

CPWF Project Report

Multiple-Use Water Services (MUS)

Project Number 28

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This report is the fruit of the joint efforts by all partners in the action research '*Models for implementing multiple-use water supply systems for enhanced land and water productivity, rural livelihoods and gender equity*', abbreviated as 'CPWF-MUS' project. This project was part of the Challenge Program on Water and Food. The national teams in eight countries with 150 partner institutions in the learning alliances and with global partners IWMI, IRC, and IDE have collaborated intensively, and continue to collaborate. As an action research project that aims to overcome sectoral boundaries within the water sector and divisions between research and change on the ground to improve poor people's livelihoods, this intense dialogue was pivotal to learn together how to implement and scale up multiple-use water services. Commitments in terms of time and matching funds by many partners far exceeded formal requirements. The financial contribution by FSP (Fonds de Solidarité Prioritaire) Echel-Eau programme, French Ministry of Foreign Affairs are also gratefully acknowledged.

Program Preface:

The Challenge Program on Water and Food (CPWF) contributes to efforts of the international community to ensure global diversions of water to agriculture are maintained at the level of the year 2000. It is a multi-institutional research initiative that aims to increase the resilience of social and ecological systems through better water management for food production. Through its broad partnerships, it conducts research that leads to impact on the poor and to policy change.

The CPWF conducts action-oriented research in nine river basins in Africa, Asia and Latin America, focusing on crop water productivity, fisheries and aquatic ecosystems, community arrangements for sharing water, integrated river basin management, and institutions and policies for successful implementation of developments in the water-food-environment nexus.

Project Preface:

The CPWF-supported project '*Models for implementing multiple-use water supply systems for enhanced land and water productivity, rural livelihoods and gender equity*' ('CPWF-MUS') innovated, tested, and documented homestead-scale and community-scale models for Multiple Use water Services in 30 rural and peri-urban sites in 8 countries: the Andes (Bolivia and Colombia), Indus-Ganges (India, Nepal), Limpopo (South Africa and Zimbabwe), Mekong (Thailand) and Nile (Ethiopia). Learning alliances for scaling up and out of results were forged in each country, encompassing a total of 150 water user groups, CBOs, (I)NGOs, domestic sub-sector and productive sub-sector agencies, local government, private service providers, rural development agencies and financiers, and knowledge centers. The resulting institutional change at intermediate and national level, together with awareness raising about the MUS models at global level, contributed significantly to a more supportive environment for reaching all water users with the multiple-use water services they need and, thus, using water most effectively to achieve all MDGs.

CPWF Project Report series:

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RESEARCH HIGHLIGHTS

More MDG per drop

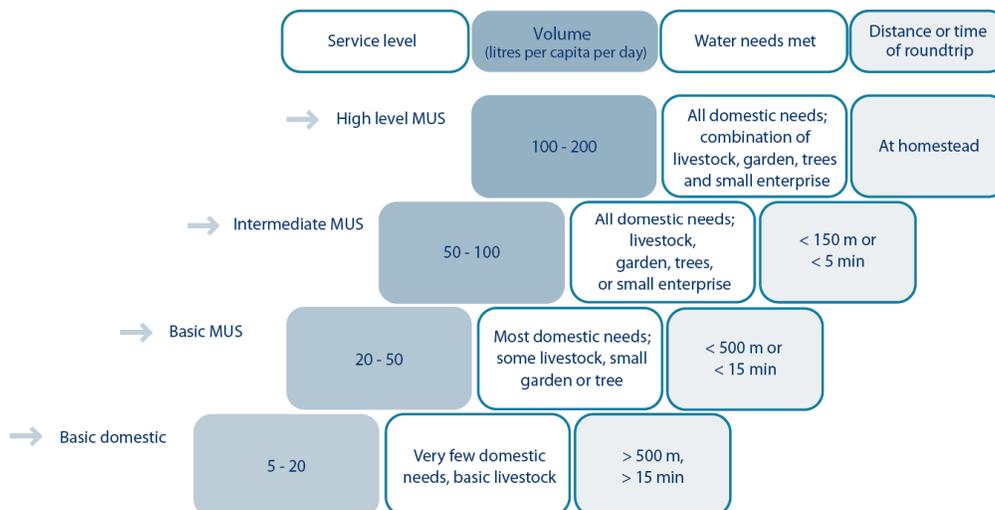
Multiple-use water services (MUS) is an innovative approach to water services. It unlocks new investment opportunities for poverty reduction and gender equity in peri-urban and rural areas. MUS takes people’s multiple water needs as the starting point of planning and design of new systems and upgrades. Universally, water users already use ‘domestic’ systems or ‘irrigation’ systems for multiple purposes, whether legal or not. By planning for these multiple uses, many more benefits from investments in infrastructure can be realized: health, freedom from domestic chores, food and income and gender equity. Thus, water investments can contribute simultaneously to all Millennium Development Goals (MDGs).

The MUS project (PN28), supported by the Challenge Program on Water and Food, pioneered the implementation of MUS and scaling up of MUS at intermediate, national and global levels. Global partners were IWMI International Water Management Institute (lead institution), IRC International Water and Sanitation Centre and IDE International Development Enterprise. Learning alliances were established with 150 governments and other institutions in the basins of the Andes (Bolivia and Colombia), Indus-Ganges (India, Nepal), Limpopo (South Africa and Zimbabwe), Mekong (Thailand), and Nile (Ethiopia). Global advocacy in collaboration with the MUS Group ensured that MUS obtained a place in the policy agendas of professional networks, such as the World Water Forums, and of international governmental and non-governmental water agencies, rural development and financing organizations. Project partners included local water user movements, NGOs, the domestic sub-sector, the irrigation sub-sector, and local government. From these diverse backgrounds, project partners innovated two successful MUS models: homestead-scale MUS and community-scale MUS.

Homestead-scale MUS: 50 – 200 litres per capita per day

Whenever water is available near homes and on adjoining lands, or ‘homesteads’, people use such water for domestic and many productive uses. This empirical relationship between water uses and availability is depicted in the ‘**multiple-use water ladder**’.

The multiple-use water ladder



The policy recommendation is to enable poor people **'to climb the water ladder'** and to provide **50-200 litres per capita per day**. Out of this, 3-5 litres per capita per day should be safe for drinking. Income generated enable repayment of most multiple-use systems investments within three years. Homestead-scale MUS is especially beneficial for **women**, who are disproportionately responsible for domestic water supplies and tend to have a stronger say over homestead production. The **land-poor**, who only have access to homestead land, also benefit. Thus, homestead-scale MUS generates most **'MDG per drop'**.

Community-scale MUS: local-level integrated water resource management

MUS at community-scale takes communities as entry point of water services. It holistically considers their multiple water uses (domestic, irrigation, animal watering, tree-growing, fisheries, enterprises, ceremonies, environment) from multiple water sources (rain, surface water, groundwater, wetlands) at multiple sites (homesteads, fields, open access). This integrated water resource management at the local level is (potentially) considerably more cost-effective and sustainable than single-use water services by:

- **Saving costs** by sharing costly bulk storage and conveyance infrastructure and by using existing infrastructure as sunk costs;
- **Enhancing water efficiency** by combining multiple water sources and re-using water at the different scales;
- **Ensuring water quality** at the appropriate scale, e.g. point-of-use treatment for drinking;
- **Empowering communities** by following their priorities and building upon own water management arrangements, which are invariably holistic and adapted for multiple uses.

EXECUTIVE SUMMARY

Rationale, aim and methodology

Multiple-use water services (MUS) has emerged as an approach better suited to meeting people's multiple water service needs in peri-urban and rural areas of low- and middle-income countries. Agriculture-based livelihoods depend on water in many ways. Of course, water is needed for drinking, sanitation, cooking, personal hygiene, laundry and general cleaning. It is also needed in many small-scale or domestic enterprises including livestock watering, horticulture, crop irrigation, tree growing, fisheries, pottery, brickmaking, arts, butchery, car washing, ice-making and for ceremonial purposes.

Water professionals in NGOs, the domestic water sub-sector, various productive sub-sectors and knowledge centers have increasingly become aware that the single water uses enshrined in the mandates of their organizations do not reflect the practice of their clients who take water from multiple sources and use it for multiple purposes. The action research project '*Models for implementing multiple-use water supply systems for enhanced land and water productivity, rural livelihoods and gender equity*' was conducted from 2004 to 2009, aiming to overcome sectoral boundaries and to identify, test, study, and scale up opportunities for MUS.

The International Water Management Institute, IRC International Water and Sanitation Centre and International Development Enterprises established partnerships with water service provider and user groups in eight countries. Partners included water users and grassroots movements, local private service providers, national NGOs, governmental domestic sub-sector agencies and representatives from the productive sub-sectors, local government, and national knowledge centers. In each country, learning alliances were established as instruments to conduct action research, learn together from experiences and scale up promising innovations. Through learning alliances, the MUS partnership was extended to 150 organizations that had experimented with, or were interested in, MUS innovation.

The first project aim was to pioneer the implementation of MUS in communities and to document *de facto* multiple uses of 'domestic' systems designed for single use. Experiences from 30 sites allowed identifying generic MUS models. The second aim was to scale up the MUS models by contributing to a supportive institutional environment at intermediate, national and global levels. This was taken up by the learning alliances.

The action research was further structured around a jointly developed MUS conceptual framework of 'principles' that team members assumed to hold the key to implementing MUS in communities and scaling it up at intermediate and national levels. The leading principle is that livelihoods act as the main driver for water services. Equitable availability and access to water is determined by a range of water resources, appropriate technologies, adequate financing mechanisms and fair institutions to manage communal systems.

MUS models

The project identified, field-tested and analyzed two models: homestead-scale and community-scale MUS. Homestead-scale MUS promotes household use of water for domestic *and* productive purposes to improve health, alleviate domestic burdens, and improve food security and income.

Community-scale MUS considers all uses, users, sites of use and water resources and infrastructure holistically. This integrated perspective opens new technological potential, including smart combinations of water sources; integration of existing infrastructure into new designs; and economies of scale in sharing bulk infrastructure for multiple uses.

Various productive water sub-sectors (e.g. x, y, z) operate at community level, where they are all concerned about the same water resources for the same people. With a MUS approach, the sectoral boundaries dividing single water uses can fade away, although sectoral expertise is still needed to turn water use into livelihood benefits.

A 'multiple-use water ladder' was developed to reflect linkages between a given level of access to water and the uses and livelihoods that can be derived. The ladder set 20 lpcd at and around homesteads as sufficient for basic domestic use, 20-50 for basic MUS, 50-100 for intermediate MUS and more than 100 for high-level MUS. At least 3 lpcd should be safe for drinking. Even below basic domestic service levels, poor people prioritize water for small-scale productive activities over personal hygiene, while significant productive uses are undertaken at intermediate and high level MUS (this project). The benefit-cost ratio of climbing the water ladder to intermediate level is favorable, and investment and operational costs can usually be paid from the income of productive purposes within three years (this project; Renwick et al 2007).

Livelihoods are the road out of poverty

Climbing the water ladder to intermediate and high-level MUS requires only a small fraction, often few percent only, of total water resources at community or basin scale, even when promoting full coverage homestead-scale MUS. In water-stressed basins, inequities in water use are substantial and re-allocation of some water by the few large-scale users can be considered legitimate. Within communities, the poor benefit most from such a reallocation, and they gain even more when resources are made available to gain access to infrastructure.

Our case studies confirm that water used at and around the homestead for multiple purposes brings diverse benefits to people's livelihoods. Provided that water services are well targeted, homestead-scale MUS is a way of achieving more livelihood benefits than conventional water services. Homestead-scale MUS empowers women, is accessible to the poor and is likely to be the best way to use water to contribute to achieving the Millennium Development Goals (MDGs).

Establishing a supportive environment for MUS

The higher service levels needed for MUS can be provided through various combinations of technologies most of which are already commonly known, such as pumps, piped supplies, rainwater and run-off harvesting techniques, tanks and other reservoirs. Provision comes at additional cost, and may have additional management implications, but the case studies have shown that these additional measures are achievable and that the investments are largely off-set by increased benefits.

To scale up these MUS models, a supportive environment is needed at intermediate level to deliver on the principles of participatory planning, coordinated long-term support, and strategic planning. At the national level, enabling policies and laws are required with effective decentralization of long-term support services. The learning alliances generated institutional innovations via water service provider groups on their own and in new collaborations.

Many water users already implement MUS in their single use systems, and in their efforts to integrate fragmented private and public support. NGOs have been innovating homestead- and community-scale MUS for years in response to people's needs for poverty alleviation. However, NGO projects are time bound and NGO support is not indefinite.

The domestic Water, Sanitation and Hygiene sub-sector may welcome the widespread *de facto* productive uses of 'domestic' water, since considerably more livelihood benefits are produced than its mandate alone. Yet, service levels need to be increased to allow water

users to climb the water ladder, balancing the need for at least 3 lpcd of water that is safe for drinking and provision for uses that do not need such high quality.

Productive economic sub-sectors such as agriculture, livestock, fisheries and forestry often already operate at community-scale . Some sub-sectors may scale up MUS by integrating the homestead as a preferred site for productive and domestic water uses and by tapping the potential of community-scale MUS through participatory approaches with communities and stronger collaboration with local government.

Local government is a potential pivot for MUS, where participatory planning, coordinated support and strategic planning occur together. Nevertheless, local government typically needs outside support in order to implement such activities, as capacities and budgets are limited. Such activities can enhance transparency of public and water resource allocation, help match demands and supplies and improve accountability. Local government is also required focus after new arrangements are developed since communities can rarely monitor and enforce agreements on their own.

Multiple-use water services gain multiple sources of support

MUS implementation is being advanced at larger scales in the project countries of Colombia, Ethiopia, Nepal, South Africa, Thailand, and India. Moreover, a growing number of initiatives across the water sector are putting MUS on the agendas of professional networks, development and financing organizations, and research organizations, rural development agencies and domestic and productive sub-sector organizations. Within a few years, the global environment has become considerably more supportive of MUS.

Multiple uses and multiple sources are already the main paradigm for water users. For professionals, a shift in perception toward multiple uses and sources offers new potentials for comprehensive water services that meet more user needs, especially in the light of the MDGs.

1 Introduction

1.1 Background: towards Multiple-Use water Services (MUS)

1.1.1 Multiple uses from multiple sources versus single-use mandates

Over the past 20 years, water professionals have become increasingly aware of the gap between their professional single-use backgrounds and the practice of communities. Agency mandates to provide water services primarily for one single end use – domestic use, irrigation, livestock or fisheries – did not match the realities and water needs of their clients, who invariably used multiple water sources for multiple uses. Communities with diversified agriculture-based livelihoods depend upon water in many ways, especially in rural and peri-urban settings within low- and middle-income countries. Communities use water for an array of domestic and productive uses, including drinking, cooking, cleaning, bathing, laundry, sanitation, livestock, crop irrigation, horticulture, tree growing, fuel wood and fodder production, fisheries, pottery, brickmaking, small-scale food processing and butchery, and for other water-dependent enterprises and ceremonies. All these uses are vital for community wellbeing. To meet these diverse needs, communities often draw upon multiple sources of water. For them, it is obvious and normal to use water from multiple sources for multiple uses. Single uses, like rain on mono-cropped fields, are the exception.

In contrast, water services are organized according to sub-sectors that emphasize a single end use sometimes as an exclusive water use. Such claims of priority end use become the sub-sector's mandate. Mandates, in turn, greatly influence the entire structuring of the sector, including job descriptions, performance indicators and upward reporting requirements. Top-down financing streams from national and global levels are also earmarked accordingly. The production and reproduction of these single-use foci in the education system perpetuates this pattern over the generations. Indeed, this single use view of water becomes a professional paradigm of how to perceive the world and act accordingly (Moriarty, 2008).

Most notably in the domestic and irrigation sub-sectors, the single-use mandate is often linked to an assumption that there is one single site where their use takes place. Thus, the domestic sub-sector focuses on homesteads¹ and sites as near as possible to homesteads. Obviously, this is the preferred site for using water for domestic purposes. In contrast, the irrigation sector focuses on water end use by plant roots in fields. Once, these fields were assumed to be grouped into shared irrigation schemes. More recently, however, greater attention has been paid to irrigation management and agricultural water infrastructure used by individuals, including mechanized and manual groundwater pumps, water harvesting or soil moisture retention techniques. However, the question of whether these fields are near to the homestead has received less attention. Consequently, neither sub-sector holistically considers the entire 'water and landscape' picture in communities or sub-basins, with its spatial layout of multiple water sources, multiple users and multiple uses at various sites, the 'arenas in which humans interact with their environments on a kilometers-wide scale' (Coward, 2008).

1.1.2 Domestic-plus and irrigation-plus

Professionals became aware of this gap, because they began to observe that systems designed for one single water use were being used for multiple purposes in an unplanned way, and so became *de facto* multiple-use systems. 'Irrigation' systems are used for drinking, bathing, washing, cattle watering, small enterprises, fisheries, or irrigation (Yoder, 1983; Silliman and Lenton, 1985; Meinzen-Dick, 1997; Bakker et al 1999;

¹ In this report, we use 'homestead' to mean the home and the immediately surrounding land used by the family. 'Household' relates to the people living at the homestead. The household may have access to water for irrigation or other purposes in fields away from the homestead, which is therefore household-use but not homestead-use water.

Renwick, 2001). Roads for monitoring canals became trading routes (Lee, 2008). Systems planned for drinking water and other domestic uses are often used for cattle watering, irrigation and a range of other small-scale productive uses (Moriarty, 2002; Lovell, 2000). While some unplanned uses were absorbed by the system, others caused damage to infrastructure or deregulated planned water allocation schedules. However, measures to prevent unplanned uses, e.g. by forbidding and declaring those uses as 'illegal', were ineffective.

Professionals started to appreciate the improvements that these unplanned uses brought to four main water-related dimensions of livelihood wellbeing: health, food production, income and freedom from drudgery. For uses that did not damage infrastructure or create scarcities, these livelihood benefits came at no cost other than the changing perspectives of water professionals. "First you would see someone irrigating some tomatoes, and you would say that he is wasting water. Now, you see the same situation, but from the perspective of the user, and you would say that he is making a good and economic use of water" (Johny Hernández, technician from SANAA Honduras, personal communication).

Academics from both the domestic and irrigation sub-sectors corroborated the potential benefits of this new perspective. Various studies were undertaken to assess the 'added' value of benefits from unplanned uses (Meinzen-Dick 1997; Renwick et al, 2007; Perez de Mendiguren, 2004). The health and hygiene benefits of using irrigation water for domestic uses received particular attention (Meinzen-Dick 1997; Van der Hoek et al., 2001; Boelee et al., 1999; Boelee et al., 2007; Renwick et al., 2007).

Armed with this new understanding, the sub-sectors started proactively enhancing accessibility to water with the double aim of stimulating the livelihood benefits and avoiding damage and disturbance to the systems. They adapted their designs with 'add-ons'. Irrigation designers constructed washing steps or cattle entry points in irrigation canals. To encourage fisheries and other aquaculture, connectivity was improved and dead storage (below which water would not run off) guaranteed reserves in reservoirs, streams and even at field level for crop-fish systems, where a crop such as rice can be grown and fin fish or prawns farmed in the same field (Nguyen-Khoa, Smith, Lorenzen, 2005). Meanwhile, domestic systems were equipped with cattle troughs, washing slabs, and sometimes a communal garden. In these ways, for limited extra cost, the uses and corresponding livelihood benefits were augmented. We call water services that maintain the primary mission of their own sector, but accommodate uses beyond the sector's mandate 'irrigation-plus' or 'domestic-plus' water services (Van Koppen et al., 2006).

1.1.3 Towards multiple-use water services

Despite this trend towards recognizing the benefits from multiple use, there was hardly any cross-sectoral collaboration until the early 2000s. Each sub-sector tried to address other uses within its own domain. Gradually realization grew that many more opportunities for better service delivery could be unlocked through a more comprehensive approach to the planning and design of new or rehabilitated water infrastructure.

Practitioners and researchers from both the domestic and irrigation sub-sectors soon began to innovate, collaborating in a global endeavor to achieve 'multiple-use water services' or 'MUS'. In 2003, in Colombia, the University research unit CINARA organized a Latin American symposium '*Usos Múltiples de Agua*'. In the same year, a global International Symposium on '*Productive water uses at the household level*' was organized in South Africa, by the IRC International Water and Sanitation Centre, the Department of Water Affairs and Forestry (DWAF), the Natural Resources Institute (NRI), and the International Water Management Institute (IWMI) (Moriarty et al., 2005).

In 2004, the invitation from the Challenge Program on Water and Food (CPWF) to forge innovative partnerships for impact-oriented research allowed these partnerships to be pursued through the CPWF-MUS action research project.

1.2 Composition and research focus

The project '*Models for implementing multiple-use water supply systems for enhanced land and water productivity, rural livelihoods and gender equity*' (abbreviated as CPWF-MUS) was composed of partners from the domestic and irrigation sub-sectors and included both implementing and academic organizations. All the partners were pioneers at that time in overcoming sectoral boundaries and in implementing and scaling up domestic-plus, irrigation-plus or multiple-use water services, or related research. The International Water Management Institute (IWMI), the lead institution, had worked for years on non-irrigation uses of large irrigation systems and health. IRC International Water and Sanitation Centre had worked on productive uses of domestic water systems. The International Development Enterprise (IDE) in collaboration with Winrock International had started implementing 'hybrid' systems in Nepal and India (Polak et al., 2004). Homestead ponds and integrated farming were being adopted at scale in Thailand (Ruaysoongnern and Penning de Vries, 2005). In South Africa, the benefits of *de facto* multiple use 'domestic' systems had been assessed and a methodology was pilot-tested on 'Securing Water to Enhance Local Livelihoods' (SWELL) by the NGO AWARD, supported by IRC (Perez de Mendiguren, 2004). In Zimbabwe, NGOs had been active in developing homestead-based technologies for multiple uses (Robinson et al., 2004). In Ethiopia, the Catholic Relief Services (CRS) actively stimulated 'multiple sources for multiple uses' in its water projects.

Thus, partnerships were established in eight countries pertaining to the benchmark basins of CPWF: Bolivia, Colombia, Ethiopia, Maharashtra-India², Nepal, South Africa, Thailand and Zimbabwe. In each country, one or two national partners led the action research, also involving a wider group of stakeholders through what became known as learning alliances. Within these eight countries, 30 study areas were selected for case studies. A study area was a community, a group of communities in a district or sub-basin, or a group of communities who had adopted a similar type of technology. A criterion for the selection of communities was their involvement or interest in MUS.

The composition of CPWF-MUS, with a great diversity across the countries and cases, permitted learning about the locally-specific characteristics of MUS and generic features with general validity across the cases, countries, and basins.

² We mainly refer to the state level for India, because the state is comparable in terms of population to the size of nations elsewhere.

2 Project objectives and methodologies

2.1 The two-pronged project strategy, objectives and methodologies

The CPWF-MUS project had two central research questions. For all partners already engaged in studying, testing or implementing domestic-plus, irrigation-plus or MUS ('MUS champions') little doubt existed about the answer to the question 'why MUS?' MUS was to overcome the counterproductive impacts of sector boundaries so as to deliver better services. More relevant were the 'how to?' questions:

1. 'how to' implement multiple-use water services at community level, and
2. 'how to' go to scale.

'Going to scale' was defined as, ultimately, reaching everybody with the water services they need. Therefore the project aimed for 100% coverage of MUS in low- and middle-income countries. This common vision of better service delivery for beneficial livelihood impacts at short, medium, and long term was the common thread throughout the project and shaped the research questions and methodologies.

At the start of the project in 2004, implementation of MUS on the ground was still new, and no scaling up did not exist. The only way to study and advance MUS implementation in communities and to scale up MUS was by innovation and learning-by-doing. Across the eight countries, CPWF-MUS adopted a two-pronged innovation strategy conforming to the project goals. The first step was to implement, test and analyze models for MUS that performed better than single-use services. The second step was to scale up these MUS models by creating a supportive environment of sustainable service delivery at scale among intermediate, national, and global water services providers.

The best way to ensure scaling up was not just through global academic 'experts' but to include implementing agencies, local practitioners and policy makers. To achieve this aim, 'learning alliances' were established. Learning alliances are 'a series of interconnected multi-stakeholder platforms at different institutional levels (national, district, community, etc.), aiming to speed up the process of identification, development and scaling up of innovations' (Moriarty et al., 2005; Smits et al., 2007). Learning alliances facilitated learning, awareness raising and scaling up lessons learnt. So, from the project outset, MUS partners forged strategic partnerships among water users and private water services providers, NGOs, governments and knowledge centers (Penning de Vries, 2007). About 150 organizations or persons became active members of learning alliances (see annex 2); many more participated to a lesser extent by attending workshops or similar events. Most learning alliance members committed themselves to longer-term collaboration beyond the short-term CPWF-MUS project time and resources.

In implementing the two-pronged innovation strategy of the project, the learning alliances identified multiple-use models on the ground, mainly derived from analysis and documentation of pilot implementation of innovative multiple-use systems, but also from *de facto* multiple uses of single-use systems. In each country, the sample of cases was generally broad and diverse enough to justify a certain generic validity and synthesize best practices into 'models' of multiple water use services at homestead and community scale.

These generic models became the focal point for the second step of the innovation strategy: scaling up innovation among service providers at intermediate, national and global levels. Scaling up at each of these levels was based on a strategic institutional analysis of the organizations and their mandates. This analysis further guided the composition of the learning alliance and steered its activities. The learning alliances raised awareness about the MUS models and their untapped potential. Even within the short time-frame of CPWF-MUS, some decision-makers and professionals incorporated MUS into intermediate level planning, programs in national policy, legislation, program formulation and follow-up research activities, and also into global programs. Even in cases where no direct changes in policy and practice occurred, many new insights were

generated by the trials and critical reflection on how best to overcome sectoral boundaries and to create a supportive environment for MUS.

2.2 The MUS framework

At the start, CPWF-MUS developed a conceptual framework to structure the learning process for cross-site, cross-country, and cross-basin comparison of findings. In developing the conceptual framework CPWF-MUS followed the 'learning wheel' methodology and Jürgen Hagmann facilitated its development and follow-up (reference). A learning wheel attempts to identify the conditions that are the most critical to achieve the envisaged goal. In this case, the goals were successful implementation of MUS models on the ground with scaling up at intermediate, national, and global levels. The conditions to achieve this, or 'MUS principles' were identified on the basis of team members' expertise and literature. The resulting 'learning wheel' is relevant for researchers and implementers alike, because it allows knowledge to be generated on 'how to' realize the necessary conditions for change. So in any local situation, implementers can check whether and how conditions that should be in place, *are* in place, and, if not, what can be done to stimulate them.

The principles identified to implement MUS for livelihoods at community level are (Figure 1):

- Use water for livelihoods. This is determined by access to water, which depends on the combination of four other principles:
 - Appropriate technology
 - Community-level institutions
 - Financial arrangements
 - Water resources for sustainable MUS

At intermediate level, the principles for supporting community MUS are:

- Participatory planning
- Coordinated long-term support
- Strategic planning

At national level, national scaling up of MUS requires:

- Decentralized long-term support
- Enabling policy and legislation

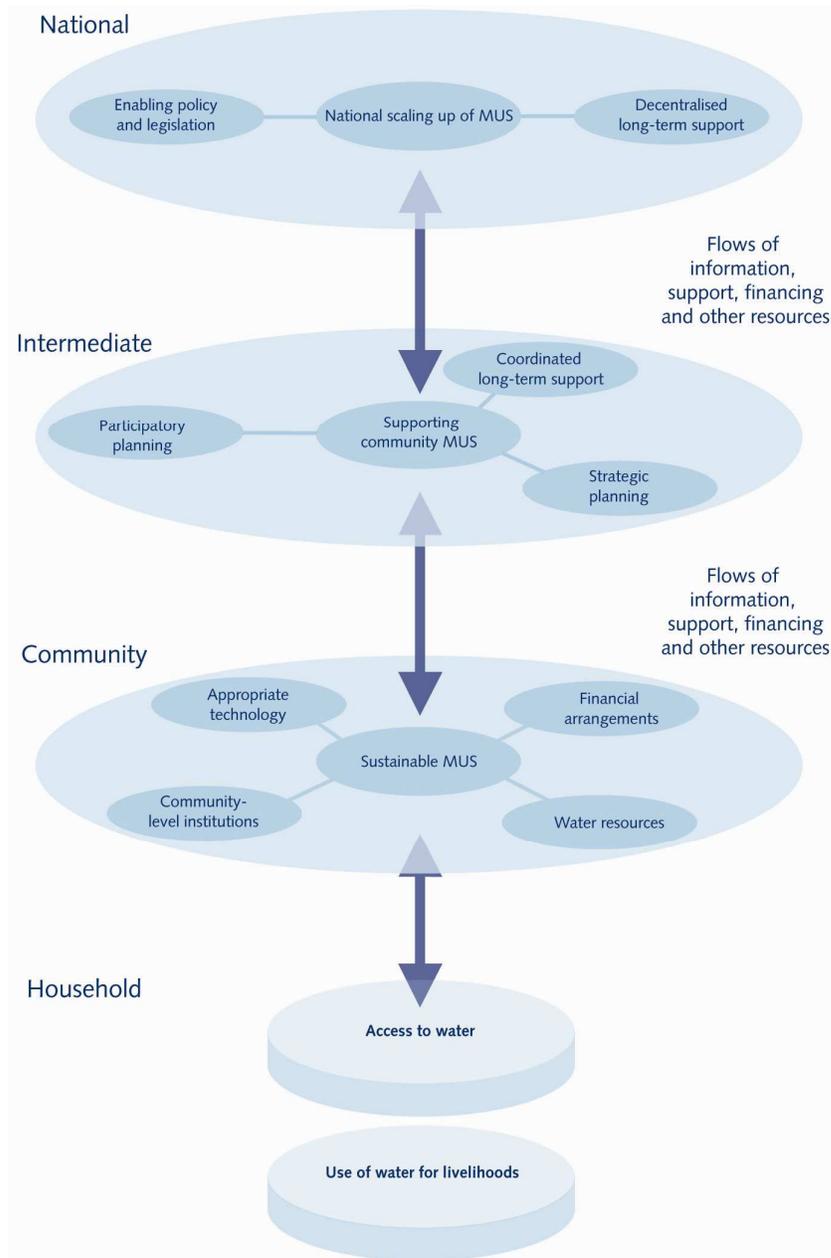


Figure 1: The MUS implementation framework

The local teams in the 30 study areas and the learning alliances decided on which subsets of principles to focus. Overall, each principle was addressed in at least three or four sites, but often in many more or in all study areas. The MUS learning wheel itself has become a living document, where improvement and adjustments are continuously made (Van Koppen et al., 2006).

2.3 Overview of country sites and foci

Table 1 provides an overview of the country sites and foci of the learning process. This overview highlights the following diversity represented in CPWF-MUS.

- In 21 study areas, innovative multiple-use water services were piloted and documented. In nine study areas, there were *de facto* multiple-use systems that

were designed for a single use. In one case this was by the irrigation sub-sector and in all other cases by the domestic sub-sector. Service levels for water uses at and around homesteads varied across the multiple-use systems and domestic-plus systems.

- In all study areas, the focus was on homesteads and surrounding areas. Moreover, most case studies (20 out of 30) also examined how communal systems for homestead-scale water service delivery were interlinked at higher levels with other domestic or irrigation systems and with community-scale water resource management in general. These case studies highlight 'community-scale MUS'.
- Six water service provider groups were included:
 - Water users themselves for self-supply, sometimes supported by small-scale private water entrepreneurs,
 - NGOs,
 - Domestic sub-sector,
 - Productive sub-sector,
 - Local government,
 - Knowledge centers, which can be seen as indirect public service providers.

All six main water service provider groups were represented, although not all groups were necessarily present in each of the study areas. One group took the lead in the CPWF-MUS case studies and learning alliances.

- All three main categories of water technologies and their related institutions were included in the sample: privately managed homestead-based technologies, such as homestead ponds and other water harvesting techniques and wells; communally managed single access points (wells and boreholes and village reservoirs); and communally managed systems with distribution networks which conveyed surface water or groundwater either to standpipes, the homestead, or distant irrigated fields.

This diversity in water service provider groups drove the CPWF-MUS country activities and initiated the learning alliances, and as a result, the foci of case studies and learning alliances also differed. These different starting points greatly influenced the learning alliance composition and steps taken, the type of obstacles faced and also the strategies developed to overcome these obstacles. In Colombia and India, the main focus was on government domestic sub-sector plans and programs; in Nepal, Ethiopia and Zimbabwe work evolved around NGO innovations; in Bolivia, Thailand and partly in South Africa, it focused on cases where household and communities themselves invest and manage their own systems. Scaling up was mainly at the intermediate level in Bolivia, Colombia, and India, and both at intermediate and national level in Nepal, Thailand and South Africa. (Butterworth et al., 2009). Taken together, this gave important new insights into the strengths and weaknesses of different water service providers in contributing to an overall enabling supportive environment for implementing MUS at scale.

Table 1. Overview of the study areas, predominant service providers studied, technologies and foci of the learning process. Countries are sorted in an ascending order according to GDP

Country and estimated number of households studied	Study area ³	Predominant service providers studied	Predominant types of technologies studied	Focus of the learning process
Ethiopia 2687	A. One Peasant Association of 11 communities in Dire Dawa Administrative Council B. One sub-catchment in Tigray region C. 40 technology adopters in Tigray region D. Two communities in one Peasant Association in Ginchi woreda (district), Oromiya Region E. Three villages in two <i>woredas</i> in East Hararghe , Oromiya Region F. 57 adopters of ponds in Oromiya and SNNP Regions. G. Irrigation farmers in Bure district, West Gojam, Amhara Region	A, B, & E. NGO-initiated community-scale MUS, in coordination with local government C. Government-initiated individual homestead-scale MUS. D. Government communal domestic water services and self-supply. F. NGO-initiated individual homestead-scale MUS G. Traditional farmer-managed irrigation systems	A and E. Groundwater-fed piped distribution systems, with scattered standpipes B and E. Surface-water fed system designed for irrigation, cattle, domestic uses and water treatment C and F. Farm ponds D. Home water treatment G. Irrigation systems from river and springs	A, B, and E. Documentation of community-scale MUS by NGOs A. Scaling up by a learning alliance at district level C. Documentation of government-initiated individual homestead- MUS D. Water quality studies F. Documentation of NGO-initiated individual homestead- MUS G. Assessment of willingness to pay for multiple uses of irrigation systems
Nepal 62	Three communities in three districts in the Middle Hills in the southern Himalaya	NGO-initiated MUS in strong collaboration with local government and line agencies	Surface water fed piped distribution systems with domestic standpipes, irrigation outlets and household storage for multiple uses	Piloting MUS through an NGO programme, and outscaling and scaling up with local and national government agencies and NGOs through a learning alliance
Zimbabwe 140	Three Rural Districts of Marondera, Murehwa and Uzumba Maramba Pfungwe (UMP)	NGO- (various) initiated individual homestead and communal technological innovation for multiple uses	Homestead shallow wells with improved lifting devices. Communal boreholes with handpumps	Documentation of innovations under past and ongoing NGO programmes. Sharing lessons learnt through national learning alliance

³ This table uses the full names of the geographical areas. In the remainder of this book, we will refer to the shortened versions of these, which are in bold.

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Bolivia 1300	Five peri-urban communities and one multi-purpose dam in Cochabamba valley	A. Communal homestead-scale and community-scale self-supply for multiple uses, supported by local private supplier and local government B. NGO irrigation services C. Multi-purpose dam	A. Both groundwater and surface water-fed piped distribution systems with household and field connections, tankers B. Open canal irrigation systems C. Dam	Documentation of community initiatives for accessing water for multiple-uses in peri-urban areas, and learning alliance to strengthen support by local private sector and local government
India 362	Two communities in Nasik District in the state of Maharashtra	State government communal domestic water services, with NGO introducing homestead-scale productive uses	Groundwater-fed piped distribution system with standpipes and household connections	Piloting MUS within the government rural water supply programme through direct contacts with communities for including homestead-scale productive uses
Colombia 3,000	Six communities and sub-catchments in the Quindío and Valle del Cauca Departments	Local and provincial government domestic services programme (PAAR) with <i>de facto</i> multiple uses	Surface-water fed piped distribution systems with household connections	Learning about <i>de facto</i> multiple-use systems, with a view towards inclusion of MUS concepts and lessons learnt into the work of PAAR and other local organisations
Thailand 120	120 technology adopters in the Provinces Buriram, Mahasarakam, Nakhon Ratchasima and Yasothon of N.E. Thailand and regional farmer network	Homestead-based self supply for multiple uses promoted by regional farmer wisdom network	Rooftop rainwater harvesting for domestic water and new run-off farm ponds for various productive uses	Outscaling and scaling up homestead ponds and other technologies through the learning alliance with the 'Farmer Wisdom Network' focused on self sufficiency and integrated farming. Engagement with and support from national policy makers
South Africa 60	A. Eleven communities in one ward in Bushbuckridge Municipality. B. Technology adopters	A. Local government services, with NGO assisting in planning for multiple uses. B. Homestead-based self supply for multiple uses promoted by grassroots movement	A. Both surface and groundwater-fed piped distribution systems with scattered public standpipes. B. Rooftop rainwater harvesting and new run-off farm ponds for multiple uses	Introducing MUS into the integrated development planning process of the Local Municipality and scaling up at national level.
Total households 7,831	Total study areas 30			

3 Results, discussion, conclusions: models for homestead-scale and community-scale MUS

3.1 Conclusions on MUS models

As mentioned, the five principles that need to be in place to implement MUS on the ground included livelihoods as the driver and four other principles that together determined access to water at a specific site of use: technologies, institutions, financing and sustainable water resources. In the course of the project, it was realized that differentiating according to site of use and scale of water management considerably clarified issues at stake. Accordingly, a distinction was made between homestead-scale MUS and community-scale MUS. Homestead-scale MUS refers to water provision to homesteads and surrounding areas both from water sources at the homestead and from communal sources. All CPWF-MUS sites included homesteads as a site of multiple water uses. This evidence underpinned the model for homestead-scale MUS.

Community-scale MUS, or important components, were piloted in two thirds of the cases. This takes people as entry point for services delivery, considering in an integrated manner technologies and institutions for system management to meet the needs of all water users at multiple sites for multiple uses. So community-scale MUS includes (usually multiple) water uses at homesteads and (multiple or single use) in fields. Natural water sources and human-made systems can channel water to homesteads or fields or both and can also be used directly (for multiple uses such as fishing, laundry, livestock watering). At community-scale, interventions by all water sub-sectors at any site and for any use by the same community *de facto* come together. This includes irrigation-plus, village reservoirs, fisheries, livestock watering, navigation, milling, hydro-power, or approaches like watershed management. Instead of becoming 'add-ons' in domestic-plus and irrigation-plus approaches (e.g. communal garden, washing steps), water needs beyond the mandated single use that professionals have set become integrated parts of community-scale MUS. At community scale, water is developed and managed according to this integrated reality. Such a focus on multiple sites of multiple uses and scales of water development and management within communities' water- and landscapes appeared a more realistic guide for water services provision than the single uses which currently structure water services delivery.

3.2 Livelihoods as drivers of MUS

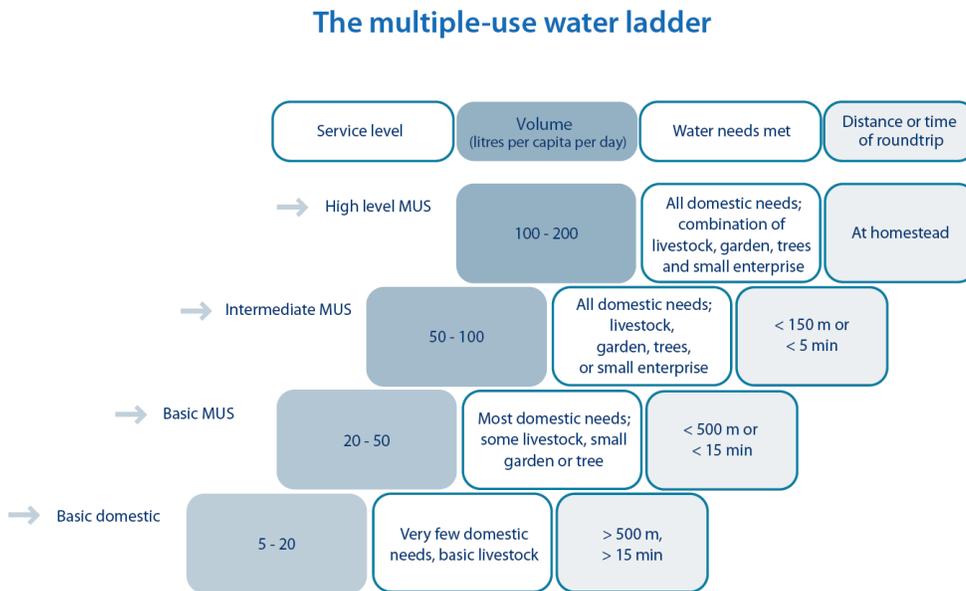
3.2.1 Livelihoods at homestead-scale: climbing the water ladder for more MDG per drop
CPWF-MUS confirmed that water services for multiple uses at and around homesteads are particularly important for multi-faceted livelihoods. The health, labor-alleviation and social benefits of domestic water services for women and girls in particular are well known. Animal health also improves while the time needed to herd animals is reduced. Productive activities contribute to food security and income, which, in turn promote health. Productive activities may represent an important part of people's income or food production. But even where they do not, they are of importance in diversifying people's livelihood options, reducing vulnerability or providing access to cash.

CPWF-MUS showed that the extent to which people take up productive water uses primarily depends on the level of access. Comparing water uses across sites highlighted that wherever water is available reliably and sufficiently near to a homestead (less than 3-5 minutes walk), a significant proportion of water users take up productive water uses. In rural areas, where livelihoods strongly depend on water-dependent agriculture-based activities, this proportion can be 100% and is higher than in peri-urban areas, where uptake can still be significant. Even at service levels that are below the commonly defined levels to meet 'basic domestic' needs of 20 lpcd, part of the water is used and re-used for productive uses, such as livestock, fruit-tree growing, or gardening. At higher service levels, water is disproportionately used for productive purposes. CPWF-

MUS case studies underline how homestead-scale MUS has a unique potential for intensifying production because it frees up the labour and recycles water and nutrients.

The fact that widespread productive uses flourish wherever water is available confirms that the water services ladder that is commonly used in the domestic sub-sector would reflect people’s water uses better if productive uses were included (see Figure 2). In the CPWF-MUS project, water uses at the foot of such a ‘multiple-use water ladder’ and related service levels between 20 and 50 lpcd were called ‘basic MUS’; between 50-100 lpcd, ‘intermediate MUS’ and above 100 lpcd, ‘high MUS’. So when water service levels provide access to 50-100 lpcd (or more), productive uses become substantial. This evidence makes the multiple-use water ladder a valid planning tool for the water sector. The livelihoods impact of water services can be considerably enhanced by allowing water users to climb the multiple-use water ladder. Out of the quantities made available, at least 3 lpcd should be safe for drinking at all steps on the ladder. As found in some case studies, communities preferred access to more water over access to a smaller quantity of high-quality water.

Figure 2. The multiple-use water ladder



CPWF-MUS also confirmed the expectation that homestead-scale MUS is a particularly powerful untapped potential for multi-faceted poverty alleviation and gender equity that can reach out to all the rural and peri-urban poor. All eight MDGs stipulate key dimensions of wellbeing that are addressed directly or indirectly through homestead-scale MUS. Critically, moreover, homestead-scale MUS is the only way of using water that can categorically reach the peri-urban and rural poor, including youth-headed households. For them the homestead is often the only site to which they have access for undertaking water-dependent productive activities on their own account. Sick people often lack the ability to work elsewhere. There is a similar untapped opportunity of *a priori* inclusion for the MDGs related to gender. Homestead-scale MUS not only meets domestic water needs but tends to give women a greater say over productive activities at home than elsewhere. It can be hypothesized that homestead-scale MUS is the best way of using water for productive self-employment that intrinsically and categorically includes the poor and women. In that case, homestead-scale MUS potentially has the highest ‘MDG per drop’. But this supposes that MUS successfully reaches the poor – which remains a major challenge to be addressed in community-scale MUS.

3.2.2 *Livelihoods at community-scale*

In a full-fledged 'community-scale MUS' model, the livelihoods of community members become the driver of water services. People are the entry point for service delivery that considers all water uses, sites, technologies and institutions. Water services are provided through facilitated participatory planning processes in which support agencies come to the table with a menu, from which communities can choose options that they re-assemble and extend according to their own priorities. In this model, the community in concert with service providers matches available budgets and other resources to their priority plans. Support by service providers is coordinated to respond to this demand.

One key livelihood issue for service delivery at community-scale regards the intra-community allocation of public support: whose livelihoods are to be improved? Whose preferences are followed in selecting sites of use and uses? Are there options for differential service delivery so that those who can pay, do pay? The importance of such intra-community allocation of external resources for water development for inclusion (or, in its absence, exclusion) of the poor and women cannot be overemphasized. In a genuine and inclusive participatory planning process for community-scale MUS in largely unserved communities, women, the poor and the sick may well prioritize homestead-scale MUS over field irrigation, which, inevitably only benefits part of the community. This warrants procedures in which the voices of all women and the poor are articulated and in which both men and women recognize the importance of domestic water uses.

Water is only one factor contributing to livelihoods, albeit a profoundly important one. Indeed, water is likely to be the limiting factor according to the CPWF-MUS finding that wherever water was available in and around homesteads, it was taken up by a significant proportion of the community. Nevertheless, health and sanitation education, agronomic knowledge about soil moisture retention and nutrients recycling, market linkages, veterinary services, and many other things are critical to enhance the productivity and benefits of water use. Expertise about how to turn water use into livelihood benefits is sector-based. This aspect of sector-based approaches remains equally meaningful in MUS. Sectoral divides are counterproductive for all the principles to do with the integrated resource of water. Overcoming those divisions either by expanding services provision or pooling efforts with others opens new potential for better service delivery, which can also affect overall costs.

3.3 Water resources

MUS requires the sustainable availability of water resources. CPWF-MUS found several advantages in an integrated perspective for water resources compared to single use perspectives. Water is, literally, a pooled resource. CPWF-MUS confirmed how various water sources were used in an integrated manner through e.g., groundwater recharge, conjunctive groundwater-surface water uses, and considering upstream-downstream linkages.

Several CPWF-MUS cases at homestead- and community-scale, found that considering multiple sources opened the possibility of combining water resources to enhance volumes made available according to natural water variability. Specific water sources were used for specific uses, e.g. using rooftop water for drinking because of its higher quality. In this way, multiple uses allowed efficient complementarities and increased community resilience.

An integrated perspective also led to re-use of waste and nutrients and to water treatment at the most appropriate scale, in peri-urban as well as in rural areas.

A third advantage was that as competition for water resources grew, an integrated perspective of all sources and uses gave a better insight into the distribution of water uses among users. At homestead-scale, different adults may have different priorities – an issue not studied in-depth in CPWF-MUS. At community-scale, CPWF-MUS found that

quantities for domestic use are usually negligible compared to what is needed to irrigate large plots. So doubling or tripling quantities to achieve intermediate- or high-scale homestead MUS still requires relatively limited water resources. Such overviews can inform decision-making about equitable distribution and guide decision-making about where water savings, for example by curtailing sugarcane irrigation or repairing leakages, would free up most water.

3.4 Technologies

3.4.1 Homestead-scale MUS

A range of technologies already exists to provide different levels of access (both in terms of quantity and quality) for homestead-scale MUS. None of these technologies is new. Small incremental changes or new combinations are all that is needed. For homestead-scale MUS to take place at significant level, technologies need to provide at least 50-100 lpcd. The CPWF-MUS cases showed that this can be achieved through on-site technologies like homestead wells, boreholes, rainwater and run-off harvesting and storage. Communal systems that channel water to well-sited public taps or house connections also allow this level of MUS. However, communal single-access points, such as boreholes with handpumps or village reservoirs, are usually too distant for homestead-scale MUS. These can still provide access for communal productive activities, such as a community garden or cattle trough.

CPWF-MUS analyzed various technological options to safeguard the quality of at least 3 lpcd for drinking, realizing that there is no need to provide high-quality water for uses that do not require such quality. Different options for treatment at different levels (point of use or central treatment or separate systems) have various advantages and disadvantages.

3.4.2 Community-scale MUS

From the perspective of the conventional domestic or irrigation systems, which starts from water uses at one particular site, technologies become slightly larger (e.g. for higher discharges) and slightly more complicated (e.g. washing steps). However, CPWF-MUS found that when there are overlapping communal surface systems and interlinked natural surface water bodies for multiple sites, the technical design from a MUS perspective becomes more efficient at community-scale. An integrated perspective at community-scale allowed the reality of multiple water sources, whether natural or human-made, to be fully exploited, using the most appropriate source. In planning incremental improvements that take a holistic view of the current situation, existing infrastructure can be incorporated as sunk costs, even if designed for another use. This avoids yet another isolated layer of infrastructure. Bulk infrastructure such as intakes, storage, and large conveyance systems to multiple sites were shared, which led to important economies of scale. Damage to infrastructure from unplanned use was avoided. Add-ons were not needed because they became full part of the community-scale design. Water treatment technologies were applied at the most appropriate scale.

In various CPWF-MUS cases, these advantages could be exploited once it was realized that everybody dealt with the same water resources, technological solutions, and people. Water resources and water technologies were recognized to be 'use-neutral'. The only real difference appears to be a matter of scale, where the domestic sub-sector is better used to smaller scales while the productive sub-sectors are more accustomed to larger scales. It was also realized that service providers differed in their preferred sites of use, related to their sector mandate. Neither sub-sector recognized the homestead as a potential site for productive uses. Once this site issue was overcome, sectoral differences in infrastructure development faded away.

In assessing potential advantages of MUS compared to single-use approaches in the development of technology, the question is: compared to what? Technology

developments for the higher discharges required for homestead-scale MUS are somewhat more complex, although smart combinations of water sources can be exploited. This picture changes at the community-scale for communal systems, where new efficiencies open up. Here, multiple sources can be combined, economies of scale are used in sharing intakes, storage, and conveyance, and existing infrastructure is integrated as sunk costs. Integrating technology design and pooling engineering skills and equipment across sub-sectors unlocks these opportunities. The main difference in the development of technology by sub-sector is a matter of scale and where the end use takes place.

3.5 Institutions

Institutions cover the organization and rules for the planning, design, construction, and operation and maintenance of communal infrastructure, and, where needed under growing competition, the sharing of water resources. For technologies that are used on-site by households, there are no management complexities, but this is different for communal systems. Problems of leadership, book-keeping, rule setting and enforcement, cost recovery, and the need for post-construction support are well known in both 'domestic' and 'irrigation' systems. In fact, the complexities are quite similar for user associations with comparable numbers of members, whether for irrigation or homestead-scale uses.

Acknowledging and promoting multiple uses by multiple users and participatory community-scale MUS may seem to add to this institutional complexity. It is true that managing a differentiated demand may be more difficult. However, CPWF-MUS case studies also found opposite trends. First, the people with multiple needs are individuals with multiple interests in one or more systems. Single-use approaches artificially split up people's interests, as they do for integrated water resources and technologies. Second, *de facto* multiple uses already exist. By making these existing practices transparent, systems become more manageable. This holds even more for various overlapping systems. As the better-off tend to use more water for multiple uses, such transparency especially benefits the poor. Third, managerial issues can be discussed upfront and influence the crafting of institutions and even the choice of technology with its related managerial requirements. Communities can develop tariff systems that accommodate multiple uses, such as volumetric pricing, block tariff systems and cross-subsidies, as was found in some CPWF-MUS case studies. Fourth, in a participatory process, existing community institutions can become involved and the social capital of communities can be further developed. For communities, multiple uses from multiple sources is a daily fact-of-life. Local governance rules have developed on many managerial issues like priorities of use, dealing with prior claims to water based on investments made, etc. Well-anchored institutions are essential for sustainability and rule enforcement in water user associations.

Lastly, with growing competition for water within one system and between systems at community-level, e.g. during the dry season, a MUS perspective also allows a clear articulation of the issues at stake. After exhausting solutions for water saving, allocation of water resources becomes a matter of prioritization in a zero-sum game. In several CPWF-MUS cases, an integrated overview revealed the phenomenon that few users consume large quantities of water, while others cannot even get enough for basic or intermediate MUS. More equitable rules can be conceived and enforced, e.g. to promote 'some for all', before 'most for a few'.

In sum, multiple uses from multiple sources is obvious for users and embedded in their institutions. Explicitly acknowledging this, allows the management of communal water systems to be strengthened. When it comes to community decision-making on water sharing, clarity about all uses by all users is especially in the interests of the marginalized whose productive water uses are relatively small and whose power to negotiate a fair share is likewise small.

3.6 Financing

This principle has two aspects: what are the benefits and costs of MUS and how can the costs be financed?

Compared to conventional domestic services, homestead-scale MUS has the benefit that people's domestic *and* productive needs are met, including not only better health and less time spent on domestic chores, but also greater food security, and higher incomes. Investment costs are slightly higher, but the potential income gained from productive water uses, which were estimated at US\$ 100-500 per year (or US\$ 0.7-2 per m³), still implies favorable benefit-cost ratios. Investments made to climb to intermediate MUS can often be repaid within 6-36 months. This calculation does not include potential efficiencies from water and nutrient re-cycling in integrated farming at homesteads and the smart use of multiple sources.

For community-scale MUS with interlinked water sources and communal systems, no specific benefit-cost calculations were made, but the potential for greater efficiencies are likely to improve the benefit-cost ratios compared to an intervention by a single sub-sector. The improvement in benefit-cost ratio would probably be even higher if the resources for infrastructure and institutional development from different sub-sectors could be put together to design better communal infrastructure and better water user institutions for considerably more benefits from multiple water uses at different sites.

In community-scale MUS, communal technology development would improve its benefit-cost ratio by:

- Combining the use and re-use of multiple sources;
- Integrating existing infrastructure as sunk costs;
- Achieving economies of scale by sharing bulk infrastructure;
- Applying water treatment technologies at the most appropriate scale; and
- Avoiding damage because of unplanned *de facto* multiple uses of single-use planned systems.

Institutional development at community-scale would provide better services for certain costs by:

- Recognizing the holistic needs of the institutional players and triggering more commitment;
- Rendering *de facto* and planned multiple uses transparent from the onset, so that multiple uses can be better managed without being disturbed by 'illegal' use of single-use design;
- Incorporating the social capital of communities to manage water from multiple sources for multiple uses; and
- Systematically allowing the option of homestead-scale MUS for productive uses, especially to the poor and to women, to contribute to reaching the MDGs.

These indications exclude the costs needed for the participatory and inclusive planning processes and technology choice that are at the heart of community-scale MUS. As participatory planning procedures for community-scale MUS are still rare, the costs and cost savings are not known.

Last but not least, all these untapped potentials are known to contribute to the sustainability of systems and benefits. Hence, it is concluded that the cost-benefit ratios of homestead-scale and community-scale MUS are likely to be quite favorable compared to other investments in water for livelihoods.

With regard to the second question on how to finance homestead-scale MUS compared to conventional investments in domestic systems, it was calculated that income from productive activities can recover the system construction and operational costs.

However, cost recovery was hardly ever applied in the CPWF-MUS cases. In most cases, communities at best contributed a small percentage of investment costs. There were some notable exceptions of users' self-supply in which investments in homestead-scale MUS were entirely self-financed. This aligns with communal irrigation systems, where income generation is the goal but where hardware also tends to be partially, if not fully subsidized, with users expected to take responsibility for operation and maintenance.

In nearly all CPWF-MUS case studies, users were responsible for covering operation and maintenance costs. No clear evidence was found that users actually did cover these costs any better than they did for conventional domestic systems, possibly due to the numerous problems that communities face managing their systems.

4 Results, discussion, conclusions: creating a supportive environment for scaling up MUS at intermediate, national and global levels

4.1 Water service provider groups

In all eight countries, CPWF-MUS tried to scale up the MUS models which were being pilot-tested or studied, at intermediate, national and global levels through newly forged learning alliances. As detailed in annex B, water users and professionals from a total of 150 institutes actively participated in the learning alliances. Besides awareness raising about the MUS models, efforts were undertaken to replicate these models at scale. Such replication warrants institutional reform towards a supportive environment for service delivery for homestead- and community-scale MUS that would reach everybody, including the poor. In some cases the efforts of the learning alliances led to changes in policies and practices even within the limited time and resources of the CPWF-MUS project. In all learning alliances, new insights were generated.

According to the above-mentioned MUS conceptual framework (see Figure 1), the creation of a supportive environment at intermediate level was expected to require:

- Participatory planning approaches in which existing infrastructure and institutions are assessed and incorporated in the design; genuine water needs and priorities are articulated for any use at any site; heterogeneity is addressed to ensure inclusion of marginalized people; information is provided on technology options with institutional and financial requirements and choices are left to communities.
- Coordinated long-term support to meet people's multiple water needs and ensure sustainability of systems over time. This encompasses technical, institutional, and financial support (which can be pooled across projects and sub-sectors) and support to turn water use into livelihood benefits (which is use- and sector-specific).
- Strategic planning for scaling up so that MUS is mainstreamed across the water sector to reach, ultimately, everybody.

At national level, there should be:

- Enabling policies and laws, which seek to use water for livelihoods and poverty alleviation, and remove those aspects of sectoral approaches that are counterproductive and that hamper meeting people's needs, while maintaining the merits of sector specialization.
- Decentralized long-term financial, technical, and institutional support to enable intermediate-level service providers to provide locally appropriate and coordinated support.

In the supportive environment for water services, a range of water service provider groups can be active: users, NGOs, the domestic and productive sub-sectors, local government and knowledge centers. Interestingly, strategies to realize each of these principles appeared to vary considerably for each water service provider group, as the starting points and related opportunities and obstacles were different. CPWF-MUS encompassed all these service provider groups and in the different countries one or more

different key partners drove the learning alliances. Hence, experiences on strategies for scaling up were gained for all main water service provider groups. This allowed identifying the following generic lessons on how to contribute to a supportive environment for MUS at scale, depending on the different starting points of the different water service provider groups. While the pathways to offer MUS differed for the various service provider groups, surprisingly little appeared as an obstacle for any service provider group to adopt community-scale MUS and homestead-scale MUS, once sectoral mindsets were overcome. For all service providers, moving to MUS better matched clients' multiple water needs and the integrated nature of water. For a detailed description of the learning alliance events in each country, see Butterworth et al., 2009.

4.2 Users, user associations and local service providers

Within the water user groups, considerable initiative for self-help MUS at homestead- and community-scale was found. As manifest in *de facto* multiple uses, communities seek to meet multiple needs from multiple sources. Users have aspirations and plans for incremental improvements in water access for multiple uses. Local providers can meet those needs to some extent. Grassroots water user movements can deploy great creativity and organizational skills for innovation and scaling up homestead-scale MUS on a largely voluntary basis. However, users on their own, certainly the poor, lack finances and technical and organizational skills to improve their access to water to levels that also accommodate population growth and respond to technological and market opportunities.

In seeking collaboration, users were found to search proactively for external support and re-assemble the various components on offer to fit their local integrated needs. Users are the driving force to integrate fragmented support. However, the poor and other marginalized groups risk being excluded from this self-initiated search for support and need to be explicitly targeted by service providers. Collaboration with user groups according to their needs is at the heart of MUS.

4.3 NGOs

NGOs were innovators for MUS even before CPWF-MUS. Participatory approaches, a livelihood focus and relative independence in dealing with sector boundaries all encourage NGOs to provide the coordinated support required for MUS. NGOs and donor agencies are pioneers in holistic participatory planning processes for MUS, a field with limited expertise. International NGOs play an important role in global scaling up. The weakness of NGOs is that they are often area-specific without a mandate to reach everyone. They may also depart at some stage, leaving systems without after-care. In the end, their accountability remains upwards to their funders and their support remains tied to specific conditions and planning cycles. In very poor areas, they may dominate even governmental structures. In order to overcome these weaknesses, NGO partners in CPWF-MUS proactively collaborated with local government on a range of issues, including identification of potential beneficiary villages; transparent and equitable allocation of public resources; ensuring long-term support after project closure; mobilizing technical and institutional support from government; collaboration with other local agencies; and scaling up of successful innovations like MUS at district and higher aggregate levels.

4.4 Domestic sub-sector agencies

National, bilateral and international governmental institutions and programs that focus on water provision for domestic uses and sanitation have considerable resources with the mandate to provide everyone with these services. They thus have a key strength for scaling up because of their presence, their financial and human resources for implementation, and their role in policy, norm setting and support for decentralization. They also play a key role in providing long-term support for communities.

However, they also have serious limitations for enabling MUS, mainly in the field of norms and standards and in their specific single-use mandate. Where supply norms are defined at the basic domestic level, public investments cannot easily provide the higher required service levels. Even where service levels can meet the need for intermediate or high MUS, a rigid norm may stipulate that domestic systems can only be used for domestic uses. Another norm concerns water quality. In many countries, agencies try to ensure that all the water supplied is of potable quality. This may limit productive uses. The cases have shown that users give priority to using water for productive purposes. There are various ways in which this issue can be dealt with, balancing the need for some safe water with the possibility of using lesser-quality water for production.

At community scale, the domestic sub-sector tends to maintain its single-use mandate for communal systems. Yet, CPWF-MUS learning alliances showed that moving up to community-scale MUS was feasible and opened up new opportunities. Domestic agencies used to run stand-alone programs, but they increasingly work through local government in a global move towards decentralizing government support. This improves accountability downwards and sustainability, which supports the implementation of MUS. There is also some collaboration with NGOs, but little collaboration with the productive sub-sectors.

4.5 Productive sub-sector agencies

The various productive sub-sector agencies tend to operate on-site with individual technologies or at community scale for communal technologies and water resources management. They also provide support on how to use water productively. This is the case for irrigation, soil conservation, fisheries, livestock, forestry, village reservoirs, enterprises, hydro-power, navigation, and watershed management. The focus is typically on fields (and increasingly on fish-crop systems) and on open access to water (for multiple uses) rather than on homesteads. Efforts are also undertaken to reach small-scale farmers and women, in particular through appropriate technologies for small-scale food production and national food security. However, unlike the domestic sub-sector, there is no clear aspiration to reach everybody.

Collaboration with local government has been limited, but is increasing in particular by attaching technicians to district or provincial government. However, large-scale governmental productive water-use projects tend to have their own vertical structures. There are also many sustainability problems stemming from project closure or the devolvement of management to user associations.

The productive sub-sectors are already engaged in multiple direct uses of open water in community-scale infrastructure and storage. The sub-sectors' engineering expertise for developing and managing larger quantities of water and their expertise on how to get more produce and income out of productive water uses remain this sector's unique contribution. Adopting community-scale MUS would open up new advantages, including pooling engineering and managerial support. If people prioritize homestead-scale MUS, such choice should be respected by the productive sub-sectors as well. This would mainstream the domestic sub-sector's priority for domestic uses into the entire water sector. Thus, the productive sub-sectors can immediately adopt MUS by including the homestead as a hitherto overlooked site of production.

4.6 Local government

All three professional water service provider groups (NGOs, the domestic sub-sector and productive sub-sectors) would greatly benefit from a better interface with communities through which support can be provided. Such improvement is especially needed to ensure accountability of service providers downwards (a key condition for sustainability of services), and for full exploitation of local knowledge. This would also provide an avenue for transparency in the allocation of public resources, pooling resources in cash,

kind and technical resources from communities and other service providers, and for tapping economies of scale in service provision. Last but not least, such an interface needs to be sustainable over time so that the many post-construction issues that seriously threaten the sustainability of systems can be addressed (such as spare parts, cost-recovery enforcement and conflict resolution). In the rare 'luxury' cases where several agencies from any sector 'compete' with each other to provide services to the same beneficiaries, pooling resources for infrastructure development and management allows them to deliver better services together than the sum of the services that each agency can deliver alone.

Local government has the mandate for such role. Fulfilling that role would institutionalize participatory planning, ensuring that each community could get the coordinated long-term support it needs, and ensure that all the fragmented components of support on offer at intermediate level were brought together strategically and efficiently, with a long-term perspective, instead of the ad-hoc crisis management that many local government officials face today. Local government needs to be supported and empowered to fulfill such role. This requires national and global level agencies to support intermediate-level players in their overall mission to bring rural development and poverty alleviation, and avoid politicization. Decision-making about the support that is needed and how to pull it together needs to be decentralized. A first step for such empowerment is the removal of artificial conditions that burden local government with bureaucratic tasks and block opportunities for integrated service delivery. Notions of separate 'domestic' water and 'productive' water and technologies create such artificial and counterproductive conditions.

4.7 Knowledge centers

The knowledge centers in the CPWF-MUS project (IWMI, IRC, Khon Kaen University Thailand, Cinara Colombia, Centro Agua Bolivia, Mekelle University Ethiopia, and the Challenge Program on Water and Food) had a critical role, and continue to have that role, in innovating and scaling up MUS. They brought expertise and resources for conceptualizing MUS as a generic and globally valid thing; analyzing, reporting and providing feedback to communities through case studies; structuring knowledge generation through a common framework; and comparing results for generic conclusions. Conceptualizing and naming existing practices of multiple uses from multiple sources and identifying untapped potentials of service provision to that end strengthened the legitimacy of MUS across the globe, not least among those who were already working on MUS. The fact that CPWF-MUS was a global project further underscored the generic validity and, hence, legitimacy of MUS.

Knowledge centers also supported the implementing partners in CPWF-MUS. Through the jointly developed MUS conceptual framework, all CPWF-MUS partners focused on similar issues of 'how to' implement and scale up MUS. Implementing agencies have in-depth knowledge and skills to realize principles and bring about an impact on livelihoods. However, they often lack the time and sometimes also the skills to reflect, analyze, and document this knowledge. Researchers helped to draw out and make this knowledge explicit.

Knowledge centers facilitated the learning alliances and mediated among members, and also mediated vertically between communities and authorities. The documentation of learning processes is complex and time-consuming and requires analytical and writing skills that knowledge centers can bring.

Communities in the CPWF-MUS sites not only benefited from their multiple-use systems but also from the feedback they received from knowledge centers. Some communities solicited technical support from knowledge centers, such as Khon Kaen University in Thailand.

A total of 37 M.Sc. students also participated in CPWF-MUS, and MUS curriculums were developed by Centro-Agua and CINARA. By these means, new insights are transferred to the next generation of professionals.

Knowledge centers engaged in policy dialogue, networking and dissemination with intermediate, national and global level policy makers, financing agencies, implementers and academia. This dialogue was about MUS concepts, the legitimacy of MUS, the validity of field-tested generic solutions and policy recommendations for implementation. As a global project, CPWF-MUS aimed at influencing debates and practices at the highest tier of a supportive environment for MUS: the global level.

4.8 Global dialogue

Last but not least, without calling it a 'global learning alliance', CPWF-MUS also aimed at contributing to the creation of a sustainable critical mass among global stakeholders that could change policies and practices towards MUS. Global financing agencies, donors, UN bodies, international NGOs and research institutes, and professional networks are highly influential but often reproduce sectoral boundaries in a top-down manner. The main thrust of CPWF-MUS global activities was to raise awareness and interest in MUS and its untapped potential. Perhaps the greatest impact of CPWF-MUS has been that a global vocabulary and common language is emerging to name the most common features of 'MUS', *de facto* multiple uses of single-use designed systems, domestic-plus, irrigation-plus, homestead-scale MUS and community-scale MUS⁴.

The creation of a critical mass requires relationships beyond the time-bound CPWF-MUS project. Most partners of CPWF-MUS became members of a permanent network of professionals: the MUS Group. This network has over 300 members from both the domestic and productive sub-sectors. It has a core membership including ODI (Overseas Development Institute), IWMI, PumpAid, WEDC (Water, Engineering and Development Centre), Cinara, Plan International, Winrock International, SEI, Rain Foundation, World Fish Center, IFAD, and IRC, which hosts the secretariat. The Group acts both as a think-tank and advocacy and dissemination platform. It (co)organizes events at international events, organizes regular meetings of its membership and provides information products such as a newsletter and website. In 2008, the MUS Group organized with the RiPPLE project a Global Symposium for taking stock of achievements and challenges after five years work on MUS (www.musgroup.net).

Strategic partnerships were forged by convening a session on MUS during the 4th World Water Forum in Mexico in 2006, in which local actions and emerging generic conclusions were presented. The Technical Committee of the Global Water Partnership was a co-convenor. The expert panel consisted of representatives of the Water and Sanitation Program of the World Bank (WSP), International Committee for Irrigation and Drainage, African Development Bank, Winrock International, and government officials from Colombia and South Africa. This highlighted how various agencies have committed themselves to MUS. For example, the coordinator of the Water and Sanitation Program compared the shift towards MUS in the domestic sector with the changes in the 1980s when, once and forever, sanitation became part and parcel of domestic water supply provision. The synthesis report of the World Water Forum endorsed the recommendations from this topic session by stating "In an integrated 'multiple-use water services approach' people's multiple domestic and productive water needs are taken as a starting point and the sector-barriers within the water sector are dissolved. This form of Integrated Water Resources Management, at the level of the household or the

⁴ The different entry points in each country also led to somewhat different interpretations of what 'MUS' is. For example, in Colombia where *de facto* multiple uses of 'domestic' systems were studied, the term 'servicos' is avoided because this refers to formal taxable commercial activities. Given the informal character of small-scale water uses, the learning alliance refers to 'Systemas' and 'Usos Múltiples del Agua' as translation of 'MUS'. In Thailand, where homestead cultivation for economic self sufficiency was the entry point, multiple sources are obvious. In Nepal and India, affordable technologies for efficient productive water use were the entry point.

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community or a number of communities, is a highly appropriate and cost-effective way to contribute to achieving the Millennium Development Goals” (Martinez and Van Hofwegen (eds), 2006).

The partnerships had become much broader by the time of the 5th World Water Forum in Istanbul in 2009. The Topic Session on MUS was convened by FAO as the chair of UN Water in collaboration with the MUS Group, IFAD, the International Network of Water and Ecosystems in Paddy Fields, IWMI, and CPWF-MUS. Relationships strengthened with, for example, the Asian Development Bank and the Dutch Ministry of International Cooperation.

To conclude, knowledge and perceptions are shaped by paradigms. CPWF-MUS has highlighted multiple uses and multiple sources as the main paradigm for water users. It has also elaborated many aspects of MUS as a paradigm shift for most professional service providers. It has shown how a shift in perception unlocks new potential for better water services, especially in the light of the MDGs. Through CPWF-MUS and other global stakeholders, improvements as a result of this paradigm shift have started to be proven empirically. This fully justifies implementation of MUS at much larger scale for the further exploration and realization of its untapped potential.

5 Outcomes and impacts

Although it is difficult to attribute impacts, the foregoing highlighted how CPWF-MUS partners actively engaged in a growing number of initiatives across the water sector that together put MUS on the radars of a range of professional networks, development and financing organizations, and research institutions from the domestic and productive sub-sectors and general rural development agencies.

At community level, 7831 households were studied that used water for multiple uses, either 'illegally' in existing single-use systems or in systems planned for multiple uses and implemented with the support of CPWF. These households derived multi-faceted benefits: health, labor alleviation, food security, and income, greater resilience against shocks, extreme droughts and floods and fluctuations in food prices, employment opportunities and markets. Household net incomes increased on average with USD100-500 per year. As women tend to have a stronger say over homestead production, they gained in particular, besides benefiting from lesser domestic chores. Wherever poor and youth-headed households or the sick and disabled were reached, MUS enabled them to take up nearby productive activities. Thus, CPWF-MUS contributed directly and indirectly to achieving all MDGs.

This impact is not a once-off event; its scaling up was strategically pursued. At national levels MUS has been taken forward, also beyond the project period, in:

- **Ethiopia.** In collaboration with ODI, with involvement of IRC and IWMI, the RiPPLE (Research-inspired Policy and Practice Learning in Ethiopia and the Nile Region) Project (www.rippleethiopia.org) has been initiated. This project is hosted by the local partner of CRS in Dire Dawa who formerly collaborated with CPWF-MUS. In 2009, MUS has been recommended in the national accelerated Universal Access Plan.
- **Nepal.** National scaling up of MUS keeps gaining momentum in Nepal. NGOs in the domestic sub-sector, like NEWAH, promote productive uses of conventional 'domestic' systems. The Asian Development Bank and Japanese International Cooperation Agency have taken up MUS linked to micro-irrigation technologies. Finland directly supports local government in implementing MUS, which include micro-scale hydropower. Perhaps most significantly, central government adjusted its policy to allow district-level agencies to receive and spend central funding for MUS.
- **Zimbabwe.** Various NGOs continue the dissemination of household technologies that allow for multiple uses and obtain funding by including a multiple-use perspective.
- **Colombia.** CPWF-MUS partner Cinara won an award for pilot social housing designs that included rainwater and grey-water use for small-scale productive activities. At national level, debates were initiated about national design and water quality norms. Funding was obtained from the government of Colombia for action research on Integrated Water Resources Management. The Water and Sanitation Program (supported by the World Bank) also commissioned a survey on MUS in Colombia in collaboration with Stanford University. Further, Cinara translated the synthesis book in Spanish for distribution in Latin America.
- **Thailand.** The Farmer Wisdom Network continues expanding with support from highest government levels to implement the national policy of economic sufficiency. The interests of small-scale users' homestead-scale multiple water uses are sought to be integrated in the new national water legislation.
- **South Africa.** The Bushbuckridge municipality included the plan developed under CPWF-MUS in its Integrated Development Plan. Partner AWARD secured funding for continued pilot testing and outscaling, and for the technical aspects of engineering

design and implementation. The district mayor committed himself to support scaling up the same methodology in his other municipalities. The involvement of high-level water officials is envisaged in these further pilots at larger scales. The debates on other policy measures, such as raising the service levels for Free Basic Water to 50 lpcd and widening up the earmarks attached to Municipal Infrastructure Grants continue (DWAF 2007). Research on MUS has also been taken up by the Water Research Commission (Main and Naidoo 2008).

At global level, the following outcomes and impacts were achieved:

- **Follow-up by professional networks and organizations.**
 - The Challenge Program on Water and Food itself takes MUS forward as a topic for its second phase.
 - The global MUS Group was strengthened by the inputs from the CPWF-MUS project. The Water Supply and Sanitation Collaborative Council, FAO and CPWF provide financial support to the MUS Group.
 - MUS sessions were organized at the Stockholm Water Weeks of 2006 and 2007 and at the World Water Forum 4 in Mexico and World Water Forum 5 in Istanbul.
 - The Comprehensive Assessment of Water Management in Agriculture referred to MUS. This multi-institute assessment of the past 50 years of water development, current challenges and solutions recommends “multiple-use systems - operated for domestic use, crop production, aquaculture, agroforestry, and livestock as one of new stimulating ideas on how to manage water resources to meet the growing needs for agricultural products, to help reduce poverty and food insecurity, and to contribute to environmental sustainability” (Molden (ed), 2007).
 - The Global Water Partnership, opinion leader on Integrated Water Resources Management, issued a policy brief on MUS in collaboration with CPWF-MUS and IRC (IWMI/IRC/GWP, 2007).
 - The International Committee of Irrigation and Drainage included ‘MUS’ in its Poverty Task Force. IFAD highlights MUS in its gender strategy (Wahaj, 2007)
 - FAO, in collaboration with IFAD, promotes MUS in its report on poverty and water (Faurès and Santini, 2008).
 - UNICEF, through Winrock International, provides support for implementing MUS at scale in India.
 - Universities, such as the University of Zurich, take up multiple uses in their curriculums.

Thus, within the past years, the global environment has become considerably more aware of and supportive of the potential merits of MUS.

5.1 Proforma

Summary Description of the Project’s Main Impact Pathways

Actor or actors who have changed at least partly due to project activities	What is their change in practice? I.e., what are they now doing differently?	What are the changes in knowledge, attitude and skills that helped bring this change about?	What were the project strategies that contributed to the change? What research outputs were involved (if any)?	Please quantify the change(s) as far as possible
Water users, especially women	Expanded their multiple uses of 'domestic' systems or newly planned multiple-use systems for multi-faceted livelihood benefits	<ul style="list-style-type: none"> • Becoming beneficiaries of pilot multiple-use systems • Greater legitimacy of de facto and planned multiple uses by global science. • New options for dialogue with intermediate and national policy makers and implementer and scaling up of own innovations 	<ul style="list-style-type: none"> • Identifying an untapped development potential and designing two-pronged action-research to corroborate and realize that vision • Designing the project for (a) replicable innovation on the ground, which, in turn, is used as convincing message for (b) scaling up through learning alliances • Innovating through 'learning by doing' for implementing and scaling up MUS 	<ul style="list-style-type: none"> • 7831 beneficiary households in 30 sites • Number of beneficiaries will become at least five-fold by 2014 through 150 current learning alliance institutes and dozens of global organizations and MUS Group
<ul style="list-style-type: none"> • Intermediate- and national-level learning alliance members (policy makers, technicians, implementers , private service providers, knowledge centers, NGOs, CBOs, etc) • International policy makers and professional networks 	<ul style="list-style-type: none"> • Changed their ideas and own practices • Engaged in awareness raising, advocacy, and concrete support for scaling up • Ensured follow-up activities beyond the project life. 	<ul style="list-style-type: none"> • Seeing a solution to better perform service delivery for livelihoods improvements • Greater awareness of users' practices and needs • Greater legitimacy of de facto and planned multiple uses by support from global science. • New options for dialogue with national policy and scaling up of own innovations 	<ul style="list-style-type: none"> • Supporting intermediate-level implementing agencies by conceptualizing, analyzing, training, awareness raising, documenting and publishing • Creating sustainable strategic partnerships with national and global stakeholders and MUS Group • Factual scaling up by awareness raising and capacity building through exposure to MUS models on the ground and facilitating dialogue at intermediate, national and global levels • Website, fliers, posters, besides international publications 	<ul style="list-style-type: none"> • 150 institutes were active members of the learning alliances. • Many more were reached at national and global level, also through the MUS Group • Public support to MUS by global players (CPWF, GWP, Comprehensive Assessment, WWF4, WWF5, ICID, SEI, FAO, IFAD, WSSCC, etc) • Growing support for MUS Group • Curriculum development in 3 universities

Of the changes listed above, which have the greatest potential to be adopted and have impact? What might the potential be on the ultimate beneficiaries?

CPWF's Second Phase with MUS as a Topic and stronger collaboration with the MUS Group offer an important potential to further expand the momentum. However, strong interaction and common methodology development is needed to ensure that the diverse initiatives apply a similar methodology, for deriving rigorous generic lessons that a global comparison can potentially provide. For factual livelihood impacts, much will depend on the collaboration between water users, implementing agencies and researchers (who can support implementation but are usually not sufficiently skilled in bringing about change on the ground).

More collaboration with the ultimate target group of **water users** and CBOs and grassroots movements on homestead-scale and community-scale MUS is warranted for meeting their needs; moreover, much can be learnt because multiple uses from multiple sources are daily reality for them.

For **implementers**, future options will depend on financing agencies willing to invest in pilot implementation of MUS at scale. **NGOs** may be willing to undertake pilots that CPWF can monitor, evaluate, and document. The **domestic sub-sector** seems increasingly willing to recognize rather than condemn their 'hidden' returns on investments in terms of unplanned livelihood benefits. Unicef India is piloting homestead-scale MUS. Improved cost-recovery because of the income gained may appear an especially strong argument- but this has hardly been implemented as yet. Measures to safeguard the water quality of 3-5 lpcd are often still a bottleneck for professionals - even if the issues on the ground are very different. Finding such measures will be critical.

For the **productive sub-sectors**, initiatives for study and implementing MUS will probably originate from a particular sector (e.g. livestock, fisheries, agricultural water management, environmental values) or by technology (e.g. village reservoirs). Artificial technology or sector biases may continue. This can be overcome by pilot projects on **community-scale MUS**, linked to local government. CPWF may consider financing this on their own, because this offers many underexplored opportunities for almost universally replicable, sustainable and cost-saving investments in water for multiple uses. Integrated service delivery on the ground through local government, NGOs, line agencies and private service providers remains the major development challenge.

What still needs to be done to achieve this potential? Are measures in place (e.g., a new project, on-going commitments) to achieve this potential? Please describe what will happen when the project ends.

In all CPWF-MUS countries (except India) there is follow-up by various funders. Potentials to continue the momentum of the first phase activities should be fully tapped - but have often not fully been recognized in the basin priority settings.

For sound generic scientific findings it is absolutely necessary to develop rigorous generic methodologies at very short term for application across MUS studies.

Each row of the table above is an impact pathway describing how the project contributed to outcomes in a particular actor or actors.

Which of these impact pathways were unexpected (compared to expectations at the beginning of the project?). Why were they unexpected? How was the project able to take advantage of them?

At the start of the project, it took quite some debate within the project to design the

research set for both concrete livelihood impacts during the project and especially scaling up of successful MUS models. Experiences with learning alliances with IRC and CPWF Theme 2 Coordinator and an excellent facilitator for that purpose, Jurgen Hagmann, were key to take advantage of an action-oriented research design. CPWF's understanding and approval for the proposed changes was vital.

What would you do differently next time to better achieve outcomes (i.e. changes in stakeholder knowledge, attitudes, skills and practice)?

Once the design was clear, implementation was rather smooth. It would have been good to also have an end-of-project workshop for all partners involved to reflect on experiences, contribute to the synthesis, and identify future research and action needs.

6 International Public Goods

Cross-site and cross-country comparison was fully integrated in the research design from the outset, through the initial MUS framework which allowed synthesizing across the sites. The resulting MUS models, homestead-scale and community-scale MUS, and the identified pathways for the different water service provider groups to scale up MUS, are generic for any informal rural and peri-urban setting where diversified livelihood strategies, in which water is key for improved cropping, vegetable growing, livestock, forestry, fisheries, and agriculture-dependent small-scale enterprise. Hence, the above-mentioned project insights are all IPGs.

A second IPG is the project methodology. As MUS was relatively new in the early 2000s, there was no other methodological option than through learning by doing, both for planning and implementing multiple-use services and for scaling up by crafting a supportive environment at intermediate, national and global levels to provide the multiple-use services that everybody needs. The broader understanding of people's water needs was only possible because the project team consisted of professionals with a domestic and professionals with a productive water use background. All were fully committed to overcome these sectoral boundaries. Close collaboration between researchers and implementing agencies was equally indispensable. This allowed knowledge centers to learn, document, conceptualize, analyze and provide feedback, and implementers to bring about factual innovative change for livelihood improvements with extensive exposure to new insights about hitherto untapped potentials. The tool of the 'learning wheel' to focus learning across all project partners, and the tool of the learning alliances for scaling up were essential for this action-research.

7 Partnership Achievements

Partnerships within the CPWF-MUS project team (from the domestic and productive sub-sectors; researchers and implementers) and between the CPWF-MUS team and others (learning alliances in all countries; MUS Group; international forums) were at the heart of all results achieved. CPWF's invitation to create innovative partnerships and its encouragement to fully exploit the new opportunities profoundly shaped the new insights, outcomes and impacts.

8 Recommendations

8.1 Recommendations to promote MUS models

In view of the merits of MUS models identified above, it is recommended that governmental and non-governmental policy makers and implementers across the water sector, adopt a MUS approach, from whatever single-use mandate they are coming.

For homestead-scale MUS policy makers and implementers should:

- Promote homestead-scale MUS for all by ensuring that people can climb one or two more steps on the multiple-use water ladder. This implies:
 - enhancing service levels for intermediate and high level MUS to provide at least 50-100 lpcd - doubling or tripling current service levels in largely unserved areas such as sub-Saharan Africa and South Asia;
 - ensuring that at least 3 lpcd of water is safe for drinking.
- Unlock the major potential of homestead-scale MUS to contribute directly and indirectly to all MDGs by targeting the poor.
- Adopt the multiple-use water ladder as a more realistic and better planning tool for water services at and around homesteads in rural and peri-urban areas in low- and middle-income countries.

For community-scale MUS policy makers and implementers should:

- Promote community-scale MUS in any situation of communal systems and shared water sources for multiple uses at homesteads, fields or through direct access.
- Fully acknowledge that the homestead is often the preferred site for productive water uses, in particular by the poor, women and the sick.
- Conceptualize water services according to the site of multiple water uses and the scale of water development and management.
- Remove single use(s) as the structuring principle of the water sector and better distinguish sites of (multiple or single) water uses and scales of water development and management.
- Leave the decision about whether a particular water use is of primary or secondary importance to users themselves, e.g. during the allocation of public resources for water development and during negotiations for sharing water resources where there is growing competition.
- Pool technical and institutional support, while maintaining use-specific expertise on how to render water use more beneficial for water-related health, food security, and income.

8.2 Recommendations for scaling up by water service provider groups

The implementation of these recommendations at scale, so that ultimately everybody can be reached, requires innovative approaches to the supportive environment of water services delivery. The pathways of the different water service provider groups to contribute to this environment are different because their starting point differs, but all can realize homestead-scale and community-scale MUS.

For supporting water users it is recommended to:

- Recognize users as the driving force for requesting and integrating support that meets their needs and capacities, while ensuring that the marginalized are also included.
- Strengthen user innovation and organization for MUS in water user associations and CBOs.
- Support users in advocacy and in articulating their demands and proposed solutions in individual communities and at larger scales.

For NGOs, it is recommended to:

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- Continue pioneering MUS and broaden their capacity, in particular on participatory planning processes, development and dissemination of appropriate technologies and management, and national and global dialogue and advocacy on successful approaches.
- Further work towards a goal of reaching the whole community, including women and the poor.
- Collaborate with local government to align with and strengthen local planning processes and ensure the long-term institutionalization of MUS innovations with continuous support to any community and district-wide scaling up.
- Pool resources for infrastructure and management with other water agencies present in an area.
- Continue facilitating multi-stakeholder exchanges, e.g. as learning alliances.

For the domestic sub-sector, it is recommended to:

- Further pursue the goal of reaching all community members, including the poor.
- Recognize and legitimize the livelihood benefits of current de facto multiple uses of domestic systems and provides support to these communities in managing and financing these uses.
- Plan new systems or future extensions by increasing norms and standards for service levels, balancing the need to treat at least 3 lpcd water to drinking water standards with the need for more water for production.
- Move up to community-scale MUS for its various advantages and the fact that it addresses people's multiple water needs beyond homesteads.
- Strengthen collaboration with local government, and accesses expertise for productive uses.
- Pool resources with other agencies in the same area, for infrastructure and management, while providing expertise on how to enhance health benefits of water use and sanitation. Conditions tied to the sub-sector's support should reward such collaboration.

For the productive sub-sector agencies, it is recommended to:

- Adopt community-scale MUS to tap various advantages and, when communities prioritize it, include homestead-scale MUS by providing intermediate- and high-level MUS to homesteads, including those of the poor.
- Establish a similar systematic collaboration with local government as the domestic sub-sector, with the benefit of accessing expertise on water and health issues.
- Pool resources for infrastructure and management with other agencies present in the same area, while providing expertise on how to make more productive use of water. Support conditions set at higher national levels should reward such collaboration.

For local government, it is recommended to:

- Facilitate iterative participatory planning processes;
- Facilitate relationships between communities and service providers and empowering them to hold service providers directly accountable;
- Coordinate service delivery from various agencies;
- Equitably allocate available resources;
- Coordinate long-term support to communities.

NGOs can support local government in such innovation.

For knowledge centers, it is recommended to:

- Continue innovating with MUS, while maintaining expertise to enhance the benefits of water use.
- Train professionals in MUS.
- Accelerate action research through 'learning by doing' with homestead- and community-scale MUS at scale, in close collaboration with implementers.
- Facilitate learning alliances for global institutionalization of MUS.

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Appendix A: abstracts selected publications

BOOK AND CD. Van Koppen, B.; Smits, S.; Moriarty, P.; Penning de Vries, F.; Mikhail, M. and Boelee, E. (2009). *Climbing the water ladder: Multiple-use water services for poverty reduction*. Technical Paper Series 52. The Hague, The Netherlands, IRC International Water and Sanitation Centre and International Water Management Institute. www.iwmi.org www.irc.nl/publications www.waterandfood.org/publications/program-publications/joint-publications;

Book cover:

In low- and middle-income countries, people need water for drinking, personal hygiene and other domestic use. But they also use it for livestock, horticulture, irrigation, fisheries, brickmaking, and other small-scale enterprises. Multiple-use water services (MUS) are best suited to meeting people's needs. However, most water services are designed only for domestic water or only for agriculture, and fail to reflect its real-life use. The action research project 'Models for implementing multiple-use water supply systems for enhanced land and water productivity, rural livelihoods and gender equity' developed case studies in eight countries (Bolivia, Colombia, Ethiopia, India, Nepal, South Africa, Thailand and Zimbabwe) involving 150 institutions. The project analysed two models: homestead-scale and community-scale MUS and developed a 'multiple-use water ladder' to show how better livelihoods flow from increased access to water. This book shows how livelihoods act as the main driver for water services and how access to livelihoods is determined by sustainable water resources, appropriate technologies and equitable ways of managing communal systems. Climbing the water ladder requires a small fraction of total water resources, yet has the potential to help people climb out of poverty. Local government can be the pivot to make this happen. But, it needs support to implement its mandate to meet multiple-use demand and to become more accountable to people in communities.

Van Koppen, B., S. Smits and M. Mikhail (2009) Homestead- and community-scale multiple-use water services: unlocking new investment opportunities to achieve the millennium development goals: In: *Irrigation and Drainage* 58 pp 73-86

Since the early 2000s, a new participatory approach to water services delivery is emerging: multiple-use water services (MUS). By overcoming sectoral boundaries within the water sector, new opportunities are opened up that better align with people's practice of using water from multiple sources for multiple uses. Two opportunities are discussed in this paper on the basis of past research by the CGIAR Challenge Program on Water and Food, among other. One new opportunity is homestead-scale MUS. Providing double or triple the quantities of the design norms in the domestic sub-sector in poor rural and peri-urban areas allows water users to take up significant productive activities besides meeting domestic needs. Benefit-cost ratios are favourable. Homestead-scale MUS is the most effective way of using water to contribute to all Millennium Development Goals. A related second new opportunity is community-scale MUS. This participatory approach to water services considers communities' holistic water- and landscapes and supports incremental improvements in infrastructure according to people's own priorities and needs, which are often in favour homestead-scale MUS. New synergies in infrastructure intakes, storage and conveyance are tapped.

KEY WORDS: multiple-use water services, domestic water supply, irrigation, Millennium Development Goals, poverty, gender

BOOK AND CD Mikhail, M. and Yoder, R. (2008). *Multiple use water service implementation in Nepal and India : experience and lessons for scale-up*. Lakewood, USA, International Development Enterprises, Challenge Programme on Water and Food, and International Water Management Institute.

www.ideorg.org/news/MUS_book.php

Book cover:

This book explores the practical implementation of the multiple-use water services (MUS) concept in Nepal and India, focusing on community-level lessons and implications for scaling up the approach. Lessons are drawn from projects that attempted to move beyond the segregation of irrigation and domestic water systems in order to allow the poor to access water for their domestic needs as well as enable income-generating vegetable production. Water service implementers and researchers will gain knowledge from two unique MUS-models: direct NGO implementation of gravity-fed community system design in the middle hills of Nepal, and access through a large-scale government domestic water project in India. The MUS work in both countries included application of the learning alliance approach, allowing idea sharing at various levels (national/state, district, and local). These community, NGO, and government partner efforts to integrate water resource use will inspire professionals to look at village water use and service delivery in new ways.

Van Koppen, B.; Moriarty, P. and Boelee, E. (2006). *Multiple use water services to advance the Millennium Development Goals*. Colombo, Sri Lanka, International Water Management Institute. (IWMI Research Report 98).

http://www.iwmi.cgiar.org/Publications/IWMI_Research_Reports/PDF/pub098/RR98.pdf

This Research Report presents the findings of the first phase of the action-research project 'Models for implementing multiple-Use water Supply systems for enhanced land and water productivity, rural livelihoods and gender equity'. Multiple-use water services, or 'mus' in short, is a participatory, integrated, and poverty reduction focused approach in poor rural and peri-urban areas, which takes people's multiple water needs as starting point for providing integrated services, moving beyond the conventional sectoral barriers of the domestic and productive sectors. Three aspects are discussed. First, a typology is developed for the various efforts since the 1980s to overcome the short-comings of conventional single-use planning and design. Second, the empirical evidence is analyzed to identify generic merits and drawbacks of these needs-based and participatory water services provision compared to conventional approaches with regard to wellbeing; gender; ability and willingness to pay for water services; water productivity and 'more use per drop'; integrated local water management institutions; protection against illegal use; health; equitable and environmentally sustainable water allocation and protection of people's basic multiple water needs; and incremental costs. Third, a framework is provided, based on principles grouped in 'Learning Wheels' at the community, intermediate and national level. The principles represent the conditions that the project team identified as pivotal for implementing and upscaling mus approaches at larger scale. The ten principles include: service provision based on thorough understanding of water-related livelihoods; sustainable, equitable and efficient use of water resources; appropriate technologies; and inclusive institutions (at community level); adequate financing (cross-cutting all levels); adaptive and learning-based management (at intermediate level); coordination between sectors and actors; long-term support; and participatory planning (at intermediate and national level); and enabling policies and legislation (by governments at national level). Action-research guided by this framework is expected to generate better insights and better action to upscale this appropriate form of IWRM and multiple its benefits to advance the Millennium Development Goals.

Kanyoka, P., S. Farolfi and S. Morardet. (2008). *Households' preferences and willingness to pay for multiple use water services in rural areas of South Africa: An analysis based on choice modelling*. In: *Water SA Vol. 34 No. 6 (IWRM Special Edition) 2008*

http://www.wrc.org.za/publications_watersa_IWRM_spec_ed.htm

Financing of multiple use (i.e. domestic and productive) water services was identified as an important ingredient to ensure improved water access for rural poor and broaden

livelihood options in South Africa. Following the principles of integrated water resource management (IWRM), efficient, equitable and sustainable investments in improved water services should be based on a thorough understanding of actual demand by consumers. Comprehensive studies looking at multiple use water services are not common in South African rural areas, where most of the economic analyses focus on either domestic or irrigation water demand. This study aims at filling this gap by assessing the household demand for multiple use water services in Sekororo-Letsoalo area in the Limpopo Province. Choice modelling is the approach used to identify the attributes determining demand for water services and quantify their relative importance. Results show that households in rural areas are willing to pay for improvements in water services. Due to the current poor level of water services in the area, users are primarily concerned with basic domestic uses and, consequently, demand for productive uses is low. Only households already relatively well served are interested in engaging in multiple water uses.

Van Koppen, B., Smits, S., Moriarty, P. and F. Penning de Vries (2008). Community-level multiple-use water services: MUS to climb the water ladder'. Paper presented at the Science Sessions of the Second International Forum on Water and Food (IFWF2), 10-14 November 2008. Addis Ababa, Ethiopia. Challenge Program on Water and Food

The MUS project (PN28) developed and tested 'multiple-use water services' ('MUS'). This 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. 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. 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 some of the project findings.

Yoder, R., M. Mikhail, K. Sharma, and D. Adhikari. (2008). Technology Adoption and Adaptation for Multiple Use Water Services in the Hills of Nepal. Paper presented at the Science Sessions of the Second International Forum on Water and Food (IFWF2), 10-14 November 2008. Addis Ababa, Ethiopia. Challenge Program on Water and Food

This paper draws on seven years of multiple use water services (mus) development effort by International Development Enterprises and partner organizations in Nepal. It describes the genesis of the mus work and the unique combination of technologies utilized to provide domestic and productive water services. The introduction of micro irrigation technologies enabled households to begin production of high value vegetables, increase their cash income and increase food security. However, scaling up introduction of these technologies required a way for households to increase access to a reliable water supply. The combination and adaptation of water control technologies from both the rural domestic water and micro irrigation sectors are explained. The paper discusses factors that have made the development intervention highly successful as a collective action community undertaking providing individual household services to meet a range of water needs.

Penning de Vries, F.W.T. and S. Ruaysoongnern (2008). Multiple sources and uses of water in North East Thailand. Paper presented at the Science Sessions

of the Second International Forum on Water and Food (IFWF2), 10-14 November 2008. Addis Ababa, Ethiopia. Challenge Program on Water and Food

Many rural households in NE Thailand grow cassava and other food crops on sandy upland soil and rice on lowland clayey soil. These crops provide only a small income and the simple farming system leads to land degradation. Roof water harvesting and water storage provides homesteads with ample and good domestic water year round but it is not enough to extend the growing season and diversify production. In the 1990's, some farmers initiated management changes and developed integrated farming.

Additional sources of water are developed (run-off fed farm ponds in particular) and additional products are grown (mainly vegetables, fish). Such farms have become economically successful. Ten different sources of water are used, >6 per homestead, in 8 productive ways. Moreover, this farming system is ecologically sustainable. A regional farmer network that promotes this holistic approach through farm visits and local training centres recognizes that it also increases social interaction and responsibility. The network with already over 100,000 members is spreading rapidly and with it the application of the 'multiple sources and uses' approach. Sharing domestic and productive water between households in communities is emerging as well.

Now that farmers have a voice through their network, the new way of farming is appreciated by the national government. It gives support through subsidies and a new water law that will give responsibility for rural water management to new local Water Resources Committees.

Penning de Vries, F.W.T. (2007). 'Learning Alliances for the broad implementation of an integrated approach to multiple sources, multiple uses and multiple users of water.' Special issue: 'Integrated assessment of water resources and global change : a north-south analysis'. In: *Water Resources Management* 21, 79-95.

'Multiple use systems' are systems that allow efficient and effective supply of water from different sources to communities for their domestic and for their productive purposes and that allow interaction with providers of water related services. Such systems are probably highly desirable from the perspective of using scarce water efficiently and also from the perspectives of gender equity and improving livelihoods. It is therefore useful to carry out scientific research to validate this statement about a water-innovation. The mode of research must be 'action research'. The specific form and management of multiple use systems depends on local biophysical and socio-economic factors, as well as on local institutions and legislation. Eleven 'cornerstones' need to be in place to realize a full multiple use system. Since a blue print cannot be made and many parties are involved, 'learning alliances' are to be set up in specific geographic areas and at national level to identify how much of these cornerstones of multiple use systems are still lacking, and to work together to create or implement these. Guidelines for setting up Learning Alliances and for actually implementing systems of multiple water use are needed.

Keywords Learning alliance . Action research . Integrated water resource management . Upscaling . Domestic water . Productive water . Implementation . Multiple use systems . Innovation

World Water Forum 4. Mexico 16-22 March 2006. Session report FT 4.25. Multiple use water services. Theme: Water, Food, and Environment. Session convenors International Water Management Institute IWMI, International Water and Sanitation Centre IRC, International Development Enterprise IDE, TEC Global Water Partnership

LOCAL ACTION [LA0128](#) IDE: Multiple water use systems by design: new low-cost tools for irrigating small plots with a limited water supply—experience from Nepal.

Projects being implemented by IDE and partners in Nepal and India have promoted smallholder farmer vegetable production using water conserving, low-pressure drip irrigation systems. This enables farmers with very limited water supply, such as the overflow from existing domestic water supply systems, to successfully produce vegetables sufficient for household consumption and some for sale in local markets. The observation that domestic water supply mirrored the infrastructure needs to support drip irrigation of small vegetable plots led to examining the feasibility of designing irrigation systems that could perform the dual role of irrigation for vegetable production and also the domestic water supply for entire villages. Early qualitative results from 7 systems designed for multiple use services—irrigation and domestic water delivery—are very promising. Based on these results the IDE Nepal program has increased emphasis on promoting design of multiple use water services and is participating in the CGIAR Challenge Program on Water and Food funded Multiple Use Water Systems Project

LOCAL ACTION LA1229 KHON KAEN THAILAND: Bottom up design and implementation of sustainable multiple water use systems by Local Wisdom farmer networks in the northeast of Thailand, and national upscaling

Since 1990, farmers started developing multi-purpose farm ponds and relating water resource management techniques for realistic resource and livelihood development, in stead of one-size-fit-all approach. At the early stage there were scattered successes with this particular approach in at least 12 locations in Nakornrachasima, Buriram, Surin, Khon Kaen, Amnatcharoen. Thereafter the successful cases attracted farmers to develop into farmer groups of 12 learning centers around the successful cases. With linkages to some external support the successful cases have eventually developed into Local Wisdom Networks that expanded to 200 other villages all over the northeast of Thailand.

LOCAL ACTION LA1199 PROGRAMA AGUA TUYA BOLIVIA: Creación de “Comités de Agua” en zonas periurbanas.

In peri-urban Cochabamba, Bolivia, most people access water supplied by community-managed water systems and other alternative supply sources that are neither recognised nor adequately supported by government and external agencies. Interventions tend to focus on extending the concession areas of utilities and this has been strongly conflictive. One of the key issues, often ignored, is the water demands of peri-urban households for small scale productive activities. The private sector enterprise AGUATUYA supports the upgrading of community managed systems with consideration for both domestic and productive needs.

LOCAL ACTION LA0829 AWARD SOUTH AFRICA. SWELL: Securing Water to Enhance Local Livelihoods in South Africa AWARD

The South African NGO Association for Water and Rural Development (AWARD) has been piloting an integrated planning approach to the implementation of a multiple use services (mus) approach in Bushbuckridge Local Municipality in South Africa, which is known locally as Securing Water to Enhance Local Livelihoods (SWELL). SWELL is a community-based planning approach for multiple uses of water, working closely with the Municipality and the local offices of the national departments of Water Affairs and Forestry (DWAF), Agriculture and Social Development. The aim is to integrate the results of SWELL into the Municipal Integrated Development Plan (IDP) process

LOCAL ACTION LA0153 GOBERNACION DEL VALLE, COLOMBIA: Implementing multiple use water services in Valle del Cauca, Colombia

In the Programa de Abastecimiento de Agua (PAAR) programme, the departmental government of the Valle del Cauca, around Cali, Colombia is modifying the conventional single-use approach to rural water supply in Colombia (a norm of 20 cubic metres per household per month) by adopting more flexible implementation of guidelines and specifically recognizing the contributions made to rural livelihoods by small-scale productive activities.

Appendix B: key members learning alliances (leading partner in bold)

Area and focus of the learning alliance	Users' organisations, CBOs and local private service providers	NGOs	Government	Knowledge centres
<p>Ethiopia Dire Dawa <i>woreda</i> (district)</p> <p>Case studies of NGO innovations in Dire Dawa district-level learning alliance</p>	<ul style="list-style-type: none"> • Water users • Multi-purpose Service Cooperative of Legedini Peasant Association • Village committees • Independent consultants 	<ul style="list-style-type: none"> • Harerege Catholic Secretariat, supported by Catholic Relief Services 	<p>Dire Dawa Administrative Rural Council , overseeing:</p> <ul style="list-style-type: none"> • District Rural Development Bureau • Water, Mines and Energy office • Office of Agriculture • Office of Health 	<ul style="list-style-type: none"> • IWMI • Haramaya University • Wageningen University • Overseas Development Institute
<p>Nepal* Middle Hills</p> <p>MUS Innovation by an NGO programme, linking with government bodies and NGOs through district and national learning alliances</p>	<ul style="list-style-type: none"> • National Federation of Water Irrigation Water user associations Nepal (NFIWUAN) • Federation of Water and Sanitation Users Nepal (FEDWASUN) • Community water users committees 	<ul style="list-style-type: none"> • IDE Nepal and Winrock International • SAPPROS • CEAPRED • WaterAid • NEWAH • others 	<p>District officers and national staff of Ministries, also member National SIMI Advisory board of:</p> <ul style="list-style-type: none"> • Agriculture • Finance • Women, Children and Social Welfare • Local Development • Agro-Enterprise Centre • Rural Water Supply and Sanitation Fund Development Board • Department of Agriculture with District Agriculture Development Office • Department of Irrigation with the Non-Conventional Irrigation Technology project (NITP) • Ministry of Local Development with Department of Local Infrastructure and Agricultural Roads 	<ul style="list-style-type: none"> • Kathmandu University • National Agricultural Research Council
<p>Zimbabwe</p> <p>Case studies on earlier MUS</p>	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Institute of Water and Sanitation Development (IWSD) 	<ul style="list-style-type: none"> • Rural District Councils • Department of Irrigation • inter-ministerial National Action Committee for Water and Sanitation 	<ul style="list-style-type: none"> • University of Zimbabwe. • IRC

<p>innovations in the Rural District Councils of Marondera, Murehwa and Uzumba Maramba Pfungwe (UMP)</p> <p>National learning alliance to consolidate MUS innovations</p>		<ul style="list-style-type: none"> • Mvuramanzi Trust • UNICEF, host of National Water and Environmental Sanitation Working Group (WES-WG) • Pump Aid • World Vision • Action Contre la Faim • Christian Care 	<p>(NAC)</p>	
<p>Bolivia Cochabamba valley</p> <p>Awareness raising through case studies and scaling up MUS in Cochabamba Valley through a local private service provider</p>	<ul style="list-style-type: none"> • Users' organisations from a number of communities • Programa Agua Tuya (provider of equipment and technical advice to communities) • Plastiforte (provider of piped and other construction material to communities) 	<ul style="list-style-type: none"> • SNV • CIPCA • ANESAPA (capacity building network) 	<ul style="list-style-type: none"> • Various Municipalities • PROMIC-BTC (a government catchment management programme) • SEMAPA (utility company) • CODESAB (water and sanitation board of Cochabamba, with municipalities, water cooperatives and major NGOs) 	<ul style="list-style-type: none"> • Centro Agua (research centre at the Universidad Mayor de San Simón, Cochabamba) • CASA (research centre for water supply and quality) • IRC
<p>Maharashtra* The districts of Nasik, Ahmednagar and Aurangabad</p> <p>Adoption of MUS by the government rural water supply programme. working closely with NGOs</p>	<ul style="list-style-type: none"> • Village Water and Sanitation Committees. • Women's Empowerment Committees • Social Audit Committees. • Community members 	<ul style="list-style-type: none"> • IDE • NGOs BSS, Adhar and Navnirman in Nasik District • NGOs SEVA, GARD, NISS, and WOTR in Ahmednagar District • Dilasa in Aurangabad District 	<ul style="list-style-type: none"> • Jalswarajya/Aple Pani water supply programme • Tehsil Agriculture Government Officer in Nasik • Agriculture Technology Management Agency in Aurangabad 	<ul style="list-style-type: none"> • Institute of Social Studies in Ahmednagar
<p>Colombia</p>	<ul style="list-style-type: none"> • Representative 	<ul style="list-style-type: none"> • Plan International 	<ul style="list-style-type: none"> • PAAR Rural Water Supply Programme 	<ul style="list-style-type: none"> • Universidad

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<p>Learning alliance in Valle del Cauca Department and learning alliance in Quindío Department</p> <p>Awareness raising through case studies and adoption of MUS by PAAR (regional 'domestic' water supply programme) and other local organisations</p>	<ul style="list-style-type: none"> • of coffee growers • AQUACOL Association of 33 community organisations providing water and sanitation services • Mondomo Users Association • Montebello Users Association • RUT Restrepo-Union Trujillo Irrigation Users Association • ATUNCELA Irrigation Users Association • Golondrinas Users Association • Bellavista Users Association 		<p>for Valle del Cauca (pooling of public departmental and municipal resources and private resources managed by the private Coffee Association)</p> <ul style="list-style-type: none"> • Departmental Secretary of infrastructure Valle del Cauca • Departmental Secretary of Agriculture Valle del Cauca • Municipality of Buga • CVC Environmental Authority of Valle del Cauca Department • Contraloría General de la Republica (National Control Institution) • UMATA Unit for Agriculture Technical Assistance • Departmental Secretary of Planning Quindío • Departmental Secretary of Tourism Quindío • EPA Empresas Publicas de Armenia (public service provider in Armenia, Quindío) • CRQ Environmental Authority of Quindío Department. • CRC Environmental Authority of Cauca Department 	<p>del Valle (CINARA and EIDENAR, the school of natural resources)</p> <ul style="list-style-type: none"> • Universidad del Quindío • Universidad Javeriana (Group of water management) • CIAT International Centre for Tropical Agriculture - CEIAR Group (Watershed and community) • Universidad Nacional de Colombia – Sede Palmira (regional centre of the national university) • IRC
<p>N.E. Thailand</p> <p>Bottom up 'Farmer Wisdom Network' focuses on self sufficiency and integrated farming. Network engages with national lawmakers</p>	<ul style="list-style-type: none"> • Local Wisdom Networks • Organic rice network • Other Farmer networks/groups 	<ul style="list-style-type: none"> • Alternative agricultural network 	<ul style="list-style-type: none"> • 30 Tambon (= district) administration organizations • 4 Changwat (= provincial) administration organizations. • National Ministry of Agriculture with three regional offices of Land Development Department; and with two regional offices of Royal Department of Irrigation • National Ministry of Science and 	<ul style="list-style-type: none"> • Khon Kaen University

			Technology with three regional offices of the Department of Water Resources	
<p>South Africa. Bushbuckridge Local Municipality</p> <p>District learning alliance for integrating MUS in Integrated Development Plan in one ward with 11 villages, linked to national learning alliance</p>	<ul style="list-style-type: none"> • Water users • Village water committees • Water for Food Movement • consultants 	<ul style="list-style-type: none"> • AWARD • World Vision • Mvula Trust . 	<ul style="list-style-type: none"> • Department of Agriculture with Provincial office and district agricultural extension officers • Department of Water Affairs and Forestry with regional office and local operators • Department of Local Government and South African Local Government Association • Department of Health. 	<ul style="list-style-type: none"> • IWMI • Water Research Commission. • University of Pretoria