Community-level multiple-use water services: MUS to climb the water ladder

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Abstract

The Challenge Program on Water and Food (CPWF) project PN28 developed and tested 'multiple-use water services' ('MUS'). This approach to water services takes multiple water needs of rural and periurban communities as the starting point for planning and designing new systems or rehabilitations. By overcoming the administrative boundaries between single-use sectors, MUS contributes more sustainably to more dimensions of well-being than single-use approaches: health, freedom from drudgery, food, and income. The action-research took place in 25 study areas in eight countries in five basins. The project brought global, national, intermediate level, and local partners together who were champions of MUS at the time. At the community level, the project identified generic models for implementing MUS. This was done through pilot-implementation of innovative multiple-use water services, and by analyzing de facto multiple uses of single-use planned systems. At the intermediate, national, and global level, the project's 'learning alliances' engaged in the wide upscaling of these community-level MUS models, with the aim of establishing an enabling environment to provide every rural and periurban water user with water for multiple uses. This paper presents some of the project findings.

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Multiple use water services (MUS) improve health, freedom from drudgery, food, *and* income considerably more effectively and sustainably than conventional single-use 'domestic' or 'irrigation' water services.

Introduction

Multiple users take water from multiple sources and use and reuse it for multiple purposes. This reality is obvious for rural and periurban water users at the local level. When they develop water themselves, they do so for multiple uses. Moreover, infrastructure that is designed for a single use, e.g., 'domestic water' or 'irrigation water' is de facto used for multiple purposes by communities. Similarly, at the highest levels, water professionals who provide bulk water supplies or manage national or basin-level water resources are well aware of the integrated nature of water resources and their multiple sources, uses, and users. This straightforward insight, however, is lacking at the community and household level. At this level, water professionals from each water sector carve out one particular end-use, which becomes the mandate and structuring principle of the entire sector. Other water uses, even by the same user taking water on the same site from the same source, are ignored. In externally supported water development and storage, this blindness is strongest for storage, conveyance, and use at homesteads and at the community or sub-basin level. This is the gap that the 'multiple-use water services' or MUS project attempted to fill.

The project developed, tested, and upscaled an alternative approach to water services at the household and community level. MUS is defined as water services planning and design of new systems or rehabilitations that start with people's multiple water uses and reuses and needs at their preferred sites within communities. By accommodating for multiple uses, multiple livelihoods benefits are achieved, in particular freedom from drudgery, health, food, and income. These benefits contribute directly or indirectly to all Millennium Development Goals. Hence, compared to conventional single-use water services approaches, MUS contributes more effectively to rural development, gender equity, and, if well targeted, poverty alleviation.

Methods

At its start in 2004, the MUS project brought those partners together who were pioneering MUS approaches at the time. Encouraged by CPWF's call for innovative partnerships, the project included representatives from the domestic and productive water sectors, and scientists and implementers. Working in five CPWF benchmark basins, each of the global lead partners chose their national and intermediate-level partners and selected sites for case studies, again according to the criterion of being a MUS innovator. Thus, IRC International Water and Sanitation Center became the basin coordinator for the Andean (Bolivia and Colombia) and Limpopo basins (South Africa and Zimbabwe); IDE International Development Enterprise coordinated MUS project activities in the Indus-Ganges Basin (India and Nepal); Khon Kaen University and the Farmer Wisdom Network led the MUS project in the Mekong Basin (Thailand); and IWMI led the project in Ethiopia in the Nile Basin, and was the lead partner. Twenty-five study areas were selected (either one or more communities or a group of adopters of a similar technology). This selection process gave a wide diversity in partners and contexts, which allowed exploring diverse perspectives on MUS. In 19 study areas, 'MUS by design' was piloted. In six sites (all from the domestic sector), de facto multiple-use systems were studied. The project partners encompassed all four main categories of water services providers: water users with self-supply, private providers, NGOs, and governments. Also, the three main technology groups were covered: private homestead-based technologies; communal systems with single-access points; and communal systems with distribution networks to public standpipes or homesteads. Socioeconomic conditions varied from low-income Ethiopia to middle-income South Africa. Hydrological contexts ranged from 300 mm average annual rainfall in Maharasthra to up to 2200 mm in Nepal.

Across all sites, the first objective was to establish generic, field-tested, and convincing models of MUS at household and community levels. The second objective was to widely upscale these models in order to reach, ultimately, all rural and periurban people with water services that meet both domestic and productive water needs. So the challenge was to create an enabling environment at intermediate, national, and global levels that responds adequately to communities' multiple water needs. This institutional innovation was taken up by 'learning alliances.' In each country the national MUS partner forged horizontal and vertical exchange with other water service providers in the local study area and at the intermediate, national, and global levels. These learning alliances raised awareness about community-level MUS models and through 'learning by doing' they induced institutional changes toward an enabling environment, which continued beyond the project life. As the MUS partners driving this process encompassed all four categories of service providers, insights in upscaling were generated from these different perspectives.

In order to structure the action-research and allow for global comparison and generic conclusions, a 'MUS conceptual framework' was developed at the start. For this, the team identified the conditions, or principles, that should be in place if MUS were to work at the community level and if MUS were to be upscaled at intermediate, national, and global levels (Van Koppen et al., 2006). Learning how *to* realize those conditions was the focus of research. At community level, the principles were: livelihood-based planning and design of water services, appropriate technologies, adequate financing, equitable institutions, and sustainable water resources. At the intermediate level, these were: participatory approaches, coordinated long-term support, and strategic planning for further MUS innovation. At the national level, the principles were: decentralization of support and enabling policies and laws. This paper synthesizes some findings, conclusions, and recommendations. Over 100 of the project's national outputs, international publications, and two books are available and forthcoming at www.musproject,net.

Results

Models for community-level MUS

Table 1. Relationship between technologies and water use in selected study areas.

Country	Technology	Range of average daily water use (lpcd)	Levels
Ethiopia	Communal piped systems with very scattered standpipes	8-17	Basic domestic
South Africa	Communal piped systems with scattered standpipes	30	Basic MUS
India	Communal piped systems with frequent standpipes	40 (design supply)	Basic MUS
Zimbabwe	a. communal boreholes with hand pumps b. individual shallow wells with windlass and buckets c. individual shallow wells with rope-and-washer pumps	a. 10-15 b. 60-70 c. 80-90	a. basic domestic b, c. intermediate MUS
Bolivia	a. tankers b. piped distribution systems with household connections	a. 30 - 40 b. 60 – 80, with exceptions up to 140	a. basic MUS b. intermediate MUS
Nepal	Communal piped systems with frequent standpipes	137-225 (design supplies)	high MUS
Colombia	a. Communal piped systems with household connections (rural communities) b. Communal piped systems with household connections (periurban communities)	a.190 - 250, with some cases much higher b.76-118	a. High MUS b. intermediate MUS
Thailand	Farms with ponds and other sources	80-1,000	Intermediate – high MUS

With regard to the principles of livelihood-based services and affordable technologies, a strong link was found between people's multiple water uses for livelihoods at and around homesteads and water availability as captured, conveyed, and stored through technologies. This link is shown in Table 1. Water-dependent productive activities that increase in number and size with higher water availability included small and large livestock keeping, trees, crops and vegetable irrigation, crafts, and small-scale food and other enterprises. This finding confirmed the project's hypothesized 'multiple-use water ladder.' This is a critique on the conventional 'service ladder' in the domestic sector, which assumes that when water quantities available at or near homesteads increase up to 100 liters per capita or more per day (lpcd), this is only used for more drinking, sanitation, cooking, cleaning, bathing, and laundry. Instead, the MUS project proposed a ladder that reflected all water uses for livelihoods, distinguishing basic domestic (less than 20 lpcd), basic MUS (20-50 lpcd), intermediate MUS (50-100 lpcd), and high-level MUS (more than 100 lpcd) (Van Koppen and Hussain, 2007).

The far-reaching policy implication of this finding is that water services that aim at meeting people's livelihoods needs at and around homesteads should double or triple the conventional design norms in the domestic sector of 20-30 lpcd for domestic uses only (for Sub-Saharan Africa or South Asia). Instead, 50-100 lpcd or more is required to ensure that services meet people's livelihood needs so they can 'climb the multiple-use water ladder.'

Increasing water availability requires incremental expansion of one type of technology (e.g. through better lifting devices), jumps from one type to another, or further combinations. Such incremental investments make economic sense, especially for intermediate-level MUS (50-100 lpcd). Systematic cost-benefit analyses of various case studies of the MUS project and other cases were conducted by Winrock, IRC and IWMI and sponsored by the Bill and Melinda Gates Foundation. They showed that total incremental investments in hard- and software to 'climb the water ladder' can be repaid in 6-36 months (Renwick, 2007).

With regard to the other principles (financing arrangements, equitable institutions and water resource availability), many challenges were similar to those in conventional domestic or productive water services. One unique feature of MUS, however, concerned equity notions for water sharing under scarcity. Homestead-based multiple uses were small-scale compared to a relatively few large users, most of whom use water beyond homesteads. Under scarcity, basic domestic needs were prioritized and, after that, minimum water supplies for both domestic and small-scale productive uses for all. Thus, within communal systems, the risk of overuse by the few was mitigated by pricing, institutional, and technical measures. Within areas with limited water resources, for example in water-scarce Maharasthra, homestead-based multiple uses by all were seen as higher priority than sugarcane farming by the few. In national water legislation, as in Thailand, the MUS project partners ensured that small-scale multiple uses were better prioritized over commercial users.

When moving from homestead-to community-level water development, another typical MUS finding was that synergies can be forged if river intakes, storage, and conveyance structures are holistically designed and incrementally improved for shared water provision, whether to homesteads or fields. Failing to build upon prior community-level abstraction, storage, and conveyance infrastructure for any use leaves unmanageable 'spaghettis' of layers of infrastructure.

Innovation and upscaling: creating a supportive environment for MUS

At intermediate, national, and global levels, project partners initiated learning alliances that started creating an enabling environment for MUS at intermediate, national and global levels. In all countries, the *visible* and *documented* successful performance of community-level MUS in sufficient cases to allow for some generic validity appeared vital for awareness creation. There were also many differences between the learning alliance processes in the respective countries. They were primarily related to the different starting points of each category of water service providers that drove the upscaling process. The strengths and weaknesses in realizing the three principles for upscaling MUS at the intermediate level, from the angle of the each of water service provider categories, are given in Table 2.

These findings show that the different water service providers brought different strengths to upscaling MUS at the intermediate level. Collaboration according to those strengths appeared effective and most sustainable and upscalable through local government. Highest-level policymakers were approached and appeared receptive in Nepal, Thailand, South Africa, and to some extent in Colombia and Zimbabwe. They started supporting community-level MUS through policymaking and providing direct support without strings. At the global level, a dozen of domestic and productive water sector organizations and IWRM agencies increasingly recognize the merits of MUS and strengthen collaboration, for example during the World Water Forums of 2006 and 2009.

Table 2. Strengths and weaknesses in realizing principles for upscaling MUS by category of water service provider

Category of water service provider	Principles for upscaling at intermediate level		
	Participatory planning	Coordinated long-term support	Strategic planning for upscaling
Self-supply Thailand (Farmer wisdom network)	Multiple water needs obvious; High own contributions in	Expansion based on mutual help with limited resources;	Strategic alliances at highest policy levels for influencing policy and support for roll-out.

South Africa (Water for Food Movement)	cash and kind; Own experimenting, mutual learning and knowledge generation.	Needs-based soliciting of external support; Sustainability of movement uncertain.	
Private service provider Bolivia (Agua Tuya)	Multiple water needs obvious; Market-driven.	Providing holistic support for higher sales; private business' outlook of medium-term growth.	Market-driven roll-out limited; linking with municipality.
NGOs Ethiopia (CRS) Nepal (IDE) Zimbabwe (various)	Responsive to multiple water needs; High own contributions in market-driven technological innovation, but otherwise limited.	Poverty relief or technological innovation driving coordinated support for multiple water uses; Short-term, project-bound.	Strategic alliances with local service providers and government at all levels for uptake of innovations and sustainable after-care of technologies.
Local government Bolivia Nepal, South Africa (with NGOs)	Responsive to multiple water needs; Elected representatives, but possibly politicized. Some own contributions.	Balancing between top-down sector-based frames and bottom-up needs-based integrated funding and service delivery; Permanent presence.	Developing generic methodology for integrating multiple water needs in local planning; Influencing national policy and guidelines.
Government/ parastatal domestic sector Colombia (with university) India (with NGO)	Top-down single-use and single-site planning; unable to prevent de facto multiple uses; limited contributions by users.	Supporting a single use at homesteads only; Short-term, project bound.	Lobbying at national level to increase design norms and address water quality issues; Awareness raising about livelihoods benefits of de facto multiple uses; Promoting immediate multiple uses of 'domestic' services planned for future expansion.
Government productive sector Learning alliance members	Top-down single-use planning biased to large-scale systems; Unable to prevent *de facto* multiple uses; limited contributions by users.	Prioritizing a single use or productive uses in agricultural zones, with 'add-ons' for better access (e.g. washing steps) Short-term, project-bound.	Lobbying at national level to support small-scale productive uses, also at homesteads; Awareness raising about livelihoods benefits of de facto multiple uses; Promoting efficient productive water use (drip kits)

Conclusions and recommendations

The MUS project identified and tested new models for meeting the multiple water needs of people in rural and periurban areas. These multiple-use water services improve health, freedom from drudgery, food, and income more effectively than conventional single-use water development. Counter-productive bureaucratic water sector boundaries are dissolved into one common agenda: to plan and design new systems or rehabilitations according to people's multiple water needs at preferred sites, starting with providing 50-100 lpcd to homesteads. At the level of one or more communities, communal abstraction, conveyance, and storage is embedded in holistic spatial layout. Specialization remains needed on health impacts, point of use water treatment, synergies, and conflicts regarding use-specific water requirements, for example, increasing productivity of water, or market linkages. Such use-specific specialist knowledge, however, is to support this common agenda instead of replacing it by systems designed for one single-end use at one specific site only.

This agenda appeared evident for water users' self-supply and private service providers. MUS project partners found NGOs and local government at the direct interface with communities also increasingly responsive to their integrated water needs. The same holds for a number of highest-level policymakers and global organizations. Indeed, proponents agree that this agenda is not rocket science but people's logic. Hence, the most relevant question for further upscaling to reach, ultimately, every citizen with appropriate services is: why do sector-based services, in particular in government and its related education systems, continue?

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References

Van Koppen, Barbara, Patrick Moriarty, and Eline Boelee. 2006. Multiple-use water services to advance the Millennium Development Goals. IWMI Research Report 98. Colombo, Sri Lanka: International Water Management Institute, Challenge Program on Water and Food, and International Water and Sanitation Center (IRC).

Van Koppen, Barbara, and Intizar Hussain. 2007. Irrigation, Gender, and Poverty: Overview of Issues and Options. Special Issue Irrigation and Poverty Alleviation: Pro-poor Intervention Strategies in Irrigated Agriculture. Edited by I. Hussain. Journal of Irrigation and Drainage, Vol. 56, issues 2-3, January. John Wiley & Sons Ltd. (IF 0.598), p. 289-98.

Renwick, M. 2007. Multiple use water services for the poor: assessing the state of knowledge. Winrock International, IRC Water and Sanitation Centre, International Water Management Institute www.winrockwater.org