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

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The Challenge Program on Water and Food-supported MUS project (PN28) developed and tested 'multiple-use water services' ('MUS'). This new approach to water services takes multiple water needs of rural and peri-urban communities as the starting point for planning and design of new systems or rehabilitations. By overcoming the administrative boundaries between single-use sectors, MUS contributes more sustainably to more dimensions of wellbeing 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 in five benchmark basins of the Challenge Programme on Water and Food (CPWF). At 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. It was found that by providing 50-100 lpcd, so doubling or tripling the common design norms in the domestic sector, multiple cost-effective benefits could be achieved from homestead-scale MUS. 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 to establish an enabling environment to provide every rural and peri-urban water user with water for multiple uses. This paper presents general project findings.

Introduction

Multiple users take water from multiple sources and use and re-use it for multiple purposes. This reality is obvious for rural and peri-urban 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. However, this straightforward insight is lacking among many service providers at the levels in-between. 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 community or sub-basin level. This is the gap that the 'Multiple-use water services' or MUS project (PN28) attempted to fill.

The MUS project developed, tested and upscaled an alternative approach to water services at household and community level: 'multiple-use water services' (MUS). MUS is defined as water services planning and design of new systems or rehabilitations that starts with people's multiple water uses and re-uses and needs at their preferred sites within communities' holistic land- and waterscapes. 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.

Methodology

At its start in 2004, the MUS project brought those partners together who were pioneering MUS approaches at the time. Encouraged by the call for innovative partnerships by the Challenge Program on Water and Food (CPWF), the project included representatives from the domestic and productive water sectors and both 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 International Water Management Institute led the project in Ethiopia in the Nile basin, and was the lead partner. A total of 25 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. Socio-economic 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 level. The second objective was to widely upscale these models in order to reach, ultimately, all rural and peri-urban 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 level 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 intermediate, national and global level. These learning alliances raised awareness about community-level MUS models and through 'learning by doing' they induced institutional changes towards an enabling environment, which continue beyond the project life. As the MUS partners driving this process encompassed all four categories of service providers (plus researchers), 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 community-level and if MUS were to be upscaled at intermediate, national and global levels (Hagmann 1998; Van Koppen et al 2006). Learning *how to* realize those conditions was the focus of research. At community level, the principles were: livelihoods-based planning and design of water services; appropriate technologies; adequate financing; equitable institutions; and sustainable water resources. At intermediate level, these were: participatory planning, coordinated long-term support, and strategic planning for further MUS innovation. At national level, the principles were: decentralization of support and enabling policies and laws. This paper synthesizes some findings, conclusions and recommendations. Over 100 project's national outputs, international publications and two books are available and forthcoming at www.musproject.net.

Results

Models for community-level MUS

With regards to the principles of livelihoods-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. Table 1 shows this link. 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 enterprise. 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).

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 households connections (rural communities) b. Communal piped systems with households connections (peri-urban 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	>100	High MUS

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'.

The benefit-cost ratio of investments in homestead-scale MUS is high, especially for intermediate-level MUS (50-100 lpcd). This is in addition to health, social, gender and age benefits. only productive uses are considered. At the income side, the CP-MUS found an increase of net annual household income of USD100-500, or, as expressed per volume of water 0.7 – 2 USD per M^3. This is in line with results from Renwick et al (2007) who found that each additional litre per capita per day (above the 20 lcpd for basic domestic needs) generates an estimated USD 0.5 to USD 1 per year of income. 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. These incremental investments in hard- and software to 'climb the water ladder' can be repaid in 6-36 months (Renwick et al 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. However, one unique feature of MUS concerned equity notions for water sharing under scarcity. Homestead-based multiple uses were small-scale compared to 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 over-use by few was mitigated by pricing, institutional, and technical measures. Within areas with limited water resources, for example in water-scarce Maharashtra, homestead-based multiple uses by all were seen as higher priority than sugar cane farming by 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. Table 2 lists the steps taken and obstacles in realizing the three principles for upscaling MUS at intermediate level from the angle of the each of the water service provider categories. These findings show that the different water service providers bring different strengths to upscaling MUS at intermediate level. Collaboration according to those strengths, with a gradually stronger role for local government, will contribute to the enabling environment for broad upscaling of homestead-scale and community-scale MUS.

At national level, the Department of Water Affairs and Forestry of South Africa ‘embraces MUS’ in its policy on Water for Growth and Development. In Nepal, national guidelines for local government promote MUS as an activity to be financed. The CP-MUS, together with the MUS Group hosted by IRC (www.musgroup.net), stimulated many global agencies to consider MUS. They include: African Development Bank, Asian Development Bank, Bill and Melinda Gates Foundation, Collaborative Council and Water Supply and Sanitation, Comprehensive Assessment on Water and Food, FAO, GWP, ICID, IFAD, World Water Forum 4 and 5.

Conclusions and recommendations

The CP-MUS identified and tested new homestead-scale and community-scale models for meeting the multiple water needs of people in rural and per-urban areas. MUS improves health, freedom from drudgery, food and income. Homestead-scale and community-scale MUS is particularly effective way in rural and often in peri-urban areas for achieving the MDGs. Taking water from multiple sources for multiple uses appeared obvious for water users’ self-supply and private service providers. NGOs and local government at the direct interface with communities are also increasingly responsive to people’s multiple water needs. The same holds for a number of highest-level policy makers and global organizations. Through the learning alliances a start was made to create an enabling environment from local go global levels.

- Promote multiple uses from multiple sources as the norm, and recognize single end-use as the exception, in all water policies, laws, programs and funding of local government, line agencies, NGOs, international water programs and financing agencies
- Adopt 50-100 lpcd or more as the design norm for water services to homesteads, so double or triple the domestic sector’s conventional design norms in order to allow people to climb the multiple-use water ladder at and around homesteads
- Target poor women and men within the overall goal of reaching full coverage of service provision
- Plan water services together with communities according to people’s own priorities for multiple end-uses, in particular at and around homesteads within communities’ holistic spatial and temporal land- and waterscapes.
- Create an enabling environment for broad upscaling of homestead-scale and community-scale MUS by forging collaboration at intermediate and national levels between water users, private providers, NGOs, government, and research and education centers according to their respective strengths and by enhancing the capacity of local government.
- Pool technical, financial and institutional resources from former sub-sectors in the joint planning and design of integrated water infrastructure hardware and software for multiple uses from multiple sources
- Tap professional expertise on the specific water requirements of various uses and on strategies to use water more beneficially: in particular for water quality, higher productivity integrated farming and enterprises, and creation of better markets.

Table 2. Water service providers' steps taken and obstacles in realizing principles for upscaling MUS

Driver of learning alliance by category of water service provider	Steps taken	Principles for upscaling at intermediate level		
	Obstacles	Participatory planning	Coordinated long-term support	Strategic planning for upscaling
Self-supply Thailand (Farmer wisdom network) South Africa (Water for Food Movement	Steps taken	Multiple water needs obvious High own contributions in cash and kind Own experimenting, mutual learning and knowledge generation	Providing integrated mutual support Soliciting needs-based integrated support within limited implementation capacity	Outscaling based on mutual help Strategic alliances at highest policy levels for concretizing policy and soliciting support for outscaling
	Obstacles	None	Uncertain future of informal networks with ageing leaders	Limited resources for outscaling Less priority for advocacy among cumbersome other intermediate level agencies
Private service provider Bolivia (Agua Tuya)	Steps taken	Multiple water needs obvious Client communities' own choice for technology, site and lay-out	Providing infrastructure and training for higher sales	Sales-driven outscaling Facilitating information exchange between users and municipality Procuring assignments from municipality
	Obstacles	Self-financing may exclude the poor	Services may not reach the poor	Market-driven outscaling limited for small business
NGOs Ethiopia (CRS) Nepal (IDE) Zimbabwe (various NGOs)	Steps taken	Responsive to multiple water needs More or less participation in technological design Participatory community-scale MUS (Partial) subsidies	Poverty relief or technological innovation fostering more coordinated support	Strategic alliances with local and other government for upscaling of innovations
	Obstacles		Short-term, project-bound.	
Local government Bolivia Nepal, South Africa (with NGOs)	Steps taken	Responsive to multiple water needs Accountable to constituencies	Permanent presence (Potentially) able to integrate support without strings	Developing generic methodology for integrating multiple water needs in local planning frameworks Influencing national policy and guidelines
	Obstacles	Can be politicized Limited participatory community-scale MUS	Limited resources and implementation capacity	
Government/ parastatal domestic sector Colombia (with university) India (with NGO)	Steps taken	Mandate to serve all, so including the poor Focused on homesteads Somewhat more participatory design	Financial support Expertise on domestic end-uses Expertise on technologies and management for small water quantities to homesteads Add-ons for non-domestic uses, e.g. livestock Improving efficiency of productive water uses (drip irrigation) at homesteads	Awareness raising about livelihoods benefits of *de facto* multiple uses Promoting immediate multiple uses of 'domestic' services planned for future expansion National advocacy to align design and water quality norms with local needs
	Obstacles	Top-down standard packages Limited participatory community-scale MUS	Design norms for domestic uses only Water quality norms unrealistically high Short-term, project bound	

Government productive sector Learning alliance members	Steps taken		Financial support Expertise on productive end-uses Expertise on technologies and management for high water quantities to fields or fisheries Add-ons for non-irrigation uses, e.g. livestock Improving efficiency of productive water uses (drip irrigation) at homesteads	
	Obstacles	Technology-driven single-use planning with (declining) bias to large-scale systems Targeting a proportion of farmers only, often larger-scale farmers Limited participatory community-scale MUS	Hardly attention for productive *and* domestic uses at the homestead Short-term, project-bound	Awareness raising about livelihoods benefits of *de facto* multiple uses National-level innovation to support small-scale productive uses, also at homesteads
Knowledge centers (IWMI, IRC, CINARA, Centro-Agua, Khon Kaen University, Mekelle University)	Steps taken	Identifying untapped opportunities of a better match between people's multiple water needs and sub-sectoral service provision Articulating communities' knowledge	Expertise and resources for: Conceptualizing MUS Analyzing, reporting and providing feedback on MUS principles through case studies Comparison for generic conclusions	Disseminating tested generic solutions and policy dialogue with intermediate, national and global level policy makers, financing agencies, implementers and academia for outscaling and upscaling
	Obstacles		Short term, project bound	

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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. Irrigation and Poverty Alleviation: Pro-poor Intervention Strategies in *Irrigated Agriculture*. Issue Edited by I. Hussain. Journal of Irrigation and Drainage Volume 56 Issues 2-3 January 2007 John Wiley & Sons, Ltd (IF 0.598) pages 289-298

Renwick, M. , D. Joshi, M. Huang, S. Kong, S. Petrova, G. Bennett, R. Bingham, C. Fonseca, P. Moriarty, S. Smits, J. Butterworth, E. Boelee, G. Jayasinghe. 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 . Case studies from CP-MUS were included in this analysis.

Keywords

Please provide three to six keywords, written in lowercase, separated with commas.

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