Water, sanitation, hygiene and the global Goals for Sustainable Development: an opportunity to move from coverage to service level

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Abstract

As the MDGs era concluded with the end of the last year, discussion has turned to how to improve post-2015 monitoring strategies. The inclusion of a dedicated Sustainable Development Goal (SDG) on water, sanitation and hygiene (WaSH) requires a fundamental change in the way we assess the sector. Multi-sectoral and system-wide approaches to monitoring and evaluation are needed. They represent a shift from a reduction in the percentage of the population without access to improved water and sanitation to aiming to ensure safely managed drinking water and sanitation services for all (Targets 1 and 2 of SDG number 6). How will we measure and monitor progress? Which indicator framework will be in place? This paper reviews two monitoring approaches that are increasingly adopted by agencies and NGOs in the WaSH sector. In Africa, the waterpoint mapping has been combined with a household survey to produce WaSH data at decentralised level. In Latin America, the Rural Water Supply and Sanitation Information System (SIASAR) initiative was launched in July 2011 to provide updated and reliable information and facilitate sector decision making. From a post-2015 perspective, we analyse the indicator framework of these two initiatives, the information sources employed to collect data, and the monitoring outcomes. For illustrative purposes, one small town in Mozambique and one rural department in Nicaragua are selected as initial case studies. We conclude that multidimensional monitoring systems are adequate to capture a complete picture of the context in which the WaSH services are delivered. In consequence, they are useful to inform the SDG monitoring architecture. In addition, by directing attention to those areas that require special policy attention, they provide evidences to influence decision-making. One specific challenge however that remains unaddressed, namely the indicator framework to report on the progressive elimination of inequalities in access, suggests the way forward.

Keywords: indicator framework, monitoring systems, sustainable development goals, water, sanitation and hygiene

1. Introduction

Water and sanitation are at the very core of sustainable development. Safe drinking water and basic sanitation together with good hygiene produce evident effects on human health and well-being (Cairncross et al., 2010; Fewtrell et al., 2005). In addition to domestic purposes, water is needed for food, energy and industrial processes. These uses are highly inter-connected and potentially conflicting, and they generate wastewater that may cause environmental pollution if not properly managed. As a result, the equitable provision of water and sanitation for people worldwide has become a top priority on the international agenda. In September 2000, the member states of the United Nations unanimously adopted the International Development Goals as the Millennium Declaration (United Nations General Assembly, 2000), and included one specific target to "halve, by the year 2015, the proportion of people who are unable to reach or to afford safe drinking water". At the 2002 World Summit on Sustainable Development in Johannesburg (United Nations, 2002), the MDG target was reformulated to include a specific focus on sanitation. In 2004,

the UN General Assembly declared the period from 2005 to 2015 as the "International Decade for Action: Water for Life", with the aim of renewing attention in the MDGs. And 2008 was declared the International Year of Sanitation, which helped to put sanitation in the spotlight. In this spirit, the UN General Assembly and the UN Human Rights Council recognized water and sanitation as a human right in 2010 (United Nations General Assembly, 2010a, 2010b). With the end of the MDG period in 2015, and despite the significant progress made (Joint Monitoring Programme, 2015a), a great deal remains to be done, particularly as regards sanitation and hygiene. Today, 663 million people still lack improved drinking water sources, and 2.4 billion have nowhere safe to go to the toilet. Among them, it is estimated that fewer than one billion people (946 million) practise open defecation.

There is no doubt that within the MDG period, monitoring data has played a key role in providing the evidence base for a range of different interventions and actions at different levels, from global to local. For instance, while national-level monitoring has served for national policymaking, planning and financing, global monitoring has been useful to determine whether progress on international agreed goals has been reached. The Joint Monitoring Program (JMP) of UNICEF and the WHO has taken over the role of producing such national, regional and global estimates of population using improved facilities since 1990 (Bartram et al., 2014; Cotton and Bartram, 2008). Particularly in 2000, it received a formal mandate to monitor progress towards the MDG drinking-water and sanitation target, with two single indicators: access to improved sources of drinking-water and access to improved sanitation facilities. Admittedly, the indicators employed during the MDG period have fallen short of measuring progress in some key areas, such as those mentioned under the Human Right to Water and Sanitation (United Nations Human Rights Council, 2011): accessibility, reliability, affordability, sustainability and equality in access, among others. In consequence, a considerable number of people who have been erroneously counted in statistics as "covered / served" do not access to a minimum level of service.

The discussion on the post-2015 development agenda has presented an unprecedented opportunity to take this critical analysis a step further and to provide concrete recommendations for the next development framework. Accordingly, and anticipating the need for a strengthened, comprehensive and more responsive post-2015 monitoring framework, the JMP has facilitated since 2011 international consultations on drinking-water and sanitation goals, targets and corresponding indicators (Joint Monitoring Programme, 2012). In 2015, the Open Working Group (OWG) on Sustainable Development Goals (SDGs) report to the UN General Assembly proposed a framework of 17 SDGs covering a range of drivers across the three dimensions of sustainable development: the economic, social and environmental (United Nations General Assembly, 2014). The OWG proposal includes a dedicated goal on water and sanitation, which comprises six technical targets. Targets 6.1 and 6.2 seek to address the unfinished business and shortcomings of MDG target 7c and call for universal access to drinking water, sanitation and hygiene. Ideally, monitoring systems should consistently report on these internationally agreed targets and their indicators to ensure the comparability of the data during the SDG period.

The aim of this research is to review two monitoring approaches that are increasingly adopted by agencies and NGOs in the WaSH sector. In Africa, the waterpoint mapping has been combined with a household survey to produce WaSH data at decentralised level. In Latin America, the Rural Water Supply and Sanitation Information System (SIASAR) initiative has been implemented in seven countries to provide updated and reliable information and facilitate sector decision making. Taking the post-2015 monitoring and reporting architecture as a reference point, we analyse the indicator framework of these two initiatives, the information sources employed to collect data, and the monitoring outcomes. The remainder of the paper is organised in four main sections. It starts by outlining the proposed indicators for post-2015 monitoring under the SDGs framework. Section 3 describes the methods. This section also documents the case studies and elaborates on the studied monitoring systems. In Section 4, the paper discusses about the suitability and validity of these monitoring systems to assess and inform about the proposed post-2015 monitoring outcomes. The paper ends in Section 5 with a synthesis of conclusions and recommendations.

1.1. Sustainable Development Goal 6: Ensure Availability and Sustainable Management of Water and Sanitation for All

The 2030 Agenda includes a dedicated goal on water and sanitation (SDG 6) that sets out to "ensure availability and sustainable management of water and sanitation for all" (United Nations General Assembly, 2014). SDG 6 expands the MDG focus on drinking water and sanitation to cover the entire water cycle, including the management of water, wastewater and ecosystem resources. With water at the very core of sustainable development, SDG 6 does not only have strong linkages to all of the other SDGs, it also underpins them; meeting SDG 6 would go a long way towards achieving much of the 2030 Agenda (UN Water, 2016).

In terms of monitoring this goal, and with a narrow focus on drinking water, sanitation and hygiene, two different targets (6.1 and 6.2) are proposed. In the process of defining the water-related target, international consultations established consensus on the need to better address normative human rights criteria including accessibility, availability, and quality (Joint Monitoring Programme, 2012, 2011). As a result, Target 6.1 reads "by 2030, achieve universal and equitable access to safe and affordable drinking water for all". The proposed new core indicator of "percentage of population using safely managed drinking water services" comprises four elements: i) a basic drinking water source (MDG "improved" indicator), ii) which is located on premises, iii) available when needed, and iv) compliant with faecal and priority chemical standards (Joint Monitoring Programme, 2015b). As regards sanitation, there was consensus among the international community on the need to go beyond access to a basic facility and address safe management of faecal waste along the sanitation chain. Target 6.2 reads "by 2030, achieve adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations", and it will presumably be monitored by a new indicator: "percentage of population using safely managed sanitation services" (Joint Monitoring Programme, 2015b). It comprises three main elements: i) a basic sanitation facility (MDG 'improved' indicator), ii) which is not shared with other households, and iii) where excreta are safely disposed in situ or transported and treated off-site.

It can be observed that both targets and indicators used for monitoring are designed to match the normative interpretation as closely as possible, while recognizing that some elements are not yet possible to measure on a routine basis. Specifically, the following tables illustrate how each element of the proposed targets can be understood from a normative perspective.

Table 16. Definition of SDG Target 6.1, from a normative perspective (Joint Monitoring Programme, 2015b)

Target 6.1 – By 2030, achieve universal and equitable access to safe and affordable drinking water for all	
Keywords, in proposed targets	**Normative interpretation**
universal	Implies all exposures and settings including households, schools, health facilities, workplaces, etc.
and ***equitable***	Implies progressive reduction and elimination of inequalities between population sub-groups
access	Implies sufficient water to meet domestic needs is reliably available close to home
to ***safe***	Safe drinking water is free from pathogens and elevated levels of toxic chemicals at all times
and ***affordable***	Payment for services does not present a barrier to access or prevent people meeting other basic human needs
drinking water	Water used for drinking, cooking, food preparation and personal hygiene

for all	Suitable for use by men, women, girls and boys of all ages including people living with disabilities

Table 17. Definition of SDG Target 6.2, from a normative perspective (Joint Monitoring Programme, 2015b)

Target 6.1 – By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	
Keywords, in proposed targets	**Normative interpretation**
access	Implies facilities close to home that can be easily reached and used when needed
to ***adequate***	Implies a system which hygienically separates excreta from human contact as well as safe reuse/treatment of excreta in situ, or safe transport and treatment off-site
and ***equitable***	Implies progressive reduction and elimination of inequalities between population sub-groups
sanitation	Sanitation is the provision of facilities and services for safe management and disposal of human urine and faeces
and ***hygiene***	Hygiene is the conditions and practices that help maintain health and prevent spread of disease including handwashing, menstrual hygiene management and food hygiene
for all	Suitable for use by men, women, girls and boys of all ages including people living with disabilities
end ***open defecation***	Excreta of adults or children are: deposited (directly or after being covered by a layer of earth) in the bush, a field, a beach, or other open area; discharged directly into a drainage channel, river, sea, or other water body; or are wrapped in temporary material and discarded
paying special attention to the ***needs of women and girls***	Implies reducing the burden of water collection and enabling women and girls to manage sanitation and hygiene needs with dignity. Special attention should be given to the needs of women and girls in 'high use' settings such as schools and workplaces, and 'high risk' settings such as health care facilities and detention centres
and ***those in vulnerable situations***	Implies attention to specific WASH needs found in 'special cases' including refugee camps, detention centres, mass gatherings and pilgrimages

2. Methods

In terms of methods, the study builds on a combination of literature review and specific local experience from the case studies. First, an extensive desk review has been conducted about two main topics: i) the present JMP post-2015 global monitoring proposal: goals, targets and indicators, and ii) key documentation related to frameworks and approaches for WASH monitoring (papers, technical reports and grey literature).

In parallel to the literature review, two different case studies from Africa and Central America have been selected as case studies. In each case study, a specific monitoring framework has been adopted and adapted to the local context. In sub-Saharan Africa, mapping of water points (WPM) has been in use by NGOs and agencies worldwide for over a decade (WaterAid, 2010; Welle,

2010). A major strength of WPM is, per definition, comprehensiveness with respect to the sample of water points audited, which entails complete geographic representation of all strata in the study area (i.e. all enumeration areas as communities, villages, etc.). Taking advantage of this logistic arrangement, and in addition to the mapping, a household-based survey may be conducted to evaluate sanitation and hygienic practices at the dwelling (Giné Garriga et al., 2013). As it may be assumed that all households are located within walking distance of one water source, the approach adopted practically ensures full inclusion of families in the sampling frame. In brief, the data collection method combines a mapping of water sources with a stratified survey of households.

In Latin America, the "Rural Water Supply and Sanitation Information System" (SIASAR) initiative was launched by the Governments of Honduras, Nicaragua, and Panama in partnership with the World Bank in July 2011. SIASAR is currently implemented in four additional countries, namely Dominican Republic, Costa Rica, the Mexican State of Oaxaca, and Peru. This information system aims to monitor and assess sustainability of rural water and sanitation services, by providing updated and reliable information on status and functionality of water supply and sanitation facilities. Its conceptual model covers a broad range of aspects, which are combined in four basic dimensions:

- Access to service, as determined by coverage information gathered at the community level;
- Quality of service, as determined by the level of service, functionality and physical condition of the infrastructure serving a community;
- Performance of service providers, as determined by the level of organization, O&M attention and financial sustainability of the local service provider; and
- Effectiveness of technical assistance, as determined by effective support of technical assistance providers (municipal employees) to run WSS systems.

It can be easily observed from previous paragraphs that there are similarities and differences among the two monitoring systems, although they share a common rationale, i.e. to provide a complete picture of the context in which water and sanitation service are delivered. Table 3 underlines key aspects of both approaches.

Table 18. Differences and similarities among two monitoring approaches for WaSH

Water Point Mapping + Household Survey	SIASAR
- Focus on local estimates - Adequate methodology when water is largely supplied through community water points, either connected to a water system or not (e.g. rural Africa) - Combination of two information sources, i.e. the household and the waterpoint. A census of schools and health centres could be also conducted in case of need - Combination of different techniques: structured questionnaire, direct observation, and water quality testing - Involvement and participation of local authorities and community leaders	- Focus on national and subnational / local estimates - Adequate methodology when water is largely supplied through decentralised water systems (e.g. Latin America) - Combination of different information sources, i.e. the system, the community, the service provider and the technical assistance provider - Combination of different techniques: structured questionnaire, direct observation, and water quality testing - Involvement and participation of local authorities and community leaders in data collection - Involvement of national authorities and key stakeholders in the definition of the indicator framework

2.1. Indicator framework A: combining waterpoint data and household data to monitor rural

WaSH

In the first case, the approach adopted for data collection combines a mapping of water sources with a stratified survey of households. Different methodologies exist which combine the waterpoint and the household as key information sources, but they commonly differ from the method proposed herein in i) the focus - national rather than local -, and in ii) the statistical precision of the estimates - inadequate to support local level decision-making -. In brief, the key features of the proposed method include i) an exhaustive identification of enumeration areas (administrative subunits as communities, villages, etc.); ii) audit in each enumeration area of all improved and unimproved water points accessed for domestic purposes; and iii) random selection of a sample size of households that is representative at the local administrative level (e.g. district, municipality, etc.) and below (Giné Garriga et al., 2013).

Despite the large amount of collected data through survey instruments designed for the waterpoint and the household, rigorous data analysis and dissemination is crucial to inform decision-making. Information about institutional, financial, management and environmental issues should be included in the indicator framework, but exhaustiveness needs to be balanced with simplicity. For this purpose, a reduced set of indices are defined on the basis of simple planning criteria (Giné Garriga et al., 2015). For each index, one ranking is produced and transposed into one league table to denote priorities. A different threshold limit is set per list for this purpose. To show at a glance both index values and priorities, different maps are developed, which enable a quick identification of key focus areas. Finally, each priority list is related with specific remedial actions to be accomplished by the local government, ultimately translating development challenges into beneficial development activities. A proposed list of indices is summarized in Table 4 (Giné Garriga et al., 2015).

This data collection methodology has been applied in various settings in East Africa (Giné Garriga and Pérez Foguet, 2013; Giné Garriga et al., 2015). The Municipality of Manhiça has been selected for illustrative purposes. It is located in Manhiça District, Maputo Province, in southern Mozambique. It has 19 bairros and covers a rough area of 250 km2. According to the local estimates, the population roughly totals 61,000 distributed in peri-urban and rural contexts.

The following pictures and Table 5 show the outcomes of this monitoring approach. It can be observed that by disseminating the planning indices listed in Table 4 through league tables and priority maps improves transparency and inclusiveness in the decision-making process. They are powerful tools to produce simple policy messages that are easily understood by decision-makers, non-technical stakeholders and the recipient populations. For instance, the “open defecation index” is useful to show those bairros in Manhiça where this practice is common. In total, 14.2% defecates in the open, although disparities exist by bairros. It can be seen that a large majority of households defecate in the open in Ribjene (61.3%), while in other bairros this practice has been almost eliminated. In those bairros where open defecation is widespread, the coordination of initiatives to support new construction of facilities, or the launch of total sanitation campaigns, such as those focused on the Community Led Total Sanitation (CLTS) approach (Kar and Chambers, 2008), would emerge as potential remedial actions. They all would trigger a movement on the sanitation ladder.

Table 19. Indices used for planning (Giné Garriga et al., 2015)

Index	Definition	Remedial Action
INDICES RELATED TO WATER SERVICE COVERAGE		
Coverage index	% of covered population by improved waterpoints (IWP) in a location, according to the standards of service level (e.g. 1 waterpoint / 250 people)	Construction of New waterpoints
INDICES RELATED TO THE MANAGEMENT OF THE SERVICE		

Functionality Index	% of functional improved waterpoints (FIWP), compared to the total number of IWP	Rehabilitation of existing waterpoints
Management Index	% of FIWP with declared income and expenditure in the year before the survey	Management supporting activities, particularly those related to creation / establishment of water entities or to financial issues (tariff collection systems)
Maintenance Index	% of FIWP with good / acceptable access to technical skills and spare parts	Management supporting activities, particularly those related to technical issues. Improve spare parts accessibility
INDICES RELATED TO THE QUALITY OF THE SERVICE		
Seasonality Index	% of FIWP that are year-round	Actions to increase reliability of the source (catchment's protection, regulation of different uses) and/or finding of additional sources
Water Quality Index	%of FIWP with acceptable bacteriological quality	Actions to improve quality of water: catchment's protection, protection of WP, water treatment, etc.
INDICES RELATED TO SANITATION SERVICE		
Coverage Index	% of covered households by improved sanitation facilities (ISF)	Construction of new facilities
Open Defecation Index	% of households that practice open defecation (OD)	Community-led Total Sanitation
INDICES RELATED TO HYGIENE		
Latrine Sanitary Conditions Index	% of latrines that are maintained in adequate sanitary conditions. Risky conditions might prevent an adequate use	Hygiene promotion campaigns
Handwashing index	% of adults with appropriate handwashing (HW) knowledge	Hygiene promotion campaigns, particularly focused on handwashing

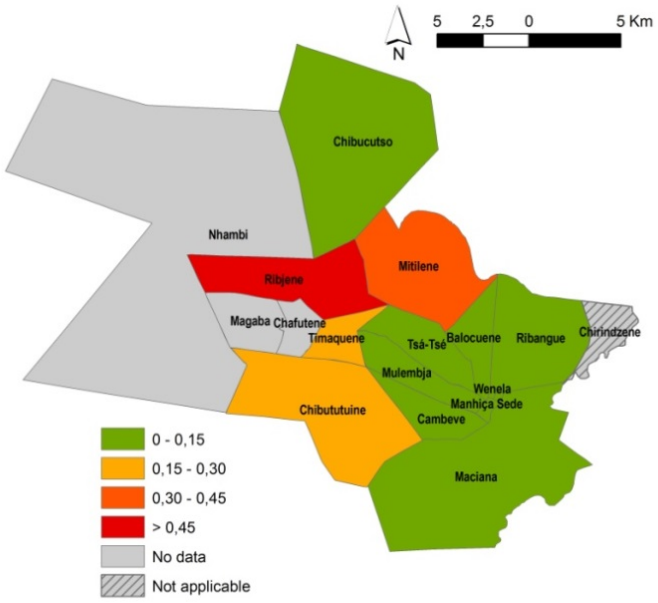

Figure 10. Open Defecation Index

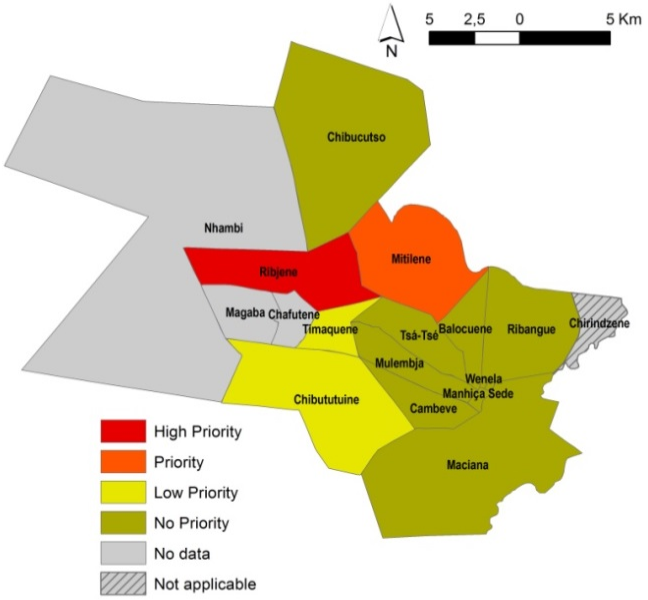

Figure 11. Open Defecation – Priorities

Table 20. Categorization of bairros from Manhiça in relation to the practice of open defecation

Bairro	Rank	p_i	$p_{l,i}$	$p_{u,i}$	Prioritization
Matadouro	13	0,000	0,000	0,048	Lowest Priority
Ribangue	14	0,000	0,000	0,046	Lowest Priority
Maciana (includes Maragra)	12	0,007	0,000	0,037	Lowest Priority
Manhiça Sede	10	0,013	0,000	0,072	Lowest Priority
Wenela	11	0,013	0,000	0,072	Lowest Priority

Cambeve	9	0,026	0,003	0,091	Lowest Priority
Tsá-Tsé	8	0,038	0,008	0,108	Lowest Priority
Balocuene	7	0,051	0,014	0,126	Lowest Priority
Chibucutso	5	0,067	0,022	0,149	Lowest Priority
Mulembja	6	0,067	0,022	0,149	Lowest Priority
Timaquene	4	0,229	0,137	0,344	Low Priority
Chibututuine	3	0,244	0,153	0,354	Low Priority
Mitilene	2	0,347	0,240	0,465	Priority
Ribjene	1	0,613	0,494	0,724	High Priority
Notes: a) α = 0.05 (95% confidence); b) Three bairros are excluded from the analysis since the sample of HHs is not adequate to achieve required statistical precision					

Table 21. Structure of SIASAR: indices and components

Water Service Level (WSL)	**Water System Infrastructure (WSI)**
Accessibility Continuity Seasonality Quality	System autonomy Infrastructure for water production Water caption protection Water Treatment system
Community Sanitation and Hygiene (CSH)	**Service Provider (SEP)**
Sanitation service level Personal hygiene Household hygiene Community hygiene	Organizational capacity Operation & Maintenance Financial management Environmental management
Schools and Health Centres (SHC)	**Technical Assistance Provider (TAP)**
Water supply in schools Sanitation in schools Water supply in health centres Sanitation in health centres	Information & Monitoring system Institutional capacity Coverage (number of communities attended) Intensity (typology of assistance)

2.2. Indicator framework B: the "Rural Water Supply and Sanitation Information System" (SIASAR)

In the second case, the monitoring system includes a comprehensive set of indicators assessed through four different survey instruments: i) the community, ii) the water system, iii) the service provider, and iv) the technical assistance provider. In brief, the indicator framework is based

on three fundamental pillars: i) data collection and data update procedures, ii) definition of aggregated indices for partial and overall performance monitoring; and iii) definition of planning indicators. Remarkably, a cross-cutting issue within all these processes is the active engagement of national stakeholders, which in turn promotes greater ownership of the system by final users.

One of the salient aspects of SIASAR is the definition of six aggregated indices to assess water and sanitation services from different and complementary points of view. They have been proposed to measure i) the water service level; ii) the community sanitation situation and various hygiene issues at the household; iii) the condition of water system infrastructure; iv) the service provider performance; v) the technical assistance provider performance; and vi) the WaSH situation in public institutions. These indices are listed in Table 6. Each index is made up of four components. In turn, each component is fed by a short list of single indicators. Typically, data are represented on different scales (e.g., percentage of systems with adequate water treatment, distance-to-source in meters, service continuity in hours per day, and so forth), and they therefore have to be normalized prior to their analyses. For each parameter, we assigned a score between 0 and 1, where 1 represents the best performance and 0 the worst case scenario. Components are then defined by simple and easy-to-use multi-attribute utility functions. As regards the index construction, the method involves three key stages: i) determination of weights for each component, ii) their aggregation to yield a single value; and iii) presentation and dissemination. For simplification and to promote greater understanding of achieved results among final users and stakeholders, equal weights and an additive aggregation form has been opted for. Similarly, indices' values are linked to a defined set of categories (A / B / C / D), in order to foster prioritization and decision-making.

SIASAR is today in use in seven countries, namely Honduras, Nicaragua, Panama, Dominican Republic, Costa Rica, the Mexican State of Oaxaca, and Peru. To illustrate, one Nicaraguan department has been selected as case study. Matagalpa is located in central Nicaragua. It covers an area of 8,523 km2, and according to official data the population is estimated at 542.419. The capital is the Municipality of Matagalpa; and administratively, the department is divided into 13 municipalities. Maps in Figures 3 and 4 give a visual representation of two components of two different indices as potential monitoring outcomes of the system. To interpret the results, indices' values can be easily understood through two limit examples. Let us consider the case of a community with a partial index equal to 0.5.This may have two different meanings: i) two components obtain optimal results (i.e. utility function equal 1) and the rest of components obtain the lowest score (i.e. utility function equal 0), or ii) the four components obtain a score of 0.5. There is a direct trade-off between components of the partial indices, due to the additive aggregation (Munda and Nardo, 2005). Similar interpretation applies at other scales, when a number of communities are grouped together in higher administrative units. In this case, however, there are two additional limit scenarios: i) all communities score the same value, or ii) half obtain optimal results and the other half score 0. There is also a direct trade-off among communities

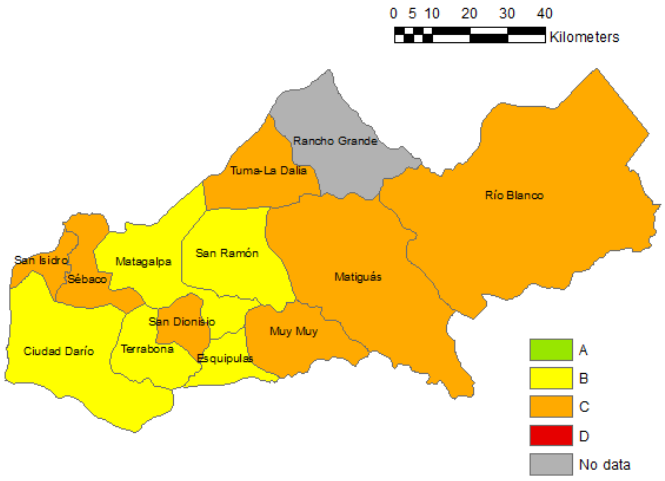

Figure 12. Sanitation service level

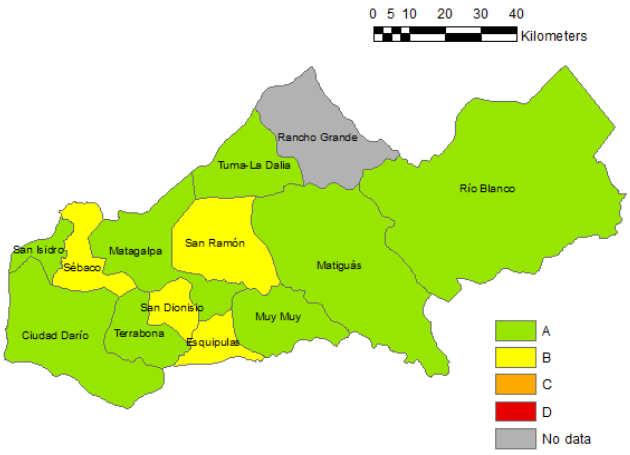

Figure 13. Infrastructure for water production

3. Results and Discussion

In this section, we review the previously described monitoring approaches and analyse their validity to inform the post-2015 targets and indicators that have been proposed for the WaSH sector. To do this, available indicators in both systems are classified in relation to the key elements identified in each target. Tables 7 and 8 summarize the list of indicators per each target element.

Table 22. Summary list of indicators to assess the water-related Target 6.1

Keywords, in proposed targets	Indicators - WPM + HH Survey	Indicators - SIASAR
universal	*** to assess this element, the method needs to include a census of schools and health centres	- % of households with improved water supply - % of schools with improved water supply - % of health centres with improved water supply
and ***equitable***	- % households with access to improved water supply. Population is stratified in wealth quintiles.	- No data (no focus on vulnerable groups). Basic ethnicity data are collected, although analysing them in relation to WaSH issues is not straightforward.
access	- Average rate of per capita domestic water consumption - % of households spending, on average, more than 30 minutes in fetching water - % of non-seasonal waterpoints	- Time to fetch water (assessed at community level, in terms of distance to the source) - Service continuity (number of hour per days) - % of non-seasonal water sources

to ***safe***	- % water sources with no bacteriological contamination - % households with adequate point-of-use water treatment	- % of water systems with adequate treatment method - % of households with adequate treatment method - Bacteriological water quality - Physicochemical water quality
and ***affordable***	- % water entities which exempt vulnerable houses from paying for water - % households that have been excluded from the service, because of a failure to pay	- No data Comment: SIASAR collects data on water tariffs and the water payment method. Also, on the number of users that regularly pay the water bill. This information may be exploited, in part, to give an insight into affordability issues
drinking water	- Domestic water uses (drinking, cooking, food preparation and personal hygiene)	- No data
for all	- Safety and security while accessing the waterpoint - % of waterpoints with user-friendly design	- No data

Table 23. Summary list of indicators to assess the sanitation-related Target 6.2

Keywords, in proposed targets	**Indicators - WPM + HH Survey**	**Indicators - SIASAR**
access	- Toilet facility location - Continuity of use of the latrine	- No data
to ***adequate***	- Safe management and disposal of human urine and faeces	- % households sharing improved sanitation facilities (assessed at community level) Comment: No data is available in relation to treatment of excreta in situ, or safe transport and treatment off-site
and ***equitable***	- % households with access to improved sanitation. Population is stratified in wealth quintiles.	- No data (no focus on vulnerable groups). The questionnaire, however, measures to a certain extent intra-household inequalities

sanitation	- % households with access to improved sanitation - % households sharing improved sanitation facilities (assessed at community level) - Sanitary conditions of the latrine (presence of insects, unpleasant smell, and cleanliness)	- % households with access to improved sanitation (assessed at community level) - % households sharing improved sanitation facilities (assessed at community level)
and ***hygiene***	- Hand washing facility and soap in the vicinity of the latrine - Hygienic practices in the latrine (materials for and anal and genital cleansing, menstrual hygiene management, hygienic disposal of cleansing materials and menstrual products	- % households with adequate handwashing behaviour (assessed at community level)
for all	- Safety and security while accessing the sanitation facility - Safety and security while using the sanitation facility - Latrine standards (condition of lined pit and upper superstructure) - Conditions of privacy in the latrine - Conditions of comfort in the latrine	- % of households where sanitation facilities are used by all household members
end ***open defecation***	- % households practicing open defecation	- % households practicing open defecation (assessed at community level) - % of Open Defecation-Free (ODF) community
paying special attention to the ***needs of women and girls***	- % households in which women shoulder the burden in collecting water - Hygienic practices in the latrine (materials for and anal and genital cleansing, menstrual hygiene management, hygienic disposal of cleansing materials and menstrual products	- % schools with access to improved sanitation (assessed at community level) - % health centres with access to improved sanitation (assessed at community level) Comment: SIASAR disaggregates the sanitation data by gender in schools and health facilities
and ***those in vulnerable situations***	- Not applicable	- No data (no focus on specific WASH needs found in 'special cases' including refugee camps, detention centres, mass gatherings and pilgrimages)

It can reasonably be inferred from the previous tables that collecting data at the household brings operational advantages in terms of monitoring post-2015 indicators for drinking water, sanitation and hygiene. This being the case, information systems such as SIASAR - with a focus on the

linkages between the sustainability of the water service and the service provider - may also produce valuable and complementary information. Specifically, SIASAR is adequate to report on the proposed drinking-water target. In contrast, as regards the sanitation and hygiene indicators, important attributes will not be assessed. On the one hand, no information will be available on excreta and/or wastewater treatment, which impedes the adequate evaluation of sanitation services management. On the other hand, accessibility issues are not correctly addressed. Remarkably, both monitoring systems will hardly report on the progressive elimination of inequalities in access to different levels of drinking water, sanitation and hygiene services, as they do not specifically address the needs of vulnerable groups.

4. Conclusions

In embarking upon the 2030 Agenda for Sustainable Development with a dedicated goal on water and sanitation, achieving higher levels of service in WaSH will be a major challenge. A related challenge will be holistic monitoring of these services, and credible data will be needed to stimulate political commitment, inform decision making, underpin sector advocacy and trigger well-placed investments towards improved health and a cleaner environment.

At present, there are several global initiatives that are monitoring different aspects of the water sector, but a coherent framework is still missing. Household surveys and censuses can fill gaps and provide basic information about access to and use of infrastructure, as well as hygiene practices at the household level. These surveys and censuses have provided the great majority of data used for tracking the WaSH MDGs, and will continue to be at the heart of SDG reporting. In rural contexts where water is delivered through decentralised water points, this study advocates for combining household data with infrastructure data. Such combination provides a more complete picture of the context in which the services are delivered. Remarkably, this approach is adequate to measure the different elements included in the water and sanitation SDG targets.

However, as sector capacities strengthen, national Management Information Systems (MIS) can increasingly produce reliable information about the level and quality of the services delivered. Such systems can provide information about management, operation and maintenance of services which can hardly be measured through household surveys or infrastructure assessments. Ideally, service providers should be increasingly involved in monitoring activities, and conduct regular surveillance of drinking water and sanitation services. Such national MIS are still relatively rare and weak in many countries, but SIASAR is a representative example. As it will be uniquely positioned to regularly report on Targets 6.1 and 6.2, SIASAR and other similar monitoring frameworks should be strengthened throughout the SDG period. To this end, it is essential to tailor these systems and their information modules to post-2015 key monitoring elements.

Finally, there is little doubt that inequality has been the biggest blind spot in the MDGs. A key challenge in the SDG period will be on reporting the progressive elimination of inequalities in access to different levels of drinking water, sanitation and hygiene services. The pledge that ‘no one will be left behind’ requires a specific focus on the poorest and most vulnerable people. For this to happen, transparent mechanisms to target the neediest and their needs should be in place. Today, few monitoring systems incorporate monitoring elements to address the issues of equality and non-discrimination.

In sum, this paper identifies a number of priorities that need to be addressed to develop an effective indicator framework for the SDG 6. They include filling gaps in available indicators; harnessing new, innovative sources of data; adapting information systems in current use, and defining adequate monitoring routines. Indeed, these challenges are of a general nature and not specific to the WaSH sector. On the one hand, emerging consensus suggests that the focus of SDG monitoring will be at the national level. On the other hand, complementary monitoring will occur within major thematic communities, such as health, education, agriculture, WaSH and so forth. Each of these communities will mobilize, analyse, and communicate data on progress towards achieving its specific goals. There is, therefore, a strong need to integrate such thematic monitoring and review within the SDG monitoring architecture, as it will be an important

complement to official monitoring and review conducted at national and global levels (Sustainable Development Solutions Network, 2015).

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