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Ph.D Thesis

Doctoral Programme in Environmental Engineering

**Development of methods for monitoring the water and
sanitation sector at different scales through human rights lenses**

by

Óscar Flores Baquero

Advisors:

Dr. Agustí Pérez-Foguet

Dr. Alejandro Jiménez Fernández de Palencia

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Abstract

The recognition of the Human right to Water and Sanitation (HRWS) through UN General Assembly and Human rights Council Resolutions in 2010 represents great progress in the Water Sanitation and Hygiene (WASH) sector as it entitles everyone to the provision of minimum standards of these essential services.

Much effort has gone into the recognition of these emerging human rights so it is essential now to shift discussion from legal and conceptual framework to practice. In this sense, three facts give the motivation to this thesis: First, international institutions have the authority to monitor States compliance with the Human right to Water and Sanitation (HRWS) but the necessary tools for this task are not ready yet. Secondly, this milestone influences governance and decision making processes at different scales. And finally, measuring access to water in the Sustainable Development Goals era involves taking into account the human rights framework. Therefore, its content should be considered to conceptualize the level of service through adequate indicators and to follow-up inequities reduction at global, national and local level. Accordingly, this work contributes significantly to each of one the three challenges presented.

First, human development sector has a wider experience on using information about progress which provides a perfect opportunity to develop this further. WHO/UNICEF Joint Monitoring Programme (JMP) and UN Water GLAAS datasets could be used for those with a mandate to monitoring the right, contributing to this challenge. Consequently, the information they offer has been analysed through a human rights lens. A matrix has been constructed to specifically identify in which extend their datasets could be combined to monitoring HRWS in a broad sense. JMP-led post-2015 proposal considerably contributes with outcome indicators to measure right holders' enjoyment of the right and GLAAS adds structural and process ones to measure duty bearers' conduct. However, there are still some critical gaps if both UN Water platforms will be used to report progress on HRWS. The thesis forwards some ideas concerning the way these shortcomings could be addressed.

Second, this work proposes a methodology for monitoring access to water in rural areas using the framework of this human right. The practicality of the approach is

demonstrated by a case study carried out in Nicaragua. Different criteria of the right to water were included in surveys and structured interviews that were conducted in rural households and water committees, respectively. Discussion analyses advantages and challenges of using this framework. Finally, the approach provides elements for policy making that can be used by different stakeholders from development and human rights sectors.

Finally, this research develops and tests a methodology to measure intra-community disparities based on human right to water normative criteria through a stratified sampling, splitting households served by community based organizations and those self-provided. This approach implies considering much reduced populations, thus special care needs to be taken with sample sizes and uncertainty of estimators. The proposed methodology is practical to locate and accurately characterize minority sectors within rural communities and allows moving beyond central-tendency estimators. It implies higher costs for field data collection than traditional approaches, but this can be assumed given the relevance of the approach from a human rights perspective, which calls for adequate tools for equity-oriented policy making at local level. The research point out how results might be used to shape decision-making processes.

Resumen

El reconocimiento del Derecho Humano al Agua y Saneamiento (DHAS) a través de las resoluciones de la Asamblea General y del Consejo de Derechos Humanos de Naciones Unidas en 2010 representa un gran avance en el sector del Agua, Saneamiento e Higiene ya que otorga a todos los seres humanos el derecho a la provisión de unos estándares mínimos en relación a estos servicios.

Tres hechos sientan las bases que motivan la investigación: i) las instituciones internacionales tienen la potestad de supervisar el cumplimiento del Derecho Humano por parte de los Estados pero las herramientas necesarias para esta tarea aún han sido definidas, ii) este hito influye en la gobernanza y la toma de decisiones a diferentes escalas y iii) la medición del acceso al agua en la nueva era de los Objetivos de Desarrollo Sostenible exige tomar en cuenta el marco de los derechos humanos. Esto supone por un lado que su contenido debe ser considerado a la hora de conceptualizar el nivel de servicio a través de indicadores adecuados y por el otro, exige dar seguimiento a la reducción de las desigualdades. Este trabajo contribuye de manera significativa a cada uno de los tres retos presentados.

En primer lugar, se identifican las plataformas JMP WHO/UNICEF y GLAAS como mecanismos de especial interés para aquellos que tienen el mandato de vigilar el cumplimiento del derecho, lo cual contribuye de alguna forma al desafío planteado. En este sentido, la información que ofrecen ha sido analizada tomando en consideración el marco de los derechos humanos. Se ha construido una matriz para identificar específicamente de qué manera estos datos se podrían combinar para la vigilancia del DHAS en un sentido amplio. La nueva propuesta de JMP contribuye considerablemente con indicadores de resultados para medir el disfrute de los titulares de derechos y GLAAS añade indicadores estructurales y de proceso para medir la conducta de los titulares de deberes. Sin embargo, todavía quedarían vacíos de información y en este sentido la tesis contribuye con algunas ideas acerca de la forma en que se podrían abordar estas deficiencias.

En segundo lugar, se propone una metodología para la medición y el seguimiento del acceso al agua en zonas rurales haciendo uso del marco conceptual del derecho humano

al agua. Los diferentes criterios del derecho han sido incluidos en encuestas y entrevistas estructuradas que han sido implementadas en hogares y comités de agua rurales, respectivamente. Se analizan y discuten las ventajas y los retos relacionados con la utilización de este marco. Además, el enfoque proporciona elementos con potencial para la definición de políticas que han sido discutidos.

Por último, esta investigación desarrolla y testea una metodología para medir disparidades a nivel intra-comunitario basadas en los criterios normativos del derecho humano al agua. Para ello se lleva a cabo un muestreo estratificado donde se definen dos tipologías de casas; aquellas que consumen agua gestionada por los comités de agua potable y las que se abastece de agua por sus propios medios. Este enfoque implica tomar en consideración poblaciones muy reducidas y por lo tanto se debe prestar especial atención a los tamaños de muestra y las incertidumbres asociadas a las estimaciones. La metodología propuesta es práctica a la hora de localizar y caracterizar con precisión la situación de sectores minoritarios en el seno de las comunidades rurales y permite ir más allá de lo que ofrecen los estimadores de tendencia central. Esto implica mayores costes para la recolección de datos en terreno que los enfoques tradicionales. Éstos son asumibles dada la relevancia de la propuesta desde una perspectiva de derechos humanos, la cual exige desarrollar instrumentos adecuados para la definición de políticas con enfoque de equidad en el ámbito local. Además la investigación destaca cómo podrían utilizarse los resultados para los procesos de toma de decisiones.

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Research projects and consultancy

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Monitoring and decision making in the upper basin of the Viejo river in Nicaragua (phases, I, II, III and IV). Partners: ONGAWA, Ingeniería para el Desarrollo Humano. Municipality of San Sebastián de Yalí (Nicaragua). Funded by: Centre for Development Cooperation (CCD) of the Universitat Politècnica de Catalunya (UPC). Project Period: June 2010 – May 2014.

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Chapter 1. Introduction

The recognition of the Human right to Water and Sanitation (HRWS) through UN General Assembly and Human rights Council Resolutions in 2010 represents great progress in the Water Sanitation and Hygiene (WASH) sector as it entitles everyone to the provision of minimum standards of these essential services. Notwithstanding critics, HRWS maintains importance as a strategy that influences governance and decision making processes at many scales which is an issue of concern that may contribute combating the global water crisis. Nevertheless, HRWS operational impact has to be further developed. One of the key areas requiring research to advance HRWS operationalization is about measuring its fulfilment. HRWS conceptual framework is broad in content and sometimes not precise enough which complicates the task to develop specific approaches for its measurement. Even more, measuring access to water and sanitation and/or human right to water and sanitation fulfilment has its own repercussions according to the different scales (international, national and local) considered.

The study addresses some of the key issues associated with the operationalization of scientific metrics for the HRWS. Being conscious about existing particularities between human rights and development sector specific metrics, the research focuses on methodologies that can be used to monitoring WASH from a human rights perspective but not renouncing to highlight the way these initiatives may be useful for human rights reporting.

The thesis proposal is organized in the following way. This chapter is divided into two main sections. The first one describes the rationale where the most relevant aspects related to HRWS conceptual framework are summarized and special attention has been paid to contextualize metrics and methodologies for monitoring both the human rights and the WASH sector. Aims and methods are described hereafter.

The detailed research is presented in Chapters 2 to 4. Chapter two places the focus on analysing the way methods and data from two international monitoring mechanisms can contribute to reporting progress on the HRWS. Chapter three proposes a methodology for monitoring access to water in rural areas using the framework of this human right.

Chapter 4 focuses on equity issues where a methodology to measure intra-community disparities in relation to level of services based on human right to water normative criteria has been developed and tested. Finally chapter 5 describes the overall theoretical, methodological, and empirical conclusions. With the goal of promoting HRWS operationalization, main policy implications of this work are outlined below. Finally, future lines of research that deal with defining specific metrics for the human rights to water and sanitation have been identified.

1.1. Rationale

1.1.1. The conceptual framework of the Human rights to Water and Sanitation

On 28 July 2010, the General Assembly formally recognized the human right to water and sanitation (United Nations, 2010a), ending the discussion of whether it should be considered a human right or not. Following it, the United Nations Human rights Council (United Nations, 2010b) affirmed that it is part of existing international law and confirms that it is legally binding upon States that have ratified the International Covenant on Economic, Social and Cultural Rights (ICESCR)¹. The juridical basis of the right to water in international law derives from articles 11 and 12 of the ICESCR of 19 December 1966 (Irujo, 2007). Almost four decades later, the committee's General Comment No. 15 (GC15) (United Nations, 2002) meant a giant step in legal interpretation of the right. However, as Cahill (2005) notes, the scope and core content of the right remain ill-defined in GC15. She suggests that it is imperative to clarify relationships between the right to water and related rights; only then will goals be clear and monitoring will have a chance to identify cause and effect (Brooks, 2007). Afterwards the Office of the United Nations High Commissioner for Human rights (OHCHR) (United Nations, 2007) and Catarina de Albuquerque –the first Special Rapporteur on the human right to safe drinking water and sanitation- during her mandate (United Nations, 2009a), worked to clarify those vagueness according to the scope and content.

As Irujo (2007) states, “what exists is a right to the supply of water (...), what is proposed is the development of an activity of the state (or by the competent authorities) that aims to provide a service of this very object”. Thus, human rights to water and sanitation have been interpreted as rights to the access of these essential services that entitle everyone to sufficient, safe, accessible, culturally acceptable and affordable water and sanitation services for personal and domestic uses and which should be delivered in a participatory, accountable and non-discriminatory manner. In this sense,

¹ United Nations Treaty Collection website informs about the status of treaties and the countries that have ratified them. <http://treaties.un.org/>

the United Nations' (UN) recognitions provide new elements that should be taken into account when monitoring the levels of these services. Thus to promote its full realization, water and sanitation services should meet all aspects of the right and, in this regard, the first UN Special Rapporteur (SR) on the human right to safe drinking water and sanitation proposes to talk about five normative (availability, quality, physical accessibility, affordability & acceptability) and three cross-cutting (non-discrimination, participation & accountability) criteria (United Nations, 2010c) (table 1.1)

Table 1.1 Human right to water and sanitation criteria

Normative criteria	Cross-cutting criteria
Availability	Non discrimination
Quality & safety	Participation & Access to information
Acceptability	Accountability
Physical Accessibility	
Affordability	

In the view of Catarina de Albuquerque, water and sanitation are interrelated but independent human rights (UN Special Rapporteur on the human right to safe drinking water and sanitation, 2014, United Nations, 2009b). The Committee of Economic Social and Cultural Rights (CESCR) published and Statement to clarify the issue of sanitation, supporting the idea of the mandate holder (United Nations, 2010d) after 2010's resolutions were adopted. According to UN resolutions, sanitation was included as part of the human right to water because if not, a lot of States were reluctant to recognize it. Thus, the issue that sanitation is recognized as part of the human right to water is a political and strategic issue for not missing sanitation in the final resolution. In this sense, it can be realized that the first SR approach to this subject is twofold: When referring to resolutions, she talks about "human right to water and sanitation" but for the rest, she considers "human rights to water and sanitation" and therefore both are starting to be interchangeably used in the literature.

The normative criteria are based on the normative content of the human rights to sanitation and water. The Committee on Economic, Social and Cultural Rights

described the content of the right to water in its general comment 15 (United Nations, 2002), and the first Special Rapporteur, in her report on human rights obligations related to sanitation (United Nations, 2009a), described the normative content of the right to sanitation. Some experts proposed the AAAQ model (The Danish Institute for Human rights, 2014) -which arises from GC15-, where physical accessibility and economic accessibility are grouped into accessibility criterion. Langford et al. (2014) urges caution about borrowing the content of the right to sanitation from the interpretative development of water as each right possess qualities that required unique attention (Langford and King, 2008). Despite the existing differences among the interpretation of water and sanitation criteria, experts suggest using the same five dimensions for both human rights (COHRE WaterAid COSUDE and UN-HABITAT, 2008, Langford et al., 2014, United Nations, 2009a). Tables 1.2 and 1.3 summarize key concepts and a definition of each normative criterion for water and sanitation, respectively.

Table 1.2. Key concepts and composition of human right to water normative criteria

Criteria	Key concepts	Definition
Availability	Acceptable quantity for domestic uses; Continuity	The water supply for each person must be sufficient and continuous for personal and domestic uses. These uses ordinarily include drinking, personal sanitation, washing of clothes, food preparation, personal and household hygiene. The quantity of water available for each person should correspond to World Health Organization (WHO) guidelines. Neither continuity nor exact quantity required can be determined in the abstract, since individual requirements for water consumption vary, for instance due to climatic conditions, level of physical activity and personal health conditions.
Physical Accessibility	Distance from the dwelling to the water point; Time spent in water hauling; Source: man ratio; Safe and convenient path for all; Easy-to-use and adapted technology	Water facilities must be physically accessible for everyone within, or in the immediate vicinity of, each household, health or educational institution, public institutions and places, and the workplace. Even where water facilities exist, they are frequently inaccessible for different reasons. Around the world, water points are often a long distance from the home, so people, especially girls and women, spend major portions of their day walking to collect water for their daily needs. The distance to the water source should be in reach of every household, bearing in mind the special needs of certain groups and individuals; a high source: man ratio is often a reason that undermine physical accessibility; People's security is often threatened on their way to or while using the service. The path leading to the facility or water source itself, should be safe and convenient for all users, including children, older people, persons with disabilities, women, including pregnant women, and chronically ill people; the facility itself should be accessible for all users and easy to use.
Quality / Safety	Safe drinking quality; Guidelines for Drinking-water Quality	Water must be of such a quality that it does not pose a threat to human health. The transmission of water-borne diseases via contaminated water must be avoided. In its <i>Guidelines for Drinking-water Quality</i> , WHO defines safe drinking water as water that “does not represent any significant risk to health over a lifetime of consumption, including different sensitivities that may occur between life stages”. The maximum limits provided in the <i>Guidelines</i> for a wide range of potentially harmful substances can serve as a reference point.
Affordability	Reasonable price (water connections and water services) for all; People's capacity to pay for water in addition to acquire other basic goods	Water facilities and services must be available for use at a price that is affordable to all people. The provision of services includes construction, maintenance of facilities and treatment of water. Paying for these services must not limit people's capacity to acquire other basic goods and services guaranteed by human rights, such as food, housing, health services and education. Affordability does not necessarily require services to be provided free of charge. Special caution must be exercised and due process guaranteed in cases of disconnection from the water supply due to a user's inability to pay. Measures must be in place to ensure that such users are not deprived of access to safe water to meet their most basic personal and domestic needs.
Acceptability	Colour; Odour; Taste; Cultural issues related to the service	Perspectives differ with regard to which water supply solutions are acceptable in a given context. Acceptability is relevant for encouraging people to use safe water sources. In particular, water should be of an acceptable colour, odour and taste. The placement of a water point or the actual water source should also be acceptable to them. Cultural prescriptions may also apply to conditions for use of these facilities.

Table 1.3. Key concepts and composition of human right to sanitation normative criteria

Criteria	Key concepts	Definition
Availability	Sufficient number of facilities; Individual and/or shared facilities according to the context	There must be a sufficient number of sanitation facilities (with associated services) within, or in the immediate vicinity, of each household, health or educational institution, public institutions and places, and the workplace. Although it is tempting to determine a specific minimum number of toilets needed to meet the requirement of availability, such determinations can be counterproductive in human rights terms. It must be recognised that not only a latrine at home but also shared or even public facilities could satisfied availability criteria in some contexts. It is crucial that the assessment of the sanitation requirements of any community is informed by the context, as well as the characteristics of particular groups which may have different sanitation needs. In this regard, participation is a vital aspect of meeting human rights obligations related to sanitation.
Physical Accessibility	Reliable accessibility; Access at all times of day and night; Reasonable waiting times; Safe and convenient path for all; Easy-to-use and adapted technology	Sanitation facilities must be physically accessible for everyone; i.e. accessibility must be reliable, including access at all times of day and night and ensuring that waiting times are not unreasonably long. The location of sanitation facilities is critical as it must ensure minimal risks to the physical security of users. This has particular implications for the path leading to the facility, which should be safe and convenient for all users, especially, those with special access needs, such as children, persons with disabilities, elderly persons, pregnant women, parents accompanying children, chronically ill people and those accompanying them. Moreover, sanitation facilities should be constructed in a way that guarantees the physical integrity while using them, minimizing the risk of attack from animals or people, particularly for women and children.
Quality / Safety	Hygienic safety; Access to safe water for hand washing and other hygiene practices; Hygienic disposal of menstrual products; Hygienic cleaning and emptying of pits	To meet the standard of quality there is a focus both on the individual user and the affected collective. As to the first, sanitation facilities must be hygienically safe to use, which means that they must effectively prevent human, animal and insect contact with human excreta. Sanitation facilities must further ensure access to safe water for hand washing as well as menstrual hygiene, and anal and genital cleansing, as well as mechanisms for the hygienic disposal of menstrual products. Regular cleaning, emptying of pits or other places that collect human excreta, and maintenance are essential for ensuring the sustainability of sanitation facilities and continued access. As to the collective dimension, quality is said to include regular cleaning, emptying of pits or other places that collect human excreta as well as maintenance for ensuring the sustainability of sanitation facilities and continued access.
Affordability	Reasonable price of sanitation services for all	Access to sanitation facilities and services, including construction, emptying and maintenance of facilities, as well as treatment and disposal of faecal matter, must be available at a price that is affordable for all people without limiting their capacity to acquire other basic goods and services, including water, food, housing, health and education guaranteed by other human rights. Water disconnections resulting from an inability to pay also impact on waterborne sanitation, and this must be taken into consideration before disconnecting the water supply
Acceptability	Cultural issues related to the service; Privacy; Gender issues	Sanitation facilities and services must be culturally acceptable. Personal sanitation is still a highly sensitive issue across regions and cultures and differing perspectives about which sanitation solutions are acceptable must be taken into account regarding design, positioning and conditions for use of sanitation facilities. In many cultures, to be acceptable, construction of toilets will need to ensure privacy. In most cultures, acceptability will require separate facilities for women and men in public places, and for girls and boys in schools. Facilities will need to allow for culturally acceptable hygiene practices, such as hand washing and anal and genital cleansing.

Non-discrimination, participation and accountability are defining attributes of human rights, with a combined effect of empowering the powerless, the marginalized and the excluded (United Nations, 2010c). These cross-cutting criteria impose specific obligations on States that add new insights about the policy environment and the way decisions should be made. Key ideas about these criteria are summarized below.

One of the main contributions of human rights is the obligation of States parties to guarantee that human rights to water and sanitation are enjoyed without discrimination and equally regardless of race, colour, sex, age, language, religion, political or other opinion, national or social origin, property, birth, physical or mental disability, health status, sexual orientation and civil, political, social or other status (United Nations, 2002). General Comment No. 15 further states that “States parties should take steps to remove de facto discrimination on prohibited grounds, where individuals and groups are deprived of the means or entitlements necessary for achieving the right to water. States parties should ensure that the allocation of water resources, and investments in water, facilitate access to water for all members of society” and “Whereas the right to water applies to everyone, States parties should give special attention to those individuals and groups who have traditionally faced difficulties in exercising this right”. It is thus necessary to develop new methodologies to measure and better understand disparities, *id est* the situation of the underserved, the most disadvantaged, and vulnerable groups in each context, which requires looking beyond central tendency estimators (United Nations, 2012). The necessity to adequately include equity measures is particularly relevant according to WASH issues (Melamed, 2012, United Nations, 2012).

Participation is a central requirement in the human rights framework. Moreover, transparency and access to information are crucial elements in order to ensure effective and meaningful participation. Participation should be more than a mere opportunity to contribute on a project execution by labour or cash (Prokopy, 2005) consultation and provision of information (United Nations, 2010c) and thus requires a real opportunity to express demands and concerns and influence decisions. It is also pivotal for all concerned individuals, groups and communities to be able to take part or be represented in participatory processes. However, members of vulnerable or marginalised groups are usually excluded from water and sanitation decision-making and thus their needs are

seldom prioritised. It is resulting in inequitable access to water and sanitation facilities and services, which is especially critical in the case of indigenous groups (Jiménez et al., 2014b). The lack of adequate participation can lead to inappropriate technical solutions, prohibitive financial costs or unrealistic payment options (Narayan, 1995). The inclusion of women is particularly relevant. Moreover, participation has been linked to the success of community based management of natural resources (Madrigal et al., 2011, Ostrom, 2007).

In a broad sense, accountability refers to “taking responsibility for one’s own behaviour and actions, at the same time being able to account for the effects of such behaviours and actions to others” (Laban, 2007). The human rights to water and sanitation establish access to water and sanitation as a legal entitlement, with a corresponding obligation of the government and other stakeholders. This legal entitlement provides a basis for individuals and groups to hold governments and other actors to account (COHRE AAAS SDC and UN-HABITAT, 2007). Taking into consideration the literature on accountability in public administration, it can be defined “as the obligation of policy makers and other development actors to take responsibility for their actions, to answer for them to those affected by their decisions, and to be subject to enforceable sanction if their conduct or explanation for it is found wanting” (Centre for Economic and Social Rights, 2014). According to this definition and from a human rights point of view, accountability is normally divided into three relevant dimensions: responsibility, answerability and enforceability (Ely Yamin, 2008). Furthermore, different actors at different levels have to assume different degrees of accountability in order to sustain access to water and sanitation services and thus, such accountability has to be defined at all levels. In this sense, accountability of rural service providers (community-based organizations) for water and sanitation use and management, towards their community is an issue of concern when it comes to translating human rights to water and sanitation framework at local level.

The human rights to water and sanitation identify certain obligations and responsibilities of states towards their residents. Assumed in the human rights approach, every human being is inherently a right holder who should enjoy universal human rights to water and sanitation that must be guaranteed. If - according to human rights language -people are

referred as right-holders, States are automatically the principal duty bearers that assume the principal roles of guaranteeing these rights by ratifying the different United Nations treaties on human rights. Right-holders can claim their rights and duty-bearers must guarantee the rights to water and sanitation equally, without discrimination and on the basis of participation and accountability. Therefore, focusing attention on specific human rights metrics, it is important to bear in mind that the evaluation of human rights fulfilment cannot rely solely on a measure of the well-being of the individual. The concept of human rights must be concerned with both the extent of the obligation of duty-bearers as well as the extent of enjoyment of rights-holders, in the context of the key principles of human rights that are explicit in international human rights instruments (Fukuda-Parr et al., 2008, Fukuda-Parr et al., 2009). Due to the economic situation of a country, the human rights to water and sanitation (as many others economic, social and cultural rights) do not have to be realized overnight (Langford 2005), but State Parties are required to take progressive action towards fulfilment of these emerging human rights. Hence, monitoring governments' efforts to fulfil the human rights to water and sanitation is highly necessary.

1.1.2. Measuring HRWS through WASH and human rights metrics and methodologies

Despite critiques of the concept (Bakker, 2007a, Parmar, 2008) other authors (Miroso and Harris, 2011) conclude that this human right remains a relevant approach in these times and thus, can be seen as an opportunity to advance in monitoring the sector (Flores et al., 2013b, Luh et al., 2013).

Different researchers point out the important role that indicators play for evaluating progress or reporting on performance both in human development and human rights fields. It is worth noting that human development and human rights approaches differ both in concepts and the way these concepts are used (Fukuda-Parr, 2011). And for these reasons, Fukuda-Parr (2011) states that “the human development indicators (...) cannot substitute for human rights indicators”. One of the main differences is related to where their attention is placed. Human development indicators are mainly focused on individual enjoyment or human outcomes while human rights indicators add the value to focus on State obligations and are developed to monitor specific legal norms (UN

Special Rapporteur on the human right to safe drinking water and sanitation, 2014). For that reason, the measurement tools used to assess human rights compliance and Human Development outcomes cannot necessarily be the same. Nevertheless, measures specifically designed to evaluate human rights are not usually available and conventional outcome indicators can be used to fill this gap. In this regard, Fukuda-Parr (2011) points out that human development analysis can benefit from human rights perspectives and vice versa, *i.e.* human rights analysis can benefit from the experience on human development sector in the use of quantitative methods and data.

In this sense, the approach based on three types of indicators (structural, process and outcome) proposed by Hunt (United Nations, 2003) is normally considered for human rights monitoring, as United Nations Special Rapporteur (2014) mentions in her handbook about realising the human rights to water and sanitation. Each one addresses a different part of the framework necessary to monitor the realization of human rights. Structural Indicators consider issues about the policy environment for the delivery of the human right and typically ‘reflect the ratification and adoption of legal instruments and the existence of basic institutional mechanisms deemed necessary for facilitating realisation of a human right (United Nations, 2008). Process indicators deal with the policy environment too but they monitor State effort through the measure of their conduct in plans and programmes taking into account human rights normative and cross-cutting criteria. It is assumed that these indicators can help to predict outcomes and it is considered that they are more sensitive to changes than outcome indicators. Outcome indicators are the ones usually used in human Development sector and monitor the extent to which individuals have access to basic needs. They may be used to assess the status of the population’s enjoyment of human rights (Green, 2001, Riedel, 2006). Therefore, while such indicators are highly relevant for human rights monitoring, they are not enough to determine the actual state of these rights in a given country (Green, 2001), as no information is provided about duty bearers based on structural and/or process indicators (Roaf, Khalfan, & Langford, 2005).

In contrast to monitoring water and sanitation from a human rights perspective, there is a long tradition in the development sector to monitoring WASH-related issues. Therefore, the design of approaches for the former may benefit from the progress made

during last decades in the later. Accordingly, below a brief outline of the recent history of monitoring frameworks that were developed during last decades in the WASH sector is presented. These frameworks have been based on monitoring the concept of level of services which is of deep relevance for human rights to water and sanitation monitoring taking into consideration Irujo's (2007) interpretation of the right mentioned before. This concept focuses on the delivery of water and sanitation to people. The term service level has been widely discussed and used to categorize and differentiate between qualities of service, typically through a set of defined and measurable indicators.

One of the earliest approaches to water service monitoring was proposed by Lloyd and Bartram (1991), who developed a strategy to survey progressive improvement of service quality in terms of health risk reduction (Lloyd B.J. and Bartram, 1991). In 2003, Howard and Bartram (2003) reviewed the requirements for water from a health point of view and different levels of service were summarized. These levels defined the basic requirements that any water service should meet in order to sustain good health, and associated each increase in level to a decrease in health risk.

In 1990, WHO and UNICEF launched the Joint Monitoring Programme for Water Supply and Sanitation (JMP) to report on progress in access to water-supply and sanitation services. Since 2000, the Programme has been in charge of monitoring target C of the Millennium Development Goal (MDG) 7, a target specifically related to water and sanitation issues. It is by large the most well-accepted monitoring strategy in current use. To improve on the comparability of data, the JMP formulated a set of core questions (Joint Monitoring Programme, 2006) that were broadly used worldwide in regularly conducted household surveys. The harmonized definitions of coverage are technology-based where JMP assumes that certain types of technology are safer or more adequate than others.

The JMP contributions to monitoring the sector at the national, regional and global level are unquestionable, as it has considerably improved both the processes and approaches, and it has strengthened the comparability of water and sanitation outcomes over time and within countries. However, one important shortcoming is related to the scale in which estimates are produced because they cannot be exploited to assist Local Government Authorities (LGAs) with local planning (Giné-Garriga et al., 2013). The

potential of JMP framework has not been transferred to decentralized level. Undoubtedly, methodologies and usefulness of information need to be revised and adapted to local contexts if there is a willingness to fully develop its potential (Jiménez et al., 2008).

Also under UN-water umbrella, different monitoring initiatives have been put in place to complement these regular JMP coverage reports. In response to the call for water quality measurements, the JMP piloted the introduction of quality tests in monitoring programmes through the Rapid Assessment of Drinking Water Quality (RADWQ) protocol (Joint Monitoring Programme, 2012) which has been tested in five different countries². In 2008, the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) emerged to monitor the inputs required to extend and sustain WASH systems and services via a country led-process, complementing the information supplied by JMP. GLAAS collects primary data through a survey (UN-Water, 2013) that solicits information on the situation of WASH services and it has been used to analyse progress and challenges in the sector. Alternatively, Water Safety Plans were promoted as a standard feature of ensuring sustainable access to safe drinking-water. GLAAS 2014 report offers findings on this issue combined with information from the Global and Regional Survey on Water Safety Plans.

During 2010–2015, the JMP has provided the platform through which debate around the post-2015 goals, targets and indicators definition for the WASH sector. However it is not the only ongoing consultation process about the way water-related issues should be included in post-2015 agenda and it is not clear that JMP proposal will be the one finally adopted. Due to their relevant role in the sector, it is likely to significantly influence the technical design of the final proposal. Noteworthy is the influence of the emerging human rights to water and sanitation framework in the proposal. Some of the key developments in this sense are: a focus on universal access instead of improving just a few lives; the inclusion of targets beyond the household, their potential to monitor

² Ehtiopia, Jordan, Nicaragua, Nigeria and Tajikistan

progression/retrogression in all nations not just the poorest, and their contribution in order to promote the progressive realization of these rights (Flores et al., 2013a)

1.1.3. Challenges related to the local implementation of the human rights framework

At local level, there is an urgent need to improve the evidences in which decisions are made. The human rights framework has a great potential in this regard, but so far the debate has focused on national monitoring systems. Many challenges exist when moving to decentralized contexts. Methodologies for field data collection; appropriateness and usefulness of global indicators and targets; the institutional framework for monitoring mechanisms; and the potential uses of the data at local level are “hot spots” in this regard.

According to the methodologies for field data collection, further research is needed about the validity of sampling techniques to achieve reliable estimates at lowest administrative level. Moreover, as the procedures for collecting information are commonly based on national ad-hoc surveys, there is no chance of increasing the capacity to collect, analyse and decide upon the collected data.

In relation to the fine-tuning of targets and indicators to cope with the specificities of the local level, it emerges as an opportunity to foster participation of local stakeholders and engage them in the monitoring framework.

Targets and indicators defined at global level could be relevant for local applications. Hence the process of fine-tuning human rights monitoring proposals to decentralized contexts is a good opportunity to make this monitoring framework more flexible. This is important to cope with the necessity to adapt proposed targets and indicators to local conditions and characteristics, which is of primary importance when dealing with normative criteria standards or for deepening into the roots of discrimination.

Experiences about monitoring water and sanitation services at local level have shown that it is still an elusive aim. Local duty bearers need capacity development in the process of collecting, analysing and defining priorities. The rotation of LGAs technical staff is an obstacle to ensure the sustainability of local capacities. And a common need

is also to face a lack of resources for data collection and a lack of decision-making support systems adapted to local level, required to transform data into useful outputs for targeting and prioritization support. Updating mechanisms are other weaknesses in local monitoring processes. Designing cheap and effective systems emerges as crucial.

Data exploitation and analysis may be facilitated through simple tools and methodologies which ease interpretation. Ranking communities, linking indicators to possible remedial actions and priority maps are examples of tools that may help promote the use of data for decision-making. To be effective, however, the process of tools development demands the involvement and participation of end users and other stakeholders, which is coherent with a rights-based approach.

1.2. Aims and methods

1.2.1. Aims of the research

This research is designed to gain more knowledge about monitoring WASH sector considering human rights to water and sanitation conceptual framework. Specifically, the emphasis will be placed on the interpretation of the conceptual framework into specific indicators, appropriate methodologies for data collection taking into consideration human rights requirements, the construction of aggregated metrics and the policy implications of these new approaches.

Basically the overall aim of this research is to operationalize the concept of human right to water and sanitation through specific metrics that can be used to monitoring human rights fulfilment at international, national and local level. More specifically, the objectives are i) to define theoretical and methodological approaches to tackle the main challenges identified to monitoring human right to water and sanitation, including the utilization of reliable data, participatory, flexible and contextually relevant techniques and internationally comparable databases, and ii) to identify the policy implications and recommendations of these monitoring approaches for water governance, including the aspects of measuring progress, planning and priority setting, and advocacy.

Taking into account the abovementioned aim and objectives, the study will focus on the following research questions:

Which human right to water and sanitation elements can be reported and which not using international platforms that fulfil the requirements of being WASH specific, periodic, country based, and commonly used in the sector? In which extend monitoring initiatives from the development sector can contribute to monitoring human rights to water and sanitation? These questions are examined and answered in Chapter 2.

How can human right to water content be used to shape the way access to water is measured at local and national level? Which are the main challenges to measure elements from the human right to water normative and cross-cutting criteria from a right-holders perspective? These questions are examined and answered in Chapter 3.

How can locate, accurately characterize and compare minority sectors within a small rural community in a consistent, representative manner and at feasible cost in order to define equity-oriented policies? How can assess levels of services based on the normative content of the human right to water? These questions are examined and answered in Chapter 4.

1.2.2. Brief overview and topics addressed in the research

As it was mentioned before, monitoring human right to water and sanitation is a broad and complex task that can be tackled from different perspectives. The thesis contributes with some of the possible approaches. Four main elements have been considered to define the contribution of each study included in the thesis as it is summarized in table 1.4. Firstly, it is necessary to specify the scale in which the monitoring framework has been defined. In this sense, the thesis proposes tools that have been designed at international, national and/or local level on a differentiated basis. But this does not mean that the approaches cannot be adapted to different scales as it will be outlined in each chapter. Second, monitoring both water and sanitation has their own particularities and thus, it has been highlighted if the chapter contributes to one or both of them. Sanitation issues have been addressed at international level from a theoretical point of view. Water aspects have been also proposed at national and local level in a more operational way. Thirdly, it has been emphasized which type of criterion (normative and/or cross-cutting) has been addressed in the study. Finally, last column has been used to classify each chapter according to the stakeholder group in which the focus has been placed.

Table 1.4. Summary of the scope and focus of studies included in the thesis

Chapter	Scope	Sector	Criteria	Stakeholder group
Chapter 2	International	Water	Normative	Right-holders & Duty-bearers
		Sanitation (& Hygiene)	Cross-cutting	
Chapter 3	National / local	Water	Normative	Right-holders
			Cross-cutting	
Chapter 4	Local	Water	Normative	Right-holders
			Equity (cross-cutting)	

1.2.3. Methods

From a methodological point of view, the thesis combines a review of the literature, an analysis of WASH-related international monitoring mechanisms and the implementation in the field of case studies.

The literature review has been considered to define theoretical and methodological approaches of the studies that comprised the thesis. First of all, United Nations' concept of human right to water and sanitation has been extensively revised in order to provide all critical elements needed to build the framework. General Comment 15 and the annual reports of the previous Special Rapporteur on the issue of human rights obligations related to access to safe drinking water and sanitation, -Catarina de Albuquerque-, have been the main theoretical basis considered to define the conceptual framework of the thesis. Different sources of information have been taken into account to complement the theoretical framework which includes academic articles, manuals and handbooks published by United Nations agencies and international non-governmental organizations from both the development sector and human rights activists and other grey literature. Secondly, an extensive literature review has been carried out in order to design appropriate tools for data collection and define pertinent indicators and indexes paying special attention to WASH-related initiatives and human rights approaches. Finally, the literature review also includes other relevant topics partially addressed in the thesis. The themes include decentralization and local government authorities' decision-making, community management of water services and self-supply as an alternative for services delivery.

The analysis of new international strategic proposals to monitoring WASH related issues includes an assessment of targets, indicators, questionnaires and data sources considering the human rights conceptual framework mentioned before. The Joint Monitoring Programme new proposal for post-2015 period and the Global Analysis and Assessment of Sanitation and Drinking-Water have been widely analysed in this sense. This methodological approach has been considered in chapter 2 where both initiatives have been described in more detail.

Case studies have been considered in chapters 3 and 4. They have been used to operationalize theoretical frameworks and validate research questions and research findings. The implementation of the case studies has comprised different methods and techniques that have been discussed in depth in both chapters. The thesis is supported by two different case studies, which are briefly introduced in the following section. Both have included field work for data collection, analysis and dissemination of information.

Table 1.5 below briefly summarizes the links between chapters, the type of study, the case study and data sources.

Table 1.5. Methods and sources of data

Chapter	Type of study	Case study	Sources
Chapter 2	Desk study of international WASH specific monitoring platforms with the potential to measure human rights to water and sanitation compliance	Not apply	SDG JMP-led proposal and GLAAS 2014 questionnaires and report
Chapter 3	Water indicators and index construction based on human right to water framework	Nicaragua. Jinotega and Matagalpa departments.	First report about the human right to water situation in Nicaragua (National survey)
Chapter 4	Research about monitoring disparities in rural communities and measuring level of water services considering human right to water normative content	Nicaragua. Sebastián de Yalí Municipality	Own data collected from households and water points (in collaboration with Local Government Authorities)

1.2.4. Case studies

Integral to the thesis has been the implementation of various case studies in Nicaragua. This country has been selected for the following reasons that also apply to a great amount of developing countries in the region and worldwide:

- The national legal framework -The Water Law (Government of Nicaragua, 2007) and the Law 722- recognizes water as a human right. Therefore, it is

pertinent to test new methodologies that can be useful to national policy makers who seek to operationalize this emerging framework.

- It is a good example of a predominantly rural country in the Latin America and the Caribbean region, marked by moderate/high coverage to improved drinking-water sources (Joint Monitoring Programme 2014a). Traditional technology-based indicators are excessively simplistic to accurately define different WASH related problematics and thus are not enough for policy-making. A multidimensional approach like the one offered by human rights is more appropriate for monitoring the sector in these contexts of moderate/high coverage.
- Decentralization of responsibilities to local government authorities with respect to water issues has not been accompanied by effective resources and thus these local stakeholders face enormous difficulties to comply with their obligations as duty-bearers. This research offer new insights with a great potential for local government capacity development.
- The national government promotes the formalization of community management through drinking water and sanitation committees (CAPS) in rural areas. It is estimated that around 1.2 million out of 2.3 million rural people are supplied by these CBOs in the whole country while the rest base their access on self-supply solutions. Taking this situation into account, it is very relevant to design methodologies that allow analysing differences among these two main groups in rural communities.
- The availability of data about the situation of human rights to water and sanitation from previous campaigns (CODA, 2011). These first attempts to define specific metrics to measures these emerging human rights compliance was crucial to part of the research.
- The relationship with ONGAWA (Ingeniería para el Desarrollo Humano), an international NGDO that has been promoting access to water and sanitation using a rights-based-approach in rural areas of the country since 1994, i) gave us an excellence opportunity to develop field work, ii) provide knowledge about reality of the country, iii) liaise with other international, national and local actors in the field of human rights.

In Nicaragua, official data (Joint Monitoring Programme 2014a) shows that WASH coverage levels are among the lowest in Latin America and the Caribbean region. About 85% of the population is using improved drinking water sources and 52% is using improved sanitation facilities. As in the majority of countries, the situation in rural areas is below the national average, where 68% and 37% of population have access to improved sources of water and adequate sanitation facilities, respectively. However, on a more positive note, the urban–rural disparity in access to drinking water and sanitation has timidly decreased since 1990. According to results from the Rapid Assessment of Drinking-Water Quality (RADWQ) carried out in the country, there is a real problem with the quality of drinking-water as arsenic contamination was far more widespread than has been assumed. Also, most of the water supplies examined were contaminated with faecal coliforms or thermotolerant streptococci (World Health Organization and UNICEF 2010). Regional disparities between Caribbean, Central and Pacific regions, gender discrimination and inequalities between the rich and the poor are an issue of concern for human rights activists (ONGAWA, forthcoming).

The research selected two different but complementary settings in the country, the Jinotega and Matagalpa departments case study from a national survey and the municipality of San Sebastián de Yalí, as specific case studies to test the applicability and validity of the proposed methodologies. The first one is used in chapter 3 and the second in chapter 4. More information about these regional settings is summarized in both chapters.

Chapter 2. Reporting progress on the human right to water and sanitation through JMP and GLAAS

An improved version of this chapter was published as:

Flores, O., Jiménez, A., & Pérez-Foguet, A. (2015). Reporting progress on Human right to Water and Sanitation through UN water global monitoring mechanisms. *Journal of Water, Sanitation and Hygiene for Development*, 5(2), 310-321, doi: 10.2166/washdev.2015.151

2.1. Introduction

Although international institutions have the supranational political authority to monitor state compliance with human rights norms, tools are not sufficiently articulated yet. Among different approaches for monitoring Economic, Social and Cultural Rights (ESCRs), using information on progress towards development goals is identified as a useful one (United Nations, 2011a). Measuring the human rights to water and sanitation is something else than counting facilities and UN institutions dealing with Water, Sanitation and Hygiene (WASH) monitoring at international level have been evolving in this sense during last years. Three relevant UN water mechanisms offer WASH-related information. Joint Monitoring Programme (JMP), Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) and the World Water Development Report (WWDR). However, only JMP and GLAAS platforms are considered in this study as WWDR focuses on different strategic water issues each year and does not provide data by country. Other cross-national data sets proposed elsewhere (Meier et al., 2014) for monitoring the HRWS, have not been considered as they are not WASH-specific, periodic, country based, and/or not commonly used in the sector.

Since 2000, JMP has been in charge of monitoring the target of the Millennium Development Goal (MDG) specifically related to water and sanitation issues. During 2010–2015, JMP has provided the platform through which debate around post-2015 goals, targets and indicators definition for the WASH sector. It is not the only ongoing consultation process about the way these issues should be included in post-2015 agenda but, due to their relevant role in the sector, it is likely to significantly influence the technical design of the final proposal. In 2008 GLAAS emerges to monitor the inputs required to extend and sustain WASH systems and services via a country led-process.

The objective of this chapter is to analyse more closely the extent to which JMP-led post-2015 and GLAAS data sources could contribute to monitoring HRWS in a broad sense. Specifically, the article identifies the main contributions to HRWS monitoring of these two mechanisms and the elements that cannot be measured as those are conceived nowadays. It is not intended that JMP and GLAAS should monitor and report on the HRWS in future as those are not design as specific HR monitoring mechanisms but to

analyse their potential contributions to this challenge at present. Finally, some ideas on the way in which they could be enriched are proposed.

2.1.1. Measuring the HRWS

General Comment 15 (GC15) introduces HRW normative criteria: availability, quality, acceptability, physical accessibility and affordability (United Nations, 2002) and SR gathers up these dimensions in her reports (UN Special Rapporteur on the human right to safe drinking water and sanitation, 2014, United Nations, 2010c). The SR focused the first year of her mandate on exploring and clarifying the scope and content of the human right to Sanitation (HRS) (United Nations, 2009a) despite it has not been recognized by UN General Assembly as a separate right yet. Its normative content could be borrowed from the HRW, considering the same five normative criteria. However, caution is necessary to consider differences among both HR content. Non-discrimination and equality, access to information and participation and accountability are habitually considered as cross-cutting criteria.

Different researchers point out the important role that indicators play for evaluating progress or reporting on performance both in human development (HD) and HR fields. Fukuda-Parr (2011) highlights that HD and HR indicators should differ because they relate to two distinct concepts and are used in different ways. One of the main differences is related to where their attention is focused. HD indicators are mainly focus on individual enjoyment or human outcomes while HR indicators add the value to focus on State obligations and are developed to monitor specific legal norms (UN Special Rapporteur on the human right to safe drinking water and sanitation, 2014). For that reason, the measurement tools used to assess HR compliance and HD outcomes cannot necessarily be the same. Nevertheless, measures specifically designed to evaluate HR are not usually available and conventional outcome indicators can be used to fill this gap.

In this sense, the approach based on three types of indicators (structural –SIN-, process –PIN-, and outcome -OIN-) proposed by Hunt (United Nations, 2003) is normally considered as UN SR (2014) mentions in her handbook. Each one addresses a different part of the framework necessary to monitor the realization of HR. SInS consider issues

about the policy environment for the delivery of the HR and typically “reflect the ratification and adoption of legal instruments and the existence of basic institutional mechanisms deemed necessary for facilitating realization of a HR” (United Nations, 2008). PINs deal about the policy environment too but they monitor State effort through the measure of programmes. It is assumed that these indicators can help to predict outcomes and it is considered that they are more sensitive to changes than OINs indicators, which are the ones usually used in HD sector and monitor the extent to which individuals have accesses to basic needs.

According to the HRWS just a few initiatives have emerged to develop indicators and measurement tools combining HD and HR approaches. It is especially relevant the proposal by the NGO COHRE (Roaf et al., 2005), the index to measure non-discrimination and equality progressive realization using existing information (Luh et al., 2013) and Flores et al (2013b) proposal to measure access to water based on HRW framework in a local context through composite indicators. Moreover, WASHwatch.org (2014) is an online platform for monitoring government commitments and financing which includes criteria comparable among countries that can be used to measure some relevant HRWS elements.

2.2. Methodology

Sources of data and the method used are briefly described below.

2.2.1. Data sources

The article assesses two complementary and recognized international sources of information about the situation of the WASH sector. Strengths and weaknesses of these mechanisms in relation to their contribution to HRWS monitoring are pointed out.

On the one hand, the present post-2015 proposal that JMP coordinates (Joint Monitoring Programme, 2014a, Joint Monitoring Programme, 2014b) is focused on targets and indicators and there is still no specific technical information about the new set of harmonized questions to be included in national surveys and census, as well as other necessary data collection mechanisms that are emerging as targets and indicators are getting more complex. The present article analyses the proposal paying attention to the last set of indicators (Joint Monitoring Programme, 2014a). On the other, GLAAS questionnaire (UN-Water, 2013) collects primary data through a survey that solicits information on the situation of WASH services. The questionnaire has changed since the first one in 2008 and thus, this research mainly focus on the 2013-2014 cycle one. GLAAS assessment is based on this new list of questions and indicators from the recently published GLAAS report (World Health Organization, 2014).

2.2.2. Matrix construction

GC15 and further clarifications by SR have been used for the selection of the normative and cross-cutting content of these HR. A first examination of both platforms using a HR approach shows that:

- i) Despite JMP was not created for monitoring HR, it is well placed to provide indicators that may be used to assess right-holders' enjoyment of the rights. In this sense, JMP post-2015 can be evaluated to assess whether it contributes enough to monitor HRWS elements that could be measured through outcome indicators
- ii) GLAAS initiative provides information about States as duty bearers of WASH service provision based on a different type of indicators: structural and process.

Similarly, GLAAS indicators could be evaluated as mentioned before in relation to JMP ones.

Taking these ideas into account, it has been considered that each element should be monitored using one or both platforms, depending on its nature. If the element is essentially outcome or structural-process focused it has been analysed in JMP or GLAAS section, respectively. Finally, if the element should be measured in both, it is discussed in the two sections.

When it is proposed that an element should not be measured by the mechanism, a grey colour has been used. In the opposite scenario, three possible options have been considered. Red shade indicates that the element should be monitor by the platform considered but it is not possible using the present sources of information and a green shade shows the opposite. Finally, orange means that it can be partially achieved. When an element has been highlighted in green, a reference to the indicator proposed in JMP post-2015 or the question in the GLAAS survey has been included to facilitate the use of results. In the case of red, another table provides elements to improve the potential contributions of the platforms analysed.

2.3. Results

Results are summarized in table 2.1 where 30 drinking water and sanitation normative elements and 13 general and cross-cutting ones have been analysed applying the methodology explained above. 24 out of 43 43 have been identified as green, 13 as red, and 6 as orange.

Table 2.1. Matrix for analysing HRWS elements in JMP and GLAAS platforms (Filling out the matrix and reference to indicators explained in the main text)

Criteria	Element	JMP post2015	GLAAS 2013-14
Availability	Priority of essential levels of drinking water over other uses		
	Continuous supply / Seasonality	3.1	
Physical Accessibility	% Access improved-basic drinking water services	Coverage: 2.1 & 3.1	Expanding access. Policy & plans:A2-A3
	Water point proximity	2.1 & 3.1	
	Physical accessibility for all members at any time	3.1	
	Security at water points and paths		
	Education/health facilities	Coverage: 2.4 & 2.5	Expanding access. Policy & plans:A2-A3
	Secure access to common water sources (CWS)		
	Drinking water quality surveillance		B3
Quality/Safety	Pollution: regulation, policies, discentives and penalties		
	Water quality at the source	Households (Yes) / Schools & Health Centres (No)	
	Risk management plan (Water Safety Plan -WSP-)		A7

Water: normative criteria

Sanitation: normative criteria		Household expenditure on drinking water		
	Affordability	Assistance to low income groups		A8 & D6
		Disconnections		
	Acceptability	Organoleptic characteristics		
	Availability	% access to improved/basic sanitation services	Coverage: 2.2 & 3.2	Expanding access. Policy & plans:A2-A3
	Physical Accessibility	Physical accessibility for all members at any time	2.2 & 3.2	
		Security at sanitation facilities and paths		
		Education/health facilities	Coverage: 2.4 & 2.5	Expanding access. Policy & plans:A2-A3
	Quality/Safety	Open defecation free status	1.1	
		Safely management of excreta	3.2	
		Sanitary conditions of sanitation facilities		
		Waste water treatment		B6
		Hygiene awareness		A3
		Handwashing device & soap	Coverage: 2.3, 2.4 & 2.5	Expanding access. Policy & plans:A2-A3
		Menstrual Hygiene Management (MHM)	Households (No) / Schools & Health centres (Yes)	
	Affordability	Household expenditure on sanitation		

	Assistance to low income groups		A8 & D6
Acceptability	Privacy, comfort, dignity	Households (No) / Schools & Health centres (Yes)	
General	Right to water/sanitation expressly contained in law		A1
	Human right to water/sanitation justiciability		
	Existence of a time-frame national strategy and plan of action to ensure the provision of water and sanitation		A3
	International financial and non-financial assistance provided by developed States		ESA survey
	Private sector participation		
Accountability // Information & participation	Monitoring mechanisms		Section B
	Civil society inclusion in monitoring process		
	Complaints mechanisms in place		A13
	Service users and communities participation in water and sanitation supply decision making		A13
Non-discrimination – Equity	Attention to marginalized and vulnerable groups in national strategies and plans of action		A8
	Budgetary strategies in place to address the situation of marginalized and vulnerable groups		D5
	Financial flows to address the needs of vulnerable groups		D11: Some groups
	Inequities reduction	Important advances but methodologies should be improved	

Cross cutting and general indicators

2.4. Discussion

2.4.1. Which HRWS elements can be reported and which not using the JMP-led post-2015 proposal?

Post-2015 proposal has been guided by five important considerations: improving service levels, including hygiene issues, reducing inequalities, going beyond the households and addressing sustainability of services (Joint Monitoring Programme, 2014a). Key issues are discussed below.

According to sanitation, stopping open defecation is a major focus in order to promote a clean and hygienic environment that benefits everyone. This idea is very well tuned with HRS as it is considered that no one can fully exercise this HR unless her/his community proceeds towards open defecation free status (Langford et al., 2014). Another group of indicators focuses on the access to sanitation services. Specifically, it is asserted that the facility has to effectively separate excreta from human contact, and it should be conducive to environment protection. Different facility types are considered as improved or basic sanitation where special attention has been paid to their superstructure, platform or squatting slab and sharing of the facility. The facility must be physically accessible, which means that it must be available for use at all times of the day or night; it has to be designed to take account of the needs of women and children, persons with disabilities, as well as those of elderly persons. Finally, the issue of safe management of households' excreta is addressed. All of them are relevant according to the normative content of the HRS.

From a HR point of view, the issues of health protection (safety), physical accessibility, affordability and privacy, comfort and dignity (acceptability) are essential (Langford et al., 2014). In this sense, the new proposal discloses four major shortcomings. First, sanitary conditions of the facility should be considered as these elements might constrain a continued use of the infrastructure (Scott et al., 2003). Second, facilities have to be situated in a location where physical security can be guaranteed both while using them and walking the paths. Third, there is no mention to the issue of affordability one of the most novel contributions of HR. Finally, it is important to measure the

elements related to acceptability criterion mentioned above. These have been considered when monitoring education and health facilities but not at household level.

According to HRWS framework, hygiene is considered as an element of quality/safety criteria. There are a variety of hygiene behaviours that are of greatest likely benefit to health. Post-2015 focuses on the issue of handwashing with soap for target setting. Specifically, spot checks of facilities are proposed as proxies for handwashing behaviour. At the dwelling, the assessment is expected to include two key areas: the sanitation facility and the food preparation area. Joint Monitoring Programme (2014b) reports for the first time this critical issue. In spite of unquestionable strides, the proposal is still subject to criticism. The inclusion of menstrual hygiene management (MHM) in the monitoring framework is critical in terms of its impact on the social development of girls and women. Despite MHM monitoring is still debatable one could advocate for the inclusion of proxy indicators to measure at least the “hardware” side of MHM at household level.

The core indicator for drinking water monitoring uses the type of technology as a proxy for a binary categorization (improved / unimproved) of the sources. But the new proposal also highlights some elements that are intrinsically linked to HRW normative criteria, especially to characterize “safely managed drinking water services” (Joint Monitoring Programme, 2014a). Continuity and seasonality are included in the proposed indicator. Water quality is also tested at the point-of-use and the existence of measures of risk management, such as Water Safety Plans (WSP) are necessary to consider that a service is safely managed in the post-2015 proposal. The technology-related proxy-indicator used during the period of the MDGs has been questioned due to it does not assess the quality of water sources (Rob ES Bain et al., 2012). Rapid Assessment of Drinking-water Quality (RADWQ) methodology developed by JMP (2012) finally tested in five countries to improve water quality monitoring has not been adopted yet (Jiménez and Pérez-Foguet, 2012) since JMP announcement (Hueb, 2006) illustrating how trade-offs between what is economically feasible versus what is desirable in global monitoring influence decisions about proxy indicators. It seems that finally, post-2015 proposal will give way to more precise indicators related to safe drinking water. These novelties represent a major step forward according to HRW, and

in addition, in the case of WSP, it also represents an opportunity to link HRW to other (potential) HR of an environmental nature. Physical accessibility is explicitly considered at both household and extra-household level when it is emphasized that the water source has to be accessible to all members/users at any time. Even more, a complementary indicator assesses the total collection roundtrip time.

However, gender disparities in water collection are no longer addressed. Although it was not included in the MDGs' target, this gender aspect has been included as a core question (Joint Monitoring Programme, 2006) that has been widely analysed in the JMP annual reports. It is an issue of concern in a context where women still bear primary responsibility for collecting water and suffer damage very often which injure their physical integrity. The proposal mentioned that "targets should address the challenge of sustaining services to ensure lasting benefits" (Joint Monitoring Programme, 2014a) but it does not result in specific targets and indicators in contrast to an earlier version (Joint Monitoring Programme, 2013), where target 4 included affordability and accountability as sustainability-related parameters. Langford (2010) alarmed about affordability final omission in the MDGs Declaration. It seems that history repeats itself in SDGs proposal. Other HRW elements about disconnections and acceptability that could be measured at households have at last not been included.

According to cross-cutting issues, it is widely recognised that MDGs focus on average global progress is a reason to explain the poor progress reported for the most marginalized. Post-2015 agenda seems to move forward as it is proposed to disaggregate data to reflect differences in access between rich and poor, urban and rural, slums and formal urban settlements, and disadvantaged groups and the general population (Joint Monitoring Programme, 2014a). Even more, equity and non-discrimination elements have been incorporated into future targets and indicators and methodological approaches: Targets 1&3 incorporate an intra-household equity approach. It is also outstanding the effort to assess separately the male-female sanitation facilities and the inclusion of MHM -which is considered a good proxy to measure discrimination against women and girls- in schools and health centres. Methodologically speaking, disadvantaged groups will be identified through participatory national processes taking into account prohibited grounds of

discrimination. Moreover, a specific measurement technique for reduction-elimination of inequalities has been designed (Joint Monitoring Programme, 2014a).

Despite advances, there is no clear definition of disadvantaged groups. The method by which these context-based types of discrimination will be assessed is also unclear, and there is thus a risk that important areas of discrimination will not be considered. Moreover, the methodology proposes a kind of composite indicator to evaluate different fields of discrimination. It is a function where under performance in some fields can be compensated with over performance in others. The scoring proposal may lead to situations where countries with no progress in a variety of discriminatory fields³ could be classified as “on-track”⁴.

2.4.2. Which HRWS elements can be reported and which not using GLAAS 2014 questionnaire?

As it was said before, JMP is outcome focused and its approach is pertinent to report rights holders’ enjoyment of the HRWS. To complement this work, GLAAS strategy offers the possibility to measure process and structural indicators that can be used to monitor duty-bearers achievement of HR obligations. GLAAS 2013-2014 is analysed below to identify challenges and opportunities for HRWS reporting.

A starting point for assessing states compliance with international HRWS obligations is to know if the HR is expressly contained in the appropriate legislation, issue that is addressed in section A1 about national laws. However, it is even more important that rights were justiciable in courts or other bodies. Despite the second element was first

³ Such as ethnicity, race, nationality, language, religion, sex/gender, age or disability

⁴ A Traffic Lights System will serve for the overall assessment of the progressive reduction of inequalities under each target, combining the four population groups (poorest vs. richest wealth quintile, rural vs. urban, slum vs. formal urban settlement, and disadvantaged groups vs. general population). Green implies “on track”, yellow shows that there is some progress, but that it is insufficient, and red means “off-track”. If 3 or 4 out of 4 disaggregated groups are on-track, it is assessed as green; 2 out of 4 is yellow; and 0 or 1 out of 4 is red (Joint Monitoring Programme, 2014)

included in 2011-2012 (UN-Water, 2011), this kind of data is not available in 2013-2014 questionnaire leaving this gap of information.

According to GC15, “the obligation to fulfil requires State parties to adopt the necessary measures directed towards the full realization of the HRW (and sanitation)” (United Nations, 2002). This obligation includes, inter alia, adopting a national strategy and a plan of action to meeting these HR. A2 and A3 provide information on this topic about all different WASH areas, differentiating between urban-rural and taking into account settings beyond HH, which is a right approach if we consider a human rights perspective. Based on information collected, GLAAS (World Health Organization, 2014) monitor if countries have set targets for universal access and if those are time-framed. National plans of action must prioritize the provision of essential amounts of water for personal and domestic uses but it cannot be measured using current survey.

Question A8 about universal access for disadvantaged groups deals with a pertinent issue according to HR obligations. There are explicit questions that pay attention to marginalised and vulnerable groups in the plan of action. An exhaustive check-list allows knowing if a policy-plan includes measures to reach a broad range of possible disadvantaged populations.

Two notorious contributions are considered in relation to accountability criterion: i) A13 collects information about the existence of public complaints mechanisms concerning the lack of, or unsatisfactory WASH services. In this sense, despite the question of disconnections - strongly linked to controversial affordability criterion- is a reason of social conflict in relation to water services, has not explicitly been addressed. ii) Section B collects data about monitoring mechanisms. It is possible to report if there is a body to assess on implementation of all aspects of the HRWS. But it is necessary to consider additional questions that would assess whether such bodies are accessible and if civil society is included in the process, which is not asked in GLAAS survey. Still on the subject of monitoring, B6 allows knowing if states are developing and implementing WASH indicators and benchmarks for progress monitoring and offers specific information about the percentage of waste-water that receives treatment. B3 deals with the issue of independent regarding water quality regulation and surveillance and A7 is used to know if WSPs are promoted as specific sustainability measures. GLAAS report

offers findings on this issue combining with information from the Global and Regional Survey on water Safety Plans (World Health Organization, 2014)

Pollution of water sources and its impact on water quality for personal and domestic uses affecting human health is an issue of concern considering HRW content. GC15 explicitly establishes connections between pollution, encroachment and Common Water Sources. Article 23 provides the obligation to protect the HRW, which requires States to prevent third parties from polluting and inequitably extracting from water resources. In this sense, GLAAS is not enough to monitor pollution related issues.

According to information and participation, the questionnaire allows monitoring if national strategies and plans of action have been devised on the basis of a participatory process where individuals and communities can meaningfully contribute to decisions about WASH planning.

Section D gives pertinent insights about financing disadvantaged groups through equity in budget allocations and the existence of financial schemes to make access to WASH more affordable for disadvantaged groups, which complements affordability monitoring from a duty bearers' perspective. Even more, financial flows for WASH promotion allow knowing disparities between urban and rural financing and also between subsectors. Monitoring the percentage of the national/local WASH budget directed towards expanding access to services to the underserved population (United Nations, 2002) is important from a HR perspective but the current proposal does not provide this kind of information. The "TrackFin" initiative under the UN-Water GLAAS umbrella (World Health Organization, 2014) represents a good opportunity to develop this further. Moreover, twenty-three External Supporting Agencies (ESAs) participated in the GLAAS 204 ESA survey (World Health Organization, 2014) which allows monitoring international financial and non-financial Official Development Assistance.

The independent expert emphasizes that HRWS does not express a preference over models of service provision where non-State service providers can play an important role in delivering WASH services (United Nations, 2010c). In this context where private sector participation gained legitimacy, State parties' obligations to protect HRWS is of particular importance. B7 is focused on monitoring service providers but it

does not allow for specific evaluations of private sector involvement. In 2011-2012 survey there were several questions that offered more information on this issue but they have been eliminated in 2013-2014 cycle.

Finally, open questions in GLAAS survey are a rich source of information as it has been demonstrated elsewhere (Jiménez et al., 2014a). Due to their qualitative properties, those have the potential to contribute to HRWS information needs more extensively. Despite some of these data have not been fully exploited in the GLAAS report, it could be important from a HR perspective to know more about countries' definition of disadvantaged population or groups (A8), what it is considered to be an effective complaint mechanism (A13), the kind of performance indicators to track progress in each country to evaluate if those are rights-based (B6) or the description of the measures taken to reduce inequities in access and levels of service (D5), among others.

2.4.3. A proposal to move forward

HRWS elements that cannot be measured through UN Water monitoring platforms analysed are taken up again in this section where some ideas concerning the way those could be addressed are presented in table 2.2. A proposal about the platform that could include gaps of information pointed out before, potential indicators based on specialized literature and the techniques that can be used are displayed in it.

Table 2.2. A proposal to move forward

Criteria	W/S*	Element	Platform that could include the element	Potential Indicator	Technique**
Availability	W	Priority of essential levels of drinking water over other uses	GLAAS	Priority of essential levels of drinking water [Roaf et al, 2005]	a
	W/S	Security at water points, sanitation facilities and paths	JMP	1. Is the path to the water source/sanitation facility safe? [Flores et al, 2013]	b
Physical Accessibility				Existence of regulations and policies to provide secure access to CWS [Roaf et al, 2005]	
	W	Secure access to CWS	GLAAS	Arbitrary interferences with customary or traditional arrangements for water allocation Effective measures to prevent third parties from interfering with the enjoyment of the HRW of populations using CWS	1: a 2&3: d
Quality/ Safety	W	Pollution: regulation, policies, disincentives and penalties	GLAAS	Existence of regulations and policies to control pollution of water sources [Roaf et al, 2005] Disincentives and penalties for pollution (States) [Roaf et al, 2005]	1&2: a 3: d
				Number of people whose human right to safe drinking water has been violated due to direct causes of contamination	
	S	Sanitary conditions	JMP	Insects-flies / unpleasant smell / cleanliness [Scott et al, 2003]	e
Affordability	W/S	Household expenditure on drinking water and sanitation	JMP	1. HH expenditure on drinking water, sanitation and hygiene / National poverty line [JMP 2013] 2. Expenditure restricts other basic expenses (right to education, food...)	b

				Legal prohibition, procedural protections [Roaf et al, 2005]	
	W	Disconnections	GLAAS / JMP	Proportion of HH that have been disconnected from water supply at least once per year [Roaf et al, 2005]	1: a 2: f 3: b
				Have you been disconnected from water supply last year?	
	W	Colour, odour and taste	JMP	Organoleptic characteristics -Perception- [Flores et al, 2013]	b
Acceptability	S	Privacy, positioning, conditions of use, dignity (household)	JMP	Sanitation facility privacy and location -Perception-	b
	W/S	Human right to water/sanitation justiciability	GLAAS	Can people claim their HRWS in a domestic court or similar institution? [UN-Water 2011] // Which are the mechanisms?	c
General				Number of actions that have been (brought before/resolved by) the Courts	
	W/S	Private sector participation	GLAAS	Percentage of service provision contracted out to the private sector [UN-Water 2011] Government (or a regulator) monitors safety and the affordability of drinking-water supplied by private sector [UN-Water 2011]	c
Accountability	W/S	Civil society inclusion in monitoring process	GLAAS	Collect information about civil society inclusion in monitoring process	d
Non-discrimination - Equity	W/S	Financial flows to address the needs of vulnerable groups	GLAAS	Besides urban-rural, include vulnerable and marginalised groups (in line with JMP Post 2015 proposal but paying special attention to what is considered "disadvantaged groups")	c & f
	W/S	Inequities reduction	JMP	It is necessary to clearly define disadvantaged groups in each country. Review mechanism proposed to progressively eliminate inequalities (to avoid in-country perpetuation of some forms of discrimination)	g

*W: Water // S: Sanitation **a. Revision of national plans of action, policies and/or laws // b. Direct Question (HH) // c. Direct Question (Authorities) // d. Consult Civil Society Organizations // e. Check through observation // f. Consult official data // g. Review methodology

2.5. Conclusions

Fukuda-Parr (Fukuda-Parr, 2011) states that human development analysis can benefit from HR perspectives and vice versa. In line with this assertion, first it is evident that JMP post 2015 working groups proposal and GLAAS 2013-2014 cycle have fed from HRWS framework, which is very relevant as it introduces new visions in the field. Secondly, the combined use of methods and data from these two human development sector mechanisms can contribute considerably to HRWS monitoring. JMP contributes with outcome indicators that may be used to assess the status of the right holders. In comparison with ongoing MDGs-related initiatives, the JMP-led proposal is a significant step forward towards a monitoring framework where HR elements are properly included. GLAAS complements JMP and could contribute by adding structural and process indicators for measuring duty bearers' obligations.

By contrast, there are still some critical gaps if both UN water platforms would be used to report progress on HRWS. Affordability at household level remains unsolved in post-2015 proposal despite HR experts have expressed concerns about the importance to visualise it. GLAAS provides relevant information but it is not enough to know important indicators as the percentage of poor people that benefit from special subsidies. Moreover, it could be possible to measure the proportion of households that have been disconnected from water supply at least once a year but the question has not been addressed.

More attention has to be paid to acceptability issues as well. There are no clear rules about the inclusion of some elements at the dwelling but not in the public institutions, and vice versa, as it is the case of water quality or MHM respectively. The negative effects that water resources contamination has on downstream access to safe drinking water have been largely reported. For a HR approach it is important to monitor the existence of regulation and policies to control pollution of water sources which is not possible using these platforms. States control and regulation when private sector is involved is necessary too. Both mechanisms are sensitive to non-discrimination and equity issues but more attention should be paid to methods and data if there is a wish to avoid perpetuation of some forms of discrimination.

But, nonetheless, these shortcomings are not so many. Furthermore they could be addressed building on existing monitoring mechanisms and taken into account relevant literature proposals as it is suggested in the article. Broadly speaking, HRWS could be measured once every two years if deficiencies are finally overcome.

A way forward for research in this area could be to apply this kind of analysis at different scales, looking for the implications for monitoring systems both at national and local level. Finally as a limitation of the article, analysing cross-cutting and general indicators together for both HR could be debatable since policies could differ from drinking water to sanitation subsectors.

Chapter 3. Monitoring access to water in rural areas based on the human right to water framework: a local level case study in Nicaragua

An improved version of this chapter was published as:

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3.1. Introduction. An urgent need for monitoring human right to water implementation

Taken into account the human right to water, there are some evidences that suggest the necessity to monitor its implementation. As some authors suggests (Biswas, 2001, Tortajada, 2010), theoretical and conceptual approaches need to be operationalized and implementable, for example through their inclusion in future targets and monitoring systems (Joint Monitoring Programme, 2011). Obligations of governments, at the domestic level, can be broken into three simple duties: respect, protect and fulfil (United Nations, 2002). The first and the second one mean that States must refrain from interfering directly or indirectly and must prevent third parties from interfering in any way with the enjoyment of the right, respectively. The duty to fulfil means that governments should take steps in the direction of ensuring universal access which is known as “progressive realization”. Appropriate policy frameworks are thus required. To talk about effective policy making in this context, implies two main issues: to target the most needed when money is allocated (Khadka, 2010) and to measure progress. An essential prerequisite to comply with both aspects is to access consistent information which is mainly dependent on a set of reliable and objective indicators (Garriga and Foguet, 2010, Molle and Mollinga, 2003). Moreover, Langford (2005) suggests that there is an urgent need for effective monitoring of public and private provision of water, particularly as it affects marginalized and vulnerable groups.

There are many initiatives regarding to the creation of appropriate, objective and reliable indicators and composite indices for monitoring the access to water from a human development perspective (Garriga and Foguet, 2010, Jiménez and Pérez-Foguet, 2008, Joint Monitoring Programme, 2000, Sullivan, 2002) and interesting case studies about their applicability (Jiménez and Pérez-Foguet, 2011, Pérez-Foguet and Giné, 2011, Sullivan et al., 2003) but none of them are based on human right to water framework. It is not the purpose of this paper to measure human right to water in his broad spectrum as other researchers have done in different initiatives related to the human right to health, water or food (Backman et al., 2009, Riedel, 2006, Roaf et al., 2005, United Nations, 2003, United Nations, 2004), but to propose a methodology to assess right to water focusing on outcome indicators. As the Economic and Social

Rights Fulfilment Index (Fukuda-Parr, 2011, Fukuda-Parr et al., 2008, Randolph et al., 2010) the proposed methodology places its attention on fulfilment rather than on violations and on quantified human outcomes rather than on structural ones or processes. Outcome indicators assess the status of the population's enjoyment of a right (Riedel, 2006) which in this case implies monitoring the extent to which individuals have access to water. In this sense, indicators, indexes, techniques to build and ways to visualize them are presented.

3.2. Case Study

In recent years, ONGAWA, a Spanish NGDO, has been working in Nicaragua, supporting water supply and water management interventions, using a rights based approach (RBA). In 2009, ONGAWA promoted a study about rural water situation in the whole country, in cooperation with local organizations (Coalición de Organizaciones por el Derecho al Agua –CODA-). A set of research questions was proposed within the right to water framework. The different categories of the right to water were considered in the design of surveys; these were conducted in 1350 rural households and were complemented with structured interviews in 61 drinking water and sanitation comities (CAPS). It is estimated that around 1,200,000 people are supplied by this Community Based Organizations in the whole country. In Nicaragua, the State has committed itself to formally delegate service provision in rural areas through its national Water Law (Government of Nicaragua, 2007) complemented with a special law that regulates CAPS organization, constitution, legalization and performance (Government of Nicaragua, 2010).

The study was carried out across the whole country but analysed data were selected from Jinotega and Matagalpa departments on the central-north region. Thus, this research utilizes data from 417 households and 28 community based organizations (CAPS), which involves 2 departments, 8 municipalities and 28 communities. The two different sources of information – households and committees – complement each other.

Table 3.1. Territorial and sample information.

Department	Municipality	Community			
		Name	Polled HH	Total HH	
Jinotega	La Concordia	Valle Valerio	11	87	
		Santiago Coyolito N° 1	12	186	
		Chichiguas	10	143	
		Los Capules	10	64	
		Colón Abajo	10	28	
		Las Quebradas	10	63	
		San Marcos	22	300	
		La Canasta	10	43	
	SRN	La Estación/Cerro Grande	9	41	
		Suni	10	90	
	SSY	Pavona Arriba	11	87	
		Las Delicias	10	82	
		La Rica	19	105	
		El Volcán	12	99	
		La Virgen N°1	15	143	
	Jinotega	El Sardinal	29	262	
		Paso Real	16	145	
		La Reforma	12	111	
	Muy Muy	Santa Fe	19	40	
		La Mora	15	296	
	Tuma la Dalia	Naranjo	10	90	
		Wasaka sureste	13	171	
		Aranjuez el porvenir	29	121	
		Matagalpa	Jucuapa centro	20	68
			Quebrachal	7	87
	El Zarzal		23	96	
	San Dionisio	El Zapote	25	237	
		El Carrizal	18	168	
2	8	28	417	3453	

3.3. Methodology

First of all, a validation of available data from surveys and interviews was conducted. Then, we defined and proposed a first set of indicators, gathering different complementary questions from the two sources above mentioned. They were sorted into six criteria, according to the human right to water conceptual framework. A score between 0 and 1 was assigned to each parameter, where a value of 0 indicates the poorest level and 1 the optimum conditions. International standards, experts, and local stakeholders were consulted during this assessment. Finally, indicators were aggregated into each criterion.

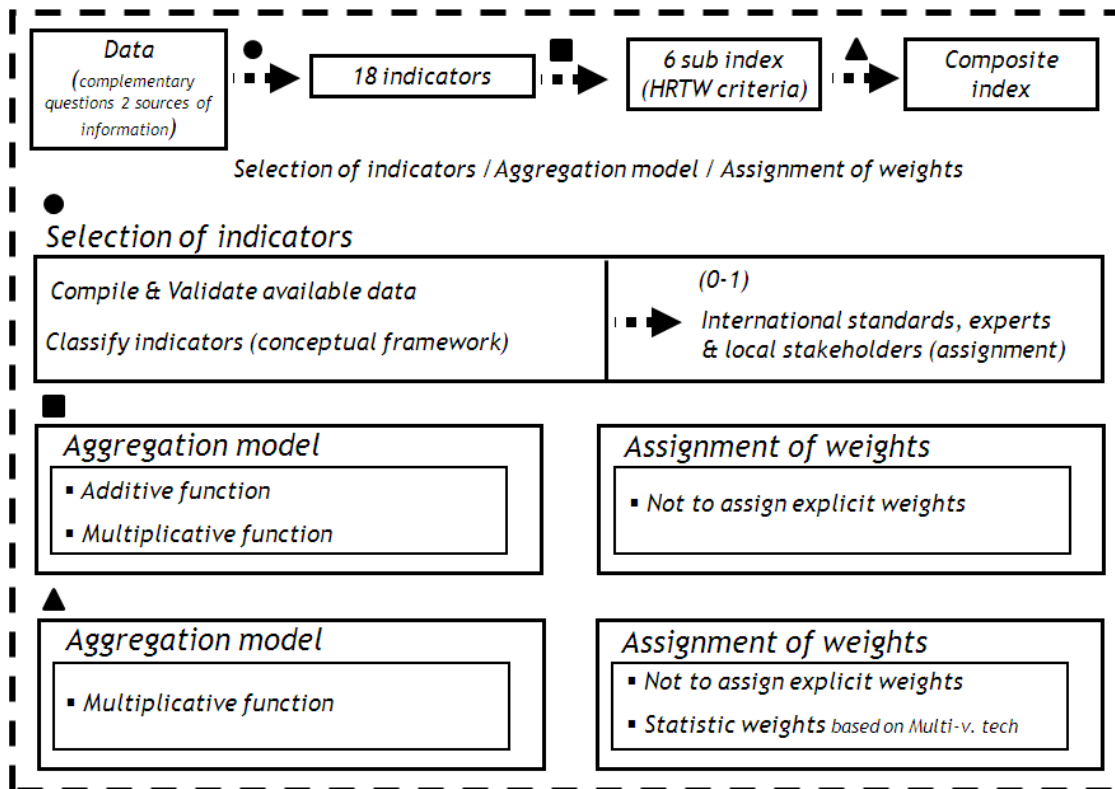
In order to aggregate indicators into right to water criteria subindexes, we considered two different approaches; when variables can compensate each other's performance and the opponent. Additive aggregation has been used for the former and multiplicative aggregation for the later.

Six criteria (availability, accessibility, affordability, quality, access to information & participation and non-discrimination) feed the composite indicator. A major issue for this task is the choice of the weighting and aggregation model (Giné and Pérez-Foguet, 2010). The assignment of weights is crucial because they should reflect the relative importance of each right to water criteria. Two possibilities were considered: not to assign explicit weights, and assigning statistical weights (based on multivariate techniques). Main argument for no weighting is based on the premise that no objective mechanism exists to assess the relative importance of the different aspects included in the index (Giné and Pérez-Foguet, 2010). Some researches highlight that multivariate techniques present an empirical and more objective option for weight assignment. A principal component analysis has been used since this methodology determines the set of weights which explain the largest variation in the original variables (Slottje, 1991).

According to the aggregating technique among the six subcriteria for constructing the index, we have opted to use a multiplicative function. The weighted arithmetic mean was rejected, mainly due to two reasons: i) this function should only be applied if indicators are mutually independent (Munda and Nardo, 2005) and it is obvious that this assumption cannot be admitted in the study as criteria are clearly interrelated. For

example, quality depends on continuity and domestic water used on physical access (Howard and Bartram, 2003). ii) An implicit compensability among the criteria indexes of the function (Nardo et al., 2005). A sine qua non requirement for right to water compliance is that all criteria should be met simultaneously. Therefore a non-compensatory method is necessary. Figure 3.1 summarizes steps in index design.

Figure 3.1. Methodology for index construction



3.3.1. Human right to water criteria and indicators proposed

Taking each criteria definition as the starting point, indicators selected are presented in this section and compiled in table 3.2

Table 3.2. Indicators used and sources of information

Criteria	Indicator	Source of information
	A1: Sufficient quantity	Households
Availability	A2: Sufficient quantity (perception)	Households
	A3: Reliability / continuity	Households
Physical Accessibility	PA1: Proximity (spent time)	Households
	PA2: Security	Households
Affordability	AFF1: Monthly tariff (water tariff)	Households
	AFF2: Affordability (perception)	Households
Quality & safety	Q1: Quality (perception)	Households
	Q2: Quality (perception)	CAPS
	Q3: Chlorination	CAPS
	Q4: Organoleptics	Households
Non-discrimination	ND1: Families without service (perception)	Households
	ND2: Families without service (perception)	CAPS
	ND3: Targeting the poor (economic advantages)	CAPS
Participation / access to information	P1: Meetings participation	Households
	P2: Information about meetings	Households
	P3: Water law (knowledge)	Households
	P4: Community participation (perception)	CAPS

There is consensus about the fact that water supply for each person must be sufficient and continuous for personal and domestic uses (United Nations, 2002), which is known as the availability criterion. There are two evident indicators that are usually considered

in this criterion: domestic water consumption rate and reliability of supply. Both ideas were considered in the methodology proposed: the availability component is composed by three different variables: i) sufficient quantity (real water consumption –litres per person per day-) ii) survey respondents' perception of water amount availability and iii) reliability of supply –daily provision of water or not-.

According to physical accessibility criterion there are two notable issues that have to be measured. On the one hand, (...) water must be accessible within, or in the immediate vicinity, of each household (United Nations, 2002) (...). On the other, physical security should not be threatened during access to water facilities and services (United Nations, 2002). Both were considered in this study: physical accessibility criteria agglutinate i) proximity to the water point, measured as total collection time and ii) right holders' perception about physical security on the way to fetch water.

GC15 states that water and water facilities and services must be affordable for all (United Nations, 2002). The kind of information used for affordability was: i) a continuous quantitative indicator –monthly tariff - and ii) right holders' perception of it.

The water required for each personal or domestic use must be safe (United Nations, 2002). Furthermore GC15 (2002) states that water should be of an acceptable colour, odour and taste for each personal and domestic use; this is the acceptability criterion, which is linked with the water quality dimension. These concepts have been translated into four indicators in the tool developed: i) right holders' and, ii) CAPS water quality perception, iii) whether a chlorination treatment is being practiced and iv) respondents' satisfaction with water organoleptic properties

Water services must be provided without any form of discrimination and right holders must have the opportunity to participate in decision-making relating to their service provision; access to information is essential for a meaningful participation. In this study, non-discrimination compiles three variables: i) right holders' and ii) CAPS appraisal of water discrimination in their communities and iii) existence of measures within the community for targeting the poor. Finally, participation and access to information were considered as two different issues. Two variables nurture each one: i) community participation in meetings and ii) CAPS assessment of it on one hand and iii) people's

information about meetings held in their communities and iv) their knowledge about the existence of national water law, on the other. Indicator iii) is specially linked to accountability processes at community level.

3.4. Results

Table 3.3 shows the average values obtained for each subindex and the resulting composite index. According to data recorded for the sample studied, affordability, non-discrimination and participation are the most critical issues. Availability, physical accessibility and quality seem to be less problematic. Index and subindex average values are relevant but histograms and territorial analysis are essential for the assessment of differences.

Table 6 Averages of criterion and composite indices

Criteria index	Average
Availability	0,638
Physical Accessibility	0,794
Affordability	0,418
Quality & safety	0,659
Non-discrimination	0,300
Participation / access to information	0,481
<i>Composite index</i>	<i>0,216</i>

Table 3.4 represents frequencies for the six criteria and the composite index obtained. This type of information is useful since it provides evidences of the main problems within a concrete situation. According to the area studied, the most outstanding result is the big amount of zeros in the composite index distribution i.e. a significant percentage of population whose enjoyment of the human right to water is not being guaranteed. As it was mentioned above, a geometric function has been used to aggregate criteria in order to avoid compensability among them. This result allows us to stress the relevance to guarantee every single human right criteria if the objective is to be met. Moreover it is interesting to stress differences between criteria and composite index distributions.

Results are consistent with the situation encountered in the area of study. Communities polled have benefited from different water programs during last years and a big amount of them were designed in domiciliary-supply logic. Hence, the quantity of water is not usually a problem. As regards quality criteria, there was no possibility to make physicochemical analysis so indicators related to perception and water treatment were used. Complex quality risks, such as pesticides pollution, have not been captured by our study.

According to participation and access to information, Narayan (1995) and many other authors have stressed the importance of right holders' participation but it is still not enough assumed in too many interventions (Schouten, 2003). Even more it has to be mentioned that the poor are frequently less able and have fewer channels to participate in community management of common-pool resources and water supplies (Agrawal and Gupta, 2005, Cleaver, 2005, Jiménez and Pérez-Foguet, 2011b). This is consistent with rural picture as it is a usual situation to find houses or sectors within a community that are not connected to the water supply system that benefits the others. These two deficiencies are shown in table 3.4.

Table 3.4. Criterion and composite index frequencies

	Availability	Physical Accessibility	Affordability	Quality	Non discrimination	Participation & information	Composite index (PCA)
[0.0-0.1]	60	34	176	22	129	91	279
(0.1-0.2]	3	0	0	0	0	20	0
(0.2-0.3]	19	0	21	66	0	7	0
(0.3-0.4]	23	0	0	0	212	5	4
(0.4-0.5]	18	94	14	92	0	62	8
(0.5-0.6]	20	0	43	0	0	92	36
(0.6-0.7]	41	0	18	0	65	34	40
(0.7-0.8)	62	0	81	99	0	15	33
[0.8-0.9)	60	0	3	0	0	8	17
[0.9-1.0]	111	289	61	138	11	83	0
TOTAL	417	417	417	417	417	417	417

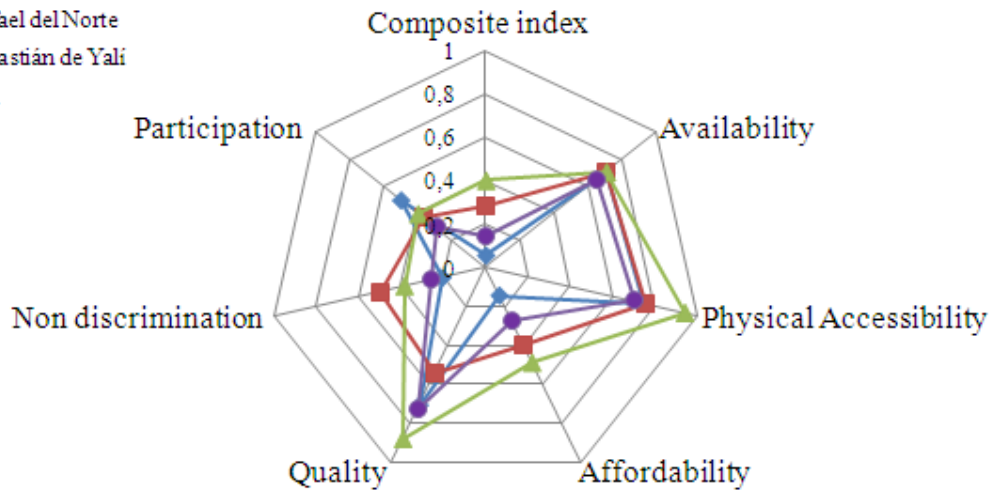
Figures 3.2 and 3.3 can be used to appreciate differences within the territory. The first one aggregates results by municipalities and the second one shows differences among communities in one municipality, taken as example. Figure 3.2 is composed by two different graphs: the first one shows the situation in municipalities from Jinotega department and the second one from Matagalpa.

Radar chart in figure 3.2 has been used to visualize criteria indexes and the composite index. This picture can be applied at any scale (household, community, municipality, department or country) allowing rapid comparison. Physical accessibility shows the highest levels while non-discrimination seems to be the most problematic issue. While communities polled from San Sebastián de Yalí (SSY) show higher values for most of the criteria, there are several tendencies that show different deficiencies in each municipality. For example, La Concordia results reflect important problems of discrimination and economic accessibility while they are among the highest in the other criteria. These outputs are important for policy making because they can be used to particularized support for problems solution and thus increase the impact and efficiency of interventions. Furthermore, some authors have proved lack of pro-poor targeting when money is allocated in water sector at international sphere (Jiménez and Pérez-Foguet, 2009a) and also at national and local level (Jiménez and Pérez-Foguet, 2010a). Thus, this methodology and the way information is visualized provide useful information for improving territorial equity. This is paramount for right to water as it calls for universal access in a non-discriminative perspective.

Figure 3.2. Human right to Water criteria and composite index for department pilot study: Jinotega (top), and Matagalpa (bottom)

MUNICIPALITIES

- ◆ La Concordia
- San Rafael del Norte
- ▲ San Sebastián de Yalí
- Jinotega



MUNICIPALITIES

- ◆ Muy muy
- Tumala Dalia
- ▲ Matagalpa
- San Dionisio

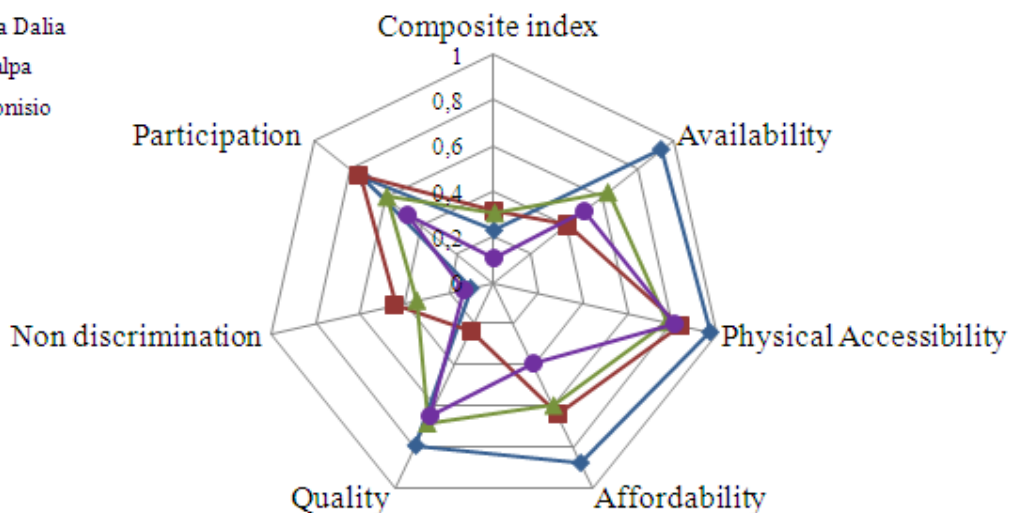
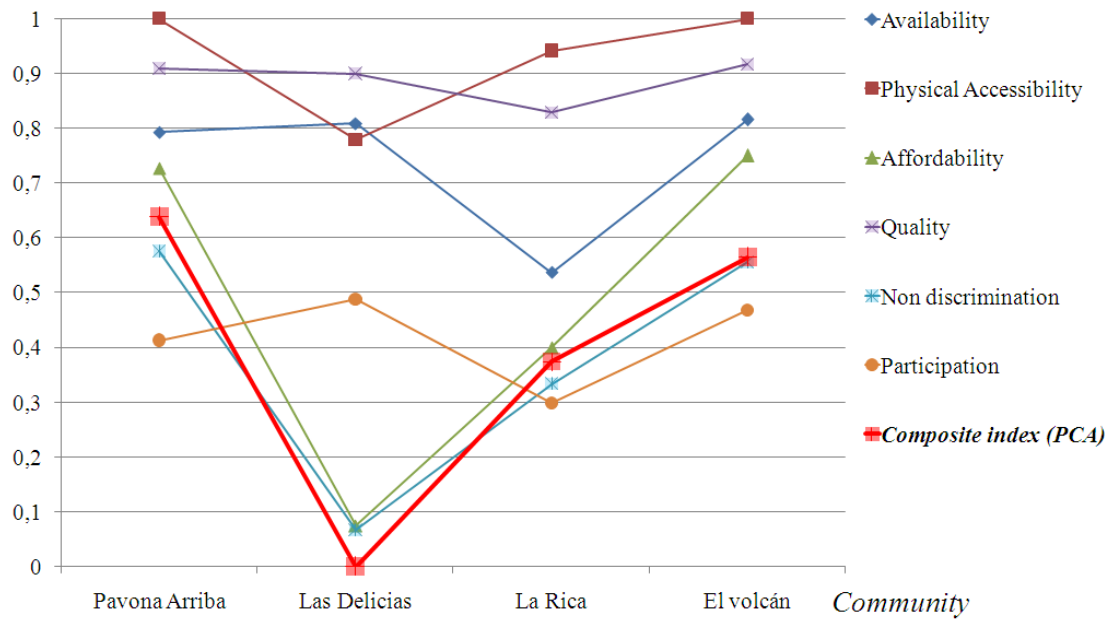


Figure 3.3 zooms in community level. The four SSY communities considered in this study are represented in it. Criteria and the composite index are shown for each community. It stresses again differences among right to water criteria. Physical accessibility does not seem to be the principal problem in the cases studied. According to diagnosis, all communities were equipped with water systems. However, all of them show signs of right to water failures where lack of participation, discrimination and affordability are especially critical.

Figure 3.3. Human right to water criteria and composite index for the pilot study in San Sebastián de Yalí municipality



3.5. Findings and discussion

This section tackles two main issues. On the one hand, we provide some reflections related to the challenges found during tool's construction. On the other, achieved results highlighted in previous section are used to explain some policy implications.

3.5.1. Difficulties for measuring access to water based on human right to water criteria at local level.

According to availability, UN General Comment 15 (2002) does not specify a quantity to be made available to all but Gleick (1996) and Howard and Bartram (2003) works about minimum standards recommendations are cited in it. Gleick (1996) argues for a 'Basic Water Requirement' (50 lpd) which covers four basic needs and he maintains that this limit is irrespective of climate, culture and level of development and technology. Howard and Bartram (2003) considered different service level categories; no access, basic access, intermediate access, and optimal access. Other researchers also considered a similar ladder approach for assessing water service delivery (Moriarty, 2010, Schouten, 2011) . "Continuous" means that regularity of the water supply should be sufficient for personal and domestic uses; however, it is not precisely defined in those documents. Moreover, it is not that simple to evaluate continuity as its negative effects will basically depend on a combination of systems failures, their frequency and households' capacity to store sufficient amount of water –which usually is lower in poor families-. Rieteveld et al (2009) propose a continuity index characterized by two indicators: number of hours per day of unplanned interruption of water supply to the households and number of days per month without unplanned water supply, which requires data not always easy to obtain and standards not simple to set up.

United Nations independent expert (United Nations, 2010c) points out, neither continuity nor exact quantity required can be determined in the abstract, since individual requirements for water consumption vary, for instance due to climatic conditions, level of physical activity and personal health conditions. Standards have been determined based on international recommendations, experts and local stakeholders in this study but it is important to deeply research on standards definition at local level.

As it was mentioned before, it is necessary to measure proximity to the water point, and access security as physical accessibility elements. For the first-mentioned, time spent in water collection is an adequate indicator for assessing accessibility (Cairncross and Feachem, 1993, Giné and Pérez-Foguet, 2010, Howard and Bartram, 2003). In our study, we highlight the difficulty to define and measure security at water-points due to the fact that it is usually a taboo and several polled families didn't answer that question. Even more, security's perception is very variable from each person, and has considerable gender bias and implications, which we have not been addressed in this study.

The percentage of household expenditure on drinking water has been established as a common indicator to measure affordability (COHRE AAAS SDC and UN-HABITAT, 2007, Roaf et al., 2005, Smets, 2009, UNDP, 2006), however, the meaning of an affordable price and its standards have not been precisely defined yet (COHRE AAAS SDC and UN-HABITAT, 2007, Smets, 2009). Different studies suggest that percentage of household income paid should stay between 1 and 5 percent or 3 percent as an upper limit (UNDP, 2006). According to our experience, it is not easy to determine affordability index mainly because of disposable income is notoriously hard to measure: polled families usually don't know about their actual income, it is very variable throughout the year, and very often they are reluctant to talk about these economic issues whereas they usually have no problem to talk about their water tariffs. Hence, we have considered the later indicator in our study (Nicaraguan Córdoba per month spent in water services per family). Nevertheless, it is necessary to investigate about not-too-complex options that allow us to assess household incomes or their economic status.

The water required for each personal or domestic use must respect WHO water quality standards (WHO, 2011). Quality analyses were not considered during field data collection so other indicators had to be defined to cover quality/safety criteria as it is the case of respondents' perception of quality although this might not provide very reliable information about actual water quality (Jiménez and Pérez-Foguet, 2012). In general, even if basic water quality parameters are measured, other chemical substances could exist that are more difficult and expensive to analyse and that are receiving inadequate attention although their presence become a critical issue (Biswas, 2005). It is the case of

pesticides, a widespread threat in many countries and particularly in Nicaragua (Castilho et al., 2000, Castillo et al., 1997). Thus water quality data availability can be an important restriction to have a complete picture of access to water, according to human rights framework.

Discrimination, participation and accountability are aspects difficult to quantify (Joint Monitoring Programme, 2011, Randolph et al., 2010) and as Ashfaq Khalfan states (Joint Monitoring Programme, 2011) it is not viable for global monitoring to collect quantitative data for every aspect of human rights. Despite the fact that they are cross-cutting criteria to all human rights, there is still no consensus about the way to measure them. Thus, it is necessary to develop methodologies to quantify them for monitoring access to water in the near future. However, easy qualitative indicators could be chosen as apposite approximations in local level monitoring systems. Some authors (JMP post-2015 Working Group on Water, 2012) propose to disaggregate information to measure discrimination instead of using additional indicators. However, there are a lot of situations where discrimination occurs deliberately both at intra- and inter-communitarian level and it can affect single families that will never be represented in statistics. Therefore, it is necessary to consider additional questions to pick up reasons and characteristics of that discrimination in order to further evidence this issue. Accountability it is more focused on legal and juridical aspects of the right. Moreover, local accountability is a much complex and broader issue that is intrinsically linked to the right to accessible and transparent information to consumers (Laban, 2007), a cross-cutting criterion for all human rights. Additional indicators were defined in this methodology, as reflected in table 3.2.

3.5.2. Policy implications

This conceptual framework has several interesting implications on water governance, as described hereinafter.

Measure progress

The way progress in access to water is measured at international level needs to be recalibrated (Jiménez and Pérez-Foguet, 2008) and the-improved-vs.-non-improved-approach should be superseded. Joint Monitoring Programme as we know it nowadays

does not consider human right to water framework. Furthermore, it is unsatisfactory in some situations as the rural Nicaraguan context. If there is certain level of infrastructure, JMP's methodology is inadequate because its simplified dichotomy hindered decisive differences. It is a complex task to measure access to water and it is even more difficult when coverage goes beyond a basic level and differences must be addressed. Nevertheless, it is necessary to keep a more detailed picture of the reality that helps us to move forward. The methodology presented in this paper could offer new visions on this field. Undoubtedly, adopting a measure of access to water based on Human right to water would imply a significant reduction in "coverage" which would have both technical and political implications.

Support policy development and priority setting

As it was commented before, human right to water framework offers new, pertinent and useful dimensions for the assessment of access to water when it is compared with other methodologies. Non-discrimination, participation and access to information, affordability, elements related to physical accessibility, quality or acceptability give the chance to move forward from previous coverage indicators. If these elements are not measured ad hoc, they won't appear in statistics and important issues for supporting policy development and priority setting won't be addressed. Results displayed in figures 3.2 and 3.3 offer a multidimensional picture of the access to water on rural communities and thus can be used to improve policy development at national and subnational level respectively. Their usefulness to support resources allocation and priority setting -based on obligatory content of the human right- is one the most outstanding opportunities for policy making if we take into consideration that lack of investments is one of the important factors of global water crisis (Biswas, 2005).

Table 3.5. Indicators defines in the human right to water methodology

Criterion	Elements	Indicators (literature)	Standard/Indicator references	Indicators (methodology)
Availability	Sufficient access	Domestic water consumption rate (l/p/d)	Gleick_BWR 50 lpd (1996) <u>Howard & Bartram</u> ladder_(WHO_2003) -> Moriarty (2010), Schouten (2011)	A1: Sufficient quantity (i) A2: Sufficient quantity (user perception) (i)
		No indicator agreed by consensus but continuity index [(1) & (2)]		
	Continuous access (reliability of supply)	(1) Number of hours per day of unplanned interruption of water supply to the households (2) Number of days per month without unplanned water supply	Hunter, Zmirou-Navier et al. (2009) / Rietveld et al (2009)	A3: Reliability / continuity (i)
Physical Accessibility	Close access	Water point proximity (<u>time spent</u> vs water point distance)	Cairncross & Feachem (1993)	PA1: Proximity (spent time) (i)
	Personal safety	No indicator agreed by consensus		PA2: Security (user perception) (i)
Affordability	Affordable access	Affordability index (% of household expenditure spent on drinking water)	COHRE (2007) Smets (2009) Some ideas -UNDP (2006), Smets (2009), Giné and Pérez-Foguet (2010)- but no standard agreed by consensus	AFF1: Monthly tariff (water tariff/family income) (i) AFF2: Affordability (user perception) (i)

Quality	Safe access (healthy)	Physicochemical Micro-organisms ¿Other chemical substances -Example: the problem of pesticides-?	WHO quality guidelines: but local governments can adapt them at local/national context (WHO 2011)	Q1: Quality (user perception) (i) Q2: Quality (CAPS perception) (ii) Q3: Chlorination (ii)
Acceptability	Acceptable access (colour, odour & taste)	No indicator agreed by consensus		Q4: Organoleptics (i)
Non discrimination				ND1: Families without service (user perception) (i) ND2: Families without service (CAPS perception) (ii) ND3: Targeting the poor (economic advantages) (ii)
Participation / Access to information		No indicator agreed by consensus / Difficult to measure -Randolph, Fukuda-Parr et al. (2010); WHO/UNICEF (2011)-		P1: Meetings participation (i) P2: Information about meetings (i) P3: Water law (knowledge) (i)
Accountability				P4: Users participation (CAPS perception) (ii)

i: data from households surveys; ii: data from CAPS interviews

Raise public awareness and advocacy

Methodology itself was used for raising right holders' awareness about this emerging human right. Once you start to talk about human rights, public awareness begins to rise because people commence to be conscious about them. This is an interesting contribution of the data collecting methodology that does not emerge in other methodologies as JMP or Water Point Mapping (WPM). This can lead into advocacy processes carried out by those deprived of their rights.

Apart from the methodological implications, human rights advocacy NGOs have used results based on the study for exposing Nicaraguan sector situation (CODA, 2011). Moreover the experience was considered as a good practice by the Special Rapporteur (De Albuquerque, 2012).

3.6. Conclusions

The human right to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses, proscribing any kind of discrimination and defending participation and access to information. Now it is the moment to think and discuss about ways to translate conceptual and legal elements of the human right to water into practice. There is a variety of fields in which it is necessary to develop mechanisms for implementing this universal right. In this chapter the focus is placed on how it could modify the way access to water is measured.

There are some challenges and barriers that it is necessary to overcome. Indicators used for monitoring the water sector should be easy to get at local level, accurately defined, standardized and internationally applicable, scalable at all administrative levels and yearly updatable (Jiménez and Pérez-Foguet, 2008). Some elements essential to measure indispensable human right to water criteria are not simple to obtain at local level; it is the case of family income or physical security, considered a taboo in some communities. There is no consensus about standards for some indicators and even some experts recommend that they should be adapted to local conditions. This research provides insights to address this lack of definition. Ultimately, similar research efforts will lead to better monitoring access to water with a human rights perspective, which will be crucial for the future policies in the sector.

Methodology proposed, as results confirm, has important policy implications: the way progress in access to water is measured at international level is in a period of redesign and the tool presented can provide appropriate inputs. Indicators and the index explained –combined with data about duty bearers’ resources and the way those are allocated- could contribute to improve the measurement of progressive realization; a complex and essential concept for those who work in the sector of human rights monitoring. It could be used to support resources allocation and priority setting, improving policy development at different levels. The process of field data collection itself was useful for raising right holders’ awareness and results obtained have been utilized for advocacy purposes.

Therefore, different type of users among development and human rights sectors can be interested in contributions from this research; local and central governments, international development agencies, NGDOs focused on human development and human rights advocacy, human rights monitoring bodies, groups of research and last but not least, the right holders.

Chapter 4. Measuring disparities in access to water based on the normative content of the human right

An improved version of this chapter was published as:

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4.1. Introduction and purpose

There is some international consensus on the need to advance the measurement of access to water at local, national and global level (Cotton and Bartram, 2008, Jiménez and Pérez-Foguet, 2008, Joint Monitoring Programme, 2011). The United Nations Children's Fund (UNICEF) / World Health Organization (WHO) Joint Monitoring Programme (JMP) measures access through a technological approach that distinguishes between improved or unimproved water points (Joint Monitoring Programme, 2006). According to this methodology many Latin American countries show quite acceptable basic indicators of access to water (Joint Monitoring Programme, 2014a). However, indicators need to be useful to support policy development and decision making for countries with relative high levels of access too; this requires indicators which can capture improvements in the different dimensions of the service. There are some notable initiatives that have shown the need to expand the conceptual framework used to follow up on these issues at different levels (Flores et al., 2013b, Giné-Garriga et al., 2013, Jemmali and Sullivan, 2014, Jiménez and Pérez-Foguet, 2010b, Majuru et al., 2012, Pérez-Foguet and Giné, 2011).

On the one hand, human right to water and sanitation normative content requires paying attention to some dimensions not sufficiently considered in the Water Sanitation and Hygiene (WASH) sector. On the other, one of the main contributions of a human rights based approach is the necessity to develop new methodologies to measure and better understand disparities, id est the situation of the underserved, the most disadvantaged, and vulnerable groups in each context, which requires looking beyond central tendency estimators (United Nations, 2012). The necessity to adequately include equity measures is particularly relevant according to WASH issues (Melamed, 2012, United Nations, 2012) but also considering the rest of development goals (Camfield et al., 2013, Unterhalter and Dorward, 2013). Despite the progress made in incorporating the human right to water normative content and methodologies to particularly evaluate disparities reduction within JMP Sustainable Development Goals (SDGs) proposal at global level (Joint Monitoring Programme, 2014b), there are still some elements that remain unsolved if the fulfilment of the human right to water and sanitation is considered in its broad spectrum (Flores et al., 2015). Incorporating these elements in monitoring is a

complex task which requires political will that does not always exist (United Nations, 2012).

A large body of literature has somehow examined and tested methodologies to measure socioeconomic disparities at district or regional level (Arief, 1982, D'sa, 1986, Haq and Ali, 2013, Ohlan, 2013). However, there are no specific studies that deal with measuring intra-community disparities considering the human right to water content. This implies defining new indicators and designing methodologies for field data collection. This research aims to address this challenge by developing and testing a methodology to measure access to basic water services from a human rights perspective in rural contexts where it is usual to find community-managed water supply systems. In those situations service provision is delegated to community-based organizations (CBOs) but these non-State service providers face some important shortcomings according to the human right to water obligations: i) they cannot solve all water-supply related issues by themselves (Bakker, 2008) and thus cannot always guarantee sufficient service levels. Moreover, ii) there is usually an amount of families by no means negligible that for various reasons are not served by them. This can be related to some kind of intra-community discrimination (Agrawal and Gupta, 2005, Cleaver, 2005) or inequitable power relations within communities (McCarthy, 2005, Mehta, 2001). Taking this into account, the research focuses on those who have been discriminated against by not receiving a drinking-water service. Self-supply solutions emerge in these situations, issue that has recently been a subject of study as an alternative service delivery model (Butterworth et al., 2013, Smits and Sutton, 2012).

The proposal includes a field data collection methodology and a set of questions to measure service level based on the human right to water normative framework. Statistically, a stratified sampling, splitting households served by community based organizations and those self-provided, is proposed. This approach implies considering reduced populations and samples, thus special care needs to be taken with sample sizes and uncertainty of estimators. Despite this small analytical effort, results offer a new practical approach to measure the situation of rural water services at community level. This work is not focused on investigating the causes of inequality and discrimination. It

is also necessary to know more about them to propose remedial actions as it is proposed elsewhere (Flores et al., 2014).

The proposal has been tested in a case study; explicitly, a municipality in northern Nicaragua. It is a good example of a rural context in the region, marked by moderate/high coverage to improved drinking-water sources (Joint Monitoring Programme, 2014b), where decentralization of responsibilities to local government authorities with respect to water issues has not been accompanied by effective resources (Novo and Garrido, 2014). More details follow in next subsection. Then, the methodology proposed is explained, and some illustrative results are used to discuss the benefits and limits of the proposal.

4.2. Case study

The human right to water is explicitly mentioned in latest national Water Law (Government of Nicaragua, 2007) and Nicaraguan State has committed itself to formally delegate service provision in rural areas to end-users' committees of drinking water and sanitation (CAPS) (Government of Nicaragua, 2010). It is common to find drinking water systems managed by CAPS that provide the service to the population of rural communities in the country. Different studies show shortages in the service delivered (CODA, 2011, Flores et al., 2013b, Rob ES Bain et al., 2012, World Health Organization and UNICEF, 2010) and intra-community disparities (Flores et al., 2014).

San Sebastian de Yalí (SSY) municipality within Jinotega department is located in the central north region of Nicaragua (figure 4.1). The Municipal Water and Sanitation Unit (UMAS) is the responsible of water and sanitation rural services. It is manned by two specialists that have to cover 22500 people located in 74 disperse rural communities, covering an area of 402 km². According to municipal data there are 67 CAPS of which 15 are legally registered according to the new Water and Sanitation Committees Law (Government of Nicaragua, 2010). Based on municipal data, water access and sanitation coverage in the area was about 70 and 80% respectively in 2012.

Figure 4.1. Location of the case study



As it was mentioned before, the study focuses on conceptual and methodological issues to measure disparities in access to water. A detailed description of the overall results for SSY municipality, including precision, is out of the scope of the paper. Thus, despite data was collected in all 74 communities of SSY municipality, results presented herein focus on a case study of five communities with 296 households (154 served by CAPS and 149 not served by CAPS). Communities have been selected representing different scenarios in the municipality. Table 4.1 describes basic characteristics of water supply systems and self-supply in each of the five communities. No pumped systems can be found in this municipality; the infrastructures mainly differ on the type of distribution scheme and on the existence of chlorination systems in operation.

Table 4.1. Basic characteristics of community managed water system and self-provision drinking water sources

Community	Category (technology)	CAPS as service provider (basic characteristics of systems)		Self-provision (drinking water sources)
		Chlorination systems working	Type of connection	
A	Gravity fed (2 systems)	System 1: Yes System 2: No	Piped water into dwelling // yard	Surface water and unprotected springs
B	Gravity fed	No	Public tap/standpipe	Surface water, protected and unprotected springs
C	Gravity fed	No	Public tap/standpipe	Protected and unprotected springs. Protected dug-wells
D		Without system		Surface water, protected and unprotected springs
E	Gravity fed	Yes	Piped water into dwelling // yard	Unprotected springs and piped systems indirectly through a neighbour

4.3. Research design and methodology

The background to this research lies in the comments of the UN Special Rapporteur on the Human right to Drinking Water and Sanitation where it is considered that i) in order to endure non-discrimination, there is a need to look beyond aggregated outcomes and identify disparate impacts or less favourable treatment over time and ii) that for small groups, special studies are needed, as their situation cannot be measured through the standard survey design used by global monitoring systems (United Nations, 2012). To tackle the matter, the approach proposes two relevant innovations when a rural household survey is conducted: a) a methodology to identify families not currently served by communitarian service providers and b) a simple set of questions to characterise the level of service based on the human right to water normative criteria. The methodology designed is presented in table 4.2 and described in detail in this section.

Table 7. Main steps of the methodology

Identification	1	Municipal Water and Sanitation Unit convenes a meeting with community leaders	
	2	Survey team generates a census of the households from community distinguishing two subgroups depending on the type of water service provider: i. Non-State Community Based Organizations, ii. Self-provision (informal)	
	3	Supervisor determines the required sample size to produce estimates with sufficient precision for local level decision-making for the two subgroups	Table 4.4
	4	Survey team randomly selects households to be surveyed for the two subgroups using the census	
	5	Survey team in collaboration with community leaders define community maps and the most natural/shortest routes to visit households selected	
Data collection and analysis	6	Service level is evaluated in all households selected regardless of the type of service provision scheme	
	7	Supervisor validates surveys in the field	
	8	Exploiting data: Indicators and indices construction and analysis of intra-community disparities	Table 4.3

4.3.1. A method to identify reduced populations within rural communities

The first five steps of the eight-step methodology are described in this section. First of all, technicians from the UMAS called community leaders and members of the CAPS board to a meeting. It is an essential starting point as this is the time when people in communities are informed and get involved to support data collection. Bennett et al (1991) consider that the selection of households to be polled based on an exhaustive census of the households from community is the best option to ensure randomness when choosing the sample. The methodology takes up the idea for the second step and proposes to distinguish two subgroups of households in each community where one subgroup is made up of those families who are not served by any water system managed by a CAPS. The other subgroup is made up of those who are in the opposite situation. This separation is useful to find and characterize those small discriminated groups not served by communitarian systems while ensuring a greater representativeness.

Thirdly, the sample size is estimated in situ based on the real population of both subsets. The sample size is fixed as the smallest integer verifying that the maximum confidence interval of the estimate is less than an admissible error. Different type of indicators, and thus of estimators, are involved (see Table 4.3). An approximation to the interval length based on the normal distribution is the usual option (Cochran, 1973, third edition). As the household sampling is without replacement, if populations that are not large, the interval is corrected for finite populations.

However, sample size determination with much reduced populations - as it is the case of communities studied - or with estimates far from being normally distributed cannot be based on this approximation, and sample size has to be computed from exact confidence limits. Here, the sample size is determined for proportions, in agreement with majority of cases in Table 4.3. The Clooper-Pearson interval (Reiczigel, 2003) corrected for finite populations (Anderson and Burstein, 1967, Anderson and Burstein, 1968, Burstein, 1975) is used.

The sample sizes are given by a formula that implicitly determines those for a given precision, e in Table 4.4 confidence level (α) and population sizes. Precision and confidence level are fixed as a compromise between accuracy and financial and time

costs. The approach produces estimates with low precision but sufficient for distinguishing extreme behaviours, and therefore for supporting basic local level decision-making. User-friendly tables were designed to facilitate its implementation in the field.

Fourthly, specific households to be surveyed are randomly selected through simple techniques making use of both censuses and the sample size defined in previous steps. Then, community maps were generated in collaboration with community leaders to facilitate the organization of field data collection.

4.3.2. A method to define the level of service based on the human right to water normative criteria

Special attention was paid to the idea of measuring access to water based on level of service concept while considering the human right normative content (availability, physical accessibility, affordability, acceptability, and quality). For that purpose a combination of different sources of information has been considered as Giné-Garriga et al (Giné Garriga and Pérez Foguet, 2013) proposed. Relatively simple and precise questions were included in household surveys that would enable to build a set of indicators to cover the first four dimensions. Additionally, an audit at the water points and/or systems was carried out to evaluate water quality/safety criteria, specifically to determine presence of faecal coliforms. Ministry of Health staff (SSY) coordinated the analysis of samples. Available data from surveys were validated in two different ways: First, the supervisor looked through surveys for mistakes in the field. Then, different cross-questions let us identify possible inconsistencies when data were transferred into the database built for their analysis.

Finally, a set of indicators was defined in order to measure the different human rights dimensions. In cases where there is more than one indicator for each criterion, the information is added in a single simple index relative to each of the criteria. Indicators considered are based on Flores et al (2013b) work where the most relevant decisions about indicators and index construction are argued. These are summarized in table 4.3, which identifies those indicators that have been enhanced for this case study. All indicators take values between 0 and 1, indicating the poorest level and the optimum

conditions, respectively. In order to aggregate indicators into subindices, two different approaches were considered: when indicators can compensate each other's performance, and the contrary. Additive aggregation has been used for the former and multiplicative aggregation for the later as it is suggested in different works (Giné and Pérez-Foguet, 2010, Munda and Nardo, 2005, Nardo et al., 2005, Saisana et al., 2002). Uncertainty and sensitivity analysis proposed elsewhere (Saisana et al., 2005) for the quality assessment of composite indicators are beyond the scope of this article.

Table 4.3. Indicators considered (Flores et al., 2013b). Improvements based on *Rietveld et al (2009) **Jiménez and Pérez-Foguet (2012).

Normative criteria	Elements // indicators	Type of variable (indicator)	Scoring (limit values)	
			0	1
Availability	Sufficient quantity	Ordinal (5 levels)	< 5 lpd	> 100 lpd
	Sufficient quantity (perception)	Ordinal (3 levels)	Not enough for drinking	Enough for all domestic purposes
	Continuity*	Continuous	0 hours/day & 0 days/month	24 hours/day & 30 days/month
	Reliability	Binary	Sometimes they have to use other sources	All year round
Physical Accessibility	Proximity (time spent)	Ordinal (4 levels)	> 30 minutes	Piped into house / compound
	Security (in paths)	Binary	No	Yes
Quality and safety	Faecal coliforms**	Ordinal (3 levels)	> 10 CFU/100 ml	0 CFU/100 ml
Affordability	Affordability (perception)	Binary	Too expensive	Fair
Acceptability	Organoleptic properties (perception)	Binary	Bad colour, odour or flavour	Good colour, odour and flavour

4.4. Results and discussion

Contributions in this section have been grouped in four blocks. First of all, the results of applying the method to identify reduced populations within rural communities are presented. Then, intra-community disparities among the two sub-groups defined are discussed, using specific metrics based on the human right to water normative content. Thirdly, an assessment of the costs related to the field data collection is included to highlight the feasibility of the proposal. Finally, how results might be used to shape decision-making processes is discussed.

4.4.1. Sample size implications to identify reduced populations

The decision on the size of a sample is critical as it affects the cost and the precision of the survey (Bennett et al., 1991, United Nations Children's Fund, 2006). The common approach is based on the approximation to the normal distribution where the confidence level and required precision are the main design factors for sample size estimation (United Nations Children's Fund, 2006). Nevertheless, population size is too small when it is necessary to produce precise estimates for rural communities. Thus, as it was mentioned before, a different approach based on exact confidence limits of binomial distribution, corrected for finite populations is applied to resolve this problem.

Table 4.4 summarizes information on the size of the community (I), the theoretical sampling design taken into account the methodological approach proposed (II) and the real size of the sample according to field data collection campaign (III). When the approach is used without stratification, results are shown in column IV –as a possible alternative-. These numbers can be used to obtain average numbers of the indicators for policy making at community level. However, if a clear picture of disparities among subgroups is sought, a stratified sample is required and therefore, proposed herein (II). A border case when the population is too reduced is shown for community E where 7 families composed the “self-provision” subgroup.

A stratified sample usually involves that a larger theoretical number of households will be necessary to be polled as can be extracted from the table (columns II and IV). When one subgroup does not exist in the community, both approaches coincide (community D). An extra amount of households –ranging from 25% to 75%- has to be polled when

considering a stratified sample design. It depends on the size of both subgroups: if both are relatively large, differences are greater (community C). Conversely, if one of the subgroups is significantly smaller, the gap is reduced (community A or E).

During field work, it is often difficult to reach the sample design in the case of self-provision subgroup when the number of households is much reduced -explicitly below 10- as it is shown in column III. Total numbers have been almost achieved but not exactly the disaggregated ones. Main reasons are: i) serious difficulties in reaching some of these families due to their location in inaccessible areas, combined with ii) very few options for substitution of families with other belonging to the same subgroup (due to reduced numbers) when there were no adults at home in the moment of home visit. Consequently, results for these subgroups at community level should be carefully analysed for policy making. Recall that the precision for figures corresponding to the overall sample are $e = 0.11$ and 0.13 with $\alpha = 0.9$. Therefore, more precise results are obtained when aggregated comparisons are considered.

Table 4.4. Design of sample size based on the size of the community and actual polled sample. ($\alpha = 0.9$; $e < 0.2$. Except * where $\alpha = 0.8$; $e < 0.25$).

Community	I. Number of Households			II. Number of Households (sample design - stratified)			III. Polled Households -stratified-			IV. Number of households (sample design - no stratified)
	Self-provision	CAPS (service provider)	TOTAL	Self-provision	CAPS (service provider)	TOTAL	Self-provision	CAPS (service provider)	TOTAL	
A	9	38	47	7	14	20	4	15	19	15
B	15	32	47	10	13	23	11	14	25	15
C	73	40	113	17	14	30	14	15	29	17
D	38	0	38	14	0	14	14	0	14	14
E	7	44	51	5*	14	19	2	18	20	15
TOTAL	142	154	296	48	55	106	45	62	107	76

4.4.2. Showing intra-community disparities based on the human right to water normative content.

This research has incorporated new dimensions to measure access to water based on human rights criteria, which provide more information than current technology-based approaches. If we focus on the indicator “access to drinking water” considered in Joint Monitoring Programme, all households using community-controlled water supply systems have access to an improved water source and the majority of families based on self-provision will be considered as using unimproved drinking water in this case study. However, a more nuanced picture emerges when analysing separately all five criteria described in table 4.3. Figure 4.2 presents an average across all five communities sampled that can be understood as an overall value of each human right to water criteria differentiating between people served and not served by CAPS.

Availability and quality are the main shortcomings in communities studied while it seems that physical accessibility is by and large adequate. The low value for availability is mainly due to the poor continuity and seasonality of the supply. It is common that households express their need to use alternative sources for drinking water in certain periods of the year. As observed during field data collection, traditional sources are the common alternative sources used in communities when community-based supply systems fail. Moreover continuity of the service is usually lower than 24 hours in a day and only some days during the week. Systems managed by CAPS often suffer breakdowns, cuts of water and flow problems in some water points. Finally, some families mentioned that available water is just enough for drinking water purposes. These problems explain low values in availability dimension where there are no differences between the two subgroups analysed.

Quality criterion is an issue of concern as most of the water supplies examined were contaminated with faecal coliforms which is in line with results from the Rapid Assessment of Drinking-Water Quality (RADWQ) carried out in the country (World Health Organization and UNICEF, 2010). Less than 1 out of 5 families were drinking water free from faecal coliforms at the moment of water points and systems auditing. For those families self-provided, about 64% are using drinking water sources with more

than 10 cfu, 20% between 10 and 0 cfu and just about 16% free from coliforms. When analysing households that depend on systems managed by CAPS, the distribution of results is 0%, 82% and 18% respectively. It can be realized that unacceptably high contamination (>10cfu) is more severe for those self-provided. However, the proportion of families which are drinking water free from coliforms is similar in both subgroups, highlighting that rural service providers -and therefore duty-bearers (United Nations, 2010c)- also have problems to ensure safety criterion to the users of community drinking water systems (right-holders). In either case, quality global scoring is worst for those self-provided.

The dimensions related to affordability and acceptability score considerably high. The water supplies were found to be affordable and acceptable, as per the indicators and criteria used. Flores et al., (2013b) discuss the difficulties of measuring access to water based on human right to water criteria at local level. The meaning of affordability criterion has not been precisely operationalized yet. According to human rights, paying for water services must not jeopardize the enjoyment of other rights. Percentage of household expenditure on drinking water has been proposed as the standard proxy for affordability but it is not simple to collect the required data. Income is hard to measure because polled families usually don't know or are reluctant to give information about it. Even more, income is very variable throughout the year. For that reason we opted to use a perception indicator as a proxy. While being more practical, its subjectivity is an important limitation. It should be noted that for households that are not connected to the system (or those connected but not paying any tariff), affordability scoring is maximum as there is no payment for the water used. On the one hand, this fact can be considered in itself a financial advantage as compared to those families which depend on a service provider that has to be remunerated. Moreover, it could be a reason for not wishing to be connected to community-controlled water supply systems. But on the other, breakdowns will happen, which require important payments for buying spare parts and/or contracting a local mechanic to repair them it (Sutton et al., 2012). Thus, i) it is important to highlight that the indicator used has its own limitations and more work is needed to investigate indicators and methodologies that allow us to assess affordability more precisely. ii) Furthermore, it should be noted that despite not paying any tariff may be scored as maximum according to affordability criterion, it could compromise

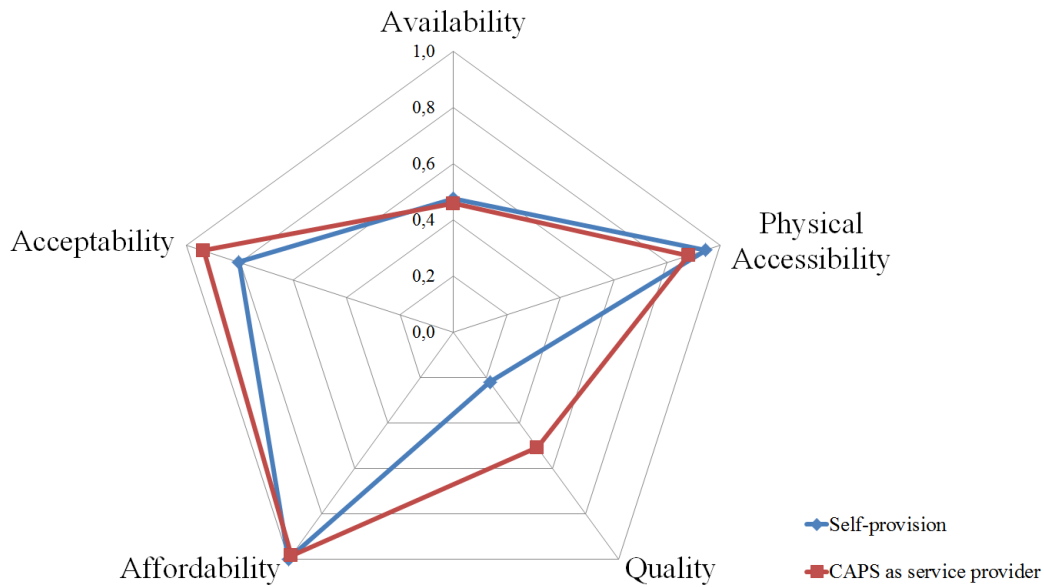
the sustainability of the service. For these reason, it is important to complement this analysis with a sustainability assessment.

Since different individuals have different notions of what is acceptable, monitoring acceptability is probably one of the most challenging aspects of monitoring the human rights to water (UN Special Rapporteur on the human right to safe drinking water and sanitation, 2014). Moreover, acceptability includes distinctive elements in case of sanitation -privacy, comfort, dignity- (Langford et al., 2014, United Nations, 2010d) which do not apply for drinking water. Even more, acceptability criterion is normally associated to organoleptic properties which are mainly linked to the quality dimension when specific metrics for the human right to water have been put into practice (Flores et al., 2013b). Traditionally there has been a current of thinking that argued for the use of protected supplies in place of disinfection (Drown, 1894) as there is a human aversion to the use of chlorine, due to its impact on the aesthetic qualities of drinking water (Jacangelo and Trussells, 2002). The indicator proposed may be used to identify probable different notions of acceptability between those drinking chlorinated water and those using protected supplies (springs and wells) but field data collection show that chlorination systems are often lacking or not working in most of the communities visited in this region. This evidence can partially explained similar results in acceptability criterion.

The Special Rapporteur also notes that “the target may be achieved but access to water as guaranteed by human rights remains unequally enjoyed by many” (United Nations, 2012). Taken this idea into account, the research also focuses on those families discriminated or not served by communitarian systems in each community. Figure 4.3 shows the importance of disaggregating data into the two types of families described before, i.e. those served by the community-controlled water supply systems and those excluded. The spider diagram shows the situation of families in a type of community (A) which represents a frequent example in the region: Families self-provided use surface water and unprotected springs while the other community members are connected to water systems into their dwelling or yard. There are two systems in community A. Most part of the households are provided by the system which belongs to the own community and the others (just some families) are connected to a system from

the neighbouring human settlement. Both systems are relatively new and both have chlorinating equipment.

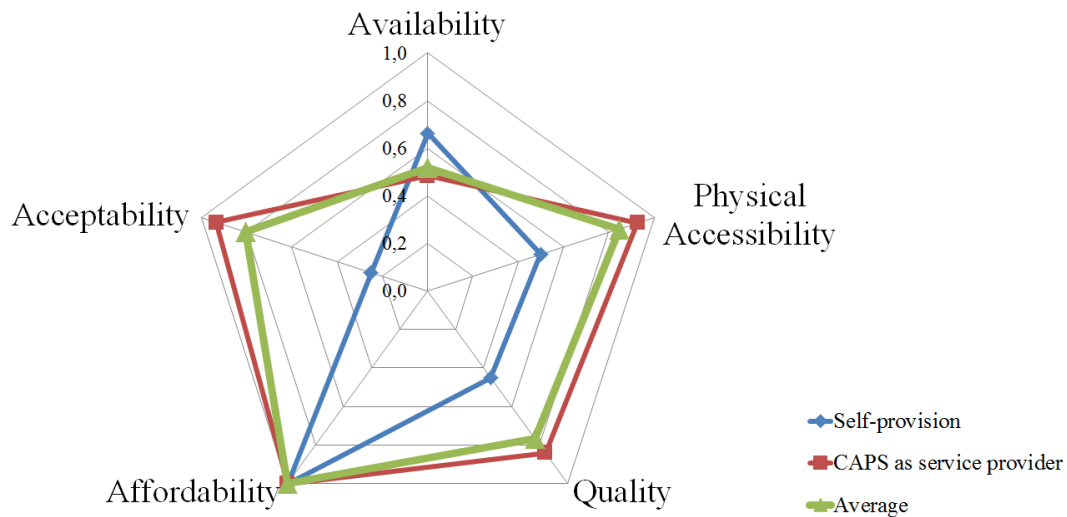
Figure 4.2. Overall disparities in access to water between families served and not served by CAPS according to human right to water normative criteria. All communities involved



Households based on self-supply have a worse level of water service as regards acceptability. Taking into account the estimated precision and the proportion of individuals with a particular feature in relation to quality and physical accessibility, it can be said that there is a tendency of better level of service for those connected to community managed systems. According to physical accessibility, whereas families self-provided have to walk to fetch water, the later have their own water point at home or at the compound. Some of those that have to move to distant places even express their insecurity in the paths. The quality of water is different in both systems (0 cfu in the system from community A and between 0 and 10 cfu in the neighbouring system where the chlorinator was not working during the data collection campaign). Due to the presence of coliforms in system 2, quality criterion scores less than 1 for those served by CAPS. However, safety seemed to be a most serious problem for those self-provided as results show. It is evident that families not connected to the system are uncomfortable with the type of water they have to drink, as reflected in acceptability criterion. The diagram in Figure 4.3 clearly shows that the situation of these discriminated families

would be "hidden" by the average at community level (as it normally occurs when using central tendency estimators) if the information is not taken, analysed and displayed separately. However, they score well with respect to availability criteria. It is explained due to they can collect water from their own sources (springs, and surface water) all the year and permanently.

Figure 4.3. Comparison between disaggregated and averaged results in Community A

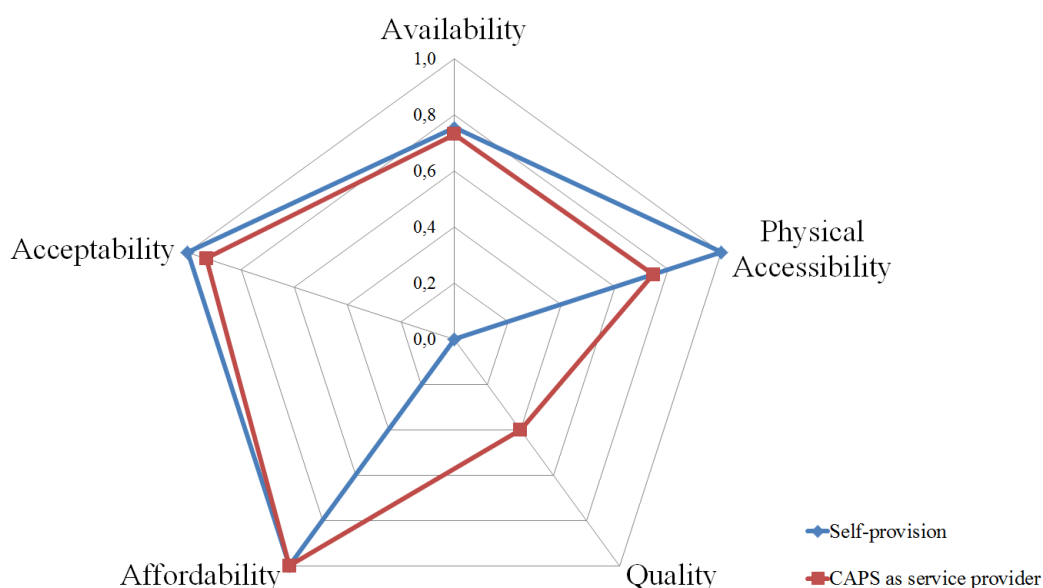


Finally, this approach allows visualizing another typical situation in the region, exemplified by community B in figure 4.4. It can be realized that physical accessibility is considerably higher for those who are not provided by CAPS. On the one hand, there are a lot of unprotected springs in this region and most of those not served by communitarian systems own or share their own sources. It is also common that they had constructed simple systems to carry water from springs to their homes through hosepipes. On the other hand, there are a lot of communities in the municipality (such as B or C) where communitarian systems were not constructed on a domiciliary logic, but rather water is distributed by a scheme of public standpipes. The system in this community is over 20 years old (19 years old in the case of C), a period in which most of interventions in the region were based on this type of distribution schemes. It requires that people have to move from their homes to the public fountains. As it was just mentioned, families not served by the system within the community do not have to fetch

water because they use artisanal ways to carry water from sources to their houses which explains differences within physical accessibility criterion.

According to water quality, community B example shows better results in water points managed by CAPS than those not served by them. However, faecal coliforms value is found within 0 and 10 cfu and represents a widespread situation in the region where a chlorinator was installed in the system but it is in a state of neglect.

Figure 4.4. Disparities in access to water as the normative dimensions of DHA between families served and not served by community-controlled water supply systems. Community B



4.4.3. Feasibility of the overall proposal for field data collection

According to field work implications, 6-7 survey takers, two drivers on average per day, a laboratory technician and a supervisor in a full time job carried out the data collection process in the whole rural municipality during 41 days in 2012. Cost for field data collection of the proposed stratified survey was approximately 5700 USD where main costs are enumerators and drivers' salaries and travel expenses, fuel and expenditure on stationery and office supplies. Salaries of the Ministry of health and UMAS staff have not been included as their participation is part of their routine activities.

Considering a campaign in which just one sample is defined in each community (instead of two subsamples), the sample size (number of households to be polled) will be

reduced to 65 per cent but the number of communities to visit is obviously the same. Some repercussions for field data collection design are discussed below where two possible options for field data collection -considering only one sample per community- have been analysed: i) to reduce the number of days necessary to carry out field work but keeping the number of enumerators constant. In this case, all the communities in the municipality could be monitored in 28 work days instead of 41. ii) To reduce the working team while maintaining the duration of field work. 3-4 enumerators, one driver, a laboratory technician and a supervisor could be able to complete the task in 41 days in this option. These alternatives would mean a reduction in costs to 70 – 80 % of the proposed stratified survey.

On a separate issue, enumerators and supervision salaries could be higher if the services of an external consultancy are contracted (up to 7500 – 8000 USD given Nicaraguan wages), as a combination of voluntary work and university internship of local students was used for field data collection in our case study. However, it is common to conduct this type of monitoring making effective use of existing local human resources in some rural contexts as it is the case of Nicaraguan municipalities. Furthermore, CAPS and/or community leaders could be involved in updating information in their communities - including both CAPS and no CAPS users' subgroups- which will result in costs reduction. Their participation in monitoring initiatives will be also worthwhile as it will help them to identify potential problem areas and consequently stimulate action (Bolt et al., 2001).

SSY Municipality annual investment in WASH activities during 2011 was 60.000 USD. It could be reasonable in terms of costs and appropriateness to update every 4 years to identify and monitor advances and progress in inequalities reduction. It represents less than 2.5% of annual budget. Elections in the municipalities take place each four years and the first one is when the new local governments define and propose a multi-annual municipal budget that afterwards will be reconsider yearly.

4.4.4. Policy implications

Human right to water imposes on States parties various type of obligations. A number of general and specific obligations as well as core obligations of immediate effect are

identified in GC15 (United Nations, 2002) and other documents that the Special Rapporteur has published to clarify the scope and content of the Human right to Water during her term of office ((United Nations, 2010c, United Nations, 2011b). Those are used as a starting point for explaining the way in which this research may improve policies to better comply with this emerging human right.

States parties have the obligation to monitor the extent of the realization, or the non-realization, of the right to water and indicators used should address the different components of adequate water (such as availability, safety and acceptability, affordability and physical accessibility). This article presents a proposal to measure the right of access to water and water facilities and services based on these five components. Once those are measured at decentralized level, local authorities could define water strategies and a plan of action to realize this right which should move beyond the construction of new systems. Rehabilitation of existing systems, actions to improve quality of water or management-supporting activities should be promoted. Even more the process of defining the strategy and plan and their content shall give particular attention to disadvantaged groups. The method proposed to identify distinct groups within rural communities can be used to integrate an equity approach throughout the planning process, involving the construction or rehabilitation of systems for unserved families within communities. It requires specific financing and appropriate local capacities.

Progressive realization implies, amongst other things, that States must move beyond minimum standards towards gradually achieving higher levels of service. This would require countries to measure specific human rights indicators and benchmarks periodically and to take positive measures to assist individuals and communities to improve their level of service.

Extending facilities to the last percentage of unserved and hardest families to reach may be too expensive (Butterworth et al., 2013, Smits and Sutton, 2012). However, States parties have the obligation to adopt relatively low-cost targeted water programmes to protect vulnerable and marginalized groups. The methodology proposed give pertinent insights about the situation of those families which based their access to water on self-

supply mechanisms. To encourage and regulate self-supply in certain contexts is needed in order to reach the goal of universal access.

States parties have the obligation to take measures to prevent, treat and control diseases linked to water. At the same time, it needs to be recognized that traditional sources might be used at sometimes in rural areas when community-based supply breaks down. As it is suggested elsewhere (Hunter et al., 2009) health benefits attributed to the consumption of safe water are almost entirely lost if raw water is consumed even once over the course of a few days. A suitable and sustainable way forward in these contexts may be to include traditional water sources (dug wells and springs) as a part of communitarian systems and implement all necessary measures to protect them within verified risk management plans. Capacity development on quality issues might be necessary in order to reduce the capacity gap of local authorities.

To meet their responsibility, service providers should take certain measures, such as providing safe water, ensuring the regularity of supply or avoiding discrimination in their operations. However, community based organizations as service providers face some difficulties (due to lack of capacity) to meet their responsibilities as it is reflected in this article. The approach enables regulatory authorities and technical assistance teams to better understand the level of service that CBOs are delivering to citizens taking into account the human rights normative content. Thus, this research might also be used to shape decision-making processes in relation to regulation, support and capacity developing to community based service providers.

4.5. Conclusions

Nowadays, measuring access to water at global level determines one “fit to all” indicator, which is excessively simplistic in some settings, and does not show existing inequalities. An approach based on aggregate outcomes and central tendency estimators does not provide any particular incentive to focus and reach marginalized groups. Despite new trends towards global monitoring are emerging in the context of Sustainable Development Goals, shortages mentioned have influenced national and local monitoring systems too often. The proposed methodology implemented at local level provides some findings to be considered as recommendations for i) local monitoring, ii) Joint Monitoring Programme platform at global level and iii) for monitoring the fulfilment of Human right to Water. The overall conclusions are grouped into these three levels.

i) At local level, the approach is practical to locate those minority sectors within rural communities that often do not benefit from the same services than the others. The sample design serves as a basis for reasonably accurate estimates of the total number of members of each sub-group within the community which is critical to broadly characterise access to water. This is very useful, as indicators can be displayed according to the percentage composition of the community besides the most common average values. In this regard, the article contributes to shape decision-making processes supporting local authorities to define appropriate plans of action which should include equity measures, visualizing the necessity to take steps concerning the protection of traditional water sources, encouraging and formalizing self-supply in certain contexts, regulating the actions of community based service providers and giving pertinent insights to achieve the implicit obligation of States parties to develop the capacity of these non-State service providers. The methodology proposed implies higher costs for field data collection than traditional approaches. However, as a result of the research, the over-investment can be assumed economically feasible considering municipal annual budgets, the required frequency for field data collection and specially taking into account the imperative need to have adequate tools for equity-oriented policy making at local level.

ii) Local level approaches for monitoring rural water supplies as the one proposed could be used to test methodologies that will be part of monitoring systems at supra-local level. Lessons learned at this level may feed national and international information tools once the human rights framework has been assimilated. At international level, the JMP proposal for SDGs is evolving in this sense as it includes a methodology to monitoring inequalities reduction in access. Doing so requires data disaggregation on four dimensions (Joint Monitoring Programme, 2014a) but it is not specified yet the way data will be collected to ensure precise estimates of sub-groups considered. Adaptations of the methodology proposed could resolve the challenge.

iii) Progressive realization of the human right to water requires not staying in a basic service level but to improve it, thus a multidimensional approach as the one presented can be apply to evaluate progress. Moreover, the methodology can be used to deepen into complex and multidimensional realities where data can yield to unexpected results as it is the case of a better position with regard to some criteria of people served by non-piped systems versus others that are supplied through piped systems as the latter is situated on the top of JMP drinking-water ladder. This is useful when identifying and characterizing communities in order to develop equitable and efficient strategies for resource allocation which is a requisite clearly justified from the perspective of the human right to water.

Chapter 5. Overall conclusions and future lines of research

As stated in the introduction, monitoring WASH related issues taking into account a human rights framework is an emerging challenge and thus a field of research. Different analyses and new methodological approaches have been described in previous chapters. Hereafter a summary of the main contributions is presented. Conclusions have been grouped into theoretical, methodological and empirical categories to make their use easier. Finally, the most relevant policy implications are outlined. A detailed presentation of the conclusions is included in the corresponding sections and subsections in chapters 2, 3 and 4. Some directions for future research are pointed out at the end of this chapter.

5.1. Overall conclusions

From a theoretical perspective, this study deepens the understanding of human rights to water and sanitation content through the operationalization of their definition into specific metrics which can be very useful to characterize the level of these services from a rights perspective. The composition of each criterion represents a relevant step forward to address the essential challenge to translate the conceptual and legal elements into practice. Particularly remarkable is the proposal in relation to the human right to water as it has been developed further.

From a methodological point of view, different contributions are summarized hereafter:

- i. The matrix proposed in chapter 2 for analysing the type of information provided by JMP and GLAAS international mechanisms from a human rights perspective, constitutes a significant step forward for analysing the inclusion of human rights to water and sanitation elements into monitoring platforms. It has been tested at international level but it can be also adapted to regional, national and/or local contexts.
- ii. The application of the step by step procedure for the index construction in chapter 3 makes an important contribution to develop the human right to water conceptual framework further. A similar approach could be used to operationalize scientific metrics for the human right to sanitation.

iii. The methodology presented in chapter 4 is practical to locate and characterize minority sectors within rural communities and thus, greatly contributes to properly measure disparities within small human settlements. The approach is especially relevant in order to better understand discriminatory patterns in access to water which is of great importance for human rights fulfilment.

The empirical findings reveal that:

i. Human rights to water and sanitation criteria are beginning to be noticed in international WASH-monitoring mechanisms. On the one hand the latest Joint Monitoring Programme Post-2015 proposal will considerably contribute to human rights to water and sanitation measuring with outcome rights-based indicators. On the other, the new version of the Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) platform complements human rights monitoring by adding process and structural indicators. Despite improvements, there are still significant gaps of information to monitor human rights in a broad sense. It is a concern that some of the omissions detected correspond to controversial and critical elements which human rights recognition should protect: Affordability at household level, including the frequency or number of disconnections; acceptability issues which are specially relevant in the case of sanitation; the existence of regulation and policies to control pollution of water sources due to the negative effects that water resources contamination has on downstream access to safe drinking water; States control and regulation when private sector is involved; more attention should be paid to methods and data if there is a wish to avoid perpetuation of some forms of discrimination.

ii. Moreover, human rights are indivisible, as well as the components are in it. The violation or non-compliance of one of these components implies ipso facto human rights non-compliance. For these reason it is crucial that specific metrics will be placed to measure and thus protect and promote human rights to water and sanitation fulfilment in a complete and coherent manner at the international level.

iii. According to the case study in rural Nicaragua (chapter 3), it is important to highlight the significant percentage of the population whose enjoyment of the human right to water is not being fully guaranteed -despite using improved sources of water-,

resulting in a null value of the index proposed. Obviously the result is conditioned by indicators considered and the non-compensatory technique used for aggregating criteria into the composite index. As it was said before, this decision is supported by human rights indivisibility (a conceptual implication of the framework considered). In other words, it can be said that water is a service that must meet certain characteristics (and the content of the human right provides minimum standards that must be met). When those are measured in detail, it appears that the level of non-compliance with these standards is very high, and therefore the level of realization of the Human right to Water. It is expected that similar results may be obtained in similar contexts around the world due to the demands of the human rights normative and cross-cutting content.

iv. The approach presented in chapter 4 is novel as it allows measuring the level of water services based on human right to water normative content. It has been applied in two different models of service delivery (when a community-based organization is the service provider and in self-provision scenarios) showing that each model presents its own limitations in the context studied. In any case, it is pertinent to define specific metrics for all five normative criteria as each one can be used to highlight different challenges that need to be solved to fully address the provision of minimum standards of this essential service. Joint Monitoring Programme water ladder assumes that access to water based on piped on premises is the highest level of service. However, non-piped schemes could score higher in some normative criteria as shown for physical accessibility in our case study. It is relevant to conduct research based on the methodology presented to broaden knowledge about this specific issue in different contexts.

5.2. Policy implications

There is an intention in the research to clearly define the policy implications of these theoretical, methodological and empirical main results. The most relevant are outlined below:

- i. Results from chapter 2 reveal that there are still some challenges to properly monitor human rights to water and sanitation using specific, periodic, country based international mechanisms which are commonly used in the sector. GLAAS is being constantly renewed since its inception in 2008 and the way progress in access to water is measured at the international level by JMP is in a period of redesign. Thus, tools presented in chapters 2, 3 and 4 can provide appropriate inputs to this work in progress.
- ii. The definition of scientific metrics to be used for monitoring the concept of progressive realization is still an open issue. The indicators and index explained in chapter 3, combined with improved data about duty bearers' resources and the way those are allocated (as it is suggested in chapter 2) could contribute to improving the measurement of this complex but extremely important concept, taking into account the human rights to water and sanitation framework. Even more, progressive realization of the human right to water requires not staying in a basic service level but to improve it, thus a multidimensional approach as the one presented in chapter 4 can be applied to evaluate progress.
- iii. A major policy implication of the research is about shaping decision making through rights-based tools as those proposed in chapters 3 and 4 to support resources allocation and priority setting. Some specific issues are summarized below:
 - a. As it is outlined in chapter 2, the methodological approach proposed at international level to monitoring the elimination of inequalities is not without its limitations. Furthermore, States parties often lack appropriate tools to measure disparities, a situation that is even worst at local level. The methodology proposed in chapter 4 has an enormous potential to contribute solving this challenge. The method proposed to identify distinct groups within rural communities can be used to integrate an equity approach throughout the planning process.

- b. As discussed in chapter 2, it is expected that the existence of measures of risk management, such as Water Safety Plans, will be monitored in the Sustainable Development Goals era as a condition to consider that a service is safely managed. However, little attention has been paid to the protection of common water sources (chapter 2). A vast number of people in developing contexts depend on traditional and common water sources -normally unprotected- both as a primary source of water or as a secondary when community-based supply breaks down. It is suggested in chapter 4 that traditional water sources should be included as part of communitarian systems and implement all necessary measures to protect them within verified risk management plans.
 - c. Challenges and barriers to develop specific metrics for human right to water criteria have been identified in chapter 3. It is concluded that some elements are not simple to measure in the field (for cross-cutting criteria particularly) but the research gives pertinent insights in this sense. Either way, specific research on this field will be necessary to define easy to get the at local level, accurately defined, standardized and internationally applicable, scalable at all administrative levels and yearly updatable indicators (Jiménez et al., 2008).
 - d. Community based organizations as service providers face some difficulties (due to lack of capacity) to meet their responsibilities as it is reflected in chapter 4 and further develop elsewhere (Flores Baquero et al., 2015). The approach presented allows identifying priority actions for decision making of actors involved in interventions at decentralized level as it is evident that CBOs usually need support to fulfil their responsibilities.
 - e. The methodology proposed in chapter 4 give pertinent insights about the situation of those families which based their access to water on self-supply mechanisms that usually coincide with those hardest families to reach. To encourage and regulate self-supply in certain contexts is needed to meet the universal access target required by international human rights law.
- iv. Specific financing and appropriate capacities are necessary to adequately applied the methodological approaches described in chapters 3 and 4 at local level. The methodology proposed in chapter 4 implies higher costs for field data collection than traditional approaches. However the over-investment can be assumed economically

feasible and especially relevant considering the imperative need to have adequate tools for equity oriented policy making at local level. Capacity development on key issues might be necessary in order to reduce capacity gaps of local duty-bearers.

v. Finally, results have been used for advocacy purposes. As discussed earlier in chapter 3, human rights NGOs have used results based on the study to expose the human rights to water and sanitation situation of rural communities in the country which culminates in the first report about human rights to water and sanitation in Nicaragua (CODA, 2011). During last years, a new attempt to monitor these emerging human rights has been conducted. The second report is now being prepared for publication (ONGAWA, forthcoming) where methodological contributions from this thesis have been applied to improve deficiencies detected in the first version.

5.3. Future lines of research

This work paved the way for future lines of research about measuring human rights to water and sanitation.

i. In the view of the first Special Rapporteur on the issue, water and sanitation are interrelated but independent human rights (UN Special Rapporteur on the human right to safe drinking water and sanitation, 2014, United Nations, 2009a). It is considered essential now to move forward with initiatives that interpret and operationalize dimensions, elements and indicators separately. Despite the existing differences among the interpretation of water and sanitation criteria, the approach presented in this thesis to define specific metrics for the human right to water could be adapted for the human right to sanitation. Local settings may be used to test the validity of the approaches as it has been done in this thesis.

ii. Human rights are indivisible, as well as the components are in it, so some experts may think that all criteria must be equally important. However, other international experts have pointed out the important role that the context should play in defining monitoring approaches. Even more, it is critical that specific metrics may not be determined in abstract and that they are flexible enough to be contextually relevant. In this sense, it may be pertinent to analyse experts' opinion on the relative importance of human rights criteria, which is a subject of study in it. Relative importance of each dimension when combining them in the construction of an aggregated index could be important to better understand where to start solving problems when assessing levels of WASH services from a rights perspective. Principal component analysis (a statistical alternative based on multivariate techniques) has been used in chapter 3 to define weights but it is pertinent to research about participatory approaches which use experts' opinion to intercept the relative importance of the base indicators.

iii. Human rights compliance has been traditionally based on a bilateral relationship between the State and the individual (United Nations, 2010c). However, in the case of the Human right to Water and Sanitation (HRWS), the supply of water and sanitation services has often been transferred to a non-State actor. This implies that the performance of the non state actors becomes crucial for the fulfilment of HHRR. A

large body of literature has to some extent examined compliance with the principles of Human rights when this third actor is a private entity (Bakker, 2007b, Prasad, 2006). However little has been investigated about the ability of community based organizations (CBOs) to comply with HR obligations, despite their relevant role in water and sanitation provision both in developed and developing countries. In this sense, the literature on collective action offers a complementary view to examine HRW compliance when the service provider is a community based organization. Further research is needed to analyse the link between collective action at community level and compliance with human rights to water and sanitation from the perspective of users (as right-holders) of rural water systems, where CBOs are responsible of service provision.

iv. Universality, non-discrimination and equity are complementary and fundamental principles of the Human right to Water and Sanitation. Disparities are becoming issues of concern when monitoring the sector (Joint Monitoring Programme, 2013). It is necessary to integrate new methodologies to measure and better understand the situation of the underserved (United Nations, 2012). In a context of decentralization, Local Government Authorities (LGAs) show limitations when meeting their Human rights to Water and Sanitation obligations, mainly due to the lack of reliable information and poor allocation of resources in terms of equity (Jiménez & Pérez-Foguet, 2010). When information for planning exists is mainly based on coverage data and interventions are principally focused on construction of new infrastructure. Prioritization is strongly linked to optimization and cost-effectiveness criteria, a fact that excludes minorities in a way (Langford et al., 2014). Chapter 4 contributes to solve this problem but it is necessary to better understand the situation of the underserved in rural communities. More specifically, small rural communities and/or reduced groups within them, living in contexts with high levels of coverage, that are not usually capable to draw LGAs attention to improve their access to water. The methodological approach must be further develop in order to define simple planning indicators as it is suggested elsewhere (Flores et al., 2014) -where the attention is placed on those minority groups that are in risk of not being prioritized according to traditional planning criteria-, avoiding the perpetuation of inequalities frequently promoted when just using coverage indicators. In this line, information about the reasons of exclusion must also be used as it is suggested

(Flores et al., 2014) to better understand the patterns of inequities and thus, orientate local government authorities decision making.

v. The international community has started to pay attention to non-discrimination issues (Joint Monitoring Programme, 2014a) but individuals' participation along the design and service provision process, as well as accountability issues, lag behind the other criteria despite relevant research has already been conducted (Laban, 2007, Narayan, 1995, Prokopy, 2005). Participation and access to information criteria have been partially tested at local level in this research. As it is outlined in chapter 3, some of the indicators proposed for these criteria include accountability elements but without going into the subject in depth. How to measure this dimension in a practical way is important, and another line of research.

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