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# DESK STUDY
# PROFESSIONALIZING RURAL WATER

December 2023

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**ABOUT USAID/REAL-WATER**
USAID Rural Evidence and Learning for Water (REAL-Water) is a five-year partnership that develops and evaluates strategies for expanding access to safe, equitable, and sustainable rural water services. REAL-Water supports policymakers, development partners, and service providers to make strategic decisions and implement best practices for water management through implementation research. It also ensures coordination with USAID programs contributing to the water, sanitation, and hygiene (WASH) and water resources management (WRM) knowledge base, in alignment with the USAID Water for the World Implementation Research Agenda. For further information about this and other aspects of the program, as well as to access our knowledge products, please visit globalwaters.org/realwater

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# GLOSSARY

| Key word | Definition | Source |
|---|---|---|
| Actors and factors | The complex network of human and non-human elements that make up a system. An actor is a stakeholder that influences the water, sanitation, and hygiene (WASH) system directly or indirectly.<br><br>**Actors** may be specific individuals or organizations (e.g., water operators, health extension workers, water committees, nongovernmental organizations [NGOs] and government agencies) or international entities with less direct links to the local system. **A factor** is a non-human element, aspect, or component of a system that influences system functioning or outcomes directly or indirectly. | (Huston and Moriarty 2018) |
| Asset management | A body of management practices, using assets as the starting point for making operational and strategic decisions. Asset management refers to systematic and coordinated activities and practices through which an organization manages its assets and asset systems, their associated performance, risks, and expenditures optimally and sustainably over their life cycles for the purpose of achieving its organizational strategic plan. | Asset management standards ISO 55 000 PAS 55 |
| Blended finance | Blended finance is the strategic use of development finance for the mobilization of additional finance toward sustainable development in developing countries. | Organisation for Economic Co-operation and Development (OECD) |
| Complex adaptive system | A system in which independent agents (actors and factors) interact in such a way that the outcome is difficult or impossible to predict. A system is complex if the interactions are dynamic, and it is adaptive if it responds to changing stimuli. | (Huston and Moriarty 2018) |
| Drinking water services | Refers to the accessibility, availability, and quality of the main source used by households for drinking, cooking, personal hygiene, and other domestic uses. | Joint Monitoring Programme (JMP) |
| Enabling environment | A set of interrelated conditions—legal, organizational, fiscal, regulatory, informational, political, and cultural—that impact on the capacity of the partners, including national government, donors, and NGOs to engage in developmental processes in a sustained and effective manner. | Adapted from (Thindwa 2001) |
| Factor | A non-human element or aspect or component of a system that influences system functioning or outcomes directly or indirectly. | (Huston and Moriarty 2018) |
| Management | Having charge over, to direct or administer a company, organization, or portfolio of assets and the associated group of people with responsibility for controlling resources or people and to deliver a desired end or outcome. | Cambridge dictionary |

| | | |
|---|---|---|
| Performance | Refers to how well a person (or a machine) completes a piece of work or an activity. In the water sector, performance relates to various characteristics of the water including the quality of the service provided and the key elements of the enabling environment required to enable service provision. | Adapted from Cambridge dictionary |
| Preventative maintenance | Regular inspection and servicing, including replacement of consumable spare parts, to preserve assets and minimize breakdowns carried out on a regular schedule according to the requirements of components of the scheme | Sustainable Water Services Initiative |
| Service delivery model | The legal and institutional setup for the provision of WASH services. A service delivery model includes all links in the value chain, the method of provision, the end use of services, and the level of service delivered. Examples include a community water supply, a utility's sewerage service, and water kiosks managed by a small private provider. | (Huston and Moriarty 2018) |
| Service ladder | The JMP service ladders are used to benchmark and compare service levels across countries and are available from: https://washdata.org/monitoring/drinking-water | JMP |
| Service provider | The entity responsible for day-to-day management of a water service, typically at the level of a community or grouping of communities, depending on the size and scale of the water supply facility. A water committee under community management arrangements, or an individual, private operator, or utility under different management arrangements may fulfill service provider functions. | (Lockwood and Smits 2011) |
| Service authority | The institution(s) with the legal mandate to ensure the planning and delivery of water services. Service authorities are usually, but not always, equated with local government, and not necessarily involved in direct service delivery themselves (although they may in some cases). | (Lockwood and Smits 2011) |
| Systems thinking | Seeing and understanding systems as wholes, paying attention to the complex and dynamic interactions and interdependencies of its parts. Systems thinking is an alternative to reductionist approaches that focus on individual components of a system. | (Huston and Moriarty 2018) |
| WASH system | All the social, technical, institutional, environmental, and financial factors, actors, motivations, and interactions that influence WASH service delivery in a given context. | (Huston and Moriarty 2018) |

# 1. INTRODUCTION

## 1.1 BACKGROUND TO REAL-WATER PROGRAM

A five-year (2021-2026) cooperative agreement between the United States Agency for International Development (USAID) and The Aquaya Institute (Aquaya)[1] supports the Rural Evidence and Learning for Water program (or REAL-Water). REAL-Water seeks to expand the evidence base for rural water supply and in doing so, contribute to expanding access to safe, equitable, and sustainable rural water across the developing world. The program's structure centers around three topics, each corresponding to a dedicated research stream, led by an individual consortium member:

- Improving rural water management (or IMP) seeks to identify conditions, factors, and practices that drive the performance and professionalization of community-based and alternative management models at scale.
- Strengthening water safety management in rural areas (or WSM) seeks to identify pathways to expand services of professional water quality laboratories for testing rural water supplies; determine how water quality data can trigger water quality improvements and assess whether water safety plans are effective forms of risk mitigation in low-resource settings.
- Improving planning for water resources management (or WRM) seeks to identify where and how rural water systems are under threat due to problematic WRM; how holistic water resources planning at scales can be relevant to rural water service authorities; and what the barriers, enablers, costs, and benefits are of successful holistic water resource planning approaches.

The objective of the Year 1 inception phase was to carry out preliminary analyses (e.g., country selection, literature reviews, initial data collection) to update research questions and hypothesis and to develop corresponding research protocols.

## 1.2 DESK STUDY REVIEW OBJECTIVES, SCOPE, AND METHODS

Aguaconsult conducted a desk study during the December 2021-March 2022 period to identify the available evidence and knowledge gaps related to the professionalization of rural water supply and to inform research plans. The objectives of the desk study were threefold:

1. Understand the historical evolution of rural water supply and approaches to management in low-, middle-, and high-income countries.
2. Identify the available evidence linking management models and service performance.
3. Unpack known processes and activities that are in place to improve the management of rural water services and that have led to improved service performance and identified knowledge gaps.

[1] The REAL-Water consortium members are Aguaconsult, United Kingdom; Ashoka Trust for Research in Ecology and the Environment (ATREE, India), Kwame Nkrumah University of Science and Technology (KNUST, Ghana); Skat Foundation's Rural Water Supply Network (RWSN, Switzerland); Safe Water Network (USA); and Water Mission (USA).

Given the breadth of the research topic, Aguaconsult developed guiding questions to specify the topics for identifying and analyzing documentation, presented in Table 1: Guiding question of the IMP desk study.

*Table 1: Guiding question of the IMP desk study*

| TOPIC | KEY QUESTIONS |
|---|---|
| Evolution of rural water supply overtime | 1. How has rural water supply evolved over the last 30 years?<br>2. What are the trends affecting rural water supply (e.g., demographics, rural development, water resources, decentralization)?<br>3. How has the financing of rural water services evolved over the last 30 years?<br>4. How has rural water supply evolved in relation to economic growth? |
| Management of rural water services | 1. How have management models evolved over time?<br>2. What were the drivers of change?<br>3. How are rural water services currently managed in low- and middle-income countries? |
| Management performance | 1. How does the sector define performance?<br>2. What is known about the performance of various management models?<br>3. What are the known drivers, conditions and factors supporting improved performance of management models (in low-, middle- and high-income countries)? |

**Document searches and screening methodology**

The review team conducted searches in Google Scholar and Google search engines using the following key words: "rural water supply" OR "professionalization rural water supply" OR "capacity rural water supply" OR "success rural water supply" OR "sustainability rural water supply" OR "management model rural water supply" OR "capacity building rural water supply" OR "rural water supply functionality" OR "community managed rural water supply" OR "private rural water supply OR "private rural water supply" OR "capacity strengthening rural water supply", "rural water supply AND privatization" OR "rural water supply private operator" OR "Professionalized maintenance rural water supply" OR "rural water supply private operator" OR "consolidation" OR "aggregation" OR "utilitization."

In the case of Organisation for Economic Co-operation and Development (OECD) countries, the team conducted the following searches: "OECD rural water supply" "United States rural water supply" OR "United States institutional capacity rural" OR "South Africa rural water supply" and "South Africa institutional capacity rural" OR "Australia rural water supply" and "Australia institutional capacity OR "European Union rural water supply," and three scholars from Australia, the US, South Africa were contacted to obtain guidance on pertinent literature.

The review team screened titles and abstracts of the first 100 hits for potentially relevant papers and downloaded the full texts of these papers if they focused on the following topics in either developing countries settings or OECD countries:

- Rural water supply management models (private, community based, or others),
- Rural water supply maintenance,
- Rural water supply functionality,
- Rural water supply sustainability,

- Professionalization and capacity building of rural water supply, and
- Privatization of rural water supply.

Once downloaded, the team screened relevant papers in more detail by looking at the introduction, literature review, methodology, and discussion and conclusion with the goal of identifying papers that were most relevant for the desk study review, which included:

- Papers based on medium to strong empirical evidence (qualitative or quantitative) of a topic of relevance (as listed above);
- Papers contributing to developing or clarifying foundational concepts (e.g., co-production in the case of community-based management or professionalization); and
- Papers applying theories from other disciplines (e.g., geography, management) to the rural water supply sector, or that had interesting new ways of thinking about management models and IMP.

The review team conducted backward and forward reference searching for all relevant papers identified with the criteria outlined above, to identify additional relevant papers. The search included no time or location restrictions but was restricted to documents for which an abstract and article in English was available. Studies not written in English, or without an English translation available, were excluded in this review.

The scope of the review included gray literature (practitioners' reports and non-peer reviewed publications), particularly in relation to functionality, sustainability, management performance, and professionalization generally. The team carried out searches for non-peer-reviewed publications using the same key words, on Google. Other documentation related to broader trends affecting the rural landscape and the water sector derived from four key websites: The United Nations Department of Economic and Social Affairs[2], the World Bank[3], the World Health Organization/United Nations Children's Fund (WHO/UNICEF) Joint Monitoring Programme (JMP)[4] and the OECD[5].

**Once identified, the review team processed literature in three stages:**

1. When large volumes of documents were available in relation to a specific topic (e.g., community-based management), the team categorized documents in "must read," "useful," and "not critical" groups.
2. As reviewers read the "must read" and "useful" groups of document references, they recorded high-level summaries in an overview table per thematic area.
3. To keep track of key ideas and points of disagreement in the literature, reviewers made notes in separate documents. These notes served as a basis for writing the present report.

[2] https://www.un.org/en/desa;

[3] https://data.worldbank.org/

[4] https://washdata.org/

[5] https://www.oecd.org/

## 1.3 STRUCTURE OF THE DESK STUDY REPORT

The remainder of the desk study report presents findings, in the following structure:

- Section 2 describes the current dynamics affecting rural areas and their implications for rural water service provision.
- Section 3 outlines the key paradigms affecting the rural water sector, including a summary of financing and how this is changing over time.
- Section 4 provides a description of approaches to managing rural water services, including both the historically predominant community management model as well as increasingly applied alternatives.
- Section 5 focuses on the performance of rural water supply management, how it has been measured in the past, and draws lessons from middle-income and OECD countries.
- Section 6 provides an overall conclusion from the study to answer what is known about the development and performance of management models and where the gaps remain. It closes with the implications of these findings for the IMP stream of the current REAL-Water research project, in terms of the main gaps in sector knowledge.

# 2. TRENDS AFFECTING RURAL WATER SUPPLY

**Key questions addressed in this section:**

- What are the current and predicted trends in low- and middle-income countries related to demographics and urban/rural development?
- What implications do these trends have for the delivery of rural water services and expectations for service levels?

## 2.1 CHANGING RURAL LANDSCAPES: A GROWING AND URBANIZING POPULATION

**The global population will continue to grow in the coming decades.** The world's population more than tripled in size between 1950 and 2020 and reached 7.8 billion in 2020, 2 billion above its level in 1996. Although the pace of world population growth has slowed over the past 50 years and will continue to decelerate, expectations are that the combination of gains in average life span, high levels of fertility in some countries, and the youthful global age distribution will lead to continuous population growth over the next decades. By 2030, the global population is expected to reach 8.5 billion and up to 11 billion people by end of the twenty-first century (UNDESA 2021).

**An uneven population growth is leading to increased population density.** Nine countries will make up more than half of the projected population growth by 2050 and among them, five will be on the African continent (Nigeria, the Democratic Republic of the Congo, Ethiopia, the United Republic of Tanzania, and Egypt).[6] This population growth will naturally lead to a significant increases in population density (e.g., from 226 people/km2 in 2020 to 856.3 people/km2 in Nigeria, from 67 people/km2 to136/km2 in Tanzania, and from 100 people/km2 to 180 people/km2 in Ethiopia in 2050) (UNDESA 2021), which among other consequences, will further strain natural resources and lead to increased environmental impacts.

**The future of the world's population is urban with striking regional differences**. Over the last decades, the urban population of the world has grown rapidly (from 751 million in 1950 to 4.2 billion or 55% of the total population in 2018), surpassing the rural population. Projections indicate that urbanization will continue across all countries in the coming decades to reach 68% in 2050. While all regions are experiencing similar trends, urbanization rates differ across continents. The most urbanized geographic regions are North America (82%), Latin America and the Caribbean (81%), Europe (74%), and Oceania (68%). The level of urbanization in Asia is only now approaching 50% and Africa remains mostly rural, with 43% of its population living in urban areas. The gradual shift of populations from rural to urban areas, combined with the overall demographic growth in the coming decades could add another 2.5 billion people to urban areas by 2050, with close to 90% of this increase taking place in Asia and Africa (UNDESA 2019). Water security influences migration patterns, including rural to urban migration. Water "shocks" built up over time, can play a significant role in influencing migration, particularly water scarcity (water deficits resulting in five times as much migration as water deluges). In

[6] The other countries are India, Pakistan, Indonesia, and the United States of America.

rapidly urbanizing middle-income countries, droughts are a key driver in the increase flow of low-skilled workers from rural to urban areas (Zaveri et al. 2021).

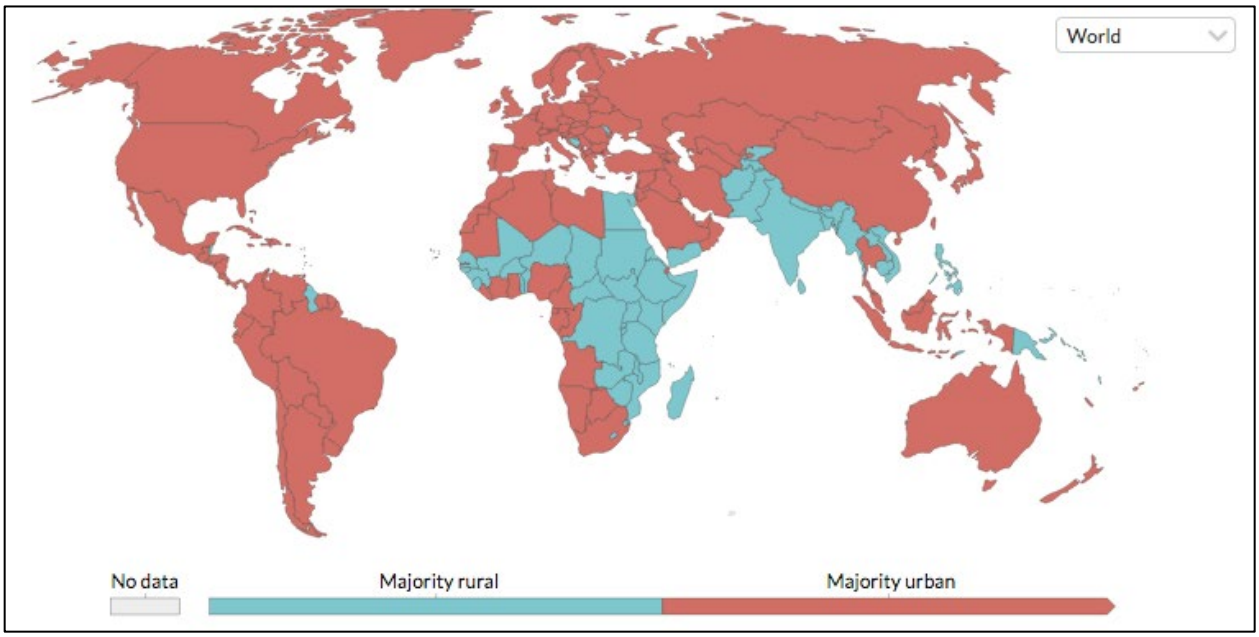
**Much of the urbanization is taking place in small towns**. While one in eight people live in megacities worldwide (cities with more than 10 million inhabitants), close to half of the world's urban dwellers reside in much smaller settlements of fewer than 500,000 inhabitants. This is also where almost half of the increase in the world's urban population is currently taking place. Projections of the combined effects of growth of periphery settlements due to arriving migrants and the suburbanization of town centers is a further expansion of towns into rural areas and the reclassification of rural areas and towns into "urban annexes." In Africa, where 57% of the urban population is living in small and intermediate towns with fewer than half a million inhabitants, urbanization trends indicate that the populations of small and intermediate towns will continue to grow by 170% by 2030 with major impacts on their rural regions, especially in peri-urban areas (UNDESA 2019).

## 2.2 RURAL DEMOGRAPHICS AND TRENDS

**Defining and categorizing rural areas according to any global benchmark remains challenging**. National definitions of rural areas vary and can relate to various characteristics including population sizes (from up to 200 inhabitants in Denmark to 100,000 inhabitants in China) (Dijkstra et al. 2020), administration decisions, or the provision of infrastructure and services (Adank, van Lieshout, and Ward 2021). Other existing definitions relate to spatial measures of rurality such as access to roads, population density, availability of services and products, and physical contexts (Watts, Walton, and Knox 2021). A new method for harmonizing national definitions of urban and rural areas, endorsed at the 51st meeting of the UN statistical Commission in March 2020, is the "degree of urbanization." This classifies a country into cities, towns, semi-dense area, and rural areas and in doing so, introduces nuances in the rural-urban continuum and shows the situation of people living in small towns more clearly. All definitions of rural areas have in common the recognition of a wide range of geographic contexts, which include very remote and sparsely populated locations far from roads, towns, and cities; dispersed or more compact village settlements, trading centers, and small towns (Richard Carter 2021).

**Despite rapid urbanization, some regions will remain predominantly rural in the coming decades**. The global rural population has grown slowly since 1950 and is now close to 3.4 billion, 90% of which is in Africa and Asia. Expectations are that the rural population will rise slightly before declining to 3.1 billion by 2050 as the result of increasing urbanization levels. These trends, however, hide important regional differences. While rural population numbers in Asia, Europe, Latin America and the Caribbean, North America, and Oceania have all peaked and are now falling, Africa's rural population (especially that of sub-Saharan Africa) is projected to continue rising. In 2050, very few countries' rural population will exceed the urban population, and these include several across sub-Saharan Africa, Asia, Pacific Island States, and Guyana in Latin America, as shown in Figure 1 (UNDESA 2019).

*Figure 1: Majority of people living in urban vs. rural areas in 2050*




SOURCE: OURWORLDDATA; HTTPS://OURWORLDINDATA.ORG

**Rural development is essential to achieving the 2030 Agenda for Sustainable Development.** Rural areas face persistent challenges of poverty and inequality, regardless of the definition of poverty used (in terms of income or as a multi-dimensional experience) (UNDESA 2021; Richard Carter 2021). Although tremendous progress in poverty reduction have been recorded over the last decades, 80% of the extreme poor and 76% of the moderately poor are concentrated in rural areas in 89 developing countries (UNDESA 2021; Castañeda et al. 2018). Rural populations continue to experience many of the dimensions of poverty simultaneously, including food and water insecurity, lack of access to energy, unemployment, lack of access to health and education services (Richard Carter 2021). Current strategies of rural development are proving inadequate for protecting the health and reducing the effects of climate change on agriculture and rural economies, and require a shift to end the current divide between rural and urban areas, partly leaning on the advent and spread of digital and other frontier technologies (UNDESA 2021).

## 2.3 IMPLICATIONS FOR RURAL WATER SERVICE DELIVERY

**Improved services are expanding into rural areas, but a significant proportion of the rural population is still left behind**. Over the 2000-2020 period, the rural population rose from 3.2 billion to 3.4 billion. Water services have expanded and improved overall during the same timeframe (Table 2). The number of people enjoying safely managed services increased by about 50%,[7] the lowest two service levels (surface and unimproved water) saw reductions in absolute number of people served (equivalent to a 54% change) and the number of people served with basic levels of service fell by 16%. Although this

[7] Data on water quality is still missing for many countries.

overall picture is encouraging, about 400 million rural dwellers (equivalent to 12% of the rural population) were still using surface or unimproved water in 2020 (WHO/UNICEF 2021).

*Table 2: Service levels and change over the period 2000-2020 for rural water supply at global level*

| Service level | Description (JMP) | Percentage served, 2000 | Percentage served, 2020 |
|---|---|---|---|
| Safely managed | Piped or non-piped improved drinking water in dwelling, yard, or plot, available when needed, and free of contamination | *42%* | *60%* |
| Basic | Drinking water from an improved source, no more than 30 minutes round trip including queueing | *28%* | *22%* |
| Limited | Drinking water from an improved source, more than 30 minutes round trip including queueing | *3%* | *6%* |
| Unimproved water | Drinking water from an unprotected well or spring | *20%* | *9%* |
| Surface water | Drinking water from a river, dam, lake, pond, stream, canal, or irrigation canal | *7%* | *3%* |
| **Total rural population (absolute numbers):** | | **3 271 943 607** | **3 415 195 397** |

SOURCE: (WHO/UNICEF 2021)

**Expectations for higher levels of services are rising.** The steady levels of economic growth, coupled with urbanization, rising standards of living and education, and the intensification of transfers of goods, information, and services are all leading to a rise in expectations of rural water users and a further blurring of lines between urban and rural areas. Users in rural growth centers and small towns are increasingly demanding services similar to those in urban areas; piped supplies into the home providing more and reliable water, of better quality (Smits and Lockwood 2015). These expectations are also supported by the increasing recognition of the UN General Assembly in 2010 of access to clean water and sanitation as human rights, which has created an important benchmark for the global community (Richard Carter and Lockwood 2011; Moriarty et al. 2013) and is in line with the Sustainable Development Goal (SDG) 6.1 target of achieving universal and on-premises rural water services for all by 2030. At the same time there is, and will remain for many years, a significant segment of the poorest households living in remote dispersed settlements for whom only the most basic levels of service are attainable in the medium-term future, often based on point supplies such as hand pumps (Smits and Lockwood 2015; World Bank Group 2017b).

**Users are increasingly willing to pay for higher levels of services, particularly in the case of household connections**. As economies grow and there is more widespread cash circulation – increasingly in the form of e-money or mobile money – users are also willing to pay for these higher levels of service, as research indicates (World Bank Group 2017b; Pezon 2013). The propensity to pay more is significantly higher in scenarios with improved performance and private connections, at least in some settings, than for incremental changes in service levels (Van Houtven et al. 2017). However, there is mixed evidence of increasing willingness plus ability to pay for higher levels of service, especially from point sources fitted with handpumps (Smith 2021).

**Key take aways from Section 2**

- Global population growth and urbanization will continue in coming decades, but sub-Saharan Africa will remain predominantly rural. Water insecurity is a key driver of out-migration from rural areas.
- Urbanization patterns are resulting in significant expansion of cities into rural areas and the multiplication/expansion of small towns, where most of the urban growth is taking place.
- The combination of demographics, increasing blurring of the lines between rural and urban areas, increased speed of communications, and rising aspirations have led to a differentiation of rural demand: users in rural growth centers and small towns are increasingly demanding services more like those in urban areas with piped supplies into the home.
- At the same time there is, and will remain for many years, a significant segment of the poorest households living in remote dispersed settlements for whom only the most basic levels of service are attainable, often relying on point source supplies.
- The Millennium Development Goal (MDG) era (2000-2015) brought significant gains to rural populations and increased first-time access as well as service quality, but rural dwellers are still left behind. Eight out of 10 people without access to safely managed water services reside in rural areas and 400 million rural dwellers are still using surface or unimproved water.
- There is evidence that rural households are willing to pay more for services, where these are reliable and meet expectations of service levels, which is mainly the case for piped connections on premises; there is less compelling evidence that users are willing to pay more for more reliable point source supplies.

# 3. PARADIGMS IN THE RURAL WATER SECTOR

**Key questions addressed in this section:**

- How has the sector understood the persistent challenges of poor functionality and lack of sustainability?
- What are the different approaches adopted by the sector to conceptualize and address rural water service provision over time?
- What are the main factors associated with improving the sustainability of rural water service delivery?
- How has this understanding impacted the approach to financing rural water?
- What new approaches is the sector adopting to financing to support improved rural water?
- How has the recognition of the human right to water (and sanitation) influenced progress in the rural water sector?
- What efforts in financing have been made to improve the management of rural water services and how have these progressed?

## 3.1 THE JOURNEY FROM FIRST-TIME ACCESS TO SYSTEMS-BASED APPROACHES

**Acceptance that there is a difference between first-time access and rural water infrastructure functionality.** Despite the significant gains recorded during the MDG era, universal access to safely managed services is still a long way from reality in many low- and middle-income countries. In 2020, 83 out of 99 countries covered by the JMP were not on track to achieve SDG 6.1 (WHO/UNICEF 2021). Sustainability of rural water schemes has been a concern for the last three decades and the sector conceptualized and addressed it in different ways. The intention of enhancing the sustainability of services partly drove the introduction of community-based management (CBM). But the mounting evidence of failure, or under-performance, decades later showed the difficulty of achieving the anticipated results in terms of expanding coverage and increasing service quality. The limitations of taking a largely infrastructure-focused approach have also been assessed (Moriarty et al. 2013; Lockwood and Smits 2011), and the limited "value for money" of donor-driven approaches is now questioned (ICAI 2016).

**Evidence of high rates of non-functionality of water points exists in the literature.** Evidence of non-functionality of water systems has been available for sub-Saharan Africa since 2010 and more recently for the Asia- Pacific region, with a wide range of non-functional water schemes across geographies, as shown in Table 3. It is important to note that the studies have used different methodologies and framing for monitoring and presenting functionality rates, but are harmonized here for the sake of clarity.

*Table 3: Overview of water point non-functionality evidence in the literature*

| COUNTRY OR REGION | KEY FINDING* | SOURCE |
|---|---|---|
| **SUB-SAHARAN AFRICA** | 36% handpumps non-functional<br>Country-level ranging from 10% to 65% non-functional | (RWSN 2010) |
| | 25% handpumps non-functional | (Foster, Willetts, et al. 2018) |
| **CAMBODIA** | 12% handpumps non-functional | (Foster, Shantz, et al. 2018) |
| **CAMEROON** | 32% of handpumps non-functional | (Deal and Furey 2019) |
| | 10- 60% of drinking water supply systems non-functional | (Mvongo, Defo, and Tchoffo 2021) |
| **ETHIOPIA** | 38.6% of water schemes non-functional | (Welle 2014) |
| | 25.5% of water schemes non-functional | (Water Development Commission 2021) |
| **GHANA** | 30% water schemes non-functional | 2/7/2024 7:00:00 PM |
| | 29% rural point systems non-functional | (Nyarko et al. 2010) |
| | 20% wells non-functional | (Fisher et al. 2015) |
| **KENYA** | 42% rural water sources non-functional | (Chepyegon and Kamiya 2018) |
| **LIBERIA** | 40% improved water points non-functional | (Government of the Republic of Liberia 2014) |
| **MADAGASCAR** | 27% water systems non-functional | (Ryan 2014) |
| **MALAWI** | 69% handpumps non-functional<br>51% gravity-flow schemes non-functional | (Baumann and Danert 2008) |
| | 66% MALDA handpumps non-functional | (Delta Partnership 2011) |
| **NIGERIA** | 50% water points and schemes non-functional | (World Bank Group 2017b) |
| **SIERRA LEONE** | 18.2% water points non-functional | (Foster 2013) |
| **TANZANIA** | 46% improved water points non-functional | (Taylor 2009) |
| | 29% water points non-functional | (Joseph et al. 2019) |
| **UGANDA** | 17.9% water points non-functional | (Foster 2013) |
| | 45% water points non-functional<br>77% water points suboptimal performance (sufficient yield and reliability) | (Owor et al. 2017) |

**Moving from functionality of infrastructure to sustainability of service delivery.** Practitioners and academia, however, soon questioned functionality as the most pertinent measure of service delivery, arguing that this simple binary measure was too blunt to characterize the nuanced functionality of water supply of piped water schemes, the progressive failure of infrastructure and an insufficient measure of service performance and likely sustainability (Lockwood and Le Gouais 2015; Richard Carter and Ross 2016). Authors argued for adapting and enriching the analysis to determine the sustainability of rural water services, defined as *a water service is sustainable if the water sources are not over-exploited but naturally replenished, facilities are maintained in a condition which ensure a reliable and adequate water supply, the benefits of the project continue to be realized by all users indefinitely and the service delivery process demonstrates a cost-effective use of resources that can be replicated.* (P. Harvey and Reed 2004). They also argued for the need to consider not only the functionality or non-functionality of infrastructure, but the quality of services received by users as defined in terms of quantity, quality, accessibility, and reliability

over time; the performance of service providers and the performance of the service authorities (Lockwood and Le Gouais 2015; 2015; Moriarty et al. 2011; World Bank Group 2017a) as broader measures of "success." Yet again, evidence mounted to suggest that drinking water service in much of sub-Saharan Africa was characterized by low reliability, poor water quality, and frequent breakdown and/or abandonment of facilities (Chowns 2015; Joseph et al. 2019; Foster et al. 2020; Lockwood, Chintalapati, et al. 2021) and that aid-supported interventions were not approaching service delivery in a systematic manner and not leading to sustainable outcomes (ICAI 2016).

**Large research programs provided further evidence of service failure and the need to move away from existing approaches, or "business as usual."** Large-scale programs from the late 2000s, notably those funded by the Bill and Melinda Gates Foundation, USAID, and other donors (WASH-Cost, Sustainable Services at Scale or Triple-S;[8] West Africa Water Supply, Sanitation, and Hygiene Program [WAWASH][9]; Sustainable Water, Sanitation, and Hygiene at Scale Programme [SusWASH][10]; Sustainable Water Services[11]) were among the first large-scale initiatives to gather evidence of service failure and to develop ideas on approaches to sustainable access to safe water and sanitation through research and advocacy. These programs contributed to flagging sector attention to the need to move away from business as usual and adopt a paradigm shift, which would involve addressing several key aspects of the enabling environment, critical to long-term service provision to deliver services. Adopting a **Service Delivery Approach** was one of the most important shifts from this period, which marked an explicit shift in conceptual thinking from a predominant focus on the funding and construction of rural water supply infrastructure projects, to the need to support water as an indefinite service (Moriarty et al. 2013).

**The rise of "building blocks" and "sustainability frameworks" to conceptualize and achieve rural water services that last**. Among the many challenges identified to explain the current state of services were issues related to poor cost-recovery and financial viability, low skill base of voluntary-based community management, lack of adequate data on service delivery, poor harmonization and coordination, insufficient support to service providers, inadequate capacities of local governments, fix-on failure approaches to maintenance, inadequate asset management and insufficient regulation of services and service providers (Moriarty et al. 2013; Lockwood and Smits 2011; Fonseca et al. 2010; World Bank Group 2017b). In the late 2010s, several WASH organizations developed their own frameworks or set of building blocks to conceptualize the shift away from a hardware focus and the consideration of key elements that were required to be in place to achieve services that last (e.g., IRC's building blocks for sustainable service delivery, WaterAid's sustainability framework, the Dutch WASH Alliance's Financial, Institutional, Environmental, Technical and Social (or FIETS) framework; UNICEF' Bottleneck Assessment Tool etc.). USAID itself invested in the development of the Sustainability Index Tool (SIT), which translated these building blocks into a diagnostic tool to assess likely sustainability; the Dutch Ministry of Foreign Affairs (DGIS) in partnership with its key partners (UNICEF, UN Habitat, Aqua for

8 Triple-S was operating in Ghana, Uganda and globally from 2009 to 2014; see: https://www.ircwash.org/projects/triple-s

9 See: https://www.usaid.gov/sites/default/files/documents/1865/RI_WA_WASH_508.pdf

10 See: https://washmatters.wateraid.org/suswash

11 See: https://www.globalwaters.org/SWS/sustainable-wash-systems-sws-resources

All, and via large-scale programs such as the SDG-WASH program) adopted the sustainability clause, compact, and checks to enforce a commitment for long-term sustainability and commit funded organizations to systematic sustainability monitoring and follow up. More recently, UNICEF developed its own sustainability framework (UNICEF 2018b) and subsequently its internal guidance for applying (Jawara et al. 2017). Table 4 presents an overview of the factors included in four of these frameworks below.

Note, however, these frameworks were built from different perspectives, based on varying levels of evidence, and in alignment with the organizational area of self-interest and positioning. These emphasize different aspects of service delivery but share the following common characteristics:

- **A common acknowledgement of the many factors** and processes that go beyond the narrow definition of service provision, to consider broader aspects largely related to governance and financing, often referred to as the "enabling environment." These relate to technical, social, financial, institutional, and environmental aspects (P. Harvey and Reed 2004; Walters and Javernick-Will 2015; Whaley and Cleaver 2017; Foster 2013; Mukherjee and Van Wijk 2002; Bonsor et al. 2015; Cronk and Bartram 2017; Behailu, Hukka, and Katko 2017).
- **The distinction between factors during project design and factors after project implementation** (WaterAid 2011), which all play a role in service sustainability. These include for example, the quality of the project implementation process (Katz and Sara 1997); the effectiveness of external support provided after construction (M. Miller et al. 2019; Lockwood 2002; P. Harvey and Reed 2004); as well as the short-term thinking of donors which leads to a focus on infrastructure building (Easterly 2002).
- **These factors relate to various levels:** community, service provider, service authority, and national enabling environment (Lockwood and Smits 2011; World Bank Group 2017b).
- **These factors are not static and interact in a non-linear manner** through "feedback loops" (Neely and Walters 2016; Huston and Moriarty 2018).

*Table 4: Overview of sustainability dimensions and factors included in various frameworks*

| DIMENSION | FACTORS INFLUENCING SUSTAINABILITY | WATERAID'S SUSTAINABILITY FRAMEWORK, 2011 | TRIPLE-S BUILDING BLOCKS FOR SUSTAINABLE SERVICES, 2011 | USAID SUSTAINABILITY INDEX TOOL, 2011 | DUTCH WASH ALLIANCE FIETS PRINCIPLES | WORLD BANK'S SUSTAINABILITY ASSESSMENT OF RURAL WATER SERVICE DELIVERY MODELS |
|---|---|---|---|---|---|---|
| **QUALITY OF IMPLEMENTATION** | High quality of implementation | X | | | | |
| **SOCIAL** | Full user participation | X | | X | | |
| | Capital contribution by users | X | | | | |
| | Needs and demand-based approaches | X | | | X | |
| | Equity and inclusion | | | | X | |
| **TECHNICAL** | Technology fit for purpose and chosen by users | X | | | | |
| | Maintenance and repairs are carried out | | | X | X | X |
| **FINANCIAL** | Appropriate tariff structure | X | | X | | X |
| | Financing to cover all life-cycle costs | X | X | X | | X |
| | Local financing of activities and limited dependency on external subsidies | | | | X | |
| **ENVIRONMENTAL** | Water resource management | X | | | | X |
| | Integrated and sustainable management of water and wastewater flows and resources | | | | X | X |
| | Policies, procedures are functional at the local level and meet user demand | | | | X | |
| | Clarity on roles and responsibilities for users, | | | X | X | X |

| DIMENSION | FACTORS INFLUENCING SUSTAINABILITY | WATERAID'S SUSTAINABILITY FRAMEWORK, 2011 | TRIPLE-S BUILDING BLOCKS FOR SUSTAINABLE SERVICES, 2011 | USAID SUSTAINABILITY INDEX TOOL, 2011 | DUTCH WASH ALLIANCE FIETS PRINCIPLES | WORLD BANK'S SUSTAINABILITY ASSESSMENT OF RURAL WATER SERVICE DELIVERY MODELS |
|---|---|---|---|---|---|---|
| | authorities and service providers, national levels | | | | | |
| | Institutional capacity | | | X | X | X |
| **INSTITUTIONAL/ MANAGEMENT** | Monitoring system | X | X | X | | X |
| | Support to supply chains, service providers | X | X | X | | |
| | Professionalization of community management | | X | | | |
| | Recognition and promotion of alternative service provider options | | X | | | |
| | Harmonization and coordination | | X | | X | |
| | Capacity support to local government | | X | X | | X |
| | Learning and adaptive management | | | | | |
| | Asset management | | X | X | | X |
| | Regulation of rural services and service providers | | X | X | | X |
| **CONTEXT** | Economic development | | | | | X |
| | Population growth | | | | | X |
| | Urbanization | | | | | X |
| | Decentralization | | | X | | X |
| | Geography | | | | | X |
| | Hydrology | | | | | X |
| | Aid dependency | | | | | X |

As a result of this understanding of important factors driving sustainable services at the level of the global sector, development partners, including many donors, called for a more holistic approach to service delivery. This shift in perspective included an explicit articulation of the challenges in achieving sustainable services as being due to the complexity of the sector, with a combination of limited capacity, inadequate financing, and historical fragmented approaches to service delivery (Valcourt, Walters, et al. 2020; WaterAid 2011). Commentators also called for a careful diagnosis of the broader ecosystem before intervening and encouraged a multi-pronged approach focused on strengthening key elements of the water sector, at multiple levels and beyond infrastructure construction (Huston, Moriarty, and Lockwood 2019). It is important to note that this analysis and dialogue was largely driven by strategic or influential development partners and while national sector stakeholders were part of the process, they were not necessarily central to it.

**From sustainable service delivery to a systems-based approach**. "Building blocks" rapidly showed their limitations to represent the complexity of adaptive systems like the water system and within it, the core functions and dynamic relationships between factors and actors that drive overall system performance (Huston and Moriarty 2018; WaterAid 2019). In the late 2010s, several organizations and global initiatives (e.g., IRC, Water For People, WaterAid, Agenda for Change) shifted their conceptualization of sustainable service delivery to a philosophy of action centered on systems, embracing complexity and the fundamentally interlinked nature of the real world (Tillett 2020). IRC defines a systems-approach as "*all the people, components and functions that are needed to deliver WASH services. The WASH system includes all the actors (people and institutions) and all the factors (infrastructure, finances, policies, and environmental conditions) that affect and drive the system*" (Huston and Moriarty 2018). WaterAid has adopted a similar definition (Casey and Crichton-Smith 2020).

**The growing recognition among development partner experts that a more holistic, systems-based approach is necessary to deliver sustainable services**. Over the last five to eight years, systems thinking and the use of systems-based analytical tools has come to dominate the dialogue of the sector (Valcourt, Walters, et al. 2020; Valcourt et al. 2019; Valcourt, Javernick-Will, et al. 2020; Walters and Javernick-Will 2015; Marks et al. 2018; Huston et al. 2021; Huston, Moriarty, and Lockwood 2019; M. Miller et al. 2019; McAlister et al. 2022). This work has fed through to policy with a number of important bilateral donors citing the strengthening of sector systems and processes as an important element of their support (Huston, Moriarty, and Lockwood 2019), along with a trend away from financing of direct service delivery. Whether taking a systems approach to the water sector in fragile states and humanitarian assistance is an open debate, with some arguing that this is possible (Tillett, Schillinger, and DeArmey 2020). However, despite this major shift in framing of the root causes of—and potential solutions to—rural water provision by accepting the need for systems-based approaches, some authors still question the extent to which this is a useful lens through which to frame all activities. For example, Carter (2021) agrees that understanding rural water as a "system" is clearly useful, but he remains doubtful whether the sector is in fact a *complex* system and that some solutions remain relatively straightforward to address (Richard Carter 2021).

Despite this shift in sector dialogue, largely at the level of development partners, there is limited documented evidence that national (government) sector actors have adopted systems-based

approaches in such explicit policy terms, notwithstanding the recognition of important gaps or weaknesses in areas such as regulation[12] or financing. One platform in which systems thinking and the need to strengthen key sector factors such as financing and monitoring data is shared with national stakeholders, is the Sanitation and Water for All (SWA) initiative and more specifically its set of Collaborative Behaviors[13]. This involves sector entities (ministries responsibly for water and sanitation, but also ministries of finance) in SWA signing up to, and monitoring progress toward, four core behaviors that can contribute to more effective and sustainable outcomes.

Finally, as an emerging paradigm, while there is a growing body of literature on understanding rural water service delivery as a system (Valcourt, Walters, et al. 2020; Valcourt, Javernick-Will, et al. 2020; Huston, Moriarty, and Lockwood 2019), there is little documented (academic) evidence that adopting a "systems-based approach" results in the delivery of improved outcomes; although some practitioner evidence is now starting to be generated (Shah, Fogelberg, and Lockwood 2021).

**The adoption of the human right to water (and sanitation) marks an important adoption of principle and has been incorporated into legislation and sector policy in many countries.** In July of 2010, the United Nations General Assembly explicitly *recognized the human right to water and sanitation and acknowledged that clean drinking water and sanitation are essential to the realization of all human rights* in Resolution A/RES/64/292. By 2013, the Human Right's Council articulated these rights in a series of dimensions including availability, accessibility, quality, affordability and acceptability (Albuquerque 2014). This core principle of recognizing water as a human right has been adopted by many, but not all, states around the world and ended in national legislation and sector policy to guide the overall vision of inclusivity and equitable services for all. As outlined in Section 2 above, it is precisely rural populations in low-and middle-income countries that are often found to be unserved or underserved in terms of access to water supply (Hope and Ballon 2021), therefore it could be expected that the human right to water (HRW) would be a critical instrument in addressing this gap.

It is the case that taking a human rights-based approach has provided useful guidance to development partners on how to support governments in implementing human rights standards and apply principles in action, for example how the HRW can be employed as a powerful advocacy platform for improved regulation of services (Gerlach 2019). Such guidelines have been developed by the UN and other key sector stakeholders (WaterAid 2017). Associated guidance focuses both on developing the capacity of governments (duty bearers) and implementing agencies to meet their obligations to fulfil the HRW, and on providing a framework to empower the rights-holders to claim their rights (Richard Carter 2021).

**In reality, progress in translating human right to water into a reality, specifically in the case of rural water, has been disappointing and barriers remain to its full adoption.**

[12] For example, in late 2021 the Eastern and Southern Africa Water and Sanitation Regulators Association commissioned a major study on regulatory arrangements in 54 African countries recognizing the key role a well-functioning regulatory system and as a *central feature of good sector governance*; see: Esawas_Report_2022.pdf

[13] https://www.sanitationandwaterforall.org/about/our-work/priority-areas/collaborative-behaviours

Having the right to water embedded in national laws and sector policies provides a powerful anchor for making the case to increase funding and improve service delivery for unserved populations. It is also recognized as having influenced the debate on drinking water from one centered on consumer choice to being treated as a social and cultural good (Hope et al. 2020). However, despite the formalization of the HRW and articulation in policy, there continues to be a major gap between this ambition and outcomes on the ground in many countries, especially for poorer and more marginalized rural consumers (Hope and Ballon 2021). A number of commentators set out the limits of applying the HRW in practice, the collective constraints to funding safely managed water for all and the slow progress of reaching rural populations given the complexities of implementation, even under the principle of so-called progressive realization of such rights (Langford and Russell 2017; Hope and Ballon 2021; Richard Carter 2021).

## 3.2 EVOLVING APPROACHES TO FINANCING RURAL WATER

**The rural water sub-sector has tended to be historically heavily aid dependent.** Conventionally, sources of finance have been captured under the so-called "three Ts," with tariffs from consumer revenues; taxes channeled via domestic public finance mechanisms; and aid transfers in the form of grants, philanthropic funding, and concessionary loans (or official development assistance [ODA])[14]. The financial sustainability of the rural water sector has been historically skewed by an over-reliance on concessional financing in the form of grants or loans, as well charitable aid from NGOs and faith-based groups, especially for initial capital investments (Pories, Fonseca, and Delmon 2019; Hope et al. 2020). Although regular revenues from consumer tariffs are in theory the most reliable of these three streams of financing, they are in many cases unable to even cover the costs of day-to-day operation and minor maintenance, and rarely extend to capital maintenance or replacement. As a result, many facilities fall into disrepair with more minor technical problems becoming more complex and costly, resulting in unnecessary downtime and service disruption (Chintalapati et al. 2020) or revert to dependency on grant aid funding and concessionary loans in the absence of substantive public funding (Pories, Fonseca, and Delmon 2019; Richard Carter 2021; Moriarty et al. 2013). This dependency on external aid transfers has been linked to the (partial) abdication of government responsibility and reflects the low priority placed on rural populations by decision-makers at the national level, who tend to be poorer and with less political agency than their urban counterparts (Lockwood and Smits 2011; Chowns 2014; Huston, Moriarty, and Lockwood 2019).

**A long-term bias toward initial capital investment with low priority – and understanding – of financing long-term operation, maintenance and replacement costs has compounded the financing challenge.** A compounding dimension to the financing challenges facing the rural water sector is a consistent imbalance in funding support by both government (publicly derived taxes) and donors (aid transfers) to cover the long-term costs of sustaining a service once the initial physical infrastructure has been paid for. A relatively simplistic starting point at the advent of CBM-based programming worked on the assumption that, by and large, donors or government pay for capital investment and the community is then expected to take on responsibility for recurrent costs, which

[14] The OECD definition of transfers (as part of the 3Ts) does not include concessionary loans, which are a form of repayable finance and require eventual repayment from domestic financing.

were not always well defined in terms of quantifiable investments nor share of risk (i.e., for minor repairs, major repairs or capital maintenance, and eventually replacement costs). This approach to financing has consistently struggled to ensure that rural water supply infrastructure is adequately maintained resulting in many tens of millions of dollars of lost investment over the years (Lockwood and Smits 2011; P. A. Harvey and Reed 2007; Moriarty et al. 2013; Richard Carter 2021; Schouten and Moriarty 2002; Chowns 2015; Hope et al. 2020; Baumann 2009).

The recognition and definition of life-cycle costs in the mid-2000s spearheaded by the WASHCost project[15] marked an important shift in the identification of cost categories and historical bias on capital investment only. Although life-cycle costing was not a novel concept outside of the sector, the WASHCost project played a pivotal role in identifying and defining a taxonomy of costs for rural water beyond only capital investment to include operational expenditure, capital maintenance, the costs of capital (interest on loans etc.), direct support costs and indirect support costs (Fonseca et al. 2010). It is now broadly recognized that the main financing challenge is as much about maintaining safe, reliable services as it is about providing first time access for the last segment of the unserved (Hutton and Varughese 2016; Pories, Fonseca, and Delmon 2019; Watts, Walton, and Knox 2021).

**The adoption of SDG 6.1 has acted as a driver for changes in financing paradigms.** The adoption of the SDGs in 2015 set the bar higher in terms of extending services and aiming for safely managed access within a 30-minute roundtrip. Estimates by the World Bank indicate that the present value of additional investment needed in WASH through 2030 will exceed US$1.7 trillion, with the proportion of financing required simply to keep services safely maintained exceeding the amounts required to meet the unserved as the sector approaches 2030 (Hutton and Varughese 2016), and that a substantial increase in sector financing is needed for governments to achieve the ambitious SDG goals. For example, the 2019 Global Analysis and Assessment of Sanitation and Drinking Water (GLAAS)report indicated cost estimates from 20 countries and territories revealing a funding gap of 61% between identified needs and available funding to reach national targets (World Health Organization 2019). With existing funding falling far short of this level and some countries needing to increase their investment in the WASH sector by up to six times, while also facing internal fiscal constraints and high debt levels, there have been calls to rethink financing strategies to achieve SDG 6.1, including for the rural sector (Pories, Fonseca, and Delmon 2019).

**A progressive shift in financing strategies, application of subsidies and diversification of sources of financing away from ODA assistance against the backdrop of dwindling aid budgets.** Academia and practitioners agree that much of the available public and ODA financing will be needed to both extend access to unserved and poorer populations in marginalized and remote areas, as well as maintain existing services. As such there is a need to not only increase public finance, but also to develop smarter subsidies to target those most in need (Andres et al. 2019). The requirement for subsidies to deliver reliable and safe water supply is now underpinned with new evidence at the operational level in the case of supply-side subsidies channeled via service providers (McNicholl et al.

[15] WASHCost was a five-year project ending in 2013 funded by the Bill and Melinda Gates Foundation and implemented by IRC WASH of the Netherlands and partners. Its design was to fill the gap in information about the costs of WASH services in rural and peri-urban areas not served by utilities and about the spending needed to ensure that they survive in the long term; https://www.ircwash.org/washcost

2019; Cord et al. 2022). Trends for sector ODA show a general decrease: external aid for water and sanitation, as a portion of total aid commitments declined from 6.2% to 3.8% from 2012 to 2015 (Pories, Fonseca, and Delmon 2019). More recent data from 2019-2020 indicates the ODA budget for water and sanitation broadly staying level or in decline (Watts, Walton, and Knox 2021); see Box 1 below.

*Box 1: WaterAid's projections on costs and financing for safely managed water and sanitation*

In a 2021 study on financing safe WASH, WaterAid updated the World Bank (2016) costing for achieving global open defecation free (ODF) by 2025 and universal access to safely managed water and sanitation by 2030 and discussed approaches for covering these costs. The key findings of the study included the following:

- Annual investment and operation and maintenance costs are estimated at US$295 billion in 2018; increasing up to US$550 billion in 2029 before reducing due to projected slowing population growth.
- There is a significant gap between financing requirements and available financing, as highlighted in the GLAAS, where 80% of countries surveyed in 2019 stated that there was insufficient financing to meet WASH targets, particularly for low- and lower-middle- income countries.
- ODA to water and sanitation reported to the OECD has grown in real terms from US$5.1 billion to US$7.4 billion between 2009 and 2018, but the proportion of ODA allocated to WASH has remained consistent at 4%, with the following notable trends of concern for the water sector with a limited return on investment:
    - Donors have put more emphasis on allocating aid to areas with geopolitically significant conflicts.
    - ODA disbursements have principally been channeled through public sector institutions.
    - The majority of ODA has been disbursed in the form of loans and this proportion has increased over time to 62% of total ODA.

A theoretical "best case" scenario is developed to meet the financing gap for new capital infrastructure. In low-income countries this would require a continual annual disbursement of US$30 billion for low-income countries (from 2018 to 2025) and an average US$61 billion through to 2025 for lower-middle income countries. This scale of international public resource provision, if proportional funding to water and sanitation were to be maintained, would require a substantial increase in ODA from OECD and other donors. The current OECD Development Assistance Committee (DAC) country average of 0.3% of Gross National Income (GNI) would have needed to rise to 4.1% in 2018, falling to 3.4% in 2025—a more than tenfold increase.

Achieving this best-case scenario calls for i) an increase in the volume of financing (public finance, ODA, cross-sectoral finance, decentralized finance, private finance, and climate finance); ii) an improvement in the quality of finance through greater transparency, financial absorption, better design of subsidies, increased aid effectiveness, the adoption of sector-wide approaches; iii) and the strengthening of the broader WASH sector.

SOURCE: (WATTS, WALTON, AND KNOX 2021)

**Rural areas present specific challenges for commercial financing and incentivizing private sector participation.** Rural communities, including small towns in rural areas, are characterized by a number of factors, all of which present barriers to alternative sources and the participation of private providers; these include low population densities, necessitating higher connection (and maintenance) costs especially for individual household connections; lower levels of disposable income; a general lack of, or lower, capacity of decentralized local institutions to operate or oversee the delivery of services; and availability of alternative water sources, which is more common in smaller settlements (when

compared to high density urban) (Ndaw 2016; Nagpal, Malik, and Eldridge 2018). On the supply side, providing access to households for investment in water services is also limited by lack of awareness of the potential market and concerns over lending for non-productive uses and perceptions of risk on the part of national financial institutions such as local banks, microcredit institutions, etc. (Trémolet 2012; Pories, Fonseca, and Delmon 2019).

**Addressing the financing challenges at both sector and individual scheme levels matters for professionalizing management of service delivery.** Limited and inadequate (e.g., poorly targeted and short-term) financing is a well-known systemic bottleneck in the sector, which affects all aspects of service provision—including its management (Huston and Moriarty 2018; Hope et al. 2020; Pories, Fonseca, and Delmon 2019). This indirectly relates to a lack of—or substandard—ability to support, monitor, or regulate service providers and for service authorities to be sufficiently resourced to carry out their functions effectively (World Bank Group 2017b). It also does not allow for transparent and well-governed subsidy mechanisms to be in place to established across aggregated service areas (A. Harvey 2021). At individual scheme and service provider level, a lack of financial viability will continue to undermine creditworthiness and act as a disincentive for managers with the right skills and capacities to ensure improved performance and to maximize revenues from consumer tariffs, thereby perpetuating the cycle of low performance, insufficient income, and poor management (Hendry and Akoumianaki 2016; Richard Carter 2021; Lockwood and Smits 2011).

### 3.3 PROGRESS ON FINANCING OF RURAL WATER

**The literature on financing of rural water services over the last five to ten years reflects a shift in focus and promotion of more innovative approaches, but significant challenges remain in operationalizing such new mechanisms at scale.** The need to explore alternative financing mechanisms to meet the financing gap for the SDGs and diversify sources of financing beyond only public expenditure and tariff revenue have been recognized for some time (Batz et al. 2010). The adoption of more innovative approaches to financing rural water, such as microfinance loans, social impact investment, multi-donor trust funds, and blended finance has been slower for WASH than for other sectors, such as health and education (Pories, Fonseca, and Delmon 2019). Indeed, the literature demonstrates that foundational issues in the sector need to be addressed to develop any kind of viable financing mechanism whether public or private. These relate to a number of systemic factors, including i) governance, institutional, policy, tariff and regulatory arrangements to ensure transparency, consistency and sustainability, ii) the technical and financial efficiency of service providers to increase absorption capacity and sustain creditworthiness, and iii) issues related to the supply of finance (Pories, Fonseca, and Delmon 2019; Watts, Walton, and Knox 2021).

**Recent attempts to scale service provision and establish mechanisms for combining sources of financing have been carried out for delegated maintenance provision** in more localized cases, such as the Trust Funds associated with the FundiFix model in Kenya based on verifiable performance metrics (see below). This approach provides a mechanism through which to deliver subsidies to providers as tariff revenue only covers around one-third of local operational costs (Hope et al. 2015) Although this model is promising, and results in strong service delivery performance, it is still operating at a small scale and has only attracted very limited private financing to date (Foster et al. 2022; Lockwood, Chintalapati, et al. 2021).

**Historically, private sector investment in the sector has been low, particularly in sub-Saharan Africa**, accounting for less than 1% of overall financing (Watts, Walton, and Knox 2021). Increasingly, sector policies are encouraging the pooling of individual community water supply infrastructure to attract larger, more competent operators. Establishing mechanisms that can support larger service areas also allows combining financing from both traditional sources (e.g., tariff revenue, public financing, and grant aid transfers), as well as forms of investment capital and philanthropic funding through blended financing. In this way the use of ODA, combined with public sources, has the potential of attracting commercial financing by de-risking investments into markets, which many have historically seen as unknown and risky ventures (Wilk 2019; Hope et al. 2020; Foster and Hope 2017; Pories, Fonseca, and Delmon 2019).

**Despite these challenges, there have been efforts to facilitate access to commercial financing in some lower-middle-income countries, but initiatives also remain relatively limited in scale.** Efforts to facilitate access to commercial finance have been documented in countries in Africa and other regions including Latin America and Asia as part of attempts to unlock market-based financing, including with a pro-poor focus (Mehta and Virjee 2007; Batz et al. 2010); see Box 2. Although these represent promising examples, they all remain on a relatively limited scale, reaching tens of thousands of households. In other contexts, where private sector participation is well established or in more densely populated rural areas and small towns in middle-income countries, there is evidence that commercial finance can be mobilized at greater scale, but only with support from government and development partners, as the case is the case in Cambodia (Tkachenko and Mansour 2021).

*Box 2: The Azure Initiative leveraging commercial investments in rural water supply in El Salvador*

Catholic Relief Services (CRS) in El Salvador works with rural banks and credit cooperatives, providing wholesale capital and guarantees for on lending to rural communities to invest in their water supply schemes. In 2018, CRS and the Inter-American Development Bank's Multilateral Investment Fund launched the Azure Initiative, a blended finance facility catalyzing both investment and grant capital to improve water and sanitation services for underserved communities. To date, Azure has provided technical assistance to 83 water services providers, benefiting more than 63,000 families, and has raised over $10 million in capital, $3 million of which has been disbursed in loans for direct upgrades to water and sanitation systems or indirectly via local financing institutions.

SOURCES (TKACHENKO AND MANSOUR, 2021; CRS 2022).

**Other approaches at the community, and particularly household level, target solutions for self-supply and include various forms of micro-financing for loans, insurance, and savings vehicles, such as Village Savings and Loan Associations.** Local micro-credit schemes are one of the most widespread vehicles and viewed as an alternative channel for rural households to mobilize funds to invest in first time access and maintain water facilities. (Innovations for Poverty Action 2011; Mengueze et al. 2014) The Water Credit Initiative promoted by Water.org is one of the largest micro-finance programs specifically targeting water (and sanitation) with over $3.7 billion disbursed across 10 million loans benefiting 45 million people and with high rates of repayment (cited at 98%)[16]. Although

[16] For further details on Water Credit initiative see: WaterCredit - A Microfinance Solution | Water.org

micro-financing is emerging as an important way of leveraging household investment (and as such, contributing in part to funding the SDGs) it has been criticized in the literature for benefiting medium- and higher-income households disproportionately, thereby raising barriers to inclusivity (Mengueze et al. 2014). Additionally, as the use of micro-finance loans for accessing what is essentially a non-income generating asset (i.e., in this case improved water supply) there are questions about its appropriateness, notwithstanding the fact that improved water supply can enhance general well-being, improve health and save time for revenue earning activities (Trémolet 2012).

**Significant progress has been made in some countries in terms of wholesale institutional reforms to establish the conditions that make the use of existing funding sources more effective and efficient.** While prospects of attracting large-scale commercial finance or private capital to rural water may not be viable in the near term, other efforts, heavily supported by technical assistance, have built the architecture to attract large volumes of financing from international finance institutions such as the World Bank and others. These initiatives take a long time to develop and typically involve aggregation through establishing large-scale service areas, separate asset holding entities and independent regulators in some cases. Such reforms have enabled sectors to attract more professional operators, as is the case in Senegal where the government has initiated sector reforms (*Réforme de la Gestion des Forages Ruraux [REGEFOR]*), with the aim of addressing issues of maintenance and improving the quality of services through progressive private sector participation. The government established the Rural Borehole Management Office ([OFOR], *Office des Forages Ruraux*) in 2014 as a national asset holding agency responsible for managing, monitoring, and delegating rural water supply assets. This arrangement has led to the introduction of public-private partnerships (PPPs) in the form of lease (*affermage*) contracts with private operators and clustering rural populations into zones based on technical, economic, geographic and socio-cultural criteria (WASH-FIN 2019; Sy 2014; Diallo 2015). Another case in point is Benin with the announcement in April 2022 by the National Agency for Rural Water and Government of Benin of a 10-year leasing contract with a consortium of providers to serve over 9.3 million people in rural areas, which represents possibly the largest PPP arrangement to date and is indicative of the potential for scaling of rural markets (Benin Ministry Water and Mines 2022). In challenging contexts public development banks can provide finance at concessional rates, as is the case in the Vietnam Social Policy Bank that has a water and sanitation portfolio providing loans to households for storage tanks and connections. Public development banks have historically played, and continue to play, an important role in financing water investments in OECD countries such as rural France, Italy, and the Netherlands (Fonseca et al. 2021).

Advances in smart technologies such as the use of remote sensors, data storage, and cashless payment systems are helping to underpin new financing strategies and improve transparency, especially for performance-based funding, but the scale of application in the rural sector is still limited. In parallel with developments in financing approaches, the growth of mobile communications networks, the use of mobile or digital money, and other innovations in recent years such as performance monitoring through the use of technologically advanced sensors, have all been cited as supporting improved service delivery outcomes and the transparent application of subsidies (McNicholl et al. 2021; A. Harvey 2021; Thomson 2021; Hope et al. 2011; UDUMA 2017). The literature cites reliable and timely flows of monitoring data as a foundational tenet of performance-based financing. A number of pilots to test the use of such data for contractual models in rural water have been tested in recent years (McNicholl et al. 2019; Hope et

al. 2020); see Box 3: Uptime Consortium using technology to improve management of rural water below.

*Box 3: Uptime Consortium using technology to improve management of rural water.*

**Uptime is a global consortium working to deliver drinking water services to millions of rural people through long-term, performance-based funding.** The first multi-country pilot for results-based funding of rural water services was launched in October 2020. The Uptime Catalyst Facility, a UK-registered charity, issues non-repayable funding to rural water maintenance providers after reliability results are confirmed. Services are now being funded in seven countries serving an estimated 1.5 million rural people. The initial scope of the initiative covered five service providers across four African countries to support reliable water services for 1.3 million rural people at a cost of less than US$1 per person per year. Tariff revenue from water users cover one-third of the operating costs with the balance being met by the Uptime Facility. In this way Uptime seeks to apply transparent subsidies allocated based on reported evidence of performance. To date, this subsidy has come from donor funding, but the intention is that in future this could be derived from a blend of development partners, public budgets, and eventually private sources. Water points maintained by professional providers under this model were functional over 90% of the time, with repair of breakdowns within three days, significantly outperforming country averages.

**Simplifying verification using technology:** Uptime's contract design reduces the cost of verification while maintaining high standards of monitoring. Key indicators relevant to payment calculations can be verified with just two types of data:

- Timestamped infrastructure use: tracking when infrastructure is used and by how much can confirm both uptime and volumetric use. A growing range of technologies can meet this need. Importantly, data need not be transmitted in real-time since payments are retroactive. Lower cost loggers that store data for collection later may be as appropriate as remote transmitting technologies; and
- Local revenue: increased uptake of digital payment technologies mean that revenue records can progressively be verified remotely. Use of digital payments has the added benefit of reducing collection costs for service providers.

SOURCE: (MCNICHOLL ET AL. 2019) FOR MORE DETAILS ON THE UPTIME CONSORTIUM SEE: HTTPS://WWW.UPTIMEWATER.ORG/

### Key take aways from Section 3

- **Concerns over the sustainability** of rural water services and limited impact of large investments have been shared for decades in the water sector and have led to recognition of the need to shift from an infrastructure focus to a service delivery approach.
- This concern has been supported by **large-scale evidence** of high non-functionality rates, but measures of "unsuccessful" service delivery have evolved from functionality, service quality to broader sustainability. Recent initiatives have sought to **harmonize measures of sustainability** but have not led to a widespread adoption of a single set of measures.
- Organizations have **conceptualized sustainable service delivery** in different ways (via building blocks and frameworks) and place emphasis on different aspects depending on the organizational drive and position. These frameworks have in common the acknowledgement of the multiple, interconnected, and dynamic factors that need to be in place at multiple levels, and

can be grouped around **five dimensions**: financial, institutional, technical, environmental, and social.

- The drive to "sustainable service delivery" has evolved into the widespread adoption of **systems-approaches** or holistic approaches that aim to embrace the complexity of service delivery to achieve sustainable outcomes, including the dynamics and inter-relations between actors in the system, moving beyond the more static building blocks.
- Despite the adoption of the **human right to water** and incorporation of such rights into legislation and sector policy in many countries, progress in making this a reality for rural populations has been disappointing and barriers remain to its full adoption, including constraints on financing.
- In terms of financing, the rural water sector has been **historically dependent on external aid** in the form of ODA and financing overwhelmingly focused on new capital investment, to the detriment of long-term operation and maintenance of services following initial construction.
- The **requirement for subsidies**, at least in the interim period, to ensure higher quality rural water services has also been recognized and is starting to be addressed in a more structured way.
- The importance of **understanding all life-time costs** associated with service delivery—and matching these with different sources of financing —is now firmly established.
- The need to design and implement new financing strategies at scale has been well accepted. This has been driven in part by the political leverage resulting from adoption of SDG 6.1, as well as changes in ODA flows and diversification of financing sources.
- **Innovations and new financing modalities** have been introduced to the rural sector in several counties, including aggregation of markets, de-risking mechanisms, performance-based contracting, and microloans; efforts to attract commercial financing for rural water have also been made. Although these have been relatively successful, for the most part these still operate at relatively limited scale and/or require substantive grant funding.
- There have been several notable examples of countries that have invested **in large-scale institutional reforms** to establish the conditions under which existing forms of finance (public and concessionary lending or grants) can be used more effectively and at scale. Public financing made available by **national development banks** can play an important role in financing rural water.
- Rapid advances in **mobile telecommunication networks, digitization, and remote sensing** are providing technical solutions to the flow of data to support new financing mechanisms as well as more transparent payments by users.
- There is a strong link between **professionalizing the management of rural water supply and improving financing** which allows for more competent operators and can support improved practices.

# 4. MANAGING RURAL WATER SERVICES

**Key questions addressed in this section:**

- What does the management of rural water services refer to and how is it defined in the sector?
- What are the characteristics of various management models for rural water services?
- How did community-based management (CBM) emerge and evolve to become the predominant model for managing rural water services?
- What are the limitations of CBM and is it failing?
- What are the alternatives to CBM?
- How and why were alternative management models introduced?
- What is the understanding of the term "professionalization?"

## 4.1 WHAT IS MANAGEMENT OF RURAL WATER SUPPLY AND HOW IS IT DEFINED?

In broad terms "management" is defined as having charge over, to direct or administer a company, organization, or portfolio of assets and the associated group of people with responsibility for controlling resources or people and to deliver a desired end or outcome. Although the term management is used widely in the sector literature, there are relatively few references to the precise meaning of the term when it relates to rural water supply. This contrasts with the use of references to management models as typologies more broadly, which are much more commonplace.

The literature that does address what is meant specifically by management for rural water includes two broad dimensions: first, the (technical) functions or roles; and second, the characteristics or attributes of management bodies or entities that carry out these functions. Both areas of discourse in the literature apply overwhelmingly to CBM. In the first instance, management functions are defined as the day-to-day operation of physical infrastructure, including **technical tasks** of varying complexity such as preventative and corrective maintenance (and in certain contexts managing capital asset maintenance or upgrading), day-to-day provision of water supplies such as opening and closing valves, checking and cleaning of valves and storage tanks, pipelines and handpump components and disinfection tasks, procurement of consumables and spare parts. In addition to these, a number of **non-physical tasks** are cited as being part of management of rural water including those relating to: the retailing of water, billing, meter reading, tariff collection, bookkeeping, and providing quarterly or annual reports on financial and other performance aspects (Lockwood and Smits 2011; World Bank Group 2017b; World Bank WSP and AFDB 2013; Schouten and Moriarty 2002; World Bank WSP 2016; Kleemeier 2010; P. Harvey and Reed 2004; Lammerink and Bolt 2002; Fragano et al. 2001). This range of functions and tasks may be applied whether the management entity are owners of assets or legally delegated to operate and maintain physical water supply facilities (Schouten and Moriarty 2002; Adank, van Lieshout, and Ward 2021).

The majority of the literature refers to CBM and, with certain exceptions, there is far less specific reference to management tasks of private sector operators (Kleemeier 2010) and water service utilities, which are characterized by paid operational staff, as well as professional paid executive management referred to as 'corporate oversight' (Adank, van Lieshout, and Ward 2021). In addition to the above

tasks which are largely focused on the physical assets and financing activities, a number of authors point to the more **organizational and facilitative roles** expected of management entities (Schouten and Moriarty 2002; Lockwood and Smits 2011; Whaley and Cleaver 2017; Lammerink and Bolt 2002; Lockwood, Bakalian, and Wakeman 2003). Again, these aspects tend to be largely associated with community-managed schemes and include the sets of functions outlined in Box 4 below.

*Box 4: Organizational and facilitation functions of management for rural water*

The following sets of functions are largely attributed to community management entities and appear across different literature sources:

- Ensuring the equitable distribution of water supply and that marginalized groups in the community or service area receive services, including applying (internal) subsidies;
- Representing and coordinating the community or scheme in contacts with government officials, external aid organizations, private sector, and other religious or cultural leadership;
- Resolving conflicts and facilitating between different parties with grievances over service levels, payment of tariffs, etc.;
- Identifying, understanding, and interpreting sector norms and guidelines or local by-laws relating to the functioning of rural water supply;
- (self) Monitoring, collecting data, and reporting to external entities such as local government or deconcentrated national government bodies;
- Liaising and collaborating with public health agencies on the promotion of good hygiene behaviors, safe water use and water conservation; and
- Training community members and (new) volunteers.

Related to the role of the management entity, particularly for more conventional CBM approaches, several references are made to the **attributes or desired characteristics** that such management bodies—and individual managers—should demonstrate to function effectively. These include authoritative and credible leadership with capacity to make and enforce decisions, recognition as a legitimate body both by users (consumers) and by local government authorities and other external stakeholders (Whaley and Cleaver 2017; Richard Carter 2021; P. Harvey and Reed 2004). Although the majority of references in the literature are made in the context of CBM, more recently the USAID Sustainable WASH System project has produced a comprehensive definition of professionalized maintenance provision as it relates to support for community management entities (Lockwood, Chintalapati, et al. 2021; Lockwood, Nyaga, et al. 2021).

**Service providers, the service authority, and the enabling environment.** Typically, service provider functions are found at the level of a community or grouping of communities, depending on the size and scale of the water supply scheme. The management functions set out above can apply to a range of different approaches or models, from CBM to private provision. However, from the early 2010s the literature includes more explicit recognition of management functions within the broader framework of rural water services, specifically by considering the scale of provision and the need to address dimensions of management of services at the level beyond individual communities. This was largely in response to the perceived limitations, of attempts to improve service delivery by intervening at a limited scale, which was not able to address more systemic functions such as post-construction support, monitoring, or financing through the use of subsidies, particularly for capital maintenance (Lockwood

and Smits 2011; Moriarty et al. 2013). The concept of management also being part of the **service authority** functions has since gained broad recognition and has been used widely in analytical frameworks and studies relating to the delivery of rural water services (Lockwood et al. 2016; WaterAid 2021; Richard Carter 2021; USAID 2020; Moriarty et al. 2013; World Bank Group 2017b). The core functions of service authorities include investment planning, contracting, monitoring, and oversight, as well as support to service providers in more complex maintenance tasks and potentially regulatory activities. These functions are typically carried out by local governments or deconcentrated branches of national ministries and are aligned with broader governance policies supporting decentralization of public service provision beyond only water supply (World Bank Group 2017b; Lockwood and Smits 2011).

When considering how management is defined for rural water and the requirements for capacity and reform at the enabling environment levels, it is interesting to note that there are a number of direct parallels with efforts to improve management in the urban sector, which are more structured and advanced; see Box 5 below.

*Box 5: Lessons from the utility turnaround framework for the rural water section*

The World Bank has developed a utility turnaround framework to improve the performance of water utilities faced by complex and multidimensional problems caused by dysfunctional political environments and entrenched backlogs of inefficient practices. The framework provides a guide for adopting a series of practical steps to increase the utility's operational and managerial efficiency, and in turn, providing sufficient, reliable, convenient, and safe water services and service provision characterized by transparency, financial sustainability, and responsiveness to citizens. In doing so, the framework is developed on a number of key assumptions that have emerged from empirical evidence with many parallels to rural water service provision:

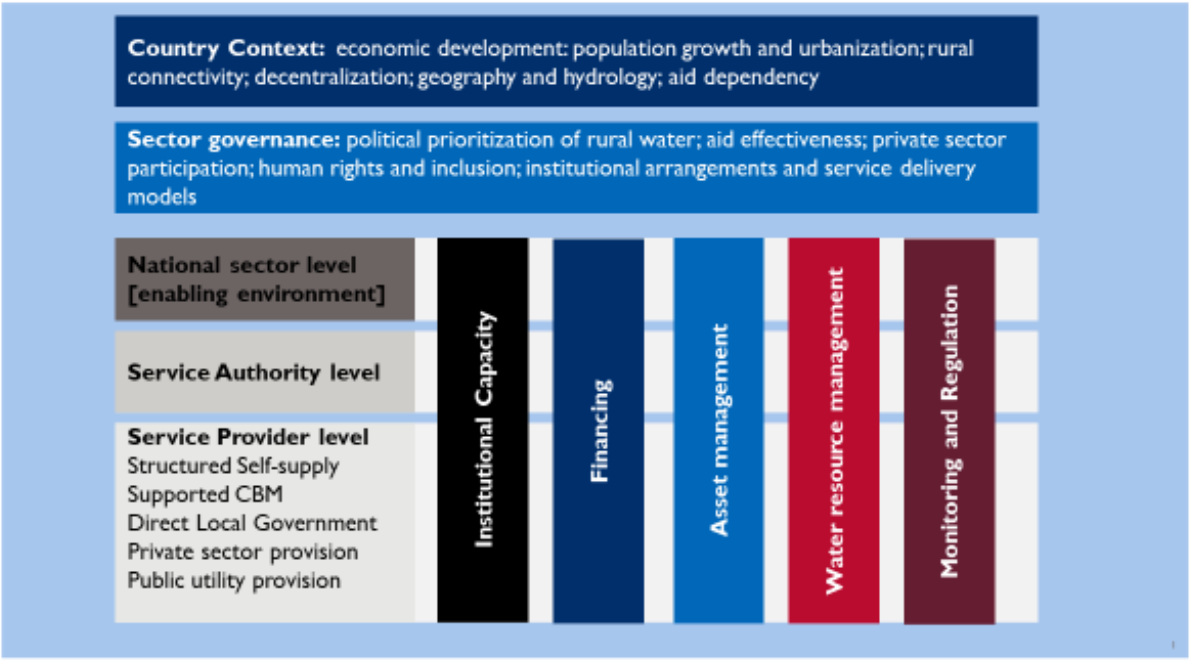
- Improved management has the potential to lead to better services.
- Despite repeated interventions, many water utilities have continued to perform poorly, largely due to the political economy in which they operate.
- Turning around a water utility's performance requires transforming the dysfunctional political economy in which it operates effectively via virtuous cycles that stop downward spirals and create the credibility, accountability, and autonomy—or at least space for reform—required to perform successfully.
- Poorly performing water utilities waste much of their funding on inefficient operations and poorly planned and executed investments. A more effective use of funds may be attained by increasing the efficiency of water utilities' operational and capital investments.
- Steps to improve the operational and managerial capacity of water utilities should be sequenced and coordinated within a broader strategy to succeed.

The empirical evidence indicates that specific conditions need to exist before starting a utility turnaround. These necessary conditions include catalysts that provide space for change, a government leader who champions the required reforms, and a competent manager with sufficient managerial autonomy to implement changes. While the first two conditions are exogenous and offer an opportunity to start a turnaround, they do not by themselves ensure success.

For more information on the utility turnaround framework:
https://openknowledge.worldbank.org/handle/10986/30863

Finally, the concept of **service delivery models**, within which specific management models' function (e.g., CBM, public utility, private etc.), emphasizes the importance of broader context and the water sector **enabling environment** at national level. This latter concept refers to the need to have "good enough" policies, institutional arrangements and macro-investment planning and financing frameworks, as well as monitoring, oversight, and where possible, appropriate forms of regulation to support service delivery at lower levels (World Bank Group 2017b; Lockwood and Smits 2011; WaterAid 2021). These core building blocks" of the service delivery model subsequently fed into thinking around taking more holistic, system-based approaches to rural water provision as outlined in Section 3.1 above. The following schematic provides an overview of the different levels (World Bank Group 2017b):

*Figure 2: Service delivery model framework for analyzing rural water sector*




SOURCE: ADAPTED BY AUTHORS FROM (WORLD BANK GROUP 2017B)

## 4.2 THE CHALLENGES OF MANAGING WATER SERVICES IN RURAL CONTEXTS

**The rural context presents multiple challenges to management of water services across many dimensions.** Rural areas in most low-and middle-income countries are challenging to live and work in at the best of times. From a geo-physical and climatic perspective, rural areas are often difficult to navigate physically, may involve very large distances between populations and suffer from extremes in weather and climate-related events, without the socio-economic resilience of more densely populated part of a country (Richard Carter 2021; Zaveri et al. 2021). As outlined in Section 2 of this document, the world is urbanizing rapidly and this trend often is a driver or pull factor for many of the most capable—and younger, more ambitious, and more capacitated—people in rural areas. Poor, or non-existent, services (offered by public, or state entities and private providers) in rural areas may also

contribute as a 'push factor' to out-migration, putting both further pressure on urban areas as people move in search of a better life, but also leading to the de-population of rural areas.

**Rural areas are less of a political priority for key decision-makers.** Among the most important factors contributing to the deprivation of rural areas at a macro level is the lack of prioritization by governments, linked to rural populations' often weak political voice and lack of agency as compared to urban centers (Richard Carter 2021; Rickert and Schmoll 2011). Also, for cash-constrained economies, the rural water sector appears less economically attractive in terms of return on investments and having higher per capita costs than urban water supply largely due to differences in population densities and possible economies of scale. One reflection of these realities, is a significant imbalance of funds directed toward investment between rural and urban areas; according to the UN-Water GLAAS produced by WHO, *urban expenditures account for more than three times rural expenditures, despite lower access* (WHO 2017).

**The specificities of rural water make it particularly difficult to attract both public and private investments and qualified managers.** Rural areas are generally less densely populated than urban areas, usually with significant pockets of remote and hard to reach communities due to the natural conditions of geography and topography. Poor transport links, and high cost of transport is an important cost-driver and hampers maintenance and business activities in rural areas. Secondly, the reality in many countries is that the rural water institutional landscape is currently dominated by often many thousands of small-scale, informal, and low capacity (community-managed) entities, who are difficult to reach and engage with for governments (Lockwood and Smits 2011; World Bank Group 2017b; Richard Carter 2021). The result is that for potential alternative, private sector management approaches, there is little, if any, in the way of true profit-incentives to be had in taking on most rural water supply schemes and some form of subsidies will be required (Lockwood, Chintalapati, et al. 2021; Richard Carter 2021; McNicholl et al. 2019).

### 4.3 COMMUNITY-BASED MANAGEMENT: FROM MYTH TO REALITY

Over the past three decades, community management has become the management model promoted by the development sector and adopted in many national sector policy approaches for rural water supply in low and middle-income countries and is true in most parts of sub-Saharan Africa. This is also the case in Latin America, where around 80,000 community water boards were recorded as operational and serving some 40 million people in rural areas (Schouten and Moriarty 2002; P. Harvey and Reed 2004; Lockwood and Smits 2011; Rodriguez de San Miguel et al. 2015). Community-management is also still central to rural water provision policy across significant number of countries in Asia, including Bangladesh, Cambodia China, Indonesia and (World Bank Group 2017b; Fischer et al. 2021; Yu 2014; Thapa, Farid, and Prevost 2021; Cambodia Government 2011). Although alternative models are also recognized and being developed, such as formalization of self-supply and promotion of small-scale private operators, CBM remains central to policy in many cases.

**Defining community.** A community is a group of people living in the same village or neighborhood, organized into a social entity. Community participation is often defined as the process of people being involved in, and sharing, a variety of activities with a communal goal; however, living in the same community does not always mean that people share the same interests. Indeed there may be conflict

between different groups within a community as most are not homogeneous, reflecting differences and asymmetries in power, religious or ethnic sub-groupings and often having marginalized sub-groups (Lammerink and Bolt 2002).

**More specifically, CBM has been defined in various ways in the literature, with two main dimensions being identified.** The first is a more tactical or literal interpretation reflected in the involvement of community members in initial scheme construction through cash or in-kind contributions, and subsequent voluntary management through the day-to-day technical operation, administration, and maintenance of the physical facility (Schouten and Moriarty 2002; Lammerink and Bolt 2002; P. Harvey and Reed 2004) . The second, and perhaps more ideological definition of community management refers to the following elements (*ibid*):

1. Responsibility: The community takes on the ownership and attendant obligations of the system.
2. Authority: The community has the legitimate right to make decisions regarding the system on behalf of the users.
3. Control: The community can determine the outcome and to carry out its decisions.

Subsequent commentators have added to these definitions by stressing ownership and cost-sharing (Lockwood 2004). The description provided by Schouten and Moriarty (2002) captures the ideological dimension of community management well: *We believe that community management is..... about communities making strategic decisions: what level of service they want, how they want to pay for it, where they want it. The community may also be involved in day-to-day operation and maintenance, in collecting money from users and in buying spare parts, but they do not have to be. They may choose to hire a professional to do this for them. Community management is about power and control.*

**CBM was introduced as a response to failing state provision**. CBM emerged in the 1980s, during the first UN "Water Decade," in part as a result of general dissatisfaction with top-down and supply-driven approaches, unresponsive bureaucracies (Arlosoroff 1987; Briscoe and Ferranti 1988; Katz and Sara 1997) and also in part as a result of state retrenchment in public services related to reforms driven by international financing conditionalities (Koehler et al. 2018). These processes encouraged other stakeholders such as communities, NGOs, and civil society groups to take responsibility for the running of public services and led the state to move toward that of a regulator, promoting "user participation" and decentralization to reduce the direct role of the state in the management of water resources (van Koppen, Butterworth, and Juma 2005).

**An appealing concept addressing various ideologies**. From a philosophical perspective, the concept of CBM can be seen as an "uneasy coalition" of ideologies (van den Broek and Brown 2015). It is altogether *all things to all people*, as it promised to shrink the state and deliver more for less and appealed to those on the right of the political spectrum. Some commentators equate this with the abdication of state responsibility as a duty bearer. It also appealed to those on the left because it promised to transfer the power to the people and deliver better outcomes (Chowns 2014). CBM has also been considered a strategy for operationalizing the concepts of decentralization, citizen-

participation, demand-responsiveness;[17] and an extension of the participatory paradigm into the rural water supply sector (Barham 2002; Cleaver and Toner 2006; Kessy and McCourt 2013; Faguet 2011).

**A rapid mainstreaming of the CBM model for rural water supply management.** At the start of the 1990s, the CBM model became mainstreamed into a sequence of sector policy positions, grounding it to community participation, cost sharing (via user contributions), and ownership (Cleaver and Toner 2006). Further, CBM became a cornerstone of the first International Water Decade, of the first 1990 New Delhi Statement (International Environmental Law Research Centre (IELRC) 1990), which had the objective of "Some for all, rather than more for some" and the Dublin Statement on Water and Sustainable Development (International Environmental Law Research Centre (IELRC) 1992). The principles of participation and ownership were celebrated as a panacea for effective and sustainable services. This legitimized the rapid construction of community-managed water points with rural populations all over the world in the context of the MDGs and with priority given to extend the provision of improved water sources to the many millions of people who lacked them through a "demand-responsive Approach," which was seen as a means of improving sustainability (Katz and Sara 1997). CBM was included in major policy and practitioner discourses on rural water supply (Schouten and Moriarty 2002; Nicol, Mehta, and Allouche 2012) and promoted through a series of conferences, communiques, and statements before being included in many national sector policies with the support of the international community (Republic of Zimbabwe 1998; Republic of Kenya 2002; Kafakoma and Silungwe 2003; Republic of Uganda 1999; van Koppen, Butterworth, and Juma 2005).

**High expectations that CBM would lead to improved services**. Decision-makers shared the expectations that CBM would result in a number of positive outcomes: i) provide more efficient and effective water services through better technical performance (through appropriate technologies, more frequent maintenance, and faster repairs by local technicians); ii) avoid the barriers of distance and poor communication that contributed to slow response time from centralized maintenance teams, and iii) provide a strong incentive to quickly repair broken infrastructure and address non-functionality (Schouten and Moriarty 2002; Annala 2021). With the financial burden of ongoing operations and maintenance (O&M) too great for the state, expectation that the only way to generate the funds needed was through user contribution (Briscoe and Ferranti 1988).

**Emerging criticism of basic forms of "unsupported" CBM, as a universal model for managing rural water supply**. Around the turn of the millennium, academic and practitioners' voices were being raised to share concerns over the unrealistic expectation that rural communities could be left to their own devices without support after a capital investment project was completed. There is some evidence in the literature of more sustainable service delivery outcomes under CBM (Whittington et al. 2009; Marks et al. 2018); however, many practitioners recognized that CBM had, by and large, not been able to achieve the ultimate goal of providing reliable and sustainable water supply at scale (Lockwood 2002; Schouten and Moriarty 2002; Kayser et al. 2014; Lockwood, Bakalian, and Wakeman 2003; Lockwood 2004; Schouten and Moriarty 2002), as evidenced by poor performance, high rates of

[17] Demand-responsive model is characterized by i) involving households in the choice of technology and of institutional and governance arrangement; ii) giving women a larger role in decision-making than had been the norm; and iii) requiring households to pay all of the operation and maintenance cost of providing water and services and at least some of the capital costs, often through contributions "in kind" such as free labor and locally sourced construction materials.

hardware failure, and low levels of service (Moriarty et al. 2013) and called for some form of post-construction support to provide training and technical assistance (Kayser et al. 2014; McIntyre and Smits 2015; Hutchings et al. 2015; Lockwood 2002). The consideration of CBM, as a "unitary, benign, effective and apolitical approach" was labeled as a myth by academics (Cleaver 1999; Blaikie 2006; Hope 2015).

**A combination of practical and theoretical flaws of CBM**. Scholars and practitioners highlighted the many fundamental flaws of the basic form of CBM to explain the observed high levels of non-functionality (Whaley and Cleaver 2017; P. A. Harvey and Reed 2007; Chowns 2015; J. Brown 2011; Cleaver 1999; O'Reilly and Dhanju 2012; Cleaver and Toner 2006), as shown in Box 6 and is summarized as follows:

- From a policy perspective, the approach was considered to fall short in two main areas: lacking strategies for long-term sustainability, and a lack of scalability across large projects (Bolt 2001); the over-reliance on voluntarism and most of all, the systemic lack of external support to provide long-term technical support to communities in their regular functions (Lockwood 2002; Baumann 2006; Hutchings et al. 2015).
- From a technical perspective, the sector realized that the lack of adequate skills was leading to suboptimal choices, insufficient supervision, inadequate maintenance, and ultimately to technical failures (Colin 1999).
- From a financial perspective: the transfer of responsibility to users became increasingly criticized with the observation that user payments were generally insufficient to meet the actual costs of O&M (Richard Carter 2009); payment mechanisms were inconsistent with financing requirements (Fonseca et al. 2011) and amounts collected generally lower than needed (Whittington et al. 2009; Richard Carter 2009).
- From an institutional perspective: CBM was associated with dangers of the localisms, including the risk of elite capture (Cleaver 1999; Vollan 2012; Mohan and Stokke 2000; Botchway 2001), CBM may in fact weaken the institutional capacity to deliver public services, by placing excessive burdens on communities while simultaneously hollowing out local government capacity (Chowns 2015). Without more pluralistic institutional approaches, communities left to manage their own water supply schemes may also be subject to a disproportionate risk, without state and private sector involvement (Koehler, Thomson, et al. 2021).

*Box 6: Is CBM fundamentally flawed, or has it not been implemented properly?*

Most of the literature focuses on outlining the practical limitations of CBM and its inability to achieve the expected outcomes (as outlined above), but a debate persists on whether CBM did not deliver results due these challenges, or rather to the way in which it was implemented, or rather the premise that CBM – in most cases – has not been applied as it was envisioned, particularly with a commensurate level of support (Franceys 2019; Richard Carter 2021).

Franceys (2019) uses the evolutionary concepts applied to institutional change to explain that institutional solutions or management models can only be self-sustaining if they have had a chance to co-evolve to be in balance with the effective social demand. He argues that rural water sector development has short-circuited these co-evolutionary mechanisms by delivering what we believe rural dwellers to be demanding (improved water supply), in advance of their co-evolution of actual demand and actual willingness to pay. In doing so, he argues that we have destroyed the possibility for genuine community institutional mechanisms to develop in

time to support that short-cut service. He therefore argues that rural water institution must be supported with long-term external resources (human as well as financial) because we are asking that institution to deliver services above the trendline of social, economic, and institutional evolved development.

SOURCE: FRANCEYS, 2019.

**A more recent outlook on CBM from a co-production perspective**. To acknowledge the joint responsibilities of communities, and state and non-state actors, recent scholars have started to propose co-production instead of community management as a concept in water governance. Co-production describes a process where hybrid service provision modalities are produced as a result of the articulation of socio-political, economic, biophysical, and infrastructural drivers whose interaction constitutes new practices, thereby producing new meaning (Annala 2021; Ahlers et al. 2014). Co-production is viewed as a route to overcome sustainability problems in rural water supply through collaboration and risk-sharing while also recognizing that water is inherently political and a space for contested power relations between state and non-state actors (Annala 2021; Hutchings 2018; Koehler et al. 2018; Koehler, Thomson, et al. 2021; Ahlers et al. 2014). While traditionally the concept has been viewed as the cooperation between state and non-state actors (Joshi and Moore 2004), Ahlers et al. (2021) and Annala (2021) argue that the co-production is far from collaborative but instead tense and riddled with power asymmetries and political aspirations, thereby producing uneven and highly contested water service provisioning.

This perspective can be contrasted with negative perspectives in studies asserting that co-construction serves as an overly consensual approach to depoliticize access to public services (Eriksson 2012); when in fact CBM reproduces neoliberal free market ideology and is a fix for the consequences of austerity (McGimpsey 2017) where paid personnel can be replaced by co-producing citizens (Fotaki 2015).

**From CBM to systemic failure**. The wide spectrum of social, economic, technical, environmental, and institutional challenges, as well as the broad range of actors involved in service provision has supported the rise of the holistic and systems-approach to rural water service delivery (see Section 3.1 above). Part of the shift in adopting systems-based approaches has been the acknowledgement that focusing on CBM or any other management arrangement alone, was insufficient to a achieve successful outcomes and that services should be designed, implemented, and managed with scale and long-term services in mind. Several writers (Walters and Javernick-Will 2015; Liddle and Fenner 2017) have pointed out that rural water services can be conceptualized as a system of nodes and links, with feedback loops; the interactions between different elements in the system make the unravelling of causal linkages (of high or low performance) difficult. Some writers go further and argue that the system is complex, exhibiting aspects such as unpredictability and adaptation (Valcourt, Walters, et al. 2020).

**The driver to move away from traditional forms of "unsupported" CBM.** Whether due to fundamental limitations or inadequate implementation, there has been growing recognition in the water sector over recent years that CBM had reached the limits of *what could be realistically achieved in an approach based on informality and voluntarism* (Moriarty et al. 2013). The classic, unsupported approach to CBM[18] has been considered inadequate, particularly in the context of international imperatives to raise

[18] Unsupported CBM is also referred to as basic CBM; the two are taken to be interchangeable for the purposes of this study.

service levels and the increasing complexity of service provision. To be effective, CBM should not be considered a form of service delivery on the cheap, and external parties should be expected to play an extensive role in supporting communities (Lockwood 2002; Baumann 2006; Lockwood and Smits 2011; Hutchings et al. 2015). Baumann (2006) labeled this transition as a move to community management plus (CM+); although other terms have also been used including post-construction support, direct and indirect support, or external support (Schouten and Moriarty 2002; Lockwood and Smits 2011; Lockwood 2002; Jansz 2011; Kleemeier 2000). Regardless of labeling, the sector has recognized the need to consider the following aspects:

- **Professionalization of CBM,** understood as services run by professionals rather than untrained volunteers, would be required to achieve improved outcomes (Moriarty et al. 2013; Chowns 2015; Franceys 2019; Lockwood and Le Gouais 2015)
- **Long-term support to communities** and a move away from "hand-over" of infrastructure to communities to take ownership and complete operation and maintenance duties would lead to a more structured approach (Baumann 2006; Lockwood 2002; Lockwood and Smits 2011; Moriarty et al. 2013; Hutchings et al. 2015), through various channels and mechanisms that have been called "Institutional Support Mechanisms" (Lockwood 2002).
- **Adoption of alternatives, including of financing sources**, based on the provision of direct support (or post-construction support) and the adoption of alternative models addressing the sustainable financing of services and direct support costs (Smits et al. 2011; Gerlach 2019) as part of the recognition of CBM plus (or CBM+) as an important alternative to the basic form of community management (Baumann 2006; Moriarty and Verdemato 2010).

### 4.4 EMERGENCE OF ALTERNATIVE MANAGEMENT ARRANGEMENTS

**The emergence of alternative management arrangements has involved common trends and drivers across different country contexts with development partners often playing a critical role, especially in piloting of new approaches.** New sector policies and changes to regulatory frameworks have allowed, or encouraged, the adoption of alternative approaches, which are progressing at different levels of completeness and scale. (Lockwood and Smits 2011; Moriarty et al. 2013; World Bank Group 2017b; Richard Carter 2021; Montangero 2008; Sutton and Butterworth 2021; Foster 2012; World Bank WSP and AFDB 2013). The development and adoption of new approaches is normally a substantive and long-term process, evolving over several years and requiring coordination and consensus building across a range of stakeholders; and in some instances, passage of new legislation to create an agency or mandate the involvement of private sector actors. Although there are no distinct pathways that are discernable from the literature it is possible to identify some of the common stages and scenarios through which management arrangements have evolved; see Table 5.

**Some** countries have introduced structured and more wholesale change, usually **underpinned** by a clear political vision or policy formulation toward a single form of management arrangement and a clear pathway to operationalization. For example, in both the cases of the PPP models let through district governments in Rwanda or the larger-scale PPP arrangements in Senegal covering eight service provision areas, there was a significant, long-term investment in adjusting the legal and institutional architecture of the sector (OFOR, Republic of Senegal 2021). Other countries have initiated progressive shifts, testing

and trialing before adopting a wholesale policy change or iteration as in the case of Ghana or Uganda (see Box 7 below). National and international NGOs, donors, and researchers often play a pivotal role in these pilots. Other approaches that have been pilots, have been in response to broader government concerns as is the case of the Inspiring Water Entrepreneurship in Tigray (iWET) program in Ethiopia which promoted the Private Local Sector Provider model (Lockwood 2019; Koehler, Nyaga, et al. 2021). In still other cases, the rural sub-sector has taken lessons in a stepwise process from gains seem in urban water supply and it in the process of applying management arrangements, asset holding and regulatory functions in rural services areas. Examples include the recently issued guidelines by the regulator Water Services Regulatory Board (WASREB) in Kenya to regularize and expand service provision to rural areas, the establishment of an asset holding entity in Mozambique for rural and small towns and the rollout of commercial utilities in Zambia (ESAWAS 2022; WASREB 2019). Generally, the option of local government direct provision is seen as not performing strongly, and apart from some important and notable exceptions, (specifically India), this arrangement is not being actively pursued.

*Table 5: Overview of evolution of alternative management arrangements and main drivers in African countries*

| COUNTRY | MANAGEMENT ARRANGEMENT | SCALE | STAGE OF DEVELOPMENT | DRIVERS | LEAD INSTITUTIONS | SOURCE |
|---|---|---|---|---|---|---|
| **Central African Republic** | Water for Good circuit rider model supporting CBM | Prefecture (9 of 16) | Well established | Lack of government presence<br>Humanitarian necessity<br>Conflict and fragility | International NGO | (Fink et al. 2022)<br>(Lockwood 2019) |
| **Ethiopia (Tigray Province)** | Piloting and scaling up of Private local service providers for professionalized maintenance to CBM-based iWET program in Tigray | Regional (with national interest) | | Failure of existing approaches<br>Federal policy on youth employment | International and local NGOs<br>Devolved reginal government<br>Ministry of Micro and Small-Scale Enterprises | (Lockwood 2019) |
| **Ghana** | Transition of functions of CWSA into rural utility actively operating and managing water piped facilities | National | Early stage of operationalization under revised sector policy (not yet approved by Parliament) | Significant shifts or withdrawal of institutional funding<br>Political influence | Water Ministry<br>Parastatal | (Huston et al. 2021)<br>(IRC 2017) |
| **Kenya** | New regulatory guidelines issued by WASREB for:<br>Establishment of new County WSPs<br>Regulation of existing County WSPs<br>Delegation of O&M by County | National and devolved County | Not yet operationalized at scale | Policy influence<br>Political decentralization | Regulator<br>Water Ministry<br>Devolved govts. | (WASREB 2019) |

| COUNTRY | MANAGEMENT ARRANGEMENT | SCALE | STAGE OF DEVELOPMENT | DRIVERS | LEAD INSTITUTIONS | SOURCE |
|---|---|---|---|---|---|---|
| | Piloting of professionalized performance-based maintenance provider supporting CBM (FundiFix) | Sub-county (Kitui and Kwale Counties) | Proof of concept established | Research<br>Donor support<br>Policy influence | Social enterprise<br>University | (Koehler, Nyaga, et al. 2021) (Fundifix 2021) (Lockwood 2019) |
| **Mali** | Introduction of obligation of municipalities to delegate public service to associations or private operators | National (30 centers) | Well established | Limited progress, poor technical and financial performance<br>Donor support | Ministry of Energy and Water | (Hydrocon seil 2016) |
| **Rwanda** | Introduction of private sector participation through PPP contracts let at district level and governed by national regulator | National | Well established | Rationalization and increased performance of service providers | Regulator<br>Water ministry<br>Local govts. | (Rwanda Ministry of Infrastructur e 2018) |
| **Senegal** | Establishment of Rural Borehole Management Office, (*Office des Forages Ruraux*), a national asset holding agency responsible for managing, monitoring, and delegating rural water supply assets to enable PPP contracting. | National | Well established | Policy influence<br>Donor support | Ministry of Water | Evaluation of rural water reform, 2022 |
| **Tanzania** | Establishment of RUWASA as rural water utility provider to rationalize and reform rural water service provision (water Supply Act No. 5, 2019) | National (129 rural districts and 61 towns) | Recently established | Poor sector performance<br>Limited technical and financial performance of COWSOs | Ministry of Water | (Tetra Tech 2022) |
| **Uganda** | Introduction of new National O&M Strategy to establish professionalized maintenance services for support to CBM through Area Service Providers | National | Not yet operationalized at scale | Failure of existing approaches<br>Policy influence | Water ministry<br>National and International NGOs<br>Donors | MWE 2020; A. Harvey 2021; Lockwood, Chintalapat i, et al. 2021 |

| COUNTRY | MANAGEMENT ARRANGEMENT | SCALE | STAGE OF DEVELOPMENT | DRIVERS | LEAD INSTITUTIONS | SOURCE |
|---|---|---|---|---|---|---|
| | Umbrella utilities for Water and Sanitation (Rural and Small-Town Focused Utilities) Direct Provision | National – currently managing over 300 facilities and serve over 4.4 million people | Well-established, albeit with the operational practices of the Umbrellas for Water and Sanitation continuing to be refined | Weaknesses in CBM<br>Emphasis on financial viability and enhanced quality of service<br>Policy influence | Ministry of Water and Environment | (Republic of Uganda 2020) |
| **Zambia** | Extension of Commercial Utility mandate to cover rural areas to delegate functions to private operators included in Framework for Provision and Regulation for Rural WSS services | National | Not yet operationalized at scale | Failure of existing approaches based on community-based management | Regulator<br>Water ministry | (NWASCO 2018; WaterAid 2021) |

*Box 7: Development, testing, and rollout of CBMS Plus as part of a broader shift away from community-based management*

The Government of Uganda has made significant efforts to strengthen CBM, by introducing area service providers to provide professionalized maintenance in support of community entities. This approach, which the government terms as "CBMS Plus" was in large part informed by the piloting and advocacy of a number of externally funded organizations which had been testing delegated private maintenance providers over several years, in collaboration with government. This restructuring of CBM has evolved through a series of phases and in parallel with broader efforts to extend service areas of the National Water and Sewerage Corporation for piped supplies to towns and rural growth centers and Umbrella Authority utilities for the other piped schemes in non-gazetted areas. The transition of the Umbrella Authorities into dedicated rural public utilities in 2017, builds on earlier reforms, in which they were first introduced to facilitate the delegation of private operators during the first decade of the 2000s. This latest reform was driven by the government's vision of consolidating service areas, achieving economies of scale and reducing overhead costs. Taken together, these developments in the sector are part of concerted effort to move from CBM to professionalized management approaches at scale with the implication that the sector seeks to eventually transition away from community-based management altogether.

SOURCES: (MWE 2020; HUSTON ET AL. 2021; A. HARVEY 2021; RENOUF AND ABIDI 2022; HIRN 2013)

**Such changes may be driven by different political or financial concerns,** for example the growing pressure on the Community Water and Sanitation Agency in Ghana to change its revenue sources due to dwindling aid funding, or in response to the perceived failure of previous approaches as in the case of the re-centralization of functions under the Rural Water Supply and Sanitation Agency (RUWASA) in Tanzania. It is also important to note that changes in management arrangements have not

materialized overnight, continue to evolve, and face challenges for different reasons, including (political) resistance of stakeholders with vested interests[19].

**A recent study researching the expansion of utility provision in rural areas, however, does identify three distinct pathways for the application or rollout of alternative management arrangements.** The study looked at experiences from 33 management arrangements in 22 countries from high-income contexts (e.g., England and Wales, Netherlands, Portugal, and France), upper-middle-income economies such as Brazil, China, Colombia, and Namibia; lower-middle-income countries (e.g., Ghana, Kenya, Senegal, Vietnam, and Zambia), and finally LICs such as Burkina Faso, Ethiopia, Mali, Rwanda, and Uganda. Utility-managed rural water supply models from these 33 examples were then mapped according to a categorization that ranges from national urban-focused utilities operating across multiple service areas to single area rural utilities. The pathways for expansion of such models into rural areas include (i) existing utility expanding networks into rural areas (either physically or taking over management functions); (ii) a transformation of the utility as a regional or national provider; and (ii) introduction of a completely new service delivery model (utility) to operate in rural areas (Adank, van Lieshout, and Ward 2021).

## 4.5 TYPOLOGY OF ALTERNATIVE MANAGEMENT MODELS

**A typology of alternative management models can be identified that is common across the majority of sector studies; these identify four main models, including self-supply, local government provision, public utility, and private operator models.** As part of documenting the diversification of alternative management models a typology emerges, including common categories of arrangements across the literature, which are summarized in Table 6 below (World Bank Group 2017b; USAID 2020; Lockwood and Smits 2011; RWSN 2019; Montangero 2008). Apart from improved or supported CBM, the most common of these typologies focuses on the following four arrangements.

**Supported self-supply: households, or small clusters of households, providing their own solutions to water supply, including initial capital investments.** This form of management is most typical in highly dispersed communities and is still a common option for remote rural populations, as well as in countries where state provision through other management models has not reached very far or services are perceived to be inadequate (World Bank Group 2017b; Smits 2012). Self-supply is a widespread solution, with the highest investments made by households in middle-income countries, but it is prevalent in all countries where universal coverage has yet to be achieved. Sutton and Butterworth (2021) estimate that approximately 7.4% of rural households in sub-Saharan Africa rely on a form of largely self-financed non-piped on-premises improved supply.

[19] The situation in Senegal demonstrates the challenges facing attempts at reform. After over two decades of change, the sector is still in transition to private sector participation with only four public service delegation contracts operational and resistance in some regions on the part of the community slowing down reforms that should have been achieved by 2017 (unpublished report evaluating the rural water sector reform, 2021).

*Table 6: Variations across the typologies of management models for rural water found in literature*

| TYPOLOGIES OF MANAGEMENT MODELS IN LITERATURE AND VARIATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **ORGANIZATION** | **YEAR** | **CBM** (INCLUDING BASIC, SUPPORTED DELEGATION OF FUNCTIONS AND ASSOCIATIONS) | **NGO OR FAITH GROUP** | **SELF-SUPPLY** | **LOCAL GOVERNMENT PROVISION** (INCLUDING DELEGATION TO COMMUNITY AND PRIVATE OPERATORS) | **PUBLIC UTILITY PROVISION** (INCLUDING NATIONAL, REGIONAL AND LOCAL UTILITIES) | **MINISTRY OR ASSET HOLDING ENTITY** (DELEGATING TO PRIVATE COMPANY) | **PRIVATE PROVISION** |
| Aguasan (7 variants) | 2008 | X (3) | | | X | X (2) | | X |
| IRC (Triple-S) (13 variants) | 2011 | X (4) | | X (2) | X (2) | X | | X (4) |
| World Bank (14 variants) | 2017 | X (5) | | X | X | X (3) | | X (4) |
| WaterAid (10 variants) | 2018 | X (4) | | | X (3) | X | | X (2) |
| RWSN (14 variants) | 2019 | X (4) | X (3) | | X (3) | X | X | X |
| USAID (4 variants) | 2021 | X | | X | | X | | X |

Self-supply remains an important approach in high-income countries. For example, in the USA more than 14% of the rural population supplied its own water for domestic use in 2005, in Ireland, some 25% of households invest individually or in small groups in well or spring-fed supplies and in Germany approximately 700,000 people rely on water from private wells (Smits 2012; Hendry and Akoumianaki 2016).

Despite its widespread application, few low- and middle-income countries have formally recognized self-supply as a management option for meeting the challenge of improved rural water supply, in part because of concerns over the efficacy of this model to address water quality (Richard Carter 2021). For example, in a multi-country study assessing sustainability of rural water supply carried out in 2017, only one of 16 cases (Ethiopia) was found to have a program of structured support to accelerate and improve service delivery under this model (World Bank Group 2017b).

**Direct local government provision.** Under this arrangement, local governments act as non-corporatized service providers for rural communities within their jurisdiction and directly carry out these services. This approach is also sometimes referred to as "direct municipal services" and is common across many low- and middle-income countries, including the eastern European region (World Bank Group 2017b; 2018; Lockwood et al. 2018; Montangero 2008). This arrangement excludes municipal enterprises or corporatized local government utilities which are classified under public utility provision. One notably country example is South Africa, which was found to be an anomaly in a recent assessment of management arrangements, being the only country in the Southern African region where direct local government provision is the predominant approach, with forms of CBM only rarely applied (WaterAid 2021). Direct local government provision is also found in Vietnam for example, where Provincial Centers for Rural Water and Sanitation Services manage many of the schemes constructed under a national rural water supply program without forming a separate corporate entity (World Bank Group 2017b).

**Public utility provision.** This arrangement applies when a separate public entity is assigned and/or established, which may be at central, regional, or municipal level, to provide management of services for communities or small towns in their assigned service area. The scale of operation of utility providers for rural populations can vary from larger sub-national regions to much smaller utilities operating at the decentralized district or municipality level. This group includes deconcentrated government entities, government-owned utilities and parastatal companies operating on a more commercial basis (World Bank Group 2017b; Adank, van Lieshout, and Ward 2021). A number of pathways for utility provision have been identified (Adank, van Lieshout, and Ward 2021), including physical expansion of existing utility networks and management structures, the absorption of existing schemes (often under CBM) into the service area of an existing utility, and thirdly, the introduction of a new utility provider dedicated to serving rural populations. This trend is prevalent in upper-middle income and higher-income countries, where urban utilities have started to integrate peri-urban and denser rural populations into their service areas, which was found to be the case in China, Morocco, and the Philippines in a recent multi-country study (World Bank Group 2017b). A similar trend is also found in OECD countries (see Section 5.3 below).

Management based on public utility provision builds on the concept of clustering or aggregation, in part to achieve economies of scale and pool risk, which is increasingly recognized as an important strategy.

Uganda is a case in point, where the National Water and Sewerage Company has extended operations into rural areas under its large-scale "100% Service Coverage Acceleration" program which aims to provide 140,000 new household connections and 20,000 public standpipes in over 21% of rural communities in the country. In parallel with this, six regional public entities, or Umbrella Authorities that were previously established to facilitate delegated private operators, now manage direct service delivery for over 430 piped schemes previously under CBM that are not managed by the National Water and Sewerage Company (Huston et al. 2021). Other examples include Ghana, where the Community Water and Sanitation Agency is attempting to transition from a facilitator or regulator of services to a national utility for rural water supply, and Zambia where the country's 11 regional commercial utilities now include licensed operating areas in rural parts of the country (Adank, van Lieshout, and Ward 2021; WaterAid 2021; NWASCO 2018). There are also examples of consolidation between more than one public authorities forming inter-communal enterprises to serve rural populations, as in the case in Moldavia (Andronic 2018).

**Private sector management.** This management model applies in cases where private operators either own water assets and manage the services directly or have been delegated responsibility for carrying out certain functions which can range from specific maintenance tasks, retailing water (referred to collectively as Safe Water Enterprises or SWEs), to wholesale O&M of publicly owned water systems through PPP arrangements. The latter are governed by management or lease (also known as *affermage*) contracts and are increasingly let by local governments. PPPs may also involve private capital investment to build, operate, and transfer or to build own and operate PPP model (World Bank Group 2017b; World Bank WSP and AFDB 2013; Kleemeier 2010). Participation of the private sector in rural water provision has partly emerged from the urban water sector, in which ideological arguments in favor of privatization were reinforced by evidence of the failure of public sector (Davis 2005). Such models have been increasingly widespread since around the turn of the millennium, specifically for piped networks (Kleemeier and Lockwood 2015; Gia and Fugelsnes 2010; World Bank Group 2014; Foster 2012; World Bank WSP and AFDB 2013; UNICEF 2018a). Successful engagement of private operators has been documented as being related to broader improvements in the architecture governing PPPs beyond only the water sector as the case in Philippines illustrates (World Bank WSP 2016). A prominent example of private sector management of rural water comes from Senegal where the national asset holding company signs long-term agreements with private operators, now managing some 2,000 schemes serving over 7 million people across the country (Box 8 below).

*Box 8: Regional concessions for private operators in Senegal*

In 2014, the Government of Senegal established the Rural Borehole Management Office, or OFOR (*Office des Forages Ruraux*), a national asset holding agency responsible for managing, monitoring, and delegating rural water supply assets. The OFOR replaced the existing CBM user associations and led to the introduction of PPPs in the form of lease (*affermage*) contracts clustering rural populations into zones based on technical, economic, geographic, and socio-cultural criteria. OFOR has signed several ten-year service agreements, including the very first in 2015, with various private companies in rural areas. To increase the likelihood of sustainability, the selected private sector operators must demonstrate resources and capability to operate complex rural water supply and distribution networks.

The government's strategy for supplying drinking water in rural areas focuses mainly on groundwater usage (97%) and significant investments have been made, with nearly 2,000 schemes now in place across the country. The schemes are composed of boreholes with mechanical pumps and piped distribution networks.

Distribution of Zones by Private Operator

| Private operator | Zone(s) covered | Population served | Production capacity $Mm^3$/year | Number of schemes |
|---|---|---|---|---|
| SEOH | NDP/GL | 500,000 | 5.4 | ~130 |
| Aquatech Senegal | Thies /Dlourbel | 1,600,000 | 14 | 265 |
| FlexEau | Kaolack /Kaffrine | 1,250,000 | 14.5 | 294 |
| SONES | Tambacounda/ Kedougou | 4,000,000 | 49.8 | ~1,000 |

SOURCE: REGIONAL WORKSHOP OFOR, 2017

**Smaller retail operations run by local entrepreneurs relying on market-based approaches have been present for well over a decade and more, often targeting a specific segment of the rural population and working most effectively in more densely populated rural areas.** One such example of a growing network of small-scale private water operators is from Cambodia, where efforts—supported by international NGOs and international funding agencies such as the World Bank—have started to become well established. Under the government of Cambodia's national policy (Cambodia Government 2011), CBM is the primary model for the rural sector, but explicitly allows communities to decide about delegation of O&M services. Over the last 10 years there has been a growth in small-scale operators managing piped supplies and the government is now moving to license these providers as they evolve from informal family-run entities into viable small businesses. There are currently estimated to be around 350 small-scale enterprises serving small towns and rural areas (with between 500 and 2,000 connections) to between 1.4 and 2.2 million people, with high functionality rates and improved water quality (1001Fontaines 2022; Cambodia Government 2011; Shantz 2018). A study carried out in 2017 into 14 different socially motivated "safe water enterprises" (SWEs), including one from Cambodia, found that this private sector approach has often relied on external subsidies (from donors or philanthropic funders) and was estimated to serve only some 3 million people globally (Dalberg 2017).

**A more recent development in PSP has been the emergence of delegated maintenance service provision to private operators to support existing CBM arrangements, with private providers signing performance-based contracts with communities and local governments.** A number of such private maintenance provider models were identified and researched as part of USAID's Sustainable WASH Systems[20] partnership and other initiatives such as Uptime[21] (Chintalapati et al. 2020; Lockwood, Chintalapati, et al. 2021; A. Harvey 2021; Foster et al. 2022). These examples include social enterprises operating along commercial lines, such as FundiFix in Kenya and Whave in Uganda, both of which pool risks across a service area at sub-district or sub-county level, signing annual contracts with communities, which are also monitored by local government. Both FundiFix and Whave are incorporating piped schemes into their model as well as point source supplies. Other PSP arrangements include examples such as the private local service provider approach from Ethiopia, under which the government, along with NGO support, has established small private companies to provide

20 For further information on the SWS learning partnership, see: https://www.globalwaters.org/SWS

21 For further information on the Uptime initiative, see: https://www.uptimewater.org

maintenance support registered with the Ministry of Micro and Small-Scale Enterprises (Lockwood 2019). A recent study carried out by the UK Foreign, Commonwealth, and Development Office's REACH program, managed by Oxford University, identified 77 service providers delivering water services for around 5 million people across 28 countries that report on operational metrics that would be suitable to use under similar results-based contracts (Nilsson et al. 2021). A different legal entity is adopted in Burkina Faso, where UDUMA operates as a simplified joint stock company and operates and maintains both handpumps and small piped schemes at a larger scale and working under a long-term 15-year contract (Wilk 2019).

**Despite the emergence and growth of private sector-based management models, this approach has been interpreted by some driven by ideological positions and arguments in favor of the efficiency of commercial approaches; however, not all commentators agree that this is feasible or even desirable.** Some researchers and practitioners have flagged the fact that the "push" for private sector service provision has been driven, in part, by entities such as the World Bank and some philanthropic foundations with an ideological agenda and that this model could be as political as the decision to promote CBM many years before. For example, Cortina de Cárdenas (2011) notes that World Bank and the International Monetary Fund advocating for water service privatization assumes that private entities can improve the management as they can invest capital to improve infrastructure, improve performance, reduce water rates, and be more responsive to consumer needs. The argument presented in the literature against private sector management points to the fact that the profit motive of private operators will marginalize the poor. Without strong regulatory institutions, privatization is argued to be inappropriate and incentivizing practices that may harm the for environment, as well as involving financing that is costlier than public sector arrangements. In spite of the growth of private sector involvement in rural water over the last decade under the various arrangements outlined above, some commentators have argued strongly against private management, given that water cannot be treated as commodity and that access to (drinking) water is a human right (Lobina and Hall 2008; Hall and Lobina 2007; Barlow and Clarke 2002).

**The term "professionalization" has been used in the literature in association with the emergence of alternative models and transition away from basic, or unsupported CBM, however, there is limited clarity around the precise definition or the exact boundaries of the concept.** Despite its frequent use in the literature, there is limited agreement on what this term refers to precisely. In the more general sense professionalization is defined as: "….*a process whereby occupations have become, or seek to become, publicly recognized as professions according to the degree to which they meet the alleged criteria. It can be seen as having two strands: one strand is concerned with the improvement of status. The other is concerned with the improvement of the capacity of members to enhance the quality of service which is provided with the assumption that these two elements proceed pari passu (side by side)"* (Smelser and Baltes 2015).

However, when it comes to the literature on rural water supply, there are several different interpretations of the concept covering different dimensions, relating to processes of formalization (through providing capacity development and training or accreditation), diversifying management models and aggregation of service areas through consolidation. Although sharing a common and general

objective of improving rural water services, the varying concepts associated with the term "professionalization" in the literature are often used interchangeably and can be captured as follows:

i. Strengthening CBM by formalizing roles and responsibilities, moving away from a reliance on unpaid and untrained volunteers to scenarios with trained and paid staff, adoption of good managerial practices and the provision of more systematic support to communities and (Lockwood 2002; Lockwood and Le Gouais 2015; McIntyre and Smits 2015; Lockwood, Chintalapati, et al. 2021) The REACH program provides the following definition: Professional service providers are characterized by contractual arrangements with water users and government authorities with sanctions if they fail to deliver to an agreed standard of reliability, water quality or price (affordability) (Nilsson et al. 2021).

ii. Adopting alternative management models most commonly involving public utilities (expanding services into rural areas) (World Bank Group 2017b; Franceys 2019; Adank, van Lieshout, and Ward 2021) and/or involvement of private operators working under different arrangements, including:
    - Regulated service providers providing professionalized maintenance using performance-based contracts for schemes still under CBM (A. Harvey 2021; Cord et al. 2022; Foster et al. 2022; Lockwood, Chintalapati, et al. 2021): Within this grouping, a specific body of literature refers to privatization of maintenance (Brault, Sanz, and Bansais 2014; Le Gouais and Webster 2011);
    - Small-scale private operators or SWEs designed as a complement to state-run public utilities using market-based approaches to deliver and retail treated, safe water to local communities (Dalberg 2017); and
    - Larger-scale PPP arrangements with long-term concessionary contracts let by government or asset holding entities to operate and maintain rural water services across defined service areas (that may include a mix of urban, small town and rural populations) (World Bank Group 2014; World Bank WSP and AFDB 2013; Kleemeier and Lockwood 2015; Kleemeier 2010).
    - The "consolidation" of services under which a service provider expands its service into multiple service areas; or the "aggregation" of services under which several service areas are grouped together as one management unit, generally driven by government (Landes et al. 2021; Renouf and Abidi 2022). These processes seek to pool resources together, increase the revenue base with the expectation of achieving greater financial viability and more efficient operations (World Bank WSP and AFDB 2013).

**Key take aways from Section 4**

- Management in the rural water context is defined by two dimensions: first, the set of technical tasks required for operating and maintaining physical facilities; second, as organizational and facilitative functions, including management of stakeholders, conflict resolution, and training. The second dimension includes a set of desired attributes or characteristics that enable managers to function effectively; these focus on credibility, leadership, and the ability to make and enforce decisions.
- Most references to management for the rural water supply are associated with CBM approaches, with an emphasis on ownership, authority, and control of the community; there is far less developed in the literature for other, alternative management models. Consideration of (good) management extends beyond the scheme level and service provider to encompass the capacity of service authorities to fulfil their mandate and to the broader enabling environment within which management models, regardless of type, must function.
- CBM was introduced in part for ideological and political reasons and has become the predominant model for delivering rural water services. Since its introduction from the 1980s onwards, and with some notable exceptions, there has been a growing body of evidence pointing to its limitations to deliver sustainable services at scale. The recognition to move away from unsupported CBM is now well established in the sector.
- This recognition has led to efforts both to strengthen and improve CBM largely through new arrangements to delegate maintenance tasks to professional providers, as well as to design and adopt alternative models to CBM.
- Various typologies of management models for rural water have been developed over the past decade with variations, but all include at least five common types of models: supported CBM, supported self-supply, direct local government provision and public utility provision, and private sector management.
- Critically however, there is limited data in most national sectors—and certainly not an aggregated picture globally—of the relative balance of populations served under CBM versus alternatives to this conventional model; this is a critical gap in knowledge.
- The emergence of alternative management arrangements involves common trends and drivers across different country contexts; development partners (donors, international NGOs, and research centers) often played a critical role, particularly but not exclusively in sub-Saharan Africa in piloting of new approaches before these are adopted by national governments.
- In the rural water sector, the term "professionalization" is not clearly defined and refers to different processes which have a common objective, namely, to improve the performance of services. These relate to i) the strengthening of CBM through various means, chiefly by improving the capacity of management entities; ii) the shift away from CBM toward the adoption of alternative management models; and iii) the aggregation or consolidation of services to increase their financial viability and efficiency.

# 5. MEASURING THE PERFORMANCE OF RURAL WATER MANAGEMENT

**Key questions addressed in this section:**

- How is rural water performance defined?
- What evidence is available of the performance of rural water services?
- What do we know about the historic challenges and drivers of performance?
- What strategies have been used to improve management of rural water service delivery in OECD countries?

## 5.1 DEFINITION OF RURAL WATER PERFORMANCE

In broad terms, performance refers to how well a person (or a machine) completes a piece of work or an activity.[22] As such, the term refers to both a process as well as the quality of its outcome. In the rural water sector, there is no shared definition of the term "performance," which has been used flexibly in reference to different aspects of service delivery. In the water sector, recent efforts to frame and monitor performance reflect a growing attention to service outcomes, as well as the tendency to either focus on a single characteristic of performance (e.g., functionality) or equate the concept of "performance" with the concept of "sustainability" using common metrics.

**At global level, water sector performance has been framed and tracked in alignment with the global development agenda**. This has followed the targets set during the MDGs for the period 2000 to 2015 and subsequently the SDG era (2015-2030) with well-defined goals and indicators, which have evolved over the two main phases covering these collective and aspirational targets for water. The indicator chosen to assess the fulfilment of Target 7.C of the MDGs was the percentage of population with **access** to an improved water source[23]. During the SDG period, Target 6.1 was established to achieve universal and equitable access to safe and affordable drinking water for all. The indicator used to monitor this target by JMP is the percentage of population **using safely managed water**, a much more demanding concept that requires monitoring the location of water source, its availability when needed by users and its quality (being free of fecal and priority chemical contamination).

This shift in goal design from a focus on a proportion of the population with access to a specific type of infrastructure to the use of safe water service for all has raised the bar and changed perspectives on sector performance. It has been described as creating a new international focus on ensuring water and sanitation for all including the most vulnerable (Antunes and Martins 2020). It has also introduced a more deliberate focus on sustainability of services and related water resources. WHO and UNICEF are the custodians of Indicator 6.1 and manage the GLAAS, which provides a global update on the policy frameworks, institutional arrangements, human resource base, and international and national finance

[22] Cambridge dictionary.

[23] Access was defined by the JMP in terms of the availability of 20L per person per day from an improved source within 1km from the users' dwelling.

streams in support of sanitation and drinking water. These monitoring efforts mirror the understanding of water service performance at multiple levels:

- As an **outcome**, at service level: performance can be understood in relation to agreed standards, which at global level, are expressed by SDG Target 6.1 but are often adapted at national levels in national policies or strategies as country-specific versions; and
- As a **process**, at a broader level, rural water service performance is understood to be dependent on the existence and strength of key aspects in the enabling environment (which relate to policies, institutional arrangements, human resources, and financing at national level) and addressed at multiple levels namely, the service provider, the service authority, and the national level.

**An open understanding of rural water service "performance" in the literature**. The term "performance" is not specifically defined in academic literature or practitioners' reports in relation to rural water services. However, it is widely used (along with associated term "success") and reflects a multifaceted and multi-layered understanding of the concept, which covers several different possible interpretations:

- A focus on the characteristics of the **service delivered**, expressed in relation to national or global standards. Aspects of performance often considered include the capacity to deliver water, as well as characteristics of the service in terms of its reliability, quality, and distance to users.
- The ability of the **service provider to fulfil** its role as the technical and financial manager of the service. Aspects of such performance include the service provider's ability to carry out adequate O&M, (partial) cost recovery through tariff revenue and accountability to users as well as to the service authority.
- The **WASH systems'** strength and ability to fulfil its functions, at service authority and national levels. Aspects of performance at this level include the service authority's ability (in terms of human and financial resources) to plan and budget for services, manage its assets, support, or oversee and regulate the performance of service providers. At national levels, aspects considered include the existence and adequacy of policy, legislation, and regulation, as well as the institutional and financial capacity of the ministry in charge of guiding the sector.

## 5.2 MONITORING OF RURAL WATER MANAGEMENT PERFORMANCE

As presented in the previous section, at global level, the performance of **rural water services** is monitored via the JMP initiative and consolidated based on nationally led data collection processes on a biannual basis. At regional and country levels, various initiatives have been deployed recently to monitor rural water performance more systematically. These efforts have included some elements of management performance; however these are yet fully established in all countries and tend to focus on larger, more formalized service providers (e.g., commercial utilities) (ESAWAS 2022).

**The absence of a commonly applied benchmark for rural water management performance**. Unlike water service performance itself, which is now framed by the global SDG agenda, management performance for rural water supply is not covered by a specific SDG target, and lacks a clear definition, benchmark, or method of measurement. As a result, there is no consolidated effort to monitor

management performance across most low- and middle-income countries, nor between countries, and the interpretation of what constitutes good management performance varies across initiatives and organizations.

This situation contrasts with the urban sector, where the International Benchmarking Network[24] (IBNET) provides a platform for benchmarking water supply and sanitation utility (service providers) worldwide, using common metrics and with a view to stimulate good/improved performance (in relation to management practices as well as service delivery). Although there have been questions raised about the quality of the data submitted into the framework, the IBNET provides utilities around the world with a toolkit, containing a common set of indicators, data definitions, and software to allow easy data collection and calculation on an annual basis. Table 7 present the key indicator headings.

*Table 7: Core indicator categories: International Benchmarking Network*

| CORE INDICATOR CATEGORIES | KEY INDICATORS CONSIDERED |
|---|---|
| **Service coverage** | Water coverage; water coverage household connections; water coverage public water points; sewerage coverage |
| **Water consumption and production** | Water production, total water consumption, water consumption split by customer type, |
| **Non-revenue water** | Non-revenue water using various units (%; m3/km/day; m3/conn/day) |
| **Metering practices** | Metering level, %sold that is metered |
| **Pipe network performance** | Pipe breaks, sewerage system blockages |
| **Cost and staffing** | Unit operational costs; staff per 1000 connections; labor costs vs. operational costs; contracted-out services as % of operational costs |
| **Quality of service** | Continuity of service, customers with discontinuous supply; wastewater at least primary treatment |
| **Billing and collection** | Average revenue; collection period; collection ratio |
| **Financial performance** | Operating cost coverage; debt service ratio |
| **Assets** | Gross fixed assets |
| **Affordability of services** | Total revenues per service pop/GNI, |
| **Process indicators** | Planning process, training strategy and other. |

**Toward a common measure of management performance for the rural water sector**. Various initiatives were developed between 2010 and 2020 to harmonize indicators and systematize rural water service data collection. This trend was in part a response to overcome the fragmentation of concepts and limited data to systematically assess service and management performance and sustainability. In 2016 the World Bank commissioned a study that investigated the possibilities for standardization of performance metrics for rural water and building on the concept of IBNET as a global benchmarking mechanism. The logic of the study was that although there was a general understanding among professionals about low levels of performance, there were few country monitoring systems that provide decision makers with sufficient and comparable evidence on number, type of water supply facilities and performance. The study took an empirical approach, analyzing indicator frameworks used in 40 different monitoring frameworks, used by national governments, large-scale World Bank projects and

[24] IBNET is an initiative to encourage water and sanitation utilities to compile and share a set of core cost and performance indicators; see: https://www.ib-net.org/

those designed and applied by other development partners in major projects or programs (World Bank Group 2017a). From a long list of performance indicators, the study proposed a final set of 24 indicators across four dimensions (service levels, functionality, service provider performance, and technical assistance provider or service authority) and suggests three levels as minimum, basic, and advanced. Table 8 gives a summary of the proposed indicator framework.

*Table 8: Proposed indicator matrix to harmonize monitoring of service provision and performance of rural water services*

| DIMENSIONS | MINIMUM | BASIC | ADVANCED |
|---|---|---|---|
| **Service levels** | Access and continuity of supply | Accessibility, availability, quality | Affordability, reliability, user satisfaction |
| **Functionality** | Water system physical conditions (handpumps and piped systems) | | |
| **Sustainability: service provider performance** | Presence and limited performance assessment of service provider | Developed assessment of service provider performance | Performance optimization metrics |
| **Sustainability: service authority or technical assistance provider performance** | Presence and limited performance assessment of service authority | Developed assessment of service authority performance | Performance optimization metrics |

**SOURCE**: (WORLD BANK GROUP 2017A)

The World Bank subsequently commissioned a further, related study in 2019-2020 to apply and test the feasibility of the proposed indicators in Burkina Faso, Kenya, and Sierra Leone and to assess how well these could be harmonized across different country contexts. This study identified that all indicators are not equally valuable to harmonize and that there are differing challenges in terms of the difficulty of collecting required data. Based on this, the researchers recommend that the proposed indicators be divided into two classifications: a core set harmonized indicators that should be collected across all cases and with a standardized methodology and a set of reference indicators that should only be collected when useful, tailored to local context and use country-level guidance (Banks et al. 2020). Although not being applied in practice in a systematic way, the indicator matrix presented above can be considered as the latest and most comprehensive attempt to frame monitoring rural water service performance.

**A growing number of performance data sets**. In the rural water sector, the following initiatives have been deployed recently to collect and analyze rural water service performance, and to some extent, management performance (with varying levels of detail). An overview of these initiatives is provided below, and their content overview presented in Table 9. ***The Sistema de Information de Agua y Sanamiento Rural*** ([SIASAR], Rural Water Supply and Sanitation Information System) was developed as a country monitoring system to capture both piped water system information and point sources and produce a sustainability Index. It was originally developed in four Central American countries and has since been rolled out to 11 countries[25]. **The Water Point Data Exchange** (WPDx) was introduced in 2018 as a freely accessible digital platform, for storing water point data from different sources and ensure this data is kept up to date by different data producers active in the

[25] For more information on SIASAR: http://globalsiasar.org/

country (including NGOs) and processed using a common format using comparable indicators with a view to support decision-making[26].WPDx currently holds records from 54 countries in the world. As part of the **REACH program**, a global diagnostic survey was carried out to evaluate the status and prospects of rural water service providers in 68 countries in 2021. The data provides information on the scale and sustainability of rural water services.

[26] For more information on WPDX: https://www.waterpointdata.org/

*Table 9: Overview of rural water performance monitoring initiatives*

| | | LEVELS ASSESSED | | | | SERVICE PERFORMANCE | | | | MANAGEMENT PERFORMANCE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DATASET** | **SCOPE** | Water point/community | **Service provider** | **Service authority** | **National level** | Continuity of service | Quality of water | Reliability | Service level | Management arrangement | Economic efficiency (metering, non-revenue water, billed amounts collected) | Operational sustainability (staff vs. O&M costs; % planned maintenance performed, pro-poor measures) | Other |
| SIASAR (2022) | Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Honduras, Kyrgyzstan, Mexico, Nicaragua, Uganda, Tanzania, Panama, Perú, Paraguay | **x** | x | | | | x | x | x | x | x | x | x |
| WPDx database (2022) | Algeria, Angola, Bangladesh, Belize, Bolivia, Burkina Faso, Burundi, CAR, Chad, Congo Iraq, Kinshasa, Congo Brazzaville, Dominican Republic, Egypt, El Salvador, Ethiopia, Gambia, Ghana, Guatemala, Haiti, Honduras, India, Indonesia, Jordan, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mexico, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Peru, Rwanda, Sierra Leone, Slovenia, Somalia, South Africa, South Sudan, Sri Lanka, Sudan, Swaziland, Tanzania, Timor Leste, Uganda, Vanuatu, Zambia, Zimbabwe | **x** | | | | x | | x | x | x | | | |
| mWater portal (ongoing) | Data provided by 160,800 users from across 189 countries | **x** | | | | | | x | x | | | | |
| 100 Million Global Diagnostic Report (2021) | 358 service providers from 68 countries | **x** | x | | | | x | x | x | x | x | x | |

From an initial analysis presented, these databases contain several aspects related to management performance, which can be used to determine the performance of various management arrangements. However, these initiatives have not been designed to specifically assess the performance of various management arrangements and the interpretation of these high-level indicators varies across initiatives (with some notable gaps).

## 5.3 OVERVIEW OF THE PERFORMANCE OF ALTERNATIVE MANAGEMENT MODELS

**Although there has been significant growth in the adoption of alternative management models across many different low- and middle-income countries in the last decade or more, there has less attention to carry out systematic performance monitoring, using a common conceptual framework and methodology.** Efforts to define and measure performance have tended to focus on single characteristics (such as functionality) or the assessment of sustainability as a broad proxy. Various qualitative studies have enabled analyses of the performance of services under different management arrangements and have enabled a broad analysis of management arrangement performance. To a large extent, CBM has been studied more extensively and more rigorously, including through the application of academic research, whereas assessments of other models have tended to be carried out using more qualitative approaches by practitioners.

The limitations of such assessments can be seen in the conflation of the outcomes and the model in question. This has tended to be correlated with the success or failure of a given model based on the outcome, rather than on a focused assessment of management performance. These gaps in the design of these studies make it difficult to draw a consolidated analysis of the performance of various management arrangements across the literature. The possible exception to this is the multi-country study commissioned by the World Bank in 2017 which applied a common framework across four different models and is the only one of its kind found in this study. However, sampling and site selection was not done in a rigorous way and relied on secondary information with the objective of assessing the performance of a range of management arrangements. The following paragraphs assess the findings from the literature in terms of the performance of the different management models identified in Section 4.5 above.

**The CBM model has been the predominant approach in almost every low-and middle-income country for several decades. While there have been islands of success in terms of functionality rates, service quality and the sustainability of services over time, the model has consistently under-performed and has not delivered the levels of service that were anticipated.** As outlined in Section 3.1 above, much of the data reflecting poor performance and high levels of non-functionality has been gathered from studies looking at CBM arrangements. In some countries where greater levels of support can be provided either by government or between communities via associations, the CBM model can be seen to work more effectively (e.g., cases in Morocco, India, and Brazil) (World Bank Group 2017b). However, especially in cases where CBM relies on by poorly trained volunteers without support and high levels of turnover it typically results in technical and financial challenges that can quickly lead to service disruption and collapse (Lockwood et al. 2016; USAID 2020; Lockwood, Chintalapati, et al. 2021; Richard Carter 2021).

**Self-supply as a management model is an important alternative to CBM and other options for achieving universal coverage given the scale of the challenge and the need to reach highly dispersed households. It has the potential to deliver high service levels but requires structured support to fully address water quality and associated public health risks.** There is increasing evidence as to the benefits of self-supply, particularly with respect to convenience in access and functionality, with a greater willingness to invest in maintenance and repairs by household, driven by a strong sense of personal ownership (Sutton and Butterworth 2021; Richard Carter 2021). Evidence presented by Sutton and Butterworth (2021) from across five sub-Saharan countries indicated that, with the exception of one country (Ghana), privately owned water supplies out-perform both community and institutional supplies across a range of technologies in terms of user satisfaction and service level performance by between 8 and 35%[27]. These findings align with other studies indicating higher levels of satisfaction with self-supply sources, but concerns remain with regular testing and treatment of water (World Bank Group 2018; Richard Carter 2021). Despite prevalence of the model, and various efforts to promote supported self-supply as a formal service delivery model, there has historically been a lack of documentation to convince policymakers of the benefits of this model and its performance for remote and dispersed communities (World Bank Group 2017b).

**Direct provision by local government as a management approach has been documented as performing poorly, especially in low-capacity environments.** Assessments of local government direct service delivery commonly conclude that services are generally substandard, and this model should not be considered unless there are no other viable alternatives. This is particularly the case where water supply units within local government administrations are not corporatized entities, are not able to operate along commercial lines and where tariff revenue from the sale of water cannot be ring-fenced from general budgets of local government (Richard Carter 2021; World Bank Group 2017b; WaterAid 2021).

Other constraints to the performance of local government acting as service providers include low credit ratings, which limit the ability to raise financing, and political influence over tariff setting leading to municipal water entities being unable to set realistic tariff levels (and poor collection rates) (Lockwood et al. 2018).

**Various assessments point to the high performance of the public utility model in serving rural populations, with strong technical and managerial capacity, but caveat that that this option is most successful under certain operating contexts.** Utility management is documented to be a particularly viable option where certain conditions are in place, including relatively high population densities and where consumers can afford water tariffs; conversely challenges for the utility are commonly found in areas of billing, revenue collection, and monitoring (Richard Carter 2021; World Bank Group 2017b). Well-performing examples highlighted in the 2017 World Bank multi-country study include Morocco, where in 2016, ONEE, the national utility[28] had extended water services through large, piped water schemes, supplying public stand posts and small village-level distribution systems in

[27] In this case the evidence presented included aggregate scores for satisfaction, quality, reliability, and adequacy (Sutton and Butterworth 2021, page 199)

[28] ONEE is the *Office National de Electricité et l'Eau Potable* – National Office for Electricity and Drinking Water.

over 400 rural centers. Another promising example from a recent study of one public rural utility from Uganda, the Mid-Western Umbrella Authority, indicates strong performance in terms of billing ratios, cost recovery (for O&M only), and more regular water testing (Renouf and Abidi 2022). It should be noted, however, that the rural provider in question has received targeted external investment and technical support as part of a transformation program since 2018. Adank et al. (2021) also conclude that the growth of utilities as a management model results in improved coverage and service levels; however, challenges remain, and utility-managed rural water supply is not always synonymous with safely managed water, particularly in sub-Saharan African countries where utilities often provide water off-premises through public standpipes.

**The literature points to positive findings in terms of performance for private management arrangements, which are cited as achieving high levels of service delivery performance, management, and efficiency gains under certain conditions but with operators in rural areas often requiring subsidies to be viable in the medium to long term.** This model has been documented as offering a promising and diverse set of arrangements for sustainable rural water services. However, as with the case of public utilities operating in more dispersed rural settings, there is limited evidence of long-term financial viability for private operators and the need for some form of (supply side) subsidy, including cross-subsidization from the urban sector (Kleemeier 2010; Davis 2005; Koestler 2009; Kleemeier and Lockwood 2015; Wilk 2019; Gia and Fugelsnes 2010). When designed well and with the appropriate legislation in place, private operators can perform well and in some cases attract investment and commercial loans (as found in the case of the case of joint stock companies with public and private shareholders in Vietnam) (Kleemeier 2010; World Bank Group 2017b).

**Positive experiences with smaller-scale private water operators, managing decentralized schemes have been documented in various contexts but are limited and with mixed evidence in terms of effectiveness and financial viability.** For example, a recent study from Cambodia highlights successful examples of providing market-based services at scale in rural areas combining piped supply with bottled water kiosks to offer a complementary approach under (1001Fontaines 2022). Other references question the effectiveness of market-based kiosk approaches, including more negative findings on household uptake and water quality issues (Jeuland et al. 2021). Evidence is mixed however in terms of financial viability of these small-scale private operators, particularly in markets in more dispersed rural areas of sub-Saharan Africa without subsidies and ongoing support from development partners (Foster 2012; Dalberg 2017). Evidence from a pilot from Bangladesh also counters the argument that private operators can attract private investment in rural areas, where contracts requiring private equity investments alongside government funding proved difficult to implement in practice (World Bank Group 2017b). The logic that private operators are more efficient and perform better than other models is also challenged, as in a recent study from Uganda which cites poor technical performance and the unrealistic focus on profits presenting challenges as they attempt to minimize energy expenses in a bid to widen profit margins (Dektar, McConnell, and Kasekende 2022).

**The more recent emergence of professionalized maintenance providers, specifically operating under performance-based contracts in support of CBM service provision, has also resulted high service levels but with a heavy reliance on external (usually aid) funding**

**to subsidize operations.** A study of five delegated maintenance providers working across four countries as part of the Uptime Consortium, and serving over 1 million people, documents very high levels of performance, with average functionality rates of over 94% as compared to regional averages of around 75%[29]. Time to repair in at least two of these cases provided along commercial lines by social entrepreneurs are equally impressive at under two days (McNicholl et al. 2019). Other sources in the literature support these positive performance outcomes, citing important lessons for policymakers (Richard Carter 2021; A. Harvey 2021; Lockwood 2019; Foster et al. 2022). However, under both the social entrepreneur examples, tariff revenues still only account for a limited proportion of operational costs (approximately 25% and not accounting for capital maintenance or asset depreciation) and otherwise rely on donor aid funding. The literature does note, however, that these are still relatively nascent and not benefiting from operation at full scale (i.e., saturation of an administrative jurisdiction such as a district to achieve economies of scale) and are making efforts to attract alternative sources of financing beyond only tariff revenue and donor funding, to include receipt of public finances and potentially local private investment (Lockwood, Chintalapati, et al. 2021; Richard Carter 2021).

## 5.4 FACTORS AND DRIVERS OF MANAGEMENT PERFORMANCE IN LOW- AND MIDDLE-INCOME COUNTRIES

As outlined above, there has been no systematic effort to monitor and analyze management performance using a common definition and benchmark across the sector. This fact, coupled with the tendency in the sector to use the term "performance" interchangeably with one of its single features (e.g., functionality) or one of its outcomes (e.g., sustainability), means that there is no evidence of a straightforward method for analyzing the factors that lead to good performance of various management arrangements at a global level.

The factors associated with "positive outcomes" are generally framed in relation to functionality and sustainability and therefore related to more sustainable outcomes. Different categorizations of these factors are made in the various studies either in line with the Financial, Institutional, Environmental, Technical, and Social (FIETS) dimensions or in terms of community conditions, program conditions, and external conditions. Given the number of different conceptual frameworks and methodologies used, studies come to different conclusions about the relative importance of specific factors in leading to positive outcomes, but all recognize the multiplicity of conditions required to achieve sustainable services; see Table 10 below. For example, Marks et al. (2018) through a qualitative comparative analysis of pathways leading to sustainability in various contexts, concluded that I) post-construction support was required across contexts, but its type and intensity varied across contexts; and II) strong management structures combined with sufficient financial and technical resources moderated the influence of physical water availability. The following observations should be noted regarding factors relating to performance in the literature:

[29] Although the averages quoted show a marked difference in functionality rates, there is a risk for self-selection bias as the CBM entities that Uptime consortium members are engaged with are likely to be those that are better managed and whose users have higher willingness to pay in the first place. (i.e., Uptime's partners did not randomly select the water points they support).

- The **diversity of conceptual frameworks** and **methodologies** used make the identification of determining factors difficult.
- Although a range of models are considered in the various studies, the majority of studies focus on CBM. In addition, no large-scale study has been conducted to assess the performance of various management arrangements deliberately and design a sampling and site selection strategy accordingly.
- Although the term "context" is widely used in the literature to relate to external aspects to water service provision, the term is rarely defined, not associated with clear determinants and its importance in driving to positive outcomes not assessed. Rather, it is considered and interpreted as background information.
- There is a tendency in the water sector to recycle common factors with limited statistical validity to design conceptual frameworks or assessment methodologies, which are subsequently replicated different organizations without a necessarily being subject to more critical analysis.
- This has led to the syndrome of" finding what one is looking for" and the reinforcement of (largely) the same sets of factors over time.
- There is a related historic tendency to focus on static factors, without attempting to interrogate the sequencing, relationship or combinations of factors that can improve performance, or the actor dynamics that combine with various factors, However, in both cases there have been recent attempts to improve on both tendencies (WaterAid 2019; Pugel et al. 2020; Cord et al. 2022; Huston, Moriarty, and Lockwood 2019).

*Table 10: Evidenced factors associated with positive outcomes*

| DIMENSION | FACTOR | ASSOCIATED MODEL | REFERENCE |
|---|---|---|---|
| ***Project design and implementation*** | Donor interest and long-term accountability focus | CBM | (Easterly 2002) |
| | Project design and implementation (including community involvement and capital contribution; quality of training; gender sensitivity and general ownership) | CBM | (Katz and Sara 1997; Baumann 2009; WaterAid 2011; Marks et al. 2018; Foster, Willetts, et al. 2018; Isham, Narayan, and Pritchett 1995) |
| ***Legal and institutional framework*** | Institutional setting and governance | All | (Marks et al. 2018) |
| | Clarity of roles and cost responsibilities | | (A. Harvey 2021) |
| | Quality of contracts (including performance-pay agreements; maintenance protocols) | PPP | (A. Harvey 2021) |
| | Regulation of rural water services and providers | All | (Hutchings et al. 2015; Smits and Lockwood 2015; World Bank Group 2017b; Dektar, McConnell, and Kasekende 2022; Gerlach 2019) |
| | Recognition and promotion of alternative service provider options beyond community management model | All | (Lockwood and Smits 2011; World Bank Group 2017b; Richard Carter 2021) |
| ***Management capacity*** | Skills capacity and technical and financial training | All | (Sugden 2003; P. A. Harvey and Reed 2007; Marks et al. 2018; WaterAid 2011; Hutchings et al. 2015; Marks, Komives, and Davis 2014; Dektar, McConnell, and Kasekende 2022) |
| | Access to supply chains of spare parts, services, and structures to carry out capital maintenance | CBM | (Hutchings et al. 2015) |
| | Long-term incentives to manage services in the community | CBM | (P. Harvey and Reed 2004) |
| | Capacity support to local government | CSM | (Smits and Lockwood 2015; Lockwood 2002) |
| ***Financing*** | Ability to cover operational and minor maintenance expenditure (regular tariff payments) | CBM | (WaterAid 2011; Welle 2014; Moriarty et al. 2011; Cronk and Bartram 2017; Adank 2013; World Bank Group 2017b) |
| | Financial management and accountability | All | (Marks et al. 2018) |
| | Access to loan and microfinance | CBM | (Hutchings et al. 2015) |
| ***Accountability and transparency toward users*** | Representation of broad user base in management structure | CBM | (Ryan and Sulemani 2013) |
| | Independence from political capture | CBM | (Ryan and Sulemani 2013) |
| | Accountability to users regarding use of revenue collected, cost of maintenance and accounting | CBM; PPP | (A. Harvey 2021; Willetts 2012; Ryan and Sulemani 2013) |
| | Trust amongst community | CBM | (Willetts 2012; P. A. Harvey and Reed 2007) |
| | Users' satisfaction with the service provided (quality, quantity, accessibility, and reliability) | CBM | (Welle 2014)<br>(Foster, Willetts, et al. 2018) |

| DIMENSION | FACTOR | ASSOCIATED MODEL | REFERENCE |
|---|---|---|---|
| ***External support*** | Support to service providers with technical, administrative, and institutional support and monitoring of community | All | (R. Carter, Tyrrel, and Howsam 1999; Boulenouar 2015; Willetts 2012)<br>(Lockwood 2002; P. Harvey and Reed 2004; Marks et al. 2018; World Bank Group 2017b; Baumann 2006) |
| | Monitoring including indicators of functionality, performance, service levels | CBM; PPP | (A. Harvey 2021; Lockwood and Gouais 2014)<br>(Cronk and Bartram 2017; World Bank Group 2017b) |
| | Capacity support to local governments to enable them to fulfil their roles | CBM | (Ndaw 2016; Welle 2014; Boulenouar 2015) |
| ***Environmental*** | Absence of competing demand by irrigated agriculture | CBM | (Welle 2014) |
| | Absence of alternative water sources | All | (Marks et al. 2018; Welle 2014) |
| | Hydrogeological determinants (changing water tables or groundwater productivity) | CBM | (B. W. Miller and Doyle 2014) |
| ***Internal community factors*** | Collective initiative | CBM | (Hutchings et al. 2015) |
| | Social capital | All | (Marks et al. 2018; Dobbin and Smith 2021) |
| | Strong leadership | CBM | (Hutchings 2016; P. Harvey and Reed 2004) |
| | Institutional transparency | CBM | (Hutchings et al. 2017) |
| ***Service area*** | Optimized service area size | PPP | (A. Harvey 2021) |
| ***Asset management*** | Handpump age and type | All | (Fisher et al. 2015; Foster 2013; Jiménez and Pérez-Foguet 2010) |
| | Asset management through systematic planning, inventory updates, financial forecasting for assets with asset ownership clearly defined | All | (World Bank Group 2017b; van Soest, Carriger, and Casella 2015) |
| ***Other*** | Harmonization and coordination among development partners and government and alignment with national policies and systems | All | (la Harpe 2015) |
| | Learning and adaptive management supported by national and decentralized levels to enable the sector to adapt based on experience | All | (van Soest, Carriger, and Casella 2015) |
| | Distance to city | All | (Foster, Willetts, et al. 2018) |
| | Freshwater availability | All | (Marks et al. 2018) |
| | Broader infrastructure context (e.g., power supply) | PPP | (Dektar, McConnell, and Kasekende 2022) |

## 5.5 LESSONS FROM OECD COUNTRIES ABOUT THE MANAGEMENT OF RURAL WATER SERVICES

Several countries within the **Organisation for Economic Co-operation and Development** (OECD) grouping[30] contain large and relatively dispersed rural populations that have faced historical challenges with small-scale water supplies that can yield lessons for low-and middle-income countries[31]. Literature tracing the evolution of management in such countries can shed light on both the challenges and solutions adopted to improve service delivery, with the latter including promoting improved management performance or "professionalization" through the following common sets of interventions:

- Improved access to financing with structured programs of financial support for investment, including grants, loans, and specialist support to improve creditworthiness;
- Technical assistance and training programs, as well as interventions to translate complex resources, laws, and guidelines into more user-friendly formats;
- Formalization of operator qualifications and ongoing certification programs to consistently raise the competency of operator and management staff;
- Imposition of increasingly stringent public health regulations to improve service quality and improve monitoring and reporting practices;
- Consolidation or aggregation of schemes, including physically linking small scale providers with larger urban utilities or merging through management umbrellas; and
- Formalization and obligatory use of asset management and water safety planning tools to drive up information and knowledge on the part of operators.

**Many small-scale rural operators in OECD countries have suffered from a vicious cycle of low (management) capacity and revenue generation, both of which have contributed to poor quality of service, so further degrading financial and management capacity.** Rural operators typically rely on a small customer base and are unable to generate sufficient revenue, which limits financial performance, and in turn, makes (re) investment in infrastructure and water quality improvement measures challenging (McFarlane and Harris 2018; Rickert et al. 2016; González-Gómez et al. 2013; Feinstein et al. 2020). Such financial constraints make investment and maintenance costs unaffordable, leading to what Hendry and Akoumianaki (2011) term as the "three lows" *of* low revenue, low investment, and low quality of service.

One of the common characteristics of such water supply arrangements is lack of human capacity in the form of trained, full-time operators and managers. Without adequate operational funds, small-scale

30 The OECD is a group of 37 member countries that discuss and develop economic and social policy and are typically democratic countries that support free-market economies. The OECD itself generates policy on technical, financing and governance issues relating to water service delivery; see: https://www.oecd.org/water/.

31 For example, it is estimated that one in ten citizens of the EU receives drinking-water from small or very small systems (McFarlane and Harris 2018). In the United States, there are nearly 50,000 community water systems supplying drinking water to some 30 million residents, of which more than half are made up of facilities serving fewer than 500 people account (Dobbin 2021). Additionally, several OECD countries have significant marginalized population groups, most commonly residing in rural areas, such as Indigenous Peoples (specifically Australia, Canada, and the USA), as well as migrant labor communities and populations facing severe socio-economic challenges.

providers are typically run by part-time staff with limited qualifications and experience and are paid at lower rates than their full-time equivalents and may serve more than one role in the community. This scenario also can result in higher levels of operator turnover and management by volunteers. Poor levels of competency have been associated with inefficient system management and increased risk of water supply failures and inadequate water treatment (McFarlane and Harris 2018; Rickert et al. 2016; Feinstein et al. 2020).

**The application of progressively stricter regulations, particularly concerning water quality and public health, has been a major challenge for small-scale rural operators.** In almost all OECD contexts there has been a growing demand to comply with regulatory requirements, which can exacerbate existing capacity limitations. Small and remote rural systems are often expected to meet the same regulatory standards as large systems, but with higher marginal service costs and lower revenues (B. Brown, Weersink, and de Loë 2005). For example, Jordan et al. (1996) notes that US regulatory reforms in the 1990s were estimated to have compliance costs of $18 billion per year, with 69% of the costs falling on small-scale schemes. Such regulatory requirements designed for larger systems with economies of scale, are "*impractical, unaffordable, or economically inefficient*" for small-scale schemes and as a result small operators have higher rates of non-compliance than larger utilities (McFarlane and Harris 2018).

**Political economy factors are commonly cited as underlying poor performance of rural water provision in OECD countries. Small-scale, rural water supplies tend to be a low priority and receive comparatively less political attention and representation than larger urban supplies.** Small scale schemes tend to serve communities which are typically less powerful and find it harder to leverage both financial and political support to improve service delivery. Small, rural, immigrant, tenant, and low-income communities are more vulnerable to performance issues and have less political representation or voice to advocate for changes in operations and governance (McFarlane and Harris 2018; Rickert and Schmoll 2011; Hendry and Akoumianaki 2016). Managers and operators of small community-managed supplies or small public supplies are less likely to be organized in professional networks or to have links with lobby groups that could articulate their interests (Hendry and Akoumianaki 2011; Rickert and Schmoll 2011).

**The decentralized nature of ownership and management of small-scale water supplies leads to fragmentation, reinforcing poor governance practices.** Small-scale water supplies in OECD countries are often either privately owned, by individuals, business, homeowner associations, or communities. For example, in the USA the proportion of private ownership increases with decreasing water system size, with 72% of very small systems being privately owned by businesses or small communities (Baird 2012). Small-scale water supplies with private governance structures are more likely to be run by part-time or volunteer (non-professional) operators and lack the more formal oversight and governance and accountability measures of larger public schemes (McFarlane and Harris 2018).

**Multiple layers of government administration and legal jurisdictions limit the extent of oversight, support and accountability placed on small scale water supplies in rural areas.** Authors point to the higher levels of "jurisdictional fragmentation" of small-scale water supplies than larger schemes in part due to more complex ownership and governance arrangements. Small-scale schemes often sit on the bottom rung of government hierarchy, with multiple institutional layers from

federal or central, down through regional or state and then to local government. Responsibility for service delivery and enforcement is therefore devolved over more institutional layers, often with unclear division of authority and responsibilities across governance scales, creating the potential for inconsistent implementation and gaps in resourcing and oversight (Rickert et al. 2016; McFarlane and Harris 2018). This more complex institutional and jurisdictional landscape creates both an increasing likelihood that poor system performance will go undetected and unaddressed, and that there are governance overlaps and conflicts (McCullough and Farahbakhsh 2015). In addition, navigating this complex multijurisdictional environment requires significant administrative and management capacity, which is often beyond the ability of already weak, small-scale operators to access in terms of information, funds, and support programs (Rickert et al. 2016).

**Solutions to poor performance of small-scale rural water supplies in OECD countries.** Common initiatives and interventions have been put into place over a significant time frame across OECD countries, which can be grouped into a number of broad areas, including i) financial, technical, and management support; ii) regulatory reform; iii) consolidation or aggregation of schemes, and iv) use of planning tools, such as asset management planning and water safety plans. Some of the activities within these broad groupings are referred to as attempts to "professionalize" operators.

**There are multiple examples of national and subnational funding mechanisms, including grants, loans, and improved access to financial markets to better enable small-scale water suppliers to make investments and improve operational performance.** In the EU and the USA, both federal (central) and subnational (state) financing has been targeted toward small-scale rural schemes. For example, the United States Department of Agriculture's (USDA's) Rural Utility Service makes grants and loans available for improvements to water supply in rural communities with fewer than 10,000 inhabitants[32]. Another federal program managed by the Environmental Protection Agency (EPA) includes a set-aside for small water supplies serving less than 10,000 people[33]. More specific and targeted grants to (private) water supply schemes are evidenced, for example in Scotland where individual grants, capped at around $1,000 have been made to assist communities in meeting more stringent water quality standards, with approximately $10 million being dispersed between 2006 to 2013 (Rickert et al. 2016).

**Establishing inter-jurisdictional entities as a way of improving creditworthiness and achieving scale have also been documented.** For example, in Estonia, resource-poor municipalities established an inter-municipal public company to attract financing from the European Bank for Reconstruction and Development (EBRD) and the Nordic Environment Finance Corporation. This group of municipalities was then able to access loans channeled via this new company and with EBRD guaranteeing tariff increases. A 15-year tariff increase was planned and included in the contract, based on assumptions of local affordability (Hendry and Akoumianaki 2016). At more operational or scheme level, a common approach has been to provide technical support to management entities to improve tariff

32 Communities are supported by state associations of the National Rural Water Association to apply for federal funding: USDA Rural Development Loan & Grant Program | NRWA

33 See details of the Drinking Water State Revolving Fund https://www.epa.gov/dwsrf

design and enforcement opportunities for revenue collection and therefore help to improve financial performance (Blanchard and Eberle 2013).

**The literature points to a wide range of training and technical support initiatives to improve the performance of small-scale water supply operators and managers, which include explicit language around professionalization.** These include development of training programs and educational materials, ongoing vocational training, knowledge sharing and experience in workshops or seminars for operators across several communities or networks, as a valuable form of peer-to-peer education and training (Rickert et al. 2016; Bickel 2006). In part, such trainings have been put in place to facilitate understanding of regulatory standards, which are often written in technical language that may be difficult for operators of small-scale water supplies to fully comprehend. Such materials include summary sheets with the essentials of operational procedures (such as good disinfection practices) in easy-to-understand language (Blanchard and Eberle 2013; Rickert et al. 2016).

**To institutionalize and sustain operator performance, several OECD countries have put in place legislation and regulations that require minimum levels of education and qualification and/or competency testing of staff, reflecting the size and complexity of the water supply schemes they operate.** These requirements can cover both aspects of initial levels of education and requirements for regular training and further qualifications for continuing professional development. An example, in Rickert et al. eds (2016) is of competency tests for waterworks employees in Finland serving more than 50 people or more than 10 $m^3$ of water per day, who must pass a multiple choice test every five years as set by the National Supervisory Authority for Welfare and Health. The exam tests competence and experience, covering water intake, treatment, distribution systems, water quality legislation, operational and surveillance monitoring, water chemistry and microbiology, as well as contingency planning. A tester authorized by the Authority organizes the evaluation (Rickert et al. 2016). In the USA, the federal EPA sets guidelines for the certification (and recertification) of operators of community water supplies, which each state then operationalizes through individual state operator certification programs. Certification requirements for operators are linked to the characteristics, including scheme type, complexity components (for example, production, treatment, distribution), or size (for example, population served, or volume of water produced) (EPA 2016). Support organizations such as the Rural Community Assistance Partnership (RCAP)and the National Rural Water Association will often assist small rural community operators with such compliance testing. Studies on the uptake and effectiveness of these initiatives vary considerably. While numerous articles have been published on small-scale water supply access to funding (Bickel 2006; Daley, Mullin, and Rubado 2014), few have examined the outcomes of training programs or operator networks in any detail to assess the effectiveness of such initiatives (McFarlane and Harris 2018).

**Compliance with increasingly strict regulations has been a challenge, but it is also identified as a driver of change and improvements through reforms that tailor regulations to better meet the needs and constraints of small-scale water supply operators.** There is a consensus that a "one size fits all" approach to regulatory standards places an unfair or unachievable compliance burden on capacity-constrained small-scale operators. The literature highlights different approaches to resolving this challenge, with examples of countries which have used regulation, but adopting differentiated approaches, whereby small-scale water schemes are regulated differently to

larger ones (McFarlane and Harris 2018; Jones and Joy 2006). Other approaches include exemptions from requirements. For example, the supranational legislation of the European Union under the Drinking Water Directive (DWD), allows provision for Member States to exempt supplies serving less than 10 $m^3$ a day or serving fewer than 50 individuals from the minimum requirements of the DWD, unless the water is supplied as part of a commercial or public activity (Rickert et al. 2016). Still other approaches include promoting stringent regulatory standards but with concurrent investment in "compliance support" (see Box 9).

*Box 9: Policy and practical measures to assist with regulatory compliance for small-scale water supplies in OECD countries*

- Adapting international standards to the national context and making them available in national or local languages;
- Developing specific guidance documents for small-scale system operators and/or encouraging national standardization organizations to create standards specifically for small-scale systems;
- Providing and advocating packages of standards for small-scale systems, which select those most relevant from the wide range of available documents;
- Making relevant documents available free of charge or at a reasonable price that operators in low-resource settings can afford;
- Raising awareness about the existence of relevant standards among small-scale system operators and local water and health officers;
- Helping operators to access standards (for example, through internet platforms, by distributing hard copies to operators in the field or by making them available through local water and health offices); and
- Providing assistance or guidance, for example through training courses, to facilitate understanding of relevant standards, which are often written in technical language that may be difficult for operators of small-scale systems to comprehend fully.

SOURCE: (RICKERT ET AL. 2016) PAGES 22-23

There is, however, a continuing debate over how to adjust regulatory frameworks to account for small-scale water supply schemes and their capacity limitations—whether through robust regulation on the one hand, combined with compliance support, or on the other, amending regulatory requirements, including exemption from some parameters of service delivery (Rickert et al. 2016). Layered on top of these possible solutions is the ongoing debate as to whether regulations should be nationally applicable (in line with harmonization), or whether decentralized approaches are more appropriate with decisions being made locally (subsidiarity) (McFarlane and Harris 2018).

**Consolidation and aggregation emerge as one of the main responses to poor performance in the literature, involving the merging or joint management of small-scale water supplies**. These two main definitions relate to consolidation and aggregation, both of which are linked to the concept of "utilitization," which refers to the creation of new dedicated rural operators, either by expanding the umbrella of management to incorporate physically separate schemes or by expanding existing urban utilities by extending physical (piped) networks into contiguous rural areas (Franceys 2019; Adank, van Lieshout, and Ward 2021). Depending on the jurisdiction and geography of communities, such processes may range from the physical inter-connection with nearby larger schemes to small schemes being operated and/or managed by an external provider with responsibility for multiple schemes (Feinstein et al. 2020; MacDonald, Zander, and Snoeyink 1997). Further, scheme consolidation

may involve a transfer of authority, responsibility, and/or ownership away from the small system to another utility or service provider, meaning that this is a governance solution as well as a technical consolidation (Morgan 2002). Consolidation was also a strategy adopted by the water sector in England, which, following the Second World War, was highly fragmented with more than 1,000 bodies involved in water supply and with planning based on highly localized activities. The focus of post-war legislation was aimed to strengthen the role of local authorities and to enable public investment to extend services to rural communities (OFWAT 2005).

Findings suggest that it may be beneficial for small-scale systems to join forces with neighboring municipalities and communities or with bigger utilities by forming **cooperative partnership arrangements** or "mutual aid" agreements (Feinstein et al. 2020). Cooperative arrangements can lead to the pooling of knowledge and experience of staff and thereby to higher levels of professionalism and better conditions for improved management and operation of facilities. Guidance and support for communities who wish to join together or associate legally as a cooperative or company is noted as an essential factor in successful consolidation processes, for example as provided by the umbrella organization, the Irish National Federation of Group Water Schemes, in the case of consolidation in Ireland (Landes et al. 2021; Hendry and Akoumianaki 2016). Rural water providers in OECD countries also have a long history of aggregation through associations with "shared governance," as the example from Austria illustrates (see Box 10).

*Box 10: Association of rural water cooperatives*

**Upper Austria Water**, or OÖ Wasser, is an autonomous, self-reliant, non-profit association of more than 1,700 cooperatives created in 1946. It has a shared governance structure, chaired by a board of seven directors and manages water-related activities, especially in rural areas, and oversees decentralized, small-scale water supply and sewerage. The association provides support to its members on technical, legal, financial, and organizational issues. It supplies operational and maintenance services (technical assistance, emergency supply, mobile technical equipment), pooling programs (for water meter purchase and water analyses, for example), and measurement services (such as leak detection, pipe and valve location, flow rates and pressure, and aquifer tests). It also proposes education and training sessions and conducts networking activities and information exchange opportunities for its members.

SOURCE: WORLD BANK, 2018 BEYOND UTILITY REACH? HOW TO CLOSE THE URBAN - RURAL ACCESS GAP; PG. 64

A recent report by RCAP in the USA highlights gains for small-scale water supply schemes from potential partnerships with one another in the form of regional collaboration, in what RCAP terms "regionalization." They further define several stages of such consolidation along a pathway from simple, informal cooperation to contractual assistance, to more shared governance and finally complete ownership transfer (Landes et al. 2021). Benefits of consolidation include improved financial capacity and opportunities for more specialized staffing (US Water Alliance 2019). Other advantages include the joint implementation of technical innovations and rationalization in the procurement of equipment and spare parts. Costs can be shared, with increased flexibility in applying funds if several municipalities contribute and agree jointly on priorities for their use (Rickert et al. 2016). Similar approaches have been documented in Eastern European countries (not in the OECD) supported by EU funding mechanisms, seeking to achieve economies of scales, improved investment capacity, and utility professionalization (World Bank Group 2018).

**Although consolidation is widely flagged in the literature as a key approach to improving professionalization of small-scale operators there is also evidence that it may not be suitable for all contexts.** Evidence from the USA suggest that system consolidation may not be widespread and remains limited. For example, one study of the potential for consolidation in 17 USA states based on geographic proximity and economic feasibility found that physical interconnection between systems would only be feasible for 35% of small schemes (Castillo et al. 1997). Another study from California (USA) across 2,867 community schemes points to the very high degree of fragmentation, including 26 different management arrangements, which acts as a barrier to consolidation of scale (Dobbin and Fencl 2021). While the *potential* benefits of consolidation may appear compelling, the global evidence that consolidation improves service delivery is limited. A World Bank study from 2017 analyzed data from the International Benchmarking Network for 1,306 utilities from over 140 countries. It found only 79 cases with a comparison of pre- and post-consolidation. In many of these cases, although improvements to service levels were achieved, consolidation was not found to improve operational or financial performance, particularly in cases of consolidation of smaller, more rural town suppliers with larger, urban utilities (World Bank. 2017).

**Reasons given as to why consolidation may not work in all cases, include costs and required understanding or leadership to pursue a regional solution, policy barriers, and institutional and socio-political resistance to uptake of wider consolidation efforts**. Conversely, larger water supply operators may see drawbacks and liability issues (e.g., poor payment rates, legacy debt and higher unit costs) and decline efforts for consolidation with small-scale water supplies serving low-income communities. Finally, there may be resistance on the part of small independent communities themselves to transfer authority to external entity (McFarlane and Harris 2018; Landes et al. 2021).

**The final area flagged in the literature as an approach to improving management and performance of small-scale rural drinking water supplies, is the use of various planning tools to generate a more holistic understanding of risks and targeting efforts to strengthen capacity** (Hendry and Akoumianaki 2011; Rickert et al. 2016; McFarlane and Harris 2018; Hendry and Akoumianaki 2016). Planning solutions are documented in a variety of forms, with the two most common being as follows:

- **Asset management tools:** used to identify and analyze threats to water supply schemes and to improve technical and financial (infrastructure replacement) planning. Many OECD countries have responded to low take up of these planning approaches on the part of small-scale providers, by developing simplified, low-cost tools to match the capacity levels of operators and not to rely on data-heavy solutions.
- **Risk planning and mitigation tools:** regulatory authorities are increasingly demanding the application of water safety plans and making risk assessments and water safety planning mandatory, even for small-scale operators. This is intended to improve knowledge of the (technical) scheme, stimulate continuous improvements (for example in preparedness and preventive measures), bring local stakeholders together and support emergency response planning which is a regulatory requirement in many industrialized countries.

Although these measures may be assumed to be achievable because of the simple (technical) nature of most small-scale water supplies, studies indicate lower uptake of asset planning and budgeting among small-scale scheme operators in the USA, contributing to poor financial performance among these systems (McFarlane and Harris 2018).

**Key take aways from Section 5**

- The performance of rural water relates to both an **outcome** (i.e., rural water services) and a process of delivering services (which involves the service provider, the service authority, and the national levels).
- While the SDG agenda provides clear benchmarks, definitions, and monitoring methods for tracking rural water services (the performance outcome); no such benchmark exists for defining and monitoring the broader process required to achieve well performing rural water services.
- There is, however, a common understanding that a successful process involves the existence and strength of a broad enabling environment or broader system that needs to be in place to support water services. This relates to both the service provider's ability and capacity to fulfil its role as technical and financial manager of the service; as well as the related ability and capacities of the service authority and national level to fulfil theirs. The performance of the service provider can be termed "management performance."
- Initiatives to collect and analyze data on rural water performance have developed in recent years and various datasets are accessible. However, these use different indicators/definitions and significant gaps exist in the ability to analyze management performance and service performance.
- Qualitative studies enable a broad analysis of the performance of various management arrangements. These demonstrate i) a generally poor performance of CBM and direct local government provision; ii) the potential of self-supply to deliver relatively high service levels (especially for access times); iii) the relative high performance of public utilities in specific operating contexts with the need for cross-subsidies to serve rural populations; and iv) generally positive findings on private management models, particularly for service delivery outcomes, but a reliance on supply-side subsidies, often provided by aid and philanthropic donors. However, the validity of the methods used to conclude on the performance of specific models is debatable and there have been very few at-scale studies to compare the relative performance across these different models.
- Various qualitative studies have highlighted many factors that play a role in rural water performance which largely relate to sustainability factors and can partly be explained by the fact that the concepts of "performance" and "sustainability" are often used interchangeably, as proxy concepts of success.
- However, given the diversity of conceptual frameworks and methodologies used, it is difficult to conclude on the relative importance of specific factors in driving the performance of rural water services under different management arrangements. Further, while the term "context" is widely flagged as playing a role in service performance, the term is not clearly defined, or associated with converging elements and its genuine importance in driving performance has not been tested.
- Small-scale rural water supply management entities in OECD countries have historically performed less well than their larger, urban utility counterparts and suffered from many of the same challenges exhibited in low- and middle-income countries: spirals of low revenue; low

investment and low quality of service; poor human capacity and largely voluntary management; low political priority for small, often socio-economically marginalized communities; large numbers of fragmented small providers that are not fully engaged with, monitored or regulated, due to multiple government institutional layers and jurisdictions.

- Solutions adopted by governments and regulators in OECD countries to improve management performance include: structured programs of financial support for investment, including grants, loans and improving creditworthiness; technical assistance, training programs and translation of complex resources, laws and guidelines into more user-friendly formats; formalizing operator qualifications and ongoing certification programs; imposition of public health regulations to improve service quality; consolidation or aggregation of schemes, including merging physically with larger urban utilities or management umbrellas; and use of asset management and water safety planning assessments and tools.

# 6. CONCLUSIONS

## 6.1 PRIORITY FINDINGS FROM THE DESK STUDY

Approaches to rural water supply have evolved, largely following, and responding to, the significant changes and trends observed in rural areas. Although it is difficult to generalize at a global level, several important trends from this study can be identified which provide the backdrop, against which rural water services are being managed and are evolving. The following holds true for many low-and middle-income countries, recognizing that there are particularly difficult challenges in fragile countries with entrenched conflict and repeated extreme climate-related events which represent a specific context where such generalizations are unlikely to apply.

- **Rural landscapes are changing, and expectations are rising.** The combination of changing rural demographics, migration, and changing economic landscapes leading to higher density communities, and other external processes such as telecommunication connectivity and improved transport networks, are all affecting rural populations' expectations: people want better, more reliable, services and are increasingly prepared to pay for them particularly for piped on premise supplies.
- **A progressive, but slow, transition to improving rural services.** Coverage is increasing, the quality of services is rising (expressed in terms of safely managed, piped to home services) and countries are aiming to achieve higher standards articulated in explicit policy goals. However, on aggregate, rural populations still trail their urban counterparts at an intra-country level and to a large extent, sector improvements follow economic growth patterns when considering progress between countries.
- **There is strong correlation between economic growth and increased rural water supply coverage**. However, there are exceptions (or "positive deviants") of countries which have accelerated rural water sector coverage faster than their economic growth over the last 20 years: this is the case of Mali, Uganda, Senegal, and.
- **There is a widespread recognition for the need to shift approaches to achieve SDG 6.1.** Evidence of limited improvements in access, functionality rates, service levels and systemic weaknesses over the past decades have been measured in different ways over the past decades. Regardless of framing of the problem, the direction of travel has reached a consensus in the rural water sector: to shift from a focus on infrastructure provision to a broader consideration of systemic capacities to deliver reliable, safe, and permanent services.
- **It is also now widely understood that to achieve universal, sustainable access, more holistic approaches must be adopted which recognize the delivery of rural water as a system.** The entire service delivery model—within which specific management arrangements operate—consists of a multi-layered and interlinked set of actors and factors, which need strengthening at all levels: from scheme operators, to service authorities and national institutions. In short, it is now recognized that "business as usual" (i.e., a cycle of short-term projects focused on infrastructure delivery) will not achieve the desired outcomes of reaching universal and sustainable access to rural water services. Ensuring that all key components of the water system are established and functioning, and that sufficient and adequate financing is in place are core requirements.

## APPROACHES TO RURAL WATER SERVICE MANAGEMENT ARE EVOLVING TO ADDRESS SECTOR LIMITATIONS.

**For decades, rural water services have been managed by communities, with widely acknowledged limitations in service quality and financial sustainability**. This model was originally introduced for ideological reasons, which have been interpreted in subsequent years as both a positive vision of greater community participation and, at the same time, an abdication by government of responsibility for the rural population for political and economic reasons. The CBM model remains the predominant model in most low- and middle-income countries, despite known limitations which have been documented for many years and are well-articulated in the literature.

**Increasingly, governments are recognizing the broader trends affecting rural areas and taking policy action to address limitations of current management arrangements.** Significant efforts to improve the performance of CBM and introduce alternative management arrangements are underway in many countries. These processes are loosely referred to as "professionalization", but the concept is not well defined in the literature and relates to different processes at different levels:

- **Strengthening CBM:** through the provision of improved management capacity, training, and long-term, regularized support from external entities, including through the establishment of mechanisms for specialist maintenance providers, and/or the creation of more horizontal, groupings or associations of CBM service providers.
- Adopting alternative models: through the involvement of public utilities, or private operators with more skilled and renumerated management staff, to either directly operate water supply facilities or to provide outsourced maintenance functions. The adoption of alternative models at sector level is happening at different scales and often comes about as the result of iterative change processes, lasting over many years and that may involve lengthy sector debates and investments in various levels (including policy, legislation, and piloting of innovative approaches).
- Rethinking the scale of service provision: through "consolidation" or "aggregation" of water supply schemes across defined service areas to achieve greater financial viability and spread risk, thereby making the O&M more viable at scale and to attract more professional operators. Scale in this case can be done by clustering communities to the level of a district (decentralized administrative unit), across several districts, or indeed up to national scale with much larger regional service areas. Such consolidation has occurred through physical expansion of (piped) networks managed by existing utility providers and/or creating new management utilities specifically for rural populations or extending the umbrella of management to incorporate physically separate schemes.

**The decisions to adopt alternative models have been stimulated by a range of drivers:** these include the influence of key development partners, political pressures, and simply a reaction to the widespread recognition that existing approaches have not been delivering expected outcomes in terms of the quality and sustainability of services. However, management reform efforts tend not to have been fully evidence based and usually do not align with efforts to address other core, systemic weaknesses at sector level such as lack of regulation of services in rural areas or inadequate financing frameworks.

**Consolidation or aggregation alone should not be viewed as a panacea.** While the experiences from OECD countries suggest potential benefits related to consolidation or aggregation strategies, successful examples are largely from those countries that can also make significant public investments in the underlying processes, including support for long term capacity building of operators, improving sector governance arrangements, and subsidizing some level of capital and operating costs. The difficulties in addressing these requirements are still evident in many low-and middle-income countries and have likely limited the effectiveness of CBM in the past. Broader efforts to reform the sector are likely needed for consolidation to fulfill its potential to achieve improved services at lower cost.

## 6.2 GAPS IDENTIFIED FROM THE DESK STUDY AND ON-GOING INITIATIVES

As the transition from a more homogenous policy offering (i.e., CBM) to a more pluralist set of management alternatives accelerates across low- and middle-income countries, the sector is at an inflection point in terms of understanding and there are important remaining gaps in knowledge about the nature of these management models and their performance. This is true, even at the most basic level in terms of what proportion of the rural population is served by different arrangements in any given country. In summary, there are two principal gaps in the literature which may be areas where the REAL-Water research program could add value: a systematic understanding of the performance of different management models and an assessment of external factors that affect these models' performance either positively or negatively.

**There is a limited understanding of rural water service management performance as opposed to "sustainability" more generally.** Unlike water sector performance, framed and tracked in alignment with the global development agenda; *management performance* of rural water supply more specifically does not link to any SDG target, definition, benchmark, or method of measurement. As a result, the interpretation of what constitutes management performance varies across initiatives and organizations. To date there has been no development of a common definition of management performance or design of measurement methods. This has resulted in the absence of a framework for assessing rural water service management performance and only patchy evidence of the performance of various management models beyond CBM. Existing multi-country datasets with some data on management performance show limited comparability and gaps. The World Bank's effort to develop a common matrix to monitor service provision and test it is a notable effort, but it has not yet been applied at scale. This situation contrasts with much more concerted efforts in the urban water sector, most notably the most measurement framework developed and applied by IBNET, including both service level and management performance indicators.

**Existing evidence of management largely focusses on the CBM model, shows limited comparability and varying levels of robustness.** Most rigorous evidence related to management derives from studies of the CBM model and points to overall poor performance as reflected in functionality outcomes or low levels of 'sustainability' of service. There are a number of important studies providing useful insights into factors affecting the sustainability of CBM-supported schemes, including also delegated maintenance models, but they do not apply a clear and unifying concept around a management arrangement across contexts, nor do they shed insights on service provider models beyond CBM (Thapa, Prevost, and Widjanarko 2021; Lockwood, Chintalapati, et al. 2021; Cronk and Bartram 2017).

**Other management models have been assessed largely in qualitative terms and there has been limited experience in applying a common methodology or framework to explore management performance.** Individual assessments of alternative management models applied in rural areas have been conducted, including private operators (SWEs), delegated maintenance providers and public utilities (Adank, van Lieshout, and Ward 2021; Dalberg 2017; A. Harvey 2021; 1001Fontaines 2022). There is also one notable study comparing different management models across 16 countries using a common framework, but this relied on secondary data and the analysis centered on the comparison of sustainability outcomes rather than management performance and the factors affecting it (World Bank Group 2017b).

**The boundaries around the concept of rural water supply management are not clearly defined and understanding of key actors involved in a management arrangement varies across studies.** There is common agreement in defining the general arrangements for service delivery, often referred to as the "service delivery model" which comprises the service provider (or operator), the service authority and national level entities, all having important functions in relation to different aspects of rural water supply (Lockwood and Smits 2011; World Bank Group 2017b; WaterAid 2021). However, beyond the service provider (regardless of type), there is less clarity around the specific functions and practices that constitute good management at each level. The relative lack of evidence in the development water sector literature maybe as the result of the bias toward the study of CBM as the predominant service provider model over time, or simply because until relatively recently, there have been less alternative management arrangements to study.

**The factors affecting rural water supply management are well studied, but largely framed in relation to sustainability and defined in broad terms under the various sustainability dimensions articulated by development partners**. Factors that support "positive outcomes" have been relatively well documented and studies using frameworks largely developed by donors, international NGOs, consultants, or UN agencies. These are usually framed either according to the FIETS framework or in reference to the community conditions, program conditions or external conditions, such as water resources availability. These studies are often linked to specific implementation programs in individual countries and carried out ex-post (Godfrey et al. 2009; Annis and Moreland 2015) or have tended to focus on factors affecting CBM. For example, the multi-country study examining factors affecting success across different service provider models using a rigorous comparative framework is relevant but compares self-supply and variations of CBM only (Marks et al. 2018). Individual factors relating to rural water provision, most notably regulation, have also been studied (Gerlach 2019).

Although several more critical factor areas emerge from the literature, including regulation, financing and long-term institutional support, the specifics of the required improvements in terms of management practices are not as well articulated. The following weaknesses or gaps in existing studies of such factors reviewed in the literature are also important to note:

- **Incomparable definitions of success: positive outcomes related to different**—either narrow or very broad—aspects of performance (i.e., functionality or sustainability).

- **Single-loop learning**: there is a tendency in the water sector to recycle common factors with limited statistical validity to design conceptual frameworks or assessment methodologies, which are subsequently replicated across other organizations without a necessarily being subject to more critical analysis. This tendency to 'find what we are looking for' without questioning the fundamental evidence has led to the reinforcement of (largely) the same sets of factors over time.
- **Factors are cited but not always clearly defined or precisely assessed:** this is particularly the case for contextual elements which are regularly cited for their importance, but then described rather than assessed in a rigorous manner.
- **Considering factors in a static manner**: factors have been assessed largely in a static manner, except for Marks et al (2018), without attempting to interrogate the sequencing, relationship or combination of factors that can improve performance. The influence of behaviors and dynamics of system actors on the strength and significance of factors (building blocks) has only recently been recognized and started to be addressed in the literature.

Finally, it is important to note ongoing or planned efforts to study areas of interest related to rural water management performance and that should be accounted for in the design of the REAL-Water research program.

**There are a number of recently concluded and current research initiatives and studies that focus on a single or specific sub-set of factors affecting rural water service provision and aspects of management.** Other initiatives examining specific aspects of rural water and the enabling environment include: the non-profit social enterprise, Uptime, focusing on financial subsidies for delegated professionalized maintenance services related to the CBM model via results-based contracts across seven African countries (McNicholl, Hope, and Money 2020). The REACH research program, led by the University of Oxford, includes an initiative focusing on the strengthening of institutions for water security and as part of this, the program is supporting and researching an innovative maintenance model for CBM-managed schemes in Kenya (Foster et al. 2022). REACH has also investigated reforms in the enabling environment in Bangladesh with a focus on institutional design, information systems and sustainable financing (Fischer et al. 2021) and recently conducted a major diagnostic survey of rural water service providers from 68 countries as part of efforts to expand results-based programming (Nilsson et al. 2021).

FundiFix, along with Whave, which is a similar performance-based maintenance model for CBM operating in Uganda, was the subject of learning of the USAID-funded Sustainable WASH Systems Learning Partnership to assess different maintenance models and the characteristics of the broader system under which they function. This project closed in 2021 but has yielded analysis and learning directly relevant to this particular management approach, including factors that influence professionalized maintenance provision and the importance of financing, regulation, and governance mechanisms in particular (Lockwood, Chintalapati, et al. 2021).

The findings of this review of literature demonstrate, there is now a clear trajectory for rural water management arrangements as the SDG target date moves into sight. In broad brush terms, this trajectory is a move away from basic CBM and fragmented approaches (which have historically relied

heavily on NGO and development partner assistance), toward strengthening CBM through various forms of support (both government and delegated to private entities), and more formalized PPP arrangements or public utility models covering much larger service areas. Generally, the option of local government direct provision is seen as not performing strongly, and apart from some important and notable exceptions, (specifically India), this arrangement is not being actively pursued. The concept of "utilitization" of the rural water space and absorbing rural populations into utility's service areas as set out by Franceys is therefore highly relevant, as is the recent research on public utility provision carried out by IRC of the Netherlands (Adank, van Lieshout, and Ward 2021; Franceys 2019).

## 6.3 IMPLICATIONS FOR THE REAL-WATER RESEARCH PROJECT

The findings from the review of literature and practitioner documentation, as summarized above, provide insights that can help answer the objectives set out at the start of this document, which in turn are important in determining the (potential) focus and added value of the REAL-Water program and in guiding the research focus in terms of questions and hypothesis to test. The knowledge gaps also provide pointers as to potential priority areas for research, which can be summarized as follows:

1. To research **management arrangements and related practices:** this could involve developing a comprehensive definition of management performance and testing of common indicators applied across different models in different countries to provide evidence for the relative performance of different institutional arrangements in different contexts. A possible outcome may be a better-informed tool or matrix for others to do the same or to contribute to a global index (similar in design and purpose to the IBNET).
2. To analyze the **reasons for differences in management performance:** to investigate why performance may vary and the different factors and processes that may explain pathways that can lead to improved management performance across different models (CBM and alternatives) and across different contexts. A possible outcome may be a step-by-step guide in the adoption of better performing management arrangements.

## REFERENCES

1001Fontaines. 2022. "Achieving Universal Access to Safely Managed Water Services in Rural Cambodia: The Case for Complementarity of Water Supply Solutions." Cambodia: 1001fontaines.

Adank, Marieke. 2013. "Small Town Water Services: Trends, Challenges and Models." Thematic Overview Papers 27. The Hague, The Netherlands: IRC International Water and Sanitation Centre.

Adank, Marieke, Rene van Lieshout, and Richard Ward. 2021. "Utility-Managed Rural Water Services: Models, Pathways, Drivers, Performance and Areas for Support. Thematic Overview Paper." The Hague, The Netherlands: IRC.

Ahlers, Rhodante, Frances Cleaver, Maria Rusca, and Klaas Schwartz. 2014. "Informal Space in the Urban Waterscape: Disaggregation and Co-Production of Water Services." *Water Alternatives* 7 (1): 14.

Albuquerque, Catarina de. 2014. *Realising the Human Rights to Water and Sanitation*. Realising the Human Rights to Water and Sanitation : A Handbook / by the UN Special Rapporteur Catarina de Albuquerque, 9.2014. Bangalore, India.

Andres, Luis A., Michael Thibert, Camilo Lombana Cordoba, Alexander V. Danilenko, George Joseph, and Christian Borja-Vega. 2019. "Doing More with Less: Smarter Subsidies for Water Supply and Sanitation." Washington, DC: World Bank. https://doi.org/10.1596/32277.

Andronic, Corina. 2018. "How to Expand Services to Rural Areas? Concrete Examples of Inter-Communal Enterprises and Cooperation with Larger Regional Utilities in Moldova."

Annala, Linda. 2021. "Co-Producing Drinking Water in Rural Ethiopia: Governmentality in the Name of Community Management" 14 (1): 22.

Annis, Jonathan, and Leslie Moreland. 2015. "WASH Sustainable Index Tool (SIT): Comparative Analysis." Final Report. United States Agency.

Antunes, Micaela, and Rita Martins. 2020. "Determinants of Access to Improved Water Sources: Meeting the MDGs." *Utilities Policy* 63 (April): 101019. https://doi.org/10.1016/j.jup.2020.101019.

Arlosoroff, Saul. 1987. *Community Water Supply: The Handpump Option*. World Bank, IBRD, and UNDP. https://digitallibrary.un.org/record/6525.

Baird, Gregory M. 2012. "Exploring the Best Practices of 'Work With Less-Better.'" *Journal - American Water Works Association* 104 (6): 21–26. https://doi.org/10.5942/jawwa.2012.104.0094.

Banks, Brian, Ethel Mendez-Castillo, Miguel Vargas-Ramirez, Sabrina Zimmermann, and Libbet Loughnan. 2020. "Testing, Piloting, and Validation of the Rural Water Indicator Global Framework in the African Context."

Barham, Elizabeth. 2002. "Towards a Theory of Values-Based Labeling." *Agriculture and Human Values* 19 (4): 349–60. https://doi.org/10.1023/A:1021152403919.

Barlow, Maude, and Tony Clarke. 2002. "Who Owns Water?" The Nation Company.

Batz, Dr. Franz-Josef, Stephanie Lorek, Johannes Majewski, and Christoph Lassenberger. 2010. "Pro-Poor Financial Services for Rural Water: Linking the Water Sector to Rural Finance." Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ). https://www.icafrica.org/en/knowledge-hub/article/pro-poor-financial-services-for-rural-water-linking-water-sector-to-rural-finance-187/.

Baumann, Erich. 2006. "Do Operation and Maintenance Pay?" *Waterlines* 25 (1): 10–12. https://doi.org/10.3362/0262-8104.2006.033.

———. 2009. "May-Day! May-Day! Our Handpumps Are Not Working!" No 1. Perspectives. RWSN.

Baumann, Erich, and Kerstin Danert. 2008. "Operation and Maintenance of Rural Water Supplies in Malawi: Study Findings." O&M Study. SKAT Foundation.

Behailu, Beshah M., Jarmo J. Hukka, and Tapio S. Katko. 2017. "Service Failures of Rural Water Supply Systems in Ethiopia and Their Policy Implications." *Public Works Management & Policy* 22 (2): 179–96. https://doi.org/10.1177/1087724X16656190.

Benin Ministry Water and Mines. 2022. "Signing of Three (03) Leasing Contracts for Hydraulic Structures for Drinking Water Supply in Rural Areas." Ministry of Water and Mines of the Republic of Benin. 2022. https://eau-mines.gouv.bj/article/71/signature-trois-03-contrats-affermage-ouvrages-hydrauliques-alimentation-potable-milieu-rural/.

Bickel, Blaine W. 2006. "Beyond SRF: Loans, Grants, and Technical Assistance for Small Water Systems." *Journal - American Water Works Association* 98 (1): 88–94. https://doi.org/10.1002/j.1551-8833.2006.tb07566.x.

Blaikie, Piers. 2006. "Is Small Really Beautiful? Community-Based Natural Resource Management in Malawi and Botswana." *World Development* 34 (11): 1942–57. https://doi.org/10.1016/j.worlddev.2005.11.023.

Blanchard, Christopher S., and W. David Eberle. 2013. "Technical, Managerial, and Financial Capacity Among Small Water Systems." *Journal of the American Water Works Association* 105 (5): E229–35. https://doi.org/10.5942/jawwa.2013.105.0045.

Bolt, Eveline. 2001. "Report on the Rural Water and Sanitation Workshop Public Private Partnership for Community Water Supply and Sanitation, a Learning Event of the Infrastructure Forum." In *Support to DGIS Sector Policy Development*, 16. Washington DC: IRC International Water and Sanitation Centre.

Bonsor, H C, N Oates, P J Chilton, R C Carter, V Casey, A M MacDonald, B Etti, J Nekesa, M Tumuntungire, and M Bennie. 2015. "A Hidden Crisis: Strengthening the Evidence Base on the Current Failures of Rural Groundwater Supplies." In *38th WEDC International Conference, Loughborough University, UK, 2015*, 2181:6. Loughborough University, UK: WEDC, Loughborough University.

Botchway, Karl. 2001. "Paradox of Empowerment: Reflections on a Case Study from Northern Ghana." *World Development* 29 (1): 135–53.

Boulenouar, Julia. 2015. "Triple-S: Capacity Support to Local Governments." Briefing Note. Building Blocks for Sustainability Series. The Hague, The Netherlands: IRC.

Brault, Jean-Martin, Zael Sanz, and Bruno Le Bansais. 2014. "Professionalizing Drinking Water Service Delivery in Small Towns of Haiti." Field Note. World Bank WSP.

Briscoe, J., and D. de Ferranti. 1988. *Water for Rural Communities: Helping People Help Themselves.* World Bank. https://www.cabdirect.org/cabdirect/abstract/19886705522#.

Broek, Marije van den, and Julia Brown. 2015. "Blueprint for Breakdown? Community Based Management of Rural Groundwater in Uganda." *Geoforum* 67 (December): 51–63. https://doi.org/10.1016/j.geoforum.2015.10.009.

Brown, Bettina, Alfons Weersink, and Rob C. de Loë. 2005. "Measuring Financial Capacity and the Effects of Regulatory Changes on Small Water Systems in Nova Scotia." *Canadian Water Resources Journal* 30 (3): 197–210. https://doi.org/10.4296/cwrj3003197.

Brown, Julia. 2011. "Assuming Too Much? Participatory Water Resource Governance in South Africa: Participatory Water Resource Governance in South Africa." *The Geographical Journal* 177 (2): 171–85. https://doi.org/10.1111/j.1475-4959.2010.00378.x.

Cambodia Government. 2011. "National Strategy for Rural Water Supply, Sanitation and Hygiene." Kingdom of Cambodia: National Religion King.

Carter, R., S. F. Tyrrel, and P. Howsam. 1999. "The Impact and Sustainability of Community Water Supply and Sanitation Programmes in Developing Countries." *Water and Environment Journal* 13 (4): 292–96. https://doi.org/10.1111/j.1747-6593.1999.tb01050.x.

Carter, Richard. 2009. "Operation and Maintenance of Rural Water Supplies." Perspectives 2. RWSN.

———. 2021. *Rural Community Water Supply: Sustainable Services for All*. Rugby, UK: Practical Action Publishing. https://doi.org/10.3362/9781788531689.

Carter, Richard, and Harold Lockwood. 2011. "A Vision for Achieving Sustainable Rural Water Services for All." Field Note 9. St. Gallen, Switzerland: RWSN.

Carter, Richard, and Ian Ross. 2016. "Beyond 'Functionality' of Handpump-Supplied Rural Water Services in Developing Countries." *Waterlines* 35 (1): 94–110. https://doi.org/10.3362/1756-3488.2016.008.

Casey, Vincent, and Hannah Crichton-Smith. 2020. "System Strengthening for Inclusive, Lasting Wash That Transforms People's Lives: Practical Experiences from the Suswash Programme." SusWASH, WaterAid.

Castañeda, Andrés, Dung Doan, David Newhouse, Minh Cong Nguyen, Hiroki Uematsu, and João Pedro Azevedo. 2018. "A New Profile of the Global Poor." *World Development* 101 (January): 250–67. https://doi.org/10.1016/j.worlddev.2017.08.002.

Castillo, Eloise Trabka, Scott J. Rubin, Sally K. Keefe, and Robert S. Raucher. 1997. "Restructuring Small Systems." *Journal - American Water Works Association* 89 (1): 65–74. https://doi.org/10.1002/j.1551-8833.1997.tb08162.x.

Chepyegon, Chemeril, and Daisuke Kamiya. 2018. "Challenges Faced by the Kenya Water Sector Management in Improving Water Supply Coverage." *Journal of Water Resource and Protection* 10 (1): 85–105. https://doi.org/10.4236/jwarp.2018.101006.

Chintalapati, Pranav, Harold Lockwood, Karl Linden, Cliff Nyaga, Adam Harvey, Adrienne Lane, Elizabeth Jordan, and Ella Lazarte. 2020. "Maintenance Approaches to Improve the Sustainability of Rural Water Supplies." Research Brief. Boulder, Colorado: University of Colorado Boulder.

Chowns, Eleanor (Ellie). 2014. "The Political Economy of Community Management: A Study of Factors Influencing Sustainability in Malawi's Rural Water Supply Sector." Doctor of Philosophy, University of Birmingham.

———. 2015. "Is Community Management an Efficient and Effective Model of Public Service Delivery? Lessons from the Rural Water Supply Sector in Malawi: Is Community Management Efficient and Effective?" *Public Administration and Development* 35 (4): 263–76. https://doi.org/10.1002/pad.1737.

Cleaver, Frances. 1999. "Paradoxes of Participation: Questioning Participatory Approaches to Development." *Journal of International Development* 11 (4): 597–612. https://doi.org/10.1002/(SICI)1099-1328(199906)11:4<597::AID-JID610>3.0.CO;2-Q.

Cleaver, Frances, and Anna Toner. 2006. "The Evolution of Community Water Governance in Uchira, Tanzania: The Implications for Equality of Access, Sustainability and Effectiveness." *Natural Resources Forum* 30 (3): 207–18. https://doi.org/10.1111/j.1477-8947.2006.00115.x.

Colin, Jeremy. 1999. "VLOM for Rural Water Supply: Lessons from Experience." Well Study 162. UK: Water and Environmental Health at London and Loughborough.

Cord, Caleb, Amy Javernick-Will, Elizabeth Buhungiro, Adam Harvey, Elizabeth Jordan, Harold Lockwood, and Karl Linden. 2022. "Pathways to Consumer Demand and Payment for

Professional Rural Water Infrastructure Maintenance Across Low-Income Contexts." *Science of The Total Environment* 815 (April): 152906. https://doi.org/10.1016/j.scitotenv.2021.152906.

Cronk, Ryan, and Jamie Bartram. 2017. "Factors Influencing Water System Functionality in Nigeria and Tanzania: A Regression and Bayesian Network Analysis." *Environmental Science & Technology* 51 (19): 11336–45. https://doi.org/10.1021/acs.est.7b03287.

CRS. 2022. "The Azure Initiative Mobilizes Capital and Technical Knowledge to Improve and Expand Water Services for Communities Living in Poverty, in Rural and Peri-Urban Areas of Central America." Investing in Water, Investing in People. 2022. https://www.azurewater.org/#/.

Dalberg. 2017. "The Untapped Potential of Decentralized Solutions to Provide Safe, Sustainable Drinking Water at Large Scale: The State of the Safe Water Enterprises Market."

Daley, Dorothy M., Megan Mullin, and Meghan E. Rubado. 2014. "State Agency Discretion in a Delegated Federal Program: Evidence from Drinking Water Investment." *Publius: The Journal of Federalism* 44 (4): 564–86. https://doi.org/10.1093/publius/pjt033.

Davis, Jennifer. 2005. "Private-Sector Participation in the Water and Sanitation Sector." *Annual Review of Environment and Resources* 30 (1): 145–83. https://doi.org/10.1146/annurev.energy.30.050504.144635.

Deal, Philip, and Sean Furey. 2019. "The 2019 RWSN Directory of Rural Water Supply Services, Tariffs Management Models & Lifecycle Costs." Switzerland: SKAT Foundation.

Dektar, Benbella, Scott McConnell, and Allan Kasekende. 2022. "Exploratory Assessment of Challenges and Issues with Private Water Operators in Rural Water Supply and Service Delivery: A Case Study of the Karamoja Region, Uganda." *Water Policy* 24 (5): 856–66. https://doi.org/10.2166/wp.2021.263.

Delta Partnership. 2011. "Malawi Sector Performance Report: Irrigation, Water, and Sanitation." Malawi Ministry of Agriculture, Irrigation and Water Development.

Diallo, Oumar. 2015. "Levers of Change in Senegal's Rural Water Sector." Water and Sanitation Program. Water and Sanitation Program; World Bank.

Dijkstra, Lewis, Ellen Hamilton, Somik Lall, and Sameh Wahba. 2020. "How Do We Define Cities, Towns, and Rural Areas?" 2020. https://blogs.worldbank.org/sustainablecities/how-do-we-define-cities-towns-and-rural-areas.

Dobbin, Kristin B., and Amanda L. Fencl. 2021. "Institutional Diversity and Safe Drinking Water Provision in the United States." *Utilities Policy* 73 (December): 101306. https://doi.org/10.1016/j.jup.2021.101306.

Dobbin, Kristin B., and Daniel W. Smith. 2021. "Bridging Social Capital Theory and Practice: Evidence from Community-Managed Water Treatment Plants in Honduras." *Journal of Rural Studies* 88 (December): 181–91. https://doi.org/10.1016/j.jrurstud.2021.10.002.

Easterly, William. 2002. "The Cartel of Good Intentions: The Problem of Bureaucracy in Foreign Aid." *The Journal of Policy Reform* 5 (4): 223–50. https://doi.org/10.1080/1384128032000096823.

EPA. 2016. "Summary of State Operator Certification Programs."

Eriksson, Kai. 2012. "Self-Service Society: Participative Politics and New Forms of Governance." *Public Administration* 90 (3): 685–98. https://doi.org/10.1111/j.1467-9299.2011.01996.x.

ESAWAS. 2022. "The Water Supply and Sanitation Regulatory Landscape Across Africa; Content Wide Synthesis Report." Synthesis Report. Eastern and Southern Africa Water and Sanitation Regulators Association. https://esawas.org/repository/Esawas_Report_2022.pdf.

Faguet, Jean-Paul. 2011. "Decentralization and Governance." Discussion paper EOPP 027. Economic Organisation and Public Policy. London, UK: London School of Economics and Political Science.

Feinstein, Laura, Katie Porter, Darcy Bostic, Morgan Shimabuku, Cindy Paulson, Alex Waite, and Rucker Alex. 2020. "Solutions for Underperforming Drinking Water Systems in California." 5015. California Urban Water Agencies: Pacific Institute.

Fink, Eliza Lynn, Pranav Chintalapati, Adrienne Lane, Andrew Wester, Amy Javernick-Will, and Karl Linden. 2022. "Determinants of Rural Hand-Pump Functionality Through Maintenance Provision in the Central African Republic." Edited by Timothy Foster. *PLOS Water* 1 (6): 19. https://doi.org/10.1371/journal.pwat.0000024.

Fischer, A, S F Hoque, M M Alam, K Charles, M Ibrahim, E H Chowdhury, Z H Mahmud, et al. 2021. "Policy Reform for Safe Drinking Water Service Delivery in Rural Bangladesh."

Fisher, Michael B., Katherine F. Shields, Terence U. Chan, Elizabeth Christenson, Ryan D. Cronk, Hannah Leker, Destina Samani, Patrick Apoya, Alexandra Lutz, and Jamie Bartram. 2015. "Understanding Handpump Sustainability: Determinants of Rural Water Source Functionality in the Greater Afram Plains Region of Ghana." *Water Resources Research* 51 (10): 8431–49. https://doi.org/10.1002/2014WR016770.

Fonseca, Catarina, Richard Franceys, Charles Batchelor, Peter McIntyre, Amah Klutse, Kristin Komives, Patrick Moriarty, et al. 2010. "WASHCost Briefing Note 1: Life-Cycle Costs Approach - Glossary and Cost Components." Brief Note 1. The Hague, The Netherlands: IRC International Water and Sanitation Centre.

———. 2011. "WASHCost Briefing Note 1a: Life-Cycle Costs Approach - Costing Sustainable Services." Brief Note 1a. IRC.

Fonseca, Catarina, Goufrane Mansour, Stef Smit, and Maricela Rodriguez. 2021. "The Role of National Public Development Banks in Financing the Water and Sanitation SDG 6, the Water Related Goals of the Paris Agreement and Biodiversity Protection." Finance in Common.

Foster, Tim. 2012. "Private Sector Provision of Rural Water Services: A Desk Study for Water for People." Water for People.

———. 2013. "Predictors of Sustainability for Community-Managed Handpumps in Sub-Saharan Africa: Evidence from Liberia, Sierra Leone, and Uganda." *Environmental Science & Technology* 47 (21): 12037–46. https://doi.org/10.1021/es402086n.

Foster, Tim, Sean Furey, Brian Banks, and Juliet Willetts. 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): 855–69. https://doi.org/10.1080/07900627.2018.1543117.

Foster, Tim, and Rob Hope. 2017. "Evaluating Waterpoint Sustainability and Access Implications of Revenue Collection Approaches in Rural Kenya." *Water Resources Research* 53 (2): 1473–90. https://doi.org/10.1002/2016WR019634.

Foster, Tim, Rob Hope, Cliff Nyaga, Johanna Koehler, Jacob Katuva, Patrick Thomson, and Nancy Gladstone. 2022. "Investing in Professionalized Maintenance to Increase Social and Economic Returns from Drinking Water Infrastructure in Rural Kenya." Policy Brief.

Foster, Tim, Andrew Shantz, Sunetra Lala, and Juliet Willetts. 2018. "Factors Associated with Operational Sustainability of Rural Water Supplies in Cambodia." *Environmental Science: Water Research & Technology* 4 (10): 1577–88. https://doi.org/10.1039/C8EW00087E.

Foster, Tim, Juliet Willetts, Mike Lane, Patrick Thomson, Jacob Katuva, and Rob Hope. 2018. "Risk Factors Associated with Rural Water Supply Failure: A 30-Year Retrospective Study of Handpumps on the South Coast of Kenya." *Science of The Total Environment* 626 (June): 156–64. https://doi.org/10.1016/j.scitotenv.2017.12.302.

Fotaki, Marianna. 2015. "Co-Production Under the Financial Crisis and Austerity: A Means of Democratizing Public Services or a Race to the Bottom?" *Journal of Management Inquiry* 24 (4): 433–38. https://doi.org/10.1177/1056492615579790.

Fragano, Frank, Carlos Linares, Harold Lockwood, Daniel Rivera, Andrew Trevett, and Guillermo Yepes. 2001. "Case Studies on Decentralization of Water Supply and Sanitation Services in Latin America." Strategic Paper No. 1. Washington, DC: Environmental Health Project.

Franceys, Richard. 2019. "Utilitisation." In *All Systems Go! WASH Systems Symposium*. The Hague, Netherlands.

Fundifix. 2021. "The FundiFix Model: Maintaining Rural Water Services."

Gerlach, Esther. 2019. "Regulating Rural Water Supply Services: A Comparative Review of Existing and Emerging Approaches with a Focus on GIZ Partner Countries." Bonn, Germany: Gesellschaft für Internationale Zusammenarbeit (GIZ).

Gia, Luc Hoang, and Thomas Fugelsnes. 2010. "Public-Private Partnerships for Small Piped Water Schemes - a Review of Progress in Seven African Countries." World Bank Water & Sanitation Program.

Godfrey, S, M Freitas, A Muianga, M Amaro, P Fernadez, and L Sousa Mosies. 2009. "Sustainability Check: A Monitoring Tool for the Sustainability of Rural Water Supplies." In *34th WEDC International Conference*, 5. Addis Ababa, Ethiopia.

González-Gómez, Francisco, Miguel A. García-Rubio, Francisco Alcalá-Olid, and M. Isabel Ortega-Díaz. 2013. "Outsourcing and Efficiency in the Management of Rural Water Services." *Water Resources Management* 27 (3): 731–47. https://doi.org/10.1007/s11269-012-0212-0.

Government of the Republic of Liberia. 2014. "Water, Sanitation & Hygiene (WASH) Sector Performance Report."

Hall, David, and Emanuele Lobina. 2007. "Profitability and the Poor: Corporate Strategies, Innovation and Sustainability." *Geoforum* 38 (5): 772–85. https://doi.org/10.1016/j.geoforum.2006.08.012.

Harpe, Jean de la. 2015. "Triple-S: Making Aid Effective at the Local Level." Briefing Note. Building Blocks for Sustainability Series. The Hague, The Netherlands: IRC.

Harvey, Adam. 2021. "Ten Factors for Viable Rural Water Services." Research Report. Sustainable WASH Systems Learning Partnership. USAID.

Harvey, Peter A., and Robert A. Reed. 2007. "Community-Managed Water Supplies in Africa: Sustainable or Dispensable?" *Community Development Journal* 42 (3): 365–78. https://doi.org/10.1093/cdj/bsl001.

Harvey, Peter, and Bob Reed. 2004. *Rural Water Supply in Africa: Building Blocks for Handpump Sustainability*. Water, Engineering and Development Centre Loughborough University. https://wedc-knowledge.lboro.ac.uk/resources/books/Rural_Water_Supply_in_Africa_-_Complete.pdf.

Hendry, Dr. Sarah, and Dr. Loanna Akoumianaki. 2011. "Small-Scale Water Supplies in the Pan-European Region." United Nations Economic Commission for Europe and World Health Organization.

———. 2016. "Governance and Management of Small Rural Water Supplies: A Comparative Study." CREW – Scotland's Centre of Expertise for Waters.

Hirn, Maximilian. 2013. "Private Sector Participation in the Ugandan Water Sector: A Review of 10 Years of Private Management of Small Town Water Systems." Working Paper. Nairobi, Kenya: Water and Sanitation Program (WSP).

Hope, Rob. 2015. "Is Community Water Management the Community's Choice? Implications for Water and Development Policy in Africa." *Water Policy* 17 (4): 664–78. https://doi.org/10.2166/wp.2014.170.

Hope, Rob, and Paola Ballon. 2021. "Individual Choices and Universal Rights for Drinking Water in Rural Africa." *Proceedings of the National Academy of Sciences* 118 (40): e2105953118. https://doi.org/10.1073/pnas.2105953118.

Hope, Rob, Tim Foster, Alex Money, Michael Rouse, Nic Money, and Mike Thomas. 2011. "Smart Water Systems. Final Technical Report to UK Department for International Development." Technical project report. Oxford, England: Oxford University.

Hope, Rob, Susanna Goodall, Adamson Katilu, Johanna Koehler, and Patrick Thomson. 2015. "Financial Sustainability for Universal Rural Water Services - Evidence from Kyuso, Kenya." Working Paper 2. Water Programme. Kenya: University of Oxford. https://programme.worldwaterweek.org/Content/ProposalResources/allfile/ssee_waterprogramme_wp2_aug2015_1.pdf.

Hope, Rob, Patrick Thomson, Johanna Koehler, and Tim Foster. 2020. "Rethinking the Economics of Rural Water in Africa." *Oxford Review of Economic Policy* 36 (1): 171–90. https://doi.org/10.1093/oxrep/grz036.

Huston, Angela, Susan Gaskin, Patrick Moriarty, and Martin Watsisi. 2021. "More Sustainable Systems Through Consolidation? The Changing Landscape of Rural Drinking Water Service Delivery in Uganda." *Water Alternatives* 14 (1): 248–70.

Huston, Angela, and Patrick Moriarty. 2018. "Understanding the WASH System and Its Building Blocks." Working Paper. The Hague, The Netherlands: IRC International Water and Sanitation Centre.

Huston, Angela, Patrick Moriarty, and Harold Lockwood. 2019. "All Systems Go! Background Note for the WASH Systems Symposium." Extended Version with References and Further Reading. The Hague, The Netherlands: IRC. https://www.ircwash.org/sites/default/files/084-201910background_symposium_extended.pdf.

Hutchings, Paul. 2016. "Supporting Community Management: A Synthesis of Successful Rural Water Services Programmes in India." PhD Thesis, India: CRANFIELD UNIVERSITY. http://dspace.lib.cranfield.ac.uk/handle/1826/11314.

———. 2018. "Community Management or Coproduction? The Role of State and Citizens in Rural Water Service Delivery in India" 11 (2): 18.

Hutchings, Paul, Mei Yee Chan, Lucie Cuadrado, Fatine Ezbakhe, Baptiste Mesa, Chiaki Tamekawa, and Richard Franceys. 2015. "A Systematic Review of Success Factors in the Community Management of Rural Water Supplies Over the Past 30 Years." *Water Policy* 17 (5): 963–83. https://doi.org/10.2166/wp.2015.128.

Hutchings, Paul, Richard Franceys, Snehalatha Mekala, Stef Smits, and A. J. James. 2017. "Revisiting the History, Concepts and Typologies of Community Management for Rural Drinking Water Supply in India." *International Journal of Water Resources Development* 33 (1): 152–69. https://doi.org/10.1080/07900627.2016.1145576.

Hutton, Guy, and Mili Varughese. 2016. "The Costs of Meeting the 2030 Sustainable Development Goal Targets on Drinking Water, Sanitation, and Hygiene." Technical Paper. Washington, DC: World Bank. https://doi.org/10.1596/K8543.

Hydroconseil. 2016. "Etat Des Lieux De La Privatisation De La Gestion Des Adductions D'eau Potables (aep) Dans 22 Centres Au Mali Et Comparaison Avec 22 Centres a Gestion Associative." Rapport final. Bamako.

ICAI. 2016. "Assessing DFID's Results in Water, Sanitation and Hygiene." ICAI Score.

Innovations for Poverty Action. 2011. "The Impact of Savings Groups on the Lives of the Rural Poor in Ghana, Malawi, and Uganda." Study Summary. Washington: CARE. https://www.poverty-action.org/printpdf/6221.

International Environmental Law Research Centre (IELRC). 1990. "New Delhi Statement, Global Consultation on Safe Water and Sanitation, 1990." Geneva, Switzerland.

———. 1992. "The Dublin Statement on Water and Sustainable Development, 1992." Dublín, Ireland.

IRC. 2017. "Community Water and Sanitation Agency Organisational Assessment: Final Report." The Hague, The Netherlands: IRC International Water and Sanitation Centre.

Isham, Jonathan, Deepa Narayan, and Lant Pritchett. 1995. "Does Participation Improve Performance? Establishing Causality with Subjective Data." *The World Bank Economic Review* 9 (2): 175–200. https://doi.org/10.1093/wber/9.2.175.

Jansz, Shamila. 2011. "A Study into Rural Water Supply Sustainability in Niassa Province,." WaterAid. https://policycommons.net/artifacts/2331132/report/3091757/.

Jawara, Dawda, Lizette Burgers, Brooke Yamakoshi, Evariste Kouassi Komlan, and Jeremie Toubkiss. 2017. "Sustainability Checks Guidance to Design and Implement Sustainability Monitoring in WASH." UNICEF.

Jeuland, Marc, Marcella McClatchey, Sumeet R. Patil, Subhrendu K. Pattanayak, Christine M. Poulos, and Jui-Chen Yang. 2021. "Do Decentralized Community Treatment Plants Provide Clean Water? Evidence from Rural Andhra Pradesh, India." *Land Economics* 97 (2): 345–71. https://doi.org/10.3368/le.97.2.345.

Jiménez, A., and A. Pérez-Foguet. 2010. "Challenges for Water Governance in Rural Water Supply: Lessons Learned from Tanzania." *International Journal of Water Resources Development* 26 (2): 235–48. https://doi.org/10.1080/07900621003775763.

Jones, Sharon A., and Nicole Joy. 2006. "The Inequity of the Revised Arsenic Rule for Very Small Community Drinking Water Systems." *Environmental Science & Policy* 9 (6): 555–62. https://doi.org/10.1016/j.envsci.2006.05.003.

Jordan, Jeffrey L., Witt, Harvey J., and Wilson, James R. 1996. "Modeling Water Utility Financial Performance." *Journal of the American Water Resources Association* 32 (1): 137-144. https://doi.org/10.1111/j.1752-1688.1996.tb03441.

Joseph, George, Luis Alberto Andres, Gnanaraj Chellaraj, Jonathan Grabinsky Zabludovsky, Sophie Charlotte Emi Ayling, and Yi Rong Hoo. 2019. "Why Do So Many Water Points Fail in Tanzania? An Empirical Analysis of Contributing Factors." Policy Research Working Paper 8729. Washington, DC: World Bank. https://doi.org/10.1596/1813-9450-8729.

Joshi, Anuradha, and Mick Moore. 2004. "Institutionalised Co-Production: Unorthodox Public Service Delivery in Challenging Environments." *Journal of Development Studies* 40 (4): 31–49. https://doi.org/10.1080/00220380410001673184.

Kafakoma, Robert, and Chikosa Silungwe. 2003. "Community Water, Sanitation and Health Project (COMWASH) Malawi: Operational Research Report On Water Ownership and Access Rights in Malawi: Customs, Practice and Statutory Laws."

Katz, Travis, and Jennifer Sara. 1997. "Making Rural Water Supply Sustainable: Recommendations from a Global Study." Washington, D.C: UNDP-World Bank Water and Sanitation Program.

Kayser, Georgia L., William Moomaw, Jose Miguel Orellana Portillo, and Jeffrey K. Griffiths. 2014. "Circuit Rider Post-Construction Support: Improvements in Domestic Water Quality and System Sustainability in El Salvador." *Journal of Water, Sanitation and Hygiene for Development* 4 (3): 460–70. https://doi.org/10.2166/washdev.2014.136.

Kessy, Ambrose T, and Willy McCourt. 2013. "Is Decentralization Still Recentralization? The Local Government Reform Programme in Tanzania."

Kleemeier, Elizabeth. 2000. "The Impact of Participation on Sustainability: An Analysis of the Malawi Rural Piped Scheme Program." *World Development* 28 (5): 929–44. https://doi.org/10.1016/S0305-750X(99)00155-2.

———. 2010. "Private Operators and Rural Water Supplies A Desk Review of Experience." World Bank Water.

Kleemeier, Elizabeth, and Harold Lockwood. 2015. "Public-Private Partnerships for Rural Water Services." The Hague, The Netherlands: IRC - Triple S Project.

Koehler, Johanna, Cliff Nyaga, Rob Hope, Nancy Gladstone, Mike Thomas, Albert Mumma, and Andrew Trevett. 2021. "Legal and Policy Change to Promote Sustainable WASH Services in Kitui County, Kenya." Kenya: University of Nairobi. https://www.globalwaters.org/sites/default/files/legal_and_policy_change_in_kitui_final.pdf.

Koehler, Johanna, Steve Rayner, Jacob Katuva, Patrick Thomson, and Rob Hope. 2018. "A Cultural Theory of Drinking Water Risks, Values and Institutional Change." *Global Environmental Change* 50 (May): 268–77. https://doi.org/10.1016/j.gloenvcha.2018.03.006.

Koehler, Johanna, Patrick Thomson, Susanna Goodall, Jacob Katuva, and Rob Hope. 2021. "Institutional Pluralism and Water User Behavior in Rural Africa." *World Development* 140 (April): 105231. https://doi.org/10.1016/j.worlddev.2020.105231.

Koestler, L. 2009. "Private Sector Involvement in Rural Water Supply: Case Studies from Uganda." In *Water, Sanitation and Hygiene: Sustainable Development and Multisectoral Approaches, 34th WEDC International Conference*, 4. Addis Ababa, Ethiopia.

Koppen, Barbara van, John Butterworth, and Ibrahim Juma. 2005. "African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa." International Workshop. Johannesburg, South Africa.

Lammerink, Marc, and Eveline Bolt. 2002. "Supporting Community Management: A Manual for Training in Community Management." Delft, The Netherlands: IRC International Water and Sanitation Centre.

Landes, Laura, Eric LaRose, Sarah Buck, Nathan Ohle, Stiger Ted, Glenn Barnes, Malini Sekhar, and Coye Gerald. 2021. "Regionalization: RCAP's Recommendations for Water and Wastewater Policy." Research Report. Rural Community Assistance Partnership (RCAP).

Langford, Malcolm, and Anna F. S. Russell, eds. 2017. *The Human Right to Water: Theory, Practice and Prospects.* Cambridge, United Kingdom ; New York, NY: Cambridge University Press.

Le Gouais, Anna, and James Webster. 2011. "Abandoning Community Management for 'Professionalization' of Water Supply in Rural Benin." In *The Future of Water, Sanitation, and Hygiene: Innovation, Adaptation, and Engagement in a Changing World*. Loughborough, UK.

Liddle, Elisabeth S., and Richard Fenner. 2017. "Water Point Failure in Sub-Saharan Africa: The Value of a Systems Thinking Approach." *Waterlines* 36 (2): 140–66. https://doi.org/10.3362/1756-3488.16-00022.

Lobina, Emanuele, and David Hall. 2008. "The Comparative Advantage of the Public Sector in the Development of Urban Water Supply." *Progress in Development Studies* 8 (1): 85–101. https://doi.org/10.1177/146499340700800108.

Lockwood, Harold. 2002. "Institutional Support Mechanisms for Community-Managed Rural Water Supply and Sanitation Systems in Latin America. Ehp Strategic Paper No. 6." Strategic Report 6. Washington, DC: USAID, Bureau for Latin America and the Caribbean. http://www.bvsde.paho.org/bvsacg/fulltext/SR6mech.pdf.

———. 2004. "Scaling Up Community Management of Rural Water Supply." Thematic Overview Papers. IRC International Water and Sanitation Centre. https://www.ircwash.org/sites/default/files/Lockwood-2004-Scaling.pdf.

———. 2019. "Sustaining Rural Water: A Comparative Study of Maintenance Models for Community-Managed Schemes." Research Report. Sustainable WASH Systems Learning Partnership. Addis Ababa, Ethiopia: IRC.

Lockwood, Harold, Alex Bakalian, and Wendy Wakeman. 2003. "Assessing Sustainability in Rural Water Supply: The Role of Follow-up Support to Communities - Literature Review and Desk Review of Rural Water Supply and Sanitation Project Documents." Bank-Netherlands Water Partnership.

Lockwood, Harold, Vincent Casey, William Tillet, and Bill Twyman. 2018. "Management Models for Piped Water Supply Services: A Decision-Making Resource for Rural and Small-Town Contexts." October. London: WaterAid and Aguaconsult.

Lockwood, Harold, Pranav Chintalapati, Caleb Cord, and Anna Libey. 2021. "A Roadmap for System Strengthening for Professionalized Rural Water Maintenance Services."

Lockwood, Harold, and Anna Le Gouais. 2014. "Service Delivery Indicators and Monitoring to Improve Sustainability of Rural Water Supplies." Briefing Note.

Lockwood, Harold, and Anna Le Gouais. 2015. "Professionalising Community-Based Management for Rural Water Services." Briefing Note. IRC - Triple S Project.

Lockwood, Harold, Goufrane Mansour, Stef Smits, and Susanna Smets. 2016. "Global Study on Sustainable Service Delivery Models for Rural Water: Synthesis of Emerging Findings." Conference Edition. World Bank Group and Agua Consult.

Lockwood, Harold, Cliff Nyaga, Stef Smits, Lemessa Mekonta, Adam Harvey, Elizabeth Buhungiro, Joel Mukanga, et al. 2021. "Professionalized Maintenance for Rural Water Service Provision: Toward a Common Language and Vision." https://www.globalwaters.org/sites/default/files/professionalized_maintenance_for_rural_water_service_provision_concept_note_20210308.pdf.

Lockwood, Harold, and Stef Smits. 2011. *Supporting Rural Water Supply: Moving towards a Service Delivery Approach*. Warwickshire, UK: Practical Action Publishing. https://www.ircwash.org/sites/default/files/Lockwood-2011-Supporting.pdf.

MacDonald, Jacqueline A., Amy K. Zander, and Vernon L. Snoeyink. 1997. "Improving Service to Small Communities." *Journal - American Water Works Association* 89 (1): 58–64. https://doi.org/10.1002/j.1551-8833.1997.tb08161.x.

Marks, Sara J., Kristin Komives, and Jennifer Davis. 2014. "Community Participation and Water Supply Sustainability: Evidence from Handpump Projects in Rural Ghana." *Journal of Planning Education and Research* 34 (3): 276–86. https://doi.org/10.1177/0739456X14527620.

Marks, Sara J., Emily Kumpel, Jean Guo, Jamie Bartram, and Jennifer Davis. 2018. "Pathways to Sustainability: A Fuzzy-Set Qualitative Comparative Analysis of Rural Water Supply Programs." *Journal of Cleaner Production* 205 (December): 789–98. https://doi.org/10.1016/j.jclepro.2018.09.029.

McAlister, Martha M., Qiong Zhang, Jonathan Annis, Ryan W. Schweitzer, Sunny Guidotti, and James R. Mihelcic. 2022. "Systems Thinking for Effective Interventions in Global Environmental Health." *Environmental Science & Technology* 56 (2): 732–38. https://doi.org/10.1021/acs.est.1c04110.

McCullough, Jason, and Khosrow Farahbakhsh. 2015. "Refocusing the Lens: Drinking Water Success in First Nations in Ontario: Drinking Water Success in First Nations in Ontario." *Canadian Public Administration* 58 (2): 271–94. https://doi.org/10.1111/capa.12114.

McFarlane, Kiely, and Leila M. Harris. 2018. "Small Systems, Big Challenges: Review of Small Drinking Water System Governance." *Environmental Reviews* 26 (4): 378–95. https://doi.org/10.1139/er-2018-0033.

McGimpsey, Ian. 2017. "Late Neoliberalism: Delineating a Policy Regime." *Critical Social Policy* 37 (1): 64–84. https://doi.org/10.1177/0261018316653552.

McIntyre, Peter, and Stef Smits. 2015. "Direct Support Post-Construction to Rural Water Service Providers." Briefing Note. The Hague, The Netherlands: IRC - Triple S Project.

McNicholl, Duncan, Rob Hope, and Alex Money. 2020. "Results-Based Contracts for Rural Water Services." Working Paper 2. Uptime Consortium. https://www.uptimewater.org/s/Results-Based-Contracts-for-Rural-WaterServices.pdf.

McNicholl, Duncan, Rob Hope, Alex Money, Adrienne Lane, Andrew Armstrong, Nicolaas van der Wilk, Mikaël Dupuis, et al. 2019. "Performance-Based Funding for Reliable Rural Water Services in Africa. Uptime Consortium, Working Paper 1." Working Paper.

McNicholl, Duncan, Rob Hope, Alex Money, Cliff Nyaga, J Katuva, Johanna Koehler, Patrick Thomson, et al. 2021. "Delivering Global Rural Water Services through Results-Based Contracts." Working Paper. UpTime.

Mehta, Meera, and Kameel Virjee. 2007. "Microfinance for Rural Piped Water Services in Kenya." Policy Note 1.

Mengueze, Sandrine, Dorcas Mbuvi, Sarah Dickin, and Corinne Schuster- Wallace. 2014. "A Micro Financing Framework for Rural Water and Sanitation Provisioning in Sub-Saharan Africa." Sub-Saharan Africa: United Nations University. https://doi.org/978-92-808-6041-2.

Miller, Brian W., and Martin W. Doyle. 2014. "Rangeland Management and Fluvial Geomorphology in Northern Tanzania." *Geomorphology* 214 (June): 366–77. https://doi.org/10.1016/j.geomorph.2014.02.018.

Miller, Meghan, Ryan Cronk, Tori Klug, Emma R. Kelly, Nikki Behnke, and Jamie Bartram. 2019. "External Support Programs to Improve Rural Drinking Water Service Sustainability: A Systematic Review." *Science of The Total Environment* 670 (June): 717–31. https://doi.org/10.1016/j.scitotenv.2019.03.069.

Mohan, Giles, and Kristian Stokke. 2000. "Participatory Development and Empowerment: The Dangers of Localism." *Third World Quarterly* 21 (2): 247–68. https://doi.org/10.1080/01436590050004346.

Montangero, Agnès. 2008. "Promising Management Models of Rural Water Supply Service." SDC in collaboration with Eawag/Sandec, Helvetas and Skat.

Morgan, Mark. 2002. "Washington's Certified Operator Requirements Pose Dilemma for Satellite Management Agencies." *Journal - American Water Works Association* 94 (12): 41–42. https://doi.org/10.1002/j.1551-8833.2002.tb10244.x.

Moriarty, Patrick, Charles Batchelor, Catarina Fonseca, Amah Klutse, Arjen Naafs, Kwabena Nyarko, Christelle Pezon, Alana Potter, Ratna Reddy, and Mekala Snehalatha. 2011. "Ladders for Assessing and Costing Water Service Delivery." Working Paper. Second Edition. IRC International Water and Sanitation Centre.

Moriarty, Patrick, Stef Smits, John Butterworth, and Richard Franceys. 2013. "Trends in Rural Water Supply: Towards a Service Delivery Approach." *Water Alternatives* 6 (3): 329–49.

Moriarty, Patrick, and Tania Verdemato. 2010. "Report of the International Symposium on Rural Water Services: Providing Sustainable Water Services at Scale." Thematic Group on Scaling Up Rural Water Services. Kampala, Uganda: Water and Sanitation Program (WSP).

Mukherjee, Nilanjana, and Christine Van Wijk. 2002. "Sustainability Planning and Monitoring in Community Water Supply and Sanitation. a Guide on the Methodology for Participatory Assessment (MPA) for Community-Driven Development Programs." Water and Sanitation Program (WSP).

Mvongo, Victor Dang, Cêlestin Defo, and Martin Tchoffo. 2021. "Sustainability of Rural Water Services in Rural Sub-Saharan Africa Environments: Developing a Water Service Sustainability Index." *Sustainable Water Resources Management*, May, 17. https://doi.org/1007/s40899-021-00526-8.

MWE. 2020. "National Framework for Operation and Maintenance of Rural Water Infrastructure in Uganda." Uganda.

Nagpal, Dr Tanvi, Dr Ammar Malik, and Matthew Eldridge. 2018. "Mobilizing Additional Funds for Pro-Poor Water Services: An Exploration of Potential Models to Finance Safe Water Access in Support of Sustainable Development Goal 6.1." Research Report. Washington, DC: URBAN Institute & John Hopkins.

Ndaw, Mouhamed Fadel. 2016. "Private Sector Provision of Water Supply and Sanitation Services in Rural Areas and Small Towns: The Role of the Public Sector." Water and Sanitation Program (WSP).

Neely, Kate, and Jeffrey P Walters. 2016. "Using Causal Loop Diagramming to Explore the Drivers of the Sustained Functionality of Rural Water Services in Timor-Leste," 18. https://doi.org/10.1007/s40899-021-00526-8.

Nicol, Alan, Lyla Mehta, and Jeremy Allouche. 2012. "Some for All Rather than More for Some'? Contested Pathways and Politics since the 1990 New Delhi Statement." Institute of Development Studies (IDS).

Nilsson, Kristina, Rob Hope, Duncan McNicholl, Saskia Nowicki, and Katrina Charles. 2021. "Global Prospects to Deliver Safe Drinking Water Services for 100 Million Rural People by 2030." Working Paper. RWSN.

NWASCO. 2018. "Rural Water Supply and Sanitation - Framework for Provision and Regulation in Zambia." Lusaka, Zambia: National Water Supply and Sanitation Council of Zambia.

Nyarko, K B, B Dwumfour-Asare, E Appiah-Effah, and P. Moriarty. 2010. "Cost of Delivering Water Services in Rural Areas and Small Towns in Ghana." In *IRC Symposium 2010*, 20.

OFOR, Republic of Senegal. 2021. "Gouvernance De L'eau Et Objectifs De Développement Durable: Avancées Et Défis À L'échelle Des Collectivités Territoriales Dans L'espace UEMOA."

OFWAT. 2005. "The Development of the Water Industry in England and Wales." Office of Water Services, UK Department for Environment, Food, and Rural Affairs (DEFRA).

O'Reilly, Kathleen, and Richa Dhanju. 2012. "Hybrid Drinking Water Governance: Community Participation and Ongoing Neoliberal Reforms in Rural Rajasthan, India." *Geoforum* 43 (3): 623–33. https://doi.org/10.1016/j.geoforum.2011.12.001.

Owor, M, AM MacDonald, HC Bonsor, J Okullo, F Katusiime, G Alupo, G Berochan, et al. 2017. "UPGro Hidden Crisis Research Consortium: Survey 1 Country Report – Uganda." Open Report. British Geological Survey (BGS).

Pezon, Christelle. 2013. "Coût, Performance Et Régulation Des Petits Réseaux De Distribution D'eau Portable Au Burkina Faso-Étude De Six AEPS Dans La Région Du Sahel." Document de recherche 2. IRC International Water and Sanitation Centre.

Pories, Lesley, Catarina Fonseca, and Victoria Delmon. 2019. "Mobilising Finance for WASH: Getting the Foundations Right." *Water* 11 (11): 2425. https://doi.org/10.3390/w11112425.

Pugel, Kimberly, Amy Javernick-Will, Matthew Koschmann, Shawn Peabody, and Karl Linden. 2020. "Adapting Collaborative Approaches for Service Provision to Low-Income Countries: Expert Panel Results." *Sustainability* 12 (7): 2612. https://doi.org/10.3390/su12072612.

Renouf, Rosie, and Yaver Abidi. 2022. "The Challenge of Small Towns: Professionalising Piped Water Services in Western Uganda." Topic Brief. Uganda: Water & Sanitation for the Urban Poor (WSUP).

Republic of Kenya. 2002. "The Water Act." Kenya Gazette Supplement No 107 (Acts No. 9).

Republic of Uganda. 1999. "The Water Act, Cap. 152." Uganda: Ministry of Water and Environment. https://www.mwe.go.ug/library/water-act-cap-152.

———. 2020. "Water and Environment Sector Performance Report." Kampala, Uganda: Ministry of Water and Environment.

Republic of Zimbabwe. 1998. "Water Act (Cap. 20:24)." Legislation. Zimbabwe. https://www.informea.org/en/legislation/water-act-cap-2024.

Rickert, Bettina, Eva Barrenberg, Oliver Schmoll, Weltgesundheitsorganisation, and Vereinte Nationen, eds. 2016. *Taking Policy Action to Improve Small-Scale Water Supply and Sanitation Systems: Tools and Good Practices from the Pan-European Region*. Kopenhagen: WHO Regional Office for Europe.

Rickert, Bettina, and Oliver Schmoll. 2011. *Small-Scale Water Supplies in the Pan-European Region: Background, Challenges, Improvements*. WHO Regional Office for Europe.

Rodriguez de San Miguel, Jorge Alejandro Silva, Mara Maricela Trujillo Flores, Fernando Lambarry Vilchis, Luis Arturo Rivas Tovar, and Andrea Yolima Bernal Pedraza. 2015. "Community Water Management in Latin America and the Caribbean: Challenges for Mexico." *Journal of Sustainable Development* 8 (3): p102. https://doi.org/10.5539/jsd.v8n3p102.

Rwanda Ministry of Infrastructure. 2018. "Water and Sanitation Sector Strategic Plan 2018 - 2024." Republic of Rwanda.

RWSN. 2010. "Myths of the Rural Water Supply Sector." RWSN Executive Steering Committee. Perspectives No 4. Rural Water Supply Network.

———. 2019. "The 2019 RWSN Directory of Rural Water Supply Services, Tariffs, Management Models, and Life Cycle Costs." St. Gallen, Switzerland: RWSN.

Ryan, Peter. 2014. "Madagascar WASH Sector: Bottleneck Assessment." Final Report. Madagascar: UNICEF.

Ryan, Peter, and Raphael Sufyan Sulemani. 2013. "Moving Sustainability Concepts to On-the-Ground Improvements – the Sustainable Water Service Delivery Project in Ghana."

Schouten, Ton, and Patrick Moriarty. 2002. *Community Water, Community Management: From System to Service in Rural Areas*. Practical Action Publishing.

Shah, Rachel, Kate Fogelberg, and Harold Lockwod. 2021. "Agenda for Change Systems Strengthening Research." Case Study. WaterSHED. United Kingdom: Springfield Centre.

Shantz, Andrew. 2018. "Rural Water Supply in Cambodia: A Consolidation of Data & Knowledge and Identification of Gaps & Research Needs." Technical Note. Phnom Penh, Cambodia.: WaterAid.

Smelser, Neil J., and Paul B. Baltes. 2015. "Professionalization." In *International Encyclopedia of the Social & Behavioral Sciences*, 2nd ed. https://www.sciencedirect.com/topics/social-sciences/professionalization.

Smith, Daniel W. 2021. "Effective Demand for Safer and More Reliable Water Supply in Low- and Middle-Income Countries: Evidence from Urban Bangladesh and Rural Uganda." PhD, Stanford University.

Smits, Stef. 2012. "Self Supply: The Case for Leveraging Greater Household Investment in Water Supply." Briefing Note. Building Blocks Sustainability. IRC - Triple-S Project.

Smits, Stef, and Harold Lockwood. 2015. "Reimagining Rural Water Services: The Future Agenda." March. *Triple-S: Briefing Note*. The Hague: IRC. https://www.ircwash.org/sites/default/files/084-201502triple-s_introdefweb.pdf.

Smits, Stef, Jeske Verhoeven, Patrick Moriarty, Catarina Fonseca, and Harold Lockwood. 2011. "Arrangements and Cost of Providing Support to Rural Water Service Providers." Working Paper 5. The Hague, The Netherlands: IRC WASHCost Project.

Soest, Audrey van, Sarah Carriger, and Deirdre Casella. 2015. "Triple-S: Sector Learning and Adaptive Management." Brief Note. Building Blocks for Sustainability Series. The Hague, The Netherlands: IRC.

Sugden, Steven. 2003. "Indicators for the Water Sector: Examples from Malawi." Fieldwork Report. Japan: WaterAid.

Sutton, Sally, and John Butterworth. 2021. *Self Supply Filling the Gaps in Public Water Supply Provision*. Practical Action Publishing. https://doi.org/10.3362/97817804481 90.

Sy, Jemima. 2014. "Reforms and Public-Private Partnerships in Senegal's Rural Water Sector."

Taylor, Ben. 2009. "Addressing the Sustainability Crisis: Lessons from Research on Managing Rural Water Projects." Tanzania: WaterAid.

Tetra Tech. 2022. "USAID/Tanzania Maji Na Usafi Wa Mazingira (MUM): Capacity Building Plan of the Rural Water Supply and Sanitation Agency (RUWASA)." Dar es Salaam, Tanzania: USAID.

Thapa, Dikshya, Muhammad Noor Farid, and Christophe Prevost. 2021. "Governance Drivers of Rural Water Sustainability: Collaboration in Frontline Service Delivery." Working Paper 9798. Policy Research. The World Bank. https://doi.org/10.1596/1813-9450-9798.

Thapa, Dikshya, Christophe Prevost, and Herry Widjanarko. 2021. "Enhancing Frontline Provider Collaboration to Improve Rural Water Sustainability: Operational Lessons from Indonesia's Community-Led Water Supply Project—PAMSIMAS." Washington, D.C.

Thindwa, J. 2001. "Enabling Environment for Civil Society in CDD Projects." Washington, DC: World Bank. www.worldbank.org/participation/enablingenvironment/ EnablingenvironmentCECDD.pdf.

Thomson, Patrick. 2021. *Remote Monitoring of Rural Water Systems: A Pathway to Improved Performance and Sustainability?* https://onlinelibrary.wiley.com/doi/10.1002/wat2.1502.

Tillett, Will. 2020. "Strengthening Water, Sanitation, and Hygiene Systems: Concepts, Examples, and Experiences." Agenda for Change.

Tillett, Will, Juliane Schillinger, and David DeArmey. 2020. "Applying WASH Systems Approaches in Fragile Contexts." Discussion Paper.

Tkachenko, Oksana, and Goufrane Mansour. 2021. "Blended Finance in Water, Sanitation and Hygiene (WASH) Lessons for DFAT." INTERNATIONAL WATERCENTRE & AGUACONSULT.

Trémolet, Sophie. 2012. "Small-Scale Finance for Water and Sanitation." Stockholm, Sweden: EU Water Initiative – Finance Working Group (EUWI-FWG). https://assets.publishing.service.gov.uk/media/57a08aa3e5274a27b20006cb/EUWI_and_SHARE_report_on_small_scale_finance_in_WATSAN_April_2012.pdf.

UDUMA. 2017. "Investing in Essential Services in Rural Areas." https://www.uduma.net/wp-content/uploads/2019/07/UDUMA-investors-brochure.pdf.

UNDESA. 2019. *World Urbanization Prospects: The 2018 Revision*. World Social Report 2021. United Nations publication.

———. 2021. *Global Population Growth and Sustainable Development*. New York: United Nations publication.

UNICEF. 2018a. "Global Evaluation of UNICEF's Water Drinking Water Supply Programming in Rural Areas and Small Towns, 2006 –2016." Evaluation Report. New York, New York, USA: UNICEF.

———. 2018b. "Programming for Sustainability in Water Services – a Framework: Accountability for Sustainability."

US Water Alliance. 2019. "Utility Strengthening Through Consolidation:" Briefing Paper. US Water Alliance.

USAID. 2020. "Rural Water Services." Technical Brief 1. Water and Development Technical Series. U.S. Agency for International Development. https://www.globalwaters.org/resources/assets/usaid-water-and-development-technical-series-rural-water-services.

Valcourt, Nicholas, Amy Javernick-Will, Jeffrey Walters, and Karl Linden. 2020. "System Approaches to Water, Sanitation, and Hygiene: A Systematic Literature Review." *International Journal of Environmental Research and Public Health* 17 (3): 702. https://doi.org/10.3390/ijerph17030702.

Valcourt, Nicholas, Jeffrey Walters, Amy Javernick-Will, Karl Linden, and Betelhem Hailegiorgis. 2020. "Understanding Rural Water Services as a Complex System: An Assessment of Key Factors as Potential Leverage Points for Improved Service Sustainability." *Sustainability* 12 (3): 1243. https://doi.org/10.3390/su12031243.

Valcourt, Nicholas, Jeffrey Walters, Amy Javernic-Will, and Daniel Hollander. 2019. "Factor Mapping for Rural Water and Small Town Sanitation Services." Research Report. Sustainable WASH Systems Learning Partnership.

Van Houtven, George L., Subhrendu K. Pattanayak, Faraz Usmani, and Jui-Chen Yang. 2017. "What Are Households Willing to Pay for Improved Water Access? Results from a Meta-Analysis." *Ecological Economics* 136 (June): 126–35. https://doi.org/10.1016/j.ecolecon.2017.01.023.

Vollan, Björn. 2012. "Pitfalls of Externally Initiated Collective Action: A Case Study from South Africa." *World Development* 40 (4): 758–70. https://doi.org/10.1016/j.worlddev.2011.09.016.

Walters, Jeffrey P., and Amy N. Javernick-Will. 2015. "Long-Term Functionality of Rural Water Services in Developing Countries: A System Dynamics Approach to Understanding the Dynamic Interaction of Factors." *Environmental Science & Technology* 49 (8): 5035–43. https://doi.org/10.1021/es505975h.

WASH-FIN. 2019. "USAID Water, Sanitation and Hygiene Finance (USAID WASH-FIN) Senegal." USAID.

WASREB. 2019. "Guideline for Provision of Water and Sanitation Services in Rural and Underserved Areas in Kenya." Kenya.

Water Development Commission. 2021. "National WaSH Inventory-II & MIS." Addis Ababa, Ethiopia: FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA.

WaterAid. 2011. "Sustainability Framework." Synthesis Report. WaterAid.

———. 2017. "Embedding and Integrating a Human Rights-Based Approach into WaterAid Programmes." Guidelines.

———. 2019. "Beyond Building Blocks Identifying and Monitoring Drivers of Sector Performance." Synthesis Report. WaterAid.

———. 2021. "Management Arrangement for Water Supply and Onsite Sanitation in Rural Through to Small-Town Context Across Southern Africa: An Assessment of the Status Quo and What Needs to Change Moving Forwards." Summary Report. Southern Africa.

Watts, Richard, Dan Walton, and Duncan Knox. 2021. "Blueprint: Financing a Future of Safe Water, Sanitation, and Hygiene for All." End Water Poverty and WaterAid.

Welle, Katharina. 2014. "Monitoring Performance or Performing Monitoring? Exploring the Power and Political Dynamics Underlying Monitoring the MDG for Rural Water in Ethiopia." *Canadian Journal of Development Studies / Revue Canadienne d'études Du Développement* 35 (1): 155–69. https://doi.org/10.1080/02255189.2014.877380.

Whaley, Luke, and Frances Cleaver. 2017. "Can 'Functionality' Save the Community Management Model of Rural Water Supply?" *Water Resources and Rural Development* 9 (June): 56–66. https://doi.org/10.1016/j.wrr.2017.04.001.

Whittington, Dale, Jennifer Davis, Linda Prokopy, Kristin Komives, Richard Thorsten, Heather Lukacs, Alexander Bakalian, and Wendy Wakeman. 2009. "How Well Is the Demand-Driven, Community Management Model for Rural Water Supply Systems Doing? Evidence from Bolivia, Peru and Ghana." *Water Policy* 11 (6): 696. https://doi.org/10.2166/wp.2009.310.

WHO. 2017. *UN-Water GLAAS Trackfin Initiative: Tracking Financing to Sanitation, Hygiene and Drinking-Water at National Level: Guidance Document*. Geneva: World Health Organization. https://apps.who.int/iris/handle/10665/259899.

WHO/UNICEF. 2021. "Progress on Household Drinking Water, Sanitation and Hygiene 2000-2020: Five Years into the SDGs." Geneva: World Health Organization. https://washdata.org/reports.

Wilk, van der, N. 2019. "Conditions for Private Sector Involvement and Financing in Rural Water Supply." In *All Systems Go! WASH Symposium*. The Hague, The Netherlands: IRC.

Willetts, J. 2012. "A Service Delivery Approach for Rural Water Supply in Timor-Leste: Institutional Options and Strategy." Institute for Sustainable Futures, University of Technology Sydney for BESIK (Timor-Leste Rural Water Supply and Sanitation Program).

World Bank. 2017. "Joining Forces for Better Services? When, Why, and How Water and Sanitation Utilities Can Benefit from Working Together."

World Bank Group. 2014. "Water PPPs in Africa." World Bank Group and World Bank Water and Sanitation Program.
———. 2017a. "Toward a Universal Measure of What Works on Rural Water Supply: Rural Water Metrics Global Framework."
———. 2017b. "Sustainability Assessment of Rural Water Service Delivery Models: Findings of a Multi-Country Review." Policy Brief. Water Papers. Washington, DC: World Bank. https://doi.org/10.1596/27988.
———. 2018. "Beyond Utility Reach? How to Close the Urban - Rural Access Gap." Washington, DC.
World Bank WSP. 2016. "Private Sector Provision of Water and Sanitation Services The Role of the Public Sector." World Bank WSP.
World Bank WSP and AFDB. 2013. "Professionalized Rural Service Areas: A Strategy: Volume 1 - Strategy Overview." World Bank WSP and the African Development Bank.
World Health Organization. 2019. "National Systems to Support Drinking-Water, Sanitation and Hygiene: Global Status Report 2019. Un-Water Global Analysis and Assessment of Sanitation and Drinking- Water (GLAAS) 2019 Report." Geneva: World Health Organization. https://apps.who.int/iris/handle/10665/342703.
Yu, Haiyan Helen. 2014. "Community-Based Water Governance under Integrated Water Resources Management Reform in Contemporary Rural China." *Environmental Management and Sustainable Development* 3 (2). https://doi.org/10.5296/emsd.v3i2.5656.
Zaveri, Esha, Jason Russ, Amjad Khan, Richard Damania, Edoardo Borgomeo, and Anders Jägerskog. 2021. *Ebb and Flow, Volume 1: Water, Migration, and Development*. Washington, DC : World Bank Group, [2021]. https://doi.org/10.1596/978-1-4648-1745-8.