Piloting new indicators and methodologies to measure the human right to water in Nicaragua

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Abstract

There is a growing interest internationally to recalibrate the monitoring framework used to measure access to basic water services. There are drives to move on from the current technological and binary approach (improved-vs.-unimproved water supply technologies). Several initiatives have been applied to support the processes of resource allocation, targeting and prioritisation in development policies. These approaches consider the level of service delivered by taking into account aspects such as water quality, quantity, and continuity.

The recognition of the human right to water and sanitation is a milestone that should contribute to the evolution of this work in progress. It brings in other issues such as affordability, physical accessibility and acceptability.

To incorporate all these human rights criteria in monitoring initiatives is undoubtedly a complex task. It involves the definition of new indicators, design of field data collection methodologies, statistical analysis of collected data, and use of information generated in policy formation and decision-making. The research presented in this paper has tried to tackle this emerging challenge. It has developed and piloted indicators that measure access to water from a human rights perspective. The proposed indicators have been applied to two different groups within communities in northern Nicaragua: people using a water system managed by a rural water committee against those vulnerable groups characterised by self-provision.

The research concludes that data needs to be well analysed, information needs to be adequately post-processed, aggregated and disseminated to promote its use in decision-making.

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Introduction
Local, national and global water services monitoring systems have different purposes. Therefore they should be conceptualised in a distinct manner. Despite their differences, the global framework has influenced considerably national initiatives where "issues that do not receive attention at global level also tend to be disregarded in national policy making" (United Nations, 2012). Decentralisation processes have definitely delegated relevant responsibilities to local level authorities. However, decentralisation of responsibilities has not usually been accompanied by decentralisation of resources (Fisher, 1999, Novo and Garrido, 2010, Ribot et al., 2006). Monitoring access to basic services at this local level lacks human and capital resources but it is an adequate sphere to experiment with improvements that could reach national systems.

There is some international consensus on the need to advance the measurement of access to water at the three levels just mentioned - local, national and international - (Cotton and Bartram, 2008, Jiménez and Pérez-Foguet, 2008, Joint Monitoring Programme, 2011). The UNICEF/WHO Joint Monitoring Programme is based on a technological approach that distinguishes between improved or unimproved water sources to measure access (Joint Monitoring Programme, 2006). According to this methodology, many Latin American countries show quite acceptable levels of access to water (Joint Monitoring Programme, 2012). However, indicators need to be relevant for countries with relatively high levels of access and they need to capture improvements in the level of service, so that they can be used to support development policies. There are some notable initiatives in the sector that have shown the need to expand the conceptual framework used to follow up on these issues (Flores et al., 2012, Giné and Pérez-Foguet, 2010, Giné and Pérez-Foguet, 2012a, Jiménez and Pérez-Foguet, 2010, Majuru et al., 2012, Moriarty, 2010, Pérez-Foguet and Giné, 2011, Schouten, 2011). Furthermore, different works have pointed out that this monitoring system should improve on other fields, including inequalities and discrimination considerations (Melamed, 2012) and performance measurement from a resource perspective (Anderson and Langford, 2012).

The declarations of the United Nations General Assembly (United Nations, 2010a) and the Human Rights Council (United Nations, 2010b) which recognise the human right to water, can be seen as an opportunity to advance in monitoring the sector, a task clearly specified in General Comment 15, "States Parties have a core obligation to include methods, such as right to water indicators and benchmarks, by which progress can be closely monitored" (United Nations, 2002). On the one hand, its normative content requires paying attention to some dimensions not always considered in the WASH sector e.g., affordability, physical accessibility or acceptability. On the other hand, one of the main contributions of a human rights based approach is the necessity to integrate new methodologies to measure and better understand the situation of the underserved,

the most disadvantaged, and vulnerable groups in terms of rights in each context (United Nations, 2012).

Incorporating these elements in monitoring requires political will (not always existing). Moreover it is a complex task that requires the definition of new indicators, the design of methodologies for field data collection, the statistical analysis of the data and the development of user-friendly tools for decision makers.

This research set out to address this challenge by developing and testing a framework for monitoring access to basic water services from a human rights perspective in rural communities in northern Nicaragua. The research focuses on those who have been discriminated against by not receiving a water supply service.

Nicaraguan Context

The human right to water is explicitly mentioned in latest national water laws of some countries including Nicaragua (Government of Nicaragua, 2007). Through its national Water Law, the Nicaraguan State has committed itself to formally delegate service provision in rural areas to community committees of drinking water and sanitation (CAPS). The Water and Sanitation Committees Law specifies the regulation, organisation, constitution, legalisation and performance of CAPS. (Government of Nicaragua, 2010).

It is common to find drinking water systems managed by CAPS that provide this service to the population of rural communities in Nicaragua. It is estimated that around 1,200,000 (Kreiman, 2010) out of 2,300,000 (INIDE, 2005) rural people are supplied by these Community Based Organisations in the whole country. But CAPS, as service providers, face some important shortcomings according to the human right to water requirements: they cannot always guarantee by themselves sufficient service levels and usually there is an amount of families (by no means negligible) that for various reasons such as location, not owning land and population growth, are not served by them. In this sense, several studies have suggested some kind of intra-community discrimination in rural communities (Agrawal and Gupta, 2005, Cleaver, 2005).

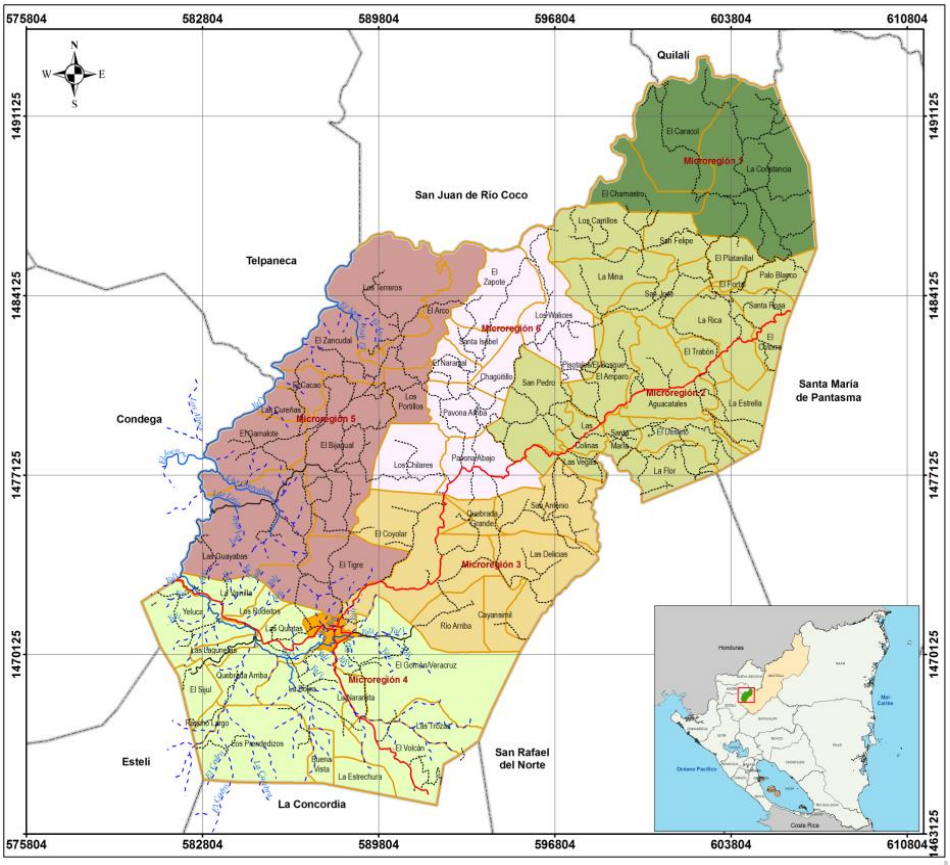
FISE is the national governmental institution that manages most of the funding and control decision making about improving, upgrading and maintaining rural water services in Nicaragua. Local governments submit proposals for new investments to FISE. In addition, at local level, municipal governments can also plan and implement water and sanitation interventions using other funding transferred directly from Central Government.

San Sebastian de Yalí Municipality within Jinotega department is located in the central northern region of Nicaragua. The Municipal Water and Sanitation Unit (UMAS) is responsible for water and sanitation rural services. It is manned by two specialists that have to cover 22,500 people (INIDE, 2005) located in 75 dispersed rural communities, covering an area of 402 km^2. 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.

Recently, SIASAR - Information System of Rural Water and Sanitation (2013) - has been set in motion as a joint initiative launched by governments of Honduras, Nicaragua and Panama and supported by WSP-WB. Its strategic objective is to have a basic information tool that can be updated, used for comparison and to verify water and sanitation services within each country. In the SIASAR system, a mobile device is used for collecting field data and a web interface is used for data editing and analysis. The system generates performance indicators that are aggregated at several geographic levels (community, municipality and department). It also automatically produces rankings, graphs and summary reports that detail the performance of communities, infrastructure systems, service providers (mainly CAPS), and technical assistance providers (mainly UMAS).

Figure 1: Map of San Sebastián de Yalí municipality.



Source: ONGAWA, 2012

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. In order to sustain non-discrimination, there is a need to look beyond aggregated outcomes and identify disparate impacts or less favourable treatment over time (United Nations, 2012).

Regarding the content of the information gathered, special attention was paid to the idea of trying to incorporate relatively simple and precise questions that would enable meeting the criteria established by the human right regulatory framework (availability, physical accessibility, affordability, quality and acceptability).Then, we defined a set of indicators, combining different complementary questions that allowed us to build at least one indicator for each of the five dimensions considered.

ONGAWA, a Spanish NGDO, funded by AECID, is undertaking a 4-year research project to develop and test indicators to measure the human right to water. Household surveys were conducted in all 75 rural communities of SSY Municipality. Field work lasted 44 days, divided into 3 different campaigns from March to September 2012. Each of the 75 communities was divided into two subgroups of households. One subgroup is not served by the water supply systems that are managed by the CAPS; the other is served by self-provision, which is not managed by the CAPS. This separation helps us to find and characterise discriminated people not served by communitarian systems.

The research used a sampling method developed by Giné and Pérez-Foguet (2012b). It is based on exact confidence limits of binomial distribution, corrected for finite populations. A simple formula implicitly determines the required sample size for a given precision, confidence levels and population size. This approach produces estimates with sufficient precision for local level decision-making.

With regard to field work, technicians from the Municipal Water and Sanitation Unit (UMAS) of the municipality of San Sebastian de Yali (SSY) called the community leaders and members of the CAPS board to a meeting. They were informed about the work and helped the team in the field work. Households to be surveyed were randomly selected using the method for the selection of households advised by Bennett et al (1991). When possible, a census of the households from community (distinguishing the two subgroups mentioned) was generated in situ. Moreover, simple community maps were generated to facilitate the organisation of field data collection in each community (Figure 2). Each house within the community is shown on the map with an X; where X with circles represents houses not served by CAPs managed community water system (i.e. self-provision) and those not circled represent the opposite. Lines are paths that were used to find houses randomly selected. When this was not feasible, a method that ensures a random or near-random selection of houses was promoted. Communities were divided into 2 or 3 areas depending on their size and dispersion. In each area a central house was selected as the starting point, then the survey taker chose a random direction from that point and selected successive households as widely spread as possible.

Figure 2. Map based on community access to water (CAPS vs. NO CAPS households).

Source: Authors, 2012.

Data were collected in all 75 communities of SSY municipality but results presented herein focus on a case study of five communities with 296 households (154 served by CAPS and 149 not served by CAPS). Among the 75 communities, these five have been selected representing different conditions in the municipality. Table 1 summarises information on the size of the community, statistical sampling and the actual number of surveys taken. Table 2 describes the existence and basic characteristics of water supply systems in each of these five communities. A description of the water situation in each community is provided below.

Quebrada Arriba is a small community of about 47 households. There is a gravity fed system constructed 12 years ago that provides water to 28 households. Another number of households (10) are provided by another gravity system from a nearby community. Both systems were constructed in a domiciliary logic supply (piped water into dwelling or yard). The rest of the households (9) take water from surface water or unprotected springs.

Las Lagunetas is also a small community. It also manages a gravity fed system but in this case it is an older one of 22 years. 32 households collect water from public standpipes. The access of the rest of households is based on surface water (3 out of 11 polled households) and on protected (5 out of 11) and unprotected springs (3 out of 11).

*Table 1. Design of sample size based on the size of the community and actual polled sample. (α=0.9; e<0.2. Except * where α=0.8; e<0.25).*

Community	Number of Households			Number of Households (sample design)			Polled Households		
	Self-provision	CAPS (service provider)	TOTAL	Self-provision	CAPS (service provider)	TOTAL	Self-provision	CAPS (service provider)	TOTAL
Quebrada Arriba	9	38	47	7	14	20	4	15	19
Las Lagunetas	15	32	47	10	13	23	11	14	25
La Bolsa	73	40	113	17	14	30	14	15	29
Yeluca	38	0	38	14	0	14	14	0	14
La Naranjita	7	44	51	5*	14	19	2	18	20
TOTAL	**142**	**154**	**296**	**48**	**55**	**106**	**45**	**62**	**107**

Source: Authors, 2012.

La Bolsa is a bigger community managing an old gravity fed system of 20 years that provides water to 40 households out of 113 through public taps. Self-provision is based on unprotected springs (12/17), protected springs (4/17) and protected dug-wells (1/17).

Yeluca community does not own a water system and 38 households that make up this small community collect water from protected springs (3/14), unprotected springs (7/14) and surface water (4/14).

La Naranjita has just been involved in a new gravity-fed water system delivering water through pipes into dwelling or yard. 50% of people not served directly by this system collect water from unprotected springs and the other half is provided from the same water but indirectly through a neighbour.

Available data from surveys were validated in two different ways: firstly, the supervisor looked through surveys for mistakes in the field. Then, different cross-questions let us identify possible inconsistencies when data are transferred into the database built for their analysis.

Table 2. Basic characteristics of community managed water system.

	Category (technology)	Type of connection
Quebrada Arriba	Gravity fed	Piped water into dwelling/yard
Las Lagunetas	Gravity fed	Public tap/standpipe
La Bolsa	Gravity fed	Public tap/standpipe
Yeluca	--	--
La Naranjita	Gravity fed	Piped water into dwelling/yard

The indicators used to measure the different dimensions and the methodology to aggregate them in order to build relatively simple indices have been developed elsewhere (Flores et al., 2012). That previous work to develop this methodology drew on international standards - when available - experts and local stakeholders (researchers and local NGDOs that work in the WASH sector) for the assignment of scores for each indicator, where a value of 0 indicates the poorest level and 1 the optimum conditions. In cases where there is more than one indicator for each criterion, the information is added in a single index relative to each of the criteria. To tackle the step for aggregating indicators into right to water criteria sub-indexes, there are different approaches. For this tool, we considered two situations; when variables can compensate each other's performance and the opposite. For example, two indicators have been considered for measuring physical accessibility; proximity and security in paths. These indicators have been aggregated using a multiplicative function, as both elements need to be guaranteed simultaneously and a good scoring in one of them should not compensate a deficient value in the other one. On the other hand, we applied an additive aggregation when we consider that two variables can compensate each other; this is the approach when aggregating water consumption and people's perception of that consumption in availability criterion. However, continuity or seasonality were aggregated using a geometric function. Indicators within each criteria sub-index are summarised in Table 3. It also points out levels and scores of all indicators and the weighting system considered to aggregate them.

Results

This research has incorporated new dimensions to measure access to water, based on a human rights approach. This provides more information than current technology-based approaches. If we focus on the indicator "access to drinking water" considered in JMP WHO/UNICEF, all households served by systems operated by CAPS have access to an improved water source in this case study. However, a more nuanced picture emerges when analysing all five of the criteria in Table 3. Figure 3 (a) presents an average across all five communities sampled that can be understood as an overall value of the situation of the human right to water criteria, differentiating between people served and not served by CAPS. Availability and quality are the main shortcomings in communities studied. The low value for availability is due to the poor continuity and seasonality of the supply; it is common that households express the existence of moments during the year when they need to use alternative sources for drinking water. Moreover, continuity

of the service is usually lower than 24 hours a day and just some days in the week. Systems managed by CAPS often suffer breakdowns, cuts of water and flow problems in some water points. These situations cause a decrease in the availability dimension.

In terms of quality, approximately 40% of people served by water systems managed by CAPS were drinking water found to have faecal coliforms of more than 10cf/100ml. The water supplies were found to be affordable, as per the criteria used. It should be noted that the affordability criteria was not measured for households that are not connected to the system. It was assumed that they do not pay a fee for water service. However, this is a weakness of the methodology that needs to be further developed. We conclude that having an improved source run by a CAPS is not a sufficient condition to ensure access to the service according to the human right to water normative criteria.

The Special Rapporteur also notes that (United Nations, 2012) "the target may be achieved but access to water as guaranteed by human rights remains unequally enjoyed by many". Thus the research also focused on those families discriminated, not served in each community. Figure 3 (b) shows the data, disaggregated into two types of families described –those served by the CAPS managed systems and those excluded in the case of Quebrada Arriba community. The spider diagram shows that households not served by the CAPS run systems have worse access to water as regards quality, acceptability and physical accessibility. However, they score well with respect to availability criteria. This is explained due to the fact that they can collect water from their own sources (springs, dug-well and surface water) all year and permanently.

Finally, this research also shows that people excluded from community drinking water projects do not always represent the lower levels in all human right to water criteria. We have already noted in Figure 3 (a) that availability is slightly higher for those not using water systems managed collectively by CAPS. In the case of Figure 3 (c), which shows the specific situation of Las Lagunetas community, it can be seen that physical accessibility is considerably higher for those people who are self-providers. In this region there are a lot of unprotected springs and a lot of those not served 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 (Figure 4). On the other hand, in communities such as Las Lagunetas, water is distributed by a system of public standpipes, which requires that people have to travel from their homes to the public fountains to fetch water. As was just mentioned, in the same community families not served by the system 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, the Las Lagunetas example shows better results in water points managed by CAPS than those not served by them.

Table 3: Indicators considered.

ACCESS TO WATER BASED ON HUMAN RIGHT TO WATER NORMATIVE CRITERIA									
Normative criteria	**Elements/Indicators**		**Levels and scores**						**Weighting system**
Availability	**W_Av**	Sufficient quantity (lpd)	< =5 lpd (0)	5-20 (0-0,2)	20-50 (0,2-0,8)	50-100 (0,8-1)	> 100 (1)		Additive & Geometric
		Sufficient quantity (perception)	Not enough sometimes for drinking (0)		Just enough for drinking (0,5)	Enough for all domestic purposes (1)			
		Continuity	See Rietveld et al (2009) for the index						
		Seasonality	Primary source for drinking water not reliable all the year (0,5)			Primary source for drinking water reliable all the year (1)			
Physical Accessibility	**W_PA**	Proximity (time spent)	> 30 minutes (0)	5-30 minutes (0,2)		< 5 minutes (0,8)	pipe into house (1)		Geometric
		Security in paths (perception)	No (0)			Yes (1)			
Quality and safety	**W_Q**	Faecal coliforms (CFU/100ml)	> 10 (0)		1-10 (0,4)	0 (1)			No aggregation necessary
Affordability	**W_Aff**	Affordability (perception)	Too expensive (0)			Fair (1)			No aggregation necessary
Acceptability	**W_Acc**	Organoleptics (perception)	Bad colour, odour or flavour (0)			Good colour, odour and flavour (1)			Geometric

*Source :Flores et al., 2012. Improvements based on *Rietveld et al., 2009 **Jiménez and Pérez-Foguet (2012).*

Flores et al., (2012) discusses the difficulties of measuring access to water based on human right to water criteria at local level. In fact, while some elements are easy to measure at household level, others are not. Some ideas are summarised below:

- The study found that it was very difficult to define and measure security at water points. Two reasons were given for this: it is a taboo question in most of the communities and security perception has considerable gender bias; thus the response depended on the gender of the informant.
- The "standard" indicator for affordability (percentage of household expenditure on drinking water) (Roaf et al., 2005, Smets, 2009, UNDP, 2006, COHRE AAAS SDC and UN-HABITAT, 2007), is not simple to measure. Its meaning and standards have not been precisely defined yet (COHRE AAAS SDC and UN-HABITAT, 2007, Smets, 2009). Income is hard to measure because polled families usually don't know or are reluctant to give information about it. Furthermore, income is very variable throughout the year. For that reason we opted to use a perception indicator as a proxy of affordability criterion. While being more practical, its subjectivity is an important limitation. More work is needed to investigate indicators and methodologies that allow us to assess affordability.

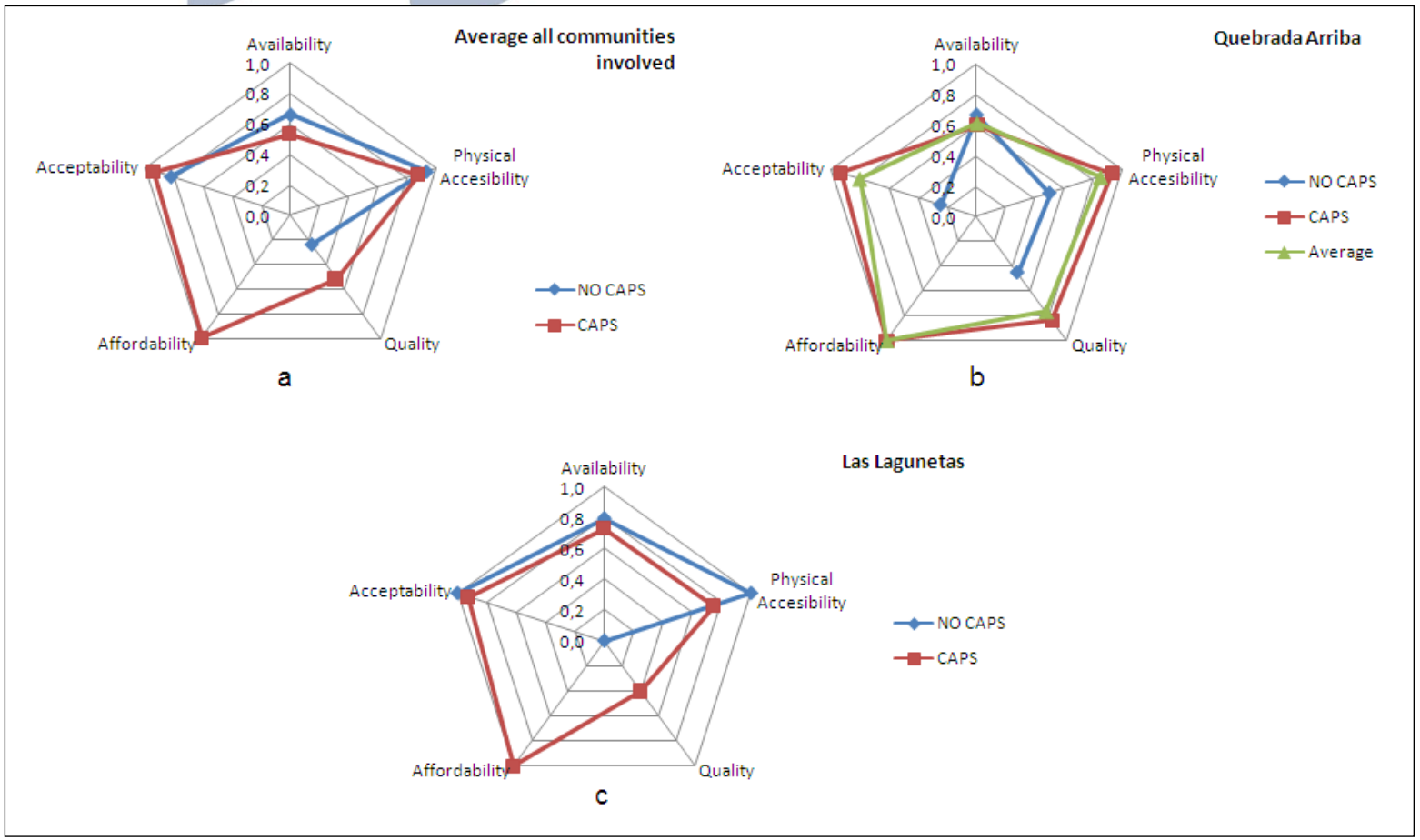
Implications

Can the monitoring system be adopted?

Some progress is to be mentioned according to the overall research process. Field work, database construction, preliminary data post-processed and a first dissemination of results have been carried out. Currently we are working with the new UMAS team after the last municipal elections (November 2012) to promote information system use in decision-making.

Field work in which the whole rural Municipality was monitored has been executed in 44 days with 6 survey takers per day on average and a supervisor in a full time job who carried out data collection. The costs for doing the work were approximately 5,500 USD. Database construction and preliminary analysis have been conducted over a 3 month period. SSY Municipality annual investment in WASH activities during 2011 was 60,000 USD. It could be reasonable, in terms of costs and appropriateness, to plan an updating in a 4 year period to identify and monitor advances and progress in inequalities reduction. Elections in the municipalities take place every four years and the first year is when the new local governments define and propose a multi-annual municipal budget that afterwards will be reconsidered annually. 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).

Figure 3 (a): Overall differences between families served and not served by CAPS in access to water according to human right to water normative criteria. (b) Comparison between disaggregated and averaged results in Quebrada Arriba community (c) Differences in access to water as the normative dimensions of DHA between families served and not served by CAPS. The Lagunetas community.



Source: Authors, 2012.

Figure 4: Access based on unprotected spring through hosepipes.

Source: Authors, 2012.

Government-led water and sanitation information system (SIASAR). A comparative analysis.

As previously mentioned, the scope of SIASAR national information system is the whole country. SSY has also been considered as a pilot municipality to implement this government-led water and sanitation information system. SIASAR methodology mainly focuses on infrastructure existence and its condition. Access to water data is collected through surveys aimed at community leaders and through direct observation of drinking water systems when necessary. Field work is not based on service level nor on human right to water criteria. Moreover, households have not been considered as key informants for field data collection. So it can be observed that SIASAR has not incorporated a human rights based approach in its definition yet. Monitoring access to water based on a human rights framework requires focusing on right holders' situations using what is called outcome indicators (Roaf et al., 2005). According to the human right to water framework, community leaders cannot be the unique source of information; individuals should have a more detailed picture of different human rights criteria. Moreover, a household approach such as the one presented, seems to be necessary to achieve the challenge of knowing more about the real situation of those not served, vulnerable, or discriminated against within communities. In this sense, the methodology proposed tries to include measures to determine who is excluded, identifying

inequalities that are normally hidden in current methods. This can be used to set incentives to decrease inequalities and focus on the most disadvantaged.

According to SIASAR field data collection in SSY, the same number of communities has been visited during the same 44 day time period where 2 survey takers per day in a part time job carried out data collection. Fewer human resources are needed in SIASAR field work.

Table :. Comparison between two water information systems.

SIASAR (FISE)	SSY WASH DIAGNOSIS
Nation (3 countries)	Municipality
Infrastructure/Coverage	Human Right to Water/Service level
No information at household level	Household surveys

Source: Authors, 2012.

The way forward, conclusions and future research

Firstly, some ideas will be mentioned about the way forward of this research. Next, some basic conclusions from the first stage are considered and due to the insights given in this paper about a methodology for monitoring intra community discrimination, some ideas related to future research on equality and non-discrimination monitoring are proposed.

The way forward

During March 2013, preliminary results have been presented to municipal government, UMAS, local NGDOs and community leaders. Results have been focused on indicators concerning water, sanitation and CAPS management of their water systems. Water and sanitation indicators have been displayed differentiating between people served by water systems managed by CAPS and self-provision as has been considered in this paper. Local government authorities and water and sanitation technicians showed concern about the results and now the research is focused on work with the new UMAS team, namely:

- Discussion and building indicators easy to get at local level, accurately defined, standard, scalable at all administrative levels and updatable. Those indicators should point out the main problems found during the first stage of the process. Indicators will be focused on access to i) water and ii) sanitation based on the human right to criteria and paying special attention to divisions between CAPS and self-provision households. Moreover, we are developing a set of indicators to measure different problems related to sustainability of systems managed by CAPS.
- Afterwards, we will be working on defining a planning process according to the different problems found. Each indicator or index defined previously will be linked to different mitigation strategies that can be applied at local level according to human and economic local resources.
- Once the plan is defined, our focus will be on implementing the plan. It would be necessary to use human and economic resources efficiently as there is a lack of both

in the context considered. This is a primary concern due to decentralisation of resources not being effectively guaranteed at municipal level in Nicaragua.
- Local NGDOs and researchers will supervise and coordinate the implementation of the plan in collaboration with UMAS.
- Finally, it would be necessary to pay special attention to updating the information system, as we know that it is one of the main weaknesses of these processes.

Some conclusions

Monitoring 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 does not provide any particular incentive to focus and reach marginalised groups, and this has affected national WASH monitoring systems. Those shortages have influenced national monitoring systems too often. At local level a main problem is a lack of human and capital resources for implementing their own monitoring routines. The proposed methodology implemented at local level provides some findings to be considered as recommendations.

- Progressive realisation requires not staying at a basic service level; it is necessary to improve it, thus a multidimensional approach such as the one presented can be used to evaluate progress.
- The proposed methodology is practical to locate those minority sectors within rural communities that often do not benefit from the same services as the others. This is useful when identifying and characterising them in order to develop appropriate strategies for resource allocation which is a requisite clearly justified from the perspective of the human right to water.
- Standards are necessary for indicators scoring in these kind of methodologies. The fact that there is no consensus about them for some indicators complicates this task. Experts recommend that standards should be adapted to local conditions. In this study, their determination has been based on international recommendations, experts and local stakeholders but it is important to thoroughly research their definition at local level.

Future research on equality and non-discrimination monitoring

To effectively improve equality and non-discrimination monitoring, however, specific challenges remain elusive. Some ideas for future research are mentioned:

- It can be noticed that information obtained when performing field data collection based at household level can differ depending on which member of the family is polled. It is necessary to develop research to cope with intra-household bias.
- Household information is essential but there are other sources of information that can be useful when addressing equality and non-discrimination principles. This is the case with service providers (governmental or not), or distribution of water points. It is necessary to investigate methodologies to combine them properly.

- 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.

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