartram, J. (2018). A categorization of water system breakdowns: Evidence from Liberia, Nigeria, Tanzania, and Uganda. *Science of the Total Environment*, 619–620, 1126–1132. [Link](#)

Mackinnon, E., Luseka, E., Naafs, A., & Tunhuma, F. A. (2021). Understanding Monitoring for SDG6 Across Eastern and Southern Africa: An Executive Brief. UNICEF: ESARO. [Link](#)

Meadows, D. (1981). *Levers of System Change*.

UNICEF. (2023). Progress on Drinking Water, Sanitation and Hygiene: JMP Report 2023. Retrieved from <https://data.unicef.org/resources/jmp-report-2023/>

UN-Water. (2013). Analytical Brief: A Framework for Action on Water Security. Retrieved from https://www.unwater.org/sites/default/files/app/uploads/2017/05/analytical_brief_oct2013_web.pdf

World Bank. (n.d.). Why Water Security is Our Most Urgent Challenge Today. Retrieved in December 2023 from <https://blogs.worldbank.org/water/why-water-security-our-most-urgent-challenge-today>