Background paper for "Monitoring Sustainable WASH Service Delivery Symposium"

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List of abbreviations and acronyms

AMCOW	African Ministers' Council on Water
CLTS	Community-Led Total Sanitation
DGIS	Directorate General for International Cooperation (The Netherlands)
GLAAS	Global Analysis and Assessment of Sanitation and Drinking-Water
ICT	Information and Communication Technology
INGOs	International Non-Governmental Organisations
IRC	IRC International Water and Sanitation Centre
JMP	Joint Monitoring Programme
JSR	Joint Sector Review
MAPAS	*Monitoreo de los Avances del País en Agua Potable y Saneamiento*
MDGs	Millennium Development Goals

M4W	Mobile For Water
MoH	Ministry of Health (Ethiopia)
MoWE	Ministry of Water and Energy (Ethiopia)
MWE	Ministry of Water and Environment (Uganda)
ODA	Official Development Assistance
ODF	Open Defecation Free
RWSN	Rural Water Supply Network
SIASAR	*Sistema de Información de Agua y Saneamiento Rural*
WASH	Water, Sanitation and Hygiene
WFP	Water For People
WHO	World Health Organization
Woreda	District
WSA	Water and Sanitation for Africa
WSSCC	Water Supply and Sanitation Collaborative Council

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Introduction

Trends and changes in monitoring WASH service delivery

Over the last few years, there have been significant developments in the monitoring of WASH (Water, Sanitation and Hygiene) service delivery. These are driven both by changes in focus in WASH service delivery, and changes in the needs and opportunities for monitoring.

The last decade has seen a concerted effort to achieve the Millennium Development Goals (MDGs) of increasing access to water and sanitation services. This was accompanied by global monitoring efforts that focused on measuring progress in access, such as the Joint Monitoring Programme (JMP) of the United Nations (WHO/UNICEF, 2012), and similar efforts at country level. In addition to such international monitoring, various countries embarked on nation-wide inventories of water – and to a lesser extent – sanitation facilities, often referred to as Water Point or Sanitation Mapping[1], to monitor levels of access in more detail and at the same time establish asset bases.

Access to water and sanitation facilities is but one parameter, which doesn't capture all aspects of service delivery. For example, Bain et al. (2012) and Onda et al. (2012) show how the figures for the achievement of the MDGs would have to be significantly reduced if water quality were taken into account. Probably, the same could probably be said if other parameters such as reliability of supply were considered, or the safe disposal of faecal matter in relation to sanitation. Many of these service parameters have in fact been part of norms in many countries. Recent monitoring initiatives have started going beyond measuring access, adding the functionality status of the assets and service level parameters such as water quantity, quality, or reliability. Others go as far as assessing the existence and functioning of a service provider, the entity responsible for operation, maintenance, administration of WASH services (typically a community-based organisation or private operator), and/or the service authority, i.e., the entity responsible for functions such as planning, coordination, and oversight (typically local government).

Informed by the Human Rights framework to water supply and sanitation, the consultation processes towards the post-2015 indicators for global water and sanitation monitoring also point towards the need to include service level parameters and measure progressive realisation and reduction of inequalities in access (JMP, 2012). Likewise, there is increased attention to the "inputs" into the sector, such as budgets and finance flows, and policies and legislation for WASH services. The progress towards achieving new targets and goals will depend not only on the amounts spent, but most importantly where the funds are spent and the approaches used. There are initiatives to monitor these inputs both at global level, such as through the two-yearly GLAAS (Global Analysis and Assessment of Sanitation and Drinking-Water) process led by UN Water, as well as at country level. A key trend is thus **the expansion in scope of monitoring from tracking increase in access to a broader set of factors, such as asset inventories, service delivery characteristics, and input parameters.**

The change in the content of what is being monitored at national and international level is being accompanied by a shift in why monitoring is being done and by whom. Implementing organisations (whether government or non-government) who built new facilities and reported outputs achieved, were often driven by the requirements of external funders. At most, the results of this process fed into national asset inventories, but often times it remained an internal report sent to the funder. Monitoring of service delivery requires involvement of those mandated to ensure service delivery, particularly local and national governments, as they are in the right position to take action according

[1] See Pearce, 2012 for an overview.

to the results of monitoring. Proper monitoring of budgets and finance flows also requires a sector-wide effort**.** We thus observe a second trend of moving **from project monitoring towards sector monitoring, involving a larger number of stakeholders**, normally led by the responsible national government entity**.**

A third trend is the **increased demand for accountability between the different parties involved in WASH services delivery**. Accountability relations between citizens, service providers, governments and donors have often been limited or rather highly asymmetric. This is changing for a variety of reasons. One of these is a more critical attitude amongst tax payers in the North over the use of ODA (Official Development Assistance), and the resultant wish of donors to measure the impact of aid in terms of increased access to services and better WASH service delivery. It is also driven by users who seek to hold service providers and authorities to account, often triggered by new, open access to information legislation. Finally, the aid effectiveness framework, as reflected in the Paris Declaration, highlights mutual accountability between recipient governments and donors as one of its key principles (OECD, 2005), and subsequently effort has gone into operationalising these accountability relations. The emphasis on accountability has not only reinforced the demand for monitoring of the services actually delivered, but also for the monitoring of financing flows in the sector.

Lastly, changes in monitoring in WASH service delivery are also undoubtedly influenced by **developments in Information and Communication Technology (ICT)** for collecting, processing, storing and visualising data**.** These have significantly increased the possibilities for real time monitoring, particularly by reducing costs and time for data collection, processing and visualisation. In addition, these tools provide opportunities for more stakeholders to be involved. For example, users can report to and access publicly available databases by anyone via the internet or mobile devices, increasing the potential to improve the quality of the data; or different implementers can contribute data from the infrastructure they are developing to national asset inventories. Yet, the speed in ICT development also comes with various risks: the institutions responsible for monitoring efforts may not be able to keep up to date with technological developments; or, that much more data is collected than can effectively be used and acted upon; or, the focus remains on ever improving data collection, and the data does not feed into decision-making processes. Already various signs exist of ICT systems for monitoring that are under-used.

These trends provide the sector with new opportunities to improve the accountability of human and financial resources towards adequate WASH service delivery, facilitated by new sets of ICT applications. But they also provide challenges, such as the need to have indicators to monitor the complexities of service levels and the sustainability of some of the ICT tools themselves. These add up to some of the challenges that have remained, such as the duplication of monitoring efforts and the effective use of monitoring results for decision-making.

Symposium on monitoring WASH service delivery

It is against this background that IRC International Water and Sanitation Centre (IRC) is organising a symposium on monitoring sustainable WASH service delivery from 9 to 11 April 2013 in Addis Ababa, in partnership with the Ministry of Water and Energy (MoWE), and the Ministry of Health (MoH) of the Government of Ethiopia, the African Ministers' Council on Water (AMCOW), WaterAid, Water and Sanitation for Africa (WSA), Rural Water Supply Network (RWSN), Water Supply and Sanitation Collaborative Council (WSSCC), and Water For People (WFP).

The overarching vision that lies at the heart of the symposium is one of strong national sector monitoring systems that allow planning and sustaining WASH services. We believe that monitoring must be strongly engrained in national sector institutions, which have the mandate to carry out monitoring, act upon the results, and eventually provide accountability over them. Strong monitoring systems imply having clear institutional arrangements for all steps in the monitoring process, with dedicated financial and human resource capacity. They also imply having information systems, including indicator sets and supported by ICT tools that can capture and process the complexities of WASH service delivery and provide the information that stakeholders at different institutional levels need.

Achieving this vision is not straightforward and may be hampered by factors ranging from lack of capacities, unclear responsibilities for monitoring, and misalignment between institutional levels.

The objective of the symposium is to provide a platform for exchange on the latest lessons and experiences with sustainable WASH service delivery monitoring—focusing on opportunities and challenges in the achievement of what is needed to move towards the vision of strong national-led monitoring systems.

About this background paper

This paper seeks to provide a common background for symposium participants. WASH service delivery monitoring is a broad topic, often understood in different ways by different people involved in it, depending on their purpose, the methods and approaches they follow or the institutional level at which they operate. It therefore tries to introduce key concepts and definitions around the most common forms of monitoring WASH service delivery, thereby focusing on those aspects of monitoring that relate to the vision outlined above. It does not seek to provide an exhaustive framework that captures all possible forms of monitoring. It also purposely focuses on the conceptual: we expect the specific examples and experiences to be captured in the key note documents and papers presented. This background paper should serve as a frame for placing and analysing those examples and experiences.

The paper starts by providing the scope and topics of the symposium. This is followed by a review of definitions and key concepts related to monitoring of WASH services, thereby focusing on the *why, what, who, how and what it costs* questions related to the vision. The paper ends by highlighting a number of points for discussion, which we feel are the key opportunities and challenges in reaching the vision, and may help structure the discussion.

Scope and topics of the symposium

The symposium covers water, sanitation, and hygiene services—acknowledging that monitoring the provision of these three types of services is very different in nature. A specific topic is dedicated to monitoring sanitation and hygiene. Although access to water resources and appropriate management of waste water are crucial for sustainable WASH service delivery, the symposium does not specifically focus on monitoring hydrological parameters or the broader impacts on the environment from untreated waste. It only refers to water resources in relation to the services that are being provided and to the environmental impact in the surroundings of the villages and neighbourhoods.

In addition, the focus of the symposium is on WASH in rural areas and small towns, as monitoring in these locations has been typically more limited in scope and with very specific challenges. Where relevant, cross-learning from experiences with monitoring in urban areas will be encouraged.

The symposium is divided into six topics, broadly based on the trends discussed above, while aligned to the vision of strong national sector monitoring systems:

- **Topic 1: Monitoring expenditures for service delivery.** This builds on the identified trend towards a need to monitor the investments made in the sector and what they are delivering (value for money), as well as providing accountability. This is important to access how appropriate the expenditure is, if services are affordable to different stakeholders and what improvements can be made. This topic discusses the approaches and methodologies for monitoring financial flows to assess value for money of WASH.

- **Topic 2**: **Country-led monitoring of rural and small towns water supplies**. For monitoring to be effective, it needs to be firmly embedded in the local and national institutions that are responsible for ensuring service delivery. This topic explores what the trend towards sector-wide monitoring means for embedding within countries' institutions, thereby looking at the realities of decentralisation, national and local capacities, decision-making culture, and external support agency practices.

- **Topic 3: WASH 'project' monitoring: a necessary evil or a stepping stone to better national sector monitoring?** Externally-driven project monitoring is likely to be a continuing feature of the sector for the next 10 to 15 years, particularly in many aid dependent countries. This topic explores the relationship between such project monitoring efforts and national sector systems and the question of misaligned accountability. Ultimately, the challenge is to harness all of the positive elements and innovation that project monitoring can bring and find ways that these experiences can be integrated, scaled up, and sustained within the predominantly low resource realities of national and (local) government systems.

- **Topic 4: ICT for monitoring sustainable service delivery.** This topic explores the opportunities that ICT developments are bringing, thereby investigating the factors for successful design and implementation of ICT systems, reviewing and showcasing the latest technologies and applications in project and national monitoring systems, but also critically debating the implications these innovations bring.

- **Topic 5: Monitoring sanitation and hygiene services.** Even though the trends mentioned in the first section equally apply to both water, sanitation, and hygiene, the implications for monitoring these sub-sectors are different, as they require different indicators, methods and tools, and often at different institutional levels. This topic will look into the specifics of monitoring sanitation and hygiene—focusing on the complexities of monitoring Community-Led Total Sanitation (CLTS), open defecation free (ODF) status, as well as hygiene practices and equity in them.

- **Topic 6: Building coherence in global-regional-national monitoring.** Global monitoring efforts such as the JMP and GLAAS initiatives have made a significant contribution to better understanding of WASH service delivery as well as to the methods of monitoring those at global level and are evolving to increase their scope and focus. Regional monitoring in Africa and other regions is gaining momentum. To meet the demand for a stronger evidence base, many countries are improving country level monitoring systems. However, differences in data between these levels are a source of confusion. This topic will present different global/regional and national monitoring initiatives and discuss the challenges of alignment and coordination. The session also devotes a specific focus on the neglected topic of monitoring capacity at all levels.

Conceptual framework for monitoring WASH service delivery

Why? – Purposes for monitoring

The Oxford dictionary defines monitoring as the observation and checking of progress or quality of 'something' over a period of time, or keeping it under systematic review. The implicit assumption behind this is that monitoring is done to see whether an expected result is achieved, and to take action if what is observed deviates from what was expected.

The purposes of monitoring WASH service delivery are manifold, as different stakeholders have different information needs. A user of a water point in Ethiopia may want to check the books of the water committee to make sure the tariffs paid are used to maintain the pump; the water committee member may want to monitor the income from those tariffs to see whether the costs of all necessary repairs can be covered; the *woreda* (district) official wants to monitor which pumps in his/her area become non-functional, so s/he can send a handpump mechanic to help with repairs; a person in the Ministry of Water and Energy monitors functionality rates of handpumps throughout the country to see whether national targets are met and to analyse whether the Operation and Maintenance framework is leading to results; a Dutch government official monitors expenditure on WASH in Ethiopia in relation to JMP data to assess whether its funding to the WASH sector makes a difference; and, at yet another step removed, a member of parliament in The Netherlands monitors expenditure reports of Dutch contributions to WASH in Ethiopia to see whether s/he can explain to his/her constituency that Dutch tax money is being spent effectively to keep water supplies flowing.

The list could easily be expanded beyond these quite linear examples. The number of possible purposes is almost as large as the number of stakeholders in the sector. For this symposium, we will focus on some of the most common types and purposes of monitoring presently found in the WASH sector that we consider particularly relevant to the vision provided in the introduction.

1) **Project cycle monitoring**. This refers to the follow up of progress in infrastructure development projects (and their corresponding software such as establishing a service provider) at specific locations, and seeks to achieve timely and efficient implementation of the project, according to the specifications. It entails activities such as checking quality of the construction, monitoring of stocks of building materials, keeping track of expenditures and time spending and supervision of contractors and builders. This type of monitoring is typically done by the entity responsible for implementation of the project (e.g., an INGO or contractor) as well as by the overseeing authority.

2) **Project or programme result monitoring**. This concerns the monitoring of final outputs of the implementation, specifically in relation to the number of assets developed – and derived from that, the number of people who have gained access to water and sanitation. Whereas the first type of monitoring refers to progress in the implementation work, this refers to the aggregated results of a programme, covering a larger number of communities, villages or small towns. Its purpose is often one of providing accountability for the results obtained from funds that were spent. An interesting recent development is that the results of projects or programmes are not only expressed in terms of new WASH systems developed or people covered, but include the level of service delivered through the intervention or elements of the enabling environment that may indicate how sustainable service delivery may be. Examples include the sustainability check used by UNICEF Mozambique (Godfrey et al., 2009) and the proposed sustainability clause that DGIS (Directorate General for International Cooperation (the Netherlands)) seeks to use in the programmes it supports (DGIS, 2012). This type of monitoring is typically done by the entity responsible for the implementation of a programme, either a government agency or an NGO, but could also be done by a donor.

3) **Inventories for asset management**. This refers to the regular updating of an inventory or register of all assets in an area, by keeping track of the results of the previous type of monitoring, but also of changes in the status of assets that have been developed earlier; e.g., systems that become dysfunctional or ones that have been repaired. Contrary to the previous types of monitoring, it is not limited to a specific project or programme, but should in theory cover an entire administrative area (e.g., a district, region, or country) and is therefore the responsibility of the relevant local or national authorities. The purpose of these inventories is one of asset management in its broadest sense: planning infrastructure development and major repairs and replacement, as it allows for an analysis of where further infrastructure development or replacement is needed. Water Point Mapping is the term often referred to for the initial development of the inventory[2] but could equally apply to the regular updating of the inventory. There are also some experiences in Sanitation Mapping (Roma et al., 2012), but in a more incipient state, not in the least place because of the amount of data that would be involved (Pearce, 2012). This type of monitoring may be done by the entity responsible for hardware development, be it a centralised agency or a local government. In addition, regulators may be involved in this kind of work, as they control whether service providers charge tariffs that are adequate to cover asset management costs and carry those out accordingly.

4) **Service delivery monitoring**. This entails the monitoring of characteristics of the service provided and the performance of different service providers in their roles of operation, maintenance and administration. The purpose is to identify possible weaknesses or lack of compliance with national service delivery standards or norms and to define corrective action. This is at the core of what service delivery is about, it is often done at different levels: a) users monitor on a day-to-day basis the service they receive or their service providers' performance and report problems, either directly to the service provider (e.g., a leaking pipe) or, in case a problem remains unsolved for a longer period, to a higher level authority; b) service providers typically carry out many routine monitoring tasks systematically – such as making monthly accounts of income and expenditure, or regular water quality tests – so as to take corrective actions within their capacity; c) service authorities monitor the performance of the service providers in their area, ideally against pre-defined service delivery indicators, with the dual aim of regulating the service providers and directing "post-construction" support to those providers which experience difficulties; d) national regulators, where they exist, may also carry out such monitoring, so as to assess whether service providers meet norms and standards on service levels.

5) **Monitoring the enabling environment**. This refers to the activities of tracking what AMCOW (2011) calls the service delivery pathway, or the conditions in the financing, institutional, policy and planning environment for service delivery. The purpose of this is to inform decision-making processes (often at highest policy and strategy level), by identifying gaps and bottlenecks in the enabling environment that eventually lead to poor service delivery on the ground. It would thus entail tracking whether certain policy or strategy decisions are indeed put into practice, but also an analysis of the impacts of such decisions on actual service delivery. This type of monitoring is typically done as a joint effort by entities operating at national level such as relevant Ministries, the regulator and development partners, sometimes in the form of Joint Sector Reviews (JSR). It may go beyond the WASH sector per se and include institutions, such as the Ministry of Finance. This type of monitoring has been given also an impetus by international and regional initiatives, including: Country Status Overviews (CSOs) in various countries in Africa (AMCOW, 2011), MAPAS (*Monitoreo de los Avances del País en Agua Potable y Saneamiento* or Monitoring of

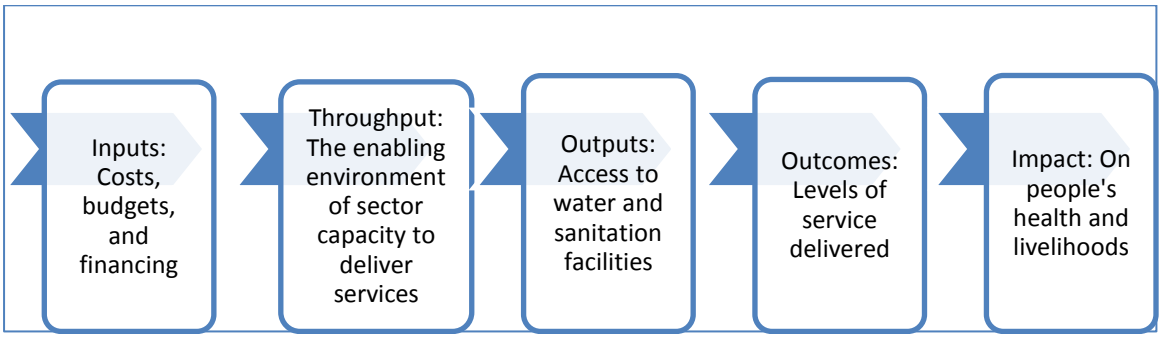
[2] See Pearce, 2012, for an overview; and Welle, 2005 and Rabbani, 2009.

Country Progress in Drinking Water and Sanitation) in Central America and the Bottleneck Analysis Tools.

What? – Scope of monitoring WASH service delivery

Having described the most common purposes of monitoring, the following aspects of WASH services can be differentiated in terms of what could be monitored, following the broad service delivery pathway, as shown in Figure 1.

Figure 1: Areas of monitoring



- **Inputs** are the costs, budgets, and financing of WASH services. At global level, the GLAAS reports compile data on financial inputs from a large number of countries (WHO, 2012). Countries such as Uganda track unit costs and financing flows as part of its sector performance monitoring (Ssozi and Danert, 2012). These are complemented by studies, such as budget tracking (e.g., Van Ginneken et al., 2012) and life-cycle cost analyses (Burr and Fonseca, 2013), which have high potential to become monitoring tools. For example, a study on costs of point source development in Mozambique by WASHCost led to the regular review of these costs, so as to identify changes in unit costs and use them for budgeting and planning (Zita and Naafs, 2011).

- **Enabling environment** refers to the "throughput", or the capacity of the WASH sector to use the inputs to deliver WASH services. It includes aspects such as the development of plans and policies, institutional and human resources capacity, and performance of sector stakeholders in their functions. For example, the GLAAS report and Country Status Overviews track progress in policy and strategy development and institutional capacity at regional and international level. At country level, it is common to have indicators monitor the performance of service providers and authorities in terms of their existence, composition, and fulfilment of their roles and responsibilities. For sanitation, specifically, it would also entail enabling factors, such as market conditions for sanitation (see Sparkman, 2012).

- **Outputs** refer to access to water and sanitation facilities. This has been the focus of most monitoring efforts at all levels. Key indicators typically monitored are the number of assets which meet the condition of being considered "improved", as per the definition of the JMP (WHO/UNICEF, 2012) or country-specific definitions, in relation to the population.

- **Outcomes** refer to levels of services that are actually delivered. Even though most countries have norms or standards for service levels, such as water quality parameters or minimum quantities to be supplied, few of them are actually monitoring those. For water this would refer to service level parameters, such as water quality, quantity, reliability and accessibility, often captured in the form of a water ladder (see Moriarty et al., 2010). The functionality status of water infrastructure and service downtime or response time could also be part of this. Potter et al. (2011a) propose a service ladder for sanitation with attributes of the service such as accessibility, safe use, operation and maintenance and environmental protection, whereas

Kvarnström et al., (2010) suggest functions to be fulfilled such as containment of faecal matter. In some instances, aspects of service delivery are implicit in the outputs. The Open Defecation Free (ODF) status is another outcome that could be monitored. Hygiene outcomes to be monitored could include certain hygienic behaviour practices in relation to faecal containment and latrine use, hand washing with soap (or substitute) and drinking water source and management (Potter et al., 2011b).

- **Impact** is the eventual impact of access to WASH services on people's health and livelihoods, e.g., through reduction in water-borne diseases, reduced drudgery and increased incomes. As these impacts are costly to monitor, and difficult to attribute to specific WASH services only, these are often not monitored on a routine basis. Rather, one-off evaluations or assessments are done that are specific to a given country. Alternatively, global reference data are used, such as the work by Hutton and Haller (2004) and Hutton et al. (2007).

Whether all these aspects need to be monitored in a given country, and at what level of detail, depends on the types of purposes, and the capacities to do so. If we think of gradually moving towards the vision of a national sector monitoring system, in all probability the categories that form the basis of such a system would be outputs and outcomes. The category of outputs has been monitored in most places already and is one that is relatively straightforward. The category of outcomes would need to be added in line with the increased focus on access to *services* as well as by imperatives such as the human right to water and sanitation, which are framed as service levels. Only once outputs and outcomes are being monitored could one expand to monitoring inputs and eventually throughputs. Those categories may not require many additional capacities, but would only make sense if there are outputs and outcomes to relate them to. Impact monitoring would arguably have the lowest priority in sector monitoring, as it is a costly and complex.

Who? – Institutional responsibilities and incentives in monitoring

As there is a multiplicity of purposes in monitoring, there are an even larger number of stakeholders involved in this. This is due to the fact that often the stakeholder responsible for monitoring a certain aspect requires contributions and involvement of a much larger group of actors. When looking at institutional responsibilities it is therefore important to differentiate between the one(s) who need to know and the one(s) who need to provide. Sometimes this is one and the same entity. For example, a service provider will want to know its financial balance, and can itself collect data on expenditure and income. But in other cases, the one who needs to know is very different from the one who provides. For example, a regulator wants to know the service delivery indicators for regulation purposes, but will require information from all service providers in the country. Service providers may need to know these as well, but in a different format or with a different frequency.

As the ones who need to know are often not the same as the ones who need to provide, there is often a limited incentive for the latter to contribute to fulfilling their responsibilities in monitoring. This can then lead to two types of mismatch: 1) mismatch between the institutional *levels*, and 2) a *sequential* mismatch between the entities involved in the different purposes of monitoring.

The mismatch between levels refers to cases where the entity doing much of the monitoring cannot directly use the data, as it only serves a purpose of an entity at another institutional level. A district official may update the national asset inventory with data from the district with the expectation of using the results to justify an investment plan, and eventually obtaining funds to improve the asset base. But if the two are not linked, it merely becomes an exercise in reporting data and not one of monitoring for action. Such a situation may also lead to perverse incentives. If the amount of funding to the district depends on the status of the assets, there may be a perverse incentive to alter the data, so as to obtain more funds.

The sequential disconnect refers to cases where one purpose of monitoring cannot be achieved, because of a limited flow of information from another type of monitoring. For example, the national agency doing an update of an asset inventory depends on inputs from all the results of project or programme monitoring done by implementers. However, there is often no incentive for the latter to feed details of its results into a national inventory. In fact, it may be seen as a burden, as the national inventory may request data in a slightly different format than the one used by the project implementer. But ultimately this leads to a situation where the respective national agencies cannot undertake adequate asset management. This situation is common in places where infrastructure development is done by a large number of NGOs or development partners, or where government agencies responsible for implementation operate in isolation from the ones responsible for planning and regulation.

These types of situations can be overcome to a large extent by reducing the extra burden of monitoring, so that there is at least no disincentive, even in the absence of a direct incentive. This can be done by standardising the types of information and indicators used across the key stakeholders and through processes of information (dis)aggregation. This will then not only require a clear definition of roles and responsibilities for monitoring, but high degrees of institutional collaboration at sector level.

In reality, such information flows and aggregation of data for monitoring at different levels doesn't take place. Dickinson (in press) presents different scenarios to describe the possible situations that the rural WASH sector may find itself – from worst to best – in terms of data management, ranging from no structured data collection to open access data on WASH. Building on his descriptions, four broad scenarios for the degree of institutional collaboration in monitoring can be identified:

- **Organisational-project level monitoring:** This represents the situation with the lowest degree of sector collaboration around monitoring. Under this scenario, implementation projects have monitoring tools and instruments in place, keep track on progress in the project cycle and report on their results. This allows the project implementers to carry out timely and efficient project implementation. Because there are typically many project implementers present in a country, it is impossible to aggregate data towards WASH inventories or macro-level planning. This situation does not permit monitoring actual service delivery.

- **Infrequently updated asset inventories or service delivery information systems**. Apart from project cycle and results monitoring, an information system exists which has the potential to compile information on the WASH assets in a specific geographic area, as well as on the characteristics of the service delivery. However, such systems are often only partially updated and remain largely underused, as it is accessible to only a few individuals. The risk that such a situation of underuse poses is particularly large after intensive asset inventories – typically with external funding – but where there is no clear institutional responsibility, funding or incentive for updating (as Scott, 2012 identifies for Malawi).

- **Institution-based monitoring**. A monitoring system is established by a sector institution. Data is collected regularly and used by that institution for analysis and action taking, and its database may be replicated across offices. It is common for other WASH sector institutions (and even those working in other, but related fields such as health and education) to have their own systems and data from one does not automatically feed into the other. The result is that use of each other's institutional information remains limited or even 'trapped', often with duplication of efforts and conflict over legitimacy of data. For example, in Honduras the national regulator keeps a registry of service providers for regulation purposes while the main water utility maintains a database of rural service providers for the purpose of post-construction support.

Although both information systems contain similar data, they are not linked and largely operate in parallel[3].

- **Sector-level monitoring**. There is a common monitoring framework that combines data from asset inventories, service delivery characteristics and other aspects such as budgets and finance, often from different information systems. Entities at different levels contribute to updating data, and the data can be accessed openly. The results also feed into global monitoring efforts. Joint data analysis and sense making takes place with involvement of all partners on a regular basis. In line with the principles of what is called country-led monitoring (Segone, 2009), a dedicated government entity has the lead. It coordinates regular updating efforts, ensures processes of aggregation and disaggregation and encourages use by all. Segone (2009) also emphasises that this should be inclusive of civil society and other stakeholders' voices, so these can evaluate public services. The emphasis on the fact that this is led by in-country stakeholders is important, as it is noted that many evaluations are still led by external donors (World Bank/OED, UNDP/EO and IOB, 2003), and – although exact data on this are lacking – many WASH monitoring efforts are also driven by donors. In sector-level monitoring, donors may still play an important role, as they have a clear stake in such monitoring; but the coordination and leadership lies with the country stakeholders. Uganda's joint performance monitoring would be an example of such a scenario, where the government, through its Ministry of Water and Environment (MWE), has the lead role, but with clear involvement of civil society organisations, local government and development partners (see Ssozi and Danert, 2012), who all contribute to data collection but above all to joint analysis and reflection.

Combinations of these four basic scenarios may occur: in a country with a relatively well-established sector monitoring system, isolated organisations may still only be carrying out project-result monitoring and are not contributing to the sector monitoring system; conversely a country may have a sector-wide initiative for an asset inventory, but it is not updated regularly.

Though the fourth category, sector level monitoring, reflects the vision provided in the introduction, some words of caution should be given. This does not imply having one single information system, which may be costly and difficult to implement. It is often more feasible to have different information systems for different aspects to monitor (e.g., the one for budget tracking would be different from the one for asset management), as long as eventually the results are combined and the information systems are compatible. It also assumes that (national) government has a leadership role. In countries where the different functions in relation to WASH (such as planning, policy making, regulation and implementation) are separated out over different government agencies, the lead entity should ensure that the monitoring system speaks to the needs of all these entities. And in general, it is clear that such a sector monitoring system is not developed overnight – nor should this be attempted; rather, it should be built up gradually.

How? – Steps and phases in monitoring

As noted by Pearce (2012) in reflection on an e-discussion on Water Point Mapping, many mapping efforts put the emphasis on data collection and processing, but less on data analysis and use. This finds its root in the fact that data collection is often the most costly and intensive part of monitoring. But also a lot of monitoring has often started as part of a one-off external project, with limited ownership over the use of data. It is therefore important to clarify the scope of a monitoring process. The following typical steps can be identified in monitoring, and we consider a monitoring cycle complete only if this whole process is followed:

[3] See Smits and Rivera (in press).

- **Defining the purpose:** This critical step defines the data needed and its purpose. Where and how would monitoring results feed into decision-making processes? What is the absolute minimum amount of data required? What do we NEED to know? And, what would be NICE to know?
- **Preparation**: This step includes the important definition of indicators and the questions and issues on which data is to be collected and the preparation of data collection instruments, such as survey forms or databases. It also includes coordination with relevant stakeholders prior to data collection so that possible institutional mismatches, as outlined above, do not occur.
- **Data collection** of all required primary and secondary data, in a systematic manner.
- **Data storage and cleaning:** Whereby data is transferred from the data collection instrument (e.g., mobile phone or paper) to a database, including an initial review of data to check for outliers, errors, and inconsistencies.
- **Processing:** Whereby data is processed and prepared for analysis often through algorithms, to a number of indicators and possibly the (dis)aggregation of data.
- **Reporting and validation**: Publishing of the raw and processed data, either in hard-copy or online, and sharing these with stakeholders for validation. Deciding how best to analyse the data to meet expectations of those that need it.
- **Analysis, learning, and decision making**: Whereby sense is made from the results obtained in relation to certain standards or benchmarks, and decisions are made with respect to priority, corrective and preventive measures, and responsibilities for those. The type of decisions depends again on the purpose identified in the first step: if a water quality test has failed, a simple decision can be made by a service provider to adjust the dose of chlorination; if an asset inventory shows 30% of handpumps are not functional, a decision can be made to revise and adjust operation and maintenance strategies.

The most important part of the monitoring process is that actual measures take place before the next round of data collection and analysis takes place. Monitoring is best done when intrinsically linked with learning processes where actions that take place are informed by evidence.

How? – Information systems

An information system consists of three components: 1) definitions of parameters and indicators, 2) algorithms to process data and 3) information and communication technologies. Each of these is elaborated below.

What are we measuring? – Criteria, indicators, and parameters

The terms “criteria”, “parameters”, and “indicators” are often used interchangeably in common language. We differentiate them as follows:

- Criterion: The broad category of what you want to monitor.
- Indicator: That which indicates the state or level of that broad category.
- Parameter: The measurable factor(s) which make up the indicator.

For example, if the criterion you want to monitor is financial performance of the service provider, then one of the indicators for financial performance is financial balance. To assess this indicator, you need to measure various parameters such as starting balance, income, and expenditure made by the service provider.

The criteria, indicators, and parameters to be used depend on the purpose and scope of monitoring, as well as on the balance between data reliability and the cost of collecting and managing the data. A compromise will need to be found between accuracy (expensive) and broad results (less expensive, but less precision). This balance also applies to scale: there is often a tension between the need to have comprehensive data that provides a full picture of service delivery, and the costs and effort to collect data. Even for a limited number of criteria to monitor, one easily ends up with a

large number of parameters. Measuring service delivery in Colombia was done by looking at five criteria for service levels. For each criterion, there was one indicator; while three criteria for service provider performance required 21 indicators. In total, some 75 parameters were collected for each water system as many of the indicators were composites (Smits et al., 2012). Uganda has a limited set of "11 golden indicators" which are actually criteria (Ssozi and Danert, 2012. But each criteria still needs two or three parameters. In the joint performance report, the data sets are then disaggregated by various categories (such as rural and urban), so in fact the number of parameters to be collected remains high.

Algorithms for aggregation, indices, and scoring

The way the value of an indicator is expressed also depends on the purpose. In some cases, the absolute value of an indicator is of interest; for example, a service provider might want to monitor the volume of water it sells or the income and expenditure it has. But, in many cases, the relative value is of more interest; a local authority would want to know which providers in its area of jurisdiction meet standards for quantities supplied and have a positive ratio between income and expenditure, rather than the absolute amounts sold by the provider. In other cases, there might be interest in even more aggregated data. For example, a national authority would want to know which service providers have an overall strong or weak performance in financial management and would not be interested in the financial balance.

Many monitoring systems therefore make use of composite indicators, which aggregate results from two or more indicators. One way of doing this is through indices. An index is a mathematical combination of a set of indicators and is based on sub-indicators that have no common meaningful unit of measurement and there is no obvious way of weighting these sub-indicators (Nardo et al., 2008). A score consists of allocating quantitative value (score) according to a specific situational statement, which can either be quantitative or qualitative in nature. Franceys and Fonseca (2012) provide an overview of commonly used scoring systems and indices in the sector. Particularly scoring systems seem to be in use for monitoring WASH such as the scorecards for monitoring the sustainability of the WASH sector in the CSOs (AMCOW, 2012). An example of a scoring using national monitoring is the SIASAR monitoring system which is being developed in three countries in Central America. The SIASAR monitoring system classifies all water systems on a scale from A to D (with A being the highest performance and D the lowest), and are based on the score on a number of indicators (SIASAR, 2012).

In order to aggregate data and to convert absolute values into relative ones and assign scores, a set of algorithms, or data processing rules, is often needed. For example, an algorithm may take the absolute values obtained for each of the service level parameters of a specific water system, and assign a score to that system based on the number of parameters that meets the national norms. An information system therefore typically contains a series of algorithms to process the data and convert these to scores and indices and provide both absolute and relative values.

Information and communication technologies

Undoubtedly, WASH service monitoring is undergoing a rapid step-change as a result of continued developments in ICT and the ever decreasing costs of equipment. Mobile phone technology (as summarised by Hutchings et al., 2012) for data collection is arguably one of the most striking manifestations of that. These include "top-down" systems whereby trained enumerators or district staff regularly monitor service delivery characteristics of water points (for example, in FLOW (Field Level Operations Watch) or SIASAR); and "bottom-up" systems, where users can report break-downs through SMS services, as in Uganda's Mobile For Water (M4W) system (M4W, 2012). Thomson et al. (2012a) provide a case of mobile phones, which measure the number of strokes on handpumps and transmits estimates of water use, based on those. Particularly the latter applications provide the

potential to increase the number of data, but above all the speed at which they can be collected, even making real-time monitoring possible. This should then facilitate rapid decision-making and response. However, Thomson et al. (2012b) warn of some of data biases, particularly in relation to crowd-sourced data.

Beyond mobile phones, Dickinson (in press) describes in detail the types of ICT tools available for each step in the monitoring process: from data collection to storage, processing,and visualisation. These tools can contribute to more effective monitoring by reducing the time to validate and process data and improve accessibility to the information. In particular, on-line data sharing makes it possible for all interested stakeholders to access data and use it for their own purpose.

The extent to which effectiveness and efficiency in monitoring are really improved also depends on the institutional capacity to respond to the results of monitoring, as argued by Thomson et al. (2012b) and Dickinson (in press). Pearce (2012) notes in the summary of an e-discussion on water point mapping that much of the emphasis still lies in the data collection and visualisation stages, but use of data is still not well-grasped. They will need support to interpret the data and act upon them. So, whereas the ICT tools can increase collection, processing and visualisation of data, the final step of analysis and use will continue to depend on the individuals and organisations that work with this data.

How much does it cost to monitor?

There is a growing body of evidence on the costs of WASH monitoring. Pearce (2012) compiles cost data based on figures quoted in a recent e-discussion on Water Point Mapping, whereas Smits, 2012 provides some costs on monitoring in Latin America. Both note that different countries estimate costs in different ways: by including or excluding certain cost items or expressing costs in different units (e.g., US$/water point or local currency per person), or only referring to the costs of data collection and processing but not of the analysis step—like 'comparing apples to oranges' (Smits, 2012). To make the figures as comparable as possible, 1 provides the available data converted to 2011 US$ and expressed as costs per person. However, care must be taken that the scope of what is included in each case differs significantly.

Table 1: Cost of Water Point Mapping and monitoring

Country	Reported cost	Reference	Unit costs (2011 US$)
Democratic Republic of Congo	52,000 US$ estimated total, ~ 2.33 US$/water point	Water Point Mapping D-Group, 2012	0.14 US$/person
Ghana	0.12 US$/person	Dickinson, 2013 forthcoming	0.12 US$/person
Liberia	45-50 US$/water point ~ approximately 0.08 US$/person	Water Point Mapping D-Group, 2012	Appr. 0.10 US$/person
Malawi	10 US$/water point ~ approximately 0.04 US$/person	Welle, 2005	Appr 0.05 US$/person
Mozambique	0.17 US$/person (estimated)	Water Point Mapping D-Group, 2012	0.17 US$/person
Swaziland	0.47 US$/person (budget)	Water Point Mapping D-Group, 2012	0.47 U$/person
Tanzania	7500 US$/district ~ approximately 0.05 US$/person	Welle, 2005	0.06 US$/person
Uganda	294,463 US$ for whole rural area	M4W presentation	0.01 US$/person
El Salvador	0.30 US$/person for an initial inventory 0.11 US$/person for regular updating	Smits, in press	0.11 - 0.30 US$/person

Honduras	0.24 - 0.34 US$/person in pilot municipalities 0.23 US$/person for regular updating nationwide	Smits and Rivera, in press	0.23 - 0.34 US$/person

Most important in this table are the orders of magnitude of around some 0.10 - 0.20 US$/person. The two Central American cases are the most expensive – as is Swaziland – probably because these go beyond Water Point Mapping and include monitoring a complete service delivery indicator set. These also refer generally to more complex piped systems, and not only water points. Finally, these have gone further in terms of analysing the results; in fact the costs of the step of analysis and interpretation of results were the second most expensive, in the pilots of SIASAR in Honduras. The Ugandan M4W is the one with lowest costs. Whatever the exact amount, they represent a relatively small fraction of all direct support costs, which are estimated to be between 2-3 US$/person/year to be effective (Smits et al., 2011). This should not be surprising as monitoring is only one of the activities needed to provide direct support to service providers.

As Pearce (2012) indicates, there is a need to get a better understanding of the costs involved in different steps in monitoring. One way of doing so is by itemising costs and accounting for them in a standardised manner, and breaking these down for each of the steps in monitoring, so that a better analysis and comparison can be made of what is included and what is not.

Points for discussion

The review of key concepts in monitoring WASH service delivery touches upon several opportunities and challenges for the achievement of the overall vision of strong national service delivery monitoring systems. These are summarised here, as we hope these – and others – can be points for discussion at the symposium. We welcome your critical feed-back and thoughts on these throughout the week.

Opportunities

Arguably one of the biggest opportunities is the drive towards the monitoring of service delivery monitoring. This is driven by increased attention to sustainability of service provision, the articulation of more service delivery oriented approaches (Lockwood and Smits, 2011) and the adoption of the human rights framework. As the sector expands its focus from increasing access to the provision of WASH services, the need also arises to monitor these services. This is already reflected in the fact that project monitoring starts to be extended to the measurement of outcomes, or at least the probability of achieving positive outcomes, as the sustainability check and sustainability clause promise to do.

Related to that is the fact that various countries have been, or are, undertaking asset inventories. Although it will still take more steps to go from such mapping to monitoring for asset management, it is encouraging that the asset inventories go beyond the mere recording of the asset and include data on service delivery indicators provided by these assets. Because of the scale of such inventories, these often represent a step towards more sector-level monitoring, as they require the contribution of all, or at least most, key sector players. Also driven by principles of aid effectiveness, the switch from institution-based to sector-level monitoring is another important opportunity and driver we see.

Monitoring has been given impetus by global initiatives, many of which are now being reviewed and updated, providing an opportunity to align them with national monitoring. The JMP has been a critically important guide to measurement of the MDGs and has been a path-breaking tool for the

sector. It is evolving to remain a key initiative to measure global sector outcomes. The UN-Water GLAAS initiative has begun the complex task of measuring sector inputs on a global scale. Many lessons have been learnt in the first two GLAAS reports and the design of the 2014 report is being redesigned to reflect these. AMCOW has initiated regional sector monitoring in Africa, but the extent of alignment with global and national monitoring is not clear. Useful progress has been made through the introduction of sector analysis tools (CSOs, BATs and others) but the approach to these analyses is not standardised and they are largely external agency-driven and not fully integrated into national systems. The review and updating of these global monitoring initiatives thus provides an opportunity to make them more supportive of country-led monitoring.

The final opportunity to move towards the vision is the already mentioned development of ICT tools that can make monitoring cheaper (by reducing data collection and processing costs), faster (even in real time), and more inclusive (by involving more stakeholders and increasing accessibility of data).

Challenges

A focus on service delivery brings in new complexities in the question of what exactly to monitor. The number and types of parameters to measure is much larger, and some data are not easy or cheap to collect. This in turn may require more complex scoring systems or indices. In addition, it requires monitoring more of the inputs and throughputs, such as capacity and performance of service providers and authorities, and financing flows. Dealing with the tension between getting a complete picture of service delivery and the complexities and costs this bring about is a challenge. This is all the more so the case for sanitation, for which less experiences and case studies have been documented on monitoring services, and where less consensus exists on the types of indicators to include.

A second and arguably more complex challenge is the governance of monitoring efforts. As argued above, at least five major purposes for monitoring can be identified, with various potential mismatches between them. To some extent these different needs can be met through and mismatches overcome by technical measures, through (dis)aggregation of data and making results in an open manner to all, facilitated by ICT developments. But above all it will require addressing challenges of coordinating and aligning monitoring systems: between different government agencies, with project implementers and with global monitoring efforts. This will not be easy as it implies dealing with issues such as ownership of data, tensions between institutional needs and sector needs, and different analyses of results. A specific challenge in this is the coordination and rationalizing of regional and global monitoring, creating consistency and eliminating duplication (Brocklehurst, 2012). Part of this alignment should be in the timing of global and regional data collection so as not to overburden national agencies. Global monitoring systems need to develop a set of common standards for data collected, in terms of parameters, units, frequency etc., and also establish good standard practices of "feedback loops" so that results of all monitoring initiatives are made known at all levels and are available for use in national planning and sector reviews.

A final group of challenges relates to capacity for monitoring. There is a risk that new information systems are set up, using the latest ICT, but with no matching institutional capacity to use the tools, or to act upon the results of monitoring, in the very low-resource environment of most of the WASH sectors. If a basic reference cost for basic mapping is some 0.10-0.20 US$/person, then annual (annually, if this is how the monitoring is probably even more expensive. This would then amount to a significant part of the recurrent expenditure on direct support in many countries, leaving little budget for acting upon the results for example through post-construction support. It is not only a monetary matter; often capacity for the interpretation of data and use for various purposes is limited. This combination of lack of funds for recurrent costs and the limited capacity and incentives,

particularly of local government staff, can seriously undermine the sustainability of monitoring systems. While there is scope to bring monitoring costs down even further, a greater challenge is the strengthening of funding and capacity to analyse and reflect on the information and act upon the results, or conversely, to develop monitoring systems that are better in line with the institutional capacity to use these.

In all of this, it should be reminded that monitoring is a means to an end: to obtain information on WASH services delivery and take corrective action if the results are not what is expected. Good WASH services will not be provided by having good monitoring systems only. Monitoring, let alone innovations to them, like new ICT tools, is not the next silver bullet for better services. Its impact on service delivery will depend on many other factors, such as availability of financing, regulation, clear policy and institutional frameworks, etc. Still, we believe that in most cases strong national-sector monitoring systems, as outlined in the vision, can make a significant contribution towards sustainable WASH services delivery. We therefore call upon your critical feed-back and thoughts on these, and other, discussion points so that the opportunities can be taken, and challenges overcome.

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