



Minutes Lessons Learnt Drinking Water

Date: 12 February 2009, 9:30-12:30

Venue: Government Accountancy Training Center (GATC)

Present:

Name	Organization	Position	Email
Clarissa Mulders	BSF/ BMB Mott MacDonald/ WE Consult	Lessons Learnt Drinking Water Consultant	clarissa@we-consult.info
Kate Louwes	BSF/ BMB Mott MacDonald	Team leader BSF	kwlouwes@bsf-secretariat-sd.org
Simon Ngida	BSF/ BMB Mott MacDonald	Administrative assistant	simon.ngida@bsf-secretariat-sd.org
Serena Bossi	BSF/ BMB Mott MacDonald	Financial administrator	serena.bossi@bsf-secretariat-sd.org
Geerte van der Meijden	BSF/ BMB Mott MacDonald	M&E officer	geerte.meijden@bsf-secretariat-sd.org
Dr John Mwesigwa	AMREF	Country Director	dr.mwesigwajohn@yahoo.com
Lindsay Harkness	IRC	Grant coordinator	lindsay.harkness@theirc.org
Ilona Drewry	IRC	Grants manager	ilona.drewry@theirc.org
Jason Snuggs	IRC	Emergency EH coordinator	jason.snuggs@theirc.org
Kennedy Otieno	AMA	Finance officer	jubaama@gmail.com
Marco van der Plas	RWSSP/ Euroconsult Mott MacDonald	Hydrogeologist RWSSP (MDTF Water)	marcovdplas@gmail.com
Mike Wood	RWSSP/ Euroconsult Mott MacDonald	Team leader RWSSP (MDTF Water)	mikael.wood@tiscali.co.uk
Sam Huston	USAID/ MSI	WASH Advisor	shuston@msi-sudan.com
Peter Lokuruka	Medair	WATSAN Manager	peter.lokuruka@southsudan.medair.org; watsan@southsudan.medair.org
Awadia Ogillo	Oxfam GB	Deputy County Representative	aogillo@oxfam.org.uk
Mengistu Teklemariam	PACT	Programme Manager WRAPP	mteklemariam@pactsudan.org



Welcome by Kate Louwes (BSF Secretariat Team Leader).

Agenda

1. Introduction – Clarissa Mulders
2. Presentation on Drinking Water Lessons Learnt – Clarissa Mulders
 - a. Background info on Water Sector Southern Sudan
 - b. Analysis of drinking water project results of the 1st and 2nd round BSF interventions
 - c. Theory and practice of the borehole construction process (actual vs optimum)
 - d. Lessons learnt/ way forward
3. Way forward – Clarissa Mulders
4. Any other business/ questions – Clarissa Mulders

The presentation and accompanying documents are available on the website: www.bsf-south-sudan.org.

1. Introduction

The BSF secretariat contracted Clarissa Mulders, who has a background in geophysical siting and drilling contract management in sub-saharan Africa, to study the role of hydrogeological and geophysical surveys and the set up of siting and drilling contracts in improving efficiency and effectiveness of the BSF water implementation activities. Her activities for this 18-days assignment included:

- collection and desk study of available siting and drilling documents, drilling contracts
- Analysis of NGO budgets and expenditures
- Interviews with BSF Contract management, grant recipients with base in Juba, sector Lead
- Field trip to AMREF/Aquafund project area in Eastern Equatoria
- Preparation of Lessons learnt report, and presentation

2a. Background info on the Water Sector in Southern Sudan

Clarissa started off by giving an overview of the current working environment in the drinking water sector in Southern Sudan in which all BSF Grant recipients operate:

HISTORICAL SETTING:

- The second civil war (1983 – 2005) has displaced 4 million southerners, a lost generation with no access to basic services.
- In 1989 Operation Lifeline Sudan was established. OLS, run alongside UNICEF, coordinated work of most NGOs and UN agencies and ran up to 2003. By Jan 2004, rural water coverage was estimated at 25-30% (JAM aims at 60-60% by 2011).

DATA AVAILABILITY:

- UNICEF developed a WES database and standard borehole completion logs for submission by implementers. UNICEF has not yet officially handed over the database to the DRWS. Unicef will provide a technical expert to assist with database management, however this as not happened so far. The unclear management structure and the lack of technical expertise makes that there is currently a backlog of data and that the database is not accessible for NGOs/ drilling companies (both to submit data and to use data for analysis).
- In the first and the second round only IRC and Medair provided logs. IRC submitted the data at state level, however not sure whether the data have been submitted to the database, as the state



departments don't have digital access. Therefore it is recommend to bring the data (soft and hardcopy) to the database.

- The database is currently physically based at the offices of the Ministry of Cooperative and Rural Development, however managed by the Ministry of Water Resources and Development (Database officer MWRI is Peter Paul Luoy, luoypeter2004@yahoo.com).

- ▶ A: BSF to make it clear to the grant recipients were and how to submit the borehole completion reports to the WES database. Grant recipients will also need to submit a copy of all the submitted reports to the BSF secretariat, to assure that all reports are submitted. Template of WES database data format will be distributed.

CAPACITY RURAL WATER DEPARTMENT – State and county level:

- The capacity of the RWDs in the counties is low and in some counties there is not even a RWD, which makes supervision of drilling even more impossible. It was agreed that the government also has the responsibility for supervision, and although there was a budget for supervision and the money was transferred to the states there are still challenges like running costs and operation & maintenance:.
- Last year approximately 25 staff members of state RWDs were trained in drilling supervision.

CONTRACTS/ REQUIREMENTS/ GUIDELINES:

- There are no standard siting and drilling contracts available, or at least the grant recipients are not aware of the availability of these standardized contracts. This makes it very unclear who has to pay for for instance for dry boreholes. Also no standard designs and specifications are available
- ▶ B: BSF to get in contact with the DRWS to get a clear picture on the availability of standard contracts, requirements and guidelines and provide the information on availability of these documents to the partners.

OPERATION AND MAINTENANCE:

- According to Water Policy, O&M is to be carried out by end users. However, spare part supply chain and O&M structures are weak. UNICEF currently provides spare parts free of charge, but regularity is unclear.
- Percentage of non-functional BHs is unknown, but might be 30% of the 8500 boreholes that are entered in the WES database.

DRILLING LOGISTICS:

- Few competent drilling contractors (in country).
- All BHs need to be drilled in dry season (Nov-May).

2b. Analysis of drinking water project results of the 1st and 2nd round BSF interventions

See table in presentation (slide 7) that gives an overview of the targeted and achieved results of all 'drinking water' partners in the first and the second round. The table on slide 8 of the presentation gives an overview of the technical information received from the partners. Comments made based on the tables:

- Oxfam GB equipped 25 boreholes with a handpump, although their water is not suitable for consumption (according to their own standards). Main problem is with Manganese and Nitrate.



Turbidity (20 boreholes) is not really a health risk and is probably caused by incomplete borehole development. High mineral content (salty) is not a health risks; the water only tastes really bad.

- At the same time was Oxfam GB the only partner/ NGO that tested the quality of the water thoroughly.
- Medair also installed handpumps on boreholes that were very salty.
- Amref/ Aquafund drilled partly in the basement and partly in the sediments. No siting reports were made available to the secretariat, and it is therefore not clear whether they sited in the basement area or not. Out of the 26 drilled boreholes, 7 were dry. Amref/ Aquafund carried out E.coli tests.
- Caritas has no technical information on the boreholes, or at least the information is incomplete.
- Save the children – US did not perform (4 out of 20 boreholes drilled) and the water points part on their budget has therefore been removed from their budget.

Some other comments:

- There is often a pressure from the community to install the handpumps, although the yield is low and/ or water is of bad quality. Also due to this pressure have some hand pumps been installed on boreholes with bad water quality. Here the government should assist as well, as this might sometimes be a big risk for drilling teams. When closing down hand pumps NGOs should also provide an alternative.
 - The government has standards (or guidelines?) for water quality and they are available for everyone.
- C: BSF to get in contact with Oxfam GB regarding the water points with bad water quality (some only need some more development and some tests have very high and therefore remarkable values). Oxfam GB recently hired a public health coordinator and are planning to improve the monitoring of the boreholes and look at the boreholes that have currently problems.
- D: BSF to ask Mike Wood how to get these water quality standards and make sure that all third rounders get these standards.

2c. Theory and practice of the borehole construction process (actual vs optimum)

As not all participants have a technical background and not all NGOs follow the same technical procedures, Clarissa gave a short overview of the procedures a drilling company might use in Southern Sudan and compared these with the procedures used in practice by the 1st and 2nd round BSF grant recipients and their sub-contractors.

SITING - *Theory is given on slide 9, 10 and 11 of presentation - Practice:*

- Only Medair and Oxfam used issued separate siting contracts, and have siting results, other partners assumed that the siting was going to be done by the drilling company, however one need a geohydrologist to do the siting.
 - All boreholes drilled in sedimentary formation during BSF project (according to limited info available) are yielding. **Therefore one might conclude that siting is not needed in the sedimentary foundations.**
 - Only AMREF/ Aquafund drilled partly in basement, of which 80% of boreholes were dry. **Siting is expected to increase the success-rate when drilling in basement.** (However water will not give any information on whether the borehole will be saline or not, for this purpose you need to check with the community and the WES database).
- E: Please note that BSF has a geohydrological map available (digitally), which was provided to all partners. This map is based on data provided by UNMIS GIS Unit in August 2006 (based on a map



which was produced in 1989, under the Water Resources Assessment & Development Project in Sudan (WADS), which was carried out between 1986 and 1988).

DRILLING AND DRILLING SUPERVISION - *Theory*:

- If you want to supervise to safeguard the quality one needs a clear definition of a successful borehole. You need an independent supervisor who can tell you based on the standards whether the company did a good job or not. **Therefore standards are needed in Southern Sudan**
- Standards for successful boreholes should be set, and agreed upon through binding contract / agreement
- Supervision by hydrogeologist / experienced drilling supervisor is a **must** to ensure minimum specifications are followed, and water quantity and quality are appropriate.

DRILLING AND DRILLING SUPERVISION - *Practice*:

- Oxfam and Medair use own rig, rest subcontracts to private sector drilling contractors.
- No contract / technical specifications are given in the contracts (IRC exception)
- Non of the BSF partners have full-time supervision
- Visits to drilling sites are sometimes made by non-qualified staff
- Borehole completion reports are largely absent (apart from IRC and Merlin/AVSI)
- Result of these practices:
 - Database at BSF has huge gaps and is inconsistent.
 - Actual numbers of successful boreholes is unknown.
 - Some boreholes installed are substandard.

The government should also take responsibility for supervision of borehole drilling. See also **2a**, CAPACITY RURAL WATER DEPARTMENT.

DRILLING SPECIFICATIONS – *Theory and practice*:

Drilling specifications are recommended for: borehole design, what kind of materials to be used (screens, kind of gravel, etc), minimum quantity and quality of the water, minimum development time and minimum test pumping time.

Water quality, parameters reported on:

- Amref/Aquafund: Only E. Coli (for some)
- Caritas Suisse: none
- IRC: 12 parameters
- Merlin/AVSI: 16 parameters
- Medair: chloride, sodium, TDS*
- Oxfam: 14 parameters

► See C and D

Water quantity, In neighbouring Uganda, the minimum sustainable yield for a borehole equipped with a hand pump is usually taken to be 0.7 m³/hr (which can provide 20 litres per person for 300 people when pumping 8.5 hours). 0.7 m³/hr is also the volume a hand pump can supply if continuously pumped for an hour regardless of the yield of the aquifer. The SPERE standard (mostly used in Sudan) for water supply is 500 people per borehole, providing 12 litres per

BSF

BASIC SERVICES FUND
SOUTHERN SUDAN



person when pumping 8.5 hours at 0.7 m³/hr. Test pumping should be minimal 3 hours at the 0.7 m³/h of the hand pump. When the water level keeps on lowering one may need to extend the pumping test to 8 hours until the water level stabilises, or at least extrapolate the water level graph to the level at 8 hours. If it stabilises above the hand pump intake (plus a couple of metres to allow for seasonal water level fluctuations) the borehole is perfectly acceptable.

- ▶ G: BSF will request all third round partners to submit the test pump readings (test pumping should at least be for 3 hours, followed by the recovery readings). These readings will then be analyzed by an expert.

FINISHING

- discussion of results
- standard designs for platform, type of hand pump, fencing, drainage/soak-away pit
- backup system: maintenance of the hand pump, availability of trained hand pump mechanics, spare parts supply chain

DATA

- Data needed for constant updates on water supply coverage, also data on dry boreholes very useful. See also 2a on DATA AVAILABILITY, and ▶ A.
- Only two NGOs supplied data to the WES database (for template of WES database data form see slide 20). However in some counties there are no RWS directorates, and even then the information is not always forwarded from state to national level.

REHABILITATION OF BOREHOLES

Many boreholes are not functioning in Southern Sudan. It could well be that 30% of the 8000 boreholes are not operational any more. To rehabilitate these boreholes is much cheaper than to drill new ones.

However most donors and NGOs still focus on drilling:

- Sometimes maintenance is the problem and therefore there is no need for rehabilitation (only one rubber missing for instance)
- There is also some kind of an financial incentive towards continuing drilling as it is for NGOs difficult to mention in their proposal that they want to rehabilitate a borehole as it might look like they failed to make to borehole sustainable and it therefore needs rehabilitation. For donors there is furthermore a risk to design borehole rehabilitation programmes as there is a reason that the boreholes need rehabilitation. We therefore need to look at systematic changes that should be addressed. Therefore is Water Committee training very important as it is seen as one of the ways to get a borehole sustainable. However a lot of Water Committees fall apart as the Water Committees have no real task. One of their tasks could be to collect water fees in order to keep the hand pumps operational. This is however not the practice at the moment.
- In some areas the NGOs focus too much on drilling boreholes as by 20% of the boreholes in some areas could be replaced by hand dug wells. Other options should also be explored, like hafirs.

2c Lessons Learnt



1. In 2.5 years, with BSF 169 boreholes were installed, and 48 boreholes rehabilitated, meaning 65,100 people gained access to safe water, assuming one borehole covers 300 people (or 108,500 with 500 p/BH).
2. Some of these boreholes are however of questionable standards, esp. water quality (turbidity, iron, hardness, manganese, or highly mineralised (salty))
3. In sedimentary formations all boreholes appear successful, and therefore no siting is required. Based on the limited geophysical siting data, it is concluded that saline aquifers do not show up as distinctly different resistivities, and therefore siting in these formations is also not warranted to discern saline aquifers from fresh aquifers In Basement formations, geophysical siting will increase success-rates, and is therefore cost-efficient.
4. Direct drilling costs vary widely from 7,280 US\$ (by IRC in Northern Bahr-El-Ghazal) to 15,500 US\$ (by AMREF/Aquafund in Central Equatoria) per successful borehole. Costs logically vary depending on the type of drilling contract, depth and installation details of boreholes, and mobilisation costs as a result of remoteness of an area. However, interestingly IRC's relatively cheap boreholes were drilled in a far more remote area than AMREF/Aquafund's boreholes.
5. Drilling supervision / management has been inadequate at all three levels:
 - BSF Secretariat / Management Consultant
 - Grant recipient (NGOs)
 - Drilling contractors
6. The borehole database nor the hydrogeological map have been used in the planning of new / rehabilitated boreholes.

4. Way forward

Please have a look at ► A to G as that are some action points for the way forward for the first, second and third round of BSF grant recipients.

1. BSF Secretariat to specify
 - Which water quality standards to apply – WHO, neighbouring countries' standards.
 - Water quality parameters to analyse.
 - Minimum yield
 - Borehole design specifications
 - Contract quality
2. Contract between BSF and Grant recipient (NGO):
 - Payment terms
 - i. LS for successful boreholes only – payment upon submission of test-pumping results proving minimum yield and adequate water quality
 - ii. BOQ based – Payment upon submission of completion records and completion certificate signed by supervisor
 - Installation terms – minimum sustainable yield, water quality
 - Reporting details
 - Appointment of fulltime borehole drilling supervisor
 - No payment for technical failures
3. Contract between grant recipient and contractor, supervisor
 - Contracts for siting, drilling, and drilling supervision
 - Finances:



- i. Type of contract: LS vs BOQ -> BOQ preferred
 - ii. payment terms, incl. retention
 - iii. advance payment, performance bonds
- ToR: hydrogeological information, designs, timeschedule, techn. specifications for development, test-pumping, minimum water quality etc.
- data collection / submission
4. Introduce standards for design, development, test-pumping, minimum water quality and quantity
5. In sediments: analyse groundwater level fluctuations over the year, to establish appropriate borehole depths and pump intake levels.
6. In Basement area: insist on geophysical siting including profiling and soundings.
7. Drilling always fulltime supervised by experienced drilling supervisor.
8. Even if the contract is a lump sum contract for successful boreholes only ! Client needs proof that the borehole has sufficient water with the pump intake placed at the correct depth (so has been test-pumped appropriately), and that the water is of good quality (water analyses of relevant parameters carried out).
9. The DRWS WES database update is responsibility of the grant recipient; BSF secretariat receives copy for their files

5. AOB/ Way forward

Most of the points raised during the discussion are already integrated in previous parts of the minutes. Below some of the points that are not part of the previous subjects.

Policy and relationship national government, state, payam

States don't always follow the government policies and it is therefore difficult for NGOs to operate (for instance at state level user fees are regarded as not to be used, although it is a government policy). Therefore there is a high need for capacity building at state level. Some counties don't even have a rural water department.

A water policy will be published in March 2009, however no strategy has been developed so far (which should be developed by Unicef) on how to implement the policy, so therefore the states are not familiar with the water policy.

Training

Water mechanics are trained every year but most of the times they move away after training. In Upper Nile for instance a lot of water mechanics got a job with an oil company. So in this way capacity building is not progressing. Solutions for this might be to train more women and to only train people that are already on a payroll (for instance teachers).

Spare parts

The provision of spare parts is a main problem and one of main reasons why so many boreholes are broken down. And the spare parts should be made available free of charge. A system should be developed. In Uganda Government has in recent years contracted out the provision of spare parts to various private suppliers operating per region. This service was only successful in some of the regions (mostly near to the capital city), and discussions are ongoing to revert to the earlier system of selling the spare parts through the District Water Offices.

BSF

BASIC SERVICES FUND
SOUTHERN SUDAN



Contracts: BoQ versus lumpsum

Most companies and NGOs in Southern Sudan use lumpsum contracts for the drilling of boreholes. This is however not the case in the region, where most companies use BoQA BoQ contract needs to be overseen by a fulltime on-site experienced supervisor. This is however cost-efficient, as lumpsum contracts are much more expensive than BoQ contracts (30-50%more) and warrant the cost of a supervisor (between 5-10% of the cost of a borehole).

Attendance

A remark was also made that although Unicef and Ministry of Water Development and Irrigation were invited, they were not at the meeting, which is rather disappointing.