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INTERNATIONAL SYMPOSIUM ON MULTIPLE-USE WATER SERVICES

From practice to policy: background paper for the symposium on multiple-use services

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Multiple-use services (MUS) have emerged as an alternative approach to providing water services, aiming to meet people's multiple water needs in an integrated manner. The international symposium "from practice to policy" aims to bring together experiences from research and practice and help move towards understanding the policy implications. In this background paper for the symposium, we aim to provide a synopsis of current work in two parts: the first part looks at key concepts and definitions on multiple-use of water and the second reviews existing work on multiple-use services, especially that carried out over the past 5 years since the earlier 2003 Johannesburg symposium. We conclude that a lot of progress has been made in the conceptual understanding of the MUS approach, as well as in terms of insights into how people use water for multiple purposes and the benefits derived. Although progress has also been made in understanding how the multiple-use approach can be applied in practice, questions persist. These include issues of performance and sustainability indicators for multiple-use services, and questions about how to best replicate and scale-up the approach and accompanying institutional changes required. These questions can only be answered through an action-research approach in which multiple-use services are developed and institutional arrangements are addressed, and these changes studied, documented and lessons learned. Most importantly we recommend that further work should not focus on whether multiple-use services are a relevant alternative to existing service delivery models, but rather on developing further insights how multiple use services can be developed in an effective and sustainable manner.

Introduction

The concept of multiple-use services (MUS) has emerged over the last five to ten years as an alternative approach to providing water services. It stems from the recognition of multiple use of water as a local practice, a fact often not considered in water services provision which has tended to focus on providing water for single uses e.g. for domestic water or irrigation only. Yet, people often use existing single-use systems to meet their multiple water needs. The MUS approach proposes to move from the mere recognition of multiple-use to water services provision, but takes people's multiple water needs as a starting point and tries to meet those in an integrated manner (Van Koppen et al., 2006). The rationale for taking this approach is twofold. First, it is expected to make a more comprehensive impact on the multiple dimensions of poverty, including health, food security, income, and other aspects of livelihoods through access to water for both domestic and productive purposes. Secondly, it is expected to contribute to improved sustainability and performance of systems at community level. Where users have access to services for a single use only, they will often try and access water for multiple purposes anyway e.g. by making illegal connections to piped water systems or altering allocation schedules. This, in turn, may lead to technical failures, financial problems in the management of the system, and conflicts within and between communities, all ultimately affecting performance, sustainability and equity of services. By explicitly catering for multiple uses, often from multiple sources at community level, it is expected that these problems can be mitigated.

A growing number of organisations have been undertaking a range of activities on multiple-use services, ranging from conceptual and empirical research to piloting multiple-use services delivery and policy advocacy (see details in next sections). The Multiple Use Services (MUS) Group was established in 2003 (originally under a different name, the PRODWAT group) as a network of organisations which work on

multiple-use services, to jointly undertake research and documentation, promote implementation and learning, and facilitate information sharing and evidence-based advocacy across sectors (MUS Group, 2008). In view of the growing body of work, the MUS Group has organised an international symposium to take a critical look at findings from research and practice and to discuss implications for taking the MUS approach forward, particularly in the form of policy recommendations. This paper provides background to the symposium and a synopsis of progress that has been made to date. The paper is split in two parts:

- Part1 provides a conceptual framework for multiple-use services. Since MUS as a topic of research is relatively new, its theory and conceptual frameworks are still works-in-progress. This section provides a synthesis of key concepts and definitions on multiple-use services as well as a framework for analysis.
- Part 2 provides a review of work on multiple-use services undertaken in the last 5 years referring back to a statement of hypotheses formulated 5 years ago at the 2003 Johannesburg symposium. We end the review by sketching an agenda for future work that we expect to be informed by the discussions to be held at the symposium

Part 1: A conceptual framework for multiple-use services

While the concept of MUS is easily understandable in general terms, there has not been an agreed set of definitions and principles on "what is" and "what isn't" MUS to help guide both practice and policy. This is caused by the emergence of MUS as a nascent approach to water service delivery and the multi-dimensionality of water use at various scales. MUS involves people from different sectors, each with slightly different understanding or mental images of what MUS is and entails. This has led to considerable confusion among practitioners, sector professionals, and donors, and greater clarity and agreement on basic definitions, key concepts, and principles around MUS is needed to advance both practice and policy. This section lays out a basic framework for understanding MUS based on some of the conceptual developments made over recent years.

Defining multiple-use services as an approach

Various authors have identified components of the MUS approach (see for example Moriarty et al., 2004 based on papers from the 2003 Johannesburg symposium), and Van Koppen et al. (2006) brought together these elements in a proposed definition suggesting that MUS can be understood as "*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 services, moving beyond the conventional sectoral barriers of the domestic and productive sectors*".

In this definition various components stand out and will be explained in more detail below:

- Taking multiple needs as the starting point
- MUS as an approach to water services provision
- An integrated approach
- Coordinated actions and/or institutional change to move beyond the constraints of sector silos

Subsequent work has identified the need to address scale issues as crucial (e.g. Van Koppen et al., forthcoming). Most emphasis recently has been placed on the small-scale i.e. water use in and around the household, although multiple uses can also be assessed and addressed at the farm, community, catchment levels etc.

Objective of MUS: meeting multiple needs for use, functions and roles

The starting point for MUS is people's multiple water needs. The ones most commonly identified needs at the household level include domestic uses (drinking, cooking, washing, cleaning, sanitation and hygiene), irrigation, livestock and small enterprises. In addition there may be other non-consumptive uses, which are also referred to as functions and roles, such as fisheries in irrigation schemes or flood protection associated with irrigated paddy cultivation (see Furihata, 2008 and Renault, 2008). Table 1 provides an overview of typical uses and functions and roles. Some of these tend to take place only at higher levels of scale, and may in some cases, be associated with Integrated Water Resources Management (IWRM). The objective of the MUS approach is to meet these needs and functions in an explicit manner.

Table 1. Multiple uses and functions

Uses	Functions and roles
Domestic uses (drinking, cooking, washing, hygiene and sanitation) Irrigation (field scale and gardens) Transportation Hydropower Livestock (Home-based) industries	Flood protection Groundwater recharge Environmental flows and ecosystem functions Fisheries Tourism Social functions linked to the infrastructure and management Recreation Soil conservation Habitat improvements (raw materials for construction, shade, cooling effects, etc)

MUS as a service, not a system

A second element in the definition is its focus on *service* provision. This refers to the provision of water of a given quality and quantity with specific services characteristics – timeliness, flexibility, reliability - at a certain place. It is the combination of these characteristics that defines the level of access and which in turn, determines the extent to which the multiple water needs can be met. The service consists of different technologies in combination with financial and management arrangements to ensure operation and maintenance of the system(s). MUS is therefore not just a system of physical infrastructure. The service approach to multiple use also implies that not all the water to meet people's needs necessarily needs should come from just one piece of hardware. The provision of multiple sources for multiple uses can be considered as part of a MUS service approach.

Scale of uses

Multiple use of water happens at different levels of scale including:

- Household or homestead level: this is the lowest level, where people use water for different uses around or near the homestead, including domestic use and small-scale productive uses, such as backyard gardens, livestock, micro-enterprises, etc.
- Water system level: this refers to the level of much communal water infrastructure (infrastructure systems can of course by household focused too). 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. An artificial distinction can be made between small systems (often communally-managed) and medium- and large-scale water systems.
- Community level; at the level of the community there may be various overlapping water systems that provides water for different sites of end-use. In one community for example, there might be a piped system providing water for domestic and small-scale productive uses at homesteads, an open canal system providing water for field-scale crop irrigation, and a village reservoir for cattle and fish.
- Catchment or river basin level: multiple uses of water occur from upper catchments down to estuaries and coastal wetlands where different users and systems 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.

Multiple-use water services relate mainly to the first three levels of scale, and can be understood as the provision of water for multiple uses at household level, as well as at other sites in the community, through various combinations of water systems that are needed to provide that water. The fourth level of multiple-use, and the management of those, is normally referred to by the heading of Integrated Water Resources Management (IWRM). However, one could argue, and we would, that the MUS approach falls within the scope of IWRM (IWMI/IRC/GWP, 2006). A difference lies in the fact that MUS is seen as a service delivery approach, whereas IWRM is often understood as an approach to coordinating the management of water resources between sectors.

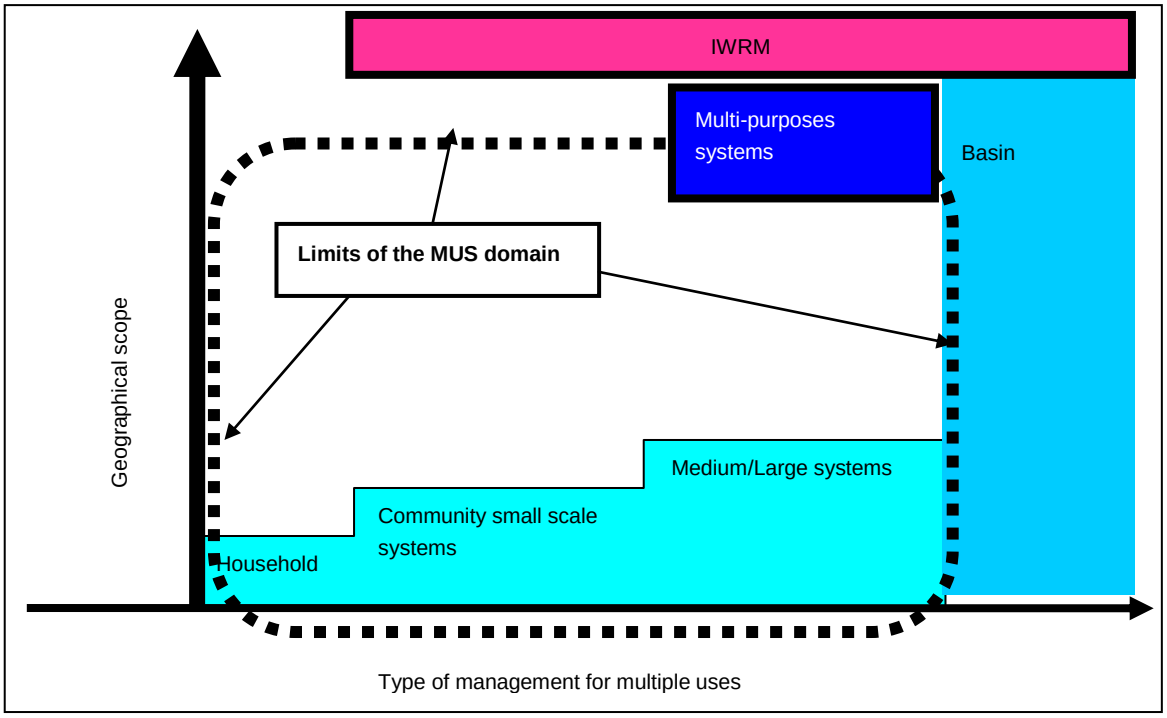


Figure 1: Multiple-use water services at different scales

The fact that MUS can be understood at multiple levels and from various entry-points to service delivery, has often given rise to confusion. This is compounded in situations where there are combinations of multiple use of water at household, community and system level. In Tables 2 and 3 we provide a number of common situations and tries to characterise them.

Table 2. Typical MUS situations

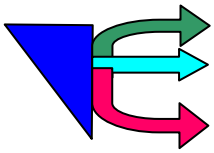
TYPE	Shared component of the system	Typical situation
A reservoir or intake with separate distribution-networks for each use of water. Usually large infrastructure	Reservoir or intake	Multipurpose reservoir
A distribution system-network designed and managed for serving multiple uses	Network	Multipurpose network
Network developed and managed for single purpose, but yielding opportunities and externalities for other de facto uses	Water resource & network	Domestic system also used for small-scale productive uses at household level Irrigation system for field-scale irrigation, also used for fisheries, domestic uses, etc
Sequential system: drops cascading from one compartment to the other Successive non- or partially consumptive uses of water	Water cycle/pathway at system or community level	Irrigation distribution after hydropower use. Surface groundwater hydrosystem supporting irrigation and domestic Reuse of wastewater
Multi dimension/functions/services Several functions/roles associated to some uses of water and/or resulting of the circulation of water and/or the set of practices associated with water management	Eco-system	Paddy Field system Wetlands

Multiple sources of multiple-uses	At user level	User taking water from a piped domestic scheme and rainwater harvesting tank to meet domestic needs

Table 3. Typical MUS situations

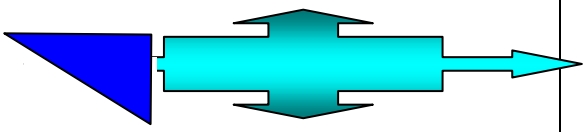
Multi-Purpose-Reservoir

One reservoir planned and managed for several use



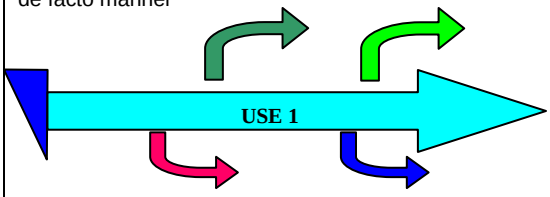
Multiple-Purpose Network

One network with distribution for different uses



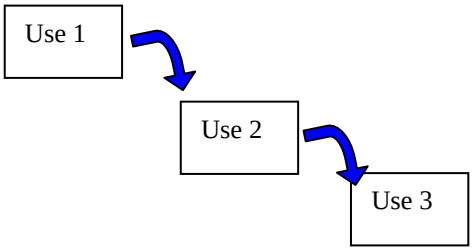
De facto multiple use of network

Network designed for one use; other uses taking place in a de facto manner

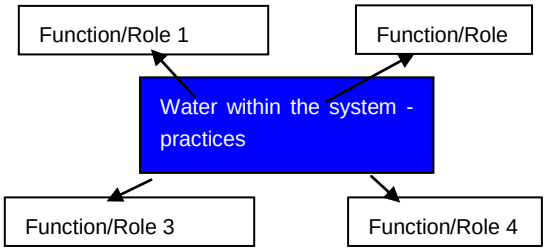


Sequential multiple use of water

System in which return flows are used for other purposes further downstream

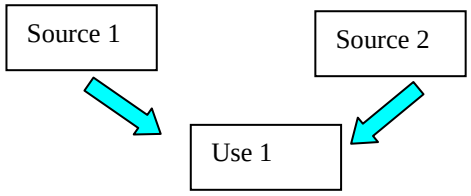


Multiple Functions of Water Systems



Multiple sources for multiple uses

Use of different source for various uses



An integrated approach

In order to meet these various uses at these different levels of scale, an integrated approach is required. Various authors have tried to define how that can be understood. A first distinction made is between de facto and planned multiple-use services (see Van Koppen et al., 2006). The former category refers to systems which were developed with a single use in mind, but which are *de facto* used for multiple purposes by users themselves. This is probably still the most common type of system, and includes for example irrigation schemes designed for field crop irrigation only, but used for cattle or backyard irrigation as well. Planned multiple-use services are services that have been planned from the outset for multiple purposes, such as multi-purpose reservoirs in Ghana (Adu-Wusu et al., 2008) or small multiple-use piped systems in Nepal (Khawas and Mikhail, 2008). In these cases, the technology, management and other arrangements explicitly try to address people's multiple water needs. It is useful to make this distinction, since it should be expected that the way in which services have been conceived and designed will impact strongly on the subsequent management and performance and especially issues like equity in access and sustainability.

Two related terms have been coined: domestic-plus and productive-plus (or irrigation-plus) services (Van Koppen et al., 2006). These terms indicate how services have been expanded to move from a single-use system to meeting multiple ones. A domestic-plus system is a system developed to meet domestic needs, but expanded to cover some small-scale productive uses as well. This may have been done *de facto* by user

themselves, or in a planned manner e.g. by developing specific management measures or infrastructural add-ons to facilitate small-scale productive uses. An irrigation-plus system is an irrigation scheme which has started to cater for other uses, such as domestic uses, fisheries or backyard gardening. Renault (2008) provides examples of how these uses are explicitly addressed in the management of large irrigation systems. In such schemes, certain multiple uses and functions may be formally addressed and recognised, while others are not. For example, the system managers may provide water to a municipal water supply system while needs for cattle or household-level productive uses are ignored.

Following an integrated approach to water services delivery can mean the delivery of a service without a specific sectoral focus in mind, or the gradual expansion of an originally single-use system to one in which multiple needs are properly catered for.

Institutional change

Taking MUS as a service delivery model also emphasises the need to look into the institutions that provide services or develop policies and programmes that govern service delivery. Moving towards an integrated approach, and therefore MUS, has major implications for institutional arrangements. The fact that most water services have been developed for single purposes has its root cause in the fact that these have been developed by organisations with a single-use mandate. A domestic water agency often has the mandate to provide users with water for domestic uses only, nothing more and nothing less. In theory, there are three types of response to the need to move towards an integrated approach:

- Developing coordination mechanisms between sector agencies; under this approach, sector agencies still only provide water services within their current sector mandates but through joint planning and coordination all needs are met. The work by Maluleke et al. (2005a; 2005b) in South Africa on integrated planning for water for multiple-uses at village and ward level is an example of such an approach.
- Expanding organisational mandates of sector agencies; here current sector agencies remain with their core mandate but also provide water for additional multiple water needs. For example, a domestic agency could increase its design norms or internal regulations to accommodate small-scale productive uses at the homestead. Smits et al. (2008) show how the rural water supply programme in Honduras has supported the development of internal regulations to deal with multiple-use. An irrigation agency could include explicit management of water flows for fisheries in its operations. Renault (2008) provides examples of how this has happened in a number of large irrigation systems.
- Developing "multiple-use" focused organisations; this is the most radical type of institutional reform where agencies have a broader mandate to provide water for whatever needs are identified. One could argue that a number of NGOs have such a broad institutional mandate. IDE's work in Nepal (Mikhail et al., 2007) for example doesn't come with an original sector bias.

Accepting MUS as a service delivery approach implies the need to establish corresponding institutional arrangements so that organisations have an adequate mandate to provide MUS services.

Towards a framework for analysis

Van Koppen et al. (2006) developed a conceptual framework, adapted slightly in Smits et al. (2008), to support analysis of multiple-uses in a given situation, but which can also be used to identify key factors to be addressed in programmes for scaling up MUS.

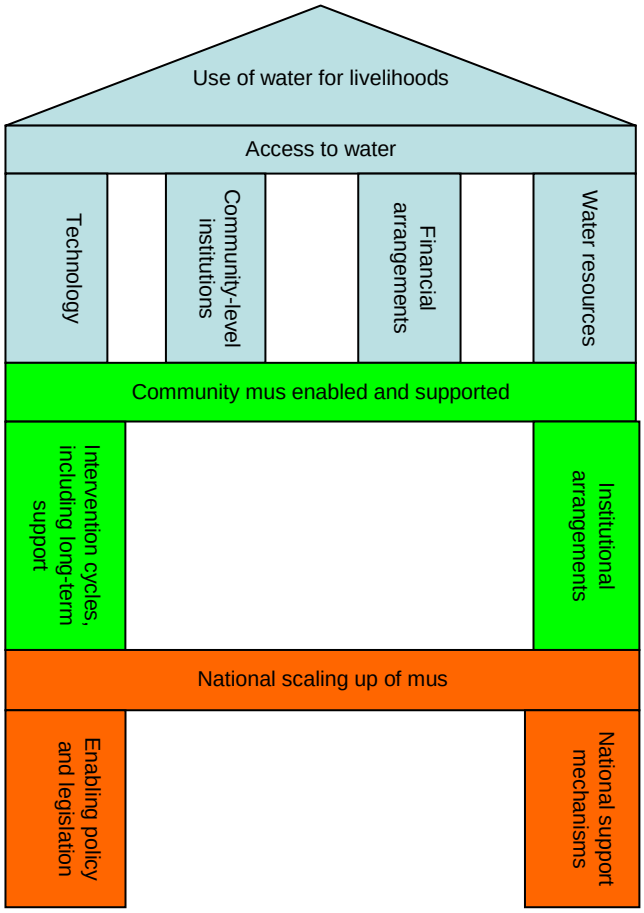


Figure 2: Conceptual framework for multiple-use services (adapted from Van Koppen et al., 2006)

Key to this multi-layered framework is the individual user who uses water in a range of livelihood activities. A first step in analysing multiple-use services is always developing an understanding on how water is used for different activities, and the benefits generated. The extent to which water supports livelihoods, is determined by the level of access defined by factors such as quantity, quality, distance and reliability. Access depends on the manner in which services are provided at the community level. Here four inter-related service characteristics: technology (or infrastructure), community-level institutions, financial arrangements and water resources are most important. In any analysis of multiple use services, these aspects and their influence on service characteristics need to be studied and understood.

At the intermediate level (i.e. the level from which service delivery is normally organised such as a local government district or municipality) one needs to look into two factors: institutional arrangements and intervention cycles. Institutional arrangements refer to the mandates of the different actors at this level, and the relations between them. Intervention cycles refer to the way in which these agencies carry out their interventions: how they do planning, financing, design, and management of services. The final level in this framework is the national level where an enabling environment is defined that can facilitate MUS as service delivery model. This has two broad elements: the national policy framework which governs service delivery, and national support mechanisms through which national agencies practically facilitate such as financial arrangements, national norms and standards, but also research and information dissemination activities.

Part 2: Reviewing results of five years of work on multiple-uses

Having discussed some key concepts, definitions and a framework for multiple-use services, this part aims to synthesise some of the results obtained to date from research and practice.

Historical overview of the emergence of the multiple-use approach

This section mainly focuses on developments in the past five years since the 2003 Johannesburg Symposium on Water, Poverty and Productive Uses of Water at the Household Level organised by a group that later developed as the MUS Group. Other authors (particularly Van Koppen et al, 2006 and Moriarty, 2008) have reviewed the earlier years of the emergence of the approach in more detail.

Already since the 1980s, professionals from both the domestic and irrigation sector have reported on the actual practice of multiple-use of water, and actually coined that term (e.g. Yoder, 1983, and Boelee et al., 1997, Renwick, 2001, cited in Van Koppen et al., 2006). Moriarty (2008) provides a historical overview of the development of the multiple-use concept looking back at the author's professional life to the early 1990s. He refers to work in the 1990s in Zimbabwe that aimed to expand basic domestic water supply services towards "productive water points" i.e. boreholes which yielded more water to enable small-scale productive uses (Lovell et al., 2000). These and some of the other early work focused on recognizing that single use systems are used for multiple purposes: irrigation systems provide also for fisheries or domestic uses, and domestic systems are actually used for small-scale productive activities.

Significant advances in the understanding of MUS at household level were made in January 2003 at the International Symposium on Water, Poverty, and Productive Uses of Water at the Household Level (Butterworth et al., 2003) that brought together representatives of the domestic and irrigation sectors. Over 25 different case experiences were presented, showing not only that water services are de facto used for multiple purposes, but also highlighting the impacts on people's livelihoods. The symposium went as far as developing an agenda for further promotion of this approach (see Box 1).

Box 1: Summary of Johannesburg symposium statement

1 Productive use of water at the household level by poor people reduces poverty

- Sustainable livelihoods can be built on access to water that goes beyond current approaches to meeting both domestic needs (drinking, cooking, and washing) and irrigation needs.
- Productive uses of water at the household level include a range of small-scale activities that enable people to grow food, earn income and save expenditure: fruit and vegetable production, keeping livestock, brick making and building, and a wide range of informal micro-enterprises.
- Without access to sufficient and reliable water for productive uses in and around the household, people are excluded from a range of options that would allow them to diversify and secure their sources of food and income.
- We believe that productive uses of water in and around the household are the most socially and economically effective uses of water after 'traditional' domestic uses, and that providing water for these uses offers one of the most effective ways to use water to tackle poverty in its multiple-dimensions.
- The provision of water services, that include water for productive uses, needs to be planned to ensure that benefits are inclusive or pro-poor.

2 People require more than their domestic water needs to be productive

- It is universally accepted that people should have access to a basic domestic water supply (often ranging between 25-50 litres per capita per day (lpcd)). We believe that poor people should also have access to water for productive uses. Total household water requirements for poor people including water for productive uses are likely to be in the range 50-200 lpcd.
- These quantities can be realised by helping households secure access to water through a range of alternative approaches (such as roofwater and run-off harvesting, family wells, communal water points, piped water systems, municipal and household level wastewater reuse) and by investment in systems that are equitable.

3 Productive use enhances the sustainability of water supply systems and services

- In most cases the sustainability of domestic water supply systems can be increased by explicitly including productive water uses that provide the means and motivation for people to engage in the management of systems. These uses generate income that can be invested in system improvement and maintenance.
- When people have demands for productive water that are not met, problems arise and ownership and participation are reduced. 'Illegal' connections to domestic piped water systems cause serious problems that could be anticipated and avoided by satisfying the demand for productive water, possibly from different sources.

- We believe the benefits will normally greatly exceed the incremental financial costs.
- Many irrigation schemes provide multiple benefits. Meeting the needs for other uses of water (including domestic) through an integrated approach enhances the impact as well as performance of irrigation schemes and systems.
- Productive use of wastewater provides opportunities for many urban and peri-urban farmers, but simultaneously places them, the consumers of their products, and the environment at risk. In accordance with the Hyderabad Declaration on Wastewater Use in Agriculture (2002), we believe that appropriate policies, strategies and interventions can mitigate the human health and environmental risks while contributing to poverty reduction.

4 People need local solutions and multiple sources for multiple uses

- Peoples' water needs are typically met through multiple sources - from rainwater to wastewater to piped systems, and single sources tend to be used for multiple purposes. A holistic approach that builds on this reality is required in planning and service delivery to meet peoples' needs for household water supplies.
- Wherever possible and taking into consideration downstream users, household water needs should be provided from locally available water resources, drawing on local knowledge, and at the lowest possible cost to provide a reasonable level of service.

5 An integrated approach is essential to achieve significant impacts on poverty

- Demand for water for multiple purposes at the household level has, until recently, been insufficiently recognised in the planning and allocation of water resources in river basins. We recommend a process in which planners, and in particular local-level and catchment planners, acknowledge and take into account these needs as a priority consideration.
- People who use water productively at the household level are numerous, but a diffuse and poorly represented group. Special attention is required to ensure that the voices of household level users, especially women, are heard at the Integrated Water Resources Management (IWRM) table.
- Improving access to water will not, on its own, eradicate poverty. People need better access to markets and credit, and to overcome many other constraints to make best use of more water. This calls for better coordination, communication, and cooperation between different government departments, civil society, NGOs and the private sector

This symposium proved to be a landmark event in the emergence of the MUS concept as it laid the foundation for the establishment of a growing group of networked organisations involved in a range of activities around multiple-use. Below we provide an overview of the main sets of activities, the organisations involved, and their main contributions to the emergence of MUS.

The year 2003 was also a turning point for those working on multiple-use in large scale irrigation systems. A very large sub-sector of irrigation - the rice based systems - was for the first time not only recognized as the major source of food for large parts of Asia but as an agricultural practice that encompasses multiple roles of water. Building on pre-symposium meetings, the 3rd World Water Forum held in Kyoto March 2003 was an opportunity for Asian countries to show the word the importance of the different values associated to rice cultivation (food, domestic water, environment, flood protection, etc.). This recognition of the multiple roles of water and the importance of externalities in paddy rice cultivation was made at technical level (Renault, 2003; Boisvert et al, 2003) as well as at political level through the ministerial declaration of the forum (see Box 2).

Box 2: Extract from the Ministerial Recommendation adopted by the Ministerial Meeting on water for Food and Agriculture Third World Water Forum KYOTO Japan 21st March 2003.

..... Basic recognition (out of 6)

Point 6:. We recognize that agricultural water is not only vital for food production, but also provides a broad spectrum of services related society, culture and environment. It is instrumental in improving economic and social benefits to vulnerable people, particularly women and children. These multiple roles and values of

agricultural water must be recognized, evaluated and taken into account for the development and management of water resources.

Point 7: We recognize that the development and the management of agricultural water resources needs to take into account a variety of other uses, including water supply for urban and rural communities, industry, hydroelectric power generation, navigation, recreation, tourism and fisheries and concerning ecosystems.

Concrete actions (out of 7)

Point 13: We will promote improved governance of agricultural water use through integrated water resource management including non-agricultural water use. The process should be efficient and equitable. It would involve the active participation of all user groups, including women and the poor in local water resource settings.

Research and conceptual development

Some of the participants of Johannesburg Symposium formed a consortium that jointly started the MUS (Multiple Use Systems) Project funded by the Challenge Programme on Water and Food (CPWF). This action-research project aimed to develop models, tools and guidelines for providing and upscaling multiple-use water services (Van Koppen et al., 2006; MUS Project, 2008). One of the first outputs of this project was the development of the conceptual framework (Van Koppen et al., 2006) mentioned in Part 1.

In addition to conceptual development, research has focused on the characterisation and analysis of field experiences with the actual provision of multiple-use services. The MUS Project carried out such research through a large number of case studies in 8 countries (see MUS Project, 2008, for the full database of cases) and their subsequent synthesis (Van Koppen et al. (forthcoming), Smits et al., 2008b). Various other researchers have tried to understand and characterise multiple-use services. Often they have looked at different sectors such as Ezeji (2008) and Raschid-Sally et al (2008) on urban water management in Nigeria and Ghana respectively, Smits et al (200ba) on rural water supply in Honduras, and Renault (2008) on large irrigation schemes.

A third, and more recent, strand of research has focused on assessing costs, benefits and poverty impacts through multiple use services. For example, the RiPPLE (Research-inspired Policy and Practice Learning in Ethiopia and the Nile Region) Project (www.rippleethiopia.org), focuses on analysing the relation between water supply and sanitation and growth and poverty reduction. Efforts have been made to assess these impacts (Hagos et al., 2008) and the related costs and benefits (Adank et al., 2008). Khawas and Mikhail (2008) provide an analysis of benefits of multiple use in rural Nepal. Renwick et al. (2007) have tried to move beyond single cases, and have assessed costs and benefits of MUS at a global scale through aggregation of various studies. Progress has been made in developing methodologies and approaches for carrying out cost-benefit analyses in this difficult area and some first indicate figures are available.

Pilots and practice

Some action research has focused on the implementation of planned multiple-use services. These, often in pilot form, have served to test and further inform the multiple-use approach. Some of the documented examples include the work by IDE and Winrock in Nepal (Khawas and Mikhail, 2008; Mikhail et al., 2007), experiences by Plan International in amongst others Ghana and Sri Lanka (Adu-Wusu et al., 2008 and Harischandra, 2008 respectively), and by PumpAid in Zimbabwe (PumpAid, 2008). The latter is an example of a programme that is rapidly trying to scale up its approach. These pilot and practical experiences have contributed to the development of a body of knowledge on how to provide multiple-use service, for example technologies that can be applied and intervention methodologies. Despite these pilots, the number of places and systems in which the MUS approach is explicitly applied by design remains limited.

Policy and programmes

Efforts have also been made to influence policies and programmes and in fact, this formed an explicit focus of the MUS Project. Here the establishment of so-called Learning Alliances aimed to bring together different stakeholders so as to facilitate scaling-up of the MUS approach through policy and programmes. A number of case studies emerging from the project will be presented at this symposium. Mikhail and Yoder (2008) report on the experiences with the learning alliance in Nepal, and how as a result MUS was taken up in various water programmes. Domínguez et al (2008) report on how inclusion of MUS concepts in the

departmental water programme has proved to be easier than scaling-up through policy. Renault (2008) reports on efforts to explicitly address multiple-use in the management of 20 large scale irrigation systems across the globe, as part of an effort to modernize irrigation management. Smits et al. (2008) provide a case study from an initiative to address multiple use of water in Honduras' support programme to rural water supply service providers.

One of the countries that arguably has made most progress in taking-up MUS in its policy framework is South Africa. Its Strategic Framework for Water Services (DWAF, 2003) already talked about "stepping up the ladder" i.e. provision of water supply to meet people's livelihood needs. Now, it tries to turn this policy into practice, through its current water programme, focused on Water for Growth and Development (Mtolo, 2008).

As Moriarty (2008) notes, many of these initiatives to scale up have encountered resistance. There has been resistance by professionals from both the domestic and irrigation sector against the MUS concept, posing many questions regarding its applicability. Most of this resistance finds its roots in the sectoral paradigms in which sector professionals have been trained. Whereas many of these questions are valid, the body of knowledge that has been developed has also provided answers. Above all, it has shown that the promotion of MUS needs to be accompanied by an agenda of institutional learning and change.

Advocacy

In addition to the more targeted policy change processes in countries like Colombia and South Africa, broader advocacy has been undertaken, particularly at global level. One of the main efforts was at the 4th World Water Forum in Mexico City. At that event, both the conceptual framework for multiple-use services and some of the learning from research and practical experiences was shared with a wider audience, including senior professionals from international organisations and governments. The topic has also had a presence at other sector events such as the Stockholm Water Week, and will be discussed at the 5th World Water Forum. ost of these advocacy efforts have gone in advocating *for* the MUS concept, i.e. trying to obtain recognition for the relevance and importance of this approach. Now that there is increasing recognition, efforts need to move towards advocacy *about* MUS i.e. about ways and mechanisms to provide multiple-use services.

Networking

Multiple-use implies the engagement of organisations from multiple sectors, and thus it is no surprise that some of the major advances are related to networking. Shortly after the Johannesburg Symposium, a group was established called PRODWAT (Productive Uses of Water at the Household Level). This group was facilitated by the IRC International Water and Sanitation Centre, and all members put in their own resources and efforts. Its aim was to act as a think-tank, as well as a platform for dissemination of information and experiences. Arguably, its initial bias was towards organisations from the domestic sector with an interest in opening up towards productive use of water, hence also the name. Rapidly, this focus opened up and the group changed its name to the MUS (Multiple Use Services) Group in 2006. It now has a membership of over 350 individuals. It has a core group of coordinating partners, which regularly attend meetings and contribute actively to activities of the group. The coordinating partners are: IRC International Water and Sanitation Centre, ODI (Overseas Development Institute), IWMI (International Water Management Institute), PumpAid, WEDC (Water, Engineering and Development Centre), Cinara, Plan International and Winrock International. Even though the name changed, the focus has remained in terms of types of activities including advocacy, acting as platform for dissemination and sharing, and working as a think-tank.

Similarly another relevant network emerged from the 3rd World water Forum: INWEPF (International Network for Water and Ecosystems in Paddy Fields). This brings together representatives from Asian countries with a focus on agricultural water management in irrigated rice schemes. It was created in 2004 with a major area of work on multiple use and functions of water management in paddy (Furihata, 2008). A third initiative is the establishment in 2006 of a group around the development of Guidelines on Agriculture and Wetlands Interactions (GAWI) to produce methodological knowledge on the multiple values of aquatic natural and man-made ecosystems (Wood and Van Halsema, 2008).

Applying the multiple-use approach: lessons learnt

Having briefly reviewed some of the activities undertaken over the past five years, this section aims to look at progress made in the areas highlighted by the statement from the Johannesburg (see Box 1). To help relate to the conceptual framework provided earlier, we do that by considering each of the levels in turn.

Lessons learnt at household level

Productive use of water at the household level reduces poverty

As indicated in the historical overview this has been one of the areas where research has focused, both through case studies (e.g. Adank et al., 2008; Khawas and Mikhail, 2008) and through the review of global datasets (Renwick et al., 2007). What has emerged is confirmation that productive use of water leads to benefits such as additional income and access to high quality food but sometimes also to unexpected benefits, such as empowerment of women (Khawas and Mikhail, 2008). Likewise, in irrigation schemes, additional benefits can be obtained from multiple use such as fisheries (Harischandra, 2008).

However, the relative importance of these uses in people's livelihoods is important to realise. MUS is a not a silver bullet we should expect to eliminate poverty. In Bolivia (Durán et al., 2004) and South Africa (Cousins et al, 2007), showed how small-scale productive uses were only an additional source of income for families, and an important one in diversifying livelihoods. Smits et al. (2008) showed that in Honduras the relative importance of these uses differs a lot between different types of users: a small additional source of food for day labourers and off-farm employees, an important mainstay of livelihoods of small and medium sized farmers, and part of commercial enterprises in the case of large users. MUS may have a role in reducing vulnerability and providing an option that helps stop people falling into poverty.

Alongside work on water and poverty at the micro-level, various initiatives have tried to link access to water for multiple uses with macro-economic growth. Research on that has been carried out in Ethiopia by Hagos et al. (2008) and Tolossa and Tafesse (2008). The Department of Water Affairs and Forestry (DWAF) in South Africa, also tries to develop multiple-use services within a broader framework for growth, called Water for Growth and Development (Mtolo, 2008). Both the initiatives in Ethiopia and South Africa have just started and will merit further analysis in the future.

People require more than their domestic water needs to be productive

This statement has also been widely researched since 2003, leading to a much more detailed specification of water needs. The results of that research can best be summarised as in the water ladder (based on Van Koppen and Hussain, 2006, Renwick et al., 2007). This ladder indicates the typical kinds of uses that people may use for a given access level. We know that productive use of domestic water happens always, even when people have less than the 25 lpcd indicated in the original statement, as for example in Ethiopia (Adank et al., 2008). But for productive uses to start taking place at a significant scale, at least between 40-100 lpcd are needed. With higher levels of access, more widespread productive use can take place.

Table 4: Household multiple-use ladder (based on Van Koppen and Hussain, 2007, and Renwick et al., 2007)

Service level	Distance or roundtrip	Quantity (lpcd)	Potential needs met
Maximal multiple-use service	Water at the homestead	>100	All domestic needs Not all but in some combination: Livestock Extensive gardening Small-scale enterprises
Intermediate level multiple-use service	Water at the homestead, or within 5 min roundtrip	50-100	Basic domestic needs Not all but in some combination: Couple of large livestock Gardening up to 50 m^2 Some micro-scale enterprises
Basic multiple-use service	Round-trip less than 15 min at distance between 150 -500m	20 – 50	Basic domestic needs Not all but in some combination: Some livestock Some gardening, especially with re-use Some micro-scale enterprises
Basic domestic service	Round-trip up to 30 min, or distance less than 1	10-20	Sufficient for drinking and cooking Hardly sufficient for basic hygiene

	km		Insufficient for other domestic uses Possibility for re-use for occasional trees and very limited livestock (e.g. few chickens or a goat)
No domestic	Round-trip more than 30 min, or more than 1 km	< 10	Sufficient for drinking and cooking Insufficient for basic hygiene

From an irrigation-plus perspective, such a ladder is more difficult to conceive. Rather efforts have been made to develop indicators and assessments of the degree to which multiple use and multiple functions of water are included in the design and operation of such systems.

Many authors have reported on different ways to generate that access, ranging from household technologies such as PumpAid's elephant pump (PumpAid, 2008), to piped systems in Nepal (Mikhail et al., 2007), farm and village ponds (Adu-Wusu et al., 2008) or additions to irrigation systems (Harischandra, 2008). An overview of technologies and their relative potential in meeting multiple needs has been given in Van Koppen (forthcoming) and Smits et al (2008b). The ladder allows planners to analyse how different technology options can be used to provide a certain level of access.

Lessons learned at water systems level

Productive use enhances the sustainability of water supply systems and services

Recent research neither substantial supports or refutes this suggestion. Not recognizing multiple use of water or neglecting these in management causes sustainability problems, as shown for example by in Smits et al. (2008a) for domestic-plus systems in Honduras. But, actively recognizing and managing services for multiple use is not yet proven and may well not automatically translate into a higher level of sustainability, as analysed again in detail in Honduras, or for the cases from the MUS Project (Smits et al., 2008). There are many other factors that affect system sustainability: multiple-use is just one of them.

A more relevant question that has emerged is to ask what are the additional management requirements of multiple-use services, and how these can be addressed to support sustainability. Various studies indicate that the additional management challenges that multiple use poses are not insurmountable in most cases, and do not pose requirements which are difficult to fulfil. Studying 20 large irrigation systems, Renault (2008) shows that multiple use in irrigation systems can be introduced as part of service oriented management (SOM). For instance when SOM is high then existing MUS is to a large extent integrated in management. Smits et al. (2008a) indicate for Honduras and the cases from the MUS project (Smits et al., 2008b) a range of management measures that can be established within community-managed systems that facilitate multiple use to take place in an equitable manner.

More work is needed on further specifying performance indicators for multiple-use services, and ways of strengthening management to reach these indicators. Also, long-term research is needed on some of the multiple use pilots that have started only recently.

People need local solutions and multiple sources for multiple uses

The original statement has two components: the application of the principle of multiple sources for multiples uses and the need to develop multiple-use services within a framework of IWRM.

With respect to the first point, there seems to be high diversity in the type and number of sources people use. For example, where people have piped schemes as in Honduras (Smits et al., 2008a) and Colombia (Cinara, 2007), people tend to use these as their main and only source. Only a few families use other water sources such as rainwater harvesting, private wells or open water sources. Those who have those in Honduras, tend to be large commercial users with sufficient funds to develop their own boreholes or intakes (Smits et al., 2008a). In other areas, people combine a wide range of improved and non-improved sources, ranging from water scarce Ethiopia (see for example Jeths, 2006) to humid Thailand. In Vietnam the role of open water sources was also found to be important (Noel, forthcoming). In areas with irrigation schemes (both large and small) it is common to find a number of overlapping and complementary sources. For example, Valenzuela and Heredia (2007) describe a case from Bolivia where a community has developed four different irrigation and domestic supply systems to meet different demands for different sections in the community, optimizing their access to both ground- and surface water. The findings across the cases show that in some cases households and communities are developing multiple sources to meet their multiple needs, often on their own initiative. Yet, in formal water programmes (irrigation or domestic) the focus is

often on the main systems only, and alternative and complementary options are rarely fully considered or utilized.

Less research has gone into the impact of the development of multiple-use services on water resources at catchment scale and appropriate responses. One likely reason for that is that most efforts have focused on single pilot or research communities whose water use has very little impact at catchment scale. It is only possible to study the possible implications when considering MUS in a scaled-up manner. The lessons learned have been derived mainly from theorizing impact, examining what may happen if a large number of communities would have multiple use services. Van Koppen et al (forthcoming) and Smits et al. (2008) provide an overview of the potential impacts in basins with different degrees of water scarcity, and potential mitigation measures.

Lessons learnt at institutional level

An integrated approach is essential to achieve significant impacts on poverty

This statement originally referred to two sub-aspects: the need for integration of multiple use in IWRM, and integration between different stakeholders, such as government, NGOs, community groups, and different sector agencies. Having referred already to findings on IWRM, here we will highlight some of the work done on integration between different stakeholders.

Most of the authors haven't so much focused on whether this assertion is true. Rather, work has focused on the question of how such an integrated approach between stakeholders can be achieved, and at which levels. The MUS Project has done so using an approach called Learning Alliances (Smits et al., 2007), consisting of multi-stakeholder platforms at different levels (community, intermediate and national). Butterworth et al. (2008 forthcoming) assess the way these alliances have facilitated the coordination between stakeholders necessary for MUS. They concluded that in a number of countries, such as Nepal (see also Mikhail and Yoder, 2008), South Africa and Colombia good progress was made in terms of raising awareness of sector stakeholders, obtaining recognition of the importance of the issue, and even inclusion of MUS principles in programmes (see also Merrey and Sibanda, 2008). A key factor in this has been the identification of local drivers and different organisational entry points for effectuating integration (Van Koppen et al., 2008). The RiPPLE Project in Ethiopia seeks a similar approach through so-called Learning and Practice Alliances (LPAs). There are other mechanisms to achieve integration and more work is needed. In addition it is important to assess the transaction costs of MUS and these methods. Institutional change doesn't come easily or cheaply.

The need to work in an integrated manner across sectors does not mean that the provision of multiple-use services cannot already start from within sectoral agencies. Renault (2008) shows how the provision of water for multiple uses can be accommodated in large irrigation schemes as part of modernization and service-oriented management of these schemes. In this study, 18 out of the 20 irrigation systems examined are somehow considering multiple uses of water, only two of them being strictly single use systems. Smits et al. (2008) discuss how agencies from the domestic sector can already start providing long-term support to rural water supply systems in Honduras so that they can better address issues of multiple-use. Whereas more integration across sectors in the end would be required, an important start can be made from within the sectoral reality by promoting coordination and joint activity.

One of the areas that has received less attention is integration with players from outside the water sector, such as those working on marketing or other aspects of infrastructure development. There has been a generic recognition that water is just one of the limitations facing poor families, and that they would also need other investments in software, including institutions, as well as access to markets for inputs and products (e.g. Faurès et al., 2008; Renwick et al., 2007). Yet, there is very little case material on how to develop those linkages outside the water sector. Probably one of the best illustrative examples is the work by IDE and Winrock on linking MUS to market development in Nepal (Mikhail et al., 2007 and Khawas and Mikhail, 2008). The RiPPLE project in Ethiopia also seeks to engage with agencies outside the water sector (Slaymaker et al., 2007), but this is still work in progress.

Towards an agenda for a way forward

The previous section has provided pointers and some answers to the questions (or hypotheses) formulated a few years ago. Some of these answers are still incomplete, and will require further research. The work over the past few years has also generated a whole series of new questions. This section provides an overview of

the kinds of questions that often arise. Finally we propose an outline agenda for discussion, to address these questions in terms of research, pilot and practice and policy dialogue.

Which questions should we ask?

As Moriarty (2008) discusses, critical questions about MUS have come from within the community working on MUS as well as from professionals working within the current sector paradigms. Typical questions raised at policy discussions and advocacy sessions fall into two broad categories:

- Questions of comparison between the MUS approach and the existing single-use approach
- Questions on how the MUS approach can be best developed so it can meet its objectives

Moriarty (2008) argues that the first set of questions is particularly difficult to answer, as it would be a comparison between two different approaches, or even paradigms, with different objectives and different performance indicators. So far, work on MUS has worked around this difficulty by looking at *incremental* changes and their costs and benefits e.g. by looking at incremental costs and benefits as compared to single-use approaches (e.g. Renwick et al., 2007), or how technologies can be incrementally upgraded to provide access to water for multiple uses (Van Koppen et al., forthcoming). However, for a number of reasons, not least of which are the limited number of scaled-up programmes to implement planned MUS systems, the limits of usefulness in comparing MUS to single-use approaches are being reached. Both for single-use and MUS services, what is important is not only the type of service provided but the way in which it is done. A badly managed MUS service will have less impact on poverty than a well-run domestic or irrigation scheme and vice-versa. The few analyses made on incremental changes between MUS and single-use services show a tendency that MUS are indeed a good and effective way of providing services.

Moriarty (2008) proposes taking a "leap of faith": "We know that how things are done now does not really work. And that while we are not sure that this is the right way forward, on the balance of probabilities it seems to be so, and to hold more promise than business as usual". This implies assuming that MUS is indeed a good way forward, and focusing more on the question of how MUS can be best provided. Only once there is a large set of MUS on the ground will we be able to assess the differences in performance (or not) with existing single use services. This realisation has important implications for the future agenda, not only for research, but also for piloting and practice, policy dialogues and networking.

Research

The main research challenges lie in answering the how and what questions. Following the conceptual framework as presented, the following questions can be formulated:

- **Impacts on poor people's livelihoods**. Having obtained reasonable insights into how people use water in their livelihoods and the benefits obtained, the main question to be addressed now is how to achieve equity in access to water for people's livelihoods, and how the poorest can be particularly targeted. In addition, further research and development is needed on factors outside the water sector (such as access to markets, credit, etc) that could enable users to make the best use of the water to support their livelihoods. To support advocacy, further efforts need to be put into assessing how many people could benefit from MUS approaches at global, regional or country level, and the size of these aggregated benefits.
- **Service provision to create access.** The water ladder seems a useful model to explain the relation between access and water use in livelihoods. The outstanding question is how best to make investments to provide these levels of access. Which kinds of technologies, institutional arrangements and financial mechanisms for MUS would be the most cost-effective in a given situation? How can these be addressed in service delivery programmes?
- **Performance and sustainability**. As discussed we shouldn't be asking whether multiple use services are more or less sustainable than single users. Rather, we should focus on the question of how multiple-use services can be provided in such a way that they are sustainable. There is a growing body of research on key indicators for sustainability in domestic and irrigation systems. Better performance and sustainability indicators for MUS are also needed.
- **Replication, scaling up and institutional change**. Institutional change towards a more coordinated or integrated approach is needed to support MUS. The key question is which institutional mechanisms will work best in different circumstances. And how can these changes be achieved? Which are the best entry points?

We will use these as guiding questions during the symposium, and hopefully we can move forwards in answering them. However, we also know that we won't be able to answer all these questions fully and the symposium will no doubt serve to better formulate these research questions.

Piloting and practice

In line with the proposed leap of faith by Moriarty, the work agenda for MUS in terms of pilots and practical implementation is one of implementation *at scale* in a programmatic manner. The body of knowledge outlined in the previous section does suggest the starting points from which programmes can be developed. For example, Renwick et al. (2007) identify a number of opportunity areas, or specific MUS situations that hold high potential for MUS to be applied at scale. Van Koppen et al. (forthcoming) provide important elements for service delivery models that can be developed into MUS service delivery programmes. There is a leap of faith, but one which is well-informed by past research and learning. We expect that the discussions and outcomes of the symposium can further inform the development of new programmes.

Only through such implementation programmes at scale can we learn important further lessons on how to provide multiple-use services. These cannot be learned from pilots in stand-alone villages. Only at programme level, can one learn about issues such as performance indicators and institutional change. We therefore recommend that these programmes act as pilots for learning and research in which some of the research questions are answers. The agendas for research and implementation on MUS are closely linked, and one cannot do without the other.

One of the expectations of the symposium is to act as bridge between the research and implementation communities, so that partnerships can be formed and developed to facilitate the linking of research and implementation agendas over the coming years.

Policy and programmes

In order that such pilot programmes are realised, it is crucial to build upon existing initiatives to mainstream MUS into policies and programmes such as the ones in South Africa, Nepal or Honduras. These programmes and initiatives hold the highest potential to act as pilot experiences and further efforts should be concentrated on such cases. In addition, efforts should go into supporting policy development and programme formulation elsewhere, so that lessons learned from these and other countries can be applied more broadly. So far relatively little emphasis has been given on developing very specific policy advocacy messages. We expect the symposium to address this gap and define more specific policy recommendations, coming out of the analysis of practice experiences and research results. Emphasis should also be given to further developing an advocacy agenda, including the participation of the wider MUS community in two sessions at the 5th World Water Forum to be held in March 2009 in Istanbul, Turkey.

Networking

The review of experiences has shown that MUS by definition requires a multi-sectoral effort by different water sectors (irrigation, domestic, IWRM) as well as by different types of organisations (NGOs, government, researchers, practitioners). If MUS is to be scaled up, the need for collaboration is even more important to ensure exchanges of lessons learned on the 'how to' question. We recommend that there is a continued structured effort in facilitating fora for the exchange of information and joint policy advocacy with this broader MUS community. The symposium expects not only to strengthen the relations between the different organisations involved in these efforts to date, but also to provide a specific future mandate to the networks that have emerged over the last years to continue this work.

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