Multiple Use Water Services in Ethiopia Scoping Study

Supported by

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Cover photo: Barriers between domestic and productive use. Woman fetching water for domestic use from an irrigation storage tank in eastern Ethiopia. Photo: John Butterworth.

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Acronyms and Abbreviations

AFD	Action for Development
BoA	Bureau of Agriculture
BoFED	Bureau of Finance and Economic Development
BMGF	Bill and Melinda Gates Foundation
BSG	Benishangul Gumuz (region)
CBN	Community-based nutrition
CDF	Community Development Fund
CLTS	Community-led total sanitation
CMP	Community Managed Projects
COWASH	Community-Led Accelerated WASH (project)
CPWF	Challenge Programme on Water and Food
CRS	Catholic Relief Services
DA	Development Agent
EPRDF	Ethiopian People's Revolutionary Democratic Front
ERHA	Ethiopian Rainwater Harvesting Association
EWRMS	Ethiopian Water Resource Management Strategy
FinnWASH-BG	Finnish supported WASH project in Benishangul Gumuz region
GLOWS	Guided Learning on Water and Sanitation
GTP	Growth and Transformation Plan
HCS	Hararghe Catholic Services
HEW	Health Extension Worker
IDE	International Development Enterprises
IWMI	International Water Management Institute
JICA	Japan International Cooperation Agency
MoA	Ministry of Agriculture
MFI	Micro Finance Institution
MoWE	Ministry of Water and Energy
MoWR	Ministry of Water Resources
O&M	Operation and maintenance
PSNP	Productive Safety Net Programme
RIPPLE	Research-Inspired Policy and Practice Learning in Ethiopia
RWSEP	Rural Water Supply and Environmental Programme
SNNPR	Southern Nations Nationalities and People's Region
SSAP	Self Supply Acceleration Programme
UAP	Universal Access Plan
TVET	Technical and Vocational Education and Training
WASH	Water Sanitation and Hygiene
WASHCO	WASH committee
WIF	WASH Implementation Framework
WUA	Water Users Association
WSDP	Water Sector Development Program

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EXECUTIVE SUMMARY

There is reasonably wide recognition of the potential merits of multiple use water services (MUS) in Ethiopia as a result of innovation by NGOs and advocacy by research institutes, including participation in the global MUS Group international conference held in Addis Ababa in 2008. Several NGOs have been implementing and upgrading community managed systems that cater for domestic and productive water uses like irrigation, watering livestock and other micro-enterprises, and integrating these different uses to try and maximize the broad livelihood benefits that are linked to various health, food security and economic development outcomes. The provision of livestock troughs with community domestic water facilities is also fairly standard. In addition, households have been implementing systems that serve their multiple needs for water through the approach known as self-supply. Family wells have been developed by tens of thousands of households, and more often than not are used for multiple purposes with increasing productivity being a key driving force for making this private investment.

The acronym 'MUS' is itself increasingly a part of the sector discourse and interest in MUS is on the rise given the growing awareness that food insecurity and water insecurity are related. However, MUS interventions and modalities have generally not been scaled up widely in the country. This seems largely due to the same barriers that MUS faces elsewhere: the conventional institutional structuring of water policies, water services implementation programs, and professional disciplines into fragmented, parallel operating 'vertical' sectors of single water uses such as rural water supply and agriculture.

In rural water supply, communal schemes hold rather limited potential for MUS since the pressures on these schemes for domestic water supply are high and the designers are generally not far-sighted enough or able to design for multiple uses beyond livestock troughs. However, two new formalized and more decentralized financing and service delivery mechanisms in the rural water supply sector create exciting new opportunities for scaling up MUS and related technologies: Community Managed Projects (CMP) and self-supply. These mechanisms offer considerable potential for scaling up MUS because they both decentralize aspects of decision-making to people in communities or households.

MUS could play an important role in helping the domestic water sector achieve its target of universal access by 2015 by generating the income needed to drive private investment in self-supply, and potentially improving the sustainability of communal water supply schemes. From an agricultural perspective, there are ambitious plans to develop 1.5 million hectares under smallholder cultivation over the next 5 years, which represents a seven-fold increase. The scoping study identifies four priority opportunities for support to acceleration of MUS within Ethiopia. These focus on finding better entry points for implementation of MUS that are more likely to go to scale, and other supporting activities that could encourage wider uptake.

A first 'best-bet' opportunity identified is to support development of the Self-Supply Acceleration Programme (SSAP). Family wells are used for multiple uses (by design) and there are existing experiences at scale to learn from, but weaknesses in the enabling environment currently hamper acceleration and do little to encourage safe water quality and sustainability. However, the self-supply approach has recently gained recognition in the

national domestic water sector policy. The agricultural sector also has ambitious plans to extend self-supply and there is potentially much to gain in terms of access to safe water and increased productivity through linking these efforts. Programmatic funding is required by the new and currently unfunded SSAP initiative focusing on technical support to help government reform the enabling environment to accelerate self-supply as a service delivery model in appropriate regions. SSAP involves providing support in four main areas: technology options and advice, strengthening the private sector, supporting financial systems and enabling government policies. Research on potential for self-supply combining groundwater availability and other indicators of potential could also contribute to acceleration. The efforts and impacts of several agencies could be further supported through funding to develop more coherent approaches to technology introduction and related learning (e.g. rope pump and manual drilling), that have a focus on users (i.e. self-supply, MUS), supply chains and introduction processes rather than individual technologies. The Self-Supply Acceleration Programme is being developed by a national working group led by the MoWE.

The second best-bet opportunity identified is implementing MUS through the Community Managed Projects (CMP) approach. CMP is a nationally recognized approach for rural WASH, in fact now the priority approach for communal supplies, and being rolled out to all regions. In theory, the decentralization of decision-making to communities in CMP ought to facilitate MUS. However, this has not been actively promoted or facilitated to date by agencies involved in CMP. Research on multiple uses of existing systems developed using the CMP model in Amhara and BSG regions is recommended. Promoting multiple use modalities is an option where communities express demand through training of support staff, development of MUS training modules, and action research/pilots. In these cases, documentation and learning would be opportune and could also include themes on MUS and sanitation links.

Working with the micro-finance institutions involved, this best-bet could pilot mixes of 100% grant (the current modality) for basic WASH infrastructure, mixed grant/loan for some add-ons/additional 'productive infrastructure' at community level, and 100% loans for household level investments. A new UNICEF implemented integrated WASH/MUS/CBN project, which also uses the CMP approach, is of major interest given its aims to test MUS approaches at scale through a 'domestic-plus' approach. Additional investments could support this project in monitoring, documentation and lesson learning, or scaling up in other regions. It is, we believe, the most substantial effort to implement MUS at scale through a 'domestic-plus' modality anywhere.

Thirdly, further scoping of productive-plus opportunities is recommended. Although there is evidence of the non-irrigation uses of irrigation systems and the damage caused, this has neither been studied systematically nor have there been intervention suggestions for designing for multiple uses. A scoping study is proposed, in collaboration with AGRA Ethiopia, to explore the potential of taking people and their multi-faceted livelihoods as entry point in the design and implementation of water and land resource interventions. The hypothesis to test is that a 'people's entry point' instead of resource conservation or crop yields as entry points, better meets the mandated goals of the soil and water conservation

measures and infrastructure by increasing ownership, maintenance and hence sustainability. In addition, more livelihood benefits may be generated.

One specific opportunity already identified from the small-scale irrigation perspective, is to support TVET training program development on small-scale irrigation, groundwater development and integrated approaches. There are major gaps in existing capacity building efforts in these areas and a MUS element could be included. The GLOWS training approach (currently WASH focused) could be expanded. A TVET capacity building program is proposed that would include curricula development, material development, training of trainers and training replication including MUS and related topics in an integrated multi-sectoral approach to water development. This could benefit from good practices and standard designs disseminated among the organizations directly responsible for small scale irrigation development, the Regional Water Resources Bureaus and Agricultural Bureaus and where they exist the Water Works Design and Supervision Offices in the Regions.

Finally, and arguably most importantly given current new initiatives, there is an opportunity for a learning network on MUS focusing on policy and practice in Ethiopia to learn from and leverage the activities of various partners. This would be timely given that there are several new MUS initiatives in the country and rising interest. Coordination and learning is generally weak within the Ethiopian water sector (especially between sectors like water, health, education and agriculture) and between levels (national, regional, *woreda*). A well run and well documented capacity building and learning platform or network on MUS could create synergies and maximize impacts. Activities might include workshops, training courses, a dedicated website, additional case study documentation to support ongoing initiatives and seed funding new initiatives. The MUS Group provides an international model that could be replicated, with adaptations, in Ethiopia.

1. WHAT IS MUS?

Multiple-Use water Services (MUS) is a participatory approach that takes the multiple domestic and productive needs of water users who take water from multiple sources as the starting point of planning, designing and delivering water services. The MUS approach encompasses both new infrastructure development and rehabilitation as well as governance.

MUS emerged in the early 2000s when professionals from the water sub-sectors, in particular the domestic water, hygiene and sanitation (WASH) sector, and the irrigation sector began to see the untapped potential of providing water beyond the confines of conventional single-use mandates (Moriarty et al., 2004). Cross-sectoral action-research documented in more than 100 cases of MUS innovation in over 20 countries (www.musgroup,net; Van Koppen et al., 2009), economic analysis (Renwick, 2007), and policy dialogue in national and international forums, such as the World Water Forums in Mexico (2006) and Istanbul (2009), have confirmed this potential (Figure 1). Focussing on where sub-sector interests overlap leads to single-use sectors better achieving their own mandates while generating additional benefits. MUS offers three main advantages compared to single-use water service delivery models: 1) more livelihoods improvements, 2) more environmental sustainability, and 3) strengthened integrated water resource management (IWRM).

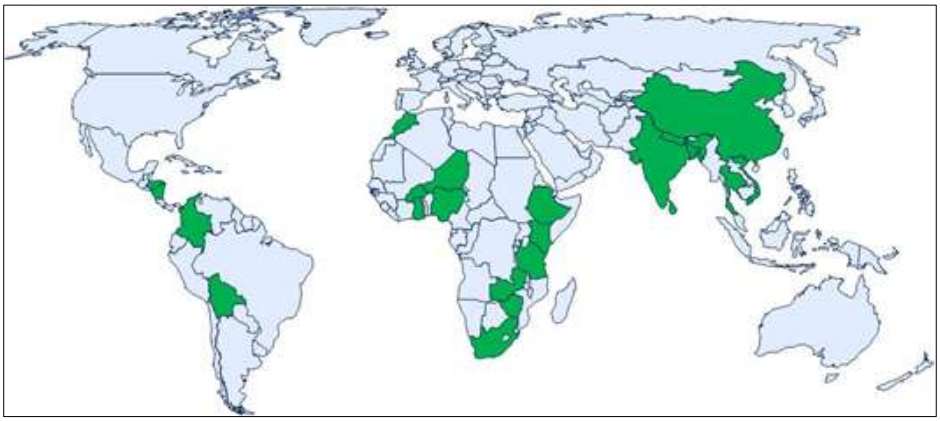


Figure 1: Countries where MUS has been applied

Livelihood returns

In terms of livelihood improvements, MUS concurrently improves health, food security, and income, and reduces women's and girls' drudgery, especially among the poor in rural and peri-urban areas where their multi-faceted, agriculture-based livelihoods depend in multiple ways on access to water. Livelihood benefits mutually reinforce each other. Thus, MUS gives "the most MDG per drop" (Renault 2008). Livelihood benefits tend to be more durable because participatory planning empowers communities to articulate their own priorities, thus enhancing ownership and willingness to pay for services. From the domestic sector perspective, adding income opportunities improves the ability to pay, hence, MUS unlocks new financing streams.

Livelihood returns from MUS investments are also more durable because they are holistic. People in many rural communities have practiced their own forms of 'integrated water resource development and management' for self-supply for many generations. Similarly, every water manager of a system designed for a single use has come to realize that people use a system for more than one purpose, planned or not. Prohibiting these other-than-planned *de facto* uses, for example by declaring such uses illegal, has typically been in vain. MUS turns the problem of unplanned uses into an opportunity to leverage investments, avoid infrastructure damage from unplanned use, and generate broader livelihood returns.

Environmental sustainability and justice

In terms of environmental sustainability and water efficiency, MUS recognizes that people use and re-use conjunctive water sources in ways that optimize, for them, the efficient development and management of rain, surface water, soil moisture, wetlands, and groundwater, and other related natural resources within their local environment. Even within the homestead, households can use up to nine different water sources, as found in Thailand (Penning de Vries and Ruaysoongnern 2010) Local knowledge and coping strategies for mitigating seasonal and annual climatic variability by combining multiple sources is at the heart of community resilience. Such efficiency and resilience will become ever more important as the impacts of climate change become more visible.

The MUS focus on the poor puts people and multiple uses at centre stage instead of casting allocation issues in terms of monolithic 'use sectors' that fail to differentiate between vested interests and multiple small-scale uses for basic livelihoods. Instead, MUS considers the distribution of water use by individuals, each with multiple water needs. Quantification of the distribution of water use is revealing. In rural South Africa, for example, 0.5 percent of users use 95 percent of the water resources. More than doubling current estimated water access by every rural user from 116 to 277 liters per capita per day would require the 0.5 percent large-scale users to share only six percent of their current water uses (Cullis and Van Koppen 2007). Focusing on the poor, MUS especially safeguards poor people's rights to water, food and livelihoods and their fair share of the resource in quantitative terms, and exposes poor people's greater vulnerability to unsafe water in qualitative terms.

A focus on community integrated water management

Last but not least, in opening up new livelihood and environmental opportunities, MUS recognizes that the natural intersection of multiple uses and multiple sources starts locally, at household and community level. MUS is bottom-up IWRM, starting with local users as clients and active participants instead of 'aid recipients'. MUS complements past IWRM efforts in two new ways. First, while IWRM tended to be a 'push' from the top-down (e.g. by establishing basin organizations), MUS is a 'pull' for integration from below, where human well being and water resources are integrated.

Second, past IWRM efforts tended to prioritize governance over infrastructure development. The 's' in MUS stands for "services" in the sense of reliably ensuring the availability of water in certain quantities and qualities, at certain times, and at a certain sites, during the full project cycle and after the construction phase. Services result from the appropriate balance between sustainable infrastructure investments and water governance. Infrastructure investments to harvest and store water in the rainy season for use in the dry

season increase the pie of available water resources for all. This win-win solution reduces competition for water in open basins where there are still uncommitted water resources available for development. Yet, in many IWRM debates that focused on sharing an inevitably limited pie, this solution tended to be ignored. Obviously, infrastructure development is a precondition to improve access to and control over water for the 'have-nots', even if that implies that the 'haves' need to save water when basins are closing.

Key questions

In the light of these untapped livelihood, resource and integration opportunities, the key question is: How can scaling up be accelerated? The question has two sides: first, what are the barriers and constraints that currently limit the scaling up of MUS and what is their comparative importance? (e.g., financing, governance, policy, awareness, implementation capacity); and, second, what are the opportunities for scaling up MUS modalities in terms of scaling pathways, overcoming challenges, and potential key partner institutions? These are the questions the Rockefeller Foundation posed to the International Water Management Institute (IWMI), in collaboration with the International Water and Sanitation Centre (IRC).

Geographic focus

The geographic focus of the scoping studies is five countries where IWMI and IRC see strong potential for scaling up MUS modalities: India and Nepal in Asia, and Ethiopia, Ghana, and Tanzania in Africa (linked to the Alliance for a Green Revolution in Africa). The answers to these questions are presented in five stand-alone country reports and one synthesis report. The present country report discusses the findings in Ethiopia.

The research objective and questions are elaborated next. This is followed by an analysis of empirical MUS related research in Africa and South Asia with the aim to further conceptualize scaling up of MUS for investigation in the five countries and to enable a structured synthesis of the results. The section on theory of change discusses four MUS modalities and related scaling pathways, i.e. "what" can be scaled up. The chapter concludes with a section on the practice of change, i.e. "how" MUS has been scaled in the past, and can continue to be scaled up through networking.

Study objective and questions

Objective

The objective of this study is to conduct country-specific research on the barriers that limit the scaling up of a multiple use services modalities to water management, the comparative importance of these barriers, and possibilities for overcoming these challenges for poor and vulnerable people in South Asia and Africa.

Research questions

- What are the different MUS modalities that have emerged, and how are they related to specific scaling pathways?
- What are the most important barriers limiting greater adoption of these modalities?
- What specifically could be done to overcome these barriers?
- What specific organizations are well placed to overcome these barriers?
- What geographic conditions would be most suitable for scaling up each kind of MUS model?

- What kinds of policy incentives are needed in each case?
- What kind of capacities and skills need to be built?
- What kind of information dissemination and engagement/partnership building needs to occur?
- What is the optimal sequencing of interventions needed to enable broader scaling up?

Theory of change: MUS modalities and scaling pathways

We define scaling up MUS as: better institutionalization of more robust MUS modalities and achieving a wider geographic spread. For people in rural and peri-urban communities, multiple uses from multiple sources is already a wide spread practice. The holistic development and management of multiple sources for multiple uses continues, both as multiple uses of systems designed for a single-use, and also as self-supply, whereby users themselves invest in the development and management of water sources for multiple purposes. These practices are often informal, sometimes without formal institutions even knowing about them. For people in many communities, the notion of "MUS" is an articulation of what they do every day.

Scaling up MUS is primarily a matter of institutional transformation of water services delivery by government agencies, NGOs, financing agencies and donors, who conventionally structure their respective policies and water development programs into isolated and vertical sub-sectors (Van Koppen *et al.* 2009). Each sub-sector focuses on and budgets for the development of services for a single use, which is the sector mandate. This is often accompanied by pre-determined technologies and related management structures. Sub-sectors structure their accountability to tax payers and other financers by justifying their budget allocations according to their performance on a single livelihood dimension such as improved health through safe water for domestic uses, or improved health through nutrition, or food security, or income. Formal professional training in colleges and universities is structured along similar lines. This compartmentalization, with vested professional interests, is the main reason for single-use services, and, hence, the main barrier that MUS proponents have sought to overcome.

The 'theory of change' adopted by most MUS proponents was to gradually channel existing institutions and financing streams towards MUS as a win-win strategy to better meet sector mandates while generating additional benefits. Accordingly, MUS proponents started addressing sectoral divides in essentially four ways or four "MUS modalities" as shown in Table 1. This gradual channelling allows for leveraging of existing human, technical, institutional and financial resources.

The following description of the four MUS modalities is the 'ideal-typical' case. The precise content, relevance, current robustness and scaling potential greatly differ by country. Differences among and between modalities are a function of the entry point. They are not mutually exclusive but overlap and mutually support each other. Each modality contributes knowledge and resources to the common pool, which renders the whole more than the sum of the components. Ultimately, for example, the community-based MUS modality, in which community members articulate and negotiate the public water services they prioritize, would encompass all other three.

Table 1: MUS modalities

MUS modality	Priority setting	Implicit priority use and site	Primary investors in infrastructure and funding earmarks	Primary scaling partners
Domestic-plus	WASH – sector, including local government, line agencies and NGOs	Domestic, near homesteads	Sub-sector, funding earmarked for domestic and some other uses, specific service levels, and often to a limited set of technologies; co-investments by users	WASH sector, with support for productive uses; sector working groups, and research centers, in learning networks
Productive-plus	Agricultural line agencies (irrigation, fish, livestock, trees), NGOs	The single productive use of the line agency, siting where appropriate	Sub-sector, funding earmarked for specific productive and some other uses; often a limited set of technologies; co-investments by users	Agricultural line agencies water bureaus, design offices and NGOs, with support for drinking water quality and other domestic needs; sector working groups, and research centers, in learning networks
Self-supply MUS	Users	Multiple uses, siting where appropriate	Users, limited by available technology choice	NGOs and private sector for technology supply, with support for drinking water quality, other domestic uses, productive uses and government support for market support, regulation; sector working groups, and research centers, in learning networks
Community-based MUS	Users	Multiple uses, siting where appropriate	Government or NGOs, with less earmarking of funds or with convergence; co-investments by users	Local government, with support of NGOs and line agencies; multiple sector working groups, and research centers, in learning networks

Domestic- and productive-plus modalities

The first two modalities are known as domestic-plus and productive-plus. Those who pursue these modalities work to scale up from within their own water sub-sector by widening the scope of public investments for their mandated single use to encompass other uses. Sub-sectors often subsidize capital investments in infrastructure, while communities are usually responsible for operation and maintenance. In +plus modalities, the implicit priority for either water for domestic uses near homesteads or crops in fields (or fisheries, or livestock watering) continues to be set by sub-sector professionals, not local users. Planning and budgeting from the top-down and a narrow range of options continues to be the norm. Planning remains 'formal' in the sense of strong involvement of government and public donors and NGOs closely collaborating with government.

However, in the +plus modalities, the sub-sectors open up their mandate. This tends to happen in a step-wise fashion. The subsequent steps from single-use to multiple-use progress from: ignoring or denying non-planned uses or declaring illegal to: turning a blind eye on these uses ("not my job") to: implementing marginal practices on the ground to accommodate multiple uses to: accommodating *de facto* multiple uses at management level to: fully integrating multiple uses from multiple sources in planning, design and use (Renault 2010). Especially in the WASH and irrigation sub-sectors, these +plus modalities have developed into fairly robust scaling models.

These steps were supported by valuation studies that identified the range of *de facto* uses and calculated the returns (Meinzen-Dick, 1997; Bakker *et al.*, 1999; Renwick 2001). In +plus approaches, the water sub-sectors are investors interested in all returns on their investments, instead of investors who may go so far as to criminalize livelihood returns only because they were not planned.

A strong argument in favor of +plus modalities is that relatively small incremental investment costs generate major livelihood benefits and avoid damage caused by unplanned uses. The benefit-cost ratio of these incremental investments is high, as confirmed by the in-depth financial evaluation of both domestic-plus and irrigation-plus scenarios conducted by Renwick (2007).

The domestic-plus modality builds on the water services ladder. While the WASH sector assumes that water quantities at higher service levels are still primarily, if not exclusively used for domestic uses, empirical research confirms that poor rural and peri-urban users in agrarian societies use and re-use water for livestock and other productive uses well below even basic service levels (see Figure 2). Similarly, studies have shown how higher service levels in terms of quantities, nearby availability and reliability lead to more productive uses. Hence, domestic-plus consists of providing higher levels of service, roughly doubling or tripling current supplies.

As domestic-plus modalities maintain a priority for meeting people's domestic and sanitation needs near to or at homesteads or residential areas, productive uses also tend to concentrate there. This site is especially relevant for women, who tend to have a stronger say over income from productive activities around their homes than from distant household production. Further, for the land-poor, sick and elderly, the homestead may be the only

place where they are able to use water productively. Thus, the relatively small incremental improvements to domestic water supply systems result in relatively high benefits from small-scale productive uses, principally backyard gardening, livestock and home-based industries. Renwick (2007) calculated that intermediate MUS service levels of MUS at 50 to 100 liters per capita per day generate income which allows repayment of the infrastructure investment and operational costs within 6 months to 3 years.

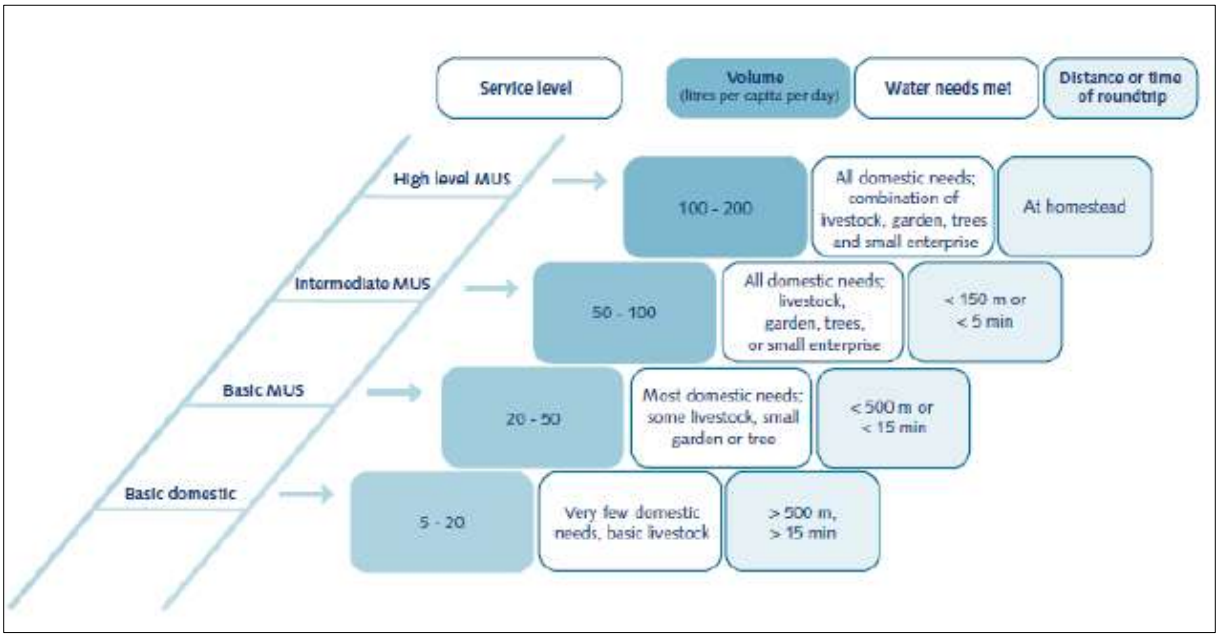


Figure 2: The domestic-plus water ladder (Renwick, 2007; Van Koppen *et al.*, 2009)

At any step on this service ladder, at least 3-5 liters per capita per day should be safe for drinking and cooking. This quantity of safe water is important for domestic water supplies, and for the many situations in which people drink water from other sources. Higher quantities of water of lesser quality for personal hygiene and sanitation are equally important for health (Van der Hoek *et al.* 2002). Scaling up domestic-plus happens mostly via the WASH sector, increasingly in collaboration with local governments.

The **irrigation-plus modality** most frequently applied in India, Vietnam, and China, is the FAO Mapping Systems and Services for Multiple Uses (MASSMUS) methodology for the modernization of large-scale irrigation systems. Relatively small incremental improvements are added on to existing irrigation infrastructure, which mostly improve access to surface water (cattle entry points, washing steps, small diversions for laundry, bridges, roads, etc.). Conjunctive use of seepage for groundwater recharge for irrigation and domestic uses are considered in planning for lining canals or not. In areas where canal water is the main source of water, water is supplied year-round and reservoirs are filled for residential areas. MASSMUS has specific domestic water and gender modules. MASSMUS makes many recommendations that can be applied to small-scale schemes as well, but they have not been systematized into a robust MUS modality as yet.

Other productive-plus modalities

The fisheries sector also conducted research on the better integration of fish and other products into water bodies, e.g. dams or irrigated fields as a 'productive-productive' approach (Nguyen-Khoa *et al.*, 2005). Ancient and modern small village reservoirs have been operated and studied from various productive and domestic entry points, including irrigation, fisheries, forestry, livestock and domestic uses (Palanisami and Meinzen-Dick, 2001; Venot *et al.*, 2011). Documentation and implementation of these productive-productive and productive-domestic approaches is still fragmentary. With more consolidated effort and coordination they could well crystallize into robust MUS modalities.

Scaling up irrigation-plus and other productive-plus modalities is largely through technical line agencies and NGOs. Line agency collaboration with local government tends to be underdeveloped.

User-driven MUS

In the user-driven and community-based modality, water users define the water systems they need for their multiple uses. Government agencies and NGOs avoid setting a priority for any water use, or a specific technology. These approaches are more recent and most are still being piloted.

"**Self-supply for multiple uses**" is the one user-driven MUS modality. Here, users themselves invest in most infrastructure capital costs, often on an individual or household basis, although some communal arrangements may be included. Examples are self-financed wells, pumps, water harvesting techniques, gravity flows, drilling options, and water quality point-of-use treatment devices. Users decide about the purchase, installation and uses, which are often multiple. Scaling up self-supply is largely through market-led supply chains which are often highly effective and sustainable. Public sector support can focus on things like technological innovation, market development for supply chains, credit for purchase, and awareness raising.

The second user-driven MUS modality is "**community-based MUS**". In this modality, government or NGOs fund the bulk of mainly communal infrastructure construction or rehabilitation costs, but the choice of the technology, siting, and lay-out is in the hands of the community. Community members, including women and marginalized groups, are empowered to articulate their needs and demands, access information, and make choices regarding their assets and resources. This MUS modality applies the general principles of community-based natural resource management (CBNRM) to water resources. (Water sub-sectors divides probably contributed to the delay in adopting community-based management compared to land or forestry resources for example). Community-based MUS can be implemented on a project basis or align with the global trend toward decentralization of decision-making of public support through local government, or as a combination of both. An example of the latter is the SADC/Danida supported IWRM Demonstration Projects in five SADC countries (SADC/Danida 2009a and 2009b).

Integration in local government is important because local government agencies are permanent institutions, which not only provide a potential solution for financial and institutional sustainability of communal water systems, but also offer considerable scope for nation-wide scaling. Decentralized decision-making through local government about the allocation of public resources can lead to community-based MUS without any explicit

intention, but as a result of a community's own prioritization for improving the use of multiple sources for multiple uses. This is the case, for example, in India's Mahatma Ghandi National Rural Employment Guarantee Scheme (MG-NREGA), as elaborated in the India country study.

In scaling through local government or through programs interacting more directly with communities, the major challenge is to match bottom-up needs with top-down state and other funds. Institutional support should facilitate participatory planning, ensure inclusion of women and marginalized peoples, and build capacity for making informed choices to articulate long lists of community needs into priority-ranked, time- and budget-bound undertakings, or small 'bankable projects'. These projects are meant to be matched with available top-down financing streams. This can be achieved either by loosening some of the strings on financing and removing or modifying single-use and single-livelihood constraints, or by converging parallel financing streams and pooling them into one project.

In community-based MUS, communities plan and solicit external support based on their overview of all multiple uses and multiple sources for their livelihoods. At this level they can tap efficiencies of developing infrastructure for multiple uses and combining and managing multiple conjunctive sources, which saves funds. Also, communities can negotiate their water needs *vis-à-vis* the needs of other users in the same watershed and at higher levels. Inter-basin transfers may also warrant negotiation. They can formally voice their concerns through local government agencies, up to watershed, district and higher levels as the issue at stake requires, without depending on the top-down establishment of new governance layers like watershed and basin organizations where the more vocal social groups tend to dominate. In this way, community-based MUS is the lowest appropriate level for pro-poor IWRM.

The practice of change: MUS networking

The 'theory of change' of scaling via one of the four modalities or a combination thereof is one side of the coin. The other side is the 'practice of change'. In the past, MUS innovation and scaling was primarily the result of the effective crafting of networks of MUS proponents from local to global level into communities of practice or learning alliances, primarily through the global MUS Group (see www.musgroup.net). A 'right mix' provides for well-informed and rigorous evidence-based innovation, in which next generic lessons and local specificities are continuously identified. The same network also ensured continuous dissemination and advocacy of this evolving body of knowledge. Such a network also brought the 'right mix of people' together, encompassing water users organizations and professionals from the different sub-sectors; academics, policy makers, and implementers; experts at the lowest local level up to national and global levels; donors and financing agencies and government officials. This scoping study also analyses such past innovation and networking and recommends partners for future networking to implement the high-potential MUS scaling pathways.

2. GEOGRAPHIC FOCUS: ETHIOPIA

Ethiopia was selected for the study owing to the active engagement of several organizations with MUS issues, mainly NGOs and research centers, but also explicit recognition of the approach in policy. Some recent developments relating to multiple use water services in Ethiopia are listed below:

- Ethiopia was one of the focus countries for the Multiple Use Services (CPWF-MUS) project from 2004-2009 where the International Water Management Institute undertook studies with NGOs implementing MUS systems in Dire Dawa (HCS) and Tigray (ADSC) providing documentation of approaches and benefits.
- The MUS group – an international network – held its 2nd international symposium in Addis Ababa in 2008 where several Ethiopia case studies were also presented.
- In 2009, multiple use systems were explicitly mentioned as an alternative service delivery strategy in the guiding WASH sector policy, the Universal Access Plan (MoWR, 2009).
- RiPPLE has published several working papers and briefing notes on the policy and practice of multiple use water services and self-supply since 2008 (www.rippleethiopia.org).

The innovative implementation approaches of NGOs and advocacy by research institutes, including participation in the global MUS Group (www.musgroup.net) where Ethiopian cases have often been presented, has led to reasonably wide recognition of the potential merits of MUS. However, MUS interventions and approaches have not been scaled up widely in Ethiopia. This seems largely due to the same barriers that all MUS approaches typically seek to overcome, which is the conventional institutional structuring of water policies, water services implementation programs, and professional disciplines into fragmented, parallel operating 'vertical' sectors of single water uses.

Methodology in Ethiopia

This country case study report is based on review of documents and interviews with key informants. Interviews focusing on the scope and barriers for multiple use water services were held with a diverse group of key informants including professionals in different federal ministries as well as staff from NGOs and donor agencies. Most of these interviews were held around a national workshop on self-supply that was held in Addis Ababa in October 2011.

Report structure

A brief introduction to context includes background on Ethiopia in general, and specifically on water institutions and administrative levels. Next, we consider the enabling environment for MUS based on a review of past experiences and the knowledge and capacity that has been generated, and policy. The third section focuses on emerging modalities for MUS that have the most potential. Specific opportunities to support these emerging modalities conclude this report.

Context

Ethiopia - Africa's second most populous country - is one of the world's fastest growing economies. Over the past 10 years, it ranked fifth in the world with growth averaging 8.4%. It is predicted to be the third best performing economy in 2011 with growth around 10%, and to hold a similar position (averaging 8.1% growth) over the next 5 years, according to

forecasts from the Economist and the International Monetary Fund. Nevertheless, Ethiopia is among one of the world's poorest nations with a GDP (PPP) of just USD 954, placing the country 168th out of 181, and 10 times below the global average (IMF, 2009, see Box 1). Ways to use water to drive further growth are vital in this context.

Box 1: Some background and key indicators

Socio-economic indicators:

- Ethiopia has a largely rural population (82%).
- Poverty levels are moderately high compared to other Nile Basin countries (39% below national poverty line).
- Human Development Index: 0.414 (rank 171 of 182 countries, UNDP 2007).
- Life expectancy at birth: 54.7 years (rank 151 out of 176 countries, UNDP 2007).
- Adult literacy rate (% ages 15 and above): 35.9% (rank 145 of 151 countries, UNDP 2007).
- Main social services: health expenditures (USD 15/ capita), electric power consumption (43 KWh per capita) and female illiteracy (82%). Ethiopia scores lower than other countries in the same socio-economic bracket.
- Agriculture is the main provider of jobs (44.4%).
- In economic value, Ethiopia is both exporter and importer of agricultural products (import to export is 1.00). The total value of agricultural exports is considerable (USD 1,352 M) especially coffee, followed by hides and chat. With respect to food, Ethiopia is a net importer (value of food imports USD 1,131 M).

Water supply, irrigation and water use:

- Population with access to improved sources of drinking water: 26% JMP 2008 or 68.5% MoWE 2011). Functionality rate reported as 33% in 2007 (Chaka *et al.*, 2011).
- Irrigated land is a small fraction of arable land (4%).
- Total water abstraction is a small percentage of renewable resources (4.6%).
- No data are available on groundwater abstraction volumes.
- In some areas groundwater has high fluoride and arsenic content.
- Irrigation performance is poor as compared with Nile Basin countries (rank 8 out of 8) – especially adequacy (rank 8 out of 8) and agricultural water productivity are low (8/8).
- Most large, medium and small-scale water and irrigation projects focus on single uses, either irrigation or domestic.

Agricultural services:

- Road density is low (4 km/100 sq. km of land area) – affecting agricultural marketing.
- Fertilizer use is low and annually fluctuating, but higher than other in Nile Basin countries (7.7 kg/ ha).
- The use of mechanical equipment is minimal (1.7 tractor per 1000 sq km of arable land).

Institutions:

- The institutional framework for WASH, irrigation and water development is under development. Key policies in WASH are the Universal Access Plan and the WASH implementation framework. Main polices for irrigation and water resource development are the Ethiopian Water Resource Management Strategy (EWRMS), which include irrigation policy and irrigation development strategy; the Water Sector Development Program (WSDP), including Irrigation Development Program and the Strategy for Water Centred Development.
- At federal level, the three line ministries covering WASH are the Ministry of Water and Energy (lead), Education (for WASH in schools), and Health (sanitation and hygiene promotion) with the

same institutions involved at regional level through their Bureaus. The *woreda* (district) level is critical for new investments and support, where there is a degree of greater collaboration between different sector offices, but generally low capacity. At local level, community-based WASHCOs (although they don't yet do significant health and sanitation activities) are responsible for running rural water schemes. They are not yet legally recognized in most places.

- The institutional mandate for irrigation development at federal level is between the Ministry of Agriculture and the Ministry of Water and Energy. At regional level, multiple institutions are involved: Regional Bureaus of Agriculture, Regional Water Resource Bureaus (Zonal Water resources offices, *Woreda* Water Offices) and River Basin Organizations (still developing). At the local level water user associations are established – yet without a legal status.
- There is a water licensing system, and a payment system is developed, but enforcement of both systems is weak.
- All land is state owned. Only usufruct rights are bestowed on landholders but tenure in some areas is provided with more secure certificates. The usufruct rights exclude the right to sell or mortgage land.
- On indicators of government effectiveness and rule of law, Ethiopia scores well compared to most other Nile Basin Countries. Corruption perception index: 2.7 (rank 120 out of 180 countries, TI 2009)

The country is overwhelmingly rural, with the highest population density found in the highland areas. Agriculture is the main driver of the economy, accounting for more than half of the country's production. Over 80% of the population live in the regions of Oromia, Amhara and the Southern Nations, Nationalities and People's Region (SNNPR), which together with Tigray are known as the major regions. The more remote and emerging regions in the country are Somali and Afar, Benishangul-Gumuz and Gambela.

As a federal state, the regions constitute an important political level in Ethiopia (see Table 2). With decentralisation policies put in place, *woredas (*districts) are found at the frontline of service delivery. Other administrative levels are the zones between regions and *woredas* and the *kebele*, which is a sub-*woreda* unit considered to be the lowest level of government. There are approximately 800 *woredas* in the country.

Since 1991 and at the end of the Derg regime, the government has been dominated by the Ethiopian People's Revolutionary Democratic Front (EPRDF). Policies emphasising federalism and decentralisation have since been introduced, with the support of donors with strong commitments to poverty reduction and the achievement of the Millennium Development Goals. In a study conducted by DFID (Barnett, *et al.*, 2009), the overseas development agency of the United Kingdom highlighted the existence of relatively sound and transparent public financial management systems in Ethiopia and the increase in expenditure in the social sectors. In the same report, however, the political context has been very much criticised for the imbalance in power manifested by a strong state that had effectively reduced space for opposition and civil society participation (Barnett, *et al.*, 2009).

Table 2: Government roles at federal, regional and *woreda* levels (application to both WASH and agriculture sectors)

Level	Roles	Comments
Federal	• Formulation of policy, strategy, regulatory and planning mechanisms • Provision of approaches and support (preparation of guidelines, manuals, etc.) • Decision making on spending of national resources as well as allocating regional government budget from treasury • Coordination of the implementation of largest capital investment projects • Negotiating and signing of donors budget support and channeling to regions	• There is sometimes a rather loose connection to the regions.
Region	• Decision making on spending of regional resources e.g. allocations between *woredas* (by regional cabinet) • Implementation of major projects and programs • Provision of technical support to zone and *woredas* • Donor and NGO coordination (by BoFED) • Follow up on progress of implementation of activities by *woredas* (including those implemented with support from donors)	• Have significant 'autonomy' i.e. federal policy change does not always trickle down quickly
Woreda	• Decision making on spending of *woreda* resources (by *woreda* cabinet) • Implementation of smaller projects • Following up the proper functioning of schemes and reporting to the higher levels e.g. where repairs are beyond capacity • Planning of different projects and coordination with donors • Supporting WaSHCOs technically and on scheme management and handling of collected monies	• Plans are often ambitious and lack the budget for implementation (reliance on NGOs and donor projects) • Due to the lack of capacity and budget the follow-up of schemes is limited
Kebele	• Planning and implementing • Support and follow up e.g. to WASHCOs • Coordination: Kebele managers, agricultural development agents (DAs), Health Extension Workers (HEWs), school directors and Kebele chairperson works as *Kebele* WASH team	• No WASH staff at this level
Local (WASHCOs, WUAs)	• Day-to-day management of schemes after 'hand-over' • Collecting fees • Small operation and maintenance	

Although many parts of Ethiopia are arid and even groundwater inaccessible, in large areas there is significant shallow groundwater (within fifteen meters) bringing it within striking distance of dug wells or hand drilled wells. This is still a major untapped resource. Examples of such areas are Butajira (SNNPR) and Raya (Tigray). Another area with large scope for shallow wells are the flood plains and lake fringes, such as Becho (Oromia), Fogera (Amhara) and Lake Koka (Oromia) and dried lake beds (Lake Haramaya). Figure 3 is a general overview of the high potential areas for shallow groundwater irrigation. With successful land management programs in parts of Ethiopia – most notably in Tigray, some groundwater tables are said to have come up, making self-supply for drinking water and irrigation possible.

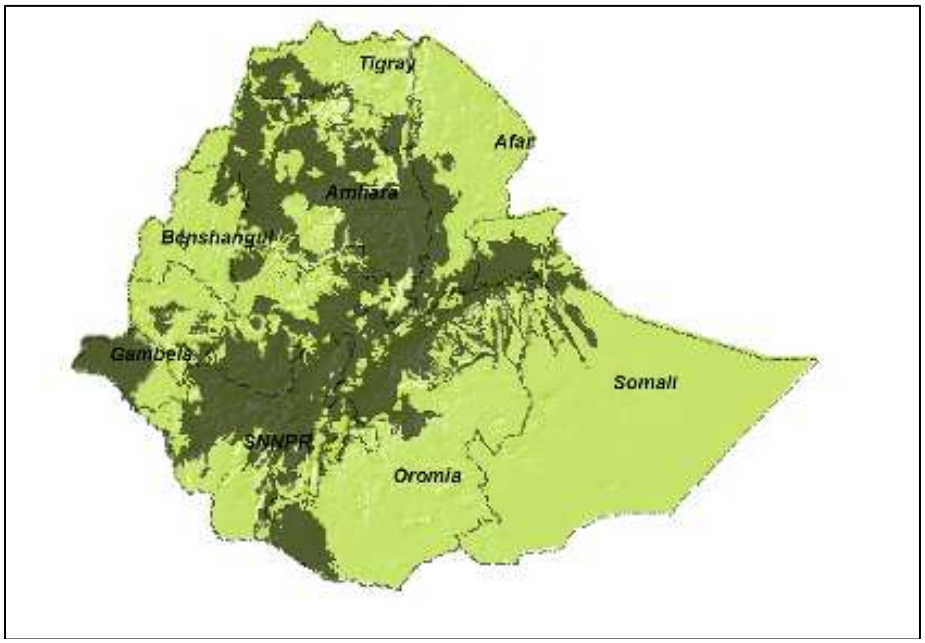


Figure 3: Highest potential aquifers in Ethiopia
Source: Seifu Kebede (Addis Ababa University)

Legend
Dark green: Relatively high groundwater potential areas for which small to medium scale irrigation can be envisaged
Light green: Areas with low groundwater potential. Water table is deep, or salinity is higher or recharge is limited.

3. THE ENABLING ENVIRONMENT FOR MULTIPLE USE WATER SERVICES

Recent experiences

This section briefly reviews recent experiences with MUS in Ethiopia. There is a rapidly growing knowledge base on the topic and capacity issues are becoming better understood. Policy is addressed separately in the next section.

Interest in multiple-use water services is on the rise in Ethiopia and even the acronym MUS itself is fairly widely recognized now. In recent years, several implementing organizations, mainly NGOs, have been implementing and upgrading community managed systems that cater for either domestic water use, or productive water uses, like irrigation, watering livestock and other micro-enterprises, and integrate these different uses. In addition, household members have been implementing systems that serve their multiple uses for water through the approach known as self-supply (usually digging your own family well or rainwater harvesting).

Some of the existing experiences and MUS champions include:

- Local farmers who have constructed their own water wells and rainwater collection systems and use these primarily for agriculture, but also for cattle and household use. In recent years the Ministry of Agriculture has promoted this, but not in consultation with other ministries. Families have also received support from local shallow well diggers or drillers and pump providers (particularly the rope pump).
- NGOs such have PLAN and the Hararghe Catholic Secretariat (HCS) have systematically given attention to MUS in their programming. HCS, AFD and the RAIN Foundation, have initiated a number of successful projects including sand dams (see Box 8) for multiple uses but these are not being promoted through government policy and institutions.
- Some development partners (e.g. UNICEF, Dutch Government, Finnish Government, WHO) are now also becoming interested for a combination of reasons including food security, water safety and income generation.
- Research programmes and institutes (notably RiPPLE and IWMI) have participated in international MUS group meetings and pilot projects including a MUS focused learning alliance in eastern Ethiopia. They have been involved in case studies and sharing experiences with the government and NGOs and have contributed to getting MUS into programming in some cases.

This collective experience is generally not supported by the government in practice except for the combined provision of water for domestic use and livestock in some areas, nor is it recognised or pursued by most sector professionals for lack of understanding, guidance and orientation. Limited documentation of experiences is common on this and other aspects in water development, with some important exceptions as summarised in the following sections.

Multiple Use Services (CPWF-MUS) project

Ethiopia was one of the focus countries for the Multiple Use Services (CPWF-MUS) project hosted by the Challenge Program on Water and Food (www.musgroup.net/page/836).

The project ran between 2004 and 2009. The aim of the project was to understand how people were using different water systems for multiple purposes. The international NGO Catholic Relief Services (CRS) had already started supporting community-scale MUS projects, implemented by its partners, but no research on MUS had been done in Ethiopia prior to the CPWF-MUS project.

The work at the community level was carried out in five areas: in Dire Dawa Administrative Council and some nearby villages in Eastern Harerghe, Oromo Region; in Tigray Region in the Adidaero and Wukro watersheds and in the western Oromo Region near the town of Ginchi. In addition, several water harvesting sites in Oromia and Southern Nations, Nationalities and People's Region (SNNPR) and irrigated areas in Amhara Region were studied. Several studies were done in the Lege Dini Peasant Association, in Dire Dawa Administrative Council. Lege Dini is a mountainous semi-arid area and groundwater is the predominant source of water. The farming system is agro-pastoralist and comprises field cropping and livestock rearing. The project worked mainly with a local NGO, Harereghe Catholic Services (HCS), supported by CRS. The case study focused on the impacts of the MUS approach practiced by HCS to provide rural water services in an integrated way, using multiple sources (where available) for multiple uses, with attention to water quality and water use. Local government was involved through their day-to-day relationship with HCS, and by involvement in a learning alliance established by IWMI and HCS.

The Tigray Region has similar physical characteristics and precipitation levels to Lege Dini. Livestock is an important part of people's livelihoods, complemented by cultivation. Here the work also focused on the documentation of experiences of CRS partners in the watershed of Adidaero, complemented by student research on farm ponds implemented by the Bureau of Agriculture in the Wukro watershed. However, there was no learning alliance. Yubdo Legebato Peasant Association in Dendi *woreda* in western Oromia near the town Ginchi is in a slightly more humid highland climate with rainfall of 800-1200 mm/yr. The additional studies were focused on water quality and potential for home water treatment. An MSc thesis was also carried out on the willingness of irrigators to pay for multiple uses of water in Amhara Region.

In both Dire Dawa and Tigray, a key factor in the development of multiple use systems was an enlightened NGO that was able to see the additional benefits of an integrated approach, and was flexible enough in its programming and support to link interventions that otherwise are often separate.

Box 2: Study of two multiple use systems in a dry area in Dire Dawa Administrative Council

As part of the MUS project, this study did deal specifically with institutional constraints. The study paints a picture of complexity in the institutional arrangements for the development of water, confusion from the perspective of the community, with numerous agencies involved from government (separate offices for water, health, agriculture, disaster preparedness etc.) and different projects and programs. In these schemes, an integrated watershed based development project and an active NGO helped contribute to the successful development of borehole based water supply schemes serving domestic, livestock and home gardens (sometimes just a few papaya trees). The findings point to the need for inter-institutional collaboration to support communities through MUS projects which fit well with their needs and have strong benefits in terms of health and other outcomes. However, the challenges in doing this are considerable. MUS does not fit so well with the institutional realities at local government levels and the systems themselves are fragile. When a high-tech pump needed replacement after a couple of years, there was no plan or preparedness for this predictable eventuality (see more detail on this case in Box 3).
Source: (Jeths, 2006).

Box 3: Linking domestic and livestock water supply

In 2002, a borehole with a diesel pump was installed in the central village of Ajo in Legedini, Eastern Harerghe. Later this was extended with several reservoirs and a network to reach the hamlets of Hallo, Edo and Edo Bolo. The improved water supply was used for domestic purposes, including the watering of small and dairy animals that are kept near people's houses. Domestic water consumption increased but remained were low at only 8-17 lpcd, but even this was sufficient to facilitate some multiple uses, in particular for livestock watering which has a high priority.

The increased availability of water had positive impacts on livestock. Animals could now drink twice a day instead of once every two days. Because they did not have to walk so far, the number of spontaneous abortions in cattle diminished. They had better appetites and, combined with the higher water intake, produced more milk per animal. Now women could sell 0.5 – 0.75 liters of milk per day in the market. The extra income is spent on the household.

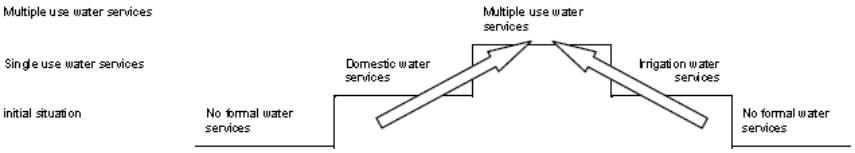
After a breakdown of the system in early 2005, the pump was repaired and enabled people to use kitchen wastewater (that they did not have before) for irrigating papayas for the local market and home consumption. By setting up a water committee, the community gained access to banks as a new way of saving instead of keeping livestock as assets.

The community members stated that a multiple use approach to water is the only way to manage limited supplies in an arid environment. In Ethiopia, livestock water requirements often have priority even over drinking for people but this is not always recognized by conventional water planners. The system in Ajo allows for all sorts of water use as identified by the community and can easily be extended and upgraded over time. Though the cost of pumping is high and fuel is not always easy to obtain in this remote area, users are interested in contributing local material, labor and even cash to further develop their water supply.

Source: Eline Boelee (IWMI), based on work by Esther van Hoeve, Pauline Scheelbeek, Martine Jeths and Desalegne Simachew.

RiPPLE research on costs and benefits

A RIPPLE study (Adank *et al.*, 2008) set out to describe examples of domestic-plus and irrigation-plus interventions and to determine the related costs and benefits. The study focused on two communities: Ido Jalala and Ifa Daba, in Gorogutu *Woreda*, East Hararghe Zone, Oromia Region, Ethiopia. In both cases, before the project intervention an unprotected spring was used by the community for domestic water use, animal watering and small-scale traditional irrigation. There was thus a clear demand for improved water services that would address these multiple demands. From the initial, pre-implementation situation, the two cases took a different path towards multiple use water services. In Ido Jalala, a water supply system for domestic use was implemented first, which was later upgraded to also supply water for irrigation. This is referred to in Figure 4 as the "domestic plus" path. In Ifa Daba the source was first developed to supply water for irrigation, while a standpipe for domestic water supply, was later added directly connected to the spring. This is indicated as the "irrigation plus" path in the Figure 4.



	Domestic plus	**Irrigation plus**
Case:	Ido Jalala	Ifa Daba
Spring discharge (l/s):	0.4	1.4
Number of households served:	70	121
Year of single use system implementation:	2005	2004
Year of implementation of the multiple use add-on:	Under construction at the time of the study	2007

Figure 4: Pathways towards multiple use water services

In both cases, the capital investment costs, operation and maintenance costs and the direct support costs (costs of support from *woreda* and regional level) and the benefits from improved health, time saving and agricultural production were determined and compared for each of the steps towards multiple use water services. Figure 5 gives an overview of the benefit/cost ratios and the ratios of the additional benefits/additional costs.

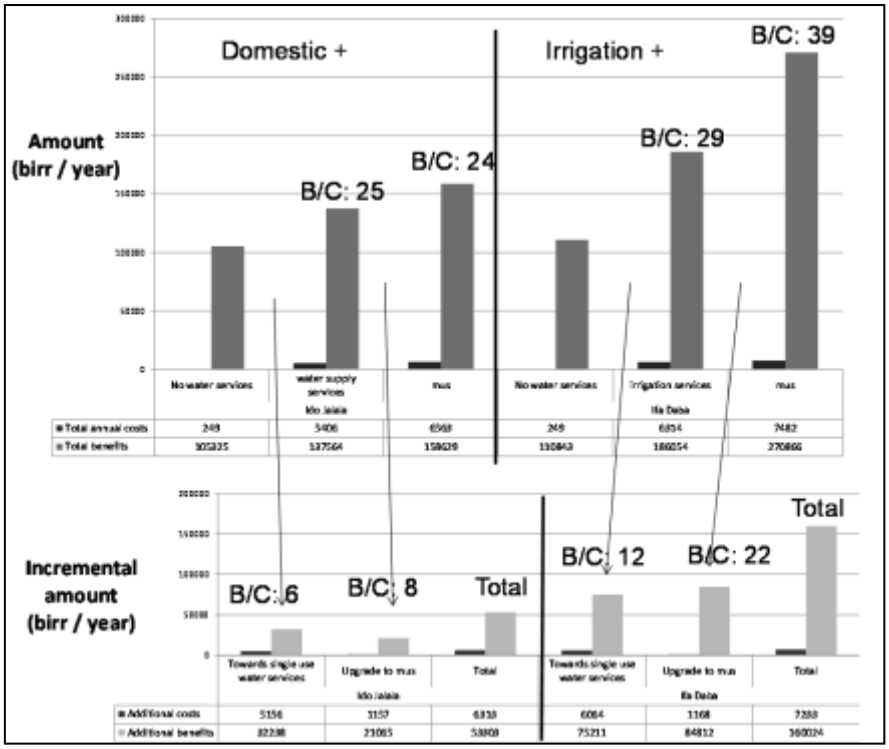


Figure 5: Benefit/cost and incremental benefit/cost ratios

In the case of Ido Jalala (domestic plus path), the increase in benefits in the step from no water services to water supply services is caused by an increase in health and time saving benefits. These outweigh a small decrease in benefits from irrigation, caused by a decrease in irrigated area in this step. With the addition of the irrigation canal in the step towards MUS, the irrigated area is again increased, as are the irrigation benefits. The benefit/cost ratio is about the same for the water supply situation as for the MUS situation, but the absolute benefits (and costs) are larger in the MUS situation.

In the case of Ifa Daba (irrigation plus path), the benefit/cost ratio for multiple use services is higher than for irrigation services, which suggests that adding a domestic water component (spring) to an irrigation system is a good investment. It could be argued that the reason is that the system is a developed spring system, which means that little extra investments and operation and minor maintenance expenditure had to be made to supply water of suitable quality for domestic purposes.

In both cases, the incremental B/C ratio is higher for the upgrade to MUS than for the step towards single use water services. This shows that indeed high incremental benefits can be obtained with relatively small incremental costs when a single use system is upgraded to cater for multiple uses. Enabling multiple uses of water by providing multiple use water services results in high benefits, as shown by this study.

Research studies on self-supply in Oromia and SNNPR

Self-supply involves households taking the lead in development and investing in the construction, upgrading and maintenance of their own water sources, lifting devices and storage facilities. It is practiced at scale with tens of thousands of wells constructed by households over recent decades. Family or traditional wells are the most common source with various types of lifting devices used, starting from a rope and bucket. Rope pumps are

Box 4: Examples of self-supply

Photos: Sally Sutton

Unprotected traditional well

Semi-protected traditional well

Rope pump

Hand pump

Diesel or electric pump

being promoted as a step ahead, and in some specific areas, diesel or electric pumps are common. Roofwater harvesting is another possible technology. Until now, there has been relatively little information available about the performance of family or traditional wells, with water quality studies for example, tending to focus on community sources such as wells or boreholes fitted with hand pumps. A recent report (Sutton *et al.*., 2011a) has brought together the findings of two complementary research studies on the role of self-supply in water services provision in different regions (Oromia and SNNPR) in Ethiopia. This section is based upon that report. A related report provides more detailed results from SNNPR (Sutton *et al.*., 2011b)

One important finding reported is that family wells are often for multiple uses, and that wells shift families into year-round food security and beyond. Family wells are used for both domestic and productive uses, bringing major advantages in increased food security, health, school attendance and better childcare according to well owners. More easily accessible well water was found to have brought about major economic changes with increased animal watering (around 90% of wells in SNNPR and some parts of Oromia are used for livestock, but only 35% in some other *woredas)* and crop production (traditional wells being used for irrigation in 20-30% cases and with rope pumps and mechanised wells employed for irrigation in 43 and 68% cases respectively). These patterns of usage were found to have brought many family well owners from below subsistence level to having food all the

year round and even some to sell. Communal hand pumps are rarely used for productive uses due to distance, queues and sometimes cost, and indeed in many cases they only provided a few litres of water for drinking, with families collecting the balance of their water requirements from more convenient alternative sources like family wells.

A related finding was that family wells often provide a free service to part of the community. Wells are usually shared widely, except in areas where almost everyone had their own well. People give their neighbours access to their well in almost all cases (90% of wells were shared). On average, 'family' wells were shared by 12 households and water from mechanised wells shared with over 20 households. Perhaps rather than family wells, we should talk about 'multi-family' wells. But it is crucial to recognise that this culture of sharing is voluntary, and the investment is household-led rather than communal.

Introduction of the rope pump

Technologies that facilitate MUS and are currently the subject of attention include the rope pump, manual drilling of low cost boreholes and the uptake the mechanised (mainly electrical) pumps in some high value crop cultivation zones (e.g. chat cultivation areas). The rope pump in particular has been the focus of considerable effort.

Sutton *et al.* (2011b) based on a review of experiences in one region, SNNPR, paints a sobering picture for enthusiasts of introducing technology. Despite several years of effort, the introduction of demonstration rope pumps has not led to widespread uptake (only about 250 pumps installed). And many of the pumps installed are reported not to be working (60%). Demand does not seem to have been created in any sustainable way through the introduction approach focusing on demonstrations, training manufacturers and often, government or NGOs purchasing pumps for subsidised distribution.

The same study, which selected wells used from drinking (rope pumps generally being installed for mainly irrigation uses so the sample was of wells used for multiple purposes), also showed that it is possible to achieve reasonable water quality performance from rope pumps, but that poor installation often fails to minimise water quality risks. Interesting differences in approach were identified between the Bureau of Water Resources model with a more government-led approach and the Bureau of Agriculture (BoA) model with more focus on the role of the private sector, NGOs and developing supply chains. The BoA were reported to have targets for over 400,000 new sources (wells and ponds) and much could apparently be gained (from a MUS perspective) by exploring potential links between water and agricultural sector interventions.

Problems associated with rope pump manufacturing were identified in a study for UNICEF by Mammo (2010). This identified other areas with more progress than SNNPR including Oromia and parts of Amhara (even 'hot' in East Gojjam in Amhara with perhaps half of the countries pumps). This pointed to gaps in communications and promotion, quality of pumps, standards and procurement practices but also the need to understand and link to self-supply rather than focusing only a water extraction technology.

Rainwater harvesting ponds

Driven by a government-backed campaign there was a surge in the construction of rainwater harvesting ponds between 2002 and 2005, both before and during the family wells campaign. These were mainly intended for agricultural uses and overall the results are considered to have been mixed, with many ponds not functional partly because they were pushed too hard against unrealistic targets with a highly subsidised approach and limited training or ongoing support.

Lemma Hagos (2005) reports on how these ponds are used for multiple uses amongst others. Although in Tigray the ponds were sometimes far from the homestead, and yields sometimes limited due to low inflows and high losses, the best ponds did enable families to develop or expand home gardens and provide irrigation water during dry spells in the rainy season. A paper by Teshome *et al.* (2010) reported on success in one *woreda* where the ponds fulfilled a useful function with high returns from irrigation of onion seedlings. But multiple uses were also identified. The authors noted that "among most of the households, the water from the pond is used for domestic purposes, livestock watering and supplemental irrigation, especially of horticultural crops. About 45% of the water is used for seedling and fruit production, 50% for livestock watering and 5% for domestic use."

Policy and institutional issues

During this scoping it was possible to form a more detailed view of policy issues in the domestic WASH sector. This section also introduces some aspects with respects to irrigation where information was available to the authors.

Although the multiple use water services approach was highlighted in the key strategic domestic sector document, the Universal Access Plan (UAP), in its 2009 revision (MoWR, 2009), no experiences or models for community-level MUS have yet been taken to scale beyond the provision of livestock troughs as part of rural water supply projects. As we will discuss later, the household level or self-supply approach has been scaled up to some extent.

The 2011 (draft) WASH Implementation Framework (WIF; MoWE, 2011) mentions multiple use three times. It also deals extensively with self-supply (mentioning it 150 times), which as we will have seen is often for multiple uses. Twice, the WIF refers to MUS as a responsibility of the WASHCO in the post implementation phase under nutrition and income generation: "WASHCO plans, finances and implements projects on multiple use of water p66) ", and once in the context of capacity building: "The need for effective integration of Hygiene, Sanitation and Water Supply components of WASH, and the need to understand and respond to demand for water for multiple uses, not only domestic water supply, demands a broader knowledge base and wider skill set among WASH planners and field practitioners and an increased capacity for teamwork" (p111).

Although it may offer greater benefits, the planned provision of multiple use water services puts higher demands on organizational and institutional arrangements and inter-sectoral coordination and communication. The slow progress with implementing the WASH MoU, an agreement for coordination between the three line ministries covering water (Ministry of Water and Energy), education (for WASH in schools) and health (sanitation and hygiene

promotion), shows what a challenge the issue of concerted action between different sectors is in a context of low capacity and high targets to increase coverage. These pressures all tend to reinforce the tendency towards a 'business-as-usual' approach, focusing on tried and tested, traditional approaches. Despite all the potential benefits, the biggest challenges to scaling up multiple use water service approaches are therefore the institutional constraints faced at all levels, with limited incentives yet extra costs for agencies with their own mandates. These agencies need to expand their mandates or collaborate. Ways to tap the lower overall costs of investments in integrated multiple use systems at a community level or higher level need to be found.

The Government of Ethiopia is now led by its Growth and Transformation Plan (for the period 2011-15). At first glance, this overarching plan, to which the sector plans contribute, should be just the incentive required to promote integrated development approaches such as MUS. However, in practice there has been little sign of the GTP leading to such different priorities in policy formulation in the water sector that takes account of the wider potential benefits of WASH and promotes integrated approaches. The targets from different sectors are all aligned at federal level, but there is apparently little movement driven by the GTP towards more integrated activities like MUS at local levels. The Ministry and departmental silos are strong, and the rural WASH efforts remain concentrated on accelerating coverage.

The important exception, and a major development that we discuss in this study, is a new initiative of UNICEF to link WASH and nutrition interventions including application of a domestic-plus approach to MUS at scale. Another example is WaterAid Ethiopia's policy on linking water and food security, which is typical of a wider awareness of the need to address these issues together. WaterAid's Ethiopia country strategy 2011-2016 includes as one of six specific objectives that 'WASH components under the food security sector in Ethiopia and WASH sector programs are effectively linked and coordinated'.

Other changes in WASH policy driven largely by changes in financing modalities are emerging and these may have significant impacts for the uptake of MUS. As set out in the WASH implementation framework (2011), the domestic water supply sector will now be managed around four main financing modalities or service delivery models.

1. **Woreda-managed projects** are the conventional approach whereby regions/*woredas* take the lead in developing new water points which are later handed over and operated and maintained by communities. Investment costs are borne almost entirely by government or a development partner with a small community contribution. This has been the main approach to date, but in future, *woreda*-managed projects are intended to be only an implementation mechanism for more complex infrastructure projects.

2. **Community-Managed Projects** (CMP) are intended to become the main approach for rural water supply. In Ethiopia, CMP has specific characteristics. CMP delivers projects on the ground that are 'implemented and managed' in the true sense by communities. The key features of CMP are that it uses micro-finance institutions to route money to communities, who are involved in all aspects of development of their own water supply scheme. This is usually a grant to cover investment costs although there is a community contribution, typically around 20%. Communities plan, procure services and construct

schemes themselves rather than assuming ownership when schemes are 'handed-over' to them. The financing mechanism that underpins CMP is known as a Community Development Fund.

3. **Self-supply projects** are where families develop complementary access at household level. Family wells and associated storage and pumping facilities are paid for entirely through private household investment with no subsidy.

4. **NGO projects** are the fourth mechanism. They provide scope for alternative approaches and innovation.

Some NGOs in Ethiopia have innovated around MUS approaches in their programming, but have yet been unable to scale up these interventions. Water schemes developed through *woreda*-managed projects hold rather limited potential for MUS since the pressures on these schemes for domestic water supply are so high and because the designers are generally not far-sighted enough or able to design for multiple uses beyond the provision of livestock drinking troughs. However, it is the two new formalized and more decentralized financing and service delivery mechanisms in the rural water supply sector, CMP and self-supply, which create new opportunities.

Because they both decentralize aspects of decision-making to communities or households, these mechanisms both offer considerable potential for MUS where there is the interest of the communities and households involved. Also related is the recognition that the number of non-operational systems has to go down (with a target of 10%) requiring better arrangements including financing for O&M with a stronger call on local resources. Here MUS may have a role to play by helping households and communities save or earn money from better water supply systems that facilitate productive activities, although this idea needs to be proven in practice for communal (rather than household) systems.

At the same time, a growing number of sector staff are beginning to understand the importance of MUS and the importance of an integrated approach to combating water and food security, among other reasons because available land per family is reducing (to some 1-1.5 ha in highland areas). This creates a greater need for small-scale irrigation to produce enough to feed families and diversify livelihoods. Climate change and the urgency of adaptation present a further reason to intensify efforts to develop water resources, use them efficiently, and protect water sources.

From the agricultural perspective, there is a plan to develop 1.5 million hectares under small-scale irrigation in the period of the Growth and Transformation Plan. The current estimated area under small-scale irrigation varies depending on what is included, improved, traditional, water harvesting, family gardens, but most estimates put the area under irrigation around 140,000 ha, with another 50-60,000 to be added as spate irrigation.

These plans are partly matched by investments. The main vehicle is the multi-donor Agricultural Growth Program led by the World Bank. This aims to support the development of different water-centred investments, small-scale irrigation being a main component. Outside this program there is the Small-scale Irrigation Project of IFAD, as well as

programmes from JICA and regional governments. In addition, under the Agricultural Transformation Cell, a parallel program of promoting very small groundwater based family irrigation has recently been considered under funding from the Bill and Melinda Gates Foundation. The status of this initiative is unclear at present.

Lastly, several resource conservation programs are undertaken in Ethiopia. Some successfully recharge groundwater. The Sustainable Land Management Program in particular is currently shifting from a technical top-down, food-for-work and relief approach to more involvement of community leaders in decision-making (Amede *et al.* 2007). Other projects pilot community participation in rainwater harvesting and resource conservation, such as the innovation forum supported by the Challenge Program on Water and Food in Diga, Jeldu and Fogera watersheds. However, there is limited attention for approaches that start from people's livelihood interests and own priorities in sustainably using water and land resources, instead of starting from resource conservation, determined by outside technicians. This would improve livelihoods and create ownership, and, hence contribute to sustainability of the investments made.

4. Emerging Modalities for MUS

Existing modalities, entry points and potential for MUS are discussed in this section according to the two main service delivery modalities in the domestic rural water supply sector that hold most potential, community managed projects and self-supply, and also the small-scale irrigation sector which is the third entry point. An overarching networking and learning opportunity is also identified.

Community Managed (WASH) Projects and MUS

Until now, the application of MUS in communal WASH systems has been rather limited and mostly confined to the provision of water for livestock, particularly in pastoralist areas. Although there are exceptions that need to identified, typically the yield of communal water points is rather low, and the demand of users for domestic so high, that there is little potential for multiple uses. Water points also tend to be a considerable distance from households (the rural norm is to provide 15 lpcd water within 1.5 kilometres). This means that most people have service levels that barely can be considered basic domestic on the MUS service level ladder as suggested by Van Koppen *et al.*., 2010.

Where *woredas* have taken the lead in developing new water supplies, the vision of *woredas,* and their development partners has generally been to develop domestic water sources separately to developing water resources for small-scale irrigation and livestock. However, interest in responding to MUS demands is growing and some NGOs such as WaterAid now include the assessment of the need to provide water for MUS in their projects. Where NGOs have innovated and responded to demands or taken advantage of high yielding sources, this has generally been through add-ons to systems designed either mainly for domestic or irrigation purposes. Several people also indicated in interviews that MUS is now becoming a MUST to be able to cater for the costs of water supply.

The new approach to rural WASH, which is known as Community Managed Projects (CMP), is essentially an innovation in financing. Known until now as a Community Development Fund (CDF), this was first introduced in 2003 as part of the Rural Water Supply and Environmental Programme (RWSEP). Successful pilot projects in two regions, Amhara and Benishangul-Gumuz, led to the decision to mainstream CDF when the name was changed to CMP in line with sector policy documents. The approach addresses a widespread problem, which is the under-spending of budgets for capital investment in WASH, and it has led to faster development of new water schemes. An evaluation showed implementation rates achieved were five times higher (1,000 water points per year compared to 200 water points per year) with above average functionality rates (94% using the approach compared to an average of 75%) and more effective use of budgets (100% compared to 53%).

The unique and innovative feature of the approach is that funds for investment in new schemes are transferred to communities via a micro-finance institution rather than the *woreda*. The community water and sanitation committee gets involved earlier in scheme development and although significant support is provided, communities effectively build the schemes themselves doing the hiring of artisans and procuring of services required. The approach has generally focused on low level technologies such as hand dug wells and spring protection.

Over the past eight years this approach has been followed in the development of some 8,000 new water points. In theory, this more empowering form of community managed WASH should facilitate MUS where the beneficiary communities have requirements for productive as well as domestic uses of water. However, there have been no studies done on whether this has actually been the case. It is also possible that the uptake of MUS and innovations by communities to facilitate productive use will have been low because 1) the focus on hand dug wells, i.e. low yielding sources, generally fitted with hand pumps; and 2) guidelines and support from *woredas* and project team members that are unlikely to have encouraged MUS.

Where communal wells are being developed, multiple uses will generally require higher yields than are possible using a single hand pump to reach a level of service of basic or intermediate MUS. Although livestock troughs are quite common (and not always used), yields are not sufficient for gardening beyond the few crops that a caretaker may look after as an accepted benefit of the job. Mechanised pumping is associated with relatively high operating costs which may only be sustainable where community-level systems are well managed to ensure the benefits translate into payments to cover operating costs and productive uses are for high value activities. Springs offer considerable potential, and where gravity-based distribution is possible, successful community level MUS schemes have been developed. A further type of source in water scarce areas of the country are sand dams (see Box 8), with experience involving organisations such as HCS, AFD, RAIN Foundation and ERHA in areas such as Dire Dawa and Borana in SNNPR (these sources are discussed in the section on small-scale irrigation).

Another opportunity for MUS is institutions such as schools. School WASH projects can also be funded through the CMP mechanism. As well as the educational value, generating income or nutrition benefits, gardens can be used as demonstrations to involve parents who can learn to improve their own gardens and exchange experiences with neighbours.

There are a number of challenges to accelerating MUS through the CMP approach:

- The CMP approach to community WASH has been tested at scale (in Amhara and BSG regions) but is only now being scaled up nationwide. At least three new regions (Oromia, Tigray and SNNPR) will work through the CMP approach in 2012.
- Opportunities for MUS are only likely to be fully realised if supporting agencies and professionals are aware of MUS modalities and their advantages and disadvantages. MUS therefore needs to be part of the capacity building strategy, and included in communications efforts.
- Efforts to make water available need to be combined with providing advice on crops and working with communities and households (often with women) on vegetable gardening and nutrition. This requires collaboration at district and community level with support from higher levels. Marketing knowledge and ability to undertake market assessments is scarce.
- Managing multiple uses requires well-functioning WASHCOs that develop and adapt appropriate rules to manage different uses.
- Credit may be required by householders to enable productive uses for example for the purchase of extra storage tanks by individuals.

Specific opportunities

The Community Managed Projects approach appears to offer good potential for MUS although it is not yet proven as a mechanism for developing multi-use projects. Research is required to look back at the impacts of the CMP approach on design of projects in the RWSEP and FinnWASH-BG projects, and promoting MUS through action research within the new nationwide programme. The COWASH project team responsible for scaling up CMP are interested in investigating the issues and promoting experimentation with multiple uses. A new UNICEF coordinated programme also has considerable potential for innovation and impact with MUS approaches being applied at scale.

COWASH project: scaling up CMP

COWASH is a technical support project within the Ministry of Water and Energy which is tasked with building the right enabling environment for CMP at the national and regional levels. The intention is to scale up CMP nationwide as the main mechanism for rural WASH service delivery, and to ensure it is an institutionally sustainable programme. Amhara region (through the RWSEP project) and BSG (through the FinnWASH-BG project) are already working with the CMP approach, and Oromia, Tigray and SNNPR regions will all start working with the approach in the 2011/2012 Ethiopian financial year (i.e. from October 2011). The technical support team based in the MoWE are providing support to the national ministries for water and finance, micro-finance institutions and regions.

The effort includes a large capacity building programme. COWASH is also developing a research programme, for which it seeks financial support, to encourage collaborative research on CMP with universities and research organisations. MUS will now be added as one of the potential research themes. One early priority is to investigate the extent to which existing projects developed using the CMP approach (i.e. in Amhara and BSG) involve any multiple uses. If yes, how has the CMP approach facilitated multiple uses? If no, why has the CMP approach not facilitated multiple uses?

There is also an interest to undertake action research through pilots on promoting MUS as part of the roll-out of the CMP approach nationwide. Previous action research (e.g. by RiPPLE and the MUS Project) has not been undertaken within the context of a genuinely national implementation programme that could lead to scaling up if successful. Where there are community demands, additional financing as part of the funding routed via the micro-finance institution could be provided with additional capacity building and support on necessary elements (pumping systems, storage, micro-irrigation, crop and livestock management, marketing, operational rules).

Community WASH projects are funded through MFIs with a grant. The MFI is a cost effective channel for delivering money, but it could be envisaged that additional productive elements of schemes be funded as a mix of grants and loans, and families funded for household level MUS (self-supply) through 100% loans. At the same time, apparently there is interest in applying the CMP approach in agriculture with a mix of grant and loan modalities through MFIs.

Integrating WASH, Multiple Use Services and Community Based Nutrition for Improved Food Security and Reproductive and Sexual Health' project

The most ambitious initiative that we are aware of to scale up an explicit MUS-by-design modality is the proposed project on Integrating WASH, Multiple Use Services and Community Based Nutrition for Improved Food Security and Reproductive and Sexual Health led by UNICEF. This new project, which started in September 2011 with funding from the Government of Netherlands, CIDA and UNICEF, has a total budget of 28 million USD. To "maximize synergy and impact, the proposed project effectively combines a Community Based Nutrition package … and a related WASH package that includes, wherever possible, Community Development Fund and the Multiple Use of Services". It aims to construct 1,250 community managed water schemes in 30 *woredas* where MUS will be promoted through an integrated approach including activities at household self-supply, community (not much detail provided although a study of technical options is planned) and institutional levels (schools and health centers), including 60 school-managed market gardens to demonstrate the benefits of MUS to surrounding communities. UNICEF works closely with national government and by its scale and explicit focus to integrate MUS, this project will be the most important experiment on scaling up MUS with significant potential to learn lessons, influence policy and build capacity.

The project's purpose is "to improve access to and use of sustainable, multiple use of water supply systems, appropriate, safe sanitation, and strengthen hygiene practices, integrating these inputs with a community-based nutrition package in order to reduce stunting and contribute to improved food security and women's reproductive health". One of the specific objectives is to "demonstrate and promote MUS for both enhanced food production and economic empowerment within the same communities ..., through access to information and technology, and access to micro-credit for local financing, with a particular focus on women's groups."

The intention is to take a multiple use approach to both sanitation and water, which recognises that the demands for use of urine and composted faeces in agriculture are less well developed than the unmet demands for productive uses of water. The team now talk of 'multiple use services' or 'multiple use systems' rather than 'multiple use water services' (Box 5).

The innovation here is to link several different activities, principally water supply, sanitation and hygiene and community-based nutrition, while at the same time including alternative service delivery approaches like self-supply and multiple use services linked to community WASH and institutional-based approaches. The water supply financing mechanism that will be followed is the CMP approach where communities are given more say in the design and development as well as operation and maintenance of their own water points. In theory, this ought to enable MUS by giving communities more choice although the technical and management advice given is likely to be crucial.

Box 5: Multiple Use Systems as described by the Integrating WASH, Multiple Use Services and Community-based Nutrition for Improved Food Security and Reproductive and Sexual Health project

"Multiple Use Systems for water and sanitation are designed to meet demand for domestic and productive uses at household (for example, in the context of family wells) and at community levels. Whilst the term MUS is most often applied to water supply, for example, providing water for livestock production, horticulture and brick making, the same philosophy can be used in terms of the use of excreta (urine diluted with water this makes a valuable fertilizer, and faeces) as a compost or soil conditioner, or as an energy source in the context of biogas. In the context of Ethiopia, with its huge number of rural farmers, anecdotal evidence indicates considerable unmet demand for water for productive use, in particular for small-scale agriculture (for example, vegetable gardens) for food production. More work is needed to establish demand for the use of excreta.

Assuming there are sufficient water resources available, responding to this demand with appropriate technologies and service levels financed by user groups could not only improve food security and nutrition but also provide an economic return that could finance the recurrent costs of operation and maintenance and eventual replacement costs in the longer term. Targeting women with MUS interventions can also lead to their social and economic empowerment. For all these reasons, MUS is an important aspect of the project."

Source: project proposal (UNICEF, 2011)

The proposed document does not say a lot about the challenges and risks to achieving such integrated approaches, but clearly anticipates some, including significant research, guideline development, and training components as well as piloting. Impact assessment and lesson learning are also planned. The project proposal specifically includes major investments on a water and sanitation technology package (USD 350,000), developing MUS strategies, materials and promotion (300,000USD), school based vegetable gardens as MUS demos (USD 450,000), impact assessment including the ambition to monitor the combined effect of interventions on intermediate outcomes like calories consumed and income and health (USD 400,000). The implementation budget for community level schemes through the CMP approach where possible is some USD 8,400,000.

Both the CoWASH and Integrating WASH, MUS and Community-based Nutrition projects could benefit from additional targeted support, in particular through development of a learning-focused network on putting MUS into policy and practice (Box 6). This is particular timely given that through these projects there is a high potential that the MUS approach will be taken to scale. Nevertheless, they would benefit from support in specific areas. Recommendations for possible collaborating activities are summarized in the concluding chapter of this report.

Box 6: Community-based Nutrition as described by the Integrating WASH, Multiple Use Services and Community-based Nutrition for Improved Food Security and Reproductive and Sexual Health project

Whilst water supply, sanitation and hygiene interventions will have an impact on child health, particularly relating to morbidity and mortality associated with diarrheal disease, and by reducing the prevalence and severity of tropical enteropathy, chronic malnutrition, it is anticipated that a significantly wider impact on stunting and food security will be secured by combining these interventions with a Community-based nutrition package.

Community-based nutrition forms an important part of the National Nutrition Strategy and includes: i) the active participation of Health Extension Workers to increase awareness of the importance of good nutrition and related practices such as exclusive breast feeding as part of a wider IEC strategy; ii) the establishment of quarterly community health days for nutritional screening, Vitamin A supplementation and the distribution of de-worming tablets, and promotion of monthly growth monitoring; iii) ensuring the availability and consumption of micro-nutrients including iron and iodine; iv) the establishment and implementation of school-based health and nutrition plans, including iron supplementation for adolescent girls; v) supporting women's groups to produce and use complementary food; and vi) developing decentralized capacity to identify and manage severe acute malnutrition.

Community-based nutrition is being rolled out with the support of UNICEF, the World Bank, CIDA and JICA. The intention is to establish the program in all *woredas*. To date, it has been introduced in an estimated 360 *woredas.* In 40 *woredas* , supported by CIDA and UNICEF, Community-based nutrition is being combined with a range of WASH interventions including the promotion of hand washing practices, CLTSH, community water supply, and WASH in health facilities. In fact, there is considerable synergy between CLTSH and the promotion of Community-based nutrition through quarterly health days; both these activities being led by Health Extension Workers.

Source: project proposal (UNICEF, 2011)

Self-supply and MUS

As we have seen, self-supply through family wells, tends to be largely for multiple uses by design. It has also been taken to scale. Nevertheless a few caveats are required. Firstly, that is 'design' by households, not by supporting or intervening agencies like government. There are examples where agencies promoting self-supply clearly do so with single-uses (small-scale irrigation) in mind. Secondly, efforts to take family wells to scale have been only partially successful and much demand is unrealised or untapped. For example, the campaign-led promotion on family wells resulted in many thousands of wells but arguably undermined sustainability and progress slowed when the campaign halted and the spotlight was off.

Self-supply has been included in the domestic sector WASH Implementation Framework (WIF) as a funding channel or service delivery model; the others as introduced earlier being *woreda* managed projects, community managed projects and NGO projects. It was also included in the Universal Action Plan (2009) but without mechanisms for funding the software activities (and the hardware is household funded) meaning that there have been no efforts towards concerted acceleration of the approach by government. A recent

workshop on accelerating self-supply (October 2011) resolved to address this issue through a working group mandated to develop a Self-supply Acceleration Programme led by the MoWE.

Self-supply is also promoted by the Ministry of Agriculture mainly for small-scale irrigation. There are several reasons to assume that the areas under irrigation from family wells will increase, and in many areas the potential to use shallow groundwater is far from fully developed. Dug wells as they exist now are used for both backyard irrigation, domestic water supply and for providing water to livestock and poultry. It is observed that in many areas (for instance Silti) the agricultural potential of these systems is still under-used, with cultivation limited to small areas of horticultural crops. In other areas, for instance north part of Lake Ziway, a special group of farmers is coming up that makes more intensive use of the economic opportunities offered by very shallow groundwater and access to markets and the latter areas represent more the shape of things to come.

At present, hand-dug wells are the most common technique of accessing shallow groundwater, but manually drilled bore wells potentially offer more reliability and lower costs. A range of low cost techniques are suitable for Ethiopia such as rota sluge, auguring and jetting, but these drilling technologies are not yet common place. A current BMGF/IDE initiative of supporting family irrigation is built around the promotion of manual drilling, and NGOs such as Living Water International have demonstrated its potential.

In groundwater based irrigation there are two main types of systems. The first are the special farmer well fields where many dug wells are developed for agriculture and situated away from residential areas. The second is a combination of a family well for drinking water, poultry/livestock and backyard farming. These are MUS systems *par excellence*.

A positive aspect is that the interest to keep the pump functioning is higher with wells are used for MUS and resources generated by agriculture activities are used to that extent, making such sources also potentially more reliable for drinking water. But contamination of many dug wells is a concern since most are basically unprotected, allowing runoff to flow into the wells. Low cost protection could go a long way to improve such self-supply systems but is not promoted. A laudable programme developed by IDE focusing on manual drilling and introduction of rope pumps gets many things right in terms of reduction of costs and trying to develop a sustainable supply chain, but measures have not yet been taken to limit risks of using such sources for drinking water supply. This is not the main focus of the projects, but it happens, and for relatively low cost, protection could be improved. Such preventative measures are important since household-level water treatment is as yet uncommon in Ethiopia, although its promotion is high on the list of priorities of the Ministry of Health.

Current family well development was found by Sutton *et al.* (2011a) to be almost totally through householders' own initiative. There was limited systematic encouragement or sustained support identified, with some localised exceptions such as through the Productive Safety Net Programme in parts of SNNPR, and efforts to promote rope pumps. In Oromia, rates of construction are reported to have tailed off after the effective 2004-2005 campaign for family well digging, which itself led to construction of more than 85,000 new family

wells. Overall, the enabling environment for self-supply was found to have improved considerably in terms of national policy, but still not to be conducive to successful scaling up. Several significant steps forward have been taken, including the recognition of self-supply projects and guidelines provided in the new WASH implementation framework, but major gaps remain. Findings related to the institutional areas of interest to this study are summarised in Box 7. The Self-Supply Acceleration Programme aims to address these gaps in the enabling environment to take self-supply to scale.

Potential exists for quick success by focussing on the large number of family wells that have been developed for small plot irrigation by farmers encouraged by development agents from the Ministry of Agriculture living in the same communities. Many of these systems have water quality problems, which in most cases could be easily prevented through upgrading with low cost protection, better hygiene practices around lifting and storing water, and using lifting devices, or more ambitiously perhaps through introduction of household water treatment. At limited cost such an approach could boost coverage by a significant margin (say 10%) in many areas. Household water treatment interventions have not been scaled up but should not be discounted since this is a focus area of the Ministry of Health and links to their approach could help to strengthen joint activity.

What would make a considerable difference would be if agricultural development agents were to work together with the Health Extension Workers (HEW) active at local level. To an extent this already happens (they are both in the Kebele WASH team) but could be much enhanced with appropriate support from their supervising colleagues and through joint training. This could also include training and mandating agricultural development agents to work on issues of drinking water quality. An equally important role exists for the local private sector in the construction of systems, and provision of pumps, micro-credit schemes. Possible alternatives may be the involvement of masons who are participating in Community Led Total Sanitation (CLTS) programmes as they may easily learn how to improve family wells. Other potential actors may include local staff from micro-finance institutions. In this context, the related introduction of Ecosan could also be explored.

The growing interest in self-supply needs to be formalised and implementation accelerated, which requires:

- Providing technology options and advice (best practices, guidelines, manuals, evaluation) ensuring that sufficient knowledgeable staff are available, are not overloaded, have resources to work, and can adopt a gender perspective in their work;
- Strengthening the private sector (sustainable supply chains; capacity building);
- Designing supportive financial systems (credit and saving schemes, rotating funds) taking into account that there is good experience with quite quick repayment of investments; and
- Enabling policies. Although already recognised in the WASH implementation framework, the UAP requires updating to be consistent (this is intended by the end of 2011) and government needs to identify budget lines to facilitate the enabling software activities required to accelerate uptake.

Box 7: Improving the enabling environment for self-supply

*Acceleration of self-supply can fill some of the more challenging gaps the sector faces***.** To accelerate household investment in water supply, services need to be developed which can be accessed both by those living in thinly scattered households, as well as those that find the level of service offered by public systems inadequate. This requires the investment of public funds in the development of four elements: providing technology options and advice, strengthening the private sector, designing supportive financial systems, and facilitating government policies.

A positive and sustained enabling environment is more effective than short-lived campaigns. The campaign mode of promotion (you *have* to build) was effective in some aspects (including building up well digging capacity) but demand is then closely related to campaigning activities and is not self-sustaining. Building up market dynamics and support services and a desire to copy ones neighbor (I like that, I want to have one too) makes a powerful enabling environment which expands and sustains demand of its own accord. The strategy needs to create a positive and supportive enabling environment (you can build, and you can get help) combined with a well-developed perception of the value added to home life by doing so. This study also identified some evidence that upgrading through programs such as the Productive Safety Net Programme can undermine feelings of ownership with negative impacts on maintenance. This needs further study but all interventions should be careful not to kill the interest of families in managing their own water sources.

Demand needs to be created based on real commitment. To create demand at household level and support within the private sector requires an understanding of decision-makers in government at all levels of the added value of accelerating self-supply. If they are not convinced, then their responsibility for initial support will not be effective. Effective support should aim to reach a critical mass, where the market takes off as a result of peer example rather than just being a result of promotion by government and private enterprise. At that point, further public investment becomes minimal and the initial costs will relate to a sufficient numbers of beneficiaries for the per capita costs to fall dramatically.

Building capacity is vital. Capacity building requirements include both the changing of attitudes towards self-supply as an approach and the development of new skills. Skills needed include aspects of developing markets for water supply improvement as well as the technical ones of low cost techniques of implementation for household level supplies, new technologies and maintenance routines.

*Roles and responsibilities of government need to be differen***t** to accelerate self-supply. The development of government roles will require an understanding of the difference between community water supply (government plans implementation, contracts and funds it, supervises and largely maintains it); and self-supply (government only plans and funds implementation of promotion, training and monitoring not supply construction itself). This, as in CLTS and scaling up CMP/CDF, requires changed attitudes to the devolution of more responsibilities to the end user and the private sector, and well-developed skills in a less 'hands-on' approach than that of community water supply for which regional and *woreda* offices are already well-equipped. There are also good synergies to achieve with other approaches like MUS and household water treatment requiring a well-coordinated and linked acceleration program.

Micro-credit could support self-supply. Currently, micro-credit lenders do not appear to view investments in family wells as investments which can provide a healthy return and secure repayment. This attitude should change, and if micro-credit institutions were willing to lend for family wells they could achieve significant impact. The amounts required fit well with the size of loans that these banks provide.

Source: Based on summary of Sutton et al. (2011a) report

Specific opportunities

Self-supply Acceleration Programme (SSAP)

The emerging Self-supply Acceleration Programme (SSAP) has high potential to support MUS scaling up. This programme is government-led, cross-sectoral and based on extensive research of existing experiences. SSAP was established as part of a national workshop and subsequent discussions in October and November 2011, including Ministerial approval. It now needs to established as a working program by the mandated working group (led by MoWE and including UNICEF, IRC and COWASH) working with their wider networks on self-supply. It focuses on creating demand and building capacity around four main challenges or elements identified above: technology options and advice, strengthening the private sector, supporting financial systems, and enabling government policies. Funding needs to be identified and used to encourage, coordinate and learn from various initiatives related to self-supply, and specific investment opportunities are also suggested in the concluding section.

Small-scale irrigation and MUS

As the Government of Ethiopia harbours ambitious plans to roll out small-scale irrigation, further investigation into the multiple use dimensions of small irrigation systems is opportune. It is therefore identified as a third entry point for MUS. The official definition of small-scale irrigation is set by the size of the command area, i.e. 200 ha. There are three types of small-scale irrigation systems and the multiple use aspects of these different systems differ:

- Groundwater-based family systems (self-supply),
- Small perennial irrigation systems, and
- Spate irrigation systems.

Groundwater-based family systems

These systems were discussed earlier under the heading self-supply since the investment tends to be entirely by users. That said, there are some signs that the Ministry of Agriculture plans to develop hundreds of thousands of wells for principally family level small-scale irrigation. It is therefore worth bearing in mind that self-supply, while generally MUS-by-design at the family level, is supported by different ministries that don't necessarily think of multiple uses in their approach. Since the MoA entry point is small-scale irrigation, there is a risk that MoA led initiatives would not take the extra low cost steps to protect family wells to minimise risks related to drinking water. This need not happen. Indeed the BoA in SNNPR has recently been more active than the BoWE in upgrading family wells through the PSNP, including standards of protection that are likely to minimise drinking water risks.

Small-scale irrigation from perennial surface sources

Small-scale perennial surface irrigation systems have been developed in the different regions through farmer initiatives and with support of the regional Water Resources Bureaus and NGOs. With the ambitions in the Growth and Transformation Program and the financial resources in the Agricultural Growth Project, which focuses on eighty high potential *woredas*, this is set to accelerate.

Cattle trampling irrigation canal banks

At present, the performance of small-scale perennial irrigation systems is patchy, if not disappointing. Reasons are related to the management of the sector, the quality of the site selection and designs, the organization of farmers and market access. The responsibility for irrigation development is shared between the Bureaux of Agriculture and the Bureaux of Water Resources in the regions with the former responsible for the smaller systems and the latter taking care of larger systems, but without there being a clear cut-off line. A serious bottleneck is that few resources are allocated for preparing designs or for engagement with or support for water users. As a result, multiple use considerations never enter the equation. Annex 2 is a sobering overview of the main issues; non-functionality and under performance are common.

However, small perennial systems serve multiple, but these functions are usually not supported by the designs of the systems, leading to damage as water users damage lined canals to provide access for livestock, and drinking from facilities that do not consider water quality. The application of MUS in irrigation is informal and systems are not designed for it even though the designs of water supply and larger irrigation systems are made in the same Ministry. Water quality issues are generally absent from the equation.

The potential exists to use these irrigation systems for drinking water supply and other productive uses like livestock watering, but this will be site specific and therefore should be explored on a scheme-by-scheme basis. Where surface water is used for irrigation it will involve some form of water treatment if it is used for drinking water. This may be organized collectively or may be done at household level. Another addition to irrigation systems that is often developed for cash crops may be to think of including water for vegetable gardens to support users to produce different vegetables to ensure a more balanced diet. For larger systems it will be necessary to initiate a dialogue in the MoWE. For smaller systems, the experience of the MoA seems a good entry point and may be able to build on the experience with self-supply.

Box 8: Sand dams for multiple uses in water scarce areas

In some of the drier lowland parts of Ethiopia, ephemeral sand rivers are a vital water resource. Walk along any sand river in the dry season and you will meet women collecting water from scoop holes in the dry river bed. Many will mention that they are there because a distant hand pump has broken down. The sandy rivers beds contain an aquifer of water that can be exploited in other ways.

Sub-surface and sand dams both aim to increase the storage of water in these sand river aquifers so that it can be more easily used. Sub-surface dams aim to retain the underground base flow along sand rivers behind an impermeable below-ground structure constructed in the sandy bed. Possible materials include clay, concrete, masonry or plastic sheeting structures. Sand dams have a similar function but are constructed usually of masonry and largely above ground at points where there are stable bank. The sand dam quickly fills with new sandy sediment behind the structure creating a new or deeper sand aquifer. The structures can be raised each year capturing more sandy sediment and increasing the storage capacity. Both kinds of structures are vulnerable to flood damage and their lifespan can be rather short. Much of the research on these structures has focused on how to build structures at low cost that do not get quickly washed away.

The water retained by sand dams and sand surface dams can be exploited from wells in the river bed or on the river banks, or alternatively through canals to downstream irrigation areas where the slope permits. A demonstration project involving RAIN, IRC and HCS/RiPPLE (with funding from the Dutch Partners for Water program) is currently investigating how such rain water harvesting structures can be developed as multiple use systems. It involves detailed study of three existing sites, construction of demonstration projects by the core project partners in three more sites, and finally replicated at three more sites by other partners with limited support. Training and dissemination activities aim to share findings widely in the study area (Dire Dawa) and nationally.

Three research themes will be investigated. The first focuses on the implementation process and life cycle costs, both for the existing systems and newly constructed systems. This aims to give users and implementers information on which they can base planning and budgeting for RWH for MUS, to minimize and cover the full lifecycle costs. The second research theme will collect evidence on the water use and benefits at community level. This theme aims to demonstrate changes in water use and all the benefits linked to the introduction of RWH for MUS to advocate scaling up. The final research theme focuses on the financing, institutional and policy issues to gain insight into opportunities and barriers to scaling up RWH for MUS in Ethiopia.

Source: MUStRAIN project documents RiPPLE/RAIN/IRC

Box 9: Rainwater harvesting and MUS in southern Ethiopia

The MUS group and RAIN Foundation commissioned a study in southern Ethiopia (Borana) to assess the potential of integrating MUS into rainwater harvesting systems in pastoralist livelihoods. It found potential for incorporating MUS components which includes water for livestock, sanitation and hygiene and water quality testing. Different approaches and strategies which could be adopted were recommended.

Findings showed that to effectively and sustainably address needs, the following MUS modalities should be promoted (not in priority order): 1) improved access to domestic use and water quality monitoring; 2) sanitation and hygiene; and 3) livestock water. In addition, the awareness on hygiene and sanitation as well as water management has to be further reinforced through refresher training.

Source: http://www.musgroup.net/page/1276

Belilo spate irrigation system. Downstream apron silted up but used as a sand dam.

A special category of systems are the traditional surface storage ponds and micro-dams that have been developed, particularly in Tigray. In the most water-deprived areas, micro-dams have come up more recently serving irrigation as well. There is a need to strengthen the MUS aspect here, particularly by considering the development of shallow wells in the areas surrounding the ponded area that could provide a more safe and secure domestic water supply than the ponds themselves. Whereas in other countries designs have been developed to combine such surface water harvesting with drinking water, for instance through filtered outlets, such combinations are as yet uncommon in Ethiopia although wells downstream of dams are found. With the success of the watershed program in some parts of the country and the large interest in scaling up sustainable land management programs, more work is required here.

Finally, an important MUS area in small-scale irrigation development is competition and access to water. Especially in smaller rivers upstream, irrigation diversions can deprive downstream users of secure water supplies for domestic water collection and for livestock. In many parts of Ethiopia, reliable base flows in rivers are at a premium and need to be well managed and protected. At present mechanisms for this are not operational.

Spate irrigation

Spate irrigation is a form of water management that is unique to semi-arid environments, particularly where mountain catchments border lowlands. Short duration floods are diverted from river beds and spread over land to cultivate crops, feed drinking water ponds, or irrigate pasture areas or forest land. Spate systems are risk-prone and are categorically different from perennial systems. The floods may be abundant or minimal and production varies from year to year. In Ethiopia, spate irrigation is, as elsewhere in Sub Saharan Africa, on the increase. Its popularity is part of a larger movement towards higher productivity farm systems that are not exclusively rain-dependent. Spate irrigation is also linked to the increasing settlement of lowland areas. The development of spate irrigation in Ethiopia is driven by both public investment as well as farmer initiatives. Almost all spate irrigation development in Ethiopia is recent revival of an old practice. The area currently under spate irrigation is estimated at close to 50,000 ha, but the potential particularly in the lowland plains is much higher.

River used for spate irrigation

The design and performance issues common in small-scale surface irrigation apply equally or more in spate irrigation. The effective development of spate systems is more complicated and there has been a tendency in Ethiopia to follow conventional perennial system designs, which are largely inappropriate. A major recurrent problem has been the inability to deal with sedimentation. As spate system uses short duration floods, the water is not generally used for domestic supply or livestock or poultry, unless it is routed to storage ponds. In addition, spate irrigation systems also have the effect of retaining water in an area and hence recharging the local aquifers. Whether this recharge is usable or used varies from locality to locality.

There is, however, an important nexus between spate irrigation and domestic water supply and MUS. In spate systems, one of the preferred design concepts is to stabilize the river bed. This prevents scour and deep channels which make it impossible for water users to divert the flows.

Bed stabilizers, and for that matter even perennial diversion dams in ephemeral rivers, double as sand dams (Box 8). This is now done unknowingly, but there is much merit in combining these two design concepts to combine irrigation with the provision of safe water supply. Dedicated drinking water supply infrastructure could then be developed alongside a sand dam.

Challenges and opportunities

There are a number of challenges in accelerating MUS in irrigation:

- Inter-ministerial collaboration and coordination as making water needs to be combined with providing advice on water treatment as well as agriculture, but also working with women on vegetable gardening and nutrition. This requires collaboration at district and community level with support from regional and national levels.
- Financing and credit strategies that mix public water supply with 'productive' water use by individuals or collectives.
- Ensuring the different supply chains involved in irrigation and domestic water supply.
- Ensuring proper water source protection and the management of chemical pollution (pesticides, herbicides etc.).
- Capacity building of a considerable number of actors, ranging from those involved on creative system design to the different users. A gender perspective is important in this process as irrigation is often male-dominated, whereas several other MUS aspects are more female related.

At present, the understanding and integration of MUS modalities in small-scale irrigation is limited. Table 3 gives an overview of issues. This is largely related to the limited capacity in small-scale irrigation in both private and public sectors. In some of the key water organizations, i.e. the Regional Water Bureaus, there are 25-60% vacancies and the turn over at the water desk is high.

Table 3: MUS issues and areas for improvement in small-scale **irrigation**

Type of small-scale **irrigation system**	**Multiple use issues**	**Areas of improvement**
Family irrigation/ groundwater	Shallow wells often used for household water supply and garden farming and poultry	No basic protection against inflow of run-off
Small-scale perennial systems	Often important use for livestock, but not part of the planning	Development of irrigation systems sometimes affects base flow in rivers that are also major sources of drinking water Multiple use and water quality issues not built into the design of the irrigation infrastructure Scope to improve drinking water functions from micro-dams or shallow wells
Spate irrigation systems	Some spate systems apart from irrigating land also feed drinking water ponds and stabilize river systems	Opportunities to combine bed stabilizing structures with sand dams

Popularizing manual drilling and related low lift techniques could be linked to courses offered in the TVET vocational training centres, especially in high potential areas. No TVET at present has curricula on small-scale irrigation development or groundwater exploration techniques with the exception of training on assembling and maintaining Afridev hand pumps. However with a number of TVETs, a program is being developed to create an institutional link with the staff working in *woredas* through a practical distance learning program called Guided Learning on Water Supply and Sanitation. The entry point to this is still WASH and not yet small-scale irrigation.

One of the difficulties of TVETs at present is to provide sufficiently practical learning in the courses. This could be turned into an advantage by TVETs if they develop into service centres providing trainings to students and artisans alike and have stocks of equipment and spare parts.

Similarly there is a need to strengthen the understanding of MUS aspects of WASH and small-scale irrigation systems in university BSc curricula and in training for mid-career professionals in the country. At the moment this is still not part of the courses. There is mechanism though for promoting this: the University Water Sector Partnership www.universitywatersectorpartnership.org which at present brings together eight universities teaching water management with a large number of water sector organizations.

A community-based MUS approach that takes local people as the entry point to integrated water and land resources management could also be piloted. The successful approach could then be scaled across Ethiopia's resource conservation programs.

5. SUMMARY OF OPPORTUNITIES AND RECOMMENDATIONS

In Table 4, specific opportunities relating to the emerging MUS modalities or entry points are summarized, together with specific recommended areas of support or intervention and further contact details.

Table 4: MUS opportunities, recommended support and contacts

Specific opportunity	Justification	Recommended support (and indicative budget)	Further contacts
1. Support to development of the Self-Supply Acceleration Programmme (SSAP)	Family wells are used for multiple uses (by design); existing experiences at scale, but weaknesses in enabling environment hamper acceleration, safe water quality and sustainability; self-supply approach has recently gained recognition in national policy.	1.1. Programme funding is required by new and currently unfunded initiative focusing on technical support to help government reform the enabling environment to accelerate self-supply as a service delivery model in all appropriate regions. This involves establishing provision of 4 main areas of support: technology options and advice, strengthening the private sector, supporting financial systems and enabling government policies. Indicative budget: USD 750,000 per year (2 years) 1.2 Research on potential for self-supply combining groundwater availability and other indicators of potential could also contribute to acceleration. Indicative budget: USD 200,000 (1 year) 1.3 Funding to develop more coherent approaches to technology introduction and related learning e.g. rope pump and manual drilling, that have a focus on users (i.e. self-supply, MUS), supply chains and introduction processes rather than individual technologies per se. Key partners would include IDE, JICA, Selam, MoWE. Indicative budget: USD 200,000 per year (2 years)	The Self-Supply Acceleration Programme is being developed by a working group including MoWE, UNICEF, CoWASH and IRC. *Contacts: Zewditu Yilma,* Self-supply *Focal Point, MoWE (Email: zewditu50@gmail.com; Tel: +2519111437306) and Inge Klaassen (Email: i.klaassen@hotmail.com)*

Specific opportunity	Justification	Recommended support (and indicative budget)	Further contacts
2. Scaling up Community Managed Projects (CMP) with MUS element	CMP is a nationally recognized funding modality for rural WASH, now the priority approach for communal supplies. In theory, the decentralization of decision-making to communities (that often tend to think in terms of multiple uses when allowed the space to do so) in CMP ought to facilitate MUS. However, this has not been actively promoted or facilitated to date by agencies supporting CMP.	2.1 Research on multiple uses of existing systems developed using the CMP/CDF model (have they facilitated multiple uses and if not, why not?) in Amhara and BSG regions. Indicative budget: USD 150,000 (1 year) 2.2. Promotion of multiple use modalities as an option where communities express demand to COWASH through training of support staff, development of MUS training modules, action research/pilots, documentation and learning. Include theme on MUS/sanitation links. Working with micro-finance institutions involved this could pilot mixes of 100% grant (the current modality) for basic WASH infrastructure, mixed grant/loan for some add-ons/additional 'productive infrastructure' at community level, and 100% loans for household level investments. Indicative budget: USD400,000 per year (2 years) 2.3. The UNICEF implemented integrated WASH/MUS/CBN project aims to test MUS approaches at scale. It is well funded but additional investments to support could include: • Additional support in monitoring, documentation and lesson learning. Indicative budget: USD 100,000 per year (5 years)	The COWASH project team based in the MoWE is responsible for scaling up CMP. *Contact: Arto Suominen (Email: arto.suominen@gmail.com; Tel: +251921775098)* UNICEF implements the WASH/MUS/CBN project. *Contact: Paul Deverill (Email: pdeverill@unicef.org; Tel: +251115184169)*

Specific opportunity	Justification	Recommended support (and indicative budget)	Further contacts
		• Investments to scale up the same approach in other regions with potential (e.g. Gambella). Indicative budget USD 1-2 million per year (5 years)	
3. Productive-plus training and scoping	There are major gaps in existing capacity building efforts in small-scale irrigation, groundwater development and integrated approaches to water development and management such as MUS. The GLOWS training approach (WASH focused) could be expanded.	3.1 TVET training program development on small-scale irrigation, groundwater development and integrated approaches. A TVET capacity building program including curricula development, material development, training of trainers and training replication including MUS and related topics in an integrated multi-sectoral approach to water development. Indicative budget: USD 300,000 per year (3 years)	RiPPLE (www.rippleethiopia.org) work on GLOWS with other key partners being Meta Meta, IWMI, SNV and UNICEF. *Contact: Zemede Abebe (Email: z.abebe@rippleethiopia.org; Tel: +251915320574)*
	Although there is evidence of the non-irrigation uses of irrigation systems and the damage caused, this has neither been studied systematically nor have there been intervention suggestions for designing for multiple uses. Similarly, the multiple uses of water and land resource conservation management tend to be seen as a secondary goal in resource conservation programs. Yet, community's own decision-making and design for multiple livelihood impacts could well enhance both sustainability and wellbeing.	3.2 Scoping productive-plus: A scoping study is proposed, in collaboration with AGRA Ethiopia, to explore the potential of taking people and their multi-faceted livelihoods as entry point in the design and implementation of water and land resource interventions. The hypothesis to test is that a 'people's entry point' instead of resource conservation or crop yields as entry points, better meets the mandated goals of the soil and water conservation measures and infrastructure by increasing ownership, maintenance and hence sustainability. In addition, more livelihood benefits are generated. The scoping could take an	*IWMI has long-standing expertise in irrigation and sustainable land management programs in Ethiopia. IWMI also facilitates innovation forums around resource conservation. Contact: Simon Langan (Email: s.langan@cgiar.org; Tel: +25111 6457222/3)* *The Spate Irrigation Network (www.spate-irrigation.org) is promoting good policy and practice in Ethiopia and in other countries where this type of water management is common.*

Specific opportunity	Justification	Recommended support (and indicative budget)	Further contacts
		existing (spate or perennial) system – preferably from an existing investment program - to strengthen multiple use functionality and document and disseminate. Indicative budget: USD 100,000 per year (2 years).	*Contact: Dr Tena Alamirew (Email: alamirew2004@yahoo.com; Tel +251922470113)*
4. Learning network on MUS in policy and practice in Ethiopia	There are several new MUS initiatives in the country and much interest. Coordination and learning within the Ethiopian water sector (especially between sectors like water, health, education and agriculture) and between levels (national, regional, *woreda*) is however generally weak.	4.1 A well-run and well-documented capacity building and learning platform/network on MUS cou**ld** create synergies and maximize impacts. Activities might include workshops, training courses, a dedicated website, additional case study documentation to support ongoing initiatives and seed funding new initiatives. The MUS Group provides an international model that could be replicated with adaptation in Ethiopia. Indicative budget: USD 100,000 per year (5 years).	RiPPLE (www.rippleethiopia.org) have a track record in MUS, knowledge management and network facilitation. Should be linked to other existing initiatives like FLOWS (Focused Learning on Water and Sanitation), new platform on water resources management (led by IWMI), donor group on WASH, Agricultural Transformation Cell, etc. *Contact: Zemede Abebe (Email: z.abebe@rippleethiopia.org; Tel: +251915320574)*

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Annex 1: Socio-Economic Indicators on Small-Scale Irrigation

SOCIO-ECONOMIC	
Food exports 2008 (current USD M) (FAO Statistical Yearbook 2010)	576
Food imports 2008, (current USD M) (FAO Statistical Yearbook 2010)	1,131
Imports/exports (calculated)	1.96
Health expenditure per capita 2009 (current USD) (World Bank)	15
Improved water source 2008 (% of population with access) (World Bank)	38
Improved water source, rural (2008) (% of rural population with access)	26
Improved water source, urban (% of urban population with access)	98
Poverty (% below national poverty line) (2004)(UNSTAT)	39.3
Illiteracy rate –Male (15+) (2008)(World Bank)	58
Illiteracy rate --Female (15+)(2008)(World Bank)	82
Primary completion rate, total (% of relevant age group) (2009)(World Bank)	55
Road density (road km/100 sq. km of land area)(2007)(World Bank)	4
Road to arable land density (road km/1000 sq. km arable land)	n.a.
Roads, paved (% of total roads)(2007)(World Bank)	14
Electric power consumption (kWh per capita)(2008)(World Bank)	43
Country area (km2) (2009)(FAOSTAT)	1,104,300
Land area (km2) (2009)(FAOSTAT)	1,000,000
Population, Projected/Estimated (2010)(FAOSTAT)	82,950,000
Urban population (% of total population)(2010) (World Bank)	18
Rural population (% of total population)(2010)(World Bank)	82
Population density (pp/km^2) (2010)((World Bank, 2010)	83
AGRICULTURAL	
Agricultural exports (USD M) (2008)(FAO Statistical Yearbook 2010)	1,352
Agricultural Import (Current USD M)(2008)(Ibid.)	1,347
Import/export (calculated)	1.00
Value added in agriculture, growth (%)(2010)(World Bank)	6
Value added, agriculture (% of GDP)(2010)(World Bank)	48
Employment agriculture (% of population)(2005-2007)(WDI, 2010)	44.4
Agricultural machinery (tractors /100 sq. km arable) (Ibid.)	2.2
Agriculture value added per worker (Constant 2000 USD) (2009)(WB)	215
Fertilizer consumption (kg per hectare of arable land) (2008)(WB)	7.7
Cereal cropland (% of land area) (FAO Resource Stat, calculated)	8.75
Agricultural area (km^2)(2009) (FAO Resource Stat)	349,850
Arable land (km^2)(2009)(FAO Resource Stat)	139,480

IRRIGATED AGRICULTURE	
Irrigated land (% of crop land) (GoE)	4
Area equipped for irrigation (ha)(2001)(Aquastat, 2001)	289,600
Actually irrigated (ha) (Bastiaansen and Perry, 2009, pp. 4[1] and FAO, 2005)	107,265-184,239
Irrigation potential (entire country) (Aquastat, 2007)	2,700,000
Irrigated Land Nile basin (ha)(Bastiaansen and Perry, 2009, pp. 4)	90,769
Irrigation schemes in Nile Basin	
Small-scale traditional schemes (1-100ha) (ha) (Bastiaansen and Perry, 2009, pp. 5)	155,014
Small-scale modern schemes (<200ha) (ha.) (Ibid.)	51,198
Medium and Large schemes (200ha<) (ha.) (Ibid.)	97,700
Modern private irrigation (ha.)	5,500
Potential schemes	See footnote 1 under Ethiopia institutional"
Water Sources[2]	Ethiopia has 12 river basins, of which 45% of all run-off is located within Abbay basins.
Water Sources – Names	Multiple Lakes (e.g. Tana, Ziway, Abyata) and rivers (e.g. Blue Nile, Atbarah, adar)
Irrigated area per household (ha) (Tigray (Hagos, 2005 pp. xiv)	0.2-0.3

SUSTAINABLE WATER ABSTRACTION RATES (2011) (AQUASTAT)	
Renewable resources (km3/year)(2007)(WDI, 2010)	122
Overlap	18
Surface water	120
ground water	20
Dependency ratio	0
ACTUAL WATER ABSTRACTION RATES	
Groundwater (km3/year)	n.a.
Surface (km3/year)	n.a.
Total water withdrawal (km3/year) (2007) (WDI, 2010)	5.6
% of renewable water resources (Total water withdrawal / Renewable resources)	4.6
Water abstraction points[3] (to reach 98% drinking water access in 2012)(MoWRE,2010)	
Hand dug well (community) av. Depth 10m	69,745
Modern hand dug well av. Depth 15 m	35,568
Deep Well	2,986
Shallow wells	9,737
Shallow well (with hand pump)	9,510
Shallow well (with motor pump)	1,570
Shallow windmill	18
Shallow well (solar pump)	36
Spring development (motor or gravity system)	210
Spring on the spot	14,426

[1] Lower estimation based on Awulachew et al. 2007, while higher estimation is based on FAO-GMIA

[2] Groundwater use for irrigation is not significant for the time being in Ethiopia. However, with the extended drought periods followed by occasional extreme flood-events there is strong interest by the government and private sector to use groundwater for irrigation. (Meghani, M. et al.. 2007, pp. 38)

[3] There is a National Groundwater database in Ethiopia named ENGDA which is developed by USGS with a financial support of IAEA. It is placed at the Ministry of Water Resources. The database is in Acess-2000 format and includes data for boreholes and spring site information, water levels and water quality data (Meghani, M. et al.. 2007, pp. 32)

IRRIGATION PERFORMANCE (Bastiaansen and Perry, 2009)[4]	
Overall Irrigation performance Large Scale Irrigation (0-5)	2.9
Result Oriented Performance	2.77 [5]
Sustainability Oriented Performance	3.1[6]
Process Oriented Performance	3.3[2]
Detailed Irrigation Performance Parameters	
Water Productivity (Performance 0-5) (Rank within Nile Basin 1-8)	3.1 (3)
Agricultural water Productivity	2.4 (8)
Crop consumptive use	3.6 (1)
Beneficial Water Use	2.9 (6)
Adequacy	2.4 (8)
Uniformity	4.5 (1)
Reliability	3.0 (8)
Sustainability	3.4(4)

Sources for Irrigation Performance Data

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4 Specific recommendations for improvement of irrigation performance, as mentioned in Bastiaansen and Perry (2009): "Improving the productivity of irrigated land should be on the agenda…" addressing Adequacy, beneficial fraction, and reliability seems most promising, as those are lowest generally…."therefore "Application of sufficient irrigation water (adequacy) at the right time (reliability) can increase biomass production. To do so, investments should be made to improve agronomical research and extension services: more qualified and equipped staff able to advice on application of fertilizers.

5 Referred to as low in Bastiaansen and Perry (2009), improve beneficial fraction especially (see further note 5)

6 Referred to as average in Bastiaansen and Perry (2009), no specific comments are made

ANNEX 2: ISSUES AND BOTTLENECKS IN SMALL-SCALE IRRIGATION DEVELOPMENT

Governance and organization	**Bottleneck**
Coordination	No formal linkages and coordination mechanisms established between institutions involved in irrigation: BOWR, BOARD, CPB and research) leading to inadequate coordination between: Research and extension services - leading to lack of information among farmers Research institutions - lack of research on irrigation management and low cost technology CPB and BOWR - no systematic support to institutional capacity of the WUAs PB and BOARD - leading to shortfall in training of WUA in input, marketing and O&M. BOARD and BOWR at catchment level - prohibits s streamlining efforts of BOARD with BOWR
Capacity	Lack of transportation facilities for support staff Limits extension services to field Lack of monitoring and evaluation of SSI schemes and performance of farmers and field staff Sub-optimal institutional learning and experience within all irrigation institutions Caused by continuous restructuring and reorganization, with high staff turnover rates Minimum in-service training No practical training
Legislation	Inadequate legislation to improve performance of SSI schemes Still no guideline on tariff structure for water services, although mentioned in EWRMP and strategy documents (pp. 63); Lack of institutions guiding and enforcing water rights Lack of legislation, and mandate, of WUAs - explaining failure to enforce fee collection for example
Implementation	
Design	Preference for designed systems 92.4% of the SSI schemes is of traditional type consisting of poorly performing canal networks and temporary diversion structures Only 7.6% of the irrigated area in 2008/2009 has well designed irrigation infrastructure Inadequate integrated design methods, not using a basin perspective, of surface water schemes: Leading to inefficient, short-life time and even abandoned schemes Upstream/ downstream water users were not considered, river flow dynamics not studied, through which schemes could not be used or only a portion, or performance in other schemes decreased, inducing conflict Inadequate design of irrigation infrastructure Very small part of budget is dedicated to design of system – prohibits good work and meaningful interaction with farmers Design errors - leading to excess sedimentation in canals, inefficient water distribution and break down of infrastructure MUS never factored in – leading to missed opportunities and breakage
Engineering and scheme development	Inadequate construction of irrigation infrastructure Leading to expensive and poorly performing schemes No cut-off drains (sedimentation), instable site slopes of main canal (collapse), poor weir design (no diversion to intake), no measuring structures included (non-uniform water distribution) Sub optimal site selection Construction on difficult vertisols and not using local available clay, making SSI schemes more expensive [7]

[7] Improvement of SSI schemes is generally expensive, lack of research on low cost technologies is not supporting to this

Governance and organization	Bottleneck
	Command areas on poorly drained soils, delaying land preparation for wet season Construction of houses, coffee processors and schools, school in vicinity of irrigation canals, demolishing them Inadequate design/ construction of groundwater infrastructure (wells) Leading to unsustainable ground water use Too narrow spaces between wells, no groundwater recharge structures designed with wells Instability of side walls; inappropriate selection/purchase of pumps
Performance	
Institutional Capacity	Weak institutional capacity of the WUA, Caused by lack of legislation, lack of attempts to strengthen them and weak institutional capacity (Institutional and physical) of extension services Lack of insight at federal level to distinguish WUA/WUC
Economic and Financial	Poor fee collection rates and no established mechanism for the users to pay fee for future O&M works Community contribution is 10% of project costs, only 5% is collected on average Modest performance in marketing strategies of cooperatives / WUCs Still need to improve cooperative establishment and capacity to buy cheap inputs and negotiate high output price. Prices for rice are sub-optimal due to transplanting at same time (pp. ix and 32 The regional land administration and use proclamation put max. of 0.5 ha/family in Oromia, Amhara and SNNPR
O&M/ field water management	Water planning often poor - cropping calendar not synchronized with peak water availability Water delivery - duration of irrigation depend on land size, rather than crop type and crop stage. (pp. viii) Water rights are not enforced, upstream users using more (pp. 41) Poor maintenance of irrigation infrastructures, leading to poorly performing canal networks and temporary diversion structures Oversized land-holding in irrigation schemes (pp. 28) , leading to poor O&M of the irrigation infrastructure
Agronomic practices	Crop choices 45.– 75% of the area in SSI schemes not cultivated with high value crops Only 1.3% of the irrigated land planted with improved seeds. Farmer strategy give priority to rain fed part of their farm Agronomic practices Poor crop rotation inducing disease and pests Planting overgrown seedlings Under fertilization by farmers Poor water management Leading to salinity (Awash valley) Over-irrigation (too much an too long), reducing yields; too less irrigation water leading to moisture stress

Source: Leul Kahsay Gezehegn (2009). Assessment of Small-scale Irrigation In Selected Project Areas And Menu Of Services To Be Financed By Agricultural Growth Program. Ministry Of Agriculture and Rural Development and World Bank