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Review of the Northern Bahr el Ghazal State Framework and Implementation Programme for the Operation and Maintenance of Rural Water Supplies (South Sudan)

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March 2015

Acknowledgements

The authors of this report would like to thank the many people (over 100) who invested their time and energy to share their experiences, concerns and ideas in numerous interviews, meetings and workshops. In addition, a big thank you is extended to the Swiss Agency for Development and Cooperation (SDC) for their on-going engagement in Water, Sanitation and Hygiene in Northern Bahr el Ghazal, including support of this assignment to improve the operation and maintenance of rural water supplies in the state.

Cover photo: Local resident with his radio, Northern Bahr el Ghazal (Kerstin Danert)

Suggested citation; DANERT, K, ALELU, I, GABRIEL, D.D, JEUG, G.A, and CURTIS I (2014) *Review of the Northern Bahr el Ghazal State Framework and Implementation Programme for the Operation and Maintenance of Rural Water Supplies,* Ministry of Water, Cooperatives and Rural Development/Swiss Agency for Development and Cooperation/Skat Foundation

Preamble

The Northern Bahr el Ghazal (NBeG) State Framework and Implementation Programme for Operation and Maintenance of Water Supplies (25 October 2013) was the main output from Skat Foundation's field visit in September 2013. The State Ministry of Water, Cooperatives and Rural Development (MWCRD) invited Skat Foundation to return for a review of progress and further advisory support in November 2014. This report sets out the main findings from that review.

Sadly, the situation in South Sudan has changed significantly since the 2013 mission. The night of 15 December 2013 saw events that escalated very quickly into civil war, which is still continuing. Thankfully, so far, NBeG has not been directly affected. Indirectly, however, the conflict has led to increased levels of uncertainty and unpredictability in the state.

One direct impact has been the diversion of donor funding away from NBeG (as a 'green' state) to those states most affected by the fighting in early 2014. This has significantly affected the activities of most of the agencies active in water and sanitation. Some have ceased their work in the State, while others have had to cut back on activities. For example, Samaritan's Purse implemented the largest number of new boreholes in 2013, but last year did not drill a single new borehole. The crisis has also had the effect of reducing the momentum of some of the change processes that the Ministry of Water, Cooperatives and Rural Development had initiated in 2013.

There has been a further political development in the state during the writing of this report following the completion of the fieldwork. December 2014 saw a serious political rift between the previous governor, now Sudan People's Liberation Army (SPLA) Chief of Staff, and the state's Caretaker Governor. This has led to a split in the state government, with no clear resolution at the time of writing, which is further affecting the operating environment.

Contents

Abbreviations

ACF	Action Against Hunger
AWODA	Aweil Window of Opportunities and Development Agency
HPM	Handpump Mechanic
IAS	International Aid Services
IoM	International Organization for Migration
IRC	International Rescue Committee
MWCRD	Ministry of Water, Cooperatives and Rural Development
NBEG	Northern Bahr el Ghazal
NRC	Norwegian Refugee Council
O&M	Operation and Maintenance
SDC	Swiss Agency for Development and Cooperation
SPLA	Sudan People's Liberation Army
SSP	South Sudan Pounds
SSRC	South Sudan Red Cross
UMCOR	United Methodist Committee on Relief
WHH	Welthungerhilfe

Introduction

This report is a review of the Northern Bahr el Ghazal (NBEG) Framework and Implementation Programme for Operation and Maintenance (O&M) of Rural Water Supplies (MWCRD, 2013). The review was undertaken over a two-week period from 25 November 2014. It involved a series of workshops and semi-structured interviews/discussions with key stakeholders (Annex 5) as well as observations of water use. Visits were made by the review team (authors of the report) to Aweil West, South, East and North, while the workshops were held at the Ministry of Water, Cooperatives and Rural Development (MWCRD) premises. Feedback and a proposed way forward comprising a revised framework and practical handbook was submitted to representatives from select counties through a presentation and discussion at the end of the review.

Where required, translation from Dinka into English was undertaken by Charles Chan Anguei and Peter Mou Madouk of the Swiss Agency for Development and Cooperation (SDC). Annex 4 summarises the review itinerary.

Figure 1: "Fixing the pump" role play drama in the workshop on 26 Nov

The report reflects on rural water supplies in the state, describes the progress made and challenges faced by the key stakeholders in Northern Bahr el Ghazal since the framework was published in and sets out recommendations for improvements to the framework, as well as actions by key stakeholders.

The National Ministry of Electricity, Dams, Irrigation and Water Resources follows 'a one policy approach' whereby state policy is directed by national policy. The Northern Bahr el Ghazal (NBEG) State Framework and Handbook for Operation and Maintenance (O&M) of Rural Water Supply Services (MWCRD, 2014a) is the State Government's response to section 4 of the National Water Policy (GoSS, 2007), i.e.:

- Section 4.1.5 "*rural communities shall be supported to take an active role in planning, managing and financing RWSS schemes on a sustainable basis*" and
- Section 4.2.6 "*to encourage users to contribute towards O&M costs while ensuring that the poor are not disadvantaged*".

- Objective 4.2.3 for effective structures to manage delivery of rural water supply services at the lowest appropriate level. Both handpump and water yard facilities in South Sudan are managed at community level: *"following years of protracted conflict, rural communities have only limited capacity to contribute towards the capital costs. However it is generally agreed that communities can reasonably be expected to contribute towards the costs of operation and maintenance"*.

The framework also responds to the State's transition from an emergency situation through recovery to development and self-reliance, and the end of free spare parts distribution in South Sudan by UNICEF in 2013 (Figure 2).

The MWCRD decided to develop and implement an O&M Framework. From the outset, this decision has been supported by the agencies represented in the state's WASH cluster meetings. The development of the framework was guided by the Draft Policy Paper for Operations and Maintenance of May 2013 (MWCRD, 2013a) and the Planning and Strategy Workshop in Wau in August 2013 (MWCRD 2013b).

Figure 2: Timeline of relevant events for the NBEG O&M Framework

An O&M Framework was published in October 2013 and circulated widely in the state. The Framework and its implementation is testimony to South Sudan and Northern Bahr el Ghazal's determination to move citizens and government from depending on others to self-reliance and fulfilling their responsibilities for the management of water supply services. A review of the O&M Framework was undertaken at the end of 2014. This included two weeks of field work, meetings and workshops in NBEG by MWCRD and a consultant (Kerstin Danert of Skat Foundation) from 23 November 2014. Key events between the first edition of the O&M framework in October 2013 and its revision are set out in Table 1. In addition, meetings have been on-going whereby MWCRD explained and discussed the framework throughout these 15 months. The review also provided an opportunity to reinforce the key policy messages of the framework.

Table 1: Key events for O&M in Northern Bahr el Ghazal

Date	Milestone
Oct '13	O&M Framework published (MWCRD, 2013c)
Dec '13	Framework presented to council of ministers New armed conflict in South Sudan begin
Feb '14	Return of SDC Advisor to Ministry
Mar' 14	Spare parts dealer in Aweil Town
May '14	Ministry tours the counties
Jun '14	Ministry starts to host WASH cluster meetings
Sept '14	First radio show on O&M (core script developed by MWCRD)
Oct '14	O&M policy emphasis at WASH cluster meeting. 2nd WASH radio show (hygiene focus)
Nov '14	Review and revision of the O&M Framework (including visits to four countries and extensive consultation)
Jan '15	Revised O&M Framework and Handbook published

Rural Water Supplies in Northern Bahr el Ghazal

Population Dynamics and Seasonality

SDC (2014) estimates the state population in 2013 to be just under 1.4 million. The return of populations from Sudan to Northern Bahr el Ghazal is an on-going process, with an estimated 400,000 having returned since the Comprehensive Peace Agreement was signed in 2005 (Northern Bahr al Ghazal Strategic Plan 2012-1015, quoted in Concordis 2013). In 2013, there were about ten officially recognised camps for returnees in the state. These locations may or may not become permanent homes for their populations, many of whom move on to their ancestral homes or are resettled elsewhere by the Government. Many communities in the state are characterised by a mix of host and returnee populations. The movement of people is coordinated by the State Government who guarantees security for the roads and provide temporary land and support to returnee as well as refugee populations (Concordis 2013). According to International Organization for Migration (IoM) data, the number of new returnees dropped considerably in 2014.

The people of Northern Bahr el Ghazal reside in a spectrum of settlement patterns ranging from scattered homesteads to denser settlements to growth centres and towns including Aweil. Areas which are referred to as urban would be considered rural in many other countries.

According to key informants, there is significant movement within the state including between different land types (high, medium and low lying land). People are apparently keen to obtain and hold on to fertile agricultural land by residing there. Such land may lack basic services including safe drinking water supplies. In addition, in the dry season, there is migration of family members with their cattle towards the wetland areas that provide dry season pasture. Nomadic cattle keepers from South Darfur also migrate into Northern Bahr el Ghazal in these months. The state is thus characterised by considerable seasonality as well as longer term change in where people live. The dynamic nature of the situation is a challenge for planning.

Figure 3 View from the road to South Aweil at the end of the rains (Source: Danert, Sept 2013)

Figure 4 View from the road to Aweil South as the dry season commences (Source: Danert, Dec 2014)

Technology Options for Rural Water Supply

The Water Policy (2007) objective 4.2.5 explicitly refers to water users making informed technology choices, taking local needs and priorities and capacity for the management and finance of O&M into account. According to the National Baseline Household Survey of 2009 (GoSS, 2010) 63% of the population of NBEG State use handpumps as their main drinking water source. However, a wide range of other sources are also used (Annex 1). Discussions with county WASH teams and water users in 2013 suggest that people use a mix of sources, depending on the season.

Currently, Government and development partners provide rather limited technology choice to rural dwellers. The India II handpump[1] (fitted onto a borehole) and the water yard (comprising a borehole

[1] A small number of India III and Afridev pumps are also in use, but these are not being installed currently.

fitted with a submersible pump run by solar panels) are the two main technologies currently being provided in the state by external agents and through Government-funded programmes. While handpumps are generally for rural dwellers, water yards tend to be for urban populations or areas considered to be in a process of urbanising.

Agencies undertake machine drilling and, since 2013 manual drilling (hand augering). International Aid Services (IAS) plan to introduce small-scale bio sand filters and rainwater harvesting facilities in 2015. There are masons in the state with skills in hand dug well construction. Payment for hand dug well construction tends to be by the users themselves (i.e. self-supply). Judging from limited discussions on this with handpump mechanics in Aweil North, there seems to be very limited knowledge of lining and a perception that it is very expensive.

Investments

Most of the investments into new facilities and rehabilitation appear to be from development partners (primarily by the Swiss Agency for Development and Cooperation [SDC]) and international NGOs). Government funding (at State and County level) currently only covers their minimum operational costs. In discussions, Aweil South County explained that they received SSP 3,000 per month for running costs from July to November 2014 but that this money had not been used due to poor accessibility because of the flooding.

If the planned finances for the state and county level start flowing as planned, Government will also have resources to invest in capital expenditure as well as to support O&M. The commissioner for Aweil West, for example, states that they expect to spend 812,000 SSP on water supplies between January and April 2015. The county is planning to drill 25 boreholes. In Aweil East, the executive director explained that one quarter of the Basic Services Fund[2] will be used for water.

In 2014, the Aweil West Rehabilitation Team constructed three privately-funded boreholes with the hand auger technique: two were paid for by the deputy governor at 5,000 SSP each (excluding the pump), while one was for a community at 15,000 SSP (including the pump which was sourced from Aweil East). It is known that people in NBEG also contract and pay masons to dig wells. This is encouraging, and may indicate a market for more user-financed sources (also known as self supply). There is evidence of water users paying for maintenance services and spare parts for their boreholes.

There is currently no comprehensive overview of investments into, or operational costs of water supplies for NBeG state. Annex 6 reiterates the schedule of requirements for Handpump Supply from the 2013 O&M framework (MWCRD, 2013c).

Water Supply Services - Boreholes

At the November 2014 WASH cluster meeting, it was estimated that 2,557 boreholes[3] had been constructed in the state to date (MWCRD, 2014b). Table 1 shows the estimated population and the average number of people per borehole for each county and Aweil Town[4]. There are an average of

[2] The County Development Grants are intended for Education, Water Health and Roads.

[3] The first edition of the State O&M Framework (MWCRD, 2013c) refers to a semi-formal mechanism of communication in place for the collection of data, which is linked to tools borrowed from the county government.

[4] Note that these figures are estimates, as it is difficult to obtain accurate population data.

over 700 people per borehole in Aweil Centre, Aweil Town and Aweil West. At 412, Aweil North has the lowest average number of people per borehole. This figure provides insights into the spread of boreholes between the counties. More detailed information on the number of boreholes in each Payam and Boma compared to the population would enable a better understanding of user numbers and equity.

Table 2: Boreholes coverage in the five counties of NBEG and Aweil Town (MWCRD, 2014b)

County	No. of boreholes (Nov 2014)	No of functional boreholes (Nov 2014)	Estimated Population (2013)	Ave no. of people per functional borehole
Aweil North	632	547	228,000	417
Aweil East	773	669	446,000	667
Aweil West	537	423	297,000	702
Aweil South	255	214	123,000	575
Aweil Centre	150	104	106,000	1019
Aweil Town	210	170	130,000	765
Total	**2,557**	**2,136**	**1,270,000**	**595**

Figure 5: Seasonal Borehole in Mariduakum, Mariam West

According to the data presented, not all of the above boreholes are functioning (Figure 6). Table 3 shows that the lowest functionality is to be found in Aweil Centre and Aweil Town, with 21% and 19% of boreholes not functioning respectively. In all counties, between 4% and 6% of the boreholes are reported as dry.

The reasons why the functionality is considerably worse in Aweil Centre and Aweil Town is not known – it can only be guessed. Likewise, the reasons for non-functionality of the sources and whether they can actually be repaired or rehabilitated are not known. Currently no published information is available on the reliability or water quality for the functional sources. In fact, anecdotal evidence suggests a spectrum of service levels for the boreholes in the state. The handpump at

Mariduakum village, Mariam West (Figure 5), is a case in point. In November 2014, the users had to wait for the water level to recover before they could recommence pumping. Despite the low yield and seasonality, the pump has been recently repaired by the community at a cost of 180 SSP.

The data in Figure 6 provides a general picture for the state. However, more information, such as borehole locations, which boreholes repeatedly fall in and out of service and the causes of non-functionality would help the Ministry. Counties and partners to reflect on the status quo, determine needs and prioritise actions. *"We have not identified the main problems"* (Executive Director, Aweil East).

Data coupled with subsequent diagnosis could help, for example, to identify areas suspected of having corrosive groundwater, or to identify boreholes which were poorly constructed in the first place. Stories of communities that are maintaining their boreholes well could also be used to inspire other communities and ultimately help all partners to improve their approaches.

Figure 6: Functionality of Boreholes for all Counties and Aweil Town

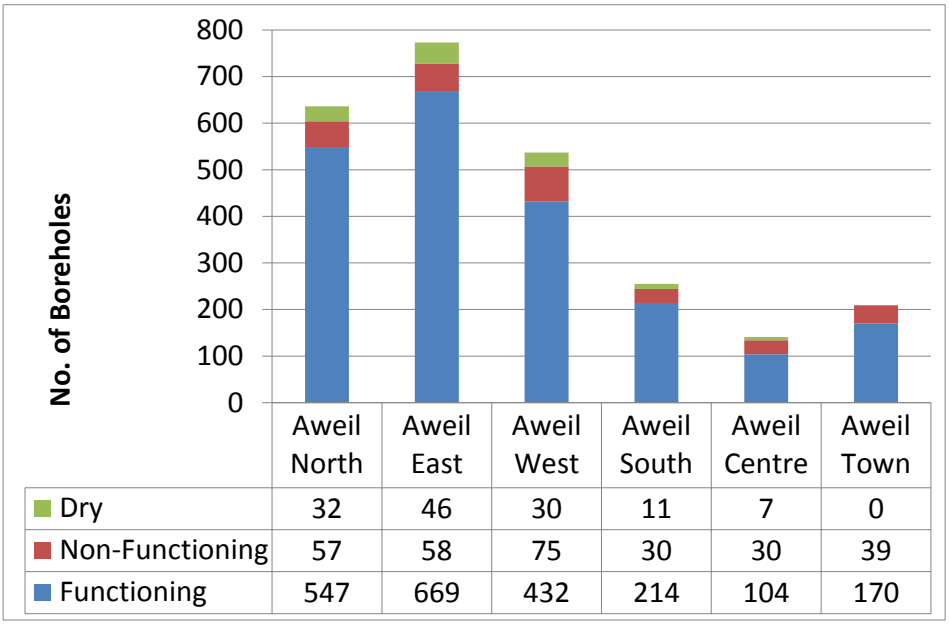


Table 3: Functionality Rates for Boreholes (Nov 2014)

	Functioning	Non-Functioning	Dry
Aweil North	86%	9%	5%
Aweil East	87%	8%	6%
Aweil West	80%	14%	6%
Aweil South	84%	12%	4%
Aweil Centre	74%	21%	5%
Aweil Town	81%	19%	0%

Siting and Boreholes Construction Quality

The importance of the borehole location was raised as a key issue by the handpump mechanics and well drillers. Ideally, it should be in the centre of the village. However, hydrogeological viability, flooding and distance from contaminants also need to be taken into consideration.

Poor borehole construction quality was raised several times during discussions with stakeholders. In particular, concerns were raised about a company called Salam, which has apparently constructed several sub-standard boreholes in the state. Unfortunately there is no compressive mechanism for licencing drillers in South Sudan, including NBeG state.

Concerns about construction quality are not only in relation to this particular company. Chevalier (2014) and Hocking (2013) also refer to poor construction quality in SDC as well as Samaritans Purse-funded boreholes.[5] Group interviews/discussions and the workshop with manual drillers and handpump mechanics on 3 December revealed stories of:

- boreholes that are "dry" after a few months;
- boreholes that started pumping muddy water after a couple of years;
- gravel inside the casing
- a pipe stuck in the well which has silted up

The 3 December workshop highlighted the importance of good construction (of machine or manually drilled boreholes) and long term work for the handpump mechanics. The manual drillers explain that they do not have sieves to properly sort the gravel pack (which comprises angular chippings). There is a lack of compressors to develop the manually drilled wells.

The professionalism of drilling and drilling supervision of the development partners operating in NBEG was not examined in detail in this mission, but the data from Chavalier (2014) and concerns by Hocking (2013), coupled with the experiences shared are not encouraging.

In the closing workshop the director of water supplies and sanitation stated very clearly that "*there are no skilled drilling supervisors on NBEG state*". Unless skills in drilling supervision are built, with roles and responsibilities clearly established and followed, the quality of boreholes in NBEG cannot be guaranteed and the long-term viability of supplies is highly unlikely. It is paramount that this problem be addressed before government funding for investment into borehole construction starts to flow.

Another key issue is the design of the soakaway, surround and fencing to prevent livestock from creating a marsh, or pond at the borehole. Muddy ponds (e.g. Figure 7) are a case in point.

[5] Chevalier (2014) found that 24% of the (103) SDC boreholes studied have the pump intake positioned within the screen, and that for 29% the dynamic water level (for a yield of 1m3/h would reach the screens.

Figure 7: Muddy pond created by livestock watering in Aweil East

WASH Stakeholders

The Ministry of Water, Cooperatives and Rural Development, NBEG has been hosting the WASH cluster meetings since the newly constructed Tukul was ready in June 2014 (Figure 8). This has strengthened the fulfilment of the Government's leadership role.

In September 2013, the Ministry was aware of 23 partners undertaking WASH activities in the State (Annex 2). Many have subsequently closed or stopped performing WASH activities in NBEG, and only 11 were known by MWCRD to be active between July and December 2014. Most now have a much reduced scale of operation. As there are no formal reporting requirements for organisations involved in WASH in NBEG, the WASH cluster meetings provide the main way to find out what they are doing, and where, how and what is planned (Table 4).

Figure 8: Training and Workshop in the MWCRD Tukul

Table 4: WASH Development Partners & Government Coordination Attendance

Attendance of WASH Cluster Meeting (July – Nov 2014)					
	July	**Aug**	**Sept**	**Oct**	**Nov**
ACF-USA	✓	✓	✓	✓	✓
AWODA	✓	✓	✓	✓	✓
IAS	✓	✓	✓	✓	✓
SDC Project	✓	✓	✓	✓	✓
SNV	✓	✓	✓	✓	✓
South Sudan Red Cross	✓	x	✓	✓	✓
Welthungerhilfe	✓	✓	x	x	✓
UNICEF	✓	✓	✓	✓	✓
UMCOR	✓	✓	✓	✓	✓
NRC	✓	✓	✓	✓	✓
TEARFUND	✓	✓	✓	**x**	**x**
Ministry - MWCRD	**Host**	**Host**	**Host**	**Host**	**Host**
Aweil North	✓	✓	✓	✓	✓
Aweil East	✓	✓	✓	✓	✓
Aweil West	✓	✓	✓	✓	✓
Aweil South	✓	✓	✓	✓	✓
Aweil Centre	✓	✓	✓	✓	✓
Aweil Town	✓	✓	✓	✓	✓

NGOs, interact differently with government (i.e. planning, selection of communities, visiting communities)[6]. These differences appear to create unease with county governments in particular. However, it is difficult for government to hold development partners to account when there are no standard procedures on how to interact with government for the state.

Change in Water Supply Services – Boreholes

A comparison of the reports presented at the WASH Cluster meeting in July 2013 with Nov 2014 indicates that 421 new boreholes have been constructed in the past 15 months. Table 5 shows the distribution of these new water points among the five states. Brief discussions with MWRCD and their advisor suggest that the figure of 421 is considerably higher than expected. The lack of systematic reporting by partners to MWRCD means that it is difficult to cross-check data submitted by the counties for mistakes, or to learn about investments by others, such as households or institutions. There is more that MWCRD could do with such data to build up a better understanding of service delivery, non-functionality and dry wells and thus support decision-making. However, all boreholes need to be geo-referenced and have a unique identification number to enable their status over time to be monitored.

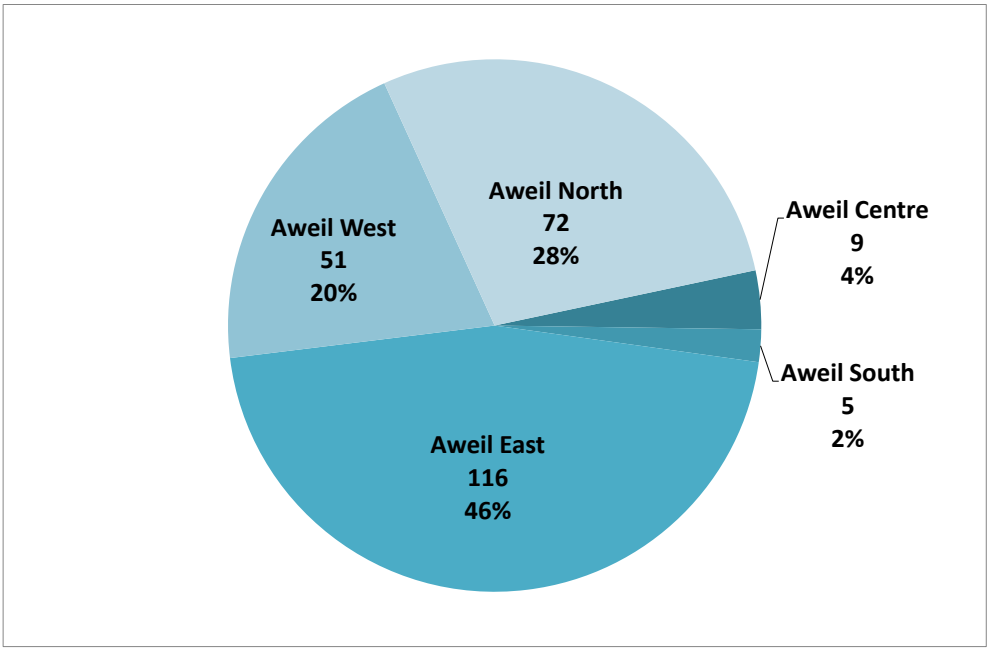
[6] For example, according to interviews with handpump mechanics and county government in Aweil East, ACF are in contact with the Payam rather than the county government. They select communities themselves and present a list to the Payam. In contrast SDC deal with the county government. Other organisations (names withheld) have been known not to consult with the government at all.

Table 5: Comparison between Boreholes in July 2013 and Nov 2014

County	No. of Boreholes July 2013	No. of Boreholes Nov 2014	Increase in No. of boreholes (July 2013 to Nov 2014)
Aweil North	560	632	72
Aweil East	657	773	116
Aweil West	486	537	51
Aweil South	250	255	5
Aweil Centre	141	150	9
Aweil Town	No data	210	na
Total	2,094	2,557	

The data from the last column in Table 1 has been used to prepare Figure 2, which indicates that between July 2013 and November 2014, 46% of the new boreholes were constructed in Aweil East, whereas only 2% and 4% respectively were constructed in Aweil South.

Figure 9: Location of New Boreholes Drilled and Installed from July 2013 to Nov 2014



Plans for 2015

Looking forwards, at least six development partners plan to undertake water supply activities in NBEG in 2015. Notably, the agencies are concentrated in Aweil, North and East, with very little planned for Aweil South, Centre or Town. The absence of Internally Displaced Persons (IDPs) in Aweil South was felt to be a reason for the lack of agencies there. However, from the perspective of development of the whole state, and of providing services and building capacity, expertise and resources need to be channelled to all counties. Another key gap identified in Table 6 is that no agencies are providing the much needed longer term support to communities to sustain their existing supplies. This would include widespread awareness-raising about the importance of clean water (e.g. through the media), re-training communities and committees, and conflict resolution. Agency investments are exclusively for new sources and rehabilitation. It should also be noted that ACF has funding to introduce a voucher scheme in two of the five counties.

Table 6: Agencies planning to undertake water supply activities in 2015[7]

	West	East	North	South	Centre	Town
Activity/Agency	WHH, SDC, IAS, SSRC	ACF, IAS	ACF, AWODA, SDC, WHH	SSRC	SSRC, AWODA	SSRC, SDC
Community work for new sources	WHH, SDC	ACF, IAS	WHH, ACF, SDC		SSRC	
Community work for existing supplies						
HPM Training	WHH, SDC	ACF	WHH, ACF, SDC			
Spare parts activities or vouchers	SDC	ACF	ACF, SDC	SDC (IRC)		
New Boreholes	SDC (20 no), WHH, SSRC (10)	ACF, IAS (5 no)	AWODA (2 no), ACF, SDC (20 no)	SSRC (10 no.)	SSRC (7), AWODA (2 no)	
Mini water yards						
Rainwater Harvesting	WHH	IAS	WHH			
Bio sand filters,		IAS (100 no)				
Rehabilitation of boreholes	WHH, IAS (5), SDC (10)	ACF	WHH, SDC, ACF		SSRC (25)	SSRC (15)

[7] Note that this table only includes the activities of the organisations that attended the workshop on 4 December 2014

Handpump Management, Operation and Maintenance

Communities

Interviews with County WASH staff, handpump mechanics and water users revealed several types of communities and borehole supplies:

- Functioning most of the time and well-maintained by community (some sources are kept very clean and swept regularly)
- Functioning thanks to the commitment and determination of a few community members (e.g. Box 1)
- Source functioning but not optimal (in terms of yield, seasonality or water quality)
- Breaking down repeatedly, but repaired by community, sometimes with agency support
- Source keeps on breaking down, and eventually the community gets tired and gives up
- Community tries to repair source but fails due to a fundamental design or construction problem
- Completely broken down

Box 1: Achan Dishak of Morol Akoln Village, Aweil West and locked pump

Achan Dishak was interviewed by the MWCRD on the O&M study in 2013. At the time she had just been punched by someone in the village for trying to collect user fees. Apparently the culprit has since left the village. According to Achan, this is one of four handpumps in the community. Although a committee was formed and trained when this source was rehabilitated by SDC in 2012, only two people remain on the committee today. The pump broken down five times in 2014, and was repaired each time. Now, however, only eight, out of an estimated 350 households in the community have actually paid. They called the pump mechanic (Paul Malek – who works for government), and paid him 150 SSP plus another 150 SSP for the spare parts. The pump has not broken down since the committee decided to lock it, opening it only between 8 and 11:30 am for those who have paid and for particularly vulnerable people.

No comprehensive or statistically significant data is available on the operation and maintenance practices of communities. Samuel Garang of Baac, Aweil East, visited 28 communities, only two of which have a committee in place. Examples of water users raising money to pay for the maintenance of their handpumps have been provided for all five counties, e.g.

- Aweil West – handpump mechanics explain that they are receiving requests to undertake repair work (Table 8)
- A community that manage to raise SSP 1,000, and bought a bull for consumption at a celebration[8]
- A community that used the funds collected in fees for a revolving loan[8]

Not all communities are managing and maintaining their supplies so well. One of the reasons given for insufficient maintenance is the lack of appreciation in many communities of how important good-quality drinking water is. "*People do not know about clean water*" Kwach (2014). As noted above, poor quality construction is also a factor, as is when there are too many users of the pump. Conflicts over payment, such as illustrated by the case in Box 1 can also play a role in undermining maintenance. Emerging research from a UK-funded project called The Hidden Crisis states that *"The underlying causes of failure of groundwater-based water supplies are complex and multifaceted, but with the correct expertise and methodologies the reasons for failure can be understood, diagnosed, predicted and mitigated"* (Chilton, 2014). However, this requires investment into thorough diagnosis.

Community Strengthening and Support

The agencies working in NBEG have different approaches in how they work with communities. The expectation from the communities also varies. International Aid Services (IAS), for example explain that with their integrated rural development approach, they facilitate sevencommunity meetings to identify needs, priorities and available resources before moving ahead with a water supply project. Communities are requested to contribute 10% of the capital cost in cash and in kind. This is not the case with any of the other projects

Handpump mechanics and county government staff, state that some agencies provide very little community training, or none at all, and that there is often no clear process of handover of the water supply to the community. Local stakeholders[9] have pointed out that that this perpetuates the culture of dependency on external assistance, with communities expecting the NGO to maintain the water supply. Diverse, and conflicting approaches by different agencies (whether NGO or government) are likely to confuse communities, make it difficult for government to send out a clear message and undermine their willingness to fulfil their roles and responsibilities.

Handpump Mechanics

One of the strengths of NBEG is the number of handpump mechanics in the state. Their level of skills and experience varies, as do literacy levels and access to tools. Some also have skills in hand dug well construction, latrine slab casting and hand drilling (auguring). Some handpump mechanics are

[8] Story retold by participant of workshop on 26 November 2014

[9] This issue came out very clearly at all three workshops (Annex 6).

salaried, working for Government[10], while others are "volunteers" – i.e. informal private businesses. Discussions with the handpump mechanics indicate that the ministerial directive of separating the government from volunteer mechanics has been followed. Only volunteer handpump mechanics are entitled to be members of the five county handpump mechanic associations (Table 9).

Figure 10: Woman carrying water, on the road from Aweil East to Aweil Town

Communities call on both salaried and volunteer mechanics to repair their handpumps, and, at times are apparently reluctant to pay the mechanics when they think that the service should be provided free by the government. Sometimes volunteer and salaried handpump mechanics work together on a job. Mechanics in Aweil South explained that they differentiated between the two categories by only paying the two salaried mechanics 20 SSP and the two volunteers 55 SSP each from the 150 SSP paid by the community.

Because of the weight of the installation the India Mk II handpump mechanics have to work in teams in order to repair it. In September 2013, it was reported that the current prices for a team carrying out repairs range from about 420 SSP when working for NGOs to 300 SSP when working for water users directly (MWCRD, 2013c). It was also reported that in some cases, a team was paid 150 SSP to check the problem. As an effort to prevent overcharging, MWCRD issued a statement in May 2014 that handpump repairs should cost the community a fixed price of SSP 150 for minor repairs. When interviewed about the charges, many, but not all of the interviewees (particularly in Aweil West) reported that they had charged SSP 150. Given the presence of MWCRD at the meetings it is not clear whether this was the truth, or whether they were reporting what they believed that government wanted to hear given the officially endorsed charge rates (Table 7).

Table 7: Schedule of Charge Rates for Repairs by Hand Pump Mechanics (at 2014 prices)

Type of Repair	Rate (SS)P
Routine Maintenance	30 – 50
Minor Repair	150
Major Repair	300

[10] Handpump mechanic grades include grade 10 (paid 850 SSP per month) and grade 13. Note grade 7 (1,225 SSP, grade 14 (420 SSP) and grade 15 (307 SSP)

Handpump mechanics are obtaining work. The examples in Table 8 are mainly work for communities. However both in 2013 and 2014, the mechanics also worked for NGOs operating in the state. IAS for example employed government handpump mechanics in 2014. According to the handpump mechanic in Aweil East, ACF have their "*own people*". SDC pays 80 SSP/day and 40 SSP/day for skilled and unskilled mechanics respectively.

Discussions with the handpump mechanics in Aweil West reveal frustrations at the lack of spare parts available in the country for the last two years. When quizzed further about the fact that spare parts had been available in Aweil Town since March and why these had not been sourced there were mixed reactions. Notably the Aweil West rehabilitation team were able to ensure that a pump was bought for a community from Aweil East n 2014 (see *Investments* above). It is not clear whether the resources available to the handpump mechanics are so low that they cannot source from Aweil (one way trip costs SSP 25 to 50); whether they never thought about it, despite the fact that investing in spares can help them to earn a living; or whether they are just waiting for a development partner, such as SDC to bring spares to the county.

Subsequent discussions with the staff of the SDC implementation project reveal that there are plans to support the establishment of three stores in Aweil West county. Whatever the underlying problem is, the handpump mechanics could benefit from business development training that helps them to realise the opportunities that already exist, and how these can be better harnessed.

The innovation that the handpump mechanics demonstrate in fixing pumps with limited resources and lack of spare parts needs to be recognised. Examples include rethreading broken pump rods, and taping up cracked and leaking GI pipe with inner tube. Table 8 shows a selection of the type of work that handpump mechanics are undertaking. There are many examples of communities that are paying for the services, as well as the spare parts.

Table 8: Examples of the extent of handpump maintenance work (Source: interviews)

Name	Area	Recent handpump repair work undertaken
Peter Thiek Kur	Gumjueil Centre, Aweil West	November – 17 requests to repair pumps but no work - no spares in county October – 13 repairs – reconditioning, so no spares were used Charged SSP 150 per repair
Marco Deng Tong	Gumjuer East, Aweil West	November – 2 repairs – reconditioning (re-threading)
John Lual Angok	Ayai, Aweil South	No work in the last months due to lack of accessibility
Samuel Garang	Baac, Aweil East	November – repaired four, 5th could not be repaired as the pipe was stuck in a borehole that had silted up (drilled by Salam)
Akol Kuol	Manhas-Tong,	November – repaired two [rusted pipe, which the community refused to replace, so the platform was broken and the well turned into an open hand

Name	Area	Recent handpump repair work undertaken
Kuut	Aweil East	dug well (at a cost of SSP 150); pump bucket worn out, so mechanic made a replacement from cow leather], 3rd well had a broken pedestal so it was not repaired.
Michael Atak Luol	Baac, Aweil East	November – 1 repair (valve in the cylinder was broken). Community collected SSP 500 and bought the spare from Aweil East.
Angelo Joal	Mangok, Aweil East	November – 6 repairs [pump bucket – SSP 75 – community paid; chain – community refused to pay, so mechanic improvised; white worms in water – Angelo chlorinated; broken thread – rethreading; bearings worn – community gave Angelo 45 SSP to buy spare part; broken nuts on water tank – businessman in the community bought them]
Deng Deng Juac	Malmal North, Aweil North	November – 8 repairs [pedestal breakdown – took pedestal from a dry borehole – community contributed a bag of cement and 200 SSP (2 HPM); GI pipe threads worn out – rethreading community paid 150 SSP (4 HPM); replaced platform on a private borehole – community contributed cement & 200 SSP (4 HPM); rod disconnected – 150 SSP (4 HPM); chain replaced – used an old chain – 150 SSP (çHPM); rod disconnected – 200 SSP (4 HPM); buckets broken, replaced with new buckets from ACF – does not know price of buckets – 100 SSP; rod broken – 130 SSP (3 HPM)]

This short study did not ascertain the cohesiveness of each handpump mechanic association, but it was noted, as in 2013 that the members interviewed appear to be motivated and energetic. The associations would benefit from training and mentoring support with respect to leadership, management, record keeping, handling finance and business development over a couple of years. This should include an explicit component to enable the associations to learn from each other through face-to-face interaction. In the short term, it would be useful for agencies to support the handpump mechanics by awarding them (perhaps through the associations) contracts for pump installation. This could easily be separated from drilling construction activities.

Table 9: Handpump Mechanic Association

	No of Members		Comments
	Sept 2013 (MWCRD, 2013)	Nov/Dec 2014 (Interviews)	
Aweil South (Paliet Pump Mechanics Association)	*	35	Formed in 2010, first chair joined army; second chair left. Paperwork got lost.
Aweil West	28	18	Now only comprises volunteers; registration expired in March 2013 and has not been renewed-
Aweil North	*	*	
Aweil East	32	*	Have store and some spares
Aweil Centre	*	*	
* means that to data was collected for these counties.			

In early 2013 UNICEF provided one quad bike per county to Aweil South and Aweil East pump mechanics. The bike of Aweil East is broken down ("parked") while that of Aweil South apparently still works. The extent to which the latter is being used was not ascertained. However, the heavy rains and flooding during the rainy season mean that there was less work for the handpump mechanics than in the dry season, particularly where there was excessive flooding, which causes problems with accessibility. However, with more surface water around, many communities are not as dependant on groundwater as they are in the dry season, despite its questionable quality.

Spare Parts Supplies

Thanks to the efforts of SDC (Box 2), a store selling spare parts opened up in Aweil Town in March 2014. The store (Figure 11) is operated by ReliefLine, a subsidiary of India's Ajay Pumps Limited. The supplier is exempt from state taxes for two years (i.e. up to the end of February 2016). The store is situated in the compound of MWRCD. At the time of the visit in November 2014 there was no sign board in place, despite the store's having existed for six months.

Individuals, as well as handpump mechanics and NGOs are buying from the store. There are examples of communities buying spares for themselves, and; in some cases, this is the preferred option for them. However, a journey to Aweil is a lot to pay to purchase a small component.

To date, relatively small quantities have been sold. The shop manager Santos Aleu's pay is linked to sales. He keeps record of all sales in his receipt book. Sales have been very slow, with casing and screen for drilling being sold primarily. However, sales picked up considerably in November 2014 (start of the dry season) amounting to 20,000 SSP. Sales between the shop opening in March and 25 November 2014 (Annex 3) show GI pipes (100 sold) and connecting rods (30 sold) were the most popular items. The store manager is hopeful that sales will pick up as more and more people realise that these items cannot be obtained for free elsewhere. However, more could be done to encourage sales.

Figure 11: Inside the ReliefLine Handpump Spare Parts Store in Aweil

The start of the dry season now is the best season for selling spare parts. Signboards would help to draw attention to the existence of the shop, firstly for the residents of Aweil town. There should be a market for the spares given the existence of 210 boreholes, including 40 that are non-functional. Aweil town, in fact, would be a good test location to encourage more preventative maintenance, rather than only focusing on breakdowns.

Figure 12: Example of Price Board for Pump Components in Malawi (Source: Danert, 2008)

Within the store itself, simple but attractive displays of components, as well as a signboard with prices, such as in Figure 12, would help to promote the products. A few adverts on local radio would also create more awareness. As a former handpump mechanic who is now an employee of ReliefLine, the store manager may also benefit from some business training to help expand the business. However, ReliefLine in Juba should also be interested in supporting the manager.

One of the key aspects of the O&M Framework was to ensure that spares are not only available in Aweil town, but also in the county headquarters. Interviews with handpump mechanics and the county government staff indicated that this was a key requirement for pump maintenance. The distance to Aweil town is considered too high in all of the county headquarters. Table 10 shows that spare parts have been available in Aweil East, and more recently in Aweil South. SDC plans to support three stores to stock spare parts in Aweil West in 2015, probably in some form of revolving loan. How the three stores will relate to the association has not been fully defined.

Table 10: Availability of Spare Parts in the County Headquarters

County	Spare parts available in the county	Who owns the spares	Origin of the spares	Comments
Aweil South	Assets of a value of SSP 25,000 (at 2014 prices).	Aweil South Handpump Mechanics Association	Given to the association in 2014 as a revolving loan. Materials originate from IRC.	Sold 8 GI pipes (SSP 125 each) and banked money with local businessman
Aweil East		Aweil East Handpump Mechanics Association	2012: received SSP, 2,500 from SNV; IRC built store. 2013: jobs from IRC	
Aweil North				
Aweil West			Supported by SNV in the past to stock spares with grant of 2,000 SSP. It subsequently collapsed.	In SDC's plans – three stores

Box 2: Encouragement and Incentives for ReliefLine to Open a Store in Aweil

The Swiss Agency for Development and Cooperation's Senior Advisor to the Ministry started pursuing options for a spare parts outlet in Aweil in October 2013. He immediately discovered that the main supplier of spare parts to South Sudan Ajay Corporation/Reliefline Africa were very interested. With the change in UNICEF's policy of supplying free spare parts, they had been looking for an opportunity to increase market penetration. In discussion with all the other WASH agencies operating in NBeG it was clear that Reliefline Africa was by far the most important supplier. For this reason detailed discussions were limited to Reliefline.

Given the risks involved in this venture Reliefline sought three assurances:

1. A guaranteed level of purchases from the store in year 1
2. No taxation on the parts to be levied by the state of NBeG
3. A small secure place from which to operate in Aweil at no cost for the first two years of operation.

These three requirements were met. Reliefline won a bid process for supply of spares to SDC in Aweil. The bid was on the basis of supply in Aweil and this single purchase went most of the way to meeting the guaranteed level.

The Ministry approached the NBeG Commissioner Revenue who agreed to exempt pumps and spares from local tax, initially for two years, on the grounds that these were to meet basic needs of the people of the State.

The Ministry agreed to provide the space requested in its warehouse since it was not being fully utilized by the Ministry.

Remarkably Reliefline undertook to sell the parts at the same price as in the store in Juba[11], absorbing the costs of transportation to Aweil.

The store was due to open in January 2014. However, it was delayed with the start of the conflict in December 2013 and opened for business in April 2014 as soon as security considerations permitted.

As noted above, the handpump mechanics association in Aweil East runs a spare parts shop. In 2012, SNV provided a grant of SSP 2,500 and IRC supplied initial stock of spares.[12] The shop (which was paid for by IRC) is located at the county headquarters and there are thus no charges for rent. Once spares were sold, the association ordered from suppliers in Juba. They have made two new orders without any additional financial support – although IRC transported the spare parts from Juba. In order to inform communities of the availability of spare parts, the association called a meeting of eight Payam chiefs, to inform them. The association paid for tea, and each chief was given an allowance of 20 SSP. This marketing approach apparently boosted sales. The current purchase and selling prices of the spares are:

- GI pipe – bought at SSP 125; sold at SSP 190
- Rod – bought at SSP 75; sold at SSP 110
- Foot valves – sold at 180
- Cylinder – sold at SSP 900

[11] As this report was being finalized ReliefLine announced a 50% increase in local (SSP) prices for parts sold in the Aweil store. This was because of the substantial devaluation of the SSP against the USD, and increased costs of transportation from Juba to Aweil.

[12] MWCRD (2013) states that SSP 28,000 was donated by IRC to purchase their initial stock. Discussions with the handpump mechanics in 2014 indicate that they were given spare parts rather than cash, including: 5 head assemblies, 2 pedestals, 25 cylinders, 25 foot valves, 50 buckets, 25 chains and one or more vice.

According to the association, communities are not purchasing GI pipes or cylinders because they are "*too expensive*". In the discussion, it was noted that the spare parts available at the shop in Aweil town are currently cheaper than those for sale in Aweil East. One of the fundamental issues is the extent to which the handpump mechanics take a margin on the spare part. An alternative is to sell the spare parts at cost recovery, and make money from the repair work. Ideally, this issue should be discussed by all of the handpump mechanic associations to determine a common approach to their business model whereby they are not undermining each other, or causing mistrust among communities.

Given the inflation in the country, as well as the acute shortage of foreign currency, one of the key challenges for all of the suppliers is how to adjust prices so that they can replace their stock.

Corrosion

Handpump mechanics and county staff have talked about rapid corrosion of pipes – Nyocawany Payam in Aweil South, where GI pipes can corrode in 3-4 months, is a case in point. India Mk II pumps are not recommended to be used in aggressive water, meaning pH <6.5. In such circumstances, pvc or stainless steel rising mains should be used. It is necessary to identify the areas where there are major problems with corrosion.

Rehabilitation and Repairs by Development Partners

Several partners are rehabilitating broken down boreholes. However, there is no defined and agreed standard approach to diagnosing the reason for the breakdown, recording the information and reporting, or for community requirements or re-training of communities. In 2013, the SDC implementation project was charging communities SSP 150 for major rehabilitation (involving work on the platform or if the pedestal is broken), but has been undertaking minor repairs free of charge (i.e. replacement of cylinder, replacement/repair of connecting rod and chain).

SDC has now increased this charge to SSP 300 for handpump rehabilitation to cover what the hand pump mechanics charge.

Communications

The interaction between the community (and water user committee specifically[13]) and the agencies when planning and construction a new water supply is only one of numerous potential communication mechanisms in the state. Others include:

- Radio, which according to Joseph Njuguna of Wëër Bai FM Radio is "*consumed more than any other media in the state*" and has been used to solve all sorts of problems including

[13] In the 2013 O&M visit it was noted that not all agencies engage with the whole community, Some focus only on the committee, which is expected to communicate roles and responsibilities to the community.

finding stolen cows, tracing the owner of a bicycle and bringing together diverse musicians from all over the state. According to Joseph, "*people want to hear themselves*".[14]

- Village chiefs, who wield considerable influence in most communities.
- Commissioners, who receive visitors and make visits to the residents of their country, particularly just after they have entered office
- Payam supervisors and administrators make regular visits to communities
- Handpump mechanics are in regular contact with communities.

Waiting rooms, and offices within the counties as well as the ministry and development partners offer the ideal space for attractive posters that clarify roles and responsibilities for O&M, as well as who can be contacted if there is a breakdown.

All of the above channels could be better used to ensure that key messages regarding O&M are taken to the community – to the grassroots level and that feedback to decision-makers is provided.

Figure 13: Local Radio Station Wëër Bai and local resident with his radio

Operation and Maintenance Framework - Progress and Challenges

This chapter summarises the progress and challenges of implementing the recommendations set out in the O&M Framework. It also reflects on the structure and content of the framework and how it could be improved to consider the realities on the ground and be more user-friendly.

[14] Joseph Njuguna of Wëër Bai FM Radio presented Community Radio, including experinces with WASH on an RWSN Webinar on 27th January 2015. The recording is available on: https://vimeo.com/118014541. Presentation available on: http://www.rural-water-supply.net/en/resources/details/651

Despite the challenges posed by the outbreak of armed conflict in December 2014 in South Sudan, and the uncertainty and loss of momentum as a result, there has been notable progress. The O&M Framework (MWCRD, 2013c) set out the following vision: Northern Bahr el Ghazal, through its own leadership and involvement of communities, was to ensure sustainable access to safe water for all in the State. The Framework highlighted three overarching requirements for success:

i. MWCRD shall lead the framework and implementation process.
ii. All rural and urban communities of the State make payments for the operation and maintenance of their drinking water systems.
iii. The skills, experience and commitment of the entire water sector within the state (NGOs, UN agencies as well as the multilateral and bilateral agencies and private sector) are built upon, with all working together to implement the framework.

MWCRD has taken the lead, as demonstrated by presentation of the framework to the Council of Ministers; circulation to all stakeholders undertaking WASH activities, with particular emphasis on newcomers as well as communication through two radio programmes and through a tour to talk to all counties in May 2013. With the completion of a Tukul on the ministry premises, the ministry is now able to host the monthly WASH cluster meeting. As noted in the previous chapter, this is a key part of the leadership role.

The second and third requirements cannot be met overnight. As reflected in the previous chapter there are examples of community payments, which is encouraging. MWCRD has joined hands with UNICEF in communicating a clear message of no free spares and community payment. The culture of presenting and discussing progress in the WASH cluster meetings provides the basis for meeting the third requirement. However, the dynamic nature of who is working in the state (Annex 2) makes it difficult, coupled with the fact that development partners are driven, as well as being constrained by their project targets, budgets and internal modes of working.

Details on progress against the ten recommended actions in the O&M Framework are set out in Table 11. The establishment of a shop in Aweil Town selling handpump spare parts and drilling materials, the radio broadcasts by government and the apparent willingness of development partners to stop providing free spare parts to community are notable achievements.

Table 12 provides an update of the summary situation and response from the framework (MWCRD, 2013c). It sets out proposals for taking forward (or dropping) issues that have not significantly progressed. In particular, it is proposed that the definition of roles and responsibilities, as well as key standard procedures, is set out in a revised O&M framework and handbook.

Table 11: Operation and Maintenance Framework for Water Supplies – Progress on Actions

Proposed Action	Progress/Challenges
1. State Ministers, Governor and State Government discuss and endorse a vision and key policy issues for the operation and maintenance framework including ○ no more free spare parts are distributed (apart from emergency responses in camps); ○ communities pay for spare parts and maintenance;	Vision endorsed
2. Clear roles and responsibilities for WASH are defined at state, county, payam, boma and community levels. This includes planning, management, monitoring and reporting as well as ensuring equitable access to water services and addressing community concerns at county level, with the regulation, oversight and support from the State Ministry.	Limited progress
3. All agencies work towards enabling stakeholders at state, county, payam. boma and community levels to fulfil their roles and responsibilities	No progress (needs more than one year and more government resources to fulfil roles and responsibilities)
4. A standard approach and common procedures for all aspects of developing and maintaining new and existing handpumps and water yards are developed by state government, together with partners.	Seems to be consensus about no free spare parts and community payment, with concerns about the vulnerable. SNV handed over their stock of spare parts as a revolving loan to Aweil South. Common procedures not developed.
5. All agencies support the operation and maintenance framework and align their approaches accordingly. This is supported by memoranda of understanding, agreements or compacts that are signed by all stakeholders working on WASH in the state.	Some progress, but signing compacts or MoU's may not be realistic for partners
6. Private supplier(s) make pumps available for purchase in Aweil and spare parts available in each county.	Partly achieved – pump supplier in Aweil town with tax free status for two years; some spares in Aweil East
7. Each handpump mechanics association registers as a legal entity and opens a bank account and members are equipped (with tools, communications and transport) and enabled (with training and support) to fulfil their responsibilities.	A different, very important achievement – ensuring that only volunteer pump mechanics are members of the association
8. Communities are able to undertake routine maintenance, with handpump mechanics performing inspection and preventive maintenance as part of their work schedule.	Some communities can, others cannot. No comprehensive data.
9. Communities make regular payments and save these funds for future maintenance and repairs.	Some communities do, others cannot. No comprehensive data.

Proposed Action	Progress/Challenges
10. An extensive and continuous process of communication is undertaken to ensure that all are aware of the framework, roles and responsibilities, procedures and that spare parts are no longer free.	Partly achieved – two radio programs took place and there is enthusiasm for more

Table 12: Updated situation and response from 2013 O&M Framework and Implementation Plan

Situation in September 2013 *Situation in November 2014*	Response (updated)
Core aspects for Implementation of the Operation and Maintenance Framework	
Political leadership at State, Ministry, County, Payam and Boma level silent (or quiet) about user payment for operation and maintenance. ***Ministry drafted a short policy paper on rural water fees levied on communities to cover operations, maintenance and repair costs***	-
Roles and responsibilities for all Government Staff at State, County, Payam and Boma level with respect to WASH are not clear. ***Limited change***	Key roles and responsibilities to be set out in O&M handbook.
Irregular work for handpump mechanics, mainly to repair pumps. ***No change***	NGOs and other agencies channel work through the handpump mechanics associations, including contracts for platform casting, pump installation, and major and minor repairs.
Strong sense of pride among volunteer handpump mechanics in their role in developing the nation. ***No change***	Ministry in its monitoring and regulatory role ensures that the framework (and more commercial approach) does not undermine the volunteer handpump mechanics' sense of pride in their role.
Not all handpump mechanic associations are formally registered, have a bank account and have established membership rights and responsibilities. ***Only volunteer mechanics are members of the association. Not all are registered or have bank accounts***.	Review this challenge as part of business development training. The Ministry, with support of nominated agencies/NGOs in each county, assists handpump mechanic associations to formally register, have a bank account and have established membership rights and responsibilities, including ID cards and membership fees.
Spare parts are only available for purchase in Aweil East ***Spare parts are available in Aweil Town, Aweil East and Aweil South***	The Ministry (with support from agencies and NGOs) continues to support and encourage spare parts available for purchase in all counties – preferably sourcing from Aweil Town.

Situation in September 2013 *Situation in November 2014*	Response (updated)
Spare parts stock in Aweil East runs out prior to purchase of new stock. ***Aweil East has stock, but is selling at a higher price than Aweil Town.***	Dialogue between handpump mechanics and business training to examine best models for pricing spares in the counties – i.e. competitive prices, or fixed prices.
Not all communities with a handpump are aware of their roles and responsibilities, including the purchase of spare parts and payment of handpump mechanics. ***Limited change***	The Ministry and Counties work together to raise communities' (with a handpump) awareness of the new arrangements, and their roles and responsibilities, through a range of communication channels, including radio, traditional leaders and county/Payam/Boma messaging.
Spare parts are being given free by some agencies ***Most agencies have stopped.***	Ministry to keep reinforcing the message.
Not all communities are collecting fees from water users for handpump or water yard use. ***No change***	Communities with handpumps or water yards supported and encouraged to collect regular user fees in line with state legislation (to be enacted).
No systematic and regular communication of WASH messages and examples of good practice through the media, local leaders and churches. ***Two radio programmes in 2014***	Ministry (including Governor and Minister) and counties (including Commissioners) undertake systematic and regular communication of WASH messages and examples of good practice through the media (including radio), local leaders and churches.
Agencies follow their own procedures, some of which are not written down, for: (i) community mobilisation and training (ii) post-construction follow-up and support of community WASH committees (iii) drilling/construction/installation supervision (iv) borehole, platform & fencing design (v) diagnosis of reason for handpump or water yard breakdown ***No change***	Key roles and responsibilities to be set out in O&M handbook.

Situation in September 2013 *Situation in November 2014*	Response (updated)
No preventive maintenance culture or system in place. ***No change***	Ministry (working with WASH agencies) develop and disseminate procedures for preventive maintenance, equip teams and communicate to communities that preventive maintenance will save them money.
Important issues for the Water Sector as a whole	
WASH Cluster provides co-ordination for the humanitarian response but there is no government-led WASH, or Water Resources coordination body. ***Ministry convenes a government-led coordination body to regularly discuss important issues of policy and practice, agree actions and review progress.***	Keep up the regular WASH cluster and WASh coordination meetings.
No comprehensive database of handpumps or water yards. ***No change***	Ministry of Water (with support from agencies) builds WIMS database at state level to include data of all existing water sources and able to generate relevant reports for monitoring progress and decision-making.
No unambiguous identification of water points possible because of lack of serial numbers ***Digital coding system has been allocated by Juba***	Ministry of Water agrees on a system (e.g. marking of unique codes on plates) to give out serial numbers (independent from Payam boundaries) and hand pump mechanics fix to all water points.
Transport to rural communities is a major challenge for the Handpump Mechanics Association and county government staff ***No change***	Review this challenge as part of business development training. The Ministry and WASH actors should work together on innovative approaches to increasing mobility of handpump mechanics and transport of spare parts
Communities are often not clear on ownership of hand pumps – as, with a few exceptions, they are provided free with no requirement for cash or in-kind contributions to the work ***No change***	The Ministry (with WASH actors) develops and agrees an approach that requires some contribution (in kind or cash) to test demand and encourage clearer understanding of ownership

Situation in September 2013 *Situation in November 2014*	Response (updated)
Technology choice is currently very limited. The presumption is for machine-drilled boreholes and the installation of India Mk II handpumps (driven by the desire to limit the required range of spare parts). This is an expensive technology, with high maintenance costs. ***International Aid Services and Welthungerhilfe are introducing new technologies (i.e. rainwater harvesting, bio-filters)***	Ministry (with support from agencies) develops groundwater mapping (initially based on topographic maps, borehole logs and local knowledge) to identify areas of alluvium, shallow groundwater, and shallow and hard rock aquifers. This provides a basis for identifying areas for protected wells and hand drilling as alternatives to machine drilled boreholes. Options broadened to include less expensive technologies – particularly for smaller communities unable to pay for maintenance costs of India Mk II Handpumps.
Unclear criteria for identifying priority communities needing water infrastructure. ***No change***	Ministry and county administrations work together to agree a basis for selection to ensure greater transparency and equity in allocation of water points. The Government of Northern Bharl el Ghazal to communicate process to WASH agencies.

The 2013 Framework provided an outline situation analysis, key definitions, details on each of the ten actions set out in the summary, and a draft activity plan. Annexes provided a structure for common procedures as well as a list of India Mark II components, prices collated and an overview of slow, medium and fast moving parts. The framework also documented other issues raised by stakeholders.

Notably, the Ministry did not use the detailed activity planning set out in the last chapter of the document, suggesting that this was more detailed than necessary.

Reflecting on how the 2013 Framework was used, and the needs expressed by stakeholders at the end of 2014, it is proposed to prepare a framework and handbook to guide all stakeholders in their practical, day-to-day activities.

Recommendations

This chapter summarises a number of practical recommendations for improving the O&M of rural water supplies in NBEG. The recommendations draw on the main concerns and ideas raised by stakeholders. Annex 7 summarises the main points raised in the four stakeholder workshops.

- **Coordination:** MWCRD should continue to take the lead in coordinating the WASH partners through the monthly WASH cluster and quarterly WASH coordination meetings. The latter should be used to explore key issues in more depth, and to keep building up a culture of agencies working together to improve WASH in the state, rather than working in isolation.
- **Collaboration & transparency:**
    - Clearly define and set down in writing how county government and NGOs should work together (including location selection, interaction with communities, reporting, siting and supervision of construction, monitoring).
    - NGOs should submit their plans and reports to the county government and the Ministry on a quarterly basis.
- **Spare parts supply:**
    - **Aweil Town**: ReliefLine should put up a signboard outside the Ministry and to consider one or two other sign boards in town. MWRCD should support Reliefline to prepare a table and chart of sales from the store since it opened to be presented by the store manager at the WASH cluster meeting.
    - **Counties**: The Ministry leads a process where support is provided to the pump mechanics association to ensure the availability of spare parts in Aweil North, East, West and South (e.g. training and mentoring, revolving fund, business training and store selection).
- **Handpump Maintenance Services:**
    - All development partners are to join hands and ensure that all of the Handpump Mechanic Associations and Rehabilitation Teams in the state benefit from high quality business development training (which includes managing an association, marketing/creating your own work, business and family, entrepreneurship, store keeping, record-keeping, customer relations).
    - MWCRD is to undertake a systematic analysis of the technical skills and tools of all handpump mechanics in the state as a basis for the development of a state-recognised syllabus, training and certification process for handpump mechanics.
- **Technology options**:
    - MWCRD, together with its partners, should monitor the new technologies being piloted by IAS and encourage other agencies to undertake technology piloting in the state.
    - MWCRD should seek support from partners to develop hydrogeological maps (including key water quality parameters such as pH or iron) to further inform technology choice.
    - Water quality testing to determine pH values in areas where there are particular concerns about corrosion.

- MWCRD needs to take an informed decision about what type of pump to install in corrosive waters. Due to the national implications of introducing a new pump in South Sudan, this needs to be undertaken in consultation, and with the approval of the national ministry.

- **Professional siting, construction and drilling supervision:**
  - MWCRD should formally bring its concern about the lack of skilled and experienced drilling supervisors and urgent need to build up this expertise to the attention of the national ministry and development partners working in the state.
  - MWCRD should raise a formal query to the national ministry about what to do with drilling companies who are repeatedly providing poor quality boreholes in the state.
  - Borehole Completion Forms (also known as dynamic data) should be delivered to the State and County by all agencies that are drilling in the state. They should be stored by the MCWRD until a mechanism has been established to digitise the data.
- **Monitoring and reporting**: MWRCD should prepare an annual report that sets out the investments, status, progress human resources and key challenges for WASH. The process of preparing the report should be used as a way to harness the work of the WIMS and Water Quality units in the Ministry, the work of the counties, as well as the work of development partners, handpump mechanics and select communities.
- **Communication:**
  - Extensive & continuous communication through radio – preferably a regular slot every week/two weeks/month to discuss WASH issues, clarify roles and responsibilities and share experiences. Consider an O&M campaign between March and June.
  - Improve communication mechanisms that harness traditional leaders, the outreach of commissioners, Payam administrators, and handpump mechanics.
  - Develop and circulate posters clarifying roles and responsibilities.
- **Community selection, sensitisation, mobilisation, training & follow-up.** Define the following for the state :
  - How communities for improved water suppliesare selected, including a written application process
  - What are the minimum requirements for community skills and knowledge to manage their water supplies?
  - Outreach to communities after construction (post-construction support) which reinforces their roles and responsibilities and who they can turn to for help. Ideas for competitions to encourage and inspire good management and maintenance practices.
  - Undertake a detailed study that examines how communities are currently dealing with payment for water from vulnerable and very poor families. Use the findings from this study as a basis for informing community training and recommendations for water user committees.
- **Improvement of framework format:** Reflecting on how the 2013 Framework was used, and the needs expressed by stakeholders at the end of 2014, the revised framework should be in

the form of a practical, pocket sized handbook to guide all stakeholders in their practical, day-to-day activities. Note that there may be need to revise nomenclature and certain procedures once the water bill is enacted.

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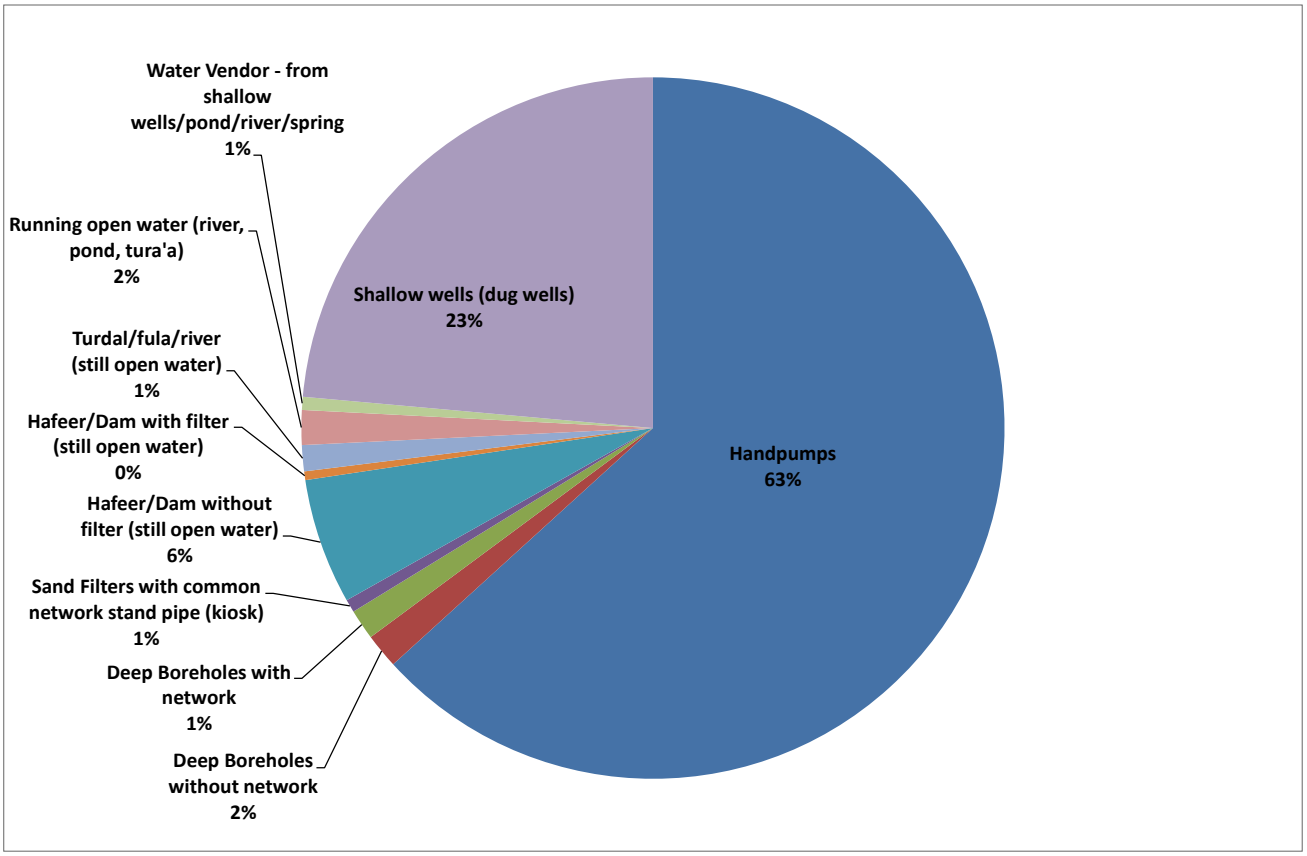
Annex 1: Main Drinking Water source in Northern Bahr el Ghazal

Percentage of Population and Main Drinking Water Source (Source National Baseline Household Survey, 2009 in GoSS 2010 pp36)



Annex 2: Development Partners undertaking WASH activities in NBEG

Agency	September 2013 (Source **MWCRD, 2013a)**	July to Dec 2014 **(Source: Minutes of WASH Cluster Meetings)**
ARARD	✓	
Action Contra le Faim (ACF) USA	✓	
ASCDA	✓	
AWODA	✓	✓
BADS	✓	
BRIGDE PROGRAM	✓	
CESVI	✓	
IAS	✓	✓
International Red Cross and Red Crescent (ICRC)	✓	
International Rescue Committee (IRC)	✓	
International Organisation for Migration (IOM)	✓	
MCC	✓	
SMOWCRD	✓	
Samaritans Purse	✓	
SNV	✓	
SODA	✓	
Swiss Agency for Development and Cooperation (SDC)	✓	
TEARFUND	✓	
SMWC & RD	✓	
UNICEF	✓	
UMCOR	✓	
UNMISS/RRP,	✓	
UNOCHA.	✓	

Annex 3: Sales of Spare Parts in Aweil Town

	Particular	Original Stock	Sold 25/11/14	Sold 16/03/15	16/03/15 Stock
1	GI Pipes 1¼" dia class B, 3m long, India Make, As per Ajay brand standard, BIS and UNICEF	300	100	300	0
2	Connecting rods MS 12mm, 3m long, India Make, As per Ajay brand standard, BIS and UNICEF	200	30	120	80
3	Head Assembly Normal India Mark II	10	3	3	7
4	Water Tank India Mark II	20	3	6	14
5	Pedestal EDW India Mark II	20	3	5	15
6	Head Assembly EDW India Mark II	10	-		10
7	Cylinder Normal India Mark II	30	-	15	15
8	EDW Cylinder	15	-	5	15
9	Sealings	200	-	5	195
10	Pump Bucket	200	-	12	188
11	Sealing upper valve	200	-		200
12	Sealing lower valve	200	-		200
13	Axle	50	-	2	48
14	Front cover India Mark II	50	-		50
15	Thired [sic] Plat India Mark II	50	-		50
16	Bolt and Nut Hex 12 x 40	500	-	20	480
17	Special tools kits	5	-		5
18	Standard tools kits	5	-		5
19	Handle assembly	10	-		10
20	Bearings India Mark II	50	-	5	45
21	Chain India Mark II	50	-	3	47
22	Fishing tools for India Mark II Handpump	5	-		5
23	Lower Valve for India Mark II Handpump	30	-		30
24	Upper Valve for India Mark II Handpump	30	-		30
25	4" diameter UPVC casings Plain 2.9m end to end, blue, India make	300	-	300	0
26	4" diameter UPVC screens[15] Plain 2.9m end to end, blue, India make	100	-	100	00
27	Molado South Sudan type	400	-		400
28	Hoes 3LB	200	-		200
29	Speads [spades]	50	-	1	49
30	Treadle pump (pump along with 7m delivery pipe and suction hose)	10	1	2	8
31	Fast moving parts stock	30	7	7	23

[15] Stock list states casings but this is assumed to be screens

Annex 4: Review Itinerary

Date	Day	Activity
23 Nov	Sunday	Arrive in Juba
25 Nov	Monday	Alien registration & briefing meetings with SDC Meeting with UNICEF Juba
25 Nov	Tuesday	Midday – arrive in Aweil Afternoon – meetings at Ministry
26 Nov	Wednesday	Meeting with Assistant Commissioners and Heads of Pump Mechanics Associations (10 total) plus staff from Ministry[16]
27 Nov	Thursday	Morning - Cluster Meeting Afternoon - Workshop – Agencies and Assistant Commissioners Late Afternoon – Discussion with SDC Staff
28 Nov	Friday	Aweil West – Meeting with Government Representatives and Handpump Mechanics
29 Nov	Saturday	Aweil South – Meeting with Government Representatives and Handpump Mechanics
30 Nov	Sunday	Resting, writing & planning
1 Dec	Monday	Aweil East - – Meeting with Government Representatives and Handpump Mechanics
2 Dec	Tuesday	Aweil North - – Meeting with Government Representatives and Handpump Mechanics
3 Dec	Wednesday	Workshop with manual drillers and handpump mechanics
4 Dec	Thursday	Workshop – Presentation of findings and recommendations for further discussion
5 Dec	Friday	Debriefing meeting with Abraham Aleu Depart for Juba Debriefing meeting with SDC - Juba
6 Dec	Saturday	Depart for Entebbe/Zurich

[16] Structure: Introduction; Communication game (Chinese whispers); Spare parts supply chain -India to NBEG communities (in teams with blind, mute and no hands); Fixing the pump – drama in stakeholder groups; Reflections and ideas for improvement

Annex 5: List of Stakeholders Consulted

26 November 2014 – Opening Workshop

No.	Name	Organization
1	Deng Nyinkuany Akuar	SMWCR
2	Biel Piroth Agoth	SMWCR
3	Marko Yak Mawien	SMWCR
4	Jackson Atak Akol	County WASH A-Commissioner
5	Dut Deng Gabriel	Deputy Director for RWSS MWCRD
6	John Angog Ajüng	Lab. Manager SMW.C8RS
7	William Wol Lueth	A-Commissioner A/W/C
8	John Lual Angok	Paliet Pump Mechanic Association
9	Piol Deng Ugay	A-Commissioner A/S/C
10	Paul Aueli Khon	WASH A-Commission, ALELC
11	Samuel Dut Buola	WASH A-Commission A/C/C
12	William Makom	Djin A - Ceniere APMA chair
13	Marko Garange Majok	Chairperson A/E/C
14	John Dau Deng	CBO header A/W/C
15	Paul Ariel Atak	CBO chairperson A/W/C

27 November 2014 – WASH Cluster Meeting

No.	Name	Title	Organization
1	Gabriel Ajou Jeug	Senior Inspector for O&M	Ministry (RSS)
2	David Piofjang	A-Commissioner	Country Wash
3	Michael	Hungerhilfe	Wash Msr.
4	Dut Deng Gabriel	D / Director	SmWcRD
5	Abraham Lueth	WASH Technicial	SDC
6	Jaill Otienc	WASH Co-ord.	ACF
7	John Angong Ajüng	Lab. Manager	SMW.C & RD
8	Bol Prioth Agoth	WMLS / manager	SMWRC8RD
9	Paul Auei Kohn	A-commissioner	Aweil East West
10	William Wol Luett	A-commissioner	Aweil West
11	Phillip Andran	WASH	SSRE
12	John Garang Kuor	WASH SFP	AWODA
13	Angmo Sam	WASH Consulant	SNV
14	Philip Gok Achuil	Wimg officer	Ministry (RSS)
15	Marko Yak Mawien	Senior Lusp	MWC8RD
16	Veronica Drajon	CMU Coordinator	AS
17	Yai Deng Garang	D. Head & P	WHH
18	Jackos Aiak Akol	A-Commissioner	RWSS
19	Abraham Aleu	Director	SMWC, RD.
20	Peter Mltial Atak	Secretary	SMWC, RD.
21	James Dut Buto	A-Commissioner	RWSS
22	Achiuit Ajang Kiir	Advisor	SNV

27 November: SDC Staff

No.	Name	Title	Organization
1	Peter Mou Maduok	WASH Technician	SDC
2	Abraham	WASH Technician	SDC
3	Anjelo Lual Agif	Rehabilittion Site Manager	SDC
4	Charles Chan	Senior WASH Officer	SDC

28 November: Aweil West - Government Representatives and Handpump Mechanics & Community

No.	Name in full	Payam	Job
1	Garang Kwach	-	County Commissioner
2	Dut Yel Akol	Gumjuer Centre	Aweil West Rehabilitation Team
3	Dominic Garank Deng	Ayat East	Handpump Mechanic
4	James Akol Dut	Mariam West	Aweil West Rehabilitation Team
5	Marko Geng Tong	Gumjuer East	Handpump Mechanic
6	Paul Aril Atak	Gumjuer Centre	Aweil West Rehabilitation Team
7	Peter Thiek Kur	Gumjuer Centre	Handpump Mechanic
10	Ashan Dishak	Morolakoln village	Village resident
11	-	Aweet Village	
12	Samual Mayar	Marialual Village, Mariam West	Village resident
13	Peter Bol Deng	as above	Village resident
14	Theresa Anne	as above	Village resident
15	Thomas	as above	Village resident

29 November 2014: Aweil South - Government Representatives, Handpump Mechanics

No.	Name in full	Payam	
1	Andrew Deng	-	County Inspector Land & Surveys; Acting Executive Director
2	Dut Geng Gabriel	-	Deputy Director for RWSS MWCRD
3	John Akieue Mathiang	Tarweng	Pump Mechanic
4	Ayat Kuac Kuac	Wathmuok	Pump Supervisor
5	Joseph Kuac Anguei	Wathmuok	Pump Mechanic
6	John Lual Angok	Ayai	Chairperson PMA
7	David Piol Deng	-	Assistant Commissioner
8	Charles Chom		Senior WASH. SDC
9	Angelo Amoi		

1 December: Aweil East - Government, pump mechanics & manual drillers

No	Name	Payam	Title/job
1	Peter Garang	-	Executive Director Aweil East County
2	James Obang	-	-/ Aweil East County
3	William Deng	-	-/ Aweil East County

No	Name	Payam	Title/job
4	Albino Atak	-	D/Assistant Commissioner - Aweil East County
5	Micheal Atak Luol	Baac	Pump Mechanic & Drilling Supervisor
6	Peter Dut Nuor	Mangar.Tung	Hygiene Promoter
7	Marko Garang	Baac	Head of Pump Mechanics Association
8	Samuel Garang	Baac	Pump Supervisor
9	Angelo Joal	Mangok	Pump Mechanic

2 December: Aweil North - Government, pump mechanics & manual drillers

No	Name	Payam	Title/job
1	Michael Diing	Malual North	Drilling Team Leader
2	Deng Deng juac	Malual North	Platform Construction
3	Deng Deng Luoc	Malual West	Platform Construction
4	Ngong Lium Ngong	Malual North	Platform Construction
5	Arkang Angelo	Manyang	Member
6	Santino Lual Angok	Mayens	Driller
7	James Wol wol	Malual Centre	D/chairman of association
8	Dau Deng	Malual North	Chairman of association
9	Barjok Bol	Malual Centre	Pump mechanics supervisor
10	Atak Atovjong	Malual North	Deputy Assistant Commissioner
11	Jackson Atak	-	Assistant Commissioner
12	James Yel	Malual Centre	Driller
13	Akol Akol	Ariath	Driller
14	Abraham Aken	Malual North	Driller

3 December 2014: Workshop with Manual Drillers and Pump Mechanics

No.	Name in full	Country	Job
1	Gabriel Ajou Jeng	State	Senior Inspector or O & M
2	Boi Peter Thomas	Aicie	Pump mechanic
3	James Dut Buoli	Aicie	Pump mechanic
4	Garang John Thiik	Aicie	Pump mechanic senior officer
5	James Yec Kuach	Mini	Pump mechanic senior officer
6	Abraham Akeen Dag	Ain	Pump mechanic senior officer
7	Akol Akot	Ain	Pump mechanic
8	Diirg Marych	Aweil North	Team Leader
9	Lueut Avgote		Pump mechanic
10	Macholt Dung Ichor	Aweil West	
11	Peter Lual Marae	Aweil town	Pump mechanic
12	Meheal Atals Marjen	Aweil East	Drilling pump mechanics
13	Angestino Garong	Aweil East	Pump mechanic
14	James Akol Tue	Aweil West	Jeuply chair person Alueiluwest
15	John Alee Jang	Aweil South	Rehabilitation team
16	Santo Aleu Dag	Aweil Town	Relieline Manger
17	Kuol Mawien Dha	Aweil South	Water / Sanitation Supervisor

No.	Name in full	Country	Job
18	Ingor Gelkoor	Aweil South	Water / Sanitation Supervisor r
19	Dut Yel	Altol	Nyamlel Imyom
20	Dames Gau Gali		
21	Dut Deng Gabriel	State	
22	Tong Bak Bak	Aweil South	Deputy Director der RIWSS
23	Maitlo Makuelth	Aweil East	Pump mechanic
24	Anyar Achuothluat	Aweil East	Pump mechanic
25	Dominic Gowang Beug	Aweil West	Drilling pump mechanics
26	Ayat Kual Kual	Aweil South	Drilling pump mechanics
27	Masok Mabior	Aweil West	Drilling pump mechanics
28	Paul Ariel Atax	Aweil West	Handpump mechanic Association C-person
29	Garang John Thiik	Derg	Hand pump Awiil pamny
30	Joseph Njugura	Weer Bei A.E	Team Leaser

4 December: O&M Feedback

No.	Name	Organization
1	Michael Gotlieb	WHH
2	Ian Curtuss	SDC
3	Charles Chan	SDC
4	Jackson Atak Akol	WASH
5	Santino Garang	UMCOR
6	Tai Deng Garage	WHH / GAA
7	Santo Aleu Dang	Ministry, Ajay
8	David Piel Deng	Wash
9	Wilson Akoon	Yuel student
10	John Mattiok Athian	Wash oficer, Umcor.
11	Aguerwol Aguer	Wash officer
12	Ali Tadayo	IAS
13	Jammmes Dut Buola	A / Commission
14	Walter Baumgartner	SDC
14	Davis Yuma	AS
15	Dut Deng Gabriel	SMWCRO
16	Abraham Aleu	SMWCRO

Other Stakeholders consulted

Name	Title	Organisation
Santos Aleu	Store Manager	Reliefline (Aweil)
Joseph Njuguna	Radio Producer	Weer Bei FM (Aweil East)
Lillian Okwirry	Chief WASH	UNICEF, Juba
Biar Kuai Biar	Water, Sanitation and Hygiene Officer (M&E)	UNICEF, Juba
Haile		UNICEF, Juba

Annex 6: Schedule of Requirements for Handpump Supply

The requirements for supply of handpumps and spare parts of NBEG are foreseen to be as shown in the table below. The average depth of installation indicated determines the components forming a complete set for each handpump type. It should be noted that:

1. The fast- or medium-moving Spare Parts are indicated with the following colour code:

Slow Moving	> 6 years
Medium Moving	2 - 5 years
Fast Moving	1 – 2 years

   However, it is noted that in NBEG rising mains and pump rods are also fast moving parts. However, it is not clear whether this is due to corrosive water or economic incentives to replace these parts and sell the original parts for other use.
2. The components indicated with **x*** are multiple parts per pump depending on the installation depth.
3. Under normal circumstances, the recommended numbers of spare parts to be included into a first order are indicated in the last column. The numbers indicated are approximate values when 1000 pumps are purchased.

Drawing No	Description of spare part	Qty /pump	Qty / 1000 Pumps
Pump head			
B2304	**Head assembly** (welded and hot dip galvanised)	**1**	**20**
B2320	**Front cover assembly** (welded and hot dip galvanised)	**1**	**20**
C1017	**Hexagonal bolt M12 x 40,** (for Pump head/Water tank)	**4**	**400**
C1016	**Hexagonal nut M12** (for Pump head/Water tank)	**8**	**800**
Pump handle			
B2326	**Handle assembly** (welded and hot dip galvanised)	**1**	**40**
B2346	**Chain assembly**	**1**	**200**
C2332	**Spacer** (electroplated)	**1**	**40**
C2333	**Handle axle** (Stainless Steel)	**1**	**40**
C2334	**Axle washer** (electroplated)	**1**	**40**
C1035	**Ball bearing** (double shielded)	**2**	**1000**
C1016	**Hexagonal nut M12** (for Handle axle)	**2**	**40**
Third plate			
B2335	**Third plate assembly** (welded and hot dip galvanised)	**1**	**20**
Water tank			
B2340	**Water tank assembly** (welded and hot dip galvanised)	**1**	**20**
C1017	**Hexagonal bolt M12 x 40,** (for Water tank/Pump stand)	**4**	**400**

Drawing No	Description of spare part	Qty /pump	Qty / 1000 Pumps
C1016	**Hexagonal nut M12** (for Water tank/Pump stand)	**8**	**400**
Pump stand			
B2348	**Stand assembly** (welded and hot dip galvanised)	**1**	**20**
Pumprods			
B2373	**Pumprod assembly** (Mild Steel, threaded, hot dip galvanised)	**x***	**200 x***
B2555	**Plunger rod assembly** (Stainless Steel, threaded)	**1**	**200**
Rising main			
C2365	**Riser pipe** (GI pipe, 1 1/4", medium, threaded, hot dip galvanised)	**x***	**200 x***
C2366	**Socket** (GI pipe, 1 1/4", medium, threaded, hot dip galvanised)	**x***	**200 x***
Pump Cylinder			
C2351/52	**Cylinder** (Cast iron, painted with Brass liner C2352 fitted)	**1**	**40**
C2353	**Reducer cap** (Cast iron, outside painted)	**2**	**40**
C2354	**Sealing ring** (Nitrile Rubber)	**2**	**80**
Plunger and Check valve			
C2355	**Plunger body** (Brass component)	**1**	**40**
C2356	**Follower** (Brass component)	**1**	**40**
C2357	**Spacer** (Brass component)	**1**	**40**
C2358	**Upper valve** (Brass component)	**1**	**40**
C2359	**Cup seal** (Nitrile Rubber)	**2**	**1000**
C2360	**Rubber seating** (Nitrile Rubber)	**1**	**200**
C2361	**Check valve** (Brass component)	**1**	**40**
C2362	**Check valve seat** (Brass component)	**1**	**40**
C2363	**Seat retainer** (Brass component)	**1**	**40**
C2364	**Rubber seating** (Nitrile Rubber)	**1**	**200**
Other components			
	Grease multipurpose – for greasing chain assembly	**1 can**	**200**
Installation and Maintenance Tools			
A2443	**Pumprod vice assembly** (for installation of Pumprods)	**1**	**20**
B2420	**Connecting tool assembly** (for installation of Pumprods)	**1**	**20**
A2470	**Pipe clamp assembly** (for installation of Riser pipes)	**1**	**20**
A2478	**Bearing mounting assembly** (for installation of Ball bearings)	**1**	**20**
C2476	**Chain support** (for installation of Chain assembly)	**1**	**20**
C2477	**Axle punch** (for installation of Handle axle)	**1**	**20**

Drawing No	Description of spare part	Qty /pump	Qty / 1000 Pumps
A2515	**Pipe vice assembly with Clamping & Fixed jaws for 1 1/4"** (for installation of Riser pipes)	**1**	**20**
B2545	**Lifting spanner 1 1/4"** (for installation of Riser pipes)	**3**	**60**
C1005	**Spanner 19** (for M12 hexagonal bolts and nuts)	**2**	**80**
C1137	**Spanner 17**(for M10 hexagonal bolts and nuts)	**1**	**80**
C1081	**Spanner 24** (for M16 hexagonal nuts)	**1**	**40**

Table (below) Replacement Frequency Estimates by IRC (2012)

S.No	Component	Estimated frequency of replacement in years	Unit cost (SSP)	Estimated annual cost (SSP)
1	Cup leather	3	25	8.3
2	Handle axle	4	100	25
3	Axle bearing	3	50	16.7
4	M12(10 nut	1	8	8
5	M12(50 nut	1	8	8
6	Indian Mark II GI riser pipes	1	114	114
7	Indian Mark II Connecting rods	1	78	78
8	Indian Mark II Foot Valves	4	150	37.5
9	Indian Mark II pump cylinder complete	4	423	105.7
10	Indian Mark II pump bucket	1	30	30
11	Indian Mark II pump O-ring	3	25	8.3
12	Indian Mark II pump chain	2	80	40
13	Indian Mark II pump bearings	2	30	15
14	Indian Mark II pump head assembly	3	300	100
15	Indian Mark II pump pedestal	5	100	20
16	Indian Mark II pump T-bar	5	100	20
17	Grease	1	25	25
	Estimated Total annual cost of components			**659.58**

Annex 7: Summary of Main Points Raised in the Stakeholder Workshops

Concerns Raised

- Not all NGOs work in the same way (e.g. community training & its quality, varied government involvement, inadequate reporting)
- Varied construction quality and inadequate supervision (-> high repair costs)
- Overuse of handpumps by too many people
- What about the vulnerable people who cannot pay?
- Long distances travelled by handpump mechanics
- Varied skills among handpump mechanics

Ideas Proposed

- Need for written rules by government
- Better communication of the policy & repetition (including by radio)
- Note the importance of the village chief
- Note the value and danger of rich person in community (pay, dependency, abuse, politics)
- Note the importance of strong community leadership
- Build on existing community structures
- Choose the right treasurer!!
- Strengthen communities (ownership & responsibility, committee needed, transparent fund management, record keeping, receipts, regular meetings, use of funds
- Clarify & strengthen supply chain up to county level
- Strong HPM Associations needed with clear roles & rules

Solutions Proposed by Handpump Mechanics and Manual Drillers

- Payam Supervisors should sensitise communities
- There is need for professional drilling supervision
- There should be a proper handover of supplies to the community
- NGOs must link with government
- There should be a combined approach to WASH, rather than separating water and sanitation