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**WATER, SANITATION AND HYGIENE:
SUSTAINABLE DEVELOPMENT AND MULTISECTORAL APPROACHES**

**The sustainability of water supply schemes in Mirab Abaya
and Alaba Special Woreda, SNNPRS, Ethiopia**

M. Jeths, I.D. Haylamicheal & H.A. Abebe, Netherlands

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This paper presents the main outcomes of a study within the RiPPLE¹ project, to identify appropriate and scalable approaches to strengthen local water governance and planning in the context of the Universal Access Plan planning framework. This study assessed the functionality and service level of water supply schemes in two woredas² in SNNP Regional State, Ethiopia to get insight in the current status of water service delivery and the main impacting factors and thus the main challenges to reach the UAP target of providing 15 litres per person per day within 1.5 km. The functionality rate of water schemes as well as coverage appeared to be below the official figures. Lack of clear accountability and responsibility, insufficient budget, man-power and material capacity, poor coordination and communications, absence of specialized spare-parts suppliers and low sense of ownership contributed to the high rate of scheme non-functionality in the study areas.

Introduction

According to the latest Water Sector Development Reports from the Ministry of Water Resources (MoWR, 2007), Ethiopia's national safe water supply coverage reached 42.2% (41% rural and 78% urban). However it is estimated that 33% of rural water supply schemes in Ethiopia are non-functional at any time, due to lack of funds for operation and maintenance (O&M), inadequate community mobilisation and commitment and a lack of spare parts (*ibid*). In order to address the low coverage percentage, Ethiopia has committed itself to achieve the Millennium Development Goals (MDGs), including target 10, on halving the share of people without access to water and sanitation by 2015. To reach the MDGs, the Ministry of Water Resources introduced the Universal Access Plan (UAP) in 2005 aiming to reach full coverage in WASH services by 2012. At the heart of the UAP is the rural water service target of providing 15 litres per person per day (l/p/d) within 1.5 km of a rural dwelling.

Within the Research Inspired Policy and Practice Learning in Ethiopia and the Nile basin (RiPPLE1) program several case studies were developed in order to identify appropriate and scalable approaches to strengthen local water governance and planning within this context of the Universal Access Plan and other decentralised planning frameworks.

The study presented in this paper paid particular attention to sustainability and coverage of water service delivery in Southern Nations, Nationalities and Peoples Region (SNNPR). Coverage relates to the provision of a water service meeting UAP norms (for rural areas 15 l/p/d within 1.5 km of the homestead) to all citizens of SNNPR that is sustainable and fully reliable. In order to assess the coverage of the water service, the study conducted a series of surveys and workshops to gain insight in the main actors in water service delivery; formal and informal division of responsibility for service delivery from regional down to community level; the knowledge, attitudes and practices related to service delivery in general and UAP specifically; and the resources (human, physical and financial) available to service providers.

According to the SNNPR Bureau of Water Resources Development (BoWRD), overall regional water supply coverage had reached 48% (45% rural and 60% urban) in 2006 (BoWRD 2006). A large number (22% to 24%) of the water supply schemes are expected to be non-functional at any given time (*ibid*), entailing negative impacts on coverage and thus on achieving universal access. Therefore the Bureau aimed

to increase the sustainability of water supply schemes from the current 76% to 95% by 2012 as stated in its strategic plan.

Total safe water supply coverage in Mirab Abaya and Alaba Special Woreda, as reported by their Woreda Water Resources Development Office (WWRDO), were respectively 32% (MAW- WRDO, 2007a) and 40% (BoFED, 2006). The non-functionality rate of the water supply schemes as reported by the WWRDOs were 26% (MAW-WRDO, 2007b) for Mirab Abaya and 37% (AW-WRDO, 2007) for Alaba Special Woreda.

Methodology

In order to get detailed insight into the reality of service delivery on the ground, a mapping and surveying exercise was executed consisting of visiting each improved water point within Mirab Abaya and Alaba Special Woredas. The exercise allowed the team not only to identify each water scheme and point in the two Woredas, but also to develop a detailed understanding of their characteristics including accessibility, reliability and functioning.

In this study different qualitative and quantitative data collection instruments were used, such as Focus Group Discussions (FGDs); interviews; KAP (Knowledge, Attitude and Practice) surveys with service users and providers; institutional/stakeholders mapping; resource mapping and observations using QIS (Qualitative Information System) and other checklists.

In order to undertake an in-depth study into scheme functionality, a scheme-based sampling method was adopted with two major stratifying factors: technology choice and scheme functionality. This sampling method resulted in the selection of four functional and four non-functional schemes in Alaba and 21 functional and 17 non-functional schemes in Mirab Abaya.

Case study areas

Mirab Abaya and Alaba Special³ Woreda are both found in the Southern Nations, Nationalities and Peoples Region (SNNPR) as indicated in figure 1. Alaba Special Woreda has an elevation ranging from 1,700 to 2,200 metres above sea level. The woreda covers a total area of 973.76 km², of which 86% is classified as woina dega (mid-altitude) and 14% mainly kolla (lowland). The mean annual rainfall ranges between 759 and 1,241 mm. In Alaba all improved water sources are deep motorised boreholes due to the groundwater depth (up to 300 meters). The 2006 woreda population was estimated at 223,991, with about 12.2% residing in urban areas and 87.8% in rural parts (FDRERA, 2007). All the rural villages are accessible in the dry period by a dry weather road.

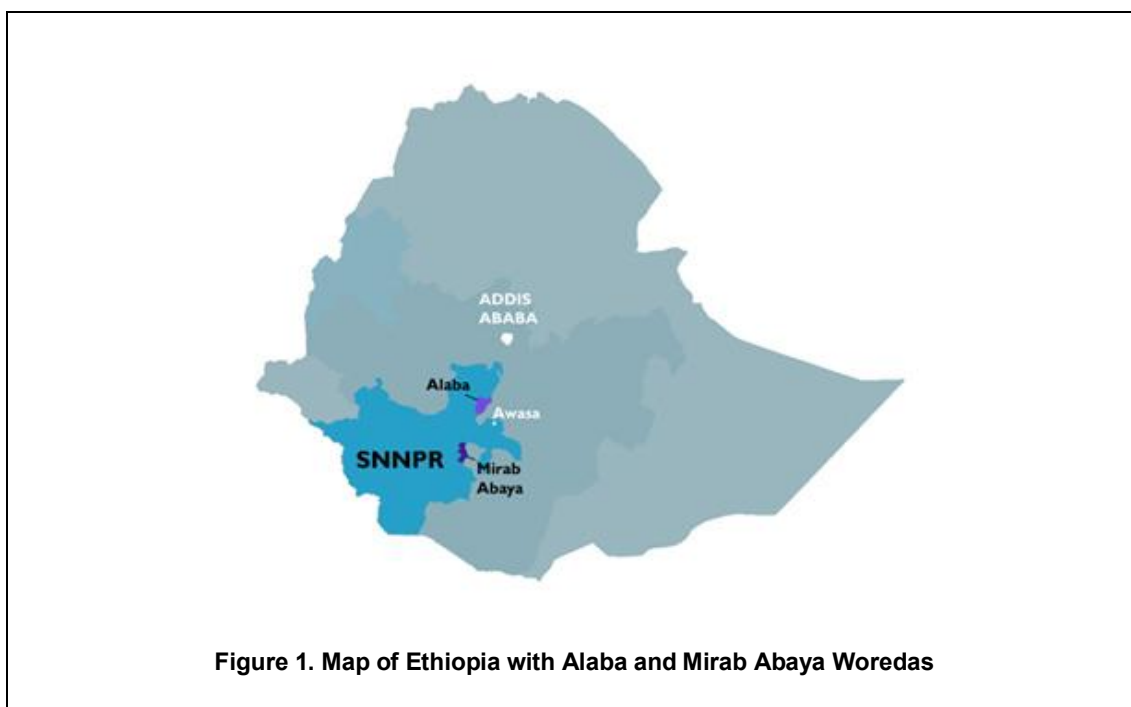


Figure 1. Map of Ethiopia with Alaba and Mirab Abaya Woredas

Mirab Abaya Woreda is located in Gamo-Gofa Zone, and is divided into 24 kebeles⁴, one urban and 23 rural. It has three major ecological zones; six kebeles are *dega* (highland), two kebeles are in *woina dega* and 16 in *kolla*. The average annual rainfall ranges from 580 mm in the *dega* and *woina dega* zones up to 1,100 mm in the *kolla* area (MAW-WRDO, 2007a). The 2006 total population was estimated to be 69,036; out of this total, around 93% live in rural areas.

Limitations

It was particularly difficult to get accurate maps with kebele boundaries as there seemed to be considerable sensitivity to share these.

Therefore the maps presented in this paper show the location of all mapped water schemes and points as located by using GPS and are hence accurate in relation to other water points. However the problems with accessing accurate shape files of woreda and kebele boundaries mean that their position is only indicative to these boundaries, with an estimated potential error of 1-2km.

Fieldwork for water point and water scheme mapping was very intensive. A lot of the water sources were only accessible by a long hike off road, which is already indicative for limiting factors to receiving maintenance and other support to keep the water delivery system running.

Main findings of the study

Water supply service can be defined as the access to a certain quantity and quality of water within a given distance with a given reliability. This section presents the key findings of this study related to these indicators for water service delivery as well as the outcomes of the water point mapping.

Water service delivery: quantity, quality, accessibility, reliability

As mentioned before key indicators for water service delivery are the amount of water, the quality, the accessibility and the reliability. Within the UAP this is defined as access to an improved water system delivering at least 15 litres per person per day within 1.5 kilometres of the dwelling.

Water quantity

According to the Universal Access Plan (UAP) every person should have access to 15 litres of water per day, which is a relaxing of the MDG norm of 20 l/p/d. The findings showed that the average domestic water use is 11 l/p/d for Mirab Abaya and 10 l/p/d for Alaba. Reasons for this are the distances to the water point as well as waiting and collecting time. Within a household women and children are responsible for collecting the water. The water will be collected in containers of 20 litres; an adult can normally carry one container on the back over a longer distance (donkeys will normally carry two containers).

Water quality

The water should be of potable quality, which can only be confirmed by testing. Regular quality testing does not take place and in Mirab Abaya 82% of the water points did not receive any quality testing. In 18% of the cases in Mirab Abaya the users perceived the quality to be bad because of the taste, muddiness, odour and the presence of worms. However in Alaba the water quality from the boreholes was perceived to be good with an exception of the high fluoride content, for which on spot treatment facilities are constructed as is the provision of household treatment.

Accessibility

Another indicator for the performance of the water service delivery is accessibility, which has an impact on the volume of water that the users are able to collect. The UAP sets the maximum distance from the dwelling to the water service point at 1.5 km (which is a relaxing of the MDG norm with 0.5 km). To travel 1.5 km (with a container) will take about 45 minutes⁵ for a roundtrip (WHO, 2008). In both cases the time spent on travelling to the water points was much more.

On average the travel time was two hours (for a roundtrip) in both Woredas, which is far above the norm. Besides the travel time the queuing time is extremely high ranging from three hours in most cases up to seven hours in the dry season in Alaba. The water tariff is also a factor to quantify the accessibility of a service. In case the tariffs are too high for the user to pay, and for this reason he cannot use the service it is clearly inaccessible. In Mirab Abaya the users indicated that the water tariffs were affordable ranging from two to ten cents per container of 20 litres or a fixed monthly tariff of 0.5 to 5Birr per household.

Respondents in Alaba noted that the tariffs were too high (10-20 cents/ container) which can be explained by the fact that all systems were motorised and thus the water fee should cover the fuel for operating the system.

Reliability

Reliability is about knowing that you can use the water service on a daily basis providing the quality and quantity of water you expect. In our case it is about opening times of the water points as well as the actual delivering of water. As seen before the high non-functionality rates make the service very unreliable. Many water points were out of order, so that users had to resort to other water points or unimproved water sources.

Minor maintenance took two to three weeks in both woredas, while waiting time for major maintenance ranged between three to 12 months in the Alaba case. In Mirab Abaya major maintenance would take on average 12 months. Water point opening hours ranged from five to 12 hours, with an average of eight hours for Alaba and nine hours for Mirab Abaya, indicating that from the functional points there is daily water available.

Water scheme and water point mapping

The official data as used by the regional water bureau and its woreda offices presented a more positive picture than the case study findings. Especially the difference between non-functionality rates and the unequal distribution of water points was salient.

Table 1 present the status of the different schemes, segregated in technology type and their service status. Abandoned schemes were not included in non-functionality percentage; reasons for abandonment were resettlement of communities, ingression of Lake Abaya and schemes served passed their design life.

The data showed higher rates of non-functionality of the water schemes viz. 42 and 32 percent for Alaba and Mirab Abaya respectively, when compared to the official woreda figures of 37 and 26 percent, which are also higher than official regional average of 22-24%.

From a service delivery point of view one should not just assess the overall scheme functionality, but also the functionality of the water service points, as this gives an indication of access for users; especially in the case of a mechanised system with a large distribution network of several kilometres and multiple stand posts. In both cases the non-functionality of the water points are alarming high especially for Alaba, where

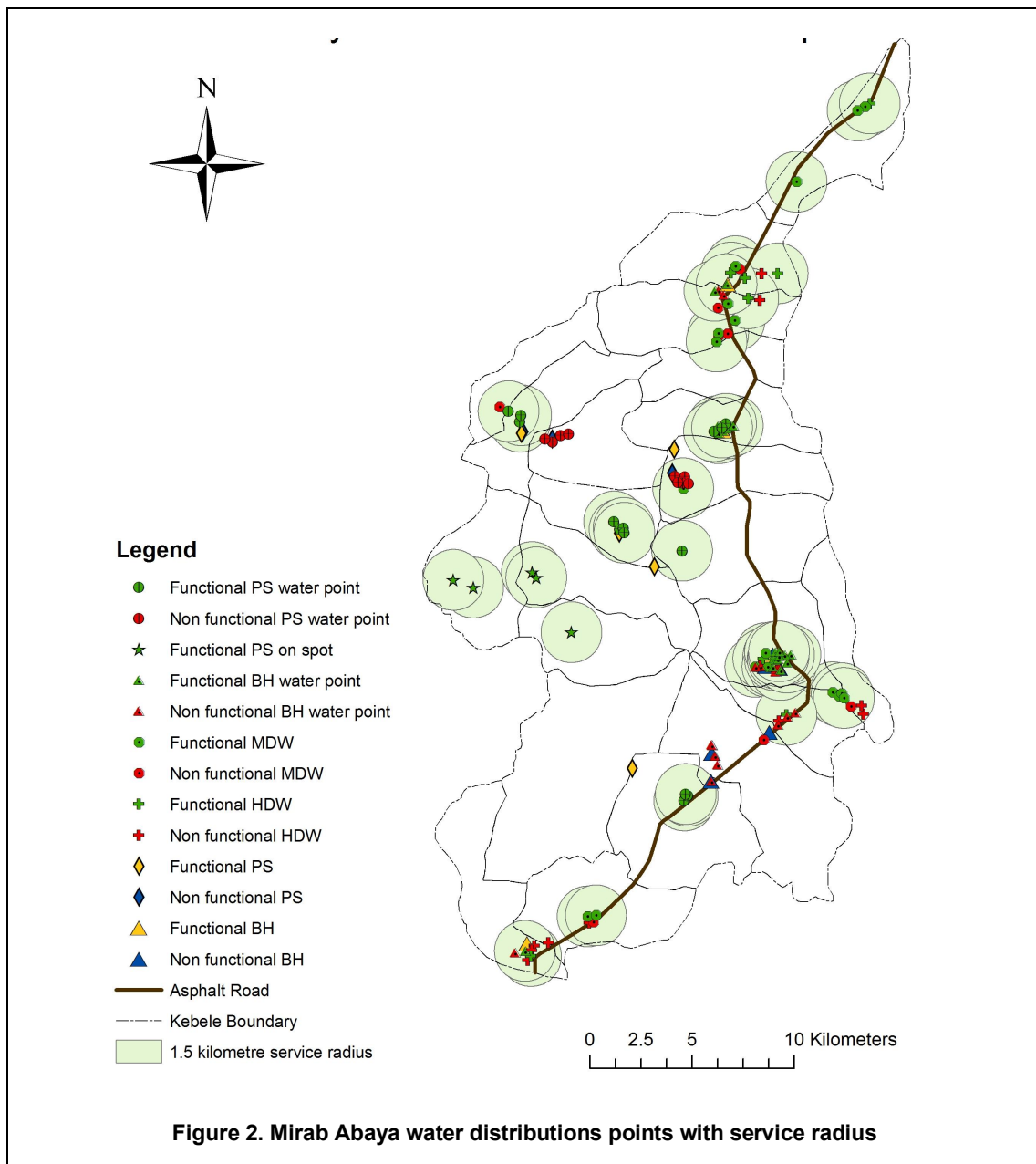
Table 1. Status water schemes and water points in Alaba and Mirab Abaya Woredas					
Scheme type	Functional	Non-functional	Abandoned	Total	% Non-functional^b
Alaba					
Borehole (submersible pump)	10	8		18	44
Borehole (mono pump)	4	2		6	33
Total schemes	14	10		24	42
Total water points	26	39		65	60
Mirab Abaya					
Borehole (BH)	4	4	3	11	50
Hand dug well (HDW)	8	5	7	20	38
Machine dug well (MDW)	18	7	1	26	28
Protected spring (PS) (incl. 5 onsite)	10	3	-	13	23
Total schemes	40	19	11	70	32
Total water points	66	38	12	116	37

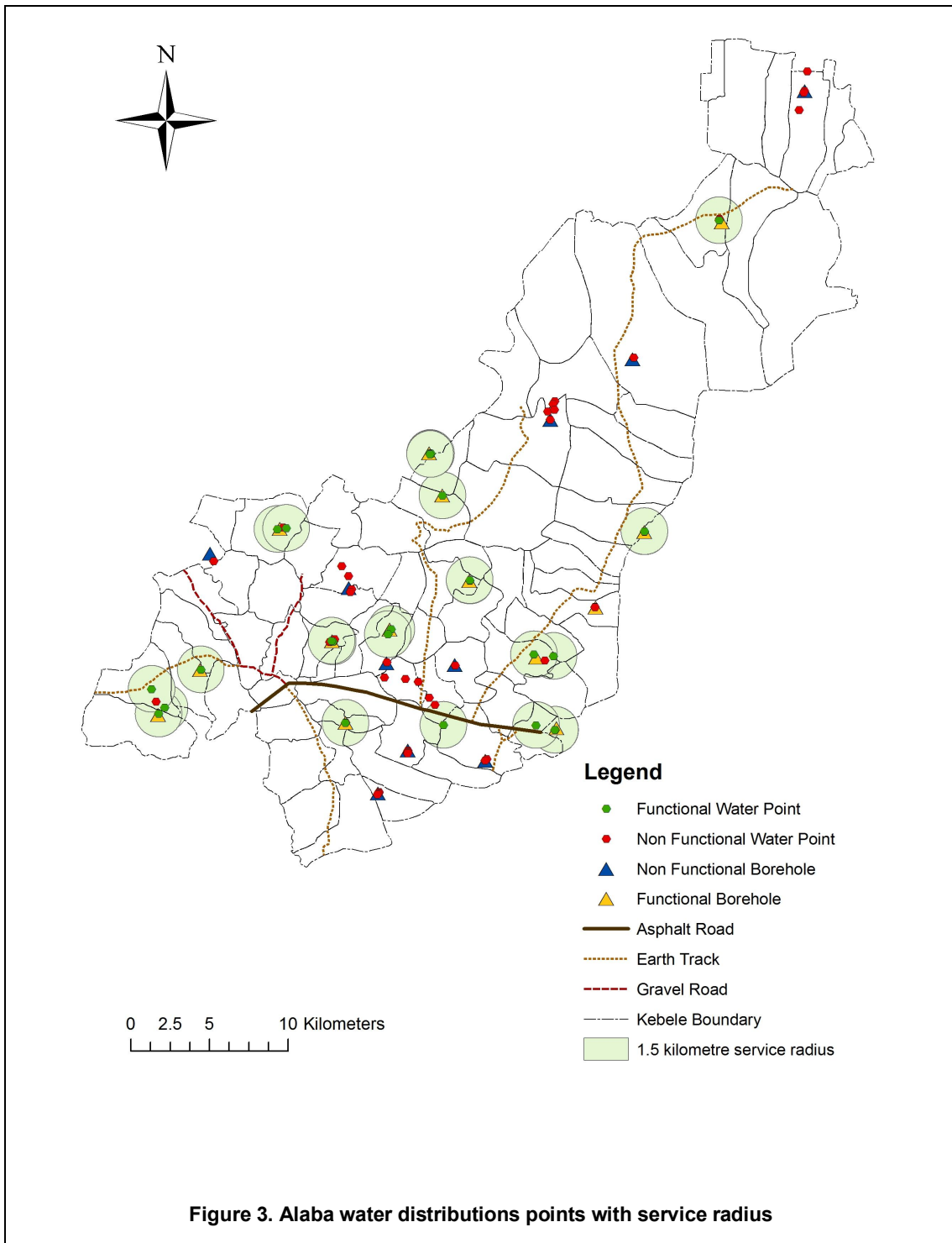
60% of the water points were out of order as well as Mirab Abaya were 50% of the boreholes were out of order, and thus also the water point connected to them.

Main reasons identified for these non-functionality rates in Alaba at scheme level were pump failure (70%), generator problems (10%) and pump head problems (20%). For the water points the reasons were.

scheme breakdown (70%), technical problems (18%), closure by the WWRDO due to Water and Sanitation Committee (WATSANCo) management problems (3%) and closure by the WATSANCo to save the money spend on tap attendants (8%), one scheme was under construction. Technical problems can be divided in unavailability of spare parts, too expensive repairs and the need of major maintenance equipment.

Figure 2 and 3 show the maps of both woredas with the kebele boundaries, the location of the different water points and the service radius of the functional water points. The water sources for the different scheme typologies are indicated as well; in Alaba there are 24 boreholes with a total of 69 water points. In Mirab Abaya there are 70 schemes (with several different types of sources), some of which have a single water point attached, but several of which have multiple water points. In total the 70 sources in Mirab Abaya had 116 water points attached to them.





From interpretation of the maps it can be concluded that by using GIS to generate ‘service areas’ of 1.5 radius (the UAP norm for water service delivery), at least in terms of physical area, the large majority of each woreda remains uncovered, even where non-functioning schemes are taken into account. The maps do not show the maximum number of users allowed, to ensure access to 15 l/p/d. Data on population density (even at the kebele level) was not made available (or does not exist), so it was impossible to categorically state that coverage figures are considerably below the assumptions. However, it does seem strongly likely given the total population living in the woreda, the number of water points and the average per capita water use.

Reasons for low coverage and high failing rates of water service delivery

The case study identified different reasons for the high non-functionality rates of the water points as well as the low coverage area of water services. Several will be explained in this section.

Human resources

WATSANCo's are responsible for daily operation and maintenance however their effective functioning is hindered by the fact that they do not have a formal legal status. End-users complained about a lack of transparency with regard to financial management of WATSANCo's, poor coordination, supervision and reporting. Examples existed of collected revenues being misused which are indicative for the lack of transparency and accountability towards the end-users.

Next to the understaffing of the woreda water offices when compared with the regional strategic plan (in Alaba 56% of the technical positions were not filled; in Mirab Abaya 43% positions were vacant), the high staff turnover caused by the unattractiveness to work in remote areas and the low salaries, have a negative impact on sector capacity and thus sector performance. Added to this lack of absolute capacity there is also a capacity constraint in having people with the right (especially practical) skills in the right positions. A general complaint by government and non-government is the lack of practical experience of the woreda level staff to assist scheme operation and maintenance.

Physical resources

According to the sector decentralisation process and the UAP, the woreda water offices are responsible for planning, implementing and evaluating water supply activities in their woreda, however the surveys carried out for this work showed that they lacked the means to do so in a meaningful manner. They do not have the resources to visit and monitor the schemes under their jurisdiction.

The WATSANCo's had no maintenance equipment besides spanners and pipe wrenches, which had a negative impact on the speed of maintenance especially for motorised schemes.

Finance and cost recovery

Financial factors impacting on the sustainability of the service include the ability of users to pay for services, finance for recurrent costs and capital investment. Revenue collection was done by WATSANCo's, however they lacked good bookkeeping systems. Nevertheless they were able to save some money for small repairs and pay the tap attendants. Water users in Mirab Abaya stated that the tariffs were affordable, while respondents in Alaba noted that the tariffs were too high.

At both woreda water offices there were budget constraints to execute their day to day job. Budget requested by the woreda water offices is systematically higher than the budget allocated. The budget allocated is not enough to cover major system maintenance (like replacing pumps and generators).

Information and data use

There is no effective monitoring system in place, which makes it impossible to assess the status of the services on daily or even monthly basis. This is one of the reasons for long response time between system failure and maintenance.

The method used by the government for calculating data on service coverage, and thus the figures used for planning, was unclear. Interviews with sector stakeholders suggested that figures used for planning are based on simple calculations of types of scheme and design population served and not on detailed mapping of users and schemes.

Functionality of schemes, i.e. water source with distribution network is reported instead of the functionality of actual service delivery points (the stand posts). If the source is functioning, the scheme is assumed to be functioning too, which is a fair assumption in case of an onsite distribution system like e.g. a protected spring. However in the case of a borehole with a motorised distribution system this does not give an accurate picture.

Conclusions and recommendations

The findings show that there is a lack of resources and capacities at woreda level to provide adequate services and sustain the water systems, which is generally acknowledged by the different governmental and non-governmental actors at regional, zonal and woreda level. Based on the results from the mapping activities in the two woredas, we can conclude that there is a long way to go to achieve Universal Access as

defined in the UAP of delivering 15 l/p/d within 1.5 km from the dwelling. People take much less than 15 l/p/d, which is for a large part determined by the long travel distance of over 1.5 km; however when assessing official data current coverage is stated to be 40 and 32 percent in Alaba and Mirab Abaya respectively.

This shows that there is a major disconnect between planning and implementation, as planning is based on assumptions and estimations and not on actual data. Another reason for this disconnect is the methodology used for calculating coverage and thus access to service.

From the point of view of achieving Universal Access as 15 l/p/d within 1.5 km from the dwelling we argue that we should take into account the distance to and functionality of the individual water points and not the schemes. Especially in the case of motorised systems with an extended distribution network and water points at several kilometres away this gives a different picture of coverage percentages. When assessing the status of a system, it is important to differentiate the functionality of the different water points (are the water point actually delivering service), and not just qualify the water point as functional because the pump is working and water is entering the distribution system.

In order to improve the information management we recommend using GIS to generate 'service areas' of 1.5 radius (the UAP norm for water service delivery) as this will give an indication of the physical area being covered (as is shown in the maps of both woredas). If kebele level population density data is available this can be plotted on the map as well, showing the percentage of people without service. Other useful data would be the daily discharge per water point so this can be matched with the population size in order to plan for service delivery of 15 l/p/d. All this information is crucial for and should be the basis for strategic planning, priority setting, coordination and implementation.

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The research reports of the Alaba and Mirab Abaya case studies are available at the RiPPLE web-site:
<http://www.rippleethiopia.org/documents>

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Notes

1. See www.rippleethiopia.org
2. The lowest administrative structure of the government, or 'district'.
3. A Special Woreda is a district (Woreda) which is not considered part of any zone.
4. The smallest administrative unit of Ethiopia, similar to a ward or a neighbourhood.

5. Collecting water at a distance of 1 km will take about 30 minutes for the roundtrip. Basic access service level is defined as access to a water service within 1 km or 30 minutes of collecting time for the roundtrip and a volume of 20 litres per person per day.

Keywords

Knowledge management, policies, research, rural, water supply.

Contact details

Martine Jeths

IRC International Water and Sanitation Centre (IRC).

Tel: +31 (0)70 304 40 35 (as of 12/12/08)

Fax: +31 (0)70 304 40 44 (as of 12/12/08)

Email: jeths@irc.nl

www.irc.nl

Israel Deneke Haylamicheal

P.O.Box: 816, Awassa, Ethiopia.

Tel: +251 (0)916 82 62 59

Fax: +251 (0)462 20 48 83

Email: israeld2@yahoo.com
