Multiple-Use Water Services (MUS): Recommendations for a Robust and Sustainable Approach

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Executive Summary

Water is fundamental for human societies and ecosystems. We need water to grow food, run industries, satiate thirst, and ensure health. Yet, the development of water resources to date has left a large number of people without enough water to meet their basic needs and impoverished the ecosystems upon which we depend. Population growth, urbanization, and climate change add new stress to water availability and demand. International institutions have over the last few decades attempted numerous solutions to meet these basic needs, from identifying water and sanitation as targets in the Millennium Development Goals, to developing international frameworks and funding streams for water development. Despite many decades of effort, water projects implemented with the best intentions still fall into disrepair or have drained existing water sources, and the poorest still face water and food insecurity.

Defining MUS

In the last decade, a new paradigm called "Multiple Use Water Services" (MUS) has emerged from the recognition by water sector professionals that the rural and peri-urban poor need water for a variety of purposes, ranging from drinking and sanitation to growing food and other productive activities. As the name suggests, MUS aims to develop multiple community sources to meet multiple needs. The MUS Group (www.musgroup.net), a collaborative partnership between international organizations interested in the approach, offers the following definition:

> *Multiple-use Water Services (MUS) are water services by the public sector or private sector, that take rural and peri-urban people's multiple water needs, which are met from multiple sources, as the starting point of planning and design. This participatory, integrated planning approach fully recognizes and strengthens the often informal ways in which communities have been developing and managing their water resources.*

The definition reflects the notion that the concept of Multiple-Use Water Services (MUS) is in many senses, pre-historic: since time-immemorial, communities have settled near water bodies and used them to meet their multiple needs, from growing food and making goods, to drinking, bathing and sanitation. However, the public sectors of most countries have bureaucracies that have mandates for "single use" service delivery - irrigation or drinking water or fishing. Water projects to meet these needs are often developed independently or even in conflict with one another. The MUS approach aims to overcome this problem by reflecting how rural and peri-urban communities actually use their water sources to render a range of services: drinking water, hygiene, and productive needs.

The MUS approach has generated significant interest among organizations working on agriculture and water issues, particularly those working at a community scale, as it offers an

opportunity to meet the many needs of poor communities. Yet, the approach also has some limitations which may hinder the long-term sustainability of MUS projects, including consideration of water resource sustainability, climate resilience, equity, sanitation, public health, and the environment. In this paper, we present challenges that need to be addressed in a successful MUS strategy, consider key lessons learned from previous efforts to improve water management, and present a set of principles and recommendations for a more comprehensive approach to accelerating water and sanitation development through MUS.

Benefits of the Multiple-Use Water Services Approach

The Multiple-Use Water Services framework offers several potential benefits, some of which include:

- MUS projects reflect the way communities actually use water. When projects which were designed for single-use (drinking water or irrigation only) are used for multiple purposes, this can lead to conflicts over water quantity or quality.
- Financial sustainability of water projects can be enhanced with MUS. Allowing for small-scale productive uses of water can boost household income and at the same time provide users with both an incentive and the financial capacity to sustain and maintain the water service system.
- The MUS approach takes a more holistic approach to public health going beyond avoidance of water-borne diseases. Lack of access to a diversified diet contributes to poor nutrition, which in turn results in higher rates of childhood mortality and morbidity from a host of different diseases. MUS projects improve access to vegetables, fruit, or protein (via livestock and fish) for the poor, which can boost immunity and reduce susceptibility to many diseases.
- The MUS approach could improve food-security among the urban/peri-urban poor, who tend to be net food consumers (consuming more than they produce), by allowing them to grow their own food.
- The MUS approach could improve coordination and provide economies of scale. MUS projects often cost less; when compared to the costs of providing drinking water and irrigation services independently.
- The MUS approach could empower women by focusing on kitchen gardens, livestock, and cottage industries, which are often the mainstay of women in the household. This is in contrast to the irrigation sector which focuses on field crops - traditionally viewed as a male activity.

Because the MUS paradigm is less than a decade old, most MUS implementations are relatively new. While these claims are plausible, it is too early to judge the long-term impacts. Additionally, there are few independent evaluations to test whether these claimed benefits have materialized.

Limitations in Multiple-Use Water Services Approach

If MUS becomes the focus of funding in the global water community, it could impact the structure of the entire water sector. Yet, the MUS approach has some limitations which may hinder the long-term sustainability of projects. In analyzing the limitations of the MUS approach, we distinguish between "risks" – unintended consequences resulting from MUS projects as currently implemented, and "gaps" – elements that are missing or weak in the MUS approach.

Risks

MUS may exacerbate existing inequities in water supply: Improved access to water for livelihoods could benefit elite sections of society more than poorer or less powerful members. Those with the land or the capacity to store large quantities of water may be able to capture a larger share of the resource for productive use. In addition, the cost of infrastructure to bring piped supply to homes may exclude poorer residents from benefiting from MUS projects. The poor may be limited by the amount they can carry to their homes and the land they have. Carrying water increases poverty, especially for women.

MUS may result in unsustainable use of the resource base: In many regions of the world, increasing use of water resources to expand agricultural production or domestic use has led to the failure of water supply. With increased populations and climate impacts, water availability is projected to be more constrained in the future. While significant attention has been paid to the sustainability of infrastructure, the sustainability of the resource is also fundamental to the ongoing success of MUS projects. Scaling up MUS projects in particular regions could lead to water conflicts or over-extraction, potentially leading to insecurity or the failure of livelihood systems supported by these projects.

The MUS approach may exacerbate public health issues: MUS projects need to address the water quality issues emerging from the coupling of domestic, irrigation, and productive water supply. Drinking water requires potable water of high standards, while irrigation and productive use water can be treated to different standards; combining both into a single project may result in compromising drinking water quality. At the same time, MUS projects will introduce new waste streams from livestock, nitrates and pesticides from farming, or chemicals from small-scale industry. These waste streams may reduce the quality of the source water used for drinking. MUS projects also increase the quantity of water supplied to the household. Without adequate management of the wastewater generated, there is a real risk of contaminating water bodies.

However, the MUS approach offers unique opportunities to mitigate some of these problems. There is a potential create a win-win situation by locally "closing the water loop." Because irrigation uses can tolerate lower water quality, there may be opportunities to reuse domestic sewage in agriculture with inexpensive treatment – particularly where the treated wastewater is used for cash crops.

Gaps

MUS may not provide sufficient climate resilience: Climate change affects how, when, where, and how much water is available. Climate resilience in MUS projects, including addressing longer or more intense droughts, will be critical to ensure the long-term success of these efforts. MUS projects are small community-based projects that often lack the storage to withstand multi-year droughts. However, to improve livelihood resilience in the poorest communities, MUS projects must explicitly include strategies for climate variability and change.

MUS may overlook environmental concerns: By some estimates, humans already use over half of the available freshwater supplies globally, and this fraction is likely to rise. The MUS approach as currently conceived focuses primarily on meeting only *anthropogenic* water needs. The concern is that as water for drinking, agricultural, and industrial uses expands, it is likely to further reduce the amount available for freshwater ecosystems, which are already disappearing at an alarming rate.

MUS may set back the sanitation sector: For many decades, sanitation has been largely ignored or under-funded, despite the fact that in almost every country in the world, more people live without adequate sanitation than live without safe drinking water. Sanitation has been shown to play a critical role in preventing the spread of waterborne diseases. The MUS approach proposes a new set of linkages in the water sector, in effect decoupling sanitation from water, while adding livelihoods. There is a concern that focusing donor attention to water services could set back recent gains in sanitation funding.

Lessons from Previous Water Sector Integration Efforts

There have been many attempts at integration in the water sector, for example Integrated Water Resources Management (IWRM); Water, Sanitation, and Hygiene (WASH); Payments for Ecosystem Services (PES); and Participatory Watershed Management (PWM). Each of these approaches (Figure ES-1) targets water problems at a slightly different scale with different objectives.

Multiple-use water services fits into the landscape of other approaches as a user-focused approach situated at the community scale which works to meet the domestic and productive water needs of households. The MUS approach can benefit from lessons learned from successes and failures in other water sector approaches. Integrated Water Resources Management (IWRM), one of the dominant paradigms in the water sector, was developed in the 1970s as an approach to integrate and coordinate water supply at the basin scale. Recently, IWRM has been severely critiqued for being a meaningless buzzword that offers no roadmap to guide actions. IWRM also does not focus on the priorities and needs of local stakeholders. A global analysis of 184 IWRM projects demonstrates that there have been a variety of projects undertaken under the IWRM framework, many of which have resulted in little new infrastructure on the ground to meet local needs, improve water or food security, or address inequity.

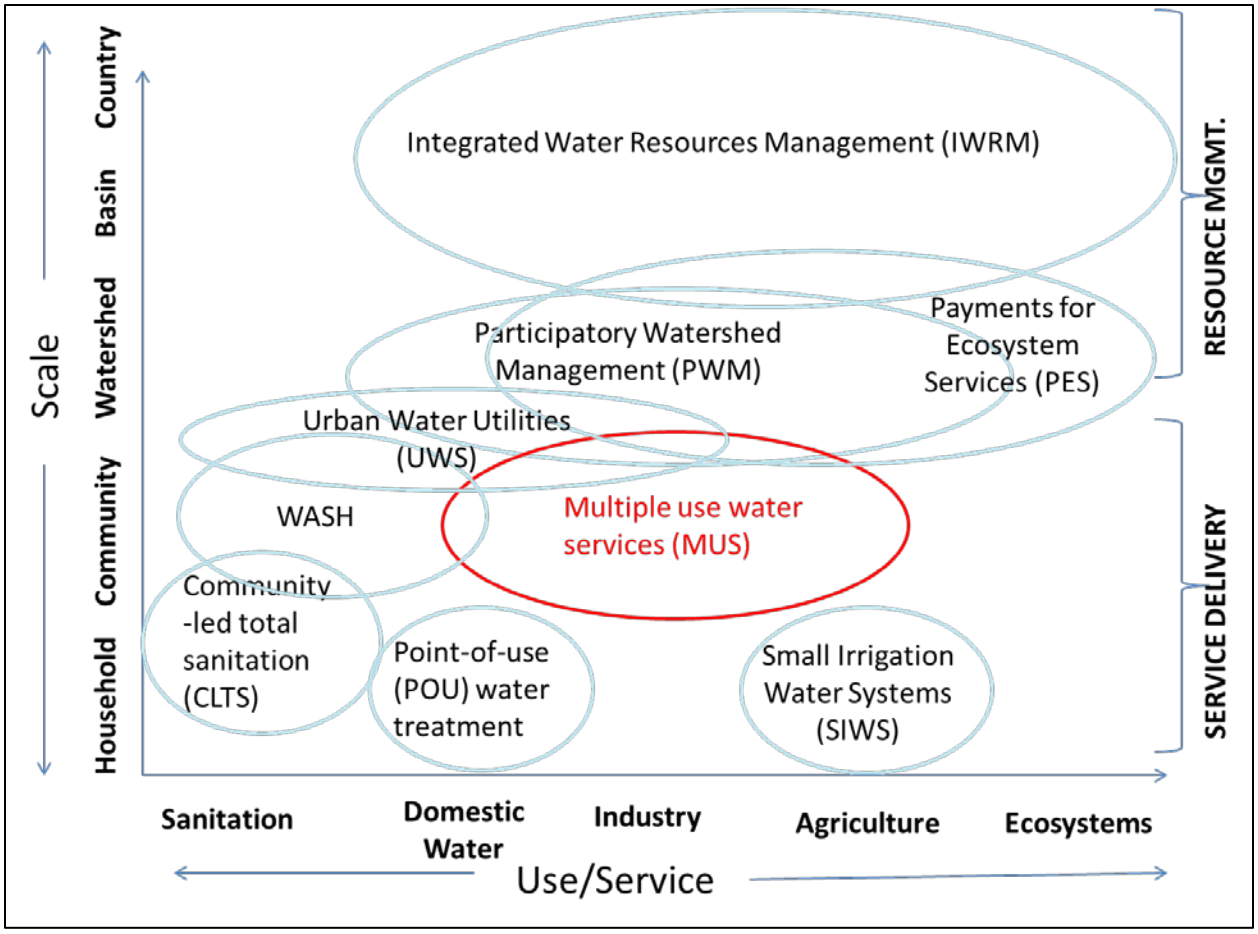

Figure ES- 1. Landscape of different water sector approaches

In contrast, one of the strengths of the MUS concept is that it focuses on the needs of the poorest and aims to deliver a basic quantity of water for drinking and livelihood needs. However, MUS funders and practitioners should work to clearly define and develop a MUS roadmap. They should clarify what *is* and, importantly, what *is not* MUS, how to implement it, and how to recognize and measure success. Attention should be given to how MUS projects can be more accountable to user communities. Additionally, bottom-up coordination to address upstream/downstream issues will be important to ensure sustainability and address potential conflicts.

Recommendations

Based on our review of Multiple-Use Water Services (MUS) and other water sector projects, we provide a set of recommendations to make the MUS framework more robust and sustainable, so that MUS implementation efforts can avoid the pitfalls described and be successful over the long term.

In this report, we offer recommendations at two levels. Project-level recommendations are geared toward communities and implementers of individual MUS projects to assist them in operationalizing sustainability, equity, environment, and water quality. Program-level recommendations are directed to donors, governments, and international and national NGOs as they work to create support structures to make all MUS implementations more successful.

Project-Level Recommendations

Technical design: The choice of technologies in project design provides opportunities to embed equity, sustainability, climate resilience, and other priorities into MUS projects. Projects can be designed in numerous ways to provide incentives for particular uses or enhance sustainability and climate resilience. Pipe sizes, check dam heights, conjunctive use of surface and groundwater, and location of the access points with respect to communal gardens are examples of technical design choices that can influence project outcomes.

Institutional design: Designing effective management institutions within MUS projects can "hardwire" equity, sustainability, and climate resilience into MUS projects. Institutions include both operational rules (e.g., water rotation scheduling, tariff structure, staff hiring practices), as well as constitutional rules (e.g., fair voting rules, representation of all major stakeholders including the environment). Institutions can address water conflicts, improve water use efficiency, ensure equity, and include environmental priorities through formal rules, pricing, and informal social norms.

Program-Level Recommendations

Knowledge sharing and tools: Improving the transfer of knowledge through staff training and tools will assist practitioners in understanding the MUS implementation approach, addressing environmental sustainability issues, and ensuring public health and water quality. A guidebook on MUS and how to implement it in a variety of topographic, socio-economic, and hydrologic settings is needed. Opportunities to reuse wastewater and incorporate sanitation will require more information on the public health and water quality implications of this effort, and water quality testing tools are needed. A drinking water treatment and sanitation decision tool could help practitioners include these technologies in MUS implementation in ways that support project outcomes to improve health and food security.

Data and research: Better data and research are fundamental to ensuring MUS implementations are sustainable and achieve stated goals, and will be even more crucial as MUS scales up. However, in many regions, the basic hydrologic data such as topography, precipitation, recharge rates, and stream flow rates needed for project design do not exist. There is an opportunity to achieve economies of scale by investing in data repositories that make such data available to all water sector practitioners. Additionally, there are opportunities to expand data collection efforts beyond centralized, governmental data collection by using participatory hydrologic monitoring; e.g., via mobile phones. There is also a need for independent, carefully structured, third-party studies beyond existing research from MUS proponents and practitioners. Careful evaluation of the costs and benefits of projects including equity, long-term sustainability, and public health would allow a comparison of MUS relative to other water sector approaches.

Success and accountability measures: One of the lessons from IWRM was that more effort needs to be made to clearly define success and hold funders and implementers accountable to communities so that projects reflect the interests and priorities of stakeholders. A blend of subjective and objective metrics would be most appropriate. Objective metrics could include quantity and reliability of supply, Gini coefficients of water allocation, increase in household income before and after the project, and percentage of household contribution to project capital costs and maintenance. Subjective metrics could include community score-card approaches that measure beneficiaries' self-assessment of how the project has benefitted them. To be accountable to communities, funders and implementers need to go beyond the project mind-set to revisit their projects after ten years, and provide incentives for ongoing sustainability.

Bottom-up coordination and enabling legislation: MUS projects operate at the community-scale. To avoid conflicts and over-abstraction of water resources, there will need to be coordination across communities as MUS scales in particular regions. This can be accomplished through other non-MUS funding approaches, although some MUS projects have already demonstrated that "bottom-up coordination" is possible by constituting a watershed committee made up of representatives from each MUS water committee to coordinate sharing and address conflicts. If MUS is to scale beyond pilot projects, regulatory roadblocks at the national and state scale will need to be addressed, including modifying laws that deem MUS projects illegal and adjusting unnecessary and impossibly high standards where they prevent efficient use and reuse of the resource.

Looking Forward

Multiple-Use Water Services is a promising framework for funding and implementation in the water sector that can address basic needs for water to meet health as well as livelihood needs of the poorest. While the MUS paradigm is historically rooted in the multiple ways in which people have always interacted with their local water sources, it seeks to overcome the fragmented way in which water is currently managed. However, the MUS approach has some limitations that can become significant if increasing international effort expands the funding and implementation of MUS projects globally.

From our analysis of lessons from previous efforts, we arrived at a set of recommendations for making MUS implementations more robust and sustainable. At the project level, MUS implementers can address sustainability, equity, and climate resilience through specific technological and institutional systems. At the programmatic level, water sector professionals, funding organizations, and governments can help create a supportive environment for more successful projects by better knowledge sharing, improved data and research, defining and measuring success, and coordinating and enabling legislation. In addressing these key limitations, Multiple-Use Water Services can avoid the failures of past approaches and ensure sustainable progress toward addressing the needs of the global poor.