MUSgroup

Guidelines for Planning and Providing Multiple-Use Water Services

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Contents

Boxes, Figures and Tables

List of acronyms

CAP	Community Action Plan
CapEx	Capital expenditure (hardware and software)
CapManEx	Capital maintenance expenditure
CPWF	Challenge Programme on Water and Food
ETc	crop water needs
ExpDS	Expenditure on direct support
ExpIDS	Expenditure on indirect support
FAO	Food and Agriculture Organization of the United Nations
FGD	Focus group discussion
FHIS	Honduran Social Investment Fund
GLOWS	Global Water for Sustainability Program
HCS	Hararge Catholic Services
IDE	International Development Enterprises
IFAD	International Fund for Agricultural Development
IRC	International Water and Sanitation Centre
IWMI	International Water Management Institute
IWRM	Integrated Water resources Management
kc	crop coefficient
ETo	Reference evapo-transpiration
lpcd	Litres per capita per day
M&E	Monitoring and evaluation
MASSMUS	Mapping System and Services for Multiple Uses of Water Services
MUS	Multiple-Use Water Services
MUStRAIN	Multiple-Use Water Services through rainwater harvesting

NREGA	Mahatma Gandhi National Rural Employment Guarantee Scheme
ODI	Overseas Development institute
OpEx	Operating and minor maintenance expenditure
PIR	Rural Infrastructure Programme
RASHON	Red de Agua y Saneamiento de Honduras
RiPPLE	Research-inspired Policy and Practice Learning in Ethiopia and the Nile region
RVWRMP	Rural Village Water Resources Management Project
SDC	Swiss Development Cooperation
SEI	Stockholm Environmental Institute
SIMI	Smallholder Irrigation and Market Initiative
SMART	Specific, measurable, achievable, realistic, time-bound
WARM-P	Water Resources Management Programme
WAWI	West Africa Water Initiative
WI	Winrock International
WPP	Water Policy Programme
WUA	Water User Associations

Glossary

Authority functions	Functions like planning, coordination, regulation and oversight, and technical assistance related to water supply, but not the actual service provision itself
Community-driven MUS	MUS entry-point, under which communities and their own water-use priorities from multiple sources are taken as starting point of improvements and offering technology choices designed for multiple uses
Domestic-plus	MUS entry-point, under which domestic water supply systems are developed but in such a way that higher levels of services are provided, so that on top of water for domestic uses, users have access to water for productive uses
Enabling environment	The overall enabling environment where sector policy, norms and regulatory frameworks are set, service levels are defined, and macro-level financial planning and development partner coordination takes place
Intermediate level	The layer of governance (government, institutions and civil society bodies) that function below national level but above community level
Irrigation-plus	MUS entry-point, under which irrigation systems are (re)developed in such a way that non-irrigation uses – both productive and domestic – can be accommodated
MUS	An approach to water services that considers the multiple needs of (poor) water users, who take water from a number of sources, and communities' own priorities as the starting point for investments in new infrastructure, management arrangements, the rehabilitation of existing infrastructure, or for improvements in management and governance
Service delivery	The delivery of a certain quantity of water with a certain quality and accessibility and reliability of the provided services.
Service provider functions	Functions related to day-to-day provision of water, and include tasks such as operation, maintenance and administration of the water system.

Introduction and set-up of the guidelines

The multiple-use water services (MUS) approach is defined as an approach to water services that considers the multiple needs of (poor) water users, who take water from a number of sources, and communities' own priorities as the starting point for investments in new infrastructure, management arrangements, the rehabilitation of existing infrastructure, or for improvements in management and governance (Van Koppen, 2006).

In less than a decade, the MUS approach has gained wide recognition among global and national policy makers, senior programme managers, development financiers, networks of water professionals, and academia. MUS started with the growing recognition in both the domestic and irrigation sectors that schemes designed for one single-use, whether domestic, irrigation, or livestock, are often used for additional purposes, and become *de facto* multiple-use schemes. Instead of ignoring or even declaring some returns as 'illegal', the MUS approach recognises these uses as returns on benefits from water investments and aims to plan and design for those multiple uses. Economic analysis found that relatively low incremental investments give disproportionately high benefits, with high benefit-cost ratios as an end result (WI, IRC, IWMI, 2007). Furthermore, providing multiple-use water services can lead to more sustainable service delivery as it avoids damage from unplanned uses, and better accommodates people's water needs and priorities, increasing their ability and interest in sustaining services and recovering costs. By using and re-using multiple water sources, both water resource efficiency and livelihood resilience can be enhanced. Last but not least, MUS matches the - often informal - realities on the ground, in which rural and peri-urban communities use and re-use a number of different sources for a variety of uses to concurrently meet a range of both domestic and productive water needs. MUS builds on these existing assets, skills, and investments.

Where do these guidelines come from?

MUS approaches have been successfully piloted in over 20 low- and middle-income countries in Africa, Asia and Latin America, as illustrated in the Figure 1 and Table 1.

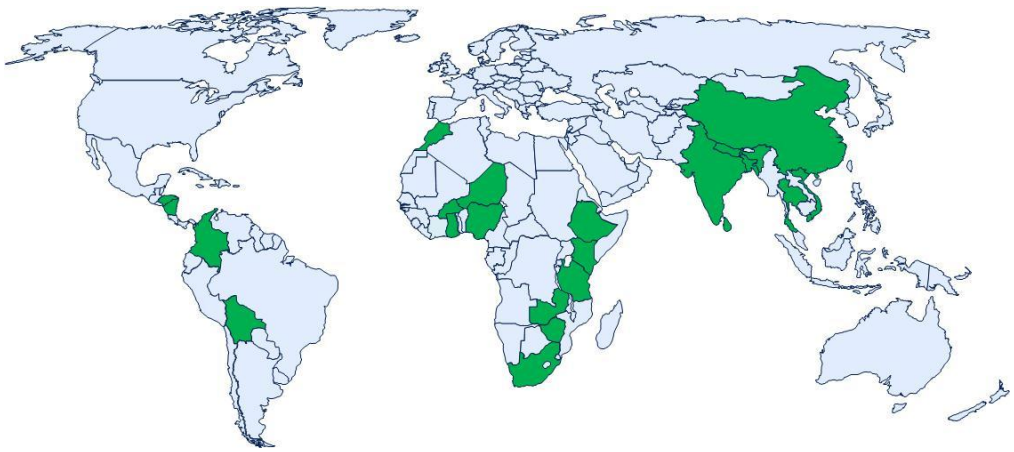

Figure 1 Countries where MUS approaches have been piloted

Table 1 MUS projects and programmes

Geographical focus	Programme	Main organisations involved
Ethiopia	RiPPLE	ODI, IRC, HCS, WaterAid Ethiopia
	MUStRAIN	IRC, RAIN Foundation, HCS/RiPPLE
Ghana	Plan's MUS programme	Plan Ghana
Honduras	PIR (Rural Infrastructure Programme)	FHIS (Honduran Social Investment Fund), RASHON , IRC
India	NREGA	IWMI, Government of India
Nepal	Smallholder Irrigation and Market Initiative (SIMI)	Winrock International
	Water Resources Management Programme (WARM-P)	WARM-P, Helvitas, Rain Foundation
	Rural Village Water Resources Management Project (RVWRMP)	RVWRMP, Government of Nepal, Government of Finland
Niger	Niger MUS WAWI II	Winrock International
Tanzania	Tanzania GLOWS	Winrock International, SHIPO
Viet Nam	Case study by SEI	SEI
Zimbabwe	ZIMWASH	Unicef, IWSD, IRC, Mvuramanzi Trust
Bolivia, Colombia, Ethiopia, South Africa, Zimbabwe, India, Nepal and Thailand	CPWF-MUS Project	IWMI, IRC, International Development Enterprises (IDE)
Burkina Faso, Ethiopia, Nepal	Sand dams and Rainwater Harvesting for MUS	RAIN Foundation
China, India, Viet Nam	MASSMUS applications	FAO
Ghana, Ethiopia, Tanzania, India, Nepal	Scoping study for Rockefeller Foundation	IWMI, IRC

Lessons on MUS were shared and promoted at the World Water Forums in 2006 and 2009. Some governments have included MUS in policies, such as Ethiopia, Nepal and South Africa. Several organisations which have been actively testing and applying a MUS approach, have incorporated MUS in their policies and started formulating guidelines to synthesise the emerging generic knowledge from these pilot experiences on 'how to do MUS'. Solutions have especially emerged on how to overcome the conventional institutional structuring of water policies, water services implementation programmes, and professional disciplines into fragmented, parallel operating

'vertical' sectors, which all tend to focus on, and budget for, the supply of technologies and/or related management structures for one pre-determined single use. (Smits et al., 2010)

A global MUS group of 14 international core members (for details, see Annex 1) and over 350 individual members facilitates exchange and deepens this knowledge on 'how to do MUS'. These guidelines reflect the outputs of the exchanges of the MUS group by synthesising the commonalities, and the minor differences, of the various existing guidelines into one concise set of generic guidelines on 'how to do MUS'. The guidelines focus on what makes MUS different from other conventional water services approaches. The table below gives an overview of the different guidelines which were used to compile the guidelines on MUS presented in this document.

Table 2 Overview of MUS guidelines

Guidelines	Geographical focus	Organisation
Guidelines for Planning for Water for Livelihoods (ZIMWASH, 2010)	Zimbabwe	IRC
Guide for planning and implementation of multiple-use water service projects (Smits and Mejía, 2011)	Honduras	RASHON & IRC
The empowers approach to water governance (Moriarty et al, 2007)	Mediterranean and North Africa region	EMPOWERS
Guidelines for planning and management of MUS systems (CINARA, 2007)	Colombia	CINARA
Multiple-Uses of Water Services in Large Irrigation Systems Auditing and planning modernisation: The MASSMUS Approach (Renault, n.d.)	Global	FAO
Engendering the MASSMUS approach, MASSMUS Gender Module (Wiegers, and Wahaj, n.d.)	Global	FAO
Guidelines for local level Integrated Water Resources Management (Van Koppen, 2006)	Southern Africa	IWMI
Guideline for Water-Use Master Plan (WUMP) preparation (WARM-P/Helvitas and RVWRMP, 2007)	Nepal	WARM & RVWRMP

Objectives and target audience

The objective of these guidelines is to provide guidance on planning, developing and providing multiple-use water services, based on the experiences of MUS group members.

The guidelines are targeted towards people and organisations that already have an interest in MUS, and are interested in applying the MUS approach. The guidelines can be used for guiding planning and providing multiple-use services and can used for the development of context specific guidelines for MUS.

Set-up of the guidelines and how to use the guidelines

These guidelines are divided into four parts:

Part 1 provides the conceptual background, by introducing the main terms and concepts referred to in these guidelines.

Part 2 presents guidelines for planning and provision of multiple-use water services. This part introduces the common elements for planning and providing multiple-use water services from the collection of guidelines in Table 2. This is followed by a description of each of the six identified common steps in detail. For each of the steps, activities are described which can be undertaken in the phase. Suggestions are given for tools which can be used to support these activities. Each of these tools is described in more detail in Part 4.

Part 3 consists of guidelines for the creation of an enabling environment for MUS at intermediate and national levels. This part focusses on evidence-based advocacy for MUS and capacity development for an enabling environment for MUS. Also here, tools are identified to facilitate these processes.

Part 4 provides a reference guide to tools which can be helpful in planning and providing MUS and creating an enabling environment for MUS.

Annex 1 gives an overview of organisations with a special interest and experience in MUS.

Annex 2 provides an overview of the different elements of the different guidelines presented in Table 2.

In **Annex 3**, summaries and overviews of these guidelines as presented.

A visual overview of Parts 2 to 4 of the guidelines is given on the next page.

In order to facilitate navigation in the digital version of this document, links have been included.

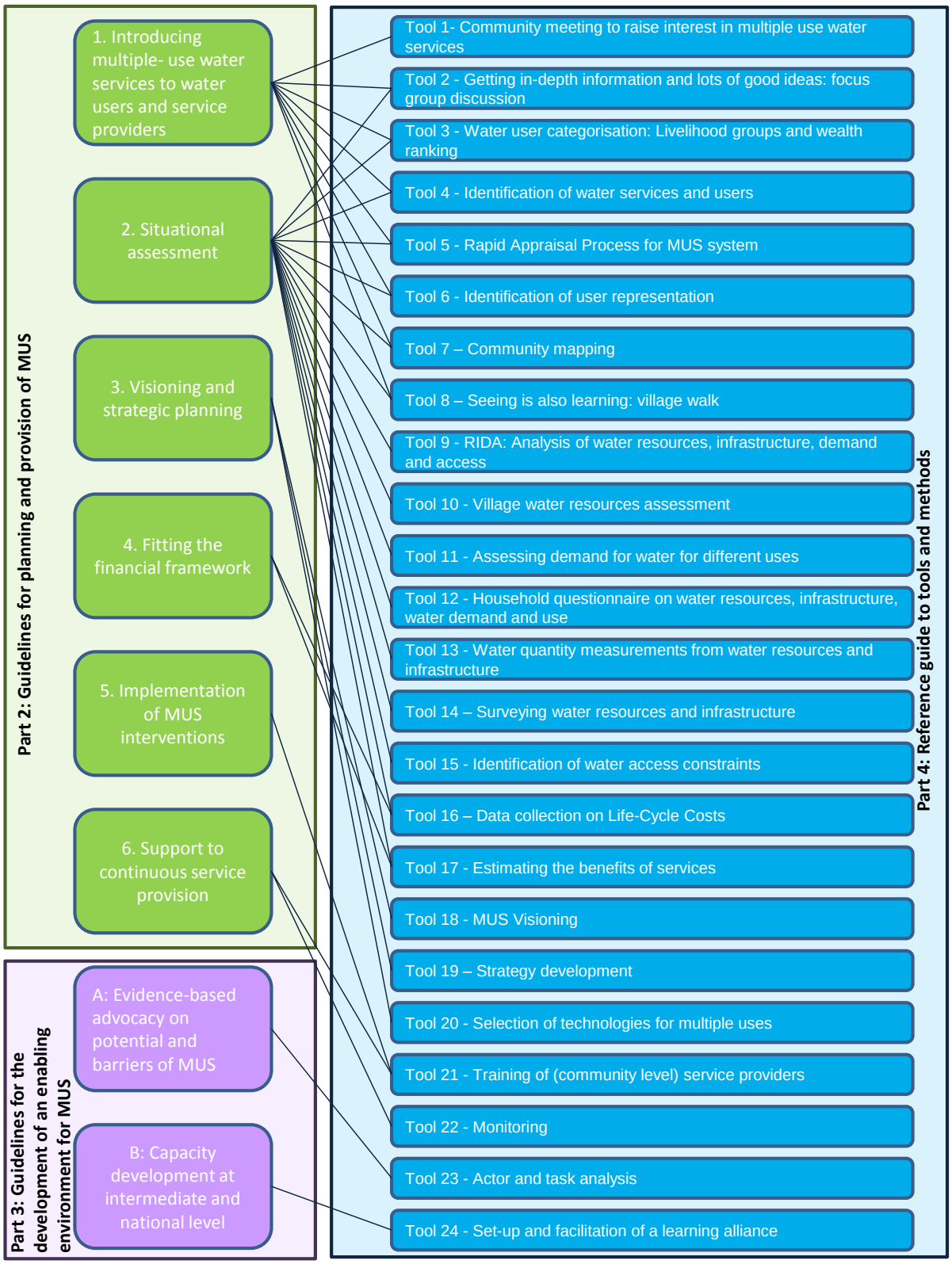

Figure 2 Overview of the guidelines

Part 1: MUS concepts and entry points

This part presents the main concepts related to multiple-use water services, as referred to in these guidelines.

Multiple-use water services

Multiple-use water services, or 'MUS' in short, is a participatory, integrated and poverty-reduction focused approach in poor rural and peri-urban areas, which takes people's multiple water needs as a starting point for providing integrated water services, moving beyond the conventional sectoral barriers of the domestic and productive sectors (Van Koppen, et al., 2006). Before exploring the entry point for MUS and the shapes and forms it can take, we will have a closer look at the concept of *water service provision*.

Water service provision is the delivery of a certain quantity of water with a certain quality. This water can be used for different purposes such as domestic uses, irrigation, watering livestock or (small scale) industrial uses. Besides the quality and quantity of water delivered, accessibility and reliability of the services are important water service delivery characteristics. Accessibility of the service relates to the time and effort required for accessing the service. This is determined by the distance between the location of the service and the location of the use of the water, but also by other barriers people might face for accessing water, like locally-set rules or water rights related to the use of water. Reliability of the service relates to whether or not the service can be reliably and consistently accessed at the right time. For some uses, this does not mean water supply has to be available all year round. For supplementary irrigation for example, extra water only has to be available at specific times during the year.

The characteristics of the provided water services (quantity, quality, accessibility and reliability) are determined by:

- **The availability of water resources:** this includes the quantity and quality of water resources and fluctuations in these over time (linked to reliability), and the location of the available water resources (linked to accessibility).
- **Infrastructure:** through infrastructure, water resources are converted into water services. The infrastructure determines to a great extent the quality, quantity, accessibility and reliability of the services provided.
- **Management and institutional arrangements:** quantity, quality, accessibility and reliability of water services are not only determined by the infrastructure, but also by the management of that infrastructure, and the institutional arrangements related to the provision of the services, such as rules and regulations around use of water.
- **Financial arrangements:** financing mechanisms define who contributes how much to the recovery of the lifecycle costs (see Table 3). These are the costs related to putting in place

the required infrastructure, management and institutional arrangements for converting water resources into water services.

Table 3 Lifecycle costs of water services

Capital expenditure (hardware and software) (CapEx)	The capital invested in constructing fixed assets such as concrete structures, pumps and pipes. Investments in fixed assets are occasional and 'lumpy' and include the costs of initial construction and system extension, enhancement and augmentation (especially in the case of domestic plus and irrigation plus). CapEx software includes once-off work with stakeholders (users and service providers) prior to construction or implementation, extension, enhancement and augmentation.
Capital maintenance expenditure (CapManEx)	Expenditure on asset renewal, replacement and rehabilitation costs, based on serviceability and risk criteria. CapManEx covers the work that goes beyond routine maintenance to repair and replace equipment, in order to keep systems running.
Operating and minor maintenance expenditure (OpEx)	Expenditure on labour, fuel, chemicals, materials, regular purchases of any bulk water. Minor maintenance is routine maintenance needed to keep systems running at peak performance, but does not include major repairs. According to Fonseca, et al., (2011), most cost estimates (in the domestic water sector) assume OpEx runs at between 5% and 20% of capital investments.
Expenditure on direct support (ExpDS)	Includes expenditure on post-construction support activities direct to service providers, users or user groups.
Expenditure on indirect support (ExpIDS)	This includes macro-level support, planning and policy making that contributes to the service environment but is not particular to any programme or project. Indirect support costs include government macro-level planning and policy-making, developing and maintaining frameworks and institutional arrangements, and capacity-building for professionals and technicians.

Source: Fonseca, et al., 2011

MUS Entry points

The MUS group distinguishes broadly three entry points for multiple-use water services:

- **Domestic-plus:** under this entry point, domestic water supply systems are developed but in such a way that higher levels of services are provided, so that on top of water for domestic uses, users have access to water for productive uses; service providers widen their mandates but maintain the (implicit) priority for domestic uses around homesteads.

- **Irrigation-plus:** under this entry point, irrigation systems are (re)developed in such a way that non-irrigation uses – both productive and domestic – can be accommodated; service providers widen their mandates, but maintain the (implicit) priority for productive uses, for instance, on fields.

- **Community-driven MUS by design:** taking communities and their own water-use priorities from multiple sources as starting point of improvements and offering technology choices designed for multiple uses.

The different entry points are described in more detail below:

Domestic-plus

For the ***domestic-plus approach***, the study by Winrock International, IRC International Water and Sanitation Centre and the International Water Management Institute (2007) showed that relatively limited incremental investments in supplying *more* water to or near homesteads was needed to move to 'higher service levels,' to 'climb the water ladder' (see Figure 3). Providing access can be an issue as well, for example when humans and livestock use the same source, and some separation is warranted, for instance through drinking troughs. Out of the higher quantities of water, at least three to five litres per day should be safe for drinking.

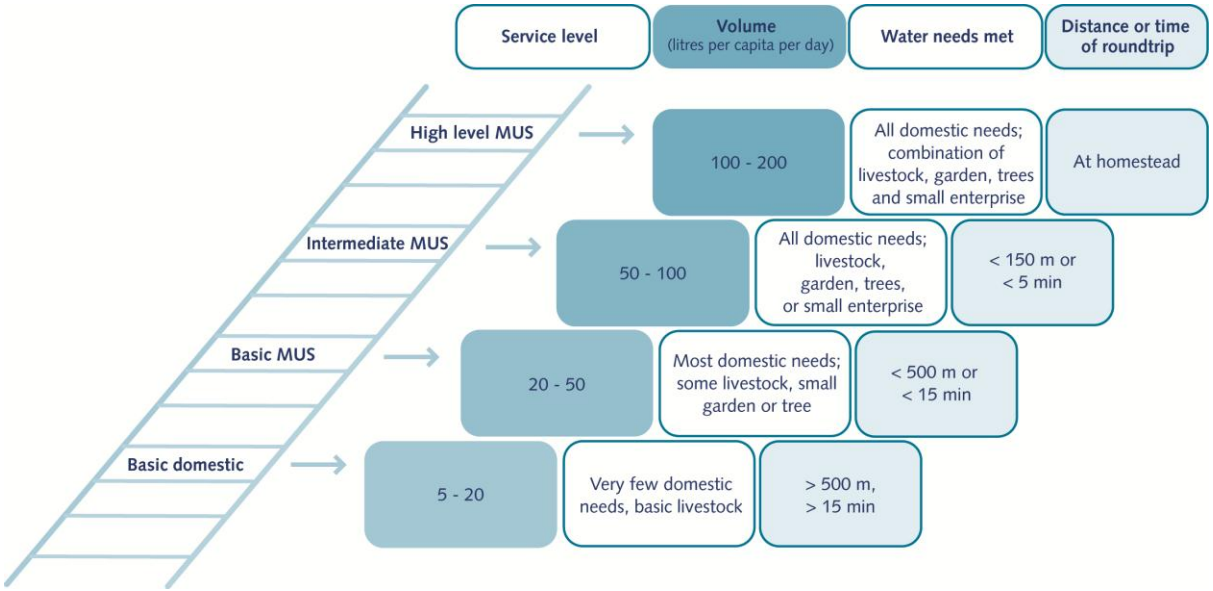

Figure 3 Water ladder

Source: Renwick, 2007; Van Koppen et al., 2009

Thus, domestic-plus aims at doubling or tripling water quantities for domestic and other small-scale uses in rural, peri-urban areas for, in principle, everybody. Concretely, this is achieved by increasing service levels of 'domestic' schemes, particularly gravity-fed piped systems or rainwater harvesting systems at household and community level. Point-sources such as boreholes with hand pumps have a limited potential for MUS. This can be enhanced by higher-discharge or mechanised lifting devices such as rope-and-washer pumps, motor pumps, etc.

The priority for domestic uses and small-scale productive uses around homesteads is pro poor and gender equitable as it is likely to align with the priority of women and of other land-poor people, for whom the homestead is often the only place where they can engage in their own productive enterprises.

Irrigation-plus

For the ***irrigation-plus approach***, the construction of 'add-ons' to communal surface irrigation schemes and storage enables access to relatively limited quantities of water for many important

non-irrigation uses and related livelihood benefits. Studies on such *de facto* uses (for instance Renwick, 2001) confirm there are many *de facto* returns on irrigation investments besides the returns from irrigation alone, which is an important argument in an era of declining investments in large-scale irrigation systems. Planned add-ons are usually low-cost, but generate high benefits (WI, IRC, IWMI, 2007). The widespread conjunctive uses of surface canal water and groundwater is another field where planning based on multiple uses and multiple sources (for instance the use of groundwater for domestic water and homestead cultivation from wells) can lead to higher benefits.

FAO's methodology for Mapping System and Services for Multiple Uses of Water Services (MASSMUS) promotes such irrigation-plus approach for large-scale irrigation schemes, in particular for the modernisation of governance of large-scale irrigation schemes by the specialised line agencies and irrigation authorities that typically manage such large systems. It has been applied, for example in India, Vietnam and China (FAO, 2010), also to address the growing competition among users in command areas, and between irrigation schemes and rapidly developing urban areas.

Community-driven MUS

The third entry point for MUS is **'community-driven MUS'**, which takes communities and their holistic existing water practices and priorities as a starting point. Instead of top-down fixing of any single-use as the priority, community-driven MUS facilitates a process of informed and needs-based technology choices and siting, which is fully adapted to the local ecological, institutional and economic-social situation. 'Community' refers to the lowest levels of hamlets or villages, or group of villages, and is in principle socially defined; communities are generally at lower aggregate levels than hydraulic watersheds or large-scale irrigation schemes.

Communities are informed and can chose among technologies and related management arrangements, which are *a priori* designed for multiple uses. Examples are gravity flow piped schemes, homestead-based tanks, the age-old village reservoirs.

Community-driven MUS would turn into domestic-plus or irrigation-plus, once communities have chosen those priorities out of the presented and informed choice.

More recently, affordable MUS technologies have been developed and are disseminated via the markets for individual or household use, in order to enable storage (for instance low-cost tanks with plastic lining), lifting (such as rope-and-washer pumps), and point-of-use water treatment (filters, chemicals).

Levels and functions

Renault et al (forthcoming) identifies that multiple uses of water can take place at different levels:

- **The household or homestead level**

  This is the lowest level, where people harvest water from several sources of water for different uses around or near the homestead, including domestic use, and for small-scale productive uses such as backyard gardens, livestock, micro-enterprises, etc.

- **The water system level**

  This is the level of a certain physical system such as a water distribution scheme or a water ecosystem. Such systems are often designed with a specific use in mind, for example, irrigation of field crops, or for domestic supply. Users may engage in multiple uses at household level, as seen above, but there may also be other uses and functions, which are built in at system level. For example, an irrigation canal may also fill village reservoirs for domestic supply, or provide water for fish. In large complex systems, such as some of the canal systems in South Asia, or paddy irrigation schemes in South East Asia, there may be a wide range of these uses and functions at system level.

- **Catchment or river basin level**

  Multiple uses of water occur from upper catchments down to estuaries and coastal wetlands, where different schemes and users take and discharge water for multiple purposes. Large dams have always typically been built to serve multiple functions such as flood protection, urban water supply, hydropower, irrigation, etc.

Besides these water user levels, where multiple uses of water take place, Smits and Lockwood (2011) define three groups of functions related to sustainable provision of (multiple-use) water services, which are linked to different levels:

- **Service provision functions**

  Service provider functions include functions of day-to-day management of a water service, which includes operation, preventative and corrective maintenance, bookkeeping, tariff collection, etc. In the case of rural water supply, domestic plus or community-driven MUS, the service provider functions are typically found at the level of a community or group of communities, depending on the size and scale of the water supply system(s) in question. This may be done directly by a committee acting on behalf of the community, or in cases where there is professionalisation of community-based management, these tasks are increasingly delegated or sub-contracted to an individual (plumber or technician) or to a local company acting under a lease contract (Smits and Lockwood, 2011). In case of (large scale) irrigation or irrigation plus, the service provision functions are commonly at the level of an irrigation department, managing the system, and/or at local level, where farmer's representatives manage (part of) the system, through a water users' association or similar community-based organisation.

- **Service authority functions**

  Smits and Lockwood (2011) define functions such as planning, coordination, regulation and oversight, and technical assistance, as service authority functions. Commonly, these functions take place at the intermediate level, described by Moriarty, et al., (2008) as the layer of governance (government, institutions and civil society bodies) that function below national level but above community level. In various countries, these intermediate levels are known as provinces, regions, districts, municipalities or governorates. The authority functions may be split between different administrative levels, for example between

provincial and district authorities, depending on the degree of decentralisation or mix between decentralisation and de-concentration of functions.

- **Enabling environment**

  This refers to the overall enabling environment where sector policy, norms and regulatory frameworks are set, service levels are defined, and macro-level financial planning and development partner coordination takes place. It can also be the level at which learning; piloting and innovation are funded and promoted. Overall sector guidance and capacity building is set by this level. This is also the level where capacity support for the service authority takes place. Commonly this takes place at the national level, but institutional at intermediate level can be involved as well.

Part 2 of these guidelines focus on the planning and provision of multiple-use water services, which involve water users, service providers and service authorities. Part 3 gives guidance on the establishment of the enabling environment.

Part 2: Guidelines for planning and provision of MUS

This section gives guidance on how to plan for and provide multiple-use water services.

The MUS cycle

In order to develop guidelines on how to plan for and provide multiple-use water services, a number of existing MUS guidelines were reviewed. We found that these guidelines use different project, management and service delivery cycles. However, they also share a number of common elements. In order to reach a generic framework for the purpose of these generic guidelines, the different cycles used in different existing guidelines were compared and common elements were identified (see Annex 1 for an overview of the common elements of these existing guidelines and Annex 2 for an overview of the content of each of the guidelines).

A common element in all guidelines is the use of the project cycle, and within that, the emphasis on the earliest phases of that cycle. It is in these phases that MUS differs most clearly from conventional single-use water services approaches. Firstly, there is an *awareness creation* and, secondly, an *assessment phase* in one form or other, generally including an assessment of water demand, uses and water resources.

Thirdly, the assessment phase is generally followed by a *planning phase*. In several guidelines (Empowers guidelines, (Moriarty, et al., 2007); Danida guidelines for local IWRM (Van Koppen, 2006); MASSMUS (Renault, n.d.), the planning phase is preceded by a visioning phase. In these generic guidelines, the *visioning phase* is considered an essential part of the strategic planning phase and therefore these two are taken together.

Fourthly, although not explicitly defined or made explicit as a separate issue or phase in most of the existing guidelines, the MUS Group recognises that MUS interventions require a *phase in which financial resources are matched with costs*, which leads to the development and adoption of a financial framework for the development and provision of multiple-use water services. Obviously, the financial conditions strongly influence earlier phases as well, and later events may warrant going back to earlier phases. However, a clear phase of agreeing on matching costs and available resources, often through contracts, can be distinguished.

Fifthly, all guidelines include an *implementation phase.* Interventions to implement or improve multiple-use water services can include both construction of new, or rehabilitation of existing infrastructure, as well as interventions to improve governance though capacity development of service providers (like water users committees). Often these kinds of interventions will go hand in hand. This phase often includes the development of work- or action plans and is about the more pragmatic planning of concrete activities in order to achieve the vision.

Lastly, guidelines focussing on project cycles tend to have a monitoring and evaluation phase follow the implementation phase. However, for these guidelines, the focus is more on service provision with its on-going administration, management and O&M, including post construction support. For these guidelines, we consider the monitoring and evaluation to be part of the on-going

administration during all phases, including management and O&M and post construction support to ensure *continuous multiple-use water service provision*.

So summing-up, the generic guidelines will consider the phases of the planning and provision of multiple-use water services as displayed in Figure 4.

This Part 2 of the guidelines presents the main objective, activities and tools that can be used for each phase of planning and provision of multiple-use water services. Part three focuses on the creation of the enabling environment for MUS.

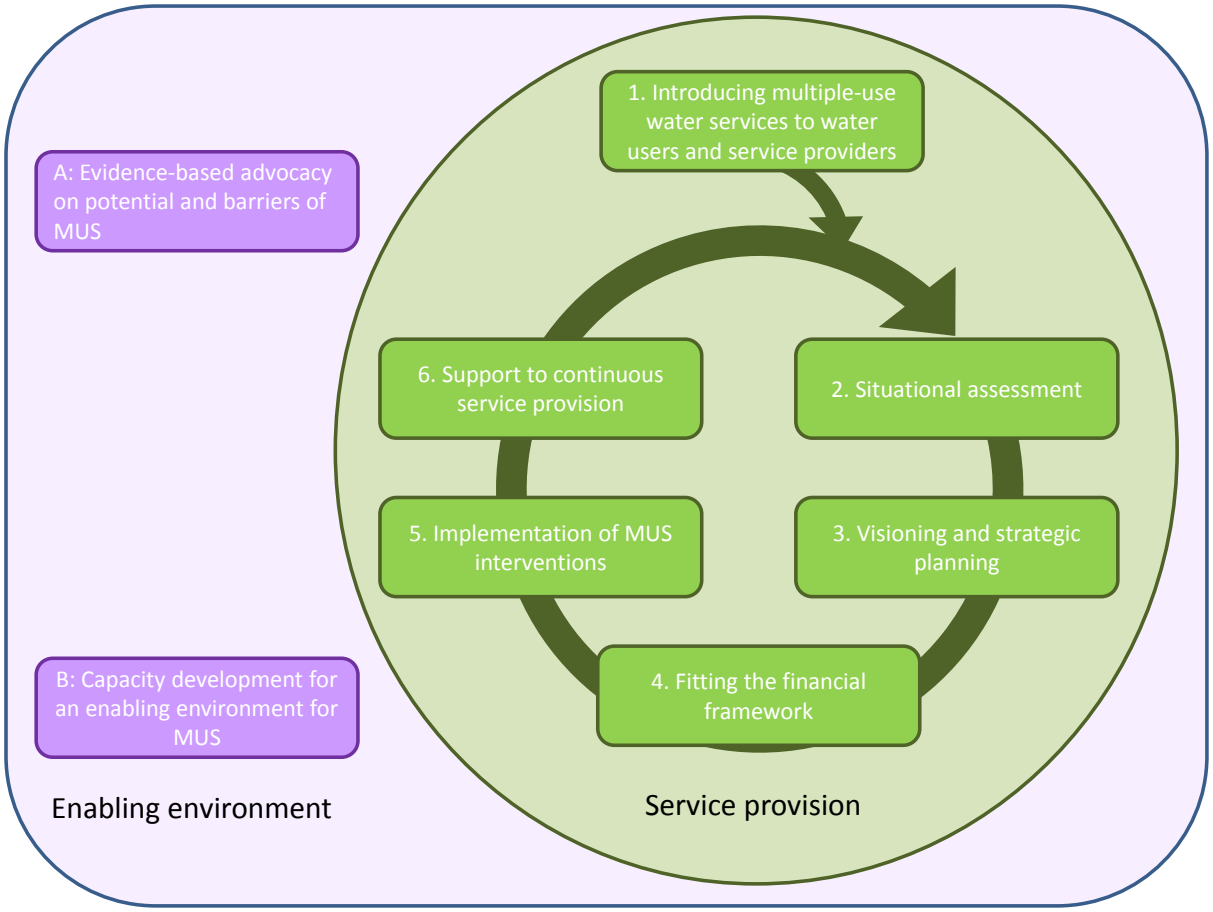

Figure 4 The MUS cycle

Phase 1: Introducing MUS

This phase should be the starting point of introducing MUS in areas where the MUS approach has not been applied before. In areas familiar to the 'intervener', where users, water service providers and service authorities are already familiar with MUS, this phase can be limited to setting expectations and conditions of a planned intervention.

Objective

The objective of this phase is to make water service providers and users aware of the potential and limitations of multiple-use water services in a certain context.

Activities

Potential and limitations for implementing or improving multiple-use water services are determined by factors related to the local context and factor related to the intervention project or initiative. In this phase, activities are to be undertaken to make these explicit.

Getting to understand the context

Obtain insight in the context of the water users. This is important for determining limitation and potential of MUS. This can be done by (broadly) identifying main livelihood activities, existing social and institutional arrangements and relationships, uses and demands for water, existing water resources and infrastructure, etc. The insight gained in this phase, can be further developed and deepened in Phase 2 through a more detailed situational assessment. In this phase, it is sufficient to obtain the amount of information that can support a well-informed discussion on potential and limitations for MUS in the local context.

Raising interest on MUS at user and service provider level

Raise awareness of water users and local service providers on multiple-use water services. Although water users do tend to use water for multiple uses, there is a need for raising the awareness of the water users and service providers of the concept of multiple-use water services. This requires stimulating out-off-the-box thinking, going beyond sectoral boundaries. Besides raising awareness of the potential for MUS, also the limitations for MUS caused by the contextual factors of the community can be discussed.

Setting expectations and conditions

Be clear on the conditions and manage expectations of water users and service providers. Multiple-use water interventions will come with their conditions, set by the 'intervener'. These conditions can include the preferred MUS entry point, technology preference, but also budgetary and resource restrictions. It is important that these conditions are made clear to the community, in order to prevent raising unrealistic expectations. This entails roughly indicating available budgets and, above all, articulating the water uses and livelihood benefits that are envisaged to be met, and any predetermined technology. Part 3 deals with how interveners can be stimulated to widen these conditions.

Tools

Several of the tools mentioned here can be used for getting better insight in the community, while at the same time raising awareness and interest of the community on multiple-use water services and it potential and limitations.

Phase 2: Situational assessment

In this phase, a more elaborate and detailed assessment and analysis is undertaken on water resources, water infrastructure and institutions, current and projected future demand for water and actual water use by different users (by wealth group, gender, etc.). This is done with the full participation of water users, service providers and the service authority, where possible. It builds on the activities related to data and information collection and analysis done in Phase 1. The depth of this phase can vary from once-off simple participatory drawings to regularly updated databases and sophisticated valuation of the different uses.

Objective

The objective of the situational assessment step is get a good insight into the current and projected future situation of water resources, water infrastructure (hardware and software), water demand and water use of different social and economic groups, at household, community, system and / or basin level. This will inform the development of realistic strategic plans in Phase 3.

Activities

Assessment of water resources

Do an assessment of the availability of rain water, surface water and ground water resources in terms of quantity, quality, reliability and accessibility at different sites throughout the year. Ideally, this should include an assessment of current water resources, as well as a projection of availability of future water resources.

This can be done though a mix of secondary data collection, mapping of water sources (see Tool 14), modelling and key-informant interviews.

Assessment of water infrastructure

Map the water infrastructure and the services that this infrastructure can provide (in terms of water quantity, quality, reliability and accessibility). The assessment of the water infrastructure should not be limited to the physical systems, but should include a mapping of the managerial and governance arrangements related to the management of the infrastructure. In cases where infrastructural improvements outside the intervention have been planned, these should be assessed as well.

This can be done through secondary data collection and a review of project documents, the mapping of water infrastructure (see Tool 14), key-informant interviews, household surveys (see Tool 12) and village walks (Tool 8).

Assessment of optimal water demand

Assess the demands for water services in terms of quality, quantity, reliability and accessibility, for different uses of water (domestic use, irrigation, livestock watering, small industrial water uses, such as brick making etc.) and for different users. This should be done for both the current situation, as well as for possible future situations. This will require making projections of future water demands.

- This can be done through focus group discussions (see Tool 2); key-informant interviews and household surveys (see Tool 12).

Assessment of actual water use and barriers to accessing water services

Assess the actual use of water from different sources, for different uses needs. Also the barriers for accessing and using water have to be assessed: who has access to which water sources and who is excluded? Who has right to which sources and when? Are there arrangements in place to regulate this (for instance water rights)? What are the costs of accessing water services and benefits of water use?

- This can be done through focus group discussions (see Tool 2 and Tool 15); key-informant interviews and household surveys (see Tool 12).

Analysis of water Resources, Infrastructure, Demand and Access

Analyse the links between the water resources, infrastructure, demand and access (see Tool 9):

- Is water demand for multiple uses being met? What are the barriers to meeting the demand, now and in the future?
- Is there potential to enhance multiple-use water services, taking into account the current and future water resources, infrastructure and demand?
- What are the main barriers to implement MUS?
- What are the potential productive water uses given the socio-economic context, for instance market niches, and what other accompanying measures may be needed to enhance the benefits?

Data storage and presentation

Information collected during this step should ideally be stored in a transparent, public information base, for instance with local government, most likely consisting of spread sheets and/or layers of information in a geographic information system (GIS layers).

Tips

- It is crucial that in this phase both planned, as well as the unplanned uses of water, including communities' informal self-supplies, are identified.
- Involving local stakeholders as much as possible in the assessment procedure is key.
- The assessment process is at the same time an important part of awareness raising. The key point is that people understand the full chain of resources, hardware and institutions, uses and users involved in providing and receiving water services.
- The 'area of interest' of the assessment may start with the village where demand and access are being assessed, but it must follow the logic of the multiple water sources and infrastructure to identify problems and opportunities to meet that demand, which could

lead to considering a watershed or an entire district or much larger supply infrastructure and drainage of which it is part.

- Structuring analytical tools (such as models) and reports helps to bring stakeholders from different levels and interested in different elements together in a joint analysis.

Tools

The following tools can be useful to support the activities within this phase:

Tool 2 Getting in-depth information and lots of good ideas: focus group discussion

Tool 3 Water user categorisation: Livelihood groups and wealth ranking

Tool 4 Identification of water services and users

Tool 5 Rapid Appraisal Procedure for MUS system

Tool 6 Identification of user representation

Tool 7 Community mapping

Tool 8 Seeing is also learning: village walk

Tool 9 RIDA: Analysis of water resources, infrastructure, demand and access

Tool 10 Village water resources assessment

Tool 11 Assessing demand for water for different uses

Tool 12 Household questionnaire on water resources, infrastructure, water demand and use

Tool 13 Water quantity measurements from water resources and infrastructure

Tool 14 Surveying water resources and infrastructure

Tool 15 Identification of water access constraints

Tool 16 Data collection on Life-Cycle Costs

Tool 17 Estimating the benefits of services

Phase 3: Visioning and strategic planning

Providing multiple-use water services is about meeting people's multiple water demands. As different people might have different demands, using water in different ways, it is important to establish a clear and common vision at water-user level and to discuss and weigh different strategic options with the participation of different water-user groups and water service providers.

Objective

Agreeing on a common vision and development of a strategic plan for multiple-use water service provision, which addresses people's multiple water needs taking into account gender and equity issues of multiple use services.

Activities

Developing a common vision

Develop a common vision about water use in the community or system in the long term (5 - 20 years). In order to develop a plan for improving multiple-use service provision in a community, system or basin, it is important to have a common understanding about a long-term vision. Therefore, a useful first step is to do a visioning exercise with users and service providers.

Developing strategies for achieving the vision: putting the options on the table

After having determined a clear-long term goal, strategies towards meeting this vision are developed. This will include:

- Providing the infrastructural and managerial options for implementing or improving multiple-use water services. For each option, the potential for different uses, costs, benefits, potential impact, management arrangements etc. should be assessed, presented and discussed. Also, both synergies and trade-offs between uses and users are to be anticipated and addressed.
- Agreeing through participatory and accountable procedures and criteria to prioritise water uses and users and related options.

Assessing and prioritising strategies

Assess the feasibility of the identified strategies. Criteria for prioritisation have to be set. These can include:

- Potential impact of the strategic option of water use for different users, in particular marginalised people.
- Potential impact of the strategic option on water resources.
- Cost estimation of the implementation of the strategic option.
- Technical feasibility of the strategic option.

- Social and managerial feasibility of the strategic options.

Then, a ranking and prioritisation of the strategic options has to be done, based on the assessment of the options according to the set criteria. In addition, the availability or resources has to be taken into account in the prioritisation of strategic option.

Tip

It is important to consider views and ideas on vision and technologies from all stakeholders, including the marginalised ones.

Tools

The following tools will be useful to support the activities within this phase:

Tool 18 MUS Visioning

Tool 19 Strategy development

Tool 20 Selection of technologies for multiple-uses

Phase 4: Fitting the financing framework

Financial resources for water interventions and the provision of water services are often earmarked to serve a particular single use, for instance, either water supply, or irrigation. Applying a multiple-use water services approach requires developing a financial framework that takes into account the costs of providing water services that serve multiple uses. Advocacy for widening of sub-sectoral mandates which will be needed for this is discussed in more detail in Part 3, while this phase focuses on how to match costs to the sources of funding.

Objective

The objective of this phase is to match costs and financing frameworks while overcoming the earmarks for single water use that used to be attached to financing streams and accountability in conventional water services. This can be achieved either by allowing for flexibility in allocation of financial resources or by converging different (sub) sectors in financing the provision of multiple use water services (like the water supply sector, the irrigation sector, the fisheries sector, etc.).

Activities

Identify (incremental) life-cycle costs of the provision of multiple use water services

Based on the prioritised strategies, identify the required costs for the provision of multiple-use water services.

Going from providing single-use water services to providing multiple-use water services will come with incremental costs. These incremental costs can include:

- Capital (maintenance) expenditure of the technological add-ons such as a water treatment system added to an open canal irrigation system (irrigation-plus) or a drip irrigation system added to a piped water supply system (domestic-plus).
- Additional operational and minor maintenance related to additional water use because of additional energy consumption.
- Additional costs of capital, related to additional loans.
- Additional direct and indirect support costs, related with the higher need for coordination between different sub-sectors, which comes at additional costs.

Identify potential sources of funding in order to meet the life-cycle costs

Identify potential sources of funding. These can include funding from governments (though taxes), from users (through tariffs), from donors (through transfers) and from individuals (through private funding).

Government funding, through taxes:

Governments generally cover direct and indirect support costs, through revenues from taxes (and / or transfers from donors). In case of multiple use services, direct and indirect support will mostly be

multi-sectoral, 'converging' support from the water supply sector, as well as from the agricultural (extension) sector and livestock sector. Governments can also provide flexible funding that can be allocated as seen fit by local stakeholders (see NREGA, see Box 1).

Box 1 Example of community-driven MUS: India's Mahatma Gandhi National Rural Employment Guarantee Scheme

An innovation in local-government-led participatory planning is India's Mahatma Gandhi National Rural Employment Guarantee Scheme. Started in 2005, it now reaches more than 50 million beneficiary households per year, who are provided up to 100 days of labour.

In this programme, local governments are relatively free to choose the social assets to which they allocate the subsidised wage labour. The NREGA guidelines provide a list of permissible works / work categories, which includes water conservation and water harvesting, restoration of traditional water bodies, irrigation works, drought proofing, flood control etc. and does not specifically mention domestic water works. However, water harvesting may be done for irrigation as well as for domestic purposes. Drought proofing work may also entail domestic water security works. Likewise, restoration of traditional water bodies may entail domestic uses as well, such as recharge of open wells in Kerala. Local governments appeared to choose for water and water-related works in 70% of the cases (Shah, et al., 2011). Over half of those assets appeared to be for multiple uses (Malik, 2011). Although still at a small scale, more experience is especially gained with 'converging' of funding from different programmes. Most of those programmes are also from government; synergies with NGOs and donor-supported programmes have been relatively limited up till now. This pooling of resources for different components of an integrated project mitigates the fragmented nature of single-use water sectors, and other development initiatives at the same time. Thus, MGNREGA is the world's major laboratory for community-driven planning, also for MUS. In Sub-Saharan Africa, NGOs can temporarily fill the gap of capacity building of both communities and local government in innovating community-driven MUS.

Tariffs (from users):

Tariffs are mostly used to cover operational and minor maintenance expenditure and occasionally part of the capital maintenance expenditure. A single tariff can be set, regardless of what the water is used for, or different tariffs can be set for different water uses. Different tariffs for different uses can be set in different ways:

- Different flat rates per household depending on the water use (for instance one tariff for people who use water only for domestic use, and another tariff for households who also use water for livestock).
- Increasing block tariff: volumetric tariff, which increases with the total amount of water used.
- Decreasing block tariff: volumetric tariff, which decreases with the total amount of water used.
- Tariff per production unit (for instance per unit land or per head of livestock).

Transfers from donors:

Donors mostly fund capital (initial investment costs and often maintenance) expenditure. A single donor can be identified to cover (part of the) the capital expenditure in order to provide multiple-use services, or separate donors can be identified to cover the capital (maintenance) expenditure associated with particular single uses.

Private funding:

As users of multiple-use water services will be able to obtain multiple benefits, the potential for self-financing of capital expenditure and operation and minor maintenance expenditure is likely to be higher for multiple use services that for single use services. Private sources of funding can include revenue from productive uses of water as well as micro-credit or other micro-financing mechanisms.

All these potential funding mechanisms have to be negotiated with the users, service providers and (potential) external funders of multiple-use water services in order to cover all the identified costs related to multiple use service provision. It is very likely that a mix of different funding sources is identified in order to fund the identified strategies for providing or improving multiple-use water services.

Agree on cost sharing arrangements

Where multiple sources of funding have been identified, cost sharing arrangements have to be developed and signed. This is especially important for MUS because funding sustainable multiple-use water services is likely to require multiple sources of funding, crossing sub-sectoral boundaries.

Tools

The following tools can be useful to support the activities within this phase:

Tool 16 Data collection on Life-Cycle Costs

Tool 17 Estimating the benefits of services

Phase 5: Implementation of MUS interventions

In this phase, the strategic plan developed in Phase 3 is implemented.

Objective

The objective of this step is to implement the strategic plan as developed in the previous step.

Activities

Development and execution of a work plan / action plan

Develop a specify work plan of action, based on the prioritised strategic options. This needs to include a funding strategy, as mentioned above, a procurement plan, a time frame, and an overview of the roles and responsibilities of different stakeholders.

Infrastructural interventions

Undertake infrastructural interventions based on the selected technologies identified and prioritised in the strategic plan.

Governance and managerial interventions

Undertake governance and managerial interventions. Initial governance and management interventions tend to be focussed on building the capacity of the service provider. If modules for capacity development of the service provider are available, these can often be used for multiple use service provision as well, with only small revisions and additions to the curriculum.

Other points of attention for governance and managerial interventions related to MUS:

- Institutional set-up: putting in place separate committees for water uses and / or one overarching water committee.
- Prioritisation of water use: putting in place structures and procedures for prioritising certain uses in case of scarcity of water resources and regulating and enforcing this prioritisation.
- Conflict management: putting in place structure to deal with conflicts that may arise over water use between different water use(r)s.

Tools

The following tools can be useful to support the activities within this phase:

Tool 21 Training of (community level) service providers

Phase 6: Support to continuous service provision

Objective

The objective of this phase is to ensure the continuous provision of sustainable multiple water services.

Activities

- Continuous post-construction support (capacity development, technical assistance, facilitation) to service providers and users.

Unlike single-use services, post construction support for MUS also includes:

- Stimulating multiple uses and providing advice, where needed also on accompanying measures such as hygiene education, market development, soil conservation, etc.
- Prioritising and regulating water uses as anticipated during the design.
- Support to tariff setting for multiple use water services.
- Continuous monitoring of the multiple use service.

In addition to the provision of post-construction support to water users and multiple-use service providers, monitoring the multiple uses and the services and taking corrective action where needed, is essential.

Tools

The following tools can be useful to support the activities within this phase:

Tool 21 Training of (community level) service providers

Tool 22 Monitoring

Part 3: Guidelines for the development of an enabling environment for MUS

In order to scale-up multiple use water services, an enabling environment has to be in place, which includes:

- Organisations and institutions with interest and mandate beyond a strict sectoral focus (so going beyond only irrigation or only water-supply).
- Organisations with structures and systems in place that stimulate multiple use water services (for instance by having cross-sectoral sections, including water supply and irrigation professionals, or by instituting coordination structures within organisations).
- Financial systems to enable scaled-up multiple use water services (such as financial systems that enable pooling financial resources from different sub sectors).
- Laws and policies that stimulate and regulate multiple use water services, rather than preventing it.
- A high level of coordination and joint learning and sharing between organisation from different sub-sectors (like water supply, irrigation, agriculture, etc.).
- A knowledge base on how to provide and scale up multiple-use water services.

The development of an enabling environment for scaled-up, multiple-use water services requires stakeholders at intermediate and national levels with awareness of and insight into the potential and barriers for providing multiple use water services. Furthermore, stakeholders at intermediate and national levels should have a favourable attitude towards MUS and adequate knowledge and skills to enable the scaling-up of multiple-use water services.

This part focuses on two major sets of activities which can be undertaken in order to stimulate the development of an enabling environment for scaling-up multiple-use water services:

A: Evidence-based advocacy; and

B: Capacity development at intermediate and national level.

A: Evidence-based advocacy

Objective

The objective of this phase is to improve awareness of and insight into the potential and barriers for multiple-use water services of stakeholders at national and intermediate levels within a certain context. This new awareness and insight can stimulate stakeholders, organisations and institutions to contribute to the creation of an enabling environment for multiple-use water services, for instance by widening sectoral mandates, improving stakeholder coordination and putting in place MUS-enabling (implementation) policies.

Activities

Data collection and analysis to feed evidence based advocacy for MUS

- Research on costs and benefits: Research has shown that relatively high incremental benefits can be obtained against relatively small incremental costs, when moving from providing single to multiple-use services. Mapping costs and benefits of multiple-use water services and the incremental costs and benefits of going from single to multiple-use services in a specific context can strengthen this argument and can be used to advocate for multiple-use water services.

- Research on *de facto* multiple uses of water: People have been using water for multiple uses since time immemorial. Mapping *de facto* non-planned uses can help advocating for interventions that facilitate these multiple uses.

- Research on institutional linkages between water sub-sectors: Different stakeholders have different roles and functions, related to (supporting) multiple-use water service provision, and are allocated different funding streams. Mapping these roles, responsibilities, funding streams and their overlap can help advocating for better stakeholder coordination.

- Implementing and testing innovative scalable models for MUS: This includes testing physical infrastructure that supports or enables MUS in a certain context, but also testing innovative organisational and/or financial models that facilitate MUS.

This research can be undertaken by research or knowledge organisations in order to develop evidence-based advocacy material to stimulate MUS. Also, relevant intermediate and national level stakeholders can be actively involved in the research, which will facilitate the uptake of lessons learnt by these stakeholders and can contribute to the development of the capacity of these stakeholders. See Section B: Capacity development .

Developing and distributing evidence-based information and advocacy materials

Developing and distributing evidence-based information and advocacy materials based on the above described research, can contribute to the development of awareness of the potential and barriers for MUS. This data and information will have to be presented and made accessible in appropriate ways, to suit different audiences.

The MUS Group and its members are a useful source of reference and advocacy materials. Besides the compilation of these generic MUS guidelines, the MUS group has generated a wealth of advocacy materials, case studies and other reference materials available on its website. See www.musgroup.net.

Tools

The following tools can be useful to support the activities within this phase:

Tool 4 Identification of water services and users

Tool 16 Data collection on Life-Cycle Costs

Tool 17 Estimating the benefits of services

Tool 23 Actor and task analysis

B: Capacity development at intermediate and national level

Objective

The objective of capacity development for an enabling environment for MUS is to create skills, knowledge and attitude and organisational and institutional systems and structures at intermediate and nation level, to stimulate, facilitate and support the provision of multiple-use water services.

Activities

Participatory action research

Involving intermediate and national level stakeholders directly in research on potential and barriers for MUS enables them to build their capacity and will improve their level of knowledge, skills and attitude towards multiple-use water services. In addition, involving these stakeholders in action research can lead to the identification of organisational and institutional barriers for MUS, which they can subsequently address.

Training of intermediate and national level stakeholders

Through training of intermediate and national level stakeholders, the capacity of these stakeholders can be built, so they have the knowledge and skills to plan for and support multiple-use water services. This can include the following:

- Training of engineers on how to design multi-purpose infrastructure.
- Training of planners and implementers on how planning for MUS can improve water services.
- Training of policy makers (local and nation government) on institutional, organisational and financial arrangements that enable MUS, etc.

The training should as much as possible be context specific and ideally be based on the evidence-base developed in the previous step. Training can include lecturing and exercises, but also field work assignments, exposure visits and exchange visits.

Applying a Learning Alliance approach

Applying a Learning Alliance approach means bringing together stakeholders at key institutional levels (local / community level – intermediate level – national level), to share and learn and jointly find solutions to complex problems (Moriarty, et al., 2005), like how to ensure the provision of sustainable multiple-use water services. It is an approach that combines action research and capacity development. The establishment of platforms at key institutional levels is intended to break down communication and coordination barriers between stakeholders a certain level and between the levels. Facilitating a Learning Alliance approach can thus contribute to improving the institutional coordination and convergence between different sub sectors (irrigation, agriculture, irrigation, etc.) needed to enable MUS.

Tools

The following tool can be useful to support the activities within this phase:

Tool 24 Set-up and facilitation of a Learning Alliance

Part 4: Reference guide to tools and methods

This part presents a collection of tools and methods for planning and providing multiple use water services and for the creation of the enabling environment needed for this. For each tool, the objective, the method and the reference to the tool on which the here presented tool has been based, in presented. The following tools are presented:

Tool 1. Community meeting to raise interest in multiple use water services

Objective

To identify community interest and their demand for water for multiple uses, and to clarify conditions of potential interventions.

Method

The community meeting consists of an open plenary discussion. A facilitator gives an introduction of the objectives of the meeting and explains in simple terms the concept of multiple-use water services and the condition of the planned multiple-use focussed intervention.

After this introduction, the facilitator asks guiding questions, which can be discussed in plenary, or sub groups, depending on the session. Where different opinions exist within a community, it is useful to explore these further. Below are a series of guiding questions:

The responses from the community members are captured on flip charts, or by other means, and read out aloud, so that all attendants know what will be documented.

Guiding questions for understanding the context and raising awareness

Current use of water

- What are the main livelihoods activities in this community? Are there different categories of livelihoods in this village?
- Is water used as input for these? If so, what water sources are used for those?

Limitations for multiple water use

- Are there limitations to the use of water from the sources, related to quantity, quality accessibility or reliability of the water?
- Are there conflicts over water use from certain sources (either within the community or with neighbouring communities)?

Interest in and demand for multiple use water services

- Is there interest and demand for using water to enhance livelihood activities?
- If access to water for livelihoods activities were to be enhanced, what would be your priority? Which kinds of sources would you consider exploiting? And for which uses?

Opportunities and limitations for multiple use water services

- Who would be the beneficiaries of that? Are there (sub) groups in the community who would benefit more or less?

- What are current limitations for the community in exploiting these resources more?
- Would the community, and specifically the final beneficiaries, be willing to contribute to such development?

Expectations

- What kind of final benefit (for instance in terms of time saving, health, production, etc.) would you expect after having access to water for multiple uses?
- What would you expect of the intervention to contribute to that? What would be your own contribution?

Tips and tricks

- It is not necessary to come to final conclusions or consensus yet, as it is only the first step in the process.

Based on

Tool 1 in: ZIMWASH, 2010. *Guidelines for Planning for Water for Livelihoods,* Harare: ZIMWASH Project.

Tool 2. Getting in-depth information and lots of good ideas: focus group discussion

Objective

To identify the interest and demand of specific groups in the community for water for multiple uses, and to clarify conditions of potential interventions.

Method

The focus group discussion (FGD) is similar to the plenary community meeting (Tool 1) in terms of its scope and guiding questions. However, it is carried out with smaller sub groups from within the community, for example with women or men only, or with specific groups of users. A focus group discussion should not consist of more than ten to fifteen persons and should take one to two hours.

Step 1: Pre-identify the focus group(s) before organising the FGD.

Step 2: The FGD is led by a facilitator who asks guiding questions, and ensures participation from all the attendants.

Step 3: The responses from the FGD members are captured on flip charts, or otherwise. A rapporteur keeps notes and will produce a report of the focus group discussion.

Guiding questions for understanding the context and raising awareness:

Current use of water for livelihoods

- What are the main livelihoods activities for you as a group within your community?
- What water sources are used for those?

Limitations for multiple water use

- What limitations does you group face for the use of water from the sources, in terms of quantity, quality accessibility or reliability of the water?
- What is the level of disagreements or conflicts over the use of water within the community, or with people outside the community?

Interest and demand for water for livelihoods

- If access to water for livelihoods activities were to be enhanced, what would be your priority? Which kinds of sources would you consider exploiting? And for which uses?

Opportunities and limitations for multiple use water services

- Are there other (sub) groups in the community who would benefit more or less?
- What are the current limitations for you in exploiting these resources more?

- How would you be willing to contribute to such development?

Expectations

- What kind of final benefit (for instance in terms of time saving, health, production, etc.) would you expect after having access to water for multiple uses?
- What would you expect of the intervention to contribute to that? What would be your own contribution?

Tips and tricks

- Depending on the context, an FGD can be done before a full community meeting is organised, if it is expected that large differences exist within the community. Or, it can be held after such a meeting, when during the meeting, substantial differences within the community are identified in terms of demand and interest within the community.
- Focus groups can be identified and formed using the 'water user categorisation' tool (Tool 3).
- The facilitator of the FGD should:
    - Use open ended questions that allow people to give full answers.
    - Avoid yes / no questions.
    - Avoid too many 'why' questions.
    - Avoid embarrassing questions like 'what did you do about this'. Ask instead 'What do people around here do about it'.
    - Be sensitive to what is being said and by whom.

Based on

Tool 2 in: ZIMWASH, 2010. *Guidelines for Planning for Water for Livelihoods*, Harare: ZIMWASH Project.

Tool 7 in: Bolt, E. and Fonseca, C., 2001. *Keep it working: a field manual to support community management of rural water supplies,* Technical paper series, IRC; no. 36, Delft: IRC International Water and Sanitation Centre.

Tool 3. Water user categorisation: Livelihood groups and wealth ranking

Objective

To identify the main categories of users in the community, their wealth status and their main livelihoods strategies, and to identify the role of water in these strategies.

Method

This exercise can be done as a focus group discussion (see Tool 2). The focus group then needs to be a good representation of the case study site (people from different communities, men/women, irrigators, livestock holders, well-off / poor), with people from different areas within the case study site.

Step 1: Identification of livelihood groups

- Ask the group 'which livelihoods strategies do people employ in the community?'
- While the community members answer, the facilitator writes these categories on a flip chart. Typical categories can include small former (those that only produce for home consumption) and larger farmers (those that produce for the market), cattle owners, people living off cash from elsewhere (pensioners, people living of remittances), employees, etc.

Step 2: Identification of wealth categories

- Have the group make drawings of a well-off / wealthy person, a worst-off / poor person and someone in between, on A4 paper and ask them to describe six to seven characteristics of each person.

Step 3: The characteristics of the water users

- Discuss links between the livelihood groups and wealth groups and come to a classification of water user groups. Community members are asked to provide a further characterisation of each group by going through the following questions:
    - For each of the categories, what are the key characteristics defining their social and economic conditions, in terms of, for example, housing conditions, land ownership or access to cash? What local criteria exist to differentiate between them?
    - For each of the categories, what are their characteristics in terms of access to and use of water? Which sources do they use, and for what purpose?
    - For each of the categories, what would be their future water needs? And what is their own capacity to contribute to developing those?

- The facilitator writes these characteristics under each user category, coming to a final matrix. An example of such a matrix is given below.

Step 4: Distribution of water-users groups in the community

- In order to get an idea of the distribution of water-user groups within the community, the group can be asked to place cards with the household names or numbers under the different categories.

- Alternative: If it is too sensitive to classify the households under the different categories, the facilitator can collect 100 small stones, seeds or berries. The group can be asked to distribute the stones, seeds or berries under the different categories, thus expressing the percentage of user categories.

Table 4 Example of water user characterisation matrix

Wealth class / Livelihood class	Well-off	Medium	Worst-off / poor
Farmer	• Grows maize for sale to the market. • Has more than ten cows. • Brick house. 5% of the community.	• Grows rain fed maize for sale for home consumption and sells part of the crop. • May have seasonal additional income (migrant work). • Has a vegetable plot irrigated from wells. • Has some cows (less than five). 70% of the community.	• Grows rain fed maize for sale for home consumption May have seasonal additional income (migrant work) • Does not have additional income • Has a vegetable plot irrigated from wells. 20% of the community.
Families living on cash from elsewhere	• Lives in the centre of the village. • Lives on remittances • Does not grow crops. • Only has small garden next to house, with flowers and some vegetables. • May have some chicken. • Brick house. 5% of the community.		

Source: ZIMWASH, 2010 and Smits and Mejía, 2011

Tips and tricks

- The facilitator should not present the user classification matrix upfront, but should let the community identify the categories.

Based on

Tool 3 in: ZIMWASH, 2010. *Guidelines for Planning for Water for Livelihoods*, Harare: ZIMWASH Project.

Tool 2 in: Smits, S. and Mejía, T., 2011. *Guía para la Planificación e Implementación de Proyectos de Usos Múltiples del Agua*, The Hague / Tegucigalpa: IRC/ RASHON.

Tool 9 in: Bolt, E. and Fonseca, C., 2001. *Keep it working: a field manual to support community management of rural water supplies,* Technical paper series, IRC; no. 36, Delft: IRC International Water and Sanitation Centre.

Tool 4. Identification of water services and users

Like Tool 3, this tool can be used to identify user groups and water services. Where Tool 3 takes livelihood groups as the starting point, this tool takes identified water services as the starting point.

Objective

To map the multiple water services provided by an irrigation scheme to different users, to identify who are the users of the different water services and to collect information on their socio-economic characteristics and their water rights.

Method

Step 1: List the multiple-use water services

Information for this can be obtained by doing key-informant interviews and observations. An example of identified multiple uses of water provided by an irrigation canal in India can be found in Box 2.

Box 2 Identified multiple water use services in the Krishna Western Delta System

Identified multiple use water services in the Krishna Western Delta System:

1. Irrigation
2. Domestic water
3. Sanitation
4. Water for animals
5. Aquaculture (fishponds)
6. Industry
7. Transport
8. Homestead garden and perennial vegetation
9. Drainage and environment
10. Flood control
11. Groundwater recharge

Source: FAO, 2010. Mapping Systems and Service for Multiple Uses in Krishna Delta Western System Andra Pradesh – India. MASSMUS Application with special focus on domestic water supply and sanitation. Rome: FAO.

Step 2: Draw up a user matrix in a FGD or key informant interview

Explain the exercise to the focus group or key informants and draw up a matrix of four columns and eight rows (more can be added when needed). Include the identified water use services in the left column.

Step 3: Identifying key users

Identify with the focus group or key informants the different users for each water-user service and put these in the second column. For each water-use service estimate the proportion of users that are male and female. Include landowners, tenants, plot managers (who make the decisions) and labourers.

Step 4: Users and formal water rights

Using the matrix, discuss the following with the focus group or the key informants

- What proportion of male and female users of each water use service has formal water rights?
- Who are the users with formal water rights?
- What are reasons for not having formal water rights?

Step 5: Areas for further investigation

Based on discussions with the focus group or key informant, identify areas that require further investigation and reasons for this.

Based on

Tool 1 in: Wiegers, E., and Wahaj R., forthcoming. Multiple Uses of Water Services for Men and Women in Large Irrigation Systems: Engendering the MASSMUS approach*, MASSMUS Gender Module,* Rome: Food and Agriculture Organisation of the United Nations

MASSMUS step 0 in: Renault, D. et al., forthcoming. *Multiple uses of water services in large irrigation systems, Auditing and planning modernisation. The MASSMUS Approach.* FAO ID 66, Rome: Food and Agriculture Organization of the United Nations.

Table 5 Example of a User matrix

Water use		Users by sex (%)	
		Male	Female
Irrigation	**Paddy fields**		
	Land rights: Landowners (proportion by sex)		
	Land rights: Tenants (proportion by sex)		
	Decision-making/plot manager by sex		
	Labour involvement – family labour by sex		
	Labour involvement – hired labour by sex		
	Field crops (second crop)		
	Labour involvement – family labour by sex		
	Labour involvement – hired labour by sex		
	Vegetables/flowers field		
	Land rights: Landowners (proportion by sex)		
	Land rights: Tenants (proportion by sex)		
	Decision-making/plot manager by sex		
	Labour involvement – family labour by sex		
	Labour involvement – hired labour by sex		
Domestic water	**Domestic water for domestic use (drinking, washing, etc.)**		
	Using		
	Fetching		
	Domestic water for productive use:		
	➢ *Agro processing unit (cashew nuts processing, etc.) – owners*		
	➢ *Agro processing unit (cashew nuts processing, etc.) – labourers*		
	➢ *Brick-making – owners*		
	➢ *Brick making – labourers*		
	➢ *...*		
Water for animals	*Large livestock*		
	Small livestock		
	Poultry		
Aquaculture	*Owners*		
	Labourers		
Homestead garden			

Source: Wiegers and Wahaj, n.d.

Tool 5. Rapid Appraisal Procedure for MUS system

The Rapid Appraisal Procedure (RAP) was developed for large-scale surface irrigation by FAO and partner institutions in the late 1990s. It is a one to two-week process of data collection and analysis for diagnosing the bottlenecks, performance and service levels within a large-scale irrigation system. The process provides a systematic examination of the hardware and processes used to convey and distribute water to all levels within the system (from the source to the users).

The RAP exercise is based on a number of Excel worksheets, allowing entry of data and automatic analysis according to pre-set indicators. RAP-MUS consists of these RAP worksheets plus an extra MUS-focussed worksheet. These will be down-loadable from the FOA website (www.fao.org).

Objective

To (help service providers) understand the way MUS is integrated or not in large scale irrigation and to better understand how far the infrastructure may allow improving the provision of multiple services to users.

Method

Three internal indicators are considered in RAP-MUS:

1. Number of water services: This indicator simply establishes the number of water services provided, intentionally or unintentionally, by a scheme. (See also step 1 of Tool 4).
2. Degree of MUS integration: This indicator establishes the level of MUS integration into the management of a scheme and the way managers see multiple uses within the command area.

3. Table 6 can be used for ranking MUS integration.

4. Importance of each water service: This indicator ranks the importance of each water service provided by a scheme through a 0-4 ranking. The importance of each service should be assessed by the irrigation managers on the basis of absolute importance. They should consider alternative sources of water available for each water use, and the impact that removing canal irrigation would have on the service. Both quantity and quality of water have to be considered when rating for importance. See Table 7.

Table 6 Ranking MUS integration in irrigation management, operation and practices

Indicator value	Management attitude	Local level operators and local practices [as seen in the field]
0	Ignoring or denying MUS and/or its magnitude.	Interventions to prevent canal water uses for other than irrigation.
2	Turning a blind eye on MUS practice by users. Manager is aware of some MUS related practices but do not consider them as part of his job.	No intervention to reduce direct pumping from canals. No particular concerns about groundwater pumping. No intervention to prevent use of canal as a waste disposal.
2	Positive marginal practices to support MUS.	Local operators accommodate in their day to day practices the other uses of water. For instance, leaving unfixed leakages to drainage when water is used by the downstream people/villages, and letting unauthorised gate flowing into nearby small tanks or drainage.
3	Integration of other services concerns into the operation. Manager knows and organises the management to serve other uses or to ensure that operation for irrigation do not penalise the other uses.	Bulk water deliveries to villages' tanks. Main canal filled with water after irrigation season to provide water to people in the GCA. Local reservoirs managed to account for other uses. Minimising period of canal maintenance.
4	Integration of multiple-use services into the management and governance. MUS is fully integrated in the management operation and maintenance.	Each service is well defined. Users are well identified, they pay for the services and they have a say in decisions regarding the system management.

Source: Renault, et al., n.d.

Table 7 Example of importance of water services in Vietnam (Bac Hung Hai Irrigation and Drainage Scheme in Kim Dong district).

Water Use	Importance of water use (0 = not important; 4 = extremely important
Water supply to crops	4.0
Cultured fishery in ponds	3.0
Captured fishery in canals	4.0
Animals	3.0
Domestic water supply to small towns	4.0
Domestic water supply to villages and individuals	2.5
Small industry and businesses	3.0
Homestead gardens	2.0
Perennial vegetation	2.0
Factories, small businesses and sewage disposal	3.0
Environmental flows	3.0
Transportation	4.0
Flood protection	4.0

Source: FAO, 2010.

The scores of these indicators can be determined through key information interviews with water users and service providers.

Based on

MASSMUS Step 1 in: Renault, D. et al., (n.d.). *Multiple uses of water services in large irrigation systems, auditing and planning modernisation. The MASSMUS Approach.* FAO ID 66, Rome: Food and Agriculture Organization of the United Nations.

Tool 6. Identification of user representation

Objective

To collect information on whom (individuals or organisations) represents the different users and the extent to which users and uses are represented in (formal) water management bodies.

Method

Key informant interviews with service providers and representatives of different user groups.

Step 1: Introduction

Introduce the exercise to the key informant and draw a matrix on a flipchart with the different uses in the left hand column. See example in Table 8.

Table 8 User representation

Water use	Name organisation / association that represents water or production-related needs of users	Description	Female participation rate	Reasons for low female participation rate
Irrigation				
Domestic water				
Water for animals				
Aquaculture				
Homestead garden				
WUA and MUS integration (0-4):				

Source: Wiegers and Waha, n.d.

Step 2: List organisations or associations in the second column

For each water use service, ask key informants to list the organisations or associations that represent the water and/or production-related needs and interest of its users. Briefly describe the different organisations that represent the different users in the third column (for instance mandate, membership, level of influence, etc.).

Step 3: Female participation

For each user organisation or association, ask key informants for the participation rate of female users. Include reasons for low female participation where required.

Step 4: Water User Associations (WUA) and MUS integration

In case of irrigation-plus as the entry point, ask key informants to identify to what extent users and uses other than irrigation are represented in WUAs by using a scale of 0 – 4.

0 = WUAs concentrate on irrigation and ignore or deny other users and water use services.

1 = WUAs are aware of MUS related practices but do not consider them as part of their mandate.

2 = WUAs are aware of MUS services and consider needs and interests of some (related) practices.

3 = WUAs incorporate the concerns of other services/users.

4 = WUAs are fully integrated and comprise multiple users directly (for instance domestic uses have a voice in the WUA) or indirectly via the municipality.

Step 5: Areas for further investigation

Based on discussions with key informant interviews, identify areas that require further investigation and reasons for this.

Based on

Tool 4 in: Wiegers, E., and Wahaj R., forthcoming. *Multiple Uses of Water Services for Men and Women in Large Irrigation Systems: Engendering the MASSMUS approach, MASSMUS Gender Module*, Rome: Food and Agriculture Organization of the United Nations.

Tool 7. Community mapping

Objective

To obtain an overview of water resources and infrastructure in the community, and sites where water is used.

Method

This exercise can be done with the whole community, or with a number of focus groups, including men and women, different water users or different wealth groups (which can be identified using Tool 3), or any other grouping deemed relevant.

Step 1: Start drawing a community map

The facilitator invites the participants to draw a map of the community and its surroundings, identifying:

- Reference points, such as roads, buildings, etc.
- Water resources being used by the community.
- Water infrastructure, such as wells, dams, boreholes, even ones that are not being used anymore.
- Sites where water is being used, such as homesteads, gardens, cattle dips, etc.
- If possible, identifying where different user categories are living.

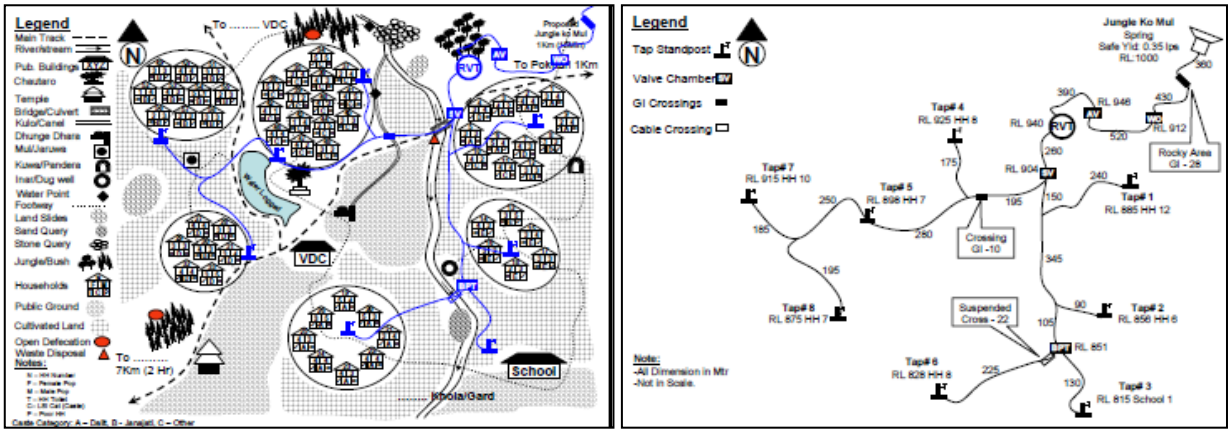

Figure 5 Examples of community maps

Source: WARM-P/Helvetas and RVWRMP, 2007

Step 2: Analysis

The participants analyse the implications of this map, guided by questions from the facilitator, including:

- What are your observations with respect to availability of water resources?

- What are your observations with respect to the use of these resources?
- Is there a relation between water sources, infrastructure and the location of users?
- What are implications for development of further infrastructure for multiple uses?

Step 3: Verifying the community map

- The participants of different groups present their map and analysis results to each other. Based on this, one final map will be drawn. In order to do so, agreements within the groups will be taken as an accord. Where the two groups have identified different objects or points of analysis, these will be discussed until agreement is reached.

Alternative / addition: using community mapping to come to a community-level MUS vision

In addition to providing a good view of the current situation, this tool can also be used to establish a vision of MUS at community level. In that case, when drawing a map of the community, the participants do not show multiple uses of water in reality, but how they would like their community to be in future in terms of multiple uses of water and multiple use services.

In order to do so, tell people at the start of the exercise that you would like to know what they consider to be a wonderful village, with relation to water services and water use. Stress that you would like them to make a map that depicts the 'village of their dreams', not as it is now.

Ask them to first take a few minutes to dream and talk about it, whereby they also dream about their community in relation to the surrounding area. To facilitate the dreaming you may ask questions such as:

- If you were to rebuild the water infrastructure in your community, what would it look like?
- If you were to change the use of water within the community, what would you change?
- What kind of improvements would you like to see that solve existing problems?

Discuss the results by asking the group(s) to explain what they have drawn and list the major differences with the community as it is now. If the tool has been used with various smaller groups, compare the results and discuss the differences and similarities.

Wind up the meeting by asking how the information from the map can be used in the near future.

Tips and tricks

- This exercise can be done using paper and pens, or by using local materials, like sticks, stones and leaves.
- Give people ample time and opportunity to draw their map and take care not to guide them.
- Take a picture of the map for future reference and leave the actual map with the community.

- Verification can be done by doing a village walk (see Tool 7).

Based on

Tool 4 in: ZIMWASH, 2010. *Guidelines for Planning for Water for Livelihoods*, Harare: ZIMWASH Project

Tool 2 in: Smits, S. and Mejía, T., 2011. *Guía para la Planificación e Implementación de Proyectos de Usos Múltiples del Agua*, The Hague / Tegucigalpa: IRC/ RASHON

Tool 5 in: Bolt, E. and Fonseca, C. (2001). *Keep it working: a field manual to support community management of rural water supplies,* Technical paper series, IRC; no. 36, Delft: IRC International Water and Sanitation Centre.

Tool 21 in: Bolt, E. and Fonseca, C. 2001. *Keep it working: a field manual to support community management of rural water supplies,* Technical paper series, IRC; no. 36, Delft: IRC International Water and Sanitation Centre.

Tool 8. Seeing is also learning: village walk

Objective

To get a physical impression of available water resources and infrastructure and their (multiple) uses in the community.

Method

The facilitator selects a path to walk through the community to carry out physical observation of points of interest related to multiple-use water services. The walk can be carried out with a group of representatives from the community who can explain relevant aspects of their community.

During the walk, the facilitators will need to note down the following:

- Physical observations regarding water resources, infrastructure and water use.
- Qualitative and quantitative information on these, can be added to the developed map, or captured in the table of the village water resources assessment.
- Informal interviews with people encountered on the way. In many cases, it is useful to have informal talks with households that are visited, or persons accompanying the walk to further dig into examples of how people access and use water.

Based on

Tool 5 in: ZIMWASH, 2010. *Guidelines for Planning for Water for Livelihoods*, Harare: ZIMWASH Project

Tool 4 in: Bolt, E. and Fonseca, C. 2001. *Keep it working: a field manual to support community management of rural water supplies,* Technical paper series, IRC; no. 36, Delft: IRC International Water and Sanitation Centre.

Tool 9. RIDA: Analysis of water resources, infrastructure, demand and access

RIDA (water resources, infrastructure, demand and access) is not a tool in the true sense, but rather an *analytical framework* that helps to structure water-related information logically and transparently. This framework can be helpful for structuring data and information in the assessment phase, but also in the strategic planning phase.

The concept of RIDA is simple: users have multiple demands for water, and to meet these they usually rely on service providers (who manages infrastructure, like pipes and reservoirs), while both user and provider rely on natural water resources (rivers, lakes or underground sources) which must be managed and kept clean.

Objective

To structure the collection and analysis of information about users demand for, and access to, water. This approach identifies barriers to meeting this demand and the potential to improve access within systems and institutions at the level of users, service providers, and water resource managers.

Method

Step 1: The starting point for using RIDA to structure a water resource assessment is to gather the necessary information to answer key questions relating to each element of the analysis.

These questions are about:

- Water resources
    - What water resources are drawn on by the water supply infrastructure?
    - What is the sustainable quantity of acceptable quality water that they can supply?
- Infrastructure
    - What are the main physical elements of the water supply infrastructure (reservoirs, canals, treatment plants, pipe networks, etc.)?
    - What is the capacity of this infrastructure (storage, treatment, supply) to meet demand?
    - What institutions are related to water supply infrastructure?
    - What major institutions are involved in managing water resources? What are their roles and responsibilities? How effective are they?
- Demand and access
    - What is the demand for water from different water users and societal groups (quantity, quality, reliability, location)?

- What other demands are made upon them?
- What existing access do users have to water now and to what extent is demand satisfied?
- What are the key water-related institutions relevant to the various water-user groups?
- What barriers to access are experienced by different water-user groups (high user fees and requirement to have membership of associations, etc.)?

Step 2: Information collected during the RIDA analysis should be stored in an information database, most likely consisting of spread sheets and layers of information in a geographic information system (GIS layers). Ideally, the storage structure should reflect the RIDA elements, for example, by using different sheets within a spread sheet to summarise each RIDA element and another to draw together key data onto a single sheet.

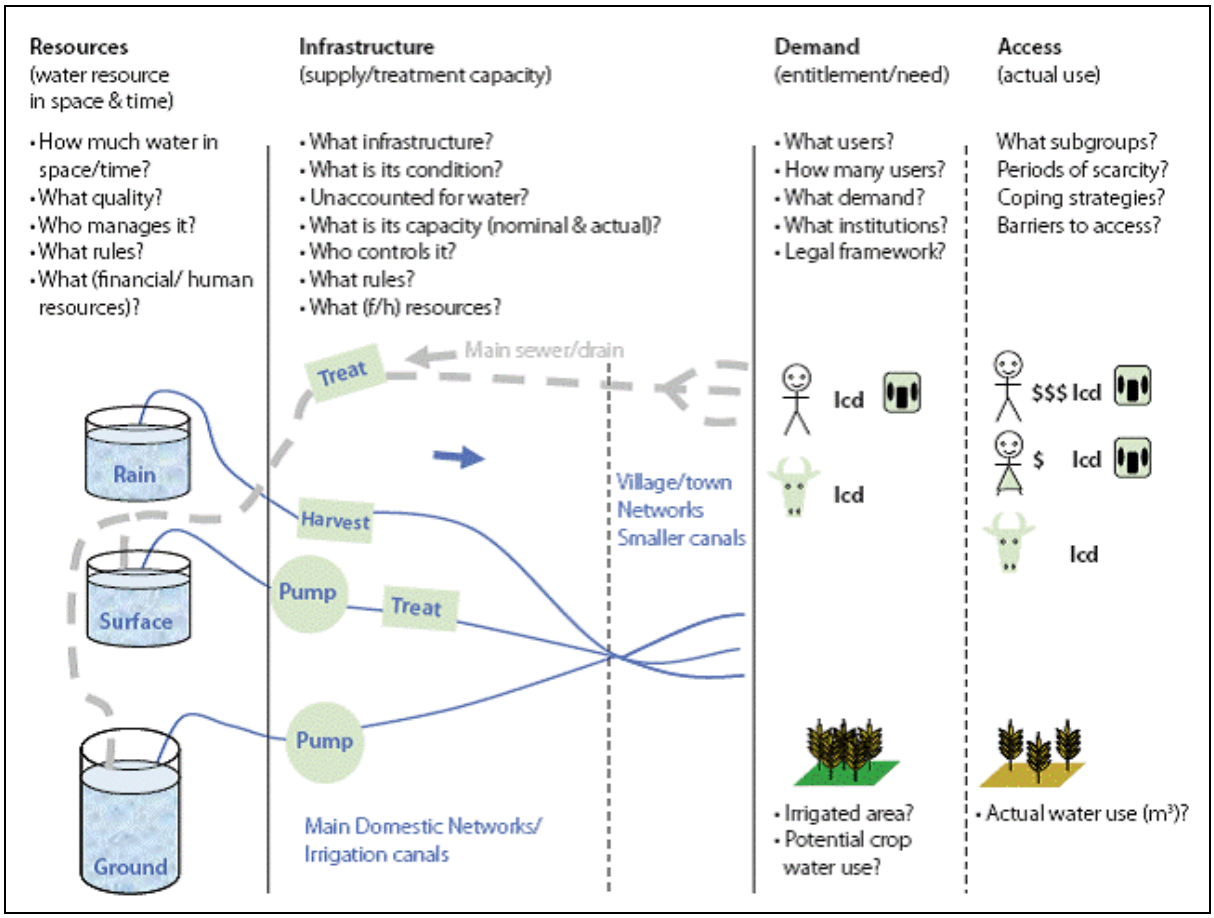

Figure 6 An example of a RIDA analysis

Source: Moriarty, et al., 2007

Tips and tricks

- The boundaries between elements of RIDA are not always clear. For example, a large irrigation canal can be seen as infrastructure for an area, or as a water resource for a single village.
- Defining the boundaries between the RIDA elements is something that is best done in a local context as part of the stakeholder dialogue process.
- A key part of the assessment phase is deciding what information can be collected from existing secondary sources and what will require primary data. Typically, user-related data (demand, access, local institutions) requires mostly primary data, often collected using a range of PRA tools; while water resource data is usually collected from secondary sources. Information about infrastructure typically requires a mix of both.
- A RIDA process is an important part of awareness-raising. The key point is that people understand the full chain of resources, hardware and institutions involved in providing water services.
- Structuring analytical tools (such as models) and reports using RIDA help to bring stakeholders from different levels and interested in different elements of RIDA together in a joint analysis.

Based on

Moriarty, P. et al., 2007. *The EMPOWERS Approach to Water Governance: Guidelines, Methods and Tools.* Amman: INWRDAM.

Suggested further reading

Case examples:

Adank, M. et al., 2011. *Towards integrated urban water management in the Greater Accra Metropolitan Area, Current status and strategic directions for the future*, Accra: SWITCH/RCN

Abebe, H. et al., 2010. *Equitable water service for multiple uses, A case from Southern Nations Nationalities and Peoples Region* (SNNPR). RiPPLE working paper 17. Addis Ababa RiPPLE. Available at: http://www.rippleethiopia.org/documents/stream/20100930-working-paper-17

Tool 10. Village water resources assessment

The village water resources assessment is a method through which the, often limited, quantitative information is put together alongside qualitative information. It uses a simplified version of the RIDA framework (see Tool 9). It is an activity undertaken by the facilitator alone, thereby drawing upon the results of participatory exercises done in the community mapping and village walk, and additional information from key informants. Where needed, additional secondary data may be obtained from other agencies.

Objective

To develop a structured overview of quantitative and qualitative information on available water resources and water infrastructure, and its current and potential future use.

Method

The method consists of the following steps:

Step 1: Draw a table with the main water resources identified in the previous participatory exercises. Add as much quantitative and qualitative information on these resources as available.

Step 2: Add two columns identifying the infrastructure linked to the water resource and the main uses of these water resources. Also include all available quantitative and qualitative information on both infrastructure and water use. Add untapped resources and potential infrastructure. See Table 9 below.

Table 9 Example of village water resource table

Water resources	Infrastructure linked to it	Use
Dam (no quantitative information available).	Open canal - is in state of repair.	Irrigation of gardens. Seems largely underused. To check on flows of irrigation canals.
Pond – dries up in winter.	None.	Goats.
Ground water –yield unknown.	Borehole.	Used by around 500 persons at an estimated 20 lpcd.

Source: ZIMWASH, 2010

Step 3: Compile information from secondary sources when back in the office for each of the cells, where available.

Step 4: Carry out a desk-top analysis, focusing on questions such as:

- Which (potential and current) uses are insufficiently met?
- What is the overall infrastructure status to meet the identified water uses and needs? Is there scope or need to develop additional infrastructure?

- What is the status of existing water resources? What are potential untapped resources?

Based on

Tool 6 in: ZIMWASH, 2010. *Guidelines for Planning for Water for Livelihoods*, Harare: ZIMWASH Project.

Tool 11. Assessing demand for water for different uses

Objective

To assess water demand for domestic use, livestock and crops.

Method

People have different water demands for different uses of water. With the methods presented here, the current and future water demands for different uses (domestic, livestock, crops, small industry) can be assessed.

Domestic water demand

The water demand for domestic activities includes primarily:

- Water for drinking.
- Water for the preparation of food.
- Water for bathing and sanitation.

To estimate the amount of water needed to meet domestic use, it is important to know the population size and dynamics of growth, as well as the per capita demand for water. This can be obtained from secondary data sources or by doing primary data collection through conducting a census.

Box 3 Water demand for domestic use

In general, from the perspective of health and hygiene, WHO (2003) states that a basic minimum water supply for health protection is 20 litres per capita per day, of which 7.5 litres, are required for drinking and food preparation. However, in reality, the demand for person per day will depend on the uses, water management and socioeconomic conditions.

Livestock water demand

To estimate the water demand for the animals, the number of animals per household and the species must be determined. The water demand can be determined by multiplying the number of animals with the daily water demand per animal.

The number of animals can be assessed though a household questionnaire (see Tool 12) or can be estimated through key informant interviews of focus group discussions (see Tool 2 and Tool 3).

The amount of water needed / recommended for each species can be obtained from secondary sources (such as the local livestock department).

Crop water requirements

In order to assess crop water requirements, the type of crops grown, their growth season and the area planted for each one of them has to be determined.

For each crop, the crop water requirements can be calculated using the following formula:

Etc = Eto * kc

kc = crop coefficient
ETo = reference evapo-transpiration (mm/day)

Etc = crop water needs (mm/day)

The crop factor, Kc, mainly depends on:

- The type of crop.
- The growth stage of the crop.
- The climate.

It can be obtained from secondary sources (as example, please see Table 10).

Table 10 Overview of crop factors

Crop	Initial stage	Crop dev. stage	Mid-season stage	Late season stage
Barley/Oats/Wheat	0.35	0.75	1.15	0.45
Bean, green	0.35	0.70	1.10	0.90
Bean, dry	0.35	0.70	1.10	0.30
Cabbage/Carrot	0.45	0.75	1.05	0.90
Cotton/Flax	0.45	0.75	1.15	0.75
Cucumber/Squash	0.45	0.70	0.90	0.75
Eggplant/Tomato	0.45	0.75	1.15	0.80
Grain/small	0.35	0.75	1.10	0.65
Lentil/Pulses	0.45	0.75	1.10	0.50
Lettuce/Spinach	0.45	0.60	1.00	0.90
Maize, sweet	0.40	0.80	1.15	1.00
Maize, grain	0.40	0.80	1.15	0.70
Melon	0.45	0.75	1.00	0.75
Millet	0.35	0.70	1.10	0.65
Onion, green	0.50	0.70	1.00	1.00
Onion, dry	0.50	0.75	1.05	0.85
Peanut/Groundnut	0.45	0.75	1.05	0.70
Pea, fresh	0.45	0.80	1.15	1.05
Pepper, fresh	0.35	0.70	1.05	0.90
Potato	0.45	0.75	1.15	0.85
Radish	0.45	0.60	0.90	0.90
Sorghum	0.35	0.75	1.10	0.65
Soybean	0.35	0.75	1.10	0.60
Sugarbeet	0.45	0.80	1.15	0.80
Sunflower	0.35	0.75	1.15	0.55
Tobacco	0.35	0.75	1.10	0.90

Source: FAO, 1986

Table 10 shows average Kc values for the various crops and growth stages. The values indicated above should be reduced by 0.05 if the relative humidity is high (RH > 80%) and the wind speed is low (u < 2 m/sec). The values should be increased by 0.05 if the relative humidity is low (RH < 50%) and the wind speed is high (u > 5 m/sec). (FAO, 1986).

The ETo is the rate of evapo-transpiration from a large area, covered by green grass, eight to fifteen cm tall, which grows actively, completely shades the ground and which is not short of water. It depends on sunshine, temperature, humidity and wind speed. It can generally be obtained from a meteorological station.

Water demand for small enterprises

Households may be involved in small scale industrial activities, such as food preparation for sales, car washes, laundry, brick making, beer brewing etc. These activities should be identified and its demand for water characterised. Claims related to this type of water use, must be evaluated on a case by case basis, taking into account the type of activity, water consumption by activity and whether this is performed by a significant proportion of the population or only a few.

Note: As with any water supply project, it is important to take into account the water demands from institutions like schools, health posts, police posts, etc.

Based on

Tool 1.1.1 to 1.1.4 in: CINARA, 2007. *Lineamientos para el diseño y administracion de sistemas de abastecimiento de agua bajo el enfoque de usos multiples*, Cali: Instituto Cinara – Universidad del Valle. Available at: http://www.musgroup.net/home/activities/the_cpwf_mus_project/basins_countries/andean_basin_cpwf_mus_studies/andes_in_english/andes_basin_outputs/guidelines_for_planning_and_management_of_mus_systems/(language)/eng-GB .

Suggested further reading

Brouwer, C. and Heibloem, M. 1986. *Irrigation water management*, Training manual no. 3, Rome: FAO. Available at: http://www.fao.org/docrep/S2022E/s2022e00.htm#Contents .

Howard, G. and Bartram, J. 2003. *Domestic Water Quantity, Service Level and Health*. Geneva: World Health Organisation.

Tool 12. Household questionnaire on water resources, infrastructure, water demand and use

Objective

To collect detailed information on water demand and use for different uses, and access to and use of water resources and water infrastructure for different uses.

Method

Step 1: Select the households to be involved in the household survey. This can be done by random sampling, or by targeting households within certain socio-economic or water user groups, which can be identified using Tool 3.

Step 2: Develop a household survey questionnaire and administer the questionnaire.

Step 3: Process and analyse the results and feed it back to the community.

Examples of questions:

General questions

- How many people live in the house?

Water demand and use

- What are the different uses of water within the household?
- How much water is used in the house each day?
- Who collects the water?
- How many times a day do the household inhabitants take a bath?
- How long does it take to go to the source to fetch water (round trip)?
- How much water can be transported in one trip?
- How many times a day must water be fetched?
- Do you have livestock / pets? What kind? How many?
- Do you grow crops? What? What is the planted area per crop type?
- Do you consider the amount of water available for different uses to be adequate?
- If not, how much water is actually needed for different uses?
- What is the most important use of water (kitchen / bathroom / animals / plants / other)?
- Are you satisfied with the service of current water supply?

- Do all households have equal access to water? Why? What? Who?
- Is there willingness to pay for water? How much would you pay? What type of service do you expect to get from paying that amount?

Water resources and infrastructure

- Is water used in the home for different uses from a single source or multiple sources?
- What are the sources of water for different uses?
- Do you have systems for storing water? If so, what is the capacity?
- How far away are the different sources?

Tips and tricks

- When designing the questionnaire, think about the coding of the questions and answers in order to facilitate processing and analysis of the data, especially in case of a big sample size.

Based on

CINARA, 2007. *Lineamientos para el diseño y administracion de sistemas de abastecimiento de agua bajo el enfoque de usos multiples*, Cali: Instituto Cinara – Universidad del Valle. Available from: http://www.musgroup.net/home/activities/the_cpwf_mus_project/basins_countries/andean_basin_cpwf_mus_studies/andes_in_english/andes_basin_outputs/guidelines_for_planning_and_management_of_mus_systems/(language)/eng-GB.

Suggested further reading

WASHCost, 2011. *Life-Cycle Cost Approach Indicator list*. Available at: http://www.washcost.info/page/1430.

Tool 13. Water quantity measurements from water resources and infrastructure

Objective

To obtain good insight in the amount of water available from water resources and infrastructure.

Method

Rainwater

To determine the rainwater supply, it is necessary to know how much it rains, when it rains, the pattern of dry and rainy seasons and how they vary from year to year. Data on this can be collected from a weather station. The reliability of the data depends on the location of the station in relation to the intervention site, its calibration and the accuracy of measurements.

As well as getting general information on precipitation from a weather station, it is possible to install rain gauges at the implementation site.

Surface water

There are several methods for measuring the quantity of water available from surface water resources. It is worth noting that the method used depends on the size of the watercourse. In a big river it is possible that the application of simple methods of estimating the capacity cannot be applied.

Velocity-area method

Step 1: Measure the width and depth of the water course.

Step 2: Measure the velocity of the surface flow. This can be done by measuring the time it takes for a float to go along an established section of the watercourse (as straight as possible). When the water depth is less than 1 m, the average velocity is considered 80% the surface velocity. Measure the velocity at least 3 times.

Step 3: Calculate the discharge of the water course.

The discharge of the watercourse can be calculated as follows:

$Q = 800 * V * A$

Q = Discharge in l / s

V = superficial velocity in m / s

A = cross sectional area in m^2

Volumetric method

Step 1: Divert the stream of water to flow in its entirety into a container with a certain volume.

Step 2: Measure the time it takes to fill the container. Do this at least 3 times.

Step 3: Calculate the discharge:

Q = V / t

Q = Discharge in l / s

V = Volume of container in l

t = average time in s

Ground water

Information of the quantity of ground water resources can be obtained in the following ways:

Secondary data: Collect hydrogeological data, such as geologic and topographic maps, data from borehole drilling, reports from geological survey, meteorological records, hydrogeological data, etc.

Community geophysical research: This can include well testing and electrical resistivity measurements. Through this you can set the location, depth and quantity of groundwater. Alternatively, when wells are present in the community, the community itself can be a good source of information on groundwater. In that case, consult the residents or do simple measurements on the locations of the wells and the depth of the ground water.

Based on the collected data, a hydro-geologist can determine the rate at which water can be abstracted without danger of depleting the surface water resources.

Based on

CINARA, 2007. *Lineamientos para el diseño y administracion de sistemas de abastecimiento de agua bajo el enfoque de usos multiples*, Cali: Instituto Cinara – Universidad del Valle. Available at: http://www.musgroup.net/home/activities/the_cpwf_mus_project/basins_countries/andean_basin_cpwf_mus_studies/andes_in_english/andes_basin_outputs/guidelines_for_planning_and_management_of_mus_systems/(language)/eng-GB.

Tool 14. Surveying water resources and infrastructure

Objective

To obtain good insight into the location of water resources and water infrastructure.

Method

Step 1: Decide on the data to be collected from each source and develop a data collection sheet (for example, see Figure 7).

Step 2: Measure the coordinates for each source, using a GPS and collect additional data through measurements, observation and on-the-spot interviews.

Step 3: Present the collected data on a map.

Step 4: Verify and discuss with water users and service providers.

Tips and tricks

- This activity can be built on, or can be further enriched by community mapping (Tool 7).

SOURCE SURVEY

(Fill up this format for every water source / bodies/streams measured points)

a) General Information

Source ID……

Name of source:…….

Type of source:

Spring Spring-fed stream Snow-fed stream Water bodies Stream

Location: District name: VDC name: Ward No.:

Owner of source:

Elevation and GPS reading:

X	Y	Elevation	Accuracy	Reading number

Source yield:

Measured yield (lps):

Safe Yield (consult with villagers):

Flow measurement method:

Date measured:

Water quality:

(by observation & interview)

Source disputes, if any:

b) Present use of this source

(dws, irrigation, microhydro, cattle feeding, others)

c) Potential use of source

(dws and / or irrigation and / or microhydro and / or cattle feeding and / or others)

d) Need for further improvement

e) General Remarks:

f) Environment around the source area:

(Middle of jungle, bushes, landslide area, rivulet, etc. & indicate chances of contamination due to upstream settlement)

Layout plan of source location

Figure 7 Example of a water source survey form

Source: WARM-P/Helvetas and RVWRMP, 2007

Tool 15. Identification of water access constraints

Objective

To identify water access constraints among different groups of users.

Method

Focus group discussions with different user groups (separated by sex and water use service)

Step 1: Draw up a matrix

Explain the exercise to focus group participants and draw up a matrix of 4 columns and 8 rows (more can be added when needed). See Table 11 for an example. Include the water use services identified from the MASSMUS exercise in the left column. Note down the number of participants, the user group they represent and the sex of the participants.

Step 2: List water-related constraints

Ask the participants to list the constraints they face related to water in terms of access, allocation (physical access, adequacy, timing, timeliness, quality), and other. Write these in the second column, using symbols where possible.

Step 3: Impacts

Using the matrix, discuss the following with the group participants.

- What are main impacts of these water constraints?
- What do people do to overcome these water-related constraints?
- How do people ensure their water needs and interests are brought forward within WUAs and the irrigation department?

Write the answers on the flipchart.

Based on

Tool 2 in: Wiegers, E., and Wahaj R., forthcoming. *Multiple Uses of Water Services for Men and Women in Large Irrigation Systems: Engendering the MASSMUS approach*, MASSMUS Gender Module, Rome: Food and Agriculture Organization of the United Nations.

Table 11 Water-related constraints

Male users					
Water use		Key constraints faced by users in terms of access, allocation (quantity, quality, accessibility, reliability), etc...	Main impacts of these water related constraints	Strategies to overcome water related constraints	Strategies to bring forward their water needs within WUAs/irrigation department
Irrigation	Landowners				
	Tenants				
	Labourers				
Domestic water	Domestic use				
	Productive use				
Water for animals					
Aquaculture					
Homestead garden					

Female users					
Water use		Key constraints faced by users in terms of access, allocation (adequacy, timing, timeliness, quality), etc...	Main impacts of these water related constraints	Strategies to overcome water related constraints	Strategies to bring forward their water needs within WUAs/irrigation department
Irrigation	Landowners				
	Tenants				
	Labourers				
Domestic water	Domestic use				
	Productive use				
Water for animals					
Aquaculture					
Homestead garden					

Source: Wiegers and Wahaj, n.d

Tool 16. Data collection on Life-Cycle Costs

As part of the Life-Cycle Cost Approach (LCCA), spearheaded by the WASHCost Project, a methodology has been developed for costing sustainable Water, Sanitation, and Hygiene (WASH) services. This methodology can be applied to analyse the (incremental) costs for Multiple-Use Water services.

Objective

Collect and analyse information on the lifecycle costs related to the provision of multiple use water services.

Method

The main data collection tools for collecting lifecycle cost information are:

Household survey

As the main source of information on household expenditure on water and sanitation, household surveys also provide insight to a household's poverty level. Surveys are at the heart of getting a detailed and statistically valid understanding of key issues linked to access and use of MUS, expenditure and household contributions to maintaining and increasing service levels. As part of the survey, users are linked to the water system(s) facilities they make use of. If required, household surveys may also be designed to capture time spent by members of the household on accessing MUS.

Technical survey

A technical survey can also provide clarity on specific cost information located across the entire chain of water delivery/access, particularly on Capital Expenditure and Capital Maintenance Expenditure.

Specific research

Specific research is conducted to obtain data on life-cycle cost information in the form of semi- / structured interviews and by gathering documents (such as contracts and project completion reports) which contain costs data. It entails a mix of several research methods, for instance conducting Key Informant Interviews (KII) with service providers and service authorities (for instance government officials involved in planning, district water engineers or area mechanics). During interviews, documents with cost information may also be collected from the study's informant and/or s/he may help in identifying sources of existing cost data.

Official government data

Official government data can be collected by contacting regional and national governmental agencies involved in water service delivery. Government data provides information on direct and indirect support costs and expenditure on salaries and administration costs for planning, policy, and decision making at intermediate and national level.

Based on

WASHCost, 2011. *Working with the Life-Cycle Cost Approach data collection tools*, WASHCost Project. Available at: http://www.washcost.info/page/1429.

Suggested further reading

www.washcost.info

Tool 17. Estimating the benefits of services

Estimating the benefits of multiple-use water services is important in order to raise awareness among key decision makers of the multiple (*de facto*) services provided by the water infrastructure. This is also important for improving management and governance of the system with a true service oriented approach; and for improving decision making in water allocation and cost sharing.

Objective

To map the order of magnitude of the benefits of multiple use services and produce some useful recommendations for further refined investigations.

Method

The benefit of the multiple uses of water can be expressed and determined in many different ways, each of which provides useful information. The following table (Table 12) shows examples of value indicators that could be identified using a rapid appraisal approach.

Detailed economic valuation per use may be carried out following various methods. The following are different techniques for valuation that can be utilised for determining the economic values of the uses and functions of MUS:

- **Productivity Method:** Estimates economic values for services that contribute to the production of goods/services that are bought and sold in commercial markets for instance, irrigated agriculture.
- **Hedonic Pricing Method:** Estimates economic values for services that directly affect market prices of some other goods, for instance, the effect of water supply on real estate prices)
- **Travel Cost Method:** Estimates economic values for services associated with sites by assuming the value is reflected in willingness to pay to travel to visit the site.
- **Contingent Valuation Method:** Estimates economic values for services by asking people to directly state their willingness to pay based on hypothetical situations[1].

The data availability is very critical for the benefit evaluation and the accuracy with which the assessment can be made. Time constraints, pragmatism and data availability will dictate the methodology used to evaluate the benefits. As the key objective is to approximately identify the prominent benefits, references values can be used to characterise the benefit of each service. Some reference values for benefits can be found in Table 12.

[1] Based on MASSMUS, Annex 2, based on a brief written by Sabina Pendse MSc from Yale University USA (Volunteer at FAO NRL in 2009).

Table 12 MASSMUS indictors for benefit estimation of specific water uses and their related references

Service	Indicators for estimating benefits	MASSMUS reference/notes
Irrigation/delivery to farms	• Crop yields. • Gross production US$/ha irrigated. • Gross production US$/$m^3$.	No reference value. Benefits for irrigation is estimated as gross production in terms of monetary value calculated from the yields on irrigated fields and farm gate prices.
Domestic water	• Cost paid by service users. • Estimated cost of an alternative solution. • Number of capita served.	In absence of local references, a reference of US$10 per capita and/or US$50 per household annually is recommended by MASSMUS, only for the direct and indirect supplies, not for in-stream uses.
Livestock/drinking water for cattle	• Value of annual animal products. • Number of households.	Livestock benefits are estimated based on the value of annual animal products and the number of households. As livestock provides a range of products (such as meat, milk, eggs, blood, hide, income, saving farm power, manure for fuel and soil fertility), local references for animal values are to be used.
Homestead garden	• Economic value of the production.	Homestead gardens produce a range of benefits like nutritious food, incomes, fuel, material for construction, shade, herbs, condiments, etc. MASSMUS estimates benefits using the following formula: VALUE (US$) = 22.5 $A^{0.36}$ [A= size of the garden in m^2].
Perennial vegetation	• Annual income.	Perennial natural vegetation generates amongst others fuel wood and construction material and in absence of local references MASSMUS uses the reference value of US$ 0.05 $ per m^2 forest annually.
Aquaculture	• Economic value of production.	For aquaculture MASSMUS uses a reference of 12US$ per kg of fish and aquatic products as a reference. The production, however, is extremely variable with intensity; low intensity small ponds (less than 500 m^2) generally produce between 1,000 and 2,000 kg fish per hectare in a year whilst high intensity aquaculture with mechanical aeration and intensive feeding can produce over 10,000 kg per year.
Capture fisheries	• Economic value of production.	Capture fishery activities in an irrigated command area can include capture fishing in water bodies, in natural streams (drainage and rivers) and in artificial streams (canal irrigation) as well as the capture of aquatic products in coastal mixed lagoons. The MASSMUS approach uses a reference of US$12 per kg of fish and aquatic products annually for benefit estimation.

Service	Indicators for estimating benefits	MASSMUS reference/notes
Small industry and business	• Annual income generated. • Number of jobs.	Small industry and business includes a range of small-scale activities like clothes washing, milk cooling, tea making, brick making, producing rice wine, etc. Benefits are estimated through the number of jobs provided by the small businesses and the estimated annual salaries.
Hydropower	• Economic value generated.	While electricity produced through hydro-power plants are an additional asset for the local economy, in irrigated areas the production of electricity is small as drops are often limited to a few meters. Therefore, MASSMUS includes no benefits for hydropower.
Cities and large Industry	• Costs of alternative sources. • Production values. • Number of jobs supported.	Water to cities is strictly limited to raw water delivery and does not include water treatment (this is the responsibility of another company) and as such differs from domestic water services. Reference values have to be locally determined.
Cultural services: recreational, social, cultural and tourism	• Economic value generated from tourism. • Number of jobs in tourism.	Except for tourism, benefits for cultural services are often intangible and difficult to assess. Hence, no rapid evaluation methods or proxies exist for estimating benefits of social, cultural and recreational services. Reference values for tourism are locally determined.
Flood control	• Population and assets protected. • Estimated cost of an alternative solution.	Context specific and based on local reference values
Transport	• Quantum transported. • Economic value. • Number of jobs.	Reference are contextual and should be developed locally only.

Source: Renault, et al., n.d.

These methods largely focus on economic values and subsequently do not show other benefits derived from the water-use services to which male and female users might attribute different levels of importance. For example, irrigation, homestead gardens, livestock, and aquaculture do not only have economic values, but also contribute to stable food supplies for the household and improved nutritional status of its members. This might be of key interest for female users, as they are primarily responsible for feeding the family. Furthermore, many water uses like home gardening, vegetable production, small livestock production, low intensity aquaculture and small industry and business activities like clothes washing, brewing, and patchwork, are usually women's responsibilities. These

activities do not only generate income for the household, but also contribute to women's economic independence (Wiegers and Wahaj, forthcoming).

The following exercise can be done in a focus group or key informant interview in order to identify both direct and indirect benefits, and who has control over these benefits.

Step 1: Introduction

Introduce the exercise to the participants of a focus group discussion/key informants and draw a matrix on a flipchart. See example in Table 13.

Table 13 Benefits of multiple water use services

Water use		Description of benefits (how much income, what is income used for, number of months food secure, time saved, period of income, convenience etc.)	Control over benefits in case of income (tick)	
			Male users	Female users
Irrigation	Landowners			
	Tenants			
	Labourers			
Domestic water	Domestic use			
	Productive use			
Water for animals				
Aquaculture				
Homestead garden				

Source: Renault, et al., n.d.

Step 2: List benefits

Ask the participants/key informants to list for each water-use service main benefits. Write these in the second column. Describe each benefit in terms whether for income or own consumption, amount of income, period of income, what is income used for, time saved, etc.).

Step 3: Control over benefits

Ask participants/key informants to identify, for each water-use service which gains income, who (male or female user) has control (makes decisions) over this income.

Step 4: Discussion:

Based on the above, discuss what areas require further investigation and what are the reasons for this.

Tips and tricks

- A MUS project typically produces impacts in various benefit categories, such as income, production (crops, fish, livestock, hydropower, jobs, etc.), health or nutrition status. This means that there are multiple variables. In order to compare and sum them, there is need for common units, such as the monetary value per unit of input (for instance US$ benefit per US$ of input, or US$ per drop of water). It is not always easy or feasible to define such values, particularly where more process benefits are identified, such as increased community cohesion. Making benefits visible is often an important first step.
- Benefits can also be expressed at system level, for example in the form of a longer life-span of a service, or in the form of less break-downs. This in turn will affect the discount rate on the cost side as well.
- Benefits are closely linked to the service level provided. An analysis of benefits therefore needs to be linked to service levels. The water service ladder (Figure 3), where relevant, can be a useful tool in this.

Based on

Renault, D. et al., forthcoming. *Multiple uses of water services in large irrigation systems, Auditing and planning modernisation. The MASSMUS Approach.* FAO ID 66, Rome: Food and Agriculture Organization of the United Nations.

Tool 3 in: Wiegers, E., and Wahaj R., forthcoming. *Multiple Uses of Water Services for Men and Women in Large Irrigation Systems: Engendering the MASSMUS approach*, MASSMUS Gender Module, Rome: Food and Agriculture Organization of the United Nations.

Smits, S. 2010. *Cost-benefit analysis of multiple-use services (MUS),* Report of expert meeting and workshop. The Hague: IRC International Water and Sanitation Centre.

Tool 18. MUS Visioning

The visioning process provides an excellent means of promoting dialogue between stakeholders involved in different aspects of multiple-use water services. It can help break down any inhibitions or deep-seated antagonisms that might exist. It is also notable that stakeholders often get considerable pleasure and a strong sense of achievement from a well facilitated visioning process.

Objective

To develop a precise and shared description of how a group of stakeholders would like multiple-use water services to be at some future time.

Method

Generic steps that can be used for developing a common MUS vision are:

Step 1: Reach agreement on the timeframe for which the visioning is to take place.

Step 2: Identify the main issues related to multiple-use water services that are to be included in the vision. Issues can be identified and grouped using a combination of techniques that include problem tree analysis and brainstorming, using cards and/or a check list provided by the facilitators.

Step 3: Develop an outline MUS vision over the agreed timeframe. The vision is best described using a concise mixture of descriptive narrative and numerical targets. Stakeholders should also be asked to use the acronym SMART (Specific, Measurable, Achievable, Realistic, Time-bound) as a checklist of attributes for a well-written MUS vision, and to help avoid the vision becoming nothing more than a 'wish list'.

Step 4: Check that the draft MUS vision is consistent with visions at higher or lower spatial or administrative scales and check that the draft MUS vision is broadly consistent with government policy. If not, it may be necessary to make modifications.

Step 5: Disseminate the MUS vision widely within the area of interest. Elicit comments and feedback. Finalise the MUS vision by taking account of constructive comments.

Tips and tricks

- Ensure that all relevant stakeholders are adequately represented in the process.
- After strategy development has been completed (see Tool 19), assess whether or not any of the strategies have the potential to achieve the vision within the agreed time horizon. If not, revise the vision.
- Visioning at community level can also be done by developing a community map of the 'Village of our dreams'. See Tool 7.

Based on

Moriarty, P. et al., 2007. *The EMPOWERS Approach to Water Governance: Guidelines, Methods and Tools.* Amman: INWRDAM.

Tool 19. Strategy development

Objectives

To develop strategies which have the potential to achieve the MUS vision.

Method

Step 1: Identify and list practical options and opportunities for achieving the vision during a strategy development workshop. Suggestions for options and opportunities are likely to originate from many sources. Some will be based on pre-existing practices; others might be entirely new to stakeholders. This can include the introduction or further development of technologies (see Tool 20), training (see Tool 21) etc.

Step 2: Discuss the different options, either in plenary, or in working sub-groups. Questions to guide the discussion can include:

- What are the advantages and disadvantages for each option identified?
- Within the spectrum of options, what do you see as the most feasible?
- What priority would you assign to each option? What about costs?

Step 3: Assess the social, technical, political, economic and environmental acceptability and viability of these options and opportunities, especially of those that are new to stakeholders. Identify risks and constraints that could impact on whether or not strategies are likely to be successful. Risks and constraints could include slow disbursement of funds, lack of capacity, corruption, limited consideration of environmental impacts, and a host of other factors. This can be facilitated within a workshop setting, but might require more in-depth analysis by an individual or a working group.

Step 4: Evaluate which strategies have the greatest potential to achieve the vision. If the evaluation indicates that none of the strategies have the potential to achieve the vision, revise the vision.

Step 5: From the list of strategies that have the potential of achieving all, or in some cases part of the vision, devise a single broad strategy. This selection should be based on criteria that have been agreed amongst the stakeholders. Different strategies will probably benefit certain groups more than others, and some form of conflict resolution may be needed.

Step 6: Polish or refine the strategy, ensuring that budgets exist (or have the potential to exist) to cover its implementation. Ensure that the strategy has a high level of political support.

Tips and Tricks

- Facilitators can help stakeholders to avoid inappropriate strategies arising from:
    - Lack of creativity in identifying possible strategies.

- Failure of stakeholders to identify a single common strategy to achieve their MUS vision.
- Failure to identify any strategies capable of achieving the vision (in this case it is likely that the vision will need to be modified).
- Capture of the process by powerful stakeholders – to the disadvantage of less powerful ones.
- Failure to take adequate account of risks, constraints and other external factors.

- Information collected during the assessment phase can be used to check whether options are viable.
- Lessons learnt from earlier projects and programmes will help to identify risks and constraints.
- It is often worthwhile to separate a complex vision into component parts before evaluating a strategy's potential to achieve the vision.
- During finalisation of the strategy, a consultation process is recommended to check whether there is scope for improving the strategy by mitigating risks, reducing costs, improving outcomes, or internalising externalities. This may involve incorporating ideas from strategies developed for other scenarios.

Based on

Moriarty, P. et al., 2007. *The EMPOWERS Approach to Water Governance: Guidelines, Methods and Tools. Amman:* INWRDAM.

Tool 2 in: Smits, S. and Mejía, T., 2011) *Guía para la Planificación e Implementación de Proyectos de Usos Múltiples del Agua*, The Hague / Tegucigalpa: IRC/ RASHON.

Tool 20. Selection of technologies for multiple-uses

Objective

To identify appropriate technological options to respond to multiple water demands.

Method

Step 1: Identify possible water resources and technologies for addressing the identified multiple water demands.

Step 2: Make a table with the technological options on one side, and demands for water use on the other. Indicate which technological options will be able to provide water for which demands. See Table 14 for an example.

Table 14 Example of technological options for different water uses

Technological option	Water use				
	Domestic	Small scale irrigation / gardening	Irrigation of crops	Livestock watering	Brick making
Conventional piped system	X	X			
Piped system with bigger diameter	X	X	X	X	X
Roof top rain water harvesting	X				
Household treatment	X				
Dugout				X	X

Source: ZIMWASH, 2010

Step 3: Discuss the advantages and disadvantages of the identified technology options, and their implications for community contribution.

- Is there one technology option that can satisfy all demands? What is it?
- If not, can combinations of technological options that can meet the demands be identified? In the selection of alternatives, consider:
    - The use of alternatives, especially for large consumers.
    - The use of water of different qualities for different purposes, for instance irrigation of crops does not require good water quality.

- The use of existing infrastructure that is obsolete but can be used for productive purposes.
- Communal productive activities such as communal gardens or water troughs for watering livestock.

- Can these required contributions from the community be met and sustained? If not, the ambition level will have to be reduced. For example, a community may identify the desire for field scale irrigation and the necessity of a motorised pump for that. However, if this would require a contribution of the community beyond their means, for instance to pay for diesel, it should reduce its ambition. Several iterations may be needed to come to a realistic combination of technologies to meet the demand.

Step 4: Based on this, the identified technology options – a single option or a combination of different options – depending on the feasibility for the community. It endeavours to eliminate those options which are technically or financially not feasible beforehand, but tries to leave options open as much as possible.

Step 5: Develop a conceptual design for each of the options that identifies the main elements of the system, its advantages and disadvantages, and a preliminary identification of costs and fees.

Based on

Tools 10 and 11 in: Smits, S. and Mejía, T., 2011. *Guía para la Planificación e Implementación de Proyectos de Usos Múltiples del Agua*, The Hague / Tegucigalpa: IRC/ RASHON.

Tool 8 in: ZIMWASH, 2010. *Guidelines for Planning for Water for Livelihoods*, Harare: ZIMWASH Project.

Tool 21. Training of (community level) service providers

Objective

To train service providers on their roles and responsibilities. Whereas it is realised that training of service providers covers a wide spectrum of issue, here we only focus on the role and responsibilities with specific reference to multiple-use water services.

Method

The training of the service provider is led by a facilitator who exposes certain issues, after which the group discusses or carries out exercises related to the issues. Below is a list of issues to be discussed:

- Control of use of water from water points for different purposes. The water service provider needs to know which uses of water from a water point are permitted, and which ones not. For example, can water be taken from a pump for a private garden or not. Often this is locally specific.
- Priority setting in case of breakdown or shortage. Even though certain uses may be foreseen in planning, it can be that water is not always available. For example, a borehole may provide a community garden. But sometimes, the water table drops too far and only enough water is available for domestic uses. The water service provider needs then to regulate how the limited amount of water is being used.
- Linkages with other institutions. For many livelihood activities, it may be necessary to draw support from other institutions. The water service provider can play a key role in linking with such institutions. It is important for the water service provider to know its role in this.
- In cases where standard curricula exist for training of service providers, focussed on single-use water services, it is advisable to add additional modules or to adapt certain modules to include MUS specific aspects, rather than designing a completely separate training programme. An example of this can be found in Table 15.

Based on

Tool 19 in: ZIMWASH, 2010. *Guidelines for Planning for Water for Livelihoods*, Harare: ZIMWASH Project.

Tool 13 in: Smits, S. and Mejía, T., 2011. *Guía para la Planificación e Implementación de Proyectos de Usos Múltiples del Agua*, The Hague / Tegucigalpa: IRC/ RASHON.

Table 15 Adaption to water board training in Honduras to take into account MUS issues

Training module	Training elements	MUS considerations to be included in the training
Qualifying phase	Feedback from the feasibility phase, motivation, awareness and establish the organisational basis.	• Confirm the expectation and the extent of the multiple uses based on the pre-feasibility, design and diagnosis MUS. • Education for sustainability. • Scope of the project in terms of promoting livelihoods.
Module I	Resettlement Policy Framework and Indigenous Peoples.	
Module II	Fundamentals of Organisation (Includes plumbing workshop, 1 day).	• Regulation of water use, including: o The different uses and will be permitted. The scope of these financial statements based on categorisation. o Duties and rights. o Management of conflicts over water use. • Institutional coordination.
Module III	Management Accounting for the O & M (tariff setting, legal framework and the general regulations for the water board.	Differentiated tariffs based on categorisation of uses.
Module IV	Social control.	• Gender aspects on multiple uses. • Issues of equity in the multiple use of water.
Module V	Environment.	
Module VI	Sanitation education.	
Module VII	Watershed management.	• Relationship between protection of sources and their availability for multiple uses. • Alternative sources. • Prioritisation in times of scarcity. • Management of conflicts with neighbouring communities on access to water resources.
Module VIII	Operation and maintenance (O&M).	• Myths and Facts about chlorine and production. • Alternative chlorination in coffee processing time. • Rules of the use of tanks. • Rules concerning the use of old infrastructure and the benefit of it.
CAP	Implementation and monitoring of Community Action Plan (CAP).	Include the above in the CAP.

Source: Smits and Mejía, 2011

Tool 22. Monitoring MUS

Monitoring is the process whereby information pertaining to multiple-use water services is collected, checked and analysed in order to ensure that these services are provided as intended and being used sustainably. Monitoring is an on-going process. It is also the basis of learning and adaptation – as lessons learnt from effective monitoring allow future changes to be identified. Monitoring can collect both hard data (whether or not systems are working) and/or qualitative data (whether people are satisfied; whether behaviour is changing). When stakeholders take certain actions to achieve their vision, it is essential to monitor and assess the impact. Are the desired impacts being achieved? If so, can the approach be replicated elsewhere? If not, can remedial actions be taken – or should the activity be stopped?

The identification of the right 'indicators' is central to monitoring and evaluating whether an action is having a desired effect. A monitoring framework should be designed for each significant action to allow progress and success to be monitored.

Problems beset many monitoring and evaluation programmes which are under-resourced or inadequately set up.

Objective

- To ensure that actions undertaken are having the intended results.
- To allow for a continuous process of learning and adaptation based on experience.
- To gather the necessary information to ensure that multiple-use water services are used sustainably.

Method

Monitoring may be formal or informal, qualitative or quantitative. All approaches have a number of key elements in common:

Step 1: Identify indicators. This is the single most important aspect of monitoring – and often the most difficult. Indicators must be sufficiently robust to allow impact to be identified and analysed. Good indicators should be simple to collect, cost-effective to monitor, unambiguous, and clearly linked to either learning or action. The golden rule is never to collect information if there is no clear use for it!

Step 2: Identify collecting and reporting mechanisms. A clear set of mechanisms is required to collect, record, quality control and communicate the results. Who should collect information about key indicators? How often? What should they do with the information? Who should receive the information and how? How will the results be discussed and acted on?

Step 3: Link monitoring to action. Monitoring should be clearly linked to action. When end-users are asked to collect and report information, they must see action resulting from their efforts. This can take the form of technicians coming to repair faulty water supply systems, or changes in project or programme design.

Tips and tricks

- Monitoring and evaluation (M&E) programmes should be well-resourced with adequately paid and well-motivated staff.
- M&E programmes need quality control procedures and data management systems to ensure that information is shared between stakeholders.
- M&E programmes must demonstrate independence; otherwise information may be manipulated to indicate a level of performance that has not been achieved.
- Involving service end-users in collecting and analysing data ensures ownership and can be an important part of capacity development.
- Indicators may be quantitative or qualitative, but need to be standardised to allow comparisons before and after interventions or between locations.

Based on

Moriarty, P. et al., 2007. *The EMPOWERS Approach to Water Governance: Guidelines, Methods and Tools.* Amman: INWRDAM.

Suggested further reading

World Bank Monitoring and Evaluation Pages:

http://www.worldbank.org/html/fpd/water/topics/m&e.html.

Action Monitoring for Effectiveness – toolkit for monitoring in the Water and Sanitation sector:

http://www.irc.nl/page/1895.

Tool 23. Actor and task analysis

A wide range of stakeholders is involved in the provision of multiple-use water services. Understanding who these stakeholders are and their different roles and responsibilities is a crucial starting point in understanding where improvements can be made in MUS. This tool helps stakeholders to identify the most important roles and linkages. It aids them in identifying and visualising tasks related to the provision of water services, allowing the key coordinating linkages to be seen in relations between the different stakeholders and their tasks.

Actor and task analysis can be carried out both in workshops and by using other approaches such as semi-structured interviews. However, at some point it is important that relevant stakeholders are able to see the totality of the analysis being developed – and to understand and discuss their roles within it.

Objective

- To have a clear understanding of the different stakeholders involved in MUS, or involved in different aspects of water service provision and management, and their roles and responsibilities.
- To identify potential gaps or overlaps in the roles of different stakeholders.
- To understand the links between different stakeholders, especially those related to the sharing and use of information.

Method

The main framework used for the analysis is the actors and tasks matrix (see Table 16 for an example). Each row represents a different actor involved in the water system, while each column identifies a key task and role.

The matrix is filled in based on discussions with stakeholders in workshops or interviews. The matrix then reveals information about gaps and overlaps in relation to essential tasks and the actors who perform them.

A number of guiding questions can be used in either workshops or interviews to prompt stakeholders, these include:

- Which tasks/functions are performed by which actors?
- What activities do the actors carry out in performing these tasks? How effective are they?
- What gaps are there between tasks?
- What overlap is there between different actors/tasks?
- Is there a coordinated effort by relevant actors to integrate their tasks?
- What factors within the system have a positive or negative influence on task performance?

- What information is held by which stakeholders that helps them to perform their tasks? Is it shared? If so, how?

Table 16 Actors and tasks matrix

Task / Actor	water provider functions (O&M)		Support to development and management		Permits for abstraction	Etc…
	Irrigation	Domestic water supply	Irrigation	Domestic water supply		
Ministry of Water Resources			*	*	***	
Irrigation department	***		***			
Water user association	***	*				
Domestic water agency		*		***		
Etc…..						

Source: Based on Moriarty, et al., 2007

Note: Stars represent the relative importance of the role.

Tips and tricks

- The quality of the output in this exercise is highly dependent on good quality facilitation and access to up-to-date knowledge, for example, on the roles and responsibilities of government departments. The roles and responsibilities of departments often reflect the policies of political parties and are therefore subject to change.

Based on

Moriarty, P., et al., 2007. *The EMPOWERS Approach to Water Governance: Guidelines, Methods and Tools. Amman:* INWRDAM.

Adapted from the RAAKS (rapid appraisal of agricultural knowledge systems) toolbox (tool B5). Available at: http://www.kit.nl/smartsite.shtml?ch=FAB&id=4616&Part=Resources.

Tool 24. Set-up and facilitation of a Learning Alliance

A Learning Alliance is defined as 'a series of interconnected multi-stakeholder platforms at different institutional levels (national, district, community, etc.), aiming to speed up the process of identification, development and scaling up of innovations' (Moriarty et al., 2005; Smits et al., 2007). Applying a Learning Alliance approach can thus serve as an instrument to conduct action research, learn together from experiences and scale up MUS, as done in action research project 'Models for implementing multiple-use water supply systems for enhanced land and water productivity, rural livelihoods and gender equity' (2004 – 2009) (Van Koppen, et al., 2009).

Objectives

- To raise awareness on MUS.
- To stimulate and facilitate joint learning on MUS.
- To contribute to the development of an enabling environment for MUS.

Method

A number of steps can be identified in starting up learning processes, including the initiation of the learning process, a stakeholder analysis, problem or opportunity identification, stakeholder mobilisation and a number of planning activities. Although these are presented as discrete steps, in reality they are not always clear cut, and there may be several iterations; activities such as stakeholder analysis often continue throughout a learning process.

Step 1: Initiation

Learning processes may be initiated in different ways and by different entities. A key question is who is the initiator, the person or organisation that triggers the establishment of a learning and change process? Eventually, it is hoped that Learning Alliance members drive their own learning processes, but in many cases the process is initiated by one, or just a few, person/people or organisation(s). Often the initiators are 'projects' or knowledge institutes, mandated to trigger change.

Step 2: Stakeholder analysis

To start a learning process around MUS, it is important that the relevant stakeholders are identified.

The stakeholder analysis aims to identify stakeholders who are crucial to MUS or its scaling up or, (just as important) those who are currently limiting it and should therefore be mobilised as part of the learning alliance. This exercise needs to be done at the relevant levels in each particular case.

Step 3: Stakeholder mobilisation

Eventually, stakeholders will be mobilised to form platforms at different levels. These may start with a core group of initiating organisations, which gradually grows, or a platform can be built upon existing networks. There is no problem with stakeholders joining in later or dropping out earlier, so long as roles and expectations are clear.

Step 4: Defining shared objectives, vision, mission, core values and responsibilities

Defining the objectives, vision, mission and core values of the alliance often overlaps with the mobilisation of stakeholders. Multiple stakeholders have different, often divergent interests, yet share a common interest or stake in MUS. To stimulate their focus and action, a clear objective, or even a vision and mission of the alliance are needed. In addition, it may be useful to define some shared core values on how the joint learning process should take place. Multiple stakeholders bring with them their own ways of working. In many cases, there may be a lack of mutual confidence, or even conflicts, between participating stakeholders. Unresolved, these can block effective ways of learning together. Defining core values may help to overcome some of these barriers. Each alliance needs to define its own values, but relevant ones may include: transparency, mutual trust, inclusiveness and equity.

Facilitators play a key role in establishing and promoting such core values, as well as monitoring that these are adhered to. Ultimately, however, it is the members who define these values and make the decision to stick to them. Finally, clear agreements need to be made on activities, responsibilities, resources and the contributions of partners to the process etc., to set the rules of the game.

Tips and tricks

- Methodological elements which are common to most learning alliances:
    - Action research – as the main mechanism through which innovations for implementing or improving MUS takes place and through which capacity is built for scaling up.
    - Process monitoring and documentation – to help to identify which factors enable or hinder scaling up, and when potentially corrective action is needed.
    - Dissemination and sharing – both within and outside the Learning Alliance.
- Good process facilitation is essential. It can best be understood by looking at the functions and activities required, including:
    - Methodological guidance – weaving different generic activities together in a flexible and context-specific manner to arrive at a robust methodology.
    - Mediating communication, coordination and decision making between all the stakeholders, so that everyone's participation is ensured, marginalised groups are empowered and conflicts are managed.

Based on

Smits, S., García, M., Moriarty, P., Laban, P., 2007. *Building learning alliances – some initial findings*. In: Smits, S., Moriarty, P., and Sijbesma, C., eds. 2007. *Learning alliances: Scaling up innovations in water, sanitation and hygiene*. Technical paper series; no. 47. Delft: IRC International Water and Sanitation Centre. Available at: http://www.irc.nl/page/35887.

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Annex 1: Organisations involved in MUS

Challenge Programme on Water and Food

The CGIAR Challenge Programme on Water and Food (CPWF) is an international, multi-institutional research initiative with a strong emphasis on north-south and south-south partnerships. Its goal is to increase the productivity of water used for agriculture, leaving more water for other users and the environment.

More information on the organisation is available on http://www.waterandfood.org/.

CINARA

CINARA is a specialist water and sanitation resource centre at the Universidad del Valle in Cali, Colombia. Over the past few years, CINARA have been working with communities in rural areas around Cali, where domestic water systems are also vital in supplying water for livestock and small-scale cultivation. Read more about CINARA (Spanish) at http://cinara.univalle.edu.co/.

FAO

The Food and Agriculture Organization of the United Nations leads international efforts to defeat hunger. Serving both developed and developing countries, FAO acts as a neutral forum where all nations meet as equals to negotiate agreements and debate policy. FAO is also a source of knowledge and information. We help developing countries and countries in transition to modernise and improve agriculture, forestry and fisheries practices and ensure good nutrition for all. Since our founding in 1945, we have focused special attention on developing rural areas, home to 70 percent of the world's poor and hungry people.

In the face of increasing water scarcity, and the dominance of agricultural water use, FAO is in the forefront to enhance global agricultural performance while promoting the sustainability of water use for food production. The Water Development and Management Unit (NRLW) is engaged in a programmatic approach to agricultural water management addressing water use efficiency and productivity, and best practices for water use and conservation, throughout the continuum from water sources to final uses.

Specific targets are integrated water resources management, water harvesting, groundwater, use of non-conventional water, modernisation of irrigation systems, on-farm water management, water-quality management, agriculture-wetlands interactions, drought impact mitigation, institutional capacities, national water strategies and policies, river basin and transboundary waters management.

More information is available at: http://www.fao.org/nr/water/.

IFAD

The International Fund for Agricultural Development (IFAD), a specialised agency of the United Nations, was established as an international financial institution in 1977 as one of the major outcomes of the 1974 World Food Conference. The Conference was organised in response to the food crises of the early 1970s that primarily affected the Sahelian countries of Africa. IFAD is dedicated to eradicating rural poverty in developing countries. Working with rural poor people, governments, donors, non-governmental organisations and many other partners, IFAD focuses on country-specific solutions, which can involve increasing rural poor peoples' access to financial services, markets, technology, land, water and other natural resources.

Through low-interest loans and grants, and guided by its Strategic Framework for IFAD 2007-2010: Enabling the rural poor to overcome poverty, IFAD works with governments to develop and finance programmes and projects that enable rural poor people to overcome poverty themselves.
By essence, IFAD is dealing with rural water. Hence, MUS agenda is highly relevant to its operations.
Read more about IFAD: http://www.ifad.org/governance/index.htm .
What IFAD does in the water sector: http://www.ifad.org/english/water/index.htm and http://www.ifad.org/english/water/innowat/index.htm.

International Water Management Institute

The International Water Management Institute (www.iwmi.cgiar.org) is a non-profit scientific research organisation focusing on the sustainable use of water and land resources in agriculture and on the water needs of developing countries. IWMI works with partners in the South to develop tools and methods to help these countries eradicate poverty through more effective management of their water and land resources.

IWMI traditionally focused on irrigation research, including research on the use of irrigation systems to meet other needs like domestic water supply. Currently the focus is on integrated water resources management.

IRC International Water and Sanitation Centre

Access to safe and adequate water is recognised as one of the most fundamental of human needs. The development of sustainable capacities to meet these needs in developing countries is one of the key challenges for the water sector as a whole.

Since its foundation in 1968, the IRC International Water and Sanitation Centre has facilitated the sharing, promotion and use of knowledge so that governments, professionals and organisations can better support poor men, women and children in developing countries to obtain water and sanitation services they will use and maintain.

The recent past has seen a shift in IRC's operations, resulting in a new direction for IRC as an organisation centred on the dissemination of knowledge and the building of capacity in partner organisations. In view of its vision, mission, strengths and weaknesses, IRC's ambition is to build on

its past achievements to become a more effective and focused knowledge dissemination and capacity building organisation.

More information is available at: http://www.irc.nl/.

Overseas Development Institute (ODI) - Water Policy Programme (WPP)

Established in 2001, WPP's mission is to improve poverty reduction and social development through better water sector policy, programmes and projects. WPP's research and consulting work now encompasses a range of issues surrounding *pro-poor service delivery*, *governance and conflict* and *environmental management*.

With the expansion of WPP, three broad research 'clusters' have been established: governance and conflict; Pro-poor service delivery; and Environmental management. Furthermore, cross-cutting work is on-going on *rights, shared waters*, *working in difficult environments* and *urban issues*.

WPP works at all levels and with a range of donors, NGOs and international organisations. Its operational experience is broad, covering sub-Saharan Africa, South Asia, Latin America and the Middle East. In all these regions we have established a strong network of research associates and collaborating institutions.

More information is available at: www.odi.org.uk/wpp.

Plan International

PLAN International is a child-focused international NGO involved in implementation of water and sanitation supply projects within a broad programme of development interventions. Since 2003, the Eastern and Southern African Region have promoted a multiple uses of water approach to link water interventions to livelihoods, health and food security programming within PLAN.

More information is available at: http://plan-international.org/.

Pump Aid

Pump Aid tackles poverty by working with local communities to establish sustainable supplies of clean water for improved health and increased agricultural production.

More information is available at: http://www.pumpaid.org/.

RAIN Foundation

RAIN (www.rainfoundation.org) is an international network with the aim to increase access to water for vulnerable sections of society in developing countries - women and children in particular - by collecting and storing rainwater. Started in December 2003, RAIN focuses on field implementation of small-scale rainwater harvesting projects, capacity building of local organisations and knowledge exchange on rainwater harvesting on a global scale.

While RAIN initially focused on providing drinking water, it is currently shifting strategy to also include multiple-uses of water by implementing a variety of rainwater harvesting technologies, such as sand dams, to store larger quantities of water. RAIN is currently working in West Africa (Mali, Burkina Faso, Senegal), Ethiopia and Nepal and welcomes collaboration with other organisations, in these or other countries, in furthering MUS.

SEI

The Stockholm Environmental Institute (SEI) is an independent, international research institute specialising in sustainable development and environment issues. Working at local, national, regional and global policy levels, its mission is to support decision making and induce change towards sustainable development around the world by providing integrative knowledge that bridges science and policy. SEI's Water Resources and Sanitation Programme has conducted research in the area of multiple-uses of domestic water, most recently in Vietnam, Cambodia and Tanzania.

More information is available at: http://www.sei-international.org/.

Water Supply and Sanitation Collaborative Council

The Water Supply and Sanitation Collaborative Council (WSSCC) is a global multi-stakeholder partnership organisation that works to improve the lives of poor people. WSSCC enhances collaboration among sector agencies and professionals around sanitation and water supply and contributes to the broader goals of poverty eradication, health and environmental improvement, gender equality and long-term social and economic development. The activities undertaken by WSSCC were recognised in the United Nations General Assembly resolution A/RES/45/181 of 21 December 1990. WSSCC is hosted by the World Health Organization (WHO). WSSCC's network of national WASH Coalitions and individual members give it the legitimacy and flexibility to work effectively at the grassroots level. Through Networking & Knowledge Management, Advocacy & Communications and the Global Sanitation Fund, WSSCC is at the forefront of knowledge; debate and influence on water, sanitation and hygiene (WASH) for all.

More information is available at: http://www.wsscc.org/.

WEDC

The Water, Engineering and Development Centre (WEDC) at Loughborough University in the UK is one of the world's leading institutions concerned with education, training, research, and consultancy relating to the planning, provision, and management of infrastructure for development. WEDC is devoted to activities that improve the health and well-being of people living in both rural areas and urban communities.

More information is available at: http://wedc.lboro.ac.uk/index.html.

Winrock International

Winrock Water is an initiative of Winrock International, a non-profit organisation that works with people around the world to increase economic opportunity, sustain natural resources, and protect

the environment. It is involved in piloting MUS approaches in different parts of the World including Niger and Tanzania.

'*Winrock International, a global leader in promoting MUS worldwide… has had outstanding results [in Niger] and is providing 'proof of concept' to regional governments and WASH sector actors about MUS*.' – USAID Ghana, West Africa Regional Mission, 2010.

More information is available at: http://www.winrockwater.org/.

Annex 2: Overview of different MUS guidelines

Guidelines	MUS entry point	Geographical focus	Described steps and phases					
			Step 1: Introducing multiple use water services to water users and service providers	Step 2: Situational assessment	Step 3: Visioning and strategic planning	Step 4: Fitting the financial framework	Step 5: Implementation of interventions to improve MUS	Step 6: Support to continuous multiple use water service provision
Guidelines for planning for water for livelihoods (ZIMWASH, 2010)	Domestic-plus	Zimbabwe	1: Awareness raising.	2: Assessment.	3: Action planning.		4: Implementation.	5: Monitoring and evaluation.
Guide for planning and implementation of multiple-use water service projects (Smits and Mejía, 2011)	Domestic-plus	Honduras		1: Identification of demand. 2: Assessment.	3: Feasibility of options. 4: Design.		5: Implementation.	6: Evaluation. 7: Post construction support.
The empowers approach to water governance (Moriarty, et al., 2007)	Domestic-plus / community-driven MUS	MENA		2: Assessment.	1: Visioning. 3: Strategising. 4: Planning.		5: Implementation.	6: Reflecting.

Guidelines	MUS entry point	Geographical focus	Described steps and phases					
			Step 1: Introducing multiple use water services to water users and service providers	Step 2: Situational assessment	Step 3: Visioning and strategic planning	Step 4: Fitting the financial framework	Step 5: Implementation of interventions to improve MUS	Step 6: Support to continuous multiple use water service provision
Guidelines for planning and management of MUS systems (CINARA, 2007)	Domestic-plus / community-driven MUS	Columbia		1: Assessment of water demand. 2: Assessment of water resources and infrastructure.	3: Technology selection. 4: Selection of water production methods. 5: Selection of organisational structure.	5: Selection of financing arrangements.		
Multiple Uses of Water Services in Large Irrigation Systems Auditing and planning modernisation: The MASSMUS Approach (Renault, n.d.)	Irrigation-plus	Global	0: Mapping the water services	1: Mapping the performance (Rapid Appraisal Process). 2: Mapping the capacity and sensitivity of the system. 3: Mapping the	9: Mapping the options for canal operations improvements / units. 10: The integration of Service Oriented Management (SOM) options. 11: A vision and a	5: Mapping the O&M costs to produce the services.		

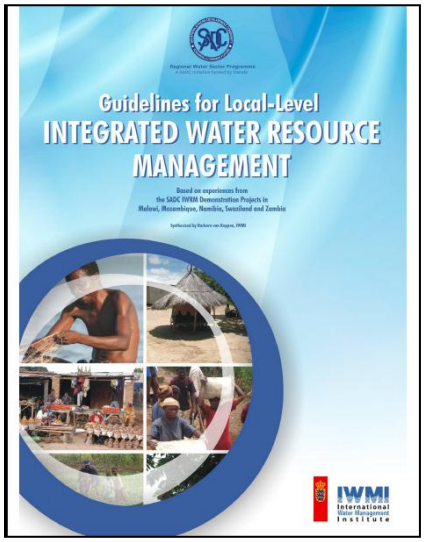
Guidelines	MUS entry point	Geographical focus	Described steps and phases					
			Step 1: Introducing multiple use water services to water users and service providers	Step 2: Situational assessment	Step 3: Visioning and strategic planning	Step 4: Fitting the financial framework	Step 5: Implementation of interventions to improve MUS	Step 6: Support to continuous multiple use water service provision
				perturbations. 4: Mapping the share of water uses and benefits. 6: Mapping the users and the services to users. 7: Mapping the management units. 8: Mapping the demand for operation.	plan for modernisation and M&E.			
Guidelines for local level Integrated Water Resources Management (Van Koppen, 2006)	Community driven MUS	Southern Africa	1: Mobilise support. 2: Select communities.		4: Create a vision and select activities to fulfil it.		6: Implement the action plans.	7 (continuous): Do participatory monitoring and evaluation, and livelihood

Guidelines	MUS entry point	Geographical focus	Described steps and phases					
			Step 1: Introducing multiple use water services to water users and service providers	Step 2: Situational assessment	Step 3: Visioning and strategic planning	Step 4: Fitting the financial framework	Step 5: Implementation of interventions to improve MUS	Step 6: Support to continuous multiple use water service provision
			3: Understand the community and build capacity.		5: Compile detailed action plans.			impact assessment for follow-up.
Guideline for Water-Use Master Plan (WUMP) preparation (WARM-P & RVWRMP, 2007)	Community driven MUS	Nepal	1: VDC selection 2: MOU with VDC. 3: Rapport building and social mobilisation. 4: Water Resources Management Sub-Committee formation. 5: Water Resources Management Committee formation.	9: Social awareness and need identification. 10: Technical assessment.	11: WUMP planning workshop, sub-committee level. 12: WUMP planning workshop, VDC level. 13: WUMP final report preparation.		6: Capacity building training to WRMC. 7: Capacity building training to sub-committee. 15: Implementation of different projects. 16: WUMP realisation and marketing.	17: WUMP follow-up.

Annex 3: Summaries of different MUS guidelines

Contents

Guidelines for Local-Level Integrated Water Resources Management



Background

These guidelines present a practical step-by-step approach on how to apply IWRM principles at local level, based on the experiences of the SADC Regional Water Sector Programme, supported by Danida, which has piloted local-level Integrated Water Resources Management (IWRM) through IWRM Demonstration Projects in five countries namely, Malawi, Mozambique, Namibia, Swaziland and Zambia.

Entry point

Community-driven MUS.

Target audience

Local authority structures, with the official mandate to coordinate service delivery to meet people's integrated needs.

Overview of guidelines

- **Step 1: Mobilise support**
    - Strengthen existing development plans.
    - Compile integrated support.
    - Define targeting procedures.
    - Establish horizontal, integrated service delivery structures.
    - Ensure vertical national support.
- **Step 2: Select communities**
    - Develop selection criteria within time and funding frames.
    - Communicate widely and test for compliance.
    - Select.
- **Step 3: Understand the community and build capacity**
    - Build trusting relationships and communicate the project concept.
    - Do contextual profiling.
    - Train the community and select community mobilisers.

- **Step 4: Create a vision and select activities to fulfil it**
    - Do participatory situational diagnosis and problem analysis.
    - Create a vision of new ways to manage water.
    - Rank opportunities and needs.
    - Select activities for implementation.
- **Step 5: Compile detailed action plans**
    - Create and train community structures.
    - Specify actions, roles and budgets.
    - Sign off.
- **Step 6: Implement the action plans**
    - Construct communal infrastructure and develop the capacity to operate and maintain it.
    - Create management structures and develop their capacity.
    - Implement the accompanying interventions and develop the capacity to maintain them.
    - Ensure sustainability when exiting.
    - Operate and maintain infrastructure and continue capacity development.
- **Continuous 'Step' 7: Do participatory monitoring and evaluation, and livelihood impact assessment for follow-up**
    - Monitor planning, implementation and use.
    - Monitor the impacts on livelihoods.
    - Identify follow-up plans for community-based water resource management.

Remarks

- These guidelines mostly focus on what needs to be done and which steps need to be taken, with less emphasis on how this should be done in practise.
- The guidelines assume that the local authority has basic demographic, social and water resource availability information. The process of obtaining this information when not available is outside the scope of these guidelines.

- The guidelines are accompanied by a 'Lessons Learnt Document'. Country experiences are documented in five country reports. All are downloadable from www.sadcwater.com.

Reference

Van Koppen, B., 2006. *Guidelines for Local Level Integrated Water Resource Management, Based on experiences from the SADC IWRM Demonstration Projects in Malawi, Mozambique, Namibia, Swaziland and Zambia.* Pretoria: IWMI.

Multiple Uses of Water Services in Large Irrigation Systems. Auditing and planning modernisation: The MASSMUS Approach

Background

Mapping System and Services for Multiple Uses of Water Services, MASSMUS for short, presents the conceptual and practical approaches proposed for auditing multiple services in large irrigation systems. It has been developed by the FAO as an addition to its auditing methodology called Mapping System and Services for Canal Operation Techniques (MASSCOTE).

The purpose of MASSMUS is to provide irrigation managers and designers with guidelines, tracks and leads that will allow them to perform Multiple-Uses/Services investigations in their own systems, unearthing all services, the obvious but also the hidden ones, and document them using local data and surveys.

Entry point

Irrigation plus.

Target audience

Irrigation managers and designers.

Overview of guidelines

The document is split into two parts. Part I introduces the MASSMUS methodology. It covers chapter 1, which presents the framework on Multiple Services, and chapter 2, which describes the MASSMUS Stepwise process. Part II covers chapters 3 to 17 with the analysis of various water services against the same MASSMUS grid.

Phase A – Baseline information

0. Mapping the water services.
1. Mapping the performance (Rapid Appraisal Process).
2. Mapping the capacity and sensitivity of the system.
3. Mapping the perturbations.

Phase B – Sizing each water service

4. Mapping the share of water uses and benefits.
5. Mapping the O&M costs to produce the services.

Phase C – Vision of Service Oriented Management (SOM) and modernisation of canal operation

6. Mapping the users and the services to users.
7. Mapping the management units.
8. Mapping the demand for operation.
9. Mapping the options for canal operations improvements / units.
10. The integration of Service Oriented Management (SOM) options.
11. A vision and a plan for modernisation and M&E.

Remarks

Although these are stand-alone guidelines dedicated to MUS, it is assumed that the classical MASSCOTE approach of a canal irrigation network is known.

Reference

Renault, D. et al., forthcoming. *Multiple uses of water services in large irrigation systems, Auditing and planning modernisation. The MASSMUS Approach.* FAO ID 66, Rome: Food and Agriculture Organization of the United Nations.

MASSMUS Gender Module

Background

The current Mapping System and Services for Multiple Uses of Water Services (MASSMUS) approach (see above) is gender neutral. This gender module was developed as an add-on to MASSMUS. It was felt that mainstreaming of key gender concerns is required, in order to optimise outcomes of the multiple water use services in terms of the number of users and the quantity and quality of benefits male and female users derive from these services. Furthermore, MASSMUS requires gender mainstreaming in order to minimise the implications management modernisation might have for male and female users. The MASSMUS gender module looks at a range of gender concerns associated with multiple water use and at the why, what and how of gender mainstreaming in MASSMUS.

Entry point

Irrigation plus.

Target audience

Irrigation managers and designers.

Overview of guidelines

The MASSMUS gender module consists of four chapters:

1. Introduction, which includes an introduction to MUS, MASSMUS and the MASSMUS steps.

2. MASSMUS and gender concerns.

3. Mainstreaming gender concerns in MASSMUS: the way, what and how.

4. An example of gender-sensitive MASMUS from India.

The annexes present a number of tools:

Annex 1 - Tool 1: Identification of users of multiple water use services (linked to MASSMUS step 0: water services).

Annex 2 - Tool 2: Identification of water access constraints (linked to MASSMUS step 0: water services).

Annex 3 - Tool 3: Identification of benefits, their importance, utilisation and control aspects (linked to MASSMUS step 4: share of water uses and benefits).

Annex 4 - Tool 4: Identification of user representation (linked to MASSMUS step 6: users and services for MUS).

Annex 5: MASSMUS Gender Reporting Format.

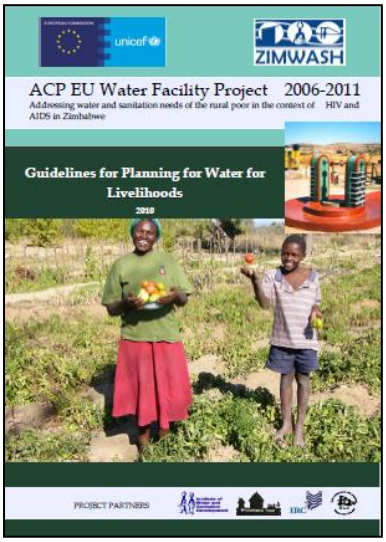
Remarks

At the time of writing of this document, the MASSMUS gender module had not been published yet.

Reference

Wiegers, E., and Wahaj R., forthcoming. *Multiple Uses of Water Services for Men and Women in Large Irrigation Systems: Engendering the MASSMUS approach*, MASSMUS Gender Module, Rome: Food and Agriculture Organization of the United Nations.

Guidelines for Planning for Water for Livelihoods



Background

As part of the ZIMWASH project (2006-2010), which aimed at addressing water and sanitation needs of the rural poor in the context of HIV and AIDS in Zimbabwe, IRC International Water and Sanitation Centre developed guidelines for planning for water for livelihoods. This guideline aims to help addressing water for livelihoods in a structured way in different steps of the project cycle related to domestic water supply. It does not aim to replace existing water supply guidelines, but rather to provide tools and methods which can be used as complement to the existing guidelines, to specifically address livelihoods.

Entry point

Domestic plus / community driven MUS.

Target audience

Members of District Water and Sanitation Sub-Committees, including local government departments and NGOs, who work on the provision of water supply to rural communities in Zimbabwe.

Overview of guidelines

This guide consists of three parts:

- **Part 1:** Conceptual framework. This part aims to define key concepts in relation to the provision of water for livelihoods.
- **Part 2:** Addressing water and livelihoods in the project cycle. In this part, an explanation is given of how to address livelihoods issues in each step of the project cycle:
    - Awareness raising.
    - Assessment.
    - Action planning.
    - Implementation.
    - Monitoring and evaluation.
- **Part 3:** Tools and methods. This part provides tools and methods that can be used in each of those steps. In addition, it provides references to further background material on the different tools:

- Tool 1: community meeting.
- Tool 2: focus group discussion.
- Tool 3: user categorisation.
- Tool 4: community mapping.
- Tool 5: village walk.
- Tool 6: village water resources assessment
- Tool 7: water resources and livelihoods matrix.
- Tool 8: technology selection, using water ladder.
- Tool 9: technology implementation manuals.
- Tool 10: training of water point committee.

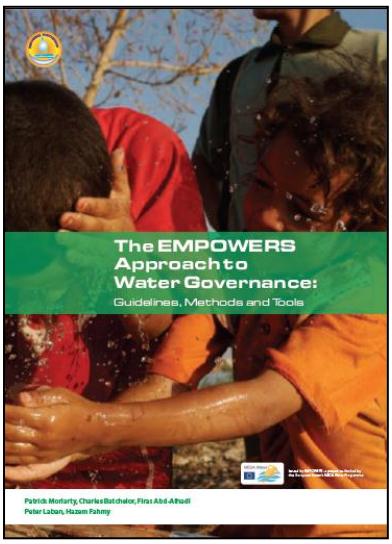
Remarks

Focus is on MUS at community level.

Reference

ZIMWASH, 2010. *Guidelines for Planning for Water for Livelihoods*. Harare: ZIMWASH Project.

The EMPOWERS Approach to Water Governance



Background

The guidelines on the EMPOWERS approach to water governance describe a practical and logical framework of activities based on the involvement of those who use and manage water, which leads towards improved local water governance, and to the development and implementation of integrated water development plans for towns, villages, district and governorates. The guidelines advocate a process of collaboration through dialogue, to bring about a change in the way that water sector professionals and water-users work with each other.

These guidelines were the result of the EMPOWERS project (2003-2007) on improving long-term access to water by local communities by advocating stakeholder-led activities to empower local people in integrated water resources management and development in Egypt, Jordan and West Bank and Gaza.

Entry point

Community-driven MUS.

Target audience

All those concerned with practical approaches for tackling the complex themes of water governance and Integrated Water Resources Management (IWRM), particularly those who want to initiate and facilitate change processes to improve local water governance.

Overview of guidelines

These guidelines are divided into five chapters:

- Chapter 1: Improved water governance.
- Chapter 2: Overview of the approach.
- Chapter 3: Facilitation and capacity development.
- Chapter 4: The management cycle.
    - Phase 1: Visioning.
    - Phase 2: Assessment.
    - Phase 3: Strategising.
    - Phase 4: Planning.

    - Phase 5: Implementation.
    - Phase 6: Reflecting.
- Chapter 5: Methods and tools
    - Visioning.
    - Scenario building.
    - Strategy development.
    - Planning.
    - Tools for participatory learning and action
        - Participatory Rural Appraisal (PRA) tools; problem tree analysis; semi-structured discussion; SWOT analysis; prioritisation and ranking; accountability and rights analysis.
    - Tools for assessing
        - Resources, infrastructure, demand and access (RIDA); Qualitative Information System (QIS); quality assurance and control; water balance estimation; time series analysis); modelling; information management; cost-benefit analysis.
    - Tools for working with stakeholders
        - Stakeholder identification; actor and task analysis; identifying key stakeholders; institutional analysis; visual models of leadership and coordination; involving the poor and marginalised; capacity development; awareness raising; facilitation; conflict management.
    - Tools for monitoring:
        - Monitoring and evaluation; benchmarking; process documentation.

Remarks

The guidelines are designed for use in processes of planning and dialogue within and between local and intermediate levels: in other words, a process involving more than one village or town, in dialogue with and supported by intermediate level stakeholders who are in turn involved in their own processes. However, elements of the guidelines are appropriate for use in stand-alone activities within a single municipality or governorate.

Some component parts of these guidelines are adaptations of well-proven methodologies from the fields of project management, business management and rural development, and they build on guidelines developed on Integrated Water Resources Management (IWRM) by the EU in 1982 and the RAAKS guidelines[3], widely used for stakeholder analysis in agricultural knowledge and information systems.

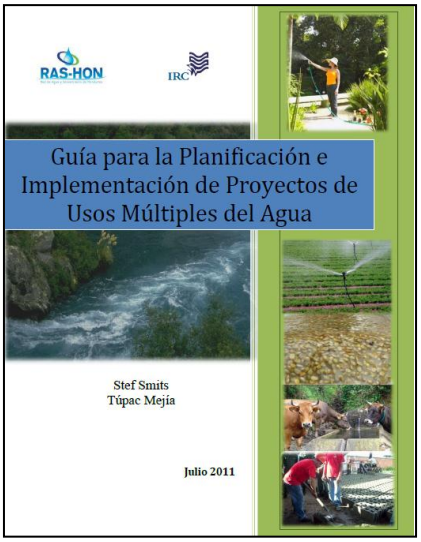
Reference

Moriarty, P. et al., 2007. *The EMPOWERS Approach to Water Governance: Guidelines, Methods and Tools.* Amman: INWRDAM.

[2] EC Guidelines for water resources development cooperation. 1998. Towards sustainable water resources management. A Strategic Approach. Published DG Development and DG External Relations and North-South Co-operation

[3] Engel, P. G.T. and Salomon, M.L., 1997. RAAKS resource box, Networking for innovation, A participatory actor-oriented methodology. Royal Tropical Institute, KIT Press, Amsterdam. Available at: <http://www.kit.nl/smartsite.shtml?ch=FAB&id=4616&Part=Resources>.

Guidelines for planning, designing and implementation of multiple-use water service projects



Background

This guide, developed in partnership between IRC and RAS-HON (Water and Sanitation Network of Honduras), presents guidelines for the planning, design and implementation of MUS systems in Honduras. It has been developed and tested in the context of a pilot MUS programme, consisting of 6 MUS systems in the Department of La Paz. Lessons from these pilot systems have been taken up in these guidelines.

Entry point

Domestic plus.

Target audience

Engineers, technicians and social professionals who are working on the implementation of water systems in rural areas.

Overview of guidelines

These guidelines consist of 3 parts:

- Part 1: Conceptual framework.
- Part 2: Multiple uses in the project framework.
    - Identification of demand.
    - Assessment.
    - Feasibility of alternatives.
    - Implementation.
    - Evaluation.
    - Post construction support.
- Part 3: Tools.
    - Tool 1: Project formulation.
    - Tool 2: Categorisation of users.
    - Tool 3: Community mapping.

- Tool 4: Analysis of water resources.
- Tool 5: Analysis of water use patterns.
- Tool 6: Identification of the scale of multiple-uses.
- Tool 7: Sanitation inspection.
- Tool 8: Focus group discussion with the Junta de Agua.
- Tool 9: Focus group discussion with water users.
- Tool 10: Matrix of technologies for multiple-uses.
- Tool 11: Meeting to analyse different options.
- Tool 12: Design guide.
- Tool 13: Capacity building of the Junta de Agua in MUS.

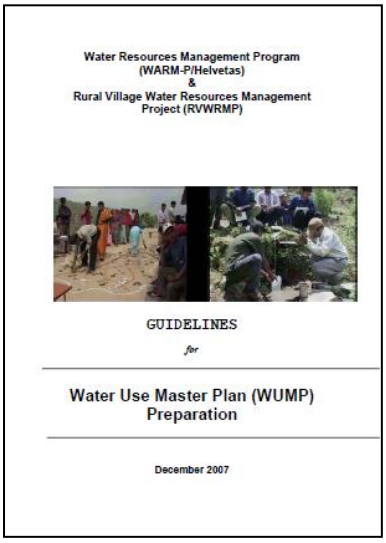
Remarks

These guidelines are in Spanish.

Reference

Smits, S. and Mejía, T., 2011. *Guía para la Planificación e Implementación de Proyectos de Usos Múltiples del Agua*. The Hague / Tegucigalpa: IRC International Water and Sanitation Centre / RASHON.

Guideline for Water Use Master Plan (WUMP) preparation



Background

These guidelines provide guidance for the development of a Water-Use Master Plan (WUMP), in which existing use of water resources in a community is identified, and an integrated plan is made for use of water in a rational, equitable and sustainable way. WUMP should be a commonly accepted plan of utilisation and conservation of water resources in a community, prepared by the communities under guidance of the Village Development Committee (VDC) and thus reflecting local demand and responsibilities.

This guideline was developed jointly by the Water Resources Management Programme (WARM-P) and the Rural Village Water Resources Management Project (RVWRMP), based on the experiences of WUMP development in these two projects. The WARM-P successfully piloted the concept of Water-Use Master Plan (WUMP) from 1998 to 2000 in Western Region of Nepal and has been working in the Far Western and Mid-Western regions since 2001. Under the RVWRMP, which has been working in Nepal since 2006, systems and structures for multiple-use of water services are developed on the basis of comprehensive Water-Use Master Plans (WUMP).

Entry point

Community-driven MUS.

Target audience

Privately project staff of WARM-P and RVWRMP, but with minor adjustments also for other water sector projects, agencies and actors.

Overview of guidelines

The guideline is divided into the following parts:

1. Introduction.
2. Water-Use Master Plan.
3. WUMP preparation process.
4. Methodology of WUMP preparation.
5. Step-wise instructions for WUMP preparation.
6. Standard formats.
7. Roles and responsibilities in WUMP preparation.

8. Monitoring.

The WUMP preparation process which is described in the guideline consists of three main phases, covering a total of 17 steps:

- **Pre-planning phase:**
    - Step 1: VDC selection.
    - Step 2: MOU with VDC.
    - Step 3: Rapport building and social mobilisation.
    - Step 4: Sub-committee formation (Water Resources Management Sub-Committee).
    - Step 5: Main committee formation (Water Resources Management Committee).
- **Planning phase:**
    - Step 6: Capacity building training to WRMC.
    - Step 7: Capacity building training to sub-committee.
    - Step 8: Pre-WUMP workshop at district level.
    - Step 9: Social awareness and need identification.
    - Step 10: Technical assessment.
    - Step 11: WUMP planning workshop, sub-committee level.
    - Step 12: WUMP planning workshop, VDC level.
    - Step 13: WUMP final report preparation.
- **Post-planning phase:**
    - Step 14: Post WUMP workshop at district level.
    - Step 15: Implementation of different projects.
    - Step 16: WUMP realisation and marketing.
    - Step 17: WUMP follow-up.

WUMP updating should be done as per need.

Remarks

A comprehensive set of tools and forms can be found in the annex, both in English as well as Nepali.

Reference

WARM-P/Helvetas and RVWRMP, 2007. Guidelines for Water Use Master Plan (WUMP) Preparation. Kathmandu: WARM-P/Helvetas and RVWRMP.

Guidelines for planning and management of MUS systems

Background:

These guidelines have been developed within the framework of the Learning Alliances process in Colombia under the MUS Project (2004-2009). They provide a practical guide for planning, developing and managing water supply systems that meet the multiple water needs of people that live in rural communities. The guidelines aim to broaden the perspective about the available options to provide water in terms of sources, technologies and to introduce strategies to incorporate cleaner production and efficient water use options for the different activities of rural communities. They also include a discussion on aspects related to management, costs and tariffs for MUS systems.

Entry point

Domestic plus / community driven MUS.

Target audience

Water sector professionals in Columbia.

Overview of guidelines

The guidelines consist of 'principles', 'options' and 'tools'.

Principle 1: The MUS approach should allow more equitable access to water for both domestic uses and for small-scale productive uses, contributing to poverty reduction, protection of health and sustainability of water supply systems.

- Option 1: Estimated water demand based on the multiple uses of the rural family.
    - Tool 1.1.1. Estimated water demand for domestic activities.
    - Tool 1.1.2. Estimated water demand for the animals.
    - Tool 1.1.3. Estimated water demand for plants.
    - Tool 1.1.4. Estimated water demand for other livelihood activities of small scale.
    - Tool 1.1.5. Techniques for determining participatory water demand on a system to multiple use.
- Option 1.2. Know the water quality requirements for each use.
    - Tool 1.2.1. Water quality requirements for drinking water.

- Tool 1.2.2. Water quality requirements for animals.
- Tool 1.2.3. Water quality requirements for plants.

Principle 2: It is necessary to use different sources of water quantity and quality, accordance with custom, gives such a way that promotes sustainability in resource use and do not jeopardise human health.

- Option 2.1. Knowing the water supply in terms of quantity from multiple sources.
  - Tool 2.1.1. Estimated supply from rainwater.
  - Tool 2.1.2. Estimate of supply from surface water.
  - Tool 2.1.3. Estimated supply from groundwater.
  - Tool 2.1.4. Estimate of supply from sewage.
- Option 2.2 Establish risks in terms of quality for the different sources.
  - Tool 2.2.1. Identify hazards in supplying sources.
  - Tool 2.2.2. Assess the risks associated with the hazards.
- Option 2.3. Characterise the range in quality from different sources.
  - Tool 2.3.1. Determination of water quality from storm water.
  - Tool 2.3.2. Determining the quality of water from surface sources.
  - Tool 2.3.3. Determining the quality of water from underground sources.
  - Tool 2.3.4. Determination of water quality from wastewater.
- Option 2.4. Establish measures to control risks associated with water quality in the sources.
  - Tool 2.4.1. Establishment of control measures for storm water catchments.
  - Tool 2.4.2. Establishment of control measures for surface water catchments.
  - Tool 2.4.3. Establishment of control measures for groundwater catchments.
  - Tool 2.4.4. Establishment of control measures for wastewater use.

Principle 3: Different technological options should be considered to take advantage of water from multiple sources in order to meet the demand for different uses of rural communities, promoting environmental sustainability and improving the quality of life of rural poor people.

- Option 3.1. Potable water supply only.

- Tool 3.1.1. Provide only potable water from surface sources.
- Tool 3.1.2. Only potable water supply from underground source.

- Option 3.2. Raw water supply and promotion of treatment of drinking water at household level.
  - Tool 3.2.1. Raw water supply and promote the treatment of drinking water at household level from surface or groundwater source.

- Option 3.3. Provide water for multiple uses from multiple sources.
  - Tool 3.3.1. Provision of rainwater at household level.
  - Tool 3.3.2 Provision of groundwater at household level.
  - Tool 3.3.3 Provision of surface water at household level.
  - Tool 3.3.4 Provision of wastewater.

Principle 4: It is necessary to incorporate cleaner production strategies in the domestic and productive activities, both at the household level as well as at system level, in order to enable productive use of water, without compromising domestic water needs and sustainability of the use of water resources.

- Option 4.1. Incorporating cleaner production strategies at the household level for domestic and productive applications.
  - Tool 4.1.1. Cleaner production in water use for domestic activities.
  - Tool 4.1.2. Cleaner production in water use in breeding pigs.
  - Tool 4.1.3. Cleaner production in water use in the ownership of cattle.
  - Tool 4.1.4. Cleaner production in the use of crop water.
  - Tool 4.1.5. Cleaner production in the coffee mill.

- Option 4.2. Cleaner production in the use of water at system level.
  - Tool 4.2.1 Cleaner production in the overall system.
  - Tool 4.2.2 Cleaner production in transportation and handling.
  - Tool 4.2.3 Cleaner production in the collective treatment of water.
  - Tool 4.2.4 Cleaner production in the water storage.
  - Tool 4.2.5 Cleaner production in the distribution of water.

Principle 5: MUS systems require an organisation that manages the system in a sustainable way.

- Option 5.1. Types of organisational structures.
    - Tool 5.1.1. Selection of organisation for managing water supply systems for MUS.
- Option 5.2. Rules for managing MUS supply systems.
    - Tool 5.2.1. Managing multiple-use systems.
- Option 5.3. Costs associated with the service.
    - Tool 5.3.1. Costing MUS system.
- Option 5.4. Fees for the service.
    - Tool 5.4.1. Calculation of rates for MUS systems.

Principle 6: A MUS project should consider reducing poverty and gender

- Option 6.1. Establish socioeconomic conditions of households.
    - Tool 6.1.1. Unsatisfied Basic Needs Calculation.
    - Tool 6.1.2. Calculating the poverty line.
- Option 6.2. Mainstreaming gender in all project phases.
    - Tool 6.2.1. Running the diagnostic phase.
    - Tool 6.2.2. Support activities in the technical design phase of the system.
    - Tool 6.2.3. Management of financial resources.
    - Tool 6.2.4. System construction.
    - Tool 6.2.5. Monitoring and evaluating the process.

Remarks

These guidelines are in Spanish.

Reference

CINARA, 2007. *Lineamientos para el diseño y administracion de sistemas de abastecimiento de agua bajo el enfoque de usos multiple. Cali:* Instituto Cinara – Universidad del Valle. Available at: http://www.musgroup.net/home/activities/the_cpwf_mus_project/basins_countries/andean_basin_cpwf_mus_studies/andes_in_english/andes_basin_outputs/guidelines_for_planning_and_management_of_mus_systems/(language)/eng-GB.

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