

Maintenance of Handpumps & Supply Chains for Spare Parts in South Sudan

BRIDGE Program, Winrock International;
UNICEF, South Sudan;
SNV, South Sudan

7 February - 31 March 2012



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Client: BRIDGE Program, Winrock International; UNICEF South Sudan, SNV Netherlands, Juba.

Consultant: Raj Kumar Daw, Pune, India

Duration: 8 Feb to 31 March 2012

1. Summary

Two surveys had been initiated by the Technical Working Group of the WASH Cluster of South Sudan in mid 2011 to understand the nature of a shortage of spare parts for handpump maintenance. A consultant worked for 5 weeks during Feb. - March 2012, contracted by Winrock International USA to analyze the data and verify the findings with field observations in three States.

In consultation with UNICEF and SNV, the duration of the assignment was extended by 2 week during March 2012.

The consolidated Outputs expected from the consultancy were:

- Summaries of the results of the two Surveys, identification of their limitations and comparison of the results with observations of the consultant, made during Field Trips to four States.
- A Report on Maintenance Management of handpumps in Southern Sudan.
- A Guidance document for handpump maintenance and spare parts supply in South Sudan.
- A Report on the status of Handpump Mechanics Associations in Northern Bahr-el-Ghazal initiated by SNV.

Field trips were made to four states of Western Equatoria, Warrap, Northern Bahr-el-Ghazal and Eastern Equatoria. Intersos facilitated the consultant's visit in Western Equatoria. In Warrap and Northern Bahr-el-Ghazal, the host was Winrock BRIDGE. The visit to Eastern Equatoria was hosted by SNV Netherlands.

At the end of the field work and discussions, the consultant made presentations of the findings and recommendations to Winrock BRIDGE, the WASH Cluster, OFDA – USAID and the Ministry of Water Resources and Irrigation, Govt. of South Sudan. Suggestions made during these debriefing sessions have been incorporated in to this report.

2. Structure of this Report

The following sections have been written under the sub-headings of:

1. Conclusions and Recommendations, with the sub-topics of:
 - 3.1 Surveys on Supply Chains
 - 3.2 Maintenance Management Systems
 - 3.3 Guidance Notes & their implementation timeframes
2. Findings of the Surveys and Comparison with the Consultant's Field Observations
3. Shortage of Spare parts & the Supply Network
4. Implications of free Handpump Spare Parts
5. Maintenance Management
6. Functioning of Associations of Handpump Mechanics in NBG initiated by SNV, March 2012

The Annexes to the report are:

Annex 1 : Terms of Reference by Winrock International.

Annex 2 : Field Visit Questionnaire.

- Annex 3.1 : Comparison of Results of the Surveys with the Consultant's Observations
 Annex 3.2 : Summary & Details – Results of a Survey of County Authorities
 Annex 3.3 : Summary & Details – Results of a Survey of NGOs
 Annex 4 : Summaries of Field Trip Reports to the States of Western Equatoria, Warrap, Northern Bahr-el Ghazal and Eastern Equatoria
 Annex 5 : Detailed Field Trip Reports: Western Equatoria (16 – 22 Feb.), Warrap (24 – 29 Feb.), Northern Bahr-el-Ghazal (1 – 6 March), Eastern Equatoria (13 – 19 March).
 Annex 6 : Handpump Maintenance Terminology and Data Banking Concepts.

3. Conclusions and Recommendations:

3.1. Surveys on Supply Chains

Comparison of Results of the Surveys with Consultant's Observations is provided in Annex 3.1. Detailed reports on the two Surveys are provided in Annexes 3.2 and 3.3. The main conclusions are as follows:

- The survey questionnaire to County authorities was of good quality and the responses were consistent. In comparison, the quality of the survey for NGOs was generally poor, in terms of the lack of clarity of questions and inconsistency in responses. Considering that NGOs had canvassed the survey questionnaire to County authorities, the problems with the NGO Survey was surprising.
- There was no shortage of spare parts, except for Galvanised Iron Pipes. The States visited generally sufficient stocks of spare parts, the Counties, less so.
- There was a high possibility that GI Pipes were being changed unnecessarily. It was not possible to gauge the magnitude of this problem but there were strong indications. There were grounds to believe that this was also the situation with some other major spare parts like cylinders.
- The concept of what a Supply Chain should be is thoroughly misunderstood. The term is used in a very loose manner in South Sudan. For all practical purposes, it does not exist.
- At the moment the Supply Network, if it can be called that, is a passive conduit for transmission of handpump spare parts given free of cost by a number of sources too States and Counties. It is an overstretched system with no planned basis, very difficult logistics and independent actors sometimes undermining each others' efforts to reach the same objective. At this point of time it is not consistent with the stated objective of the Strategic Framework of the government to make communities responsible for their water source.
- There is a lack of quality awareness, specifications and technology options and has led to some opportunism arising from these weaknesses.

3.2. Maintenance Management Systems

A conceptual framework for a Maintenance Management System does not exist. There is lack of a systematic approach to maintenance of handpumps. It is like firefighting, waiting for a pump to break down and then repairing it. The supply network is a reflection of this situation and should be viewed with this perspective.

- Maintenance is equated to break-down repair.
- Preventive maintenance is a term that is often used but is probably not understood, much less, practiced.
- Basic data is available and is often conflicting. Data reliability is a nagging issue.
- Available reliable data is not put to use for planning, projecting or understanding maintenance needs.

- On the other hand, a number of good (but scattered) efforts have been made to compile water source inventories and implement components of maintenance management. These need to be studied carefully to arrive at a data structure that specifies a common minimum number of data fields for a County – to – Country data structure on the basis of which a maintenance management system for the country’s drinking water sources can be implemented.
- Actions of protagonists involved in the construction and maintenance of water source are sometimes contradictory. There are divergent and multiple efforts of building inventories in the same place at the same time. Information is not shared.

There is need to address the issue: Should the country have Maintenance Management System or is it an unaffordable luxury?

Development of a better understanding of a number of issues is recommended through pilot projects, which have been elaborated later in the Guidance Notes.

3.3. Guidance Notes & their implementation timeframes:

The initial intention of the Guidance Notes was limited to NGOs and handpump spare parts. With the expanded outputs, the scope of the Notes has been expanded. The Notes have been classified in eight main groups, listed below and then detailed further in [Table I](#) along with suggestions as to who should lead them and in what time frame.

1. Articulating the Strategic Framework
2. Interpretation of Functionality
3. Implement Maintenance Management
4. Training
5. Standards, Specifications & Technology Choices
6. Separating the Necessary from the Unnecessary
7. The Vanishing Pipe
8. Data

Table 1 Guidance Notes

Sl. No.	Descriptions	By	6 m	2 Yr	5 Yr
			Short	Med	Long
3.3.1	Articulating the Strategic Framework	UNICEF should develop a plan of how and when it will phase out its current approach to supply spare parts free of cost to South Sudan.			
		NGOs should also do the same and reexamine the appropriateness of the tools and spare parts they give to communities after training Water Committees and Caretakers.			
		How much longer will donor funding still continue in the humanitarian assistance mode for creation and rehabilitation of water sources? By extension, it provided a strong justification for providing free spare parts. This question cannot be avoided if community management is to take roots in South Sudan.			
		An economic assessment of the cost of spare parts needs to be completed. It would provide a quantitative basis for deciding on the above issues. It might even provide acceptable justification to continue with or modify the present system.			
		Move programs and act in ways that improves the sense ownership of communities toward their water sources.			

Sl. No.	Descriptions	By	6 m	2 Yr	5 Yr
			Short	Med	Long
3.3.2	Functionality figures from States and Counties currently are very impressive. But is the situation being correctly reported? The absence of a repair report on a pump CANNOT be assumed to be functional pump. The number of repair reports NOT attended DOES NOT represent the number of pumps NOT working. Reporting MUST graduate to reporting on the Working Well/ Poor Performance/ Not Working status for the entire population of pumps.	MWRI/ UNICEF/ NGOs/ Consultants	Pilot Project		
	Development of a uniform vocabulary for describing aspects of maintenance (refer Annex 6 for a working document).				
3.3.3	Reliable data on number of sources, their functionality and population coverage is needed to reflect on some of the above. At this point of time, there is significant variance in this data. This should be approached on a territorial basis, indicating the degree of data reliability for a particular territory (County/ State). It would allow the implementation of subsequent management improvements in territories where data has been found to be reliable.	MWRI/ UNICEF/ NGOs/ Consultants	Read with 3.3.8 Data		
	Development of reporting systems from Boma and Payam levels to Counties for maintenance events and a data consolidation and transfer system from County to State to Country for reporting (refer Annex 6 for a working document).	NGOs/ Consultants	Read with 3.3.8 Data		
	Implementing a system based on preventive maintenance rather than break-down repair, and assessing its impact.	State/UNICEF / NGOs/ Consultants	Pilot Project		
	Testing the application of light weight pump rods along with non-corrodible riser pipes for areas with deep water table and/or aggressive waters.	State/UNICEF / NGOs/ Consultants	Pilot Project		
	Developing reporting formats for illiterate pump mechanics to give factually correct reports.	Counties/ NGOs/ Consultants			
	Further work in attracting private enterprise in making decentralized access of handpump spare parts possible at a reasonable cost.	UNICEF/ NGOs			
	In-house (within NGOs) and County/ State level capacity building efforts are needed to create awareness of technology options and quality of products. Similar exercises may be needed to share experiences with maintenance systems elsewhere in the developing world.	UNICEF/ NGOs/ Consultants			
3.3.4	The training content of Water management Committees and Caretakers needs emphasis on detection of problems and preventive maintenance. Preventive maintenance, Leakage and Discharge Tests need to be emphasized and reemphasized.	NGOs/MWRI / UNICEF/ Consultants			
	The training content for Mechanics also needs to be reviewed so that the curriculum is by-and-large uniform across the country.				
	Most Counties have more than adequate numbers of mechanics. No more mechanics need to be trained without a careful look at the existing number of mechanics at County and Payam levels.				
3.3.5	NGOs need to become more aware of standards and specifications. It is not enough to state such things in the terms of a contract.	NGOs/ Consultants			
	UNICEF should consider the feasibility of extending quality assurance orientation and services to NGOs and drilling contractors and African handpump hardware dealers.	UNICEF/ MWRI/ NGOs/ Dealers			
	The government should find ways of preventing dumping of sub-standard goods in States and Counties. Using approved suppliers and approving new suppliers, adherence to specifications, declaration of procurement sources by those bringing in goods, black-listing of suppliers and NGOs who violate norms can be some of the measures.	MWRI/ UNICEF			

SI. No.	Descriptions	By	6 m	2 Yr	5 Yr
			Short	Med	Long
	UNICEF should consider the feasibility of establishing third-party quality control procedures for approval of suppliers and supplies in East Africa. This could be extended to prequalification and/or approval of Indian manufacturers supplying to Africa and pre-dispatch inspections at dealers' premises prior to arrival of goods in South Sudan.	UNICEF/ MWRI/ Donors/ Consultants/ NGOs			
	The sector needs to be aware of what technology choices are available now. Having the same pump across the country has a justification. But only up to the point that they are maintainable.	UNICEF/ MWRI/ NGOs/ Consultants			
3.3.6	UNICEF should take up the matter of packaging the so called "Fast Moving Spare Parts Kit" with its India Office Supply Section.	UNICEF			
	NGOs need to rethink through the implications of giving Fast Moving Spare Parts Kits and the kind of tools that they presently give to Caretakers. It is not just wasteful, but is detrimental to the development of an open market for spare parts. Also, it is developmentally counterproductive, reinforcing dependency.	NGOs			
3.3.7	The question of the excessive use of GI pipes needs to be resolved.	MWRI			
	If the initial results are indicative of water quality problems, a batch of 10 or 20 test installations in a limited area with 50mm PVC pipes with Three Piece Couplers, Universal non-corrodible cylinders, fiber glass or stainless steel pump rods, all of which have been tested by UNICEF in India 15 years ago in deep installation environments, should be considered.	UNICEF/ MWRI/ Donors/ Consultants/ NGOs	Pilot Project		
	If we don't have a water quality problem, we can do a cost calculation of the value of used pipes that volunteer mechanics might get and have the basis to decide to turn a blind eye to this particular question.	MWRI			
3.3.8	Examine current results and efforts at creating water source inventories. Evolve a minimum set of data fields that forms the beginning of a County level Water Source Data base. Formulate procedures and protocols by which new and rehabilitation data is periodically included.	MWRI/ UNICEF/ NGOs/ Consultants			
	Arrive at a more meaningful reporting format for monthly reporting from Counties to States on new construction, rehabilitation, repair (and other WASH activities).	NGOs/ Consultants	with Maintenance Management		
	Help States to be able to consolidate County reports, again to make reports more productive.	Counties/ NGOs			
	Collect County level water source statistics and consolidate this at State level, and ensure this information is presented at the next Biannual Coordination Meeting.	Counties/ NGOs			
	Agree that NGOs must report County level water supply activities to County authorities and not violate this. Black-list those who do not.	MWRI			
	Move programs and act in ways that improves the sense ownership of communities toward their water sources.	MWRI/ Donors/ NGOs			
	Assist Counties with capabilities and facilities that NGOs take for granted but are still not within the reach of County authorities, e.g. computing, e-mailing, report preparation.	NGOs			

4. Findings of the Surveys and Comparison with Field Observations

Two surveys had been initiated by the Technical Working Group of the WASH Cluster in mid 2011. The purpose of both the surveys was to understand the nature of the problem related to a perceived shortage of spare parts for handpump maintenance. One survey was aimed at collecting

information from County officials by NGOs working in those Counties. The other survey was aimed at the NGOs themselves.

The TWG had tabulated the responses from the two surveys. The consultant was expected to analyze the data and compare them with his own observations during field visits. The results of this exercise have been presented in Annexes 3.1, 3.2 and 3.3 and are summarized below.

There were 34 respondents to the Survey addressed to County authorities and 21 respondents to the Survey addressed to NGOs. The overview of the scope of the Surveys is given below in Table 2. There were multiple responses in both the surveys, the same County responding twice (unexpected), the same NGO responding twice, separately for each State (expected). All the responses have been considered in the data analysis, despite the possible of an error in the County Survey.

Table 2 Scope of the Surveys

Responses of County Authorities	Responses from NGOs
34 respondents (dual responses from 5 Counties, considered)	21 respondents, from 18 NGOs, working in 7 States (multiple responses from NGOs working in more than one State, considered)
Responding States: CE, EE, Jonglei, Lakes, NBG, U Nile, Warrap, WE	Responding States: CE, Jonglei, Lakes, NBG, U Nile, Warrap, WE. No respondent from EE.
Five main areas of Query* <ol style="list-style-type: none"> 1. County/State Water Department 2. Accessibility of Spare Parts 3. Stock Management 4. Cost Sharing and Revenue Collection 5. Why Supply Chains Break Down 	Six main areas of Query* <ol style="list-style-type: none"> 1. NGO Programs 2. System Management 3. Cost Sharing and Revenue Collection 4. Support from State / County Authorities 5. Procurement / Accessing Spare Parts 6. Why Supply Chains Break Down

* Areas of Query common to both the Surveys are highlighted

The consultant's observations address the main areas of queries of the two surveys. At places the observations go beyond the scope of the queries of the surveys.

States/ Counties visited by the consultant:

Western Equatoria - Yambio, Nzara
 Warrap – Gogiral West, Twic
 NBG – Aweil East, Aweil West, Aweil North
 Eastern Equatoria – Torit, Ikotos, Magwi, Kapoeta South

Q: County/State Water Department, NGO Programs

The County survey reported and the consultant confirms most of the results.

- All Counties visited had Water Departments.
- Most Counties had lists of water points, usually with details on Payam level numbers and the functional status.
- Usually repairs were completed within a week, usually through Payam (volunteer) mechanics.
- Most NGOs working in WASH, had components of drilling and rehabilitation.
- Only a few did repairs directly.
- Even fewer supported Counties with spare parts and had their own stores.
- Repair requests came through Payam Mechanics or to the County, sometimes through the Boma Chiefs.

The responses from NGOs were very erratic. The questions were ambiguous and had probably been misunderstood or answered without consideration. Examples:

At one point 16 NGOs said “yes” to involvement to supply chain projects, and later only 1 responded positively. Similarly, with Rehabilitation – All 21 said “Yes” in the opening question and then only 5 listed it later as an activity.

- Private sector contracting was used almost universally used by NGOs for drilling and to some extent for Rehabilitation.
- Rehabilitation was sometimes done pooling resources, handpump hardware and construction materials coming from NGO partners and used County PMs on payroll.

Q: Accessibility of Spare Parts (both Counties and NGOs)

Table 3 Accessibility of Spare Parts

Counties	NGOs
<ul style="list-style-type: none"> – Majority response: There were no supply chains in Counties. – Spare parts came from UNICEF and NGOs, usually within 4 months. Govt. vehicles were the most common means of transport, followed jointly by bicycles and by foot. – Spare parts were not available locally. 	<ul style="list-style-type: none"> – NGOs sourced their own spares, mostly from East Africa. – Spares were not available from the state level. – NGOs had an average annual budgetary provision of US \$ 47,500 for spare parts. – Average cost of a repair was estimated at US \$ 1,100

- Supply chains in the strict sense of the term did not exist.
 - Projections of requirements of spare parts were not made at any level.
 - Schedules of supply needs were not drawn up, delivery schedules and back logs were not tracked, analysis and accounting of utilization of fresh spares issued from stores to sites or of used items coming back from sites was not done.
 - What did exist was a network of formal and informal arrangements, by which handpump hardware reached its destination – a new well, an old well being rehabilitated or a repair request from a community.
- Inventories were made periodically by States and Counties with varying degrees of sophistication but were not used for any management purpose.
- Counties got spare parts mainly from the State, which held and distributed what it received from UNICEF. The stocks moving from one level to the next often was NOT related to the density of pumps in a County or to the specific characteristics of boreholes, pump installation depths, yields or water quality of a specific County.
- As mentioned earlier, a few NGOs gave spares to Counties on request.
- States generally had substantial stocks of spare parts. Only one item, GI pipes, was usually found to be short supply. Corrosion and thread failure were widely reported problems and seen in some places. The use of other handpump options for aggressive waters had not been considered.
- The frequency of delivery of spare parts to States and Counties varied, depending on when imported supplies reached South Sudan, whether they were UNICEF imports directly from India or NGOs procuring from East Africa, or drilling contractors from East Africa, Khartoum or Addis Ababa.
- While NGOs and drilling contractors had dedicated transport at their call, the movement of spare parts from State to County depended heavily on availability of transport. Though this was a major bottle-neck, it was solved somehow, since response time was usually short and functionality was high.
- Tools and spare parts were NOT available in local shops. Hardware dealers were aware of the handpump markets, but were of the opinion that handpumps were the monopoly of the Govt.

and the NGOs, giving free items to communities. Hence, there was no business opportunity in the open market at any level. This opens up the whole question of free distribution of spare parts to debate.

- Communities did not procure spare parts.
- As mentioned earlier, apart from UNICEF, who sourced parts directly from India, the two other major sources of spares in South Sudan, NGOs and Drilling Contractors, who procured spare parts from different parts of Africa that originated from India. Nairobi and Kampala were commonly mentioned. Khartoum was a source in Wau and Ethiopian packaging was seen in Kapoeta.
- There were no open market outlets for spare parts, except for the case in Gogiral West in an ACF project.
- Some dealers like Davis & Shirtliff and Techno Relief Services, from Nairobi, are said to have set up business offices in Juba. So perhaps the market is opening up.
- The quality of spare parts from NGOs is a point of concern that needs to be discussed in detail.

Q: System Management (only to NGOs)

The questionnaire clearly said: "A pump mechanic is someone able to perform all maintenance needs associated with a handpump i.e. not a caretaker who is likely to perform only preventative maintenance and very simple repairs". Therefore, it was clearly misunderstood.

- 86% NGOs said trained pump mechanics.
- Almost all NGOs had training components for establishment of Water Committees and Caretakers and left spares with Committees.
- A few trained PMs.

Training content needs to be looked at carefully. There is good possibility that Preventive Maintenance has low emphasis, is misinterpreted, or is missing.

- Repair requests came through Payam Mechanics or to the County, sometimes through the Boma Chiefs.
- Most Counties had their full complement of payroll mechanics and large numbers of volunteer mechanics.
- Conceptually, Maintenance Management was not practiced.
 - Reporting in some form or another was common from County to State (bi-weekly, monthly, quarterly, annual).
 - Individual records of repairs were generally not detailed and only a record of parts used was reported. These reports went to State and to NGOs who gave spares. Formats and contents of maintenance reports varied from excellent to indifferent.
 - Most NGOs provided full work reports of new and rehabilitated boreholes, and repairs, but some did not.
 - Tracking maintenance histories of individual installations was unheard of. However, overall functionality figures were readily available.
 - Computerized and hand written inventories of water sources existed, usually at County level, generally initiated by NGOs, but were not used to a great extent by County officials. A number of independent efforts were ongoing in inventorying water source at State and County level.
 - States did not use County reports for any management purposes except to compile State level statistics.
 - State reports sometimes bordered the absurd.
 - There were no assessments of maintenance workload, incidence or frequency of repairs, projection of spare parts needs, and identification of problem patterns on a territorial basis, by pump densities, population pressures or depths of installations.

Q: Stock Management (only to Counties)

- The usual number of repair request per month was 4.
 - However, Counties were NOT able to meet the demand for spares/ repairs (unclear).
 - This does not match the relatively low repair requests of 4 per month.
 - Spare parts were provided free of cost, though there were cases of payment for this.
 - Counties generally had Stores for spare parts.
- State level inventory reports were usually available along with stock registers for recording incoming and outgoing spare parts. Such records were not so complete at Counties.
 - Number of repair requests at County level over a few months or a year, was not compiled.
 - But monthly reports on repairs were there.
 - Counties were able to meet the demand for repairs, as reflected by the relatively good functionality rates and the quick response time.
 - Spare parts were mostly free (except in the case of W Equatoria).
 - States had or were building good storage facilities.
 - Counties usually had facilities that were shared, small, make-shift and not well kept.

Q: Cost Sharing and Revenue Collection (both Counties and NGOs)

Table 4 Cost Sharing and Revenue Collection

Counties	NGOs
<ul style="list-style-type: none"> – Govt. & County mechanics were available and travelled for repairs. Private mechanics were more frequently available than NGO. – A majority of communities paid for repairs, though this was for labor only. A minority of communities paid for almost all components of repair – labor, spare and transport. This means that culture of payment for repairs is significantly positive. 	<p><i>A number of ambiguities and conflicting responses when the data in this group was looked at, as a whole. Examples:</i></p> <ul style="list-style-type: none"> – <i>A total of 90% “Yes” for contributions being made in Cash, Kind or both, was not consistent with only 33% “Yes” for “Are communities accustomed to contributing anything...”</i>

- Most NGOs said that collection of funds was a regular part of the training of Water Committees.
- Payment for repairs was reported almost uniformly across the 4 States. Amounts differed and were generally small, mostly as a token or food money for the volunteer PMs.
- Cash contributions were often reported, but were generally irregular and usually on an “as needed” basis, by door-to-door collection from those living in the immediate vicinity of the pump.
- There was only one instance of formal guidelines for cost sharing from the State to the Counties, but it was not very strictly implemented.

Q: Support from State / County Authorities (only to NGOs)

There was a very strong negative perception among NGOs of the States’ and Counties’ roles in the provision of spare parts.

- States and Counties managed the spare parts which came mainly from UNICEF.
- Counties supplemented the availability of spare parts from NGOs.
- Counties sometimes approached NGOs for assistance with transport and the pumps mechanics.

Q: Why Supply Chains Break Down (both Counties and NGOs)

Table 5 Why Supply Chains Break Down

Counties	NGOs
<p>Rank 1:</p> <ul style="list-style-type: none"> - Spare parts not available locally - No community initiative for ownership and repair - Affordability <p>Rank 2:</p> <ul style="list-style-type: none"> - Lack of transportation - Community unwilling to raise funds/pay for repairs <p>Rank 3:</p> <ul style="list-style-type: none"> - Lack of trained mechanics - Lack of County level staff - Lack of secure warehouses 	<p>Rank 1:</p> <ul style="list-style-type: none"> - Spare parts not available locally <p>Rank 2:</p> <ul style="list-style-type: none"> - Problems related to Accessibility <p>Rank 3:</p> <ul style="list-style-type: none"> - Community unwilling to raise funds/pay for repairs - Lack of trained mechanics

Supply Chains, in the strict sense of the term, did not and could not exist. So the question of their breaking down was irrelevant.

- Except for one isolated case, there was no effort at all by any of the institutional actors to foster the growth of a supply chain.
- Spares were generally free of cost to States, Counties and communities and so the questions of ordering and delivery, of payment from one link in the chain to the next, etc., i.e., processes of operation of a supply chain, were not relevant.
- Spares were not available locally because there was no localized demand. The State or County did not have the resources to buy spares and NGOs and drillers brought in their own requirements.
- In most Counties, there was generally a surplus of mechanics, especially volunteers at Payam level.
- Communities did pay, though only small sums, for labor costs.

5. The Supply Network of Spare parts & their Shortage

The flow chart below represents the current network by which handpump hardware and spare parts move from one point to another. At one point UNICEF used to route spare parts through NGOs and is now considering procurement within South Sudan.

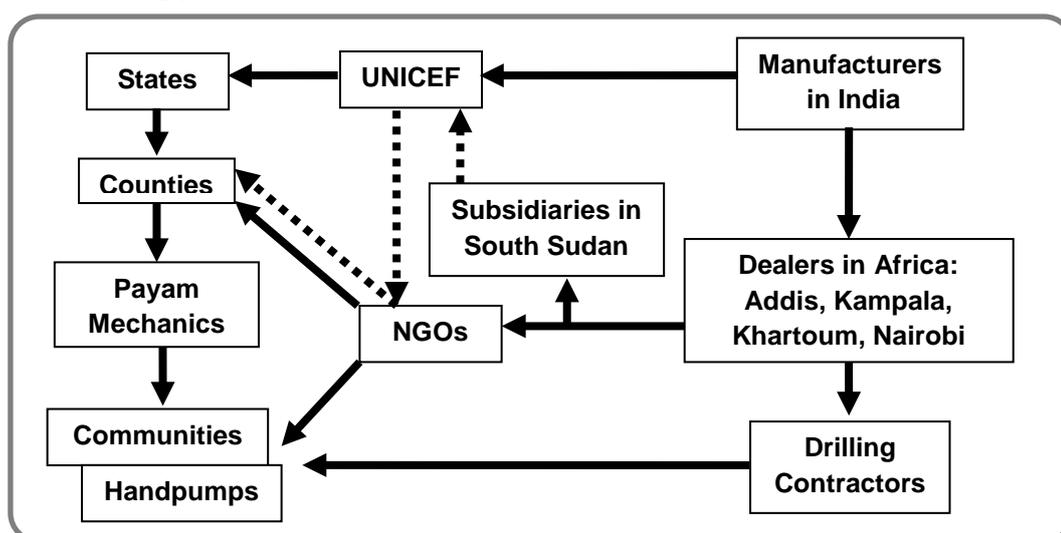


Table 6 Supply Network for Handpump Spare parts in South Sudan

The characteristics of this Network are:

- The above supply network is passive (as compared to interactive).
- It is monopolistic.

- It is not based on any form of projection of needs.
- It was a system that was a conduit for free spares.
- There is no “profit” motive for the system to form, grow and thrive.
- No “market” has been allowed to form.

It cannot be interpreted as a Supply chain.

There is no shortage of handpump spare parts in South Sudan originating from UNICEF imports. State stores have plenty of spare parts. There is adequate documentation available to substantiate this.

Only one item in a long list of handpump parts, Galvanised Iron Riser pipes (GI pipes), is in perpetual short supply. One reason often advanced for the use of large quantities of GI pipes is corrosion. But there is no corresponding water quality data to establish that waters in South Sudan are largely aggressive, which would be reason for pipes to corrode rapidly. Pipe threads corroding and breaking were the other reasons mentioned.

Insignificant quantities of used/ old pipes are returned to Counties stores to substantiate claims of corrosion. The few old pipes that were seen do indicate there is pipe thread corrosion, damage and breakage. However, at least 30% to 50% of old pipes still had their galvanizing intact, meaning that they were still serviceable. Only at SDC, Aweil, was there a serious effort to sort, clean and rethread old used pipes.

Unfortunately there was not enough data and resources (information and time) to substantiate this conclusion. Verifying this conclusion will be an area of work in the future.

The conspicuous consumption of pipes is influenced by a number of other factors:

- Pipes supplied by NGOs are sometimes of a distinctly inferior quality. This issue of quality will be discussed again since the problem is not limited to GI pipes only.
- Some parts of the country have concentrations of very deep cylinder installation, as deep as 24 to 26 pipes, or 72 m to 78 m. Such depths are past the extreme performance limits of India Mark II Extra Deep Well handpumps that are to be found on such wells. In such situations riser pipes joints could be expected break with a high frequency.
- It also leads to a question about the technological choices made for such difficult situations. Again, this matter will be discussed later.
- If in fact, there are areas of South Sudan where waters are aggressive, then GI pipes will always face problems of corrosion and deterioration of water quality also result. However, there were no reports, none what-so-ever, of users rejecting water sources on account of deterioration of water quality – color, odor, sediment, which are very easy signs to identify. If waters were aggressive, and if this can be documented, then solutions exist that have been tried and tested. Again, this is another work area for the future.
- The phenomenon of vanishing pipes is probably best explained by one County official. The material coming out of a repaired borehole is sold to supplement the income of volunteer mechanics, who, in any case, do not get wages for repairing pumps and are usually dependent on what they are paid by communities, which are small token sums, ranging between SSP 50 to 150.

What has been seen in the case of GI Pipes is also true for Cylinders, but probably to a lesser extent. This is another item that is issued out of stores in noticeably large numbers as complete assemblies. Yet the Cylinder is an item that has only a few small and cheap rubber parts prone to wear and requiring regular replacement. The rest of the Cylinder is virtually indestructible in passive waters, since it is made from cast iron, cast gun metal and stainless steel. A few old cylinders seen in stores do not show any noticeable signs of corrosion, reinforcing the doubt on the occurrence of aggressive waters.

Another aspect of the spare parts issue is its packaging. The smaller spare parts of handpumps now come under a package called the Fast Moving Spare Parts Kit. Originally when this kit was put together, it was supposed to contain spare parts that handpump Caretakers would need for routine preventive maintenance of handpumps. This kit now contains a number of items that are neither fast moving nor usable by a Caretaker (e.g. Handle axle and Bearings). The kit is now a wasteful collection of spare parts, some of which are unnecessary (e.g. Rod Couplings). This situation is also true for the tools sometimes provided to Caretakers (e.g. Flat file).

6. Implications of free Handpump Spare Parts

Table 7 Sources of Spare Parts, Conditionalities and Implications

Sources of Spare Parts	Conditionalities	Implications & Actions
UNICEF is the major source of spare parts in South Sudan, which it imports from manufacturers in India. UNICEF's spare parts are distributed to States, who store them and then distribute them to respective Counties.	By the conditions of UNICEF's grants, the spare parts must be given free of cost to the eventual beneficiaries, the communities where the water sources are located. By and large, this condition is met, with rare exceptions.	Handpump installation hardware and spare parts have been given to communities in South Sudan for some years now. If the eventual aim is to have communities bear the cost of maintenance of their water sources (as stated in the Strategic Framework), moving away from supplying spare parts free of cost must be agreed upon by all actors across the board with little exception.
NGOs procure handpump hardware and spare parts, generally from East African dealers, mostly in Nairobi and Kampala. These supplies are used by NGOs for their own repair and rehabilitation programs. Sometimes NGOs give spare parts to Counties, either in lots, or more commonly, on specific requests from Counties, for meeting specific repair needs to be carried out by County/ Payam PMs.	NGOs using their own handpump supplies for new wells, rehabilitation, repair programs also effectively provide these supplies free of cost to communities. This is also true for Drilling contractors working on NGO contracts. Again, the same situation is true for NGO giving spare parts to Counties for repair of pumps.	However, with this principal stated, its actual translation will be influenced by many factors and vested interests. Can the donor and NGO community move away from giving spare parts that eventually reach the user communities free of cost?
NGOs and donors supporting creation of new water sources or rehabilitation of existing ones contractually bind drilling companies to supply handpump hardware needed for these activities. These service providers bring in handpump hardware mostly from East Africa. More recently, sources of handpumps are said to have come up in Juba.		Because of past actions, a very strong culture of dependency has been perpetuated. The reasons for this having happened is not the issue at debate at this point of time and it is possible to find adequate justification for continuing the practice of giving spare parts free of cost. However, it will not be easy to reverse this dependency, unless some very radical decisions are taken and implemented.
NGOs conduct training programs for capacitating Water Management Committees and HP Caretakers. At the end of the training, the Committees/ Caretakers get tools and spare parts that, theoretically, should meet the needs of preventive maintenance and minor repairs.	Again, spare parts reach user communities free of cost	

7. Maintenance Management

In the short term, handpump maintenance needs to be rationalized and a maintenance management system needs to be put in place.

- The creation of a new water source is a one-time activity and one data line in a data base. However in terms of its maintenance, every new source adds to the existing maintenance workload. The cumulatively increasing work on/ by the maintenance system must be recognized from the start, since it has very important implications, the most important being that maintenance needs increasing resources all the time, as new installations are added and as old installations grow older. If this is recognized, then it will follow that resource allocations to maintenance must increase with time.
- Investment in creating new sources to reach a desired service level in the rural population and to achieve greater equity in access to water are noble objectives, but such investment cannot be at the cost of maintenance. Sustainability of water sources is directly related to the maintenance input is keeping these sources functional.
- At the core of this maintenance management system there will be the need for a reliable and verifiable data base that lists all water sources and their corresponding condition of functionality, to provide the factual basis for future decisions.
- Experience in establishing such a data base is already available from the efforts of a number of NGOs for the Counties that they presently work in. These inventories should be examined systematically to arrive at a common minimum number of data fields for conducting any inventory of water sources in any County of the country. There are many questions that will have to be resolved along the way to reach this objective, but unless this basis for planning is established, there will be no factual foundation for further actions.
- The objectives of the Maintenance Management System need to be clearly spelt out. It has to be able to provide reliable information on the status of water sources within the country, measurable by a number of parameters like functionality, service level and utilization. Further it must set the guidelines and implementing procedures for monitoring of water sources in qualitative and quantitative terms, to provide the basis for computing the key parameters. Additionally, it must detail operating procedures for gathering and collation of maintenance data for understanding specific details of maintenance needs –manpower, spare parts, logistics and costs. It must develop and continually refine analytical methods by which maintenance data can be used to yield critical information, for example, predict failure patterns of extra deep well handpump installation or produce annual projections of spare parts requirements of a given County or State.
- The establishment of such a Maintenance Management System will have many layers and levels that must be gradually elaborated and acted upon. It will need substantial capacity building inputs at many different levels. It will also need field trials and pilot projects of a number of different kinds to test the validity of some of the ideas. Such trials could be the development of reporting systems from Boma and Payam levels to Counties for maintenance events. It could be assessing the impact of implementing a system based on preventive maintenance rather than break-down repair. It could be testing the application of light weight pump rods along with non-corrodible riser pipes for areas with deep water table and/or aggressive waters. It could even be developing reporting formats for illiterate pump mechanics to give factually correct reports.
- At a higher level, it would mean the development of data storage systems, analysis programs, and even basic computer literacy among County level staff to monitor, assimilate and put out information that becomes increasingly and strategically relevant.

8. Functioning of Associations of Handpump Mechanics in NBG, March 2012*

- SNV motivated stakeholders to establish Associations of Pump Mechanics in all the five Counties of NBG. The idea was to bring all PMs together to rationalize maintenance service provision and make it in to an economically productive activity. The associations had been registered all 5 Counties in the latter half of 2011. Along with repairs, the Associations were

* Based on discussions with representatives of SNV at Aweil and Juba and on meeting with Association members and County officials in Northern Bahr-el-Ghazal.

expected to be able to provide spare parts also to communities. One of the long term objectives was to enter in “maintenance service contract”- like agreements with communities.

- It was governed at County level by a Board, constituted by one mechanic from each Payam of the County.
- Some Associations had a one-time membership fee, others did not.
- At the Association in **Aweil East**, there was an expectation that SNV would equip the Association, but this has not happened.
- Since the Associations have been established recently, it is too early to comment on their functioning, but they are unable to access spare parts from the open market.
- The Associations come together under a State level Steering Committee chaired by a Dy. Director, RWSS.
- At **Aweil West County**, prior to the formation of the Association, there was a group called as the Aweil West Rehabilitation Team, which was also an association, registered in 2009, which had the membership of Pump Mechanics. This Rehab Team took Govt. and NGO contracts for hand drilling and rehabilitation.
- Pump mechanics were member of both the Rehab Team as well as the new Association.
- Since registration of the Association in Sept. 2011, they had done 6 repairs in Aweil West.
- The Association had rented a room which was to serve as their shop, and had managed to buy a complete handpump from a drilling company.
- Currently they had no spare parts available except this one complete handpump.
- They had no funds to buy spare parts after the initial money from SNV, SSP 2500, was spent.
- The operational status of the Association in **Aweil North** was similar to that of the Aweil East and West. SNV had provided some funds initially, but that was exhausted. They did not have spare parts, because of which they could not undertake any repairs through the Association. They had expectations that SNV would get them spare parts.
- Since Jan 2012, the mechanics have reverted back to repairing handpumps with spare parts from the County.
- During discussions it emerged that each County in NBG had a group called that County’s Rehab Team (mentioned earlier). Most were CBOs and they jointly took up hand drilling and rehabilitation jobs on contract.
- The current membership of the Associations is given below:

Table 8 Membership of Associations of Pump Mechanics in NBG

County	Nos. of PMs	
	Total in the County	Members of the Association
Aweil East		26
Aweil North	26	23
Aweil Centre	63	40
Aweil West	56	56
Aweil South	32	32
Total		177

Annex 1: Terms of reference for spare parts consultancy

A. BRIDGE Program

Winrock International's US Agency for International Development (USAID)-funded Building Responsibility for Delivery of Government Services (BRIDGE) Program strengthens the ability of state and county governments in South Sudan to plan and deliver essential services and empowers communities to become active partners in their development and reconstruction. In addition to helping state and county governments set up and adopt key functional procedures and systems by building their skills and knowledge through training, Sudan BRIDGE also builds their technical skills through practical, on-the-ground implementation that facilitates the delivery of peace dividends. At the same time, South Sudan BRIDGE's sector programs in Water and Sanitation, Education, and Agriculture put a practical face on the work of developing good governance at the state level and below. The Sudan BRIDGE integrated approach creates a model for success by addressing key service delivery areas while also building the skills and knowledge of government to deliver those essential services and promoting dialogue between government officials and communities. By building the ability of government to plan, design, and implement coherent services while simultaneously fostering mechanisms for citizen input and oversight, South Sudan BRIDGE serves as an important link in USAID's overall strategy to transition efforts in South Sudan from relief to development.

B. Problem Statement/Objective of the Consultancy

Many rural water supplies in South Sudan demonstrate high operational failure rates, particularly those using hand pumps to extract groundwater. It is estimated that some 30% of 10,000 hand pumps are not functioning due to minor mechanical difficulties leaving some three million people to fetch water from open water sources, often exposing them to disease. One of the main reasons for non functionality of water points is lack of a harmonized approach/strategy from the government to address the issue of operation and maintenance aimed at sustained water provision. In addition, the supply of spare parts for pump maintenance is one of the weak links in the quest for sustainability in rural water supply. BRIDGE recognizes this big challenge and hindrance to development in South Sudan. Winrock/ BRIDGE will therefore work with the Ministry of Water Resources and Irrigation (MWRI) to engage a consultant to develop a guideline framework/strategy to be used by all –cluster member organizations in order to improve spare parts provision on a national scale and improve the functionality of hand pumps.

C. Water Sanitation and Hygiene (WASH) Component Objectives

The Sudan BRIDGE WASH Component assists state- and county-level governments in the delivery of improved water and sanitation services while simultaneously building government capacity in the planning, building, and maintenance of water and sanitation systems.

D. Scope of work for the consultant

The consultant will achieve the following in an initial 3 week field visit:

- The consultant shall hold an inception meeting upon arrival with Technical Working Group members to verify the TOR and discuss the timeline. The spare parts technical working group is wing of the WASH NGO forum and (its main objectives are to document problems with spare parts supply, disaggregated by state and county, analyze and define problems to find crucial areas of intervention, and produce a guideline framework)
- The consultant will develop and share a questionnaire to be used in gathering the information in the field

- Review survey results during/upon completion of the field visits. The survey results shall be provided to the consultant by spare parts technical working group lead
- Juba-based desk study of existing data (1 week). This will consist of:
- Data supplied by the TWG, which will draw heavily from a recently conducted Spare Parts Supply Chain Survey completed by a number of WASH stakeholders across many Counties of South Sudan
- Interviews with stakeholders in Juba

Output	Survey Results summary including limitations of survey
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- Three separate field visits (1 week each):
 - Western Equatoria (hosted by Intersos):

The Consultant will be expected to visit at least 4 communities across 2 counties, and hold meetings with local authorities (County and State level), water management committees, INGOs (including field staff who train WMCs) and CBOs, in order to gather additional information on the issues surrounding the supply of spare parts in this location. The viability of private sector involvement in spare parts supply should be broadly analyzed for the location.
 - NBG and Warrap (hosted by Winrock BRIDGE):

The Consultant will be expected to visit at least 4 communities across 2 counties, and hold meetings with local authorities (County and State level), water management committees, INGOs (including field staff who train WMCs) and CBOs, in order to gather additional information on the issues surround the supply of spare parts in their location. The viability of private sector involvement in spare parts supply should be broadly analyzed for the location.
 - The field trips should also be used as means of verifying or disproving survey results
- Logistics for the consultant shall be arranged by Winrock and the consultant shall work closely with Winrock/BRIDGE Advisor during the entire period of consultancy

Output	Report on Field visits including highlighting the difference in situation between locations
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- The consultancy is expected to commence in mid February 2012

Output	1	In close coordination with ministry of water resources and irrigation (MWRI) and TWG, Organize and facilitate a 2 day workshop with a wide range of stakeholders to discuss findings and agree upon a common approach
	2	Produce guidance document/strategy for NGOs on operating with water management committees, government and general operations as pertaining to the spare parts supply issue

Total consultancy time = 5 weeks

Annex 2: Field Visit Questionnaire

Guideline Areas of Query and Questions

Handpump Spare parts Supply Chain and Maintenance Management in South Sudan

Used by Raj Kumar Daw, Consultant, Winrock International BRIDGE Program, Juba, S Sudan

Feb – March 2012

Basic Information

Location	State		
	County		
	Payam		
	Boma		
	Village		
Persons met	Persons met 1		
	Persons met 2		
	Persons met 3		
	Persons met 4		
	Persons met 5		
Category persons met	HP User		
	Mechanic		
	NGO rep		
	Govt. Rep		
	Spares supplier		
	Other		

Areas of Query @ State Level: Basic statistics/ documentation/ reports/discussions on:

Basic statistics/ documentation/ reports/discussions on:

1. Total numbers of handpumps in the State, by Counties, along with information on Functionality.
2. Reporting procedures from Counties on maintenance. Availability of reports. Verification of reports. Quality and regularity of reports.
3. Use of reports for management purposes – assessing workloads, analyzing nature and frequency of maintenance needs, assessment of demand for spare parts.
4. Territorial (County level) maintenance characteristics.
5. Visit to Spare Parts Store, estimation of availability of spare parts – type, quantity. Looking at inventory verification and reporting.
6. Distribution of spare parts to Counties, procedures, records, feedback.
7. Payment practices for maintenance – between State and County and County/ Mechanic and User Communities.

Areas of Query @ County Level: Basic statistics/ documentation/ reports/discussions on:

1. Total numbers of handpumps in the County by Payams, along with information on Functionality.
2. Examination of record keeping procedures, of basic borehole construction and rehabilitation records, and of maintenance.
3. Reporting procedures from County to State on maintenance. Availability of reports. Verification of reports. Quality and regularity of reports.
4. Numbers and distribution of Payroll Mechanics and Payam level volunteer-mechanics.
5. Territorial (County level) maintenance characteristics.
6. Visit to County Spare Parts Store, estimation of availability of spare parts – type, quantity. Looking at inventory verification and reporting.
7. Current status of spare parts to Counties, procedures for issue of spares, records, feedback.
8. Payment practices for maintenance – between County/ Payam Mechanic and User Communities.
9. Interviews with County/ Payam mechanics – experience, years of work, training received, location, other means of livelihood, nature/ amount of payments received for communities. Do they make a record of work done at a site, do they report it to the County?

Areas of Query @ Handpump Level

Site Ref	Location description		
	Latitude		
	Longitude		
	Elevation		
Details of Borehole	Date of Construction/ Rehab		
	Depth		
	SWL		
	Adequacy of water		
Details of handpump	Type		
	Installed when		
	Condition		
	Working/ Not W		
Details of Platform/ Drain	Original/ Rehab		
	Condition		
	Waste water disposal (Good/ Poor/ Bad)		

Discussion subjects with communities:

1. How many user households?
2. How far do users come from?
3. Where is the next/ alternative source?
4. Where do the users go in case of a failure?
5. Is there a Committee? Caretaker/s?
6. Who/ how is failure reported? To whom?
7. How much time for repairs to be done?
8. Who does repairs?

9. Any payments made?
10. When was the last repair? Its details? What happened?

Discussion subjects with NGOs:

1. Priorities and Current projects
2. Description of WASH – Water supply related activities.
3. Geographical area of operation: Counties/ States
4. Work done during 2011
5. Source of handpump hardware and spare parts
6. Passing on technical information to County/ State levels

Annex 3.1: Comparison of Results of the Surveys with the Consultant’s Observations - Supply Chain of Spare Parts for Handpumps

Summary Results - Responses of County Authorities	Summary Results - Responses from NGOs	Consultant’s Field Observations																				
34 respondents (dual responses from 5 Counties, considered)	21 respondents, from 18 NGOs, working in 7 States (multiple responses from NGOs working in more than one State, considered)																					
Responding States: CE, EE, Jonglei, Lakes, NBG, U Nile, Warrap, WE	Responding States: CE, Jonglei, Lakes, NBG, U Nile, Warrap, WE. No respondent from EE.	States/ Counties visited: WE - Yambio, Nzara, Warrap – Gogiral West, Twic NBG – Aweil East, West and North EE – Torit, Ikotos, Magwi, Kapoeta South																				
Five main areas of Query 6. County/State Water Department 7. Accessibility of Spare Parts 8. Stock Management 9. Cost Sharing and Revenue Collection 10. Why Supply Chains Break Down	Six main areas of Query 7. NGO Programs 8. System Management 9. Cost Sharing and Revenue Collection 10. Support from State / County Authorities 11. Procurement / Accessing Spare Parts 12. Why Supply Chains Break Down	The consultant’s observations address issues raised in all the queries in both the surveys. There were three areas of query which were common to both the Surveys - Accessing Spare Parts, Cost Sharing and Revenue Collection and Why Supply Chains Break Down .																				
I. County/State Water Department – Most (88%) respondents said that there was a Water Department in the County. – Most (94%) respondents said that the Counties had lists of water points. – The Average and Median values were 5 and 1 week/s, respectively as the Average time to repair after reporting in Weeks – To pass on repair requests , Communities/ Water Management Committees most often contacted Pump mechanics (59%), County authorities (29%). NGOs/ CBOs figured very low.	I. NGO Programs Involved in WASH supply chain projects? 16 NGOs – Yes, 5 - No Involved in handpump rehabilitation programs? 21 NGOs – Yes <table border="1" data-bbox="815 1142 1491 1356"> <thead> <tr> <th>Activity</th> <th>Drilling</th> <th>Rehab</th> <th>Repair</th> <th>Training</th> <th>Spares</th> <th>Stores</th> <th>Monitoring</th> <th>Supply Chain</th> <th>No Response</th> </tr> </thead> <tbody> <tr> <td>Responding NGOs</td> <td>2</td> <td>5</td> <td>2</td> <td>7</td> <td>4</td> <td>1</td> <td>1</td> <td>1</td> <td>5</td> </tr> </tbody> </table>	Activity	Drilling	Rehab	Repair	Training	Spares	Stores	Monitoring	Supply Chain	No Response	Responding NGOs	2	5	2	7	4	1	1	1	5	<ul style="list-style-type: none"> – All Counties visited had Water Departments. Only Budhi, E Equatoria (not visited) was reported not to have a Water Department. – Most Counties had lists of water points, usually with details on Payam level numbers and the functional status. – Usually repairs were completed within a week, usually through Payam (volunteer) mechanics. – Most NGOs working in WASH, had components of drilling and rehabilitation. – Only a few did repairs directly. – Even fewer supported Counties with spare parts, which had their own stores.
Activity	Drilling	Rehab	Repair	Training	Spares	Stores	Monitoring	Supply Chain	No Response													
Responding NGOs	2	5	2	7	4	1	1	1	5													

Summary Results - Responses of County Authorities	Summary Results - Responses from NGOs	Consultant's Field Observations
<p><i>Most Counties had Water Departments, had lists of water points, generally responded to repair requests within a week, and most repair requests were made to Pump Mechanics and County. Communities knew their mechanics.</i></p>	<p><i>A very ambiguous set of questions</i></p> <p><i>What are supply chain projects? Projects which need supplies? Projects with the objective of making supplies available more efficiently? Projects which come across supply related problems, foreseen or not, and then try to solve these problems?</i></p> <p><i>At one point 16 NGOs said "Yes" to involvement to supply chain projects, and later only 1 responded positively. Similar problem with Rehabilitation – All 21 said "Yes" and then only 5 listed it as an activity.</i></p>	<p>– Repair requests came through Payam Mechanics or to the County, sometimes through the Boma Chiefs.</p> <p>Private sector contracting was used almost universally used by NGOs for drilling and to some extent for Rehabilitation, with the exception of CRS in Torit, EE.</p> <p>Rehabilitation was sometimes done pooling resources, handpump hardware and construction materials and transport coming from NGO partners and used County PMs on payroll.</p>
<p>2. Accessibility of Spare Parts Was there a supply chain in the County? 32% Yes, 56% No.,</p> <p><i>Possibility of ambiguity.</i></p> <p>Where did supplies come from? UNICEF 65% , NGOs 29% , State 9%.</p> <p><i>Perception that States had little to do with making spare available?</i></p> <p>How often does the county receive spares? Median response 4 months</p> <p>Means of transport?</p> <ul style="list-style-type: none"> – Govt. vehicles 50% – "Bicycle" and "Foot" 29% each. – Public transport 15% and Motor bikes 9%. "Other" means- 18%. – Private vehicles, not at all. <p>Availability of spares and tools in local County markets? Uniformly NO.</p> <p><i>There were no supply chains in Counties in the strict sense of the term.</i></p>	<p>5. Procurement / Accessing Spare Parts</p> <p>"Where do communities... procure spare parts?" : "No system in place" 33%, "Your NGO" 24%, "Other NGOs" 19%, Govt. 14%, 5% for "Local hardware business" - Western Equatoria.</p> <p><i>This appeared consistent with the modus operandi of most NGOs who sourced their own spares.</i></p> <p><i>Procurement from local hardware business in Western Equatoria [by CAFOD] needed to be looked in to.</i></p> <p>"Where does your organization procure spare parts?" East Africa 67%, "in country" 33%, "Free from UNICEF" 29%.</p> <p><i>East Africa (both Kampala and Nairobi) were definitely major sources of spare parts for handpumps for NGOs.</i></p> <p>Are spares available at state level? 33% Yes, 52% No</p> <p><i>Yet the State Govt. was the major source for Counties!</i></p> <p>On "... your organization's budget for spares annually..." and on "average cost of repair", the maximum, average, and</p>	<p>Supply chains in the strict sense of the term did not exist. Projections of requirements of spare parts were not made at any level. Schedules of supply needs were not drawn up, delivery schedules and back logs were not tracked, analysis and accounting of utilization of fresh spares issued from stores to sites or of used items coming back from sites was not done.</p> <p>What did exist was a network of formal and informal arrangements, by which handpump hardware reached its destination – a new well, an old well being rehabilitated or a repair request from a community.</p> <p>Inventories were made periodically with varying degrees of sophistication but were not used for any management purpose.</p> <p>Counties got spare parts mainly from the State, which held and distributed spares distributed what it</p>

Summary Results - Responses of County Authorities	Summary Results - Responses from NGOs	Consultant's Field Observations												
<p><i>Spare parts came from UNICEF and NGOs, usually within 4 months. Govt. vehicles were the most common means of transport, followed jointly by bicycles and by foot. Spare parts were not available locally.</i></p>	<p>minimum figures were:</p> <table border="1" data-bbox="828 271 1478 494"> <thead> <tr> <th></th> <th>Max</th> <th>Average</th> <th>Min</th> </tr> </thead> <tbody> <tr> <td>Organization's annual budget for spares</td> <td>150,000</td> <td>47,462</td> <td>1,000</td> </tr> <tr> <td>Average cost of repair of a handpump (inclusive of staff and support)?</td> <td>3,000</td> <td>1,101</td> <td>100</td> </tr> </tbody> </table> <p><i>As per the questionnaire, the budget and repair cost estimate figures were to be reported in US Dollars. Hence, an average budget of a little less than USD 50,000 per annum per NGO reporting (14) does represent a substantial resource base for spare parts alone, USD 700,000. Could there be an error? Similarly, when the cost of a new borehole with pump is of the order of USD 13,000 – 15,000, the maximum and average repair cost figures of USD 3000 and USD 1101, respectively, appear to be high. Unless the question has not been properly addressed by the respondents.</i></p>		Max	Average	Min	Organization's annual budget for spares	150,000	47,462	1,000	Average cost of repair of a handpump (inclusive of staff and support)?	3,000	1,101	100	<p>received from UNICEF. The stocks moving from one level to the next often was NOT related to the density of pumps in a County or to the specific characteristics of boreholes, pump installation depths, yields or water quality of a specific County.</p> <p>As mentioned earlier, a few NGOs gave spares to Counties on request. States generally had substantial stocks of spare parts. Only one item, GI pipes, was usually found to be short supply. Corrosion and thread failure were widely reported problems. The use of other handpump options for aggressive waters had not been considered.</p> <p>The frequency of delivery of spare parts to States and Counties varied, depending on when imported supplies reached South Sudan, whether they were UNICEF imports directly from India or NGOs procuring from East Africa, or drilling contractors importing from East Africa, Khartoum or Addis Ababa.</p> <p>While NGOs and drilling contractors had dedicated transport at their call, the movement of spare parts from State to County depended heavily on availability of transport.</p> <p>Tools and spare parts were NOT available in local shops. Hardware dealers were aware of the handpump markets in East Africa, but were of the opinion that handpumps were the monopoly of the</p>
	Max	Average	Min											
Organization's annual budget for spares	150,000	47,462	1,000											
Average cost of repair of a handpump (inclusive of staff and support)?	3,000	1,101	100											

Summary Results - Responses of County Authorities	Summary Results - Responses from NGOs	Consultant's Field Observations
		<p>Govt. and the NGOs, giving free items to communities. Hence, there was no business opportunity in the open market at any level. This opens up the whole question of the consequences of free distribution of spare parts to debate.</p> <p>Communities did not procure spare parts.</p> <p>As mentioned earlier, UNICEF sourced parts directly from India. The two other major sources of spares in South Sudan were NGOs and Drilling Contractors, who procured spare parts from Nairobi and Kampala, Khartoum and Addis Ababa in Africa that had originated from India.</p> <p>There were no open market outlets for spare parts, except for the case in Gogrial West in an ACF project.</p> <p>Some dealers like Davis & Shirtliff and Techno Relief Services, from Nairobi, are said to have set up business offices in Juba. So perhaps the market is opening up.</p> <p>The quality of spare parts from NGOs is a point of concern that needs to be discussed in detail.</p>
	<p>2. System Management 86% trained pump mechanics. <i>The questionnaire clearly said: "A pump mechanic is someone able to perform all maintenance needs associated with a handpump i.e. not a caretaker who is likely to perform only preventative maintenance and very simple repairs".</i></p>	<ul style="list-style-type: none"> - Almost all NGOs had training components for establishment of Water Committees and Caretakers and left spares with Committees. - A few trained PMs, in the true sense of the term.

Summary Results - Responses of County Authorities	Summary Results - Responses from NGOs	Consultant's Field Observations
	<p><i>Did NGOs train Pump Mechanics on such a large scale, given the fact that there are many existing mechanics at County and Payam levels? Mechanics training is usually a longer and more complicated process, requiring a high level of technical capability and resources.</i></p> <p>14% DID NOT train pump mechanics.</p> <p>10% made the distinction between Caretakers training and Pump mechanics training.</p> <p>62% felt that mechanics could earn their livelihood HP maintenance, 29% did not.</p> <p><i>Ambiguity in the positive response from the 62% respondents. A majority of mechanics are volunteers at Payam level, trained since the war period of the mid-1990s and onwards. They are dependent on what the client-communities give them as labour charges in cash or kind. Some Counties have guidelines for "community cost sharing" or contributions to the volunteer-mechanics, and these are not large sums, of the order of SSP 100 - 200, sometimes less.</i></p> <p>Who were Water Committees trained to pass on information for repair needs? Pump Mechanics - 62% respondents, County Rural Water authorities - 48%.</p>	<p>Training content needs to be looked at carefully. There is good possibility that Preventive Maintenance has low emphasis, is misinterpreted, or is missing.</p> <ul style="list-style-type: none"> - Repair requests came through Payam Mechanics or to the County, sometimes through the Boma Chiefs. - Most Counties had their full complement of payroll mechanics and large numbers of volunteer mechanics. <p>Conceptually, Maintenance Management was not practiced.</p> <p>Reporting in some form or another was common from County to State (bi-weekly, monthly, quarterly, annual).</p> <p>Individual records of repairs were generally not detailed and only a record of parts used was reported. These reports went to State and to NGOs who gave spares. Formats and contents of maintenance reports varied from excellent to indifferent.</p> <p>Most NGOs provided full work reports of new and rehabilitated boreholes, but some did not.</p> <p>Tracking maintenance histories of individual installations was unheard of. However, overall functionality figures were readily available.</p>

Summary Results - Responses of County Authorities	Summary Results - Responses from NGOs	Consultant's Field Observations
		<p>Computerized and hand written inventories of water sources existed, usually at County level, generally initiated by NGOs, but were not used to a great extent by County officials. A number of independent efforts were ongoing in inventorying water source at State and County level.</p> <p>States did not use County reports for any management purposes except to compile State level statistics.</p> <p>State reports sometimes were of poor quality.</p> <p>There were no assessments of maintenance workload, incidence or frequency of repairs, projection of spare parts needs, and identification of problem patterns on a territorial basis, by pump densities, population pressures or depths of installations.</p>
<p>3. Stock Management Inventory report available? 74% Yes Records of items released for repair available? 88% Yes Number of repair requests received in a month? Median – 4 County able to meet the demand? 21% Yes, 76% No. Spare parts provided to communities for free? 74% Yes, 21% No. Did the County have a storage facility? 74% Yes, 24% No.</p> <p><i>In summary: Spare parts inventories were maintained and releases were</i></p>		<p>State level inventory reports were usually available along with stock registers for recording incoming and outgoing spare parts. Such records were not so complete at Counties.</p> <p>Number of repair requests at County level over a few months or a year, was generally not compiled. A few Counties were able to give these figures and they were realistic (30% to 50% of the total number of pumps = annual repair work load, i.e. a pump breaking down once in 2 to 3 years) and in one case it was absurdly high.</p>

Summary Results - Responses of County Authorities	Summary Results - Responses from NGOs	Consultant's Field Observations
<p><i>recorded.</i> <i>The usual number of repair request/ month was 4.</i> <i>However, Counties were NOT able to meet the demand for spares.</i> <i>Spare parts were provided free of cost, though there were cases of payment for this.</i> <i>Counties generally had Stores for spare parts.</i></p>		<p>Counties were able to meet the demand for repairs, as reflected by the relatively good functionality rates. But this might not be a correct reflection of the actual situation, since sometimes significant numbers of pumps were reported to be pending repair.</p> <p>Spare parts were mostly free (except in the case of WE).</p> <p>States had or were building good storage facilities. Counties usually had facilities that were shared, small, make-shift and not well kept.</p>
<p>4. Cost Sharing and Revenue Collection Are there pump mechanics who travel around the County to repair pumps? Yes: County mechanics 56%, Govt. 44%. Private 29%, NGO-supported mechanics 24%. <i>Ambiguity: County mechanic = County mechanic on payroll? Then who are Govt. Mechanics? Because, Payam level mechanics were volunteers.</i> <i>The Private mechanics' market share of 29%, more than the NGO? Can this be the case?</i> Do communities pay for repairs: Yes 62%, No 38% On What components ... do communities pay for: Labor only 71%, Labor, transport and spares 24% <i>This means that payment for repairs was an accepted practice.</i> On Is a spare parts list available from Govt. or private sector: The majority response was No – 65% (22).</p>	<p>3. Cost Sharing and Revenue Collection 57% trained communities to collect regular water usage fees. 33% said this was on an “as needed” basis (<i>which meant that they did not have collection of fees on their training agenda?</i>), and 1 respondent replied a categorical “no”. 90%: Water Management Committees were not taxed by State or County. <i>Why/ where did the question of “taxation” arise?</i> Only one respondent said that Water Management Committees WERE taxed by the county. “...communities were accustomed to contributing anything for handpumps...?” 33% “Regular Water Usage Fees”, 5% “Collection on “as-needed basis” , 52% “Not trained to collect funds” Type of contribution made: 33% “Cash”, 38% “Kind”, 19%</p>	<p>Most NGOs said that collection of funds was a regular part of the training of Water Committees.</p> <p>Payment for repairs was reported almost uniformly across the 4 States. Amounts differed and were generally small, mostly as a token or food money for the volunteer PMs.</p>

Summary Results - Responses of County Authorities	Summary Results - Responses from NGOs	Consultant's Field Observations
<p><i>Ambiguity: What does "list" mean? Inventory? Then the response is inconsistent (refer 3.2). Price list? Then the question was not clearly formulated.</i></p> <p>On Does the county water department collect any money within the county: Majority response No, except for Fees for Repairs: Yes 56%.</p> <p>In summary: <i>Govt. & County mechanics were available and travelled for repairs. Private mechanics were more frequently available than NGO.</i></p> <p><i>A majority of communities paid for repairs, though this was for labor only. A minority of communities paid for almost all components of repair – labor, spare parts and transport. This means that culture of payment for repairs is significantly positive, though in small sums.</i></p>	<p>"Both".</p> <p>In summary: <i>The responses to this group of questions threw up a number of inconsistencies.</i> <i>A total of 90% for contributions being made in Cash, Kind or both, was not consistent with only 33% positive for "Are communities accustomed to contributing anything..."</i></p> <p><i>Conflicting responses when the data in this group was looked at, as a whole.</i></p>	<p>Cash contributions were often reported, but were generally irregular and usually on an "as needed" basis, by door-to-door collection from those living in the immediate vicinity of the pump.</p> <p>There was only one instance of formal guidelines for cost sharing from the State to the Counties, but it was not very strictly implemented.</p>
	<p>4. Support from State / County Authorities</p> <p>What do County governments provide?" A high "lack of response" (between 90% to 57%) to this and its subsidiary questions were surprising.</p> <p>Only 19% positive responses to whether the County provides spare parts.</p> <p>An even higher degree of lack of response (90%- 67%) for "What do State governments provide?".</p>	<p>States and Counties managed the spare parts which came mainly from UNICEF.</p> <p>Counties supplemented the availability of spare parts from NGOs.</p> <p>Counties sometimes approached NGOs for assistance with transport and the pumps mechanics.</p>

Summary Results - Responses of County Authorities	Summary Results - Responses from NGOs	Consultant's Field Observations
	<p>Whether services are provided free:, 38% Yes, 43% No <i>Payment for service was a common occurrence.</i></p> <p>On whether Counties received spare parts from the State or not, had 33% (7) positive responses and 62% (13) negative, again heavily emphasizing the opinion that most Counties DID NOT receive spare parts from the State.</p> <p><i>The above responses represent a very strong negative perception among NGOs of the States' and Counties' roles in the provision of spare parts. Communities paid for services.</i></p>	
<p>5. Why Supply Chains Break Down</p> <p>Rank 1:</p> <ul style="list-style-type: none"> - Spare parts not available locally - No community initiative for ownership and repair - Affordability <p>Rank 2:</p> <ul style="list-style-type: none"> - Lack of transportation - Community unwilling to raise funds/pay for repairs <p>Rank 3:</p> <ul style="list-style-type: none"> - Lack of trained mechanics - Lack of County level staff - Lack of secure warehouses. 	<p>6. Why Supply Chains Break Down</p> <p>Rank 1:</p> <ul style="list-style-type: none"> - Spare parts not available locally <p>Rank 2:</p> <ul style="list-style-type: none"> - Problems related to Accessibility <p>Rank 3:</p> <ul style="list-style-type: none"> - Community unwilling to raise funds/pay for repairs - Lack of trained mechanics 	<p>Disagree with most of the reasons of both the Surveys</p> <p>Supply Chains, in the strict sense of the term, did not exist. So the question of their breaking down is not relevant.</p> <ul style="list-style-type: none"> - States generally had adequate stock of spares. - Spares were generally free of cost and so the question of payment from one link in the chain to the next did not arise. - There was a surplus of mechanics. - While spares were not available locally, there were no resources with State or County level to procure them. - Communities did pay, though only small sums, for labor costs.

Annex 3.2 : Summary & Details – Results of a Survey of County Authorities

Supply Chain of Spare Parts for Sustainability of Handpumps in South Sudan

1. Background

This survey was one of two surveys initiated by the Technical Working Group (TWG), a sub-group of the WASH Cluster agencies in South Sudan. The purpose of both the surveys was to gain a better understanding of the perceived crises of shortage of spare parts leading to a high number of non-functional handpumps

In this particular survey, NGOs working in the WASH sector in South Sudan were requested to canvass a questionnaire, which is attached as **County Survey Questionnaire**, to their respective County WASH officials. The questionnaires were completed in mid- 2011, after which the responses were compiled in MS Excel by the TWG.

The analysis of the survey is based on the above data compilation provided by the TWG. A similar analysis has been also done for the other survey, where the respondents to a similar questionnaire were by the NGOs themselves.

2. Scope and Respondents

As shown in Table 9, below, there were 34 respondents. 5 Counties (high-lighted) responded twice, each from two different respondents. This may result in some inaccuracy in analysis resulting from variations in data for the same County from but from different respondents. However, the data analysis is based on the information provided by the all the 34 respondents.

Table 9 Responding Counties and States

Sl. No	State	County	Respondent	Sl. No	State	County	Respondent
1.	CE	Kajo Keji	RWSS (Govt.)	18.	Lakes	Wulu	Oxfam GB
2.		Lainya	JEN	19.		Yirol East	RUWASSA
3.		Lainya	RWSS (Govt.)	20.		Yirol West	RUWASSA
4.		Morobo	RWSS (Govt.)	21.	NBG	Aweil East	IOM
5.		Terekeka	RWSS (Govt.)	22.		Aweil East	Samariatn's Purse
6.		Yei	IAS	23.		Aweil West	Samariatn's Purse
7.		Yei	RWSS (Govt.)	24.	Upper Nile	Fashoda	Tear Fund
8.	EE	Kapoeta North	SSRRC	25.		Longechuk	Relief International
9.		Kapoeta South	PACT Sudan	26.		Longechuk	Oxfam GB
10.	Jonglei	Akobo	PACT Sudan	27.		Maban	Oxfam GB
11.	Lakes	Awerial	RUWASSA	28.	Nasir	PACT Sudan	
12.		Cuiebei	RUWASSA	29.	Warrap	Twic	IOM
13.		Rumbek Centre	RUWASSA	30.	WE	Ezo	Intersos
14.		Rumbek	Oxfam GB	31.		Nagero	Intersos

Sl. No	State	County	Respondent	Sl. No	State	County	Respondent
		Centre					
15.		Rumbek East	RUWASSA	32.		Nzara	Intersos
16.		Rumbek North	RUWASSA	33.		Tambura	Intersos
17.		Wulu	RUWASSA	34.		Yambio	Intersos

3. Main areas of Query

As mentioned earlier, the questionnaire is attached as the **County Survey Questionnaire**. There were five main areas of query in the survey. These were:

11. County/State Water Department
12. Accessibility of Spare Parts
13. Stock Management
14. Cost Sharing and Revenue Collection
15. Why Supply Chains Break Down?

4. Summary of Results & Interpretations (in italics)

Detailed data tables and their analysis of the survey results have been presented in Section 5 of this report. An abbreviated form of the analysis and interpretations of each of the five main areas of query have been provided below.

4.1 County/State Water Department

- Most (88%) respondents said that **there was a Water Department in the County**.
- Most (94%) respondents said that the **Counties had lists of water points**.
- The Average and Median values were 5 and 1 week/s, respectively as the **Average time to repair after reporting** in Weeks
- **To pass on repair requests**, Communities/ Water Management Committees most often contacted Pump mechanics (59%), County authorities (29%). NGOs/ CBOs figured very low.

4.2 Accessibility of Spare Parts

- **Was there a supply chain in the County?** 32% positive, 56% negative.
An ambiguous question. It could mean: "Did spare parts reach the County?" Or was it: "Was there a spare parts outlet in the County, which was part of a supply chain?" The two mean entirely different things. From responses to the next question, this ambiguity was very clear.
- **"Where did supplies come from?":** UNICEF 65%, NGOs 29%, State 9%, Private 3%.
If UNICEF was seen clearly and dominantly as a source of supplies to Counties, then UNICEF (or NGOs, for that matter) were clearly NOT seen as a part of the Supply Chain in the earlier question. Also, UNICEF supplied spare to NOT to Counties, but to States. Yet the perception at the Counties was that supplies were UNICEF's and the State had little to do with this. This perception indicates that Counties do not differentiate between their State and UNICEF as sources of spare parts.
- **"How often does the county receive...":** Average 8 months, Median 4 months.
- **"... means of transport...":** Govt. vehicles (50%), "Bicycle" and "Foot" 29% each, Public transport 15% and Motor bikes 9%. Private vehicles were not used at all.

- “...availability of spares and tools in local County markets...”: NO positive responses at all.
This is not consistent with the response that there was one response for a Private supplier (CES, Yei County, respondent – IAS)

4.3 Stock Management

- **Is inventory report or record available?** 74% positive.
- **Are records of items released ... for repair available?** 88% positive.
- **Number of repair requests received in a month:** Maximum 35, Average 6, Median 4, Min. 1.
- **Is the County able to meet the demand ...?** Only 21% responded “Yes”, 76% “No”.
Lack of clarity. Demand for what? Spares? Repair requests?
- **... spare parts provided to communities for free?** Yes 74%, No 21%.
- **...is there a storage facility in the county?** Yes 74%, No 24%.
The above responses indicate, in a majority of cases:
 - *Spare parts inventories were maintained.*
 - *Spares released for repair were recorded.*
 - *The Median value of the number of repair request per month was 4.*
 - *Counties were NOT able to meet the demand for spares, which does not match the high functionality reported during filed visits.*
 - *Spare parts were provided free of cost, though there were cases of payment for this.*
 - *Stores at Counties were generally available.*

4.4 Cost Sharing and Revenue Collection

- **Are there pump mechanics who travel around the County doing repair?** Yes: County mechanics 56%, Govt. 44%. Private 29%, NGO-supported mechanics 24%.
 - *Ambiguity: County mechanic = County mechanic on Payroll? Then who are Govt. Mechanics? Because, Payam level mechanics are volunteers.*
 - *A Private mechanics’ market share of 29%, more than the NGO? Can this be the case?*
- **Do communities pay for repairs:** Yes 62%, No 38%
- **On What components ... do communities pay for:** Labor only 71%, Labor, transport and spares 24%
This means that a culture of payment for repairs is significantly positive.
- **On Is a spare parts list available from Govt. or private sector:** The majority response was “No” – 65%.
Ambiguity: What does “list” mean? Inventory? Then the response is inconsistent (refer 3.2). Price list? Then the question was not clearly formulated.
- **On Does the county water department collect any money within the county:** Majority response **No**, except for **Fees for Repairs:** Yes 56%.

4.5 Why Supply Chains Break Down?

- 8 alternatives were provided to be ranked on a scale of 1 to 8.
- Three reasons shared Rank 1, though to different magnitudes:
 - **Spare parts not available locally:** 82%.
 - **No community initiative for ownership and repair:** 44%
 - **Affordability:**41%
 - Two reasons shared Rank 2, with different magnitudes:
 - **Lack of transportation:** 41%
 - **Community unwilling to raise funds/pay for repairs:** 35%

- Even their Rank 1 values of 9 and 7, respectively, were also quite significant.
- Three reasons were jointly ranked 3, all with 41%. These were:
 - **Lack of trained mechanics**
 - **Lack of secure warehouse**
 - **Lack of trained staff**

*The responses for **Community unwilling to raise funds/pay for repairs**, a total of 56% [Rank 1+2] was completely at variance with: **4.4: Do communities pay for repairs?... where 62% respondents felt that communities pay for repairs.***

“ What are the main obstacles, ..., preventing a suitable spares supply chain?”

- The group of **County capacity - Office, Staffing, Monitoring, Storage** ranked as the most important common problem with 10 responses.
- The group of **Spare - Availability, Cost, limits, subsidy** ranked as the second-most important common problem with 7 responses.
- This was followed by the **Working Conditions** group with 6 responses and **Coordination** with 6 responses.
- This was followed by **Transport** (4), **Community Awareness/ Ownership** (3) and **Accessibility** (1) which were grouped.

*The above categorization does not follow a strict logic, nor was it predetermined. It was done with the intention of simplifying analysis. Perhaps that is why it presents some contradictions with lack of **Capacity at County level** emerging as a more important problem than the **lack of Spare parts**.*

On the other hand the field visits indicated that the lack of capacity at County level is a more serious problem than the lack of spare parts.

5. Detailed Analysis and Interpretation of Survey Results:

The survey data on each of the five main areas of query have been tabulated and are presented below.

5.1 County/State Water Department

Table 10 Results of responses to questions on County/State Water Department

Sl. No.	Area	Responses				
		Yes	No	No Resp.		
1.1	Is there a county water department in your county?	30	4			
1.2	Where is it located?	Individual responses, not discussed				
1.3	Does the county/ state have a list of water points?	32	2			
1.4	How long on average does it take a boreholes to be repaired after it is reported broken? (weeks)				Duration in weeks	
					Maximum	50
					Average	5
					Median	1
1.5	Who do WMCs/ communities	Chiefs	8	26		
		Payam Admin	6	28		
		Pump Mechanics	20	14		

Sl. No.	Area	Responses			
		Yes	No	No Resp.	
	contact in the event of a breakdown?	County rural water dept.	10	24	
		State Rural Water Dept.		34	
		Others*	3	31	

*Others: 3 "Yes" responses: NGOs/ CBOs

- 30 out of 34 responses were positive for **Is there a Water Department in the County.**
- 32 respondents replied positively to **Does the County have a list of water points.**
- On the question of **Average time to repair after reporting**, in Weeks, the **Maximum, Average, Median and Minimum values were 50, 5, 1, 1 week/s, respectively.**
A Median value has been computed to understand the most frequent time interval, rather than the value reflected by an arithmetical mean, which can be skewed by a single high value (of the Max of 50 in this case).
- **To pass on repair requests**, Communities/ Water Management Committees contacted Pump mechanics most often (20/ 34 respondents), followed by the County authorities (10/ 24). Information to Chiefs were 8/ 34, Payam authorities were 6/ 34, NGOs/ CBO – 3/34, and none to the State authorities. There were multiple responses to this question.

5.2 Accessibility of Spare Parts

Table 11 Results of responses to questions on Accessibility of Spare Parts

		Responses			
		Yes	No	No Resp.	
2.1	Is there supply chain of hand pump spare parts in your county?	11	19	4	
2.2	Where did the supplies come from?	UNICEF	22	9	3
		State Ministry	3	28	3
		NGO	10	21	3
		Private Sector	1	30	3
		Other*	1	30	3
	• The single "Other" response was "CBO" from Kapoeta S PACT				
2.3	Who is in charge of supply chain of parts for the county?	County WASH Authority	7		
		NGO/CBO	2		
		UNICEF & NGO	1		
		State DWRSS	20		
2.4	How often does the county receive additional spare parts?	Duration in months			
		Maximum	84		
		Average	8		
		Median	4		
2.5	What method is used to transport the spare parts to the broken hand pumps?	Govt. Vehicle	17	15	2
		Private Vehicle		32	2
		Public Transport	5	27	2
		Motorbike	3	29	2
		Bicycle	10	22	2
		Foot	10	22	2
2.6	Are there any relevant spare parts or tools available in local market within the county?	Parts		33	1
		Tools		33	1

- 11/34 positive responses [and 19 negative] to: **Was there a supply chain in the County?**
The question was somewhat ambiguous. It could mean: “Did spare parts reach the County?”. Or was it: “Was there a spare parts outlet in the County, which was part of a supply chain?”? The two mean entirely different things. From responses to the next question, this ambiguity was very clear.
- In response to “**Where did supplies come from**” UNICEF was the most frequent answer – 22/34, followed by NGOs – 10/34, State – 3/34, Private Sector and Others (CBO) 1 each/34. The single response of Private Sector comes from CES, Yei County, respondent – IAS. No further details are available.
If UNICEF was seen clearly and dominantly seen as a source of spare parts to Counties, then UNICEF (or NGOs, for that matter) was clearly NOT seen as a part of the Supply Chain in the earlier question. Also, UNICEF supplied spare to NOT to Counties, but to States. Yet the perception at the Counties was that supplies were UNICEF’s and the State had little to do with this. This perception indicates that Counties do not differentiate between their State and UNICEF as sources of spare parts.
- On the question of “**How often does the county receive...**”, the maximum value of 84 months was probably an error in responding or recording. The Average was 8 months, the Median was 4 months and the Minimum was 0, indicating an immediate response.
- On the query of **means of transport**, Govt. vehicles were most frequently used (17/ 34), followed by “Bicycle” and “Foot” (both 10 each/ 34). Public transport and Motor bikes were less frequently used (5 and 3, respectively/ 34). 6/ 34 was the value under “Other” means of transport, but the data does not provide further details. Private vehicles were not used at all.
- On the issue of **availability of spares and tools in local County markets**, there were NO positive responses at all.
This is not consistent with the response that there was one response for a Private supplier (CES, Yei County, respondent – IAS)

5.3 Stock Management

Table 12 Results of responses to questions on Stock Management

		Responses					
		Yes	No	No Resp.			
3.1	Is inventory report or a record of items available?	25	9				
3.2	Are records of items released to communities for repair available?	30	4				
3.3	Number of requests received in a month?				6	Maximum	35
						Average	6
						Median	4
						Minimum	1
3.4	Is the county able to meet the demand?	7	26	1			
3.5	Are spare parts provided to communities for free?	25	7	2			
3.6	Is there a storage facility for spare parts in the county?	25	8	1			

- There were 25 positive responses to: **Is inventory report or record available?**
- There were 30 positive responses to: **Are records of items released ... for repair available?**
- On the query on **Number of repair requests received in a month**, there were 28 responses, which indicated a **Maximum of 35 requests, Average, Median and Minimum values of 6, 4 and 1**, respectively.
- Only 7 respondents felt that **the County was able to meet the demand**. 26 disagreed.
- 25 respondents felt that **spare parts provided to communities for free**. 7 disagreed.
- Again, 25 respondents felt that **there was a storage ... in the county**, 8 did not think so.

The above responses indicate, in a majority of cases:

- Spare parts inventories were maintained.
- Spares released for repair were recorded.
- The Median value of the number of repair request per month was 4.
- Counties were NOT able to meet the demand for spare.
- Spare parts were provided free of cost, though there were cases of payment for this.
- Stores at Counties were generally available.

5.4 Cost Sharing and Revenue Collection

Table 13 Results of responses to questions on Cost Sharing and Revenue Collection

		Responses			
		Yes	No	No Resp.	
4.1	Are there pump mechanics who travel around the county repair?	Private HP Mechanics	10	24	
		Govt.	15	19	
		County	19	15	
		NGO supported mechanics	8	25	1
		Others? Please specify.		33	1
4.2	Do communities pay for repairs?	21	13		
4.3	What components of repair do communities pay for?	Just labor	24	10	
		Labor, transport and spares	8	26	
		Others? Please specify.*	2	27	5
		* Fencing			
4.4	Is a spare parts list available from Govt. or private sector?	12	22		
4.5	Does the county water department collect any money within the county?	Yes or No	9	25	
		Tax from Water Mgt Committee (SDG)	3	31	
		Fees for direct usage	3	31	
		Fees for Spare Parts	4	29	1
		Fees for Repairs	19	13	2

- In response to **Are there pump mechanics who travel around the county repair**, Yes responses were: 19 to County mechanics, 15 to Govt., 10 to Private and 8 to NGO-supported mechanics.
Ambiguity: County mechanic = County mechanic on Payroll? Then who is the Govt. Mechanic? Because, Payam level mechanics are the volunteers.
- To the question **Do communities pay for repairs**, 21 said Yes and 13 responses were No.
- On **What components ... do communities pay for**, 24 responses were for Labor only and 8 were for Labor, transport and spares.
*The responses to the above two questions indicate that 62% (21/34) respondents felt that **communities pay for repairs**, 24% (8/34) paid for almost all components of repair and 71% (24/34) paid for labor. This means that a culture of payment for repairs is significantly positive.*
- On **Is a spare parts list available from Govt. or private sector**, the majority response was No (22/34).
Ambiguity: What does "list" mean? Inventory? Then the response is inconsistent (refer 3.2). Price list? Then the question was not clearly formulated.
- On **Does the county water department collect any money within the county**, the majority response to all subsidiary questions were **No** (i.e. for **Tax, direct usage, spare parts**), except in the case of **Fees for Repairs** where the Yes responses were 19/ 34.
*Apart from **Fees for Repairs**, where 56% (19/34) responded that the **County water department collect money**, there were no other significant reasons for collecting payments from communities.*

*Field visits indicated that volunteer mechanics got directly paid small sums for labor charges from communities. County water departments **DID NOT** collect money.*

5.5 Why Supply Chains Break Down?

5.1	What are the biggest reasons hand pumps are not being fixed in these communities? (Overall Rank)
-----	--

For judging reasons why supply chains fail against a set 8 alternatives, each of these alternatives were ranked on a scale of 1 to 8 (1 = Most significant, 8 = Least significant.). The results are given in **Table 14**.

Table 14 Results of responses to questions on Why Supply Chains Breakdown

Reason	Ranking on scale of 8 (1= Most significant, 8=least significant.)								N/R	Check Totals
	1	2	3	4	5	6	7	8		
Spare parts not available locally	28	2	2						2	34
No community initiative for ownership and repair	15	3	7	1		1			7	34
Affordability	14	6	3		2		1		8	34
Lack of transportation	9	15	2	3	1				4	34
Community unwilling to raise funds/pay for repairs	7	12	5	1		1		1	7	34
Lack of trained mechanics	2	9	14			1		1	7	34
Lack of secure warehouse	8	3	14		1		1	1	6	34
Lack of trained staff	4	5	14			1	2	1	7	34
Other Reasons: please specify.*	3	1		1					29	34

*3 Other Reasons: Ranked 1
Difficulty in communication with the head quarter
Lack of govt. employed pump mechanics
Accessibility/Insecurity

- Three reasons shared Rank 1, though to different magnitudes:
 - **Spare parts not available locally** was with 28 responses, the highest, in Rank 1.
 - **No community initiative for ownership and repair** was with 15 responses in Rank 1.
 - **Affordability** was with 14 responses in Rank 1.
- Two reasons shared Rank 2, with different magnitudes:
 - **Lack of transportation** – 14 responses
 - **Community unwilling to raise funds/pay for repairs** -12 responses
 - Even their Rank 1 values of 9 and 7, respectively, were also quite significant.
- Three reasons were jointly ranked 3, all with 14 respondents each. These were:
 - **Lack of trained mechanics**
 - **Lack of secure warehouse**
 - **Lack of trained staff**
- Three additional reasons were provided under the “Other Reasons” category, all ranked 1. These were:
 - **Difficulty in communication with the head quarter**
 - **Lack of govt. employed pump mechanics**
 - **Accessibility/Insecurity**

The responses for **Community unwilling to raise funds/pay for repairs** of 56% [Rank 1+2, i.e. (7+12)/34] was completely at variance with [4.2] **Do communities pay for repairs?** where 62% (21/34) respondents felt that **communities pay for repairs**.

The last question of the section on **Why Supply Chains Breakdown** was: “ **What are the main obstacles, in your opinion, preventing a suitable spares supply chain?**” This question elicited descriptive responses which were sorted into 7 main categories with subsidiary responses in four of the main categories. The results of this analysis are given in Table 15.

Table 15 Categorization of responses to Main Obstacles to a Supply Chain

	1	2	3	4				5				6		7			
	Transport	Accessibility	Community Awareness/ Ownership	Spare - Availability, Cost, limits, subsidy				County capacity - Office, Staffing, Monitoring, Storage,				Coordin- ation		Working Conditio ns		No Comment	
				NGOs give spares only within their area	Spares	High cost of Spares	Subsidized fair price shop for Spares	Staff Capacity at County	Storage	Office, equipment	Monitoring from County	Yard Tech., WQ Tech, Drilling	between Water Committees & County	between WASH players	Payment/ Incentives to HPM		Safety equipment to PM
Sub-totals	4	1	3	1	4	1	1	2	4	2	1	1	1	2	5	1	
Totals	4	1	3	7				10				3		6		12	

From the above table:

- The group of **County capacity - Office, Staffing, Monitoring, Storage** ranked as the most important common problem with 10 responses.
- The group of **Spare - Availability, Cost, limits, subsidy** ranked as the second-most important common problem with 7 responses.
- This was followed by the **Working Conditions** group with 6 responses and **Coordination** with 6 responses.
- This was followed by **Transport** (4), **Community Awareness/ Ownership** (3) and **Accessibility** (1) which were grouped.

The above categorization does not follow a strict logic, nor was it predetermined. It was done with the intention of simplifying analysis. Perhaps that is why it presents some contradictions with lack of **Capacity at County level** emerging as a more important problem than the **lack of Spare parts**.

On the other hand the field visits indicated that the lack of capacity at County level is a more serious problem than the lack of spare parts.

County Survey Questionnaire**Supply Chain/Spare Parts/Sustainability
County Surveys****Guidance notes on completion:**

- The survey is intended to be administered by NGO staff operating in the field
- The survey should be completed by means of interview with a senior government official working at county level – in many cases this would be the Assistant Commissioner for Water and Sanitation, if there is no such person at county level it could be the Superintendent of Handpump Maintenance Team
- One survey form should be complete for each county your NGO operate in
- On completion of the survey the results should checked for questionable results by the administering NGO management
- If you wish you can also submit hard copies to the spare parts TWG through the WASH cluster

Name of County: _____**State:** _____**Interviewer(s):** _____ **Signature** _____**Your NGO/agency:** _____**Name and position of person you are interviewing:** _____**Date:** _____**I. County/State Water Department**

1. Is there a county water department in your county? Yes No
2. Where is it: _____
3. Does the county/state have a list of water points? Yes No
4. If there is no county water department in your county, who keeps the list of water points?
5. How long on average does it take a borehole to be repaired after it is reported broken? _____ weeks
6. Who do WMCs/communities contact in the event of a breakdown?
 - Chiefs Payam Admin Pump Mechanics County rural water
 - State rural water Other: _____

II. Accessibility of Spare Parts

1. Is there a supply chain of hand pump spare parts in your county? Yes No
2. Where did the spare parts come from? UNICEF State Ministry NGO Private Sector Other _____
3. Who is in charge of the supply chain of spare parts for the county? NGO, program Coordinators do for NGO drilled boreholes only _____ (list title/position)
4. How often does the county receive additional spare parts? _____ Months
5. What method is used to transport the spare parts to the broken hand pumps?
 - Government Vehicle Private Vehicle Public Transport Motorbike Bicycle Foot Other : _____
6. Are there any relevant spare parts or tools available in local markets within the county?
 - Parts: Yes No
 - Tools: Yes No
7. If there are no spare parts or tools available in local markets within the county, where is the nearest place to buy spare parts and tools?

III. Stock Management

1. Is there an inventory report or a record of what items the county has in stock? Yes No
2. Are records being kept of spare parts released to communities for repairs? Yes No
3. On average, how many requests for spare parts are received in a month? _____
4. Is the county able to meet the demand for spare parts? Yes No
5. Are Spare Parts free to communities that request them? Yes No
6. Is there a storage facility for hand pump spare parts in your county? Yes No

IV. Cost Sharing and Revenue Collection

1. Are there pump mechanics, who travel around the county and repair boreholes and water supply systems
 - a. Private hand pump mechanics? Yes No
 - b. Government employee? Yes, State Yes, County No
 - c. NGO Supported mechanics? Yes No
 - d. Others? _____
2. Do communities pay for the repairs? Yes No
3. What components of repair do communities pay for?
 - Just labor
 - Labor and transport
 - Labor, transport and spares
 - Other _____
4. Is a spare parts price list available i.e. from government or private sector? Yes No
5. Does the county water department collect any money within the county?

Charge:	Yes	No	Amount? ¹
Receive taxes from Water Management Committees?			
Fees for direct Water Usage?			
Fees for Spare Parts?			
Fees for Repairs?			

V. Why Supply Chains Break Down?

What are the biggest reasons hand pumps are not being fixed in these communities?

Write (1), (2), or (3) next to the list of reasons below.

- (1) = A very important reason why hand pumps are not being fixed
- (2) = A reason why hand pumps are not being fixed
- (3) = Not important/not relevant reason why hand pumps are not being fixed

So for example, if “Spare parts not available locally” is a very important reason as to why hand pumps are not being fixed in this county, write (1) in the space provided. If “Lack of trained mechanics” is a reason

¹ This could vary widely – big repairs versus small repairs, tool kits versus individual chains – but fill in any concrete amounts named. Use the notes section if there is a complex system needing more explanation.

why handpumps are not being repaired in this county, but is not as important as the availability of spare parts, then write (2) in the space provided.

- Spare Parts not available locally
- Lack of Trained Mechanics
- Communities unwilling to raise funds/pay for repairs
- Affordability
- Communities do not show initiative to take ownership of water points and repair
- Lack of adequate transportation
- Lack of secure warehouse
- Lack of trained staff
- Other _____

Additional Notes:

Annex 3.3 : Summary & Details – Results of a Survey of NGOs Supply Chain of Spare Parts for Sustainability of Handpumps in South Sudan

5. Background

This survey was one of two surveys initiated by the Technical Working Group (TWG), a sub-group of the WASH Cluster agencies in South Sudan. The purpose of both the surveys was to gain a better understanding of the perceived crises of shortage of spare parts leading to a high number of non-functional handpumps

In this particular survey, NGOs working in the WASH sector in South Sudan were requested to response to a questionnaire, which is attached as **NGO Survey Questionnaire**. The questionnaires were completed between May and August 2011, after which the responses were compiled in MS Excel by the TWG.

The analysis of the survey is based on the above data compilation provided by the TWG. A similar analysis has been also done for the other survey, where the respondents to a similar questionnaire were County level government authorities concerned with provision of rural drinking water supply.

6. Scope and Respondents

As shown in Table 16, below, responses were received from 18 NGOs working in 7 States of South Sudan. There were a total of 21 responses, multiple responses coming from NGOs working in more than one State. The data analysis is, therefore, based on these 21 responses.

Table 16 Responding NGOs and States

States		Responding NGOs	
1.	CE	1.	ACF-USA
2.	Jonglei	2.	ARC
3.	Lakes	3.	CAFOD
4.	Northern Bahr-el-Ghazal	4.	Community Action Water Project
5.	Upper Nile	5.	GIZ-DETA
6.	Warrap	6.	GOAL
7.	WE	7.	Intersos
		8.	IOM
		9.	NCA
		10.	NCDA
		11.	PAH
		12.	RUWASA
		13.	Solidarites
		14.	SUHA
		15.	Tearfund
			Water Harvest International
		16.	International
		17.	World Vision
		18.	ZOA Refugee CARE

7. Main areas of Query

As mentioned earlier, the questionnaire is attached in **NGO Survey Questionnaire**. There were six main areas of query in the survey. These were:

1. NGO Programs
2. System Management
3. Cost Sharing and Revenue Collection
4. Support from State / County Authorities
5. Procurement / Accessing Spare Parts
6. Why Supply Chains Breakdown

8. Summary of Results & Interpretations (in italics)

Detailed data tables and their analysis of the survey results have been presented in Section 5, of this report. An abbreviated form of the analysis and interpretations of each of the six main areas of query have been provided below.

4.1 NGO Programs

Involved in WASH supply chain projects? 16 NGOs – Yes, 5 - No

Involved in handpump rehabilitation programs? 21 NGOs – Yes

Table 17 Water Supply related Activities of Responding NGOs

Activity	Drilling	Rehab	Repair	Training	Spares	Stores	Monitoring	Supply Chain	No Response
Responding NGOs	2	5	2	7	4	1	1	1	5

A very ambiguous set of questions

What are supply chain projects? Projects which need supplies? Projects with the objective of making supplies available more efficiently? Projects which come across supply related problems, foreseen or not, and then try to solve these problems?

At one point 16 NGOs said “Yes” to involvement to supply chain projects and later only 1 responded positively, listing it as an activity. Similar problem with Rehabilitation – All 21 said “Yes” at one point and then only 5 listed it as an activity.

4.2 System Management

- 86% trained pump mechanics.

The questionnaire clearly said: “A pump mechanic is someone able to perform all maintenance needs associated with a handpump i.e. not a caretaker who is likely to perform only preventative maintenance and very simple repairs”.

Did NGOs train Pump Mechanics on such a large scale, given the fact that there are many existing mechanics at County and Payam levels? Mechanics training is usually a longer and more complicated process, requiring a high level of technical capability and resources.

- 14% DID NOT train pump mechanics.
- 10% made the distinction between Caretakers training and Pump mechanics training.
- 62% felt that mechanics could earn their livelihood HP maintenance, 29% did not.

There is inconsistency in the positive response from the 62% respondents, who felt that pump maintenance could provide a livelihood. A majority of mechanics were volunteers at Payam level, trained since the war period of the mid-1990s and onwards. They were dependent on what the client-communities give them as labour charges in cash or kind. Some Counties had guidelines for “community cost sharing” or contributions to the volunteer-mechanics, and these were not large sums, of the order of SSP 100 - 200, sometimes less.

- **Who were Water Committees trained to pass on information for repair needs?** Pump Mechanics - 62% respondents, County Rural Water authorities - 48%.

4.3 Cost Sharing and Revenue Collection

- 57% trained communities to collect regular water usage fees. 33% said this was on an “as needed” basis, and 1 respondent replied a categorical “No”.
Did this mean that the 43% NGOs did not have collection of fees on their training agenda?
- 90%: Water Management Committees were not taxed by State or County.
Why/ where did the question of “taxation” arise?
- Only one respondent said that Water Management Committees WERE taxed by the county.
- “...communities were accustomed to contributing anything for handpumps...?” 33% “Regular Water Usage Fees”, 5% “Collection on “as-needed basis” , 52% “Not trained to collect funds”
- **Type of contribution made:** 33% “Cash”, 38% “Kind”, 19% “Both”.
The responses to this group of questions throw up a number of issues, because of ambiguities or interpretations. A total of 90% for contributions being made in Cash, Kind or both, was not consistent with only 33% positive for “Are communities accustomed to contributing anything...”
Conflicting responses when the data in this group was looked at as a whole.

4.4 Support from State / County Authorities

- **What do County governments provide?”** A high “lack of response” (between 90% to 57%) to this and its subsidiary questions were surprising.
- Only 19% positive responses to **whether the County provides spare parts.**
- An even higher degree of lack of response (90%- 67%) for **“What do State governments provide?”**.
- **Whether services are provided free:**, 38% Yes, 43% No
Payment for service was an accepted practice.
- On whether Counties received spare parts from the State or not, had 33% (7) positive responses and 62% (13) negative, again heavily emphasizing the opinion that most Counties DID NOT receive spare parts from the State.
The above responses represent a very strong negative perception among NGOs of the States’ and Counties’ roles in the provision of spare parts.
Communities paid for services.

4.5 Procurement / Accessing Spare Parts

- **“Where do communities... procure spare parts?”** : “No system in place” 33%, “Your NGO” 24%, “Other NGOs” 19%, Govt. 14%, 5% for “Local hardware business” - Western Equatoria.
This would appear consistent with the modus operandi of most NGOs who source their own spares.
- **“Where does your organization procure spare parts?”** East Africa 67%, “in country” 33%, “Free from UNICEF” 29%.
East Africa (both Kampala and Nairobi were definitely major sources of spare parts for handpumps for NGOs.
- **Are spares available at state level?** 33% Yes, 52% No
Yet the State Govt. was the major source for Counties!
- On “... **your organization’s budget for spares annually...**” and on “**average cost of repair**”, the maximum, average, and minimum figures were:

Table 18 NGO budgets for Spare Parts & Cost of Repairs

	Max	Average	Min
Organization’s annual budget for spares (Doubtful data from 1 response has been disregarded, 667,071 reported by from ARC, Central Equatoria).	150,000	47,462	1,000
Average cost of repair of a handpump (inclusive of staff and support)?	3,000	1,101	100

As per the questionnaire, the budget and repair cost estimate figures were to be reported in US Dollars. Hence, an average budget of a little less than USD 50,000 per annum per NGO reporting (14) does represent a substantial resource base for spare parts alone, USD 700,000. Could there be an error?

Similarly, when the cost of a new borehole with pump is of the order of USD 13,000 – 15,000, the maximum and average repair cost figures of USD 3000 and USD 1101, respectively, appear to be high. Unless the question has not been properly addressed by the respondents.

4.6 Why Supply Chains Breakdown

8 alternatives were provided to be ranked on a scale of 1 to 8.

- Rank 1: “**Spare parts not available locally**”, 62% responses.
- Rank 2: “**Problems related to Accessibility**”, the second- most frequent response, ranked 2 with 24 responses.
- Rank 3: “**Communities unwilling to raise funds/pay for repair**” and “**Lack of trained mechanics**” were jointly ranked third, with 19% and 14%, respectively.

To the question: **What are the main obstacles, ... preventing a suitable spares supply chain?** Availability/ Cost (71%) were the most disruptive, followed by Market forces (52%), Lack of Ownership (33%).

5. Detailed Analysis and Interpretation of Survey Results:

The survey data on each of the six main areas of query have been tabulated and are presented below.

5.1 NGO Programs

Table 19 Results of responses to questions on NGO Programs

		Yes	No	No Response
1.1	Is your NGO implementing WASH spares supply programs?	16	5	
1.2	Describe:	Refer Annex 2		
1.3	Does your NGO have handpump rehabilitation program?	21		
1.4	If yes, what methodology do you apply?	Directly with NGO staff	6	15
		Directly with trained/re-trained VPM	12	9
		Using existing VPMs	10	11
		Government structures	5	16
		Private Sector	4	17

16 NGO responded that they are implementing WASH spares parts supply programs. 5 said that they were not.

The detailed description of activities is provided in **Annex 2 NGO Survey: Water Supply Activities of responding NGOs** and is summarized below:

Table 20 Summary of Water Supply related Activities of Responding NGOs

Activity	Drilling	Rehab	Repair	Training	Spares	Stores	Monitoring	Supply Chain	No Response
Responding NGOs	2	5	2	7	4	1	1	1	5

All 21 NGO said that had handpump rehabilitation programs.

To the question of the most common methodology applied, the responses were:

- 12: Directly with trained/re-trained PM, followed by

- 10: Using existing PMs,
- 6: Directly with NGO staff,
- 5: Government structures
- 4: Private Sector

There were cases of multiple responses, e.g., an NGO could be engaged in a number of activities simultaneously or be following multiple methodologies.

Table 21 Detailed Water Supply related Activities of Responding NGOs

State	County	NGO/Agency	Activities	No Response	Drilling	Rehab	Repair	Training	Spares	Store	Monitoring	Supply Chain
CEQ	1	Water Harvest International	Drilling		1							
CEQ	1	GIZ-DETA	Repair & Rehab			1	1					
CEQ	2	SUHA	Spares & Training					1	1			
CEQ	2	ARC	Nothing									
CEQ	7	Community Action Water Project	Water Supply			1	1					
CEQ	Lainya	ZOA Refugee CARE	Repair & Rehab									
Jonglei	4	PAH	Store, spare parts, monitoring maintenance, training					1		1	1	
Jonglei	Fangak	Solidarites		1								
Jonglei	Wuror	Tearfund	Training after drilling		1			1				
Lakes	9	RUWASA		1								
NBG	Aweil East & Centre	Tearfund	Rehab			1						
Upper N	Maban & Longechuk			1								
Upper N	Manyo & Fashoda	Tearfund		1								
Upper N	Nasir and Ulang	NCUDA	Rehab, training			1		1				
Warrap	1	GOAL	Training					1				
Warrap	All	IOM	Training, Spares, rehab.			1		1	1			
Warrap	Gogrial West	NCA	Spares						1			
Warrap	Twic	ACF-USA	Supply chain establishment									1
WEQ	2	World Vision	Procuring Spares									
WEQ	5	Intersos	Spares, Training					1	1			
WEQ	6	CAFOD		1								
Totals				5	2	5	2	7	4	1	1	1

5.2 System Management

Table 22 Results of responses to questions on System Management

		Yes	No	No Response
2.1	Do you train Pump Mechanics?	18	3	
2.2	If not, why not?	Refer Notes below		
2.3	Are the mechanics able to earn a livelihood?	13	6	2
2.4	Do you train water management committees?	19		2
2.5	Who does your agency teach communities to report handpump breakdowns to?	Chiefs	5	16
		Payam Administration	6	15
		Pump Mechanics	13	8
		County Rural Water	10	11
		State Rural Water	2	19
		Other	1 response: to NGO -CEQ/ Water Harvest International	

- 18 respondents trained pump mechanics.
There is a clear misinterpretation of this question by the respondents. The questionnaire (NGO Survey Questionnaire) clearly said: "A pump mechanic is someone able to perform all maintenance needs associated with a handpump i.e. not a caretaker who is likely to perform only preventative maintenance and very simple repairs".

Did NGOs train Pump Mechanics on such a large scale, given the fact that there are many existing mechanics at County and Payam levels? Mechanics training is usually a longer and more complicated process, requiring a high level of technical capability and resources.
- 3 respondents said that they DID NOT train pump mechanics. Two respondents made the distinction between Caretakers training and Pump mechanics training.

Table 23 Reasons for not training pump mechanics

State	NGO	Comment
CEQ	GIZ-DETA	Not in project.
WEQ	Intersos	Only care takers for minor maintenance. There are already many trained Pump Mechanics in the State. Most needed is management of the hand pump.
WEQ	CAFOD	Dilemma, only really caretaker as not VLDM.

- 13 respondents felt that mechanics could earn a livelihood from this profession and 6 did not.
The positive response from the 13 respondent does not match field observations. A majority of mechanics were volunteers at Payam level, trained since the war period of the mid-1990s and onwards. They were dependent on what the client-communities gave them as labour charges in cash or kind. Some Counties had guidelines for "community cost sharing" or contributions to the volunteer-mechanics, and these are not large sums, of the order of SSP 100 - 200, sometimes less.
- Pump Mechanics (13 respondents) followed by County Rural Water authorities (10) were the most common points where community passed on information for repair needs.

5.3 Cost Sharing and Revenue Collection

Table 24 Results of responses to questions on Cost Sharing and Revenue Collection

					Regular Water Usage Fees	Collection "as-needed" basis	Not trained to collect funds	No response
3.1	Does your NGO train communities to collect funds?				12	7	1	1
					Yes	No	Varies	No Response
3.2	Are WMCs taxed by state government?		19		2			
3.3	Are WMCs taxed by county government?	1	18		2			
3.4	Do you provide spare parts for free?	14	5		2			
3.5	Are communities accustomed to contributing anything for handpumps?	7	1	11	2			
					Cash	Kind	Both	No response
3.6	What is the type of contribution?				7	8	4	2

- On the matter of training communities to collect water usage fees, 12 respondents said that did train communities to collect regular water usage fees, 7 said this was on an “as needed” basis (*which meant that they do not have collection of fees on their training agenda?*), and 1 respondent has said replied a categorical “No”.
- 19 and 18 respondents, respectively, have replied that Water Management Committees are not taxed by either state or county governments.
- Community Action Water Project, from Central Equatoria was the one NGO who has said that Water Management Committees ARE taxed by county governments.
- 7 responses were for “**Regular Water Usage Fees**”, 1 for “**Collection as-needed basis**” and 11 for “**Not trained to collect funds**” for the question on whether “... communities accustomed to contributing anything for handpumps...”
- To the question on **the type of contribution**, 7 responses were “Cash”, 8 were for “Kind” and 4 for “Both”.

The responses to this group of questions throws up a number of issues, some of which could be due to ambiguities or interpretations and some are inconsistencies.

12 positive responses to training against 7 positive responses for actual practice of regular collections indicate a low rate of conversion to practice.

A total of 19 responses of contributions being made in Cash, Kind or both were not consistent with only 7 positive responses to “Are communities accustomed to contributing anything...”

Table 25 is a tabulation of responses to all the subsidiary questions on Cost Sharing and Revenue Collection and looks at this data group as a whole.

Table 25 All Responses to questions on Cost Sharing and Revenue Collection

Sl. No. in Data Sheet	State	NGO/Agency	Cost Sharing and Revenue Collection					
			3.1 Does your NGO train communities to collect funds?	3.2 Are WMCs taxed by state government?	3.3 Are WMCs taxed by county government?	3.4 Do you provide spare parts for free?	3.5 Are communities accustomed to contributing anything for handpumps?	3.6 What is the type of contribution?
1.	CEQ	Water Harvest International	Not trained to collect funds	No	No	No	Varies	In-Kind
2.	CEQ	GIZ-DETA	Regular Water Usage Fees	No	No	Yes	Yes	Cash
3.	CEQ	SUHA	Regular Water Usage Fees	No	No	Yes	Varies	Cash
4.	CEQ	ARC	Collect on "as-needed" basis				Varies	In-Kind
5.	CEQ	Community Action Water Project	Regular Water Usage Fees	No	Yes	No		In-Kind
6.	CEQ	ZOA Refugee CARE	Regular Water Usage Fees	No	No	No		Cash
7.	Jonglei	PAH	Collect on "as-needed" basis	No	No	Yes	Yes	Both
8.	Jonglei	Solidarites	other	No	No	Yes	Varies	Cash
9.	Jonglei	Tearfund	Regular Water Usage Fees	No	No	Yes	No	
10.	Lakes	RUWASA	Regular Water Usage Fees	No	No		Varies	Both
11.	NBG	Tearfund	Regular Water Usage Fees	No	No	Yes	Varies	In-Kind
12.	Upper N		Collect on "as-needed" basis	No	No	Yes	Varies	Cash
13.	Upper N	Tearfund	Collect on "as-needed" basis	No	No	Yes	Yes	In-Kind
14.	Upper N	NCDA	Collect on "as-needed" basis	No	No	Yes	Varies	In-Kind
15.	Warrap	GOAL	Collection "as-needed" basis	No	No	Yes	Yes	Both
16.	Warrap	IOM	Regular Water Usage Fees	No	No	Yes	Yes	Both
17.	Warrap	NCA	Regular Water Usage Fees	No	No	Yes	Yes	In-Kind
18.	Warrap	ACF-USA	Collect on "as-needed" basis	No	No	No	Yes	In-Kind
19.	WEQ	World Vision	Regular Water Usage Fees			Yes	Varies	
20.	WEQ	Intersos	Regular Water Usage Fees	No	No	No	Varies	Cash
21.	WEQ	CAFOD	Regular Water Usage Fees	No	No	Yes	Varies	Cash

When this data group is looked at as a whole a few questions arise. The data cells high-lighted above indicate potential contradictions and inconsistencies.

- Sl. No. 1: The community was “not trained to collect funds”, which does not pose a problem in itself. Spare parts are NOT provided free. Yet contributions are “in kind”.

- Sl. No. 5: “Regular Water Usage Fees” collection, the only one responding “Yes” to “...taxed by county ...” spare parts are NOT provided free, yet contributions are “In kind”.
How are spares paid for? What happens to the contributions?
- Sl. No. 6: “Regular Water Usage Fees” collection, spare parts are NOT provided free, contributions are “Cash”, but there is no response against “Are communities accustomed to contributing anything...”
- Sl. No. 11: “Regular Water Usage Fees” collection, but contributions are “In kind”.
- Sl. No. 17: Same situation as in Sl. No. 11. *Regular fees in kind?*
- Sl. No. 18: This data line states that Collection of Funds is “as needed”, spare parts are NOT provided free. Yet contributions are “in kind”. Then how are spares paid for?
Responses of “...not trained to collect funds...” and “collect on as needed basis” were not consistent with “...paying for spare parts...” and “in kind”.
A number of cases of “regular user contribution” did not match corresponding responses of payment “in kind”.

5.4 Support from State / County Authorities

Table 26 Results of responses to questions on support from state / county authorities

			Yes	No	No Response
4.1	What do County governments provide?	Spare Parts	4		17
		Pump Mechanics	9		12
		Storage	7		14
		Other	3		19
		Nothing			
4.2	What do State governments provide?	Spare Parts	7		14
		Pump Mechanics	5		16
		Storage	5		16
		Other	4		17
		Nothing	2		19
4.3	Are services free or do they charge?	8	9	4	
4.4	Do all counties receive parts from the state level?	7	13	1	

The high proportion of “lack of response” (ranging between 19 to 12) to the main question of “What do County governments provide?” and its subsidiary questions are surprising, except (relatively) on the matter of whether the County provides Pump Mechanics. Of special concern is that there are only 4 positive responses to whether the County provides spare parts.

- An even higher degree of lack of response (ranging between 19 to 14) was recorded for the next main question of “What do State governments provide?”
- The level of positive response to provision of spare parts was 7, but other positive responses were 5 or lower.

Whether spare parts are provided free or not, has elicited 8 positive and 9 negative responses, which means payment (not necessarily for spare parts) was a common occurrence.

On whether Counties received spare parts from the State or not, had 7 positive responses and 13 negative, again heavily emphasizing the opinion that most Counties DID NOT receive spare parts from the State.

Can the above responses be taken at face value? Because they do represent a very strong negative perception among NGOs of the States’ and Counties’ role in the provision of spare parts.

5.5 Procurement / Accessing Spare Parts

Table 27 Results of responses to questions on procurement / accessing spare parts

			Yes	No	No Response
5.1	Where do communities you work in procure spare parts?	Government	3		18
		Your NGO	5		16
		Other NGOs	4		17
		No system in place	7		14
		Local hardware business	1		20

			Yes	No	No Response
		Other*	1	Refer notes below	
5.2	Where does your organization procure spare parts?	Procure In-Country	7		14
		Procure from East African Region	14		7
		Free from UNICEF	6		15
		Other**	1	Refer notes below	
5.3	Are spares available at state level?	7	11	3	
			Max	Average	Min
5.4	What is your organizations budget for spares annually? (Doubtful data from 1 response disregarded).		150,000	47,462	1,000
5.5	On average how much does it to repair one handpump (inclusive of staff and support)?		3,000	1,101	100

*Neighboring Counties e.g. Moyo (from Central Equatoria, Community Action Water Project)

**Duba Tropic from Belgium, (from Jonglei, Polish Humanitarian Assistance)

The response to “Where do communities you work in procure spare parts?” was dominated by “No system in place” (7), followed by “Your NGO” (5) and “Other NGOs” (4). Govt. rated low as a source (3) and only one response was given against “Local hardware business” which was from CAFOD in Western Equatoria. Also, there was a single response to “Others” coming from Community Action Water Project, Central Equatoria, which said that spares come from an adjoining County.

This is consistent with the modus operandi of most NGOs who source their own spares.

Procurement from local hardware business in Western Equatoria by CAFOD needs further information.

The response to “Where does your organization procure spare parts?” was dominated by procurement from East Africa (14), followed by “in country” (7) and “Free from UNICEF” (6). The single response under “Others” came from Polish Humanitarian Assistance, Jonglei, who procured Duba handpump parts from Belgium.

East Africa (both Kampala and Nairobi) were definitely major sources of spare parts for handpumps for NGOs.

The responses to “Are spares available at state level?” were: 7 Yes, 11 No, 3 No response.

Yet the State Govt. was the major source for Counties!

On “... your organizations budget for spares annually...” and “...on average how much does it cost to repair one handpump...” the maximum, average, and minimum figures were:

Table 28 NGO budgets for spare parts & cost of repairs

	Max	Average	Min
Organization’s annual budget for spares (Doubtful data from 1 response disregarded, 667071 reported by from ARC, Central Equatoria).	150,000	47,462	1,000
Average cost of repair of a handpump (inclusive of staff and support)?	3,000	1,101	100

As per the questionnaire, the budget and cost estimate figures were to be reported in US Dollars. Hence, an average budget of a little less than USD 50,000 per annum per NGO reporting (14) does represent a substantial resource base for spare parts alone, USD 700,000. Could there be an error?

Further, when the cost of a new borehole with pump is of the order of US\$ 13,000 – 15,000, the maximum and average repair cost figures of US\$ 3000 and USD 1,101 appears to be high. Unless the question has not been properly addressed.

5.6 Why Supply Chains Breakdown

5.1	What are the biggest reasons hand pumps are not being fixed in these communities? (Overall Rank)
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For judging reasons why supply chains fail against a set 8 alternatives, each of these alternatives were ranked on a scale of 1 to 8 (1 = Most significant, 8 = Least significant.). The results are given in Table 29.

Table 29 Results of responses to questions on why supply chains breakdown

			Ranking on scale of 1 to 8 (1 = Most significant, 8 = Least significant.)								Check Totals	
			1	2	3	4	5	6	7	8		No Response
6.1	What are the biggest reasons handpumps break down in these communities?	Spare parts not available locally	13	1	2	1		1			3	21
		Accessibility		5	2	4	3		1		6	21
		Communities unwilling to raise funds/pay for repair	2	2	4		2	3	1	1	6	21
		Lack of trained mechanics	2	1	3	2	2	2	3		6	21
		Transportation of parts to rural field locations		4	1	7	1	1		1	6	21
		Affordability		4	2	1	4	3	1	1	5	21
		Communities do not show initiative to take ownership	2	1	2			2	4	3	7	21
		Debris requires sophisticated tools	1				1	1	3	7	8	21
		Other reasons*										

* Other reasons

State	NGO	Reason
Lakes	RUWASA	Insecurity
WEQ	CAFOD	IMII handpump is difficult to maintain and requires high support
Warrap	GOAL	Minimal or no support from County RWD owing to limited logistical support. No RWD at Payam or Boma, all at county

- “Spare parts not available locally” was the most frequent response, ranked 1 with 13 responses.
- “Problems related to Accessibility”, the second- most frequent response, ranked 2 with 5 responses.
- “Communities unwilling to raise funds/pay for repair” was the third- most frequent response, ranked 3 with 4 responses.
- “Lack of trained mechanics” was also the third- most frequent response, ranked 3 with 3 responses.
- “Transportation of parts to rural field locations” was the fourth level of problems with 7 responses.
- “Affordability” (5th rank with 4 responses and 6th rank with 3 responses), “Lack of Community Ownership” (7th rank with 4 responses), “Need for sophisticated Tools ... “ (8th rank with 7 responses) were the other reasons, respectively, in decreasing order of priority.
- Insecurity (in Lakes State), India Mark II pumps being difficult to maintain and lack of support from County level were the “Other” reasons provided.
- The range on “No responses” varied from 3 to 8 respondents, against each of the above problems.

The last question of the section on **Why Supply Chains Breakdown** was:

“What are the main obstacles, in your opinion, preventing a suitable spares supply chain?”

This question elicited descriptive responses which were firstly sorted into 22 problems (First Categorization) and then further grouped together in to a Second Categorization of 10 problems. The results of this analysis are given in Tables 30 and 31.

Table 30 First & Second Categorization of responses to main obstacles to a supply chain

Sl. No.	Responses to 6.2 – First Categorization	Second Categorization	No. of Responses
1.	Imported spares require centralization and resources. Not easy to obtain, expensive	Availability/ Cost	3
2.	No spares in-country/ No information where they can be found	Availability/ Cost	9
3.	High cost of Spares	Availability/ Cost	3
4.	Lack of institutional capacity	Capacity	2
5.	Lack of trained Mechanics	Capacity	1
7.	Poor mgmt, poor financial mgmt.	Capacity	1
8.	No reliable information	Data	1
9.	Lack of government/ state support and services	Govt. role	4
10.	No Govt. involvement in supply of spares	Govt. role	2
11.	Lack of infrastructure (communication, phones)	Infrastructure	4
12.	Difficult physical access	Infrastructure	7
13.	Volunteer mentality. Not market oriented.	Market forces	1
14.	Lack of initiatives for/ absence of supply chain	Market forces	2
15.	No support to encourage Private sector	Market forces	2
16.	Clear division between "payroll" and "volunteer" mechanics	Type of Mechanics	2
17.	Lack of Community ownership	Ownership	3
18.	Communities unwilling to pay / Irregular payment	Ownership	2
19.	Dependency	Ownership	1
20.	No effective cost sharing	Ownership	1
21.	No policy on "no free spares"	Policy	3
22.	Technology choice/ options	Technology Choice	1

Table 31 Second Categorization of responses to main obstacles to a supply chain

Sl. No.	Number of Respondents	21
Second Categorization of Problem Areas		
1.	Availability/ Cost	15
2.	Market forces	11
3.	Ownership	7
4.	Infrastructure	6
5.	Capacity	4
6.	Policy	3
7.	Govt. role	2
8.	Type of Mechanics	2
9.	Data	1
10.	Technology Choice	1

In Table 30 showing the second level of categorization, Availability/ Cost (15 responses) is the most disruptive reason for a malfunctioning Supply Chain. This is followed by Market forces (11), Lack of Ownership (7), Infrastructure (6), Capacity (4). Other reasons with lesser responses were Govt. role and Type of Mechanics (2 each) and Data and Technology Choice (1 each).

NGO Survey Questionnaire**Supply Chain/Spare Parts/Sustainability
NGO Surveys****Guidance Notes for Survey Completion:**

- This survey is to be completed by individual NGOs
- Ideally it will be completed by senior technical management accompanied with input from technical field staff
- The aim of the survey is to understand what effect NGO programs are having on the spare parts supply chain
- It also offers NGOs the opportunity to openly comment on spare parts supply and where they feel critical issues lie

Name of NGO _____

International _____ (optional)

State: _____ (one survey form for each state you work in)

Counties: _____ (list all counties you work in)

Respondent: _____ Signature _____

Date: _____

I. NGO Programs

1. Is your NGO implementing any WASH supply chain projects? Yes No
If yes, briefly describe what your supply chain project involves:

2. Does your NGO have a handpump rehabilitation or repair program? Yes No

3. What methodology do you employ for handpump rehabilitations?

- Rehabilitate directly with own NGO staff
- Rehabilitate directly but training/refreshing village pump mechanics
- Rehabilitate using existing village pump mechanics
- Mobilize government structures to rehabilitate
- Sub-contract the work to private sector
- Other: _____

II. System Management

1. Does your NGO train Pump Mechanics?² Yes No

2. If not, why not? _____

3. Are the mechanics you've trained able to earn a livelihood from repairing hand pumps? Yes No

4. Does your NGO train Water Management Committees (WMC)? Yes No

5. Who does your agency train WMCs to report hand pump breakdowns to?

² A pump mechanic is someone able to perform all maintenance needs associated with a handpump i.e. not a caretaker who is likely to perform only preventative maintenance and very simple repairs

- Chiefs Payam Admin Pump Mechanics
 County rural water State rural water Other: _____

III. Cost Sharing and Revenue Collection

1. Does your NGO train WMCs to collect funds from the community?
 - Regular Water Usage Fees Collecting on an "as-needed" basis.
 - Not trained to collect funds Other: _____
2. Are WMCs taxed by the state government? Yes No
- 3.
4. Are WMCs taxed by the county government? Yes No
5. Do you provide spare parts for free? Yes No
 - Do not provide spares
6. Are communities accustomed to contributing Yes No
7. anything for hand pumps/water systems? Varies across state
8. What is the contribution for the services? Cash In-Kind

IV. Support from State / County Authorities

1. What do the County governments provide?
 - Spare Parts
 - Pump Mechanics
 - Storage
 - Other: _____
2. What does the State government provide?
 - Spare Parts
 - Pump Mechanics
 - Storage
 - Other: _____
3. Are services free or do they charge? Free Charge
4. Do all counties receive spares from the state level? Yes No

V. Procurement / Accessing Spare Parts

1. Where do communities you work in procure spare parts?
 - Government
 - Your NGO
 - Other NGOs
 - No system in place
 - Local hardware business
 - Other _____
2. Where does your organization procure spare parts?
 - Procure In-Country
 - Procure from East African Region
 - Free from UNICEF
 - Other _____
3. Are spare parts available at the state level? Yes No

- 4. What is your organization’s approximate overall budget for spare parts annually (inclusive of staff and support costs)? USD _____ (only enter supplies procured by your organization)
- 5. On average how much does it cost to repair one handpump (inclusive of staff and support costs)? USD _____

VI. Why Supply Chains Breakdown

- 1. What are the biggest reasons hand pumps are not being fixed in these communities? (rank all relevant options in order of importance, from most important (1), to least important)
 - 1. Spare Parts not available locally
 - 2. Communities do not show initiative to take ownership of water points and repair
 - 3. Lack of Trained Mechanics
 - 4. Accessibility
 - 5. Transportation of parts to rural field locations
 - 6. Communities unwilling to raise funds/pay for repairs
 - 7. Affordability
 - 8. Debris in the well requiring sophisticated tools
 - 9. Other _____
- 2. What do you think are the main obstacles preventing a WASH supply chain of operating effectively in this county? Please be specific.

Annex 4: Summaries of Field Trip Reports to the States of Western Equatoria, Warrap, Northern Bahr-el Ghazal and Eastern Equatoria

Report on Field visits to Western Equatoria, 16 – 22 Feb, 2012 Schedule of meetings and visits

Sl. No.	Dates	Place	Event	Purpose
1.	16-18 Feb.	Yambio	Biannual Coordination Meeting of WASH Sector Agencies	Familiarization, Group discussion on Maintenance Management (Ref: Table 33).
2.	19 Feb.	Yambio	Discussions with Asteway Yigezu, WASH Officer, World Vision	Data on Tambura County (Table 34 & 35).
3.	19 Feb.	Yambio	Discussions with Dennis Igua, WASH Officer, Tear Fund, Juba	Tear Fund's water supply program in South Sudan
4.	20 Feb.	Yambio	Visit to Handpumps in Yambio Town at – Yambio Open Market – Hai Abegyou	Discussion with users. Understanding how water vendors operate and how pumps are maintained.
5.	20 Feb.	Nzara County	Visit to Nzara County Meetings with: – County WASH Inspector – County Commissioner Visits to 3 handpump sites	Overview of water supply situation in Nzara County. (Table 36, 37 & 38). Discussion on O&M with users.
6.	21 Feb.	Yambio	Meetings with: Intersos, CAFOD, UNICEF	WASH activities of Intersos, CAFOD UNICEF
			Discussions with two hardware shops in Yambio market	Availability of handpump spare parts.
7.	21 - 22 Feb.	Yambio	Meetings with Dy. Dir, DRWSS	Information on – State level Water Supply data (Table 39 & 40). – O&M Data at State Level (Table 41 & 42). – Reporting of O&M from Counties (Table 43). – Cost Sharing Guidelines for Spare Parts (Table 44). – Availability of Spare Parts & Inventory (Table 45). – Spare parts distribution plans (Table 46).
8.	22 Feb.	Makpandu & Yambio Road	Visit to Makpandu Refugee Camp	Understanding the water supply and O&M situations (Table 47).
			Visit to Handpumps at : – Nangere Road IDP Camp – Bazmgwa Primary School	Conditions of installations. Discussion with users on O&M.
9.		Nagero County		Data collected by Intersos
10.	23 Feb.		Travel: Yambio - Juba	

Brief Notes and Conclusion

The consultant's field visits in Western Equatoria were coordinated by Intersos. Wesley Sigei, WASH Adviser, Winrock BRIDGE, Juba and Henry Bernado, WASH Officer, Intersos, Yambio accompanied the consultant during most of the meetings and visits. A summary of the events of the field trip are describes below, in the chronological order that they occurred.

16-18 Feb: Biannual Coordination Meeting of WASH Sector agencies at Yambio.

Very little hard information was provided on total numbers of water sources by territorial units (State-wise or County-wise), distribution and functionality status of such water sources, population provided with access to water and service level, or the changes brought about in any of these parameters during the past year (except for Lakes and NBG States).

The consultant was requested to serve as a resource person to a group discussion on maintenance and spare parts. The issues identified were:

- Collection of reliable data on water sources and their functionality from the states and management of this information.
- Flow and consolidation of maintenance data from Payam PMs to Counties to State and Country levels.
- Management and interpretation of this data for understanding maintenance work loads, improving functionality and impacting sustainability.
- Identification and accreditation of PMs.
- Supply chain management.
- Revenue management – Community contributions, cost sharing.
- Contradictions/ transition/ harmonization between emergency and development.
- Establishing community level ownership of water sources.

19 Feb: Discussions with World Vision at Yambio - Data on Tambura County

- World Vision worked in 3 Payams (Mupoi, Source Yubu and Tambura) of Tambura County, W Equatoria, which had a total of 48 handpumps of which 24 were functional, (therefore, functionality was 50%). These three Payams had a total population of 55,365 persons [Source: 5th Housing and Population Census (2009)], making the Population-to-pump ratio (Service level) = 1,153 persons/ pump if all pumps were working (and 2,206 with 50% functionality).

Discussions with Tear Fund - TF's water supply program in South Sudan

- Tear Fund (TF) operate in two Counties of Northern Bahr-el-Ghazal and have a small rehabilitation project in Upper Nile. The WASH component had drilling of new wells, rehabilitation of existing wells, roof water harvesting and protect ted hand dug wells. Handpump supplies for rehabilitation came from Kenya.

20 Feb: Visits to Handpumps in Yambio Town

- Three handpumps were visited.
- The first pump was a public handpump, in Yambio market, virtually monopolized by water vendors, for which they paid no charge. Presently, it was functioning well and was maintained by the RWSS, at no cost.
- Two adjoining handpumps at Hai Abegyou, Yambio, both privately owned, by the same owner. The two pumps were exclusively used by fixed groups of vendors (19+12) for which

they paid 75 SSP per month per vendor to the owner, and 30 SSP to RWSS for maintenance services and spare parts.



Handpumps at Yambio Market (left) and Hai Abegyou (right)

20 Feb. Nzara County, W Equatoria

- The County had 81 handpumps of which 58 were functioning (Functionality = 72%), and a population of 252,509, making the service level = 3,117 persons/ pump.
- There were alternate water sources, unsafe, like streams and springs.
- Regular monthly and annual reports were made to the State, with site-by-site details of maintenance carried out.
- Lack of spare parts was the main problem. Within this, it was the lack of GI pipes, which were required in large numbers. Corrosion of pipes was reported to be a common problem.
- The State wanted a “cost sharing” contribution of SSP 1,000 for the current requirement of spare parts, for which the County had so far collected 850 SSP.

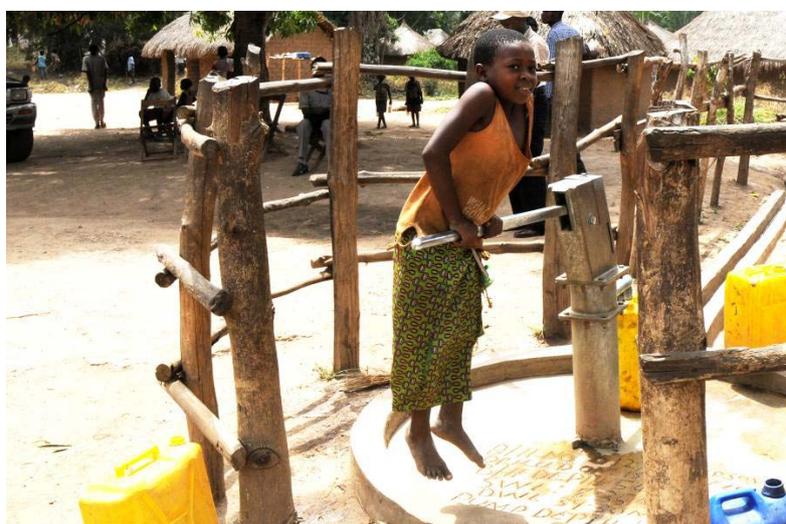
Visits to handpump sites in Nzara County

- Visits were made to three handpumps.
- While quality of construction was good, one of the three hand pumps visited was not an India Mark II. This handpump was clearly branded as “U2”. Though there were a great of similarities with the IM II, the U2 is a different pump.
This leads to the conclusion that client-NGOs were not familiar with specifications, contractors installed what was easily available and close to the IM II. It also indicated that field supervision and quality awareness was not very robust.
- The manual given to Caretakers did not have the complete description of preventive maintenance. The necessity of regular Leakage and Discharge Tests were not mentioned.
Hence, Caretakers were not equipped to judge when pumps were transitioning from “Functioning Well” to the “Poor Performance” stage. Hence Maintenance was being equated to Breakdown repair and Preventive maintenance was only partially and ineffectively practiced. However, the severity of this problem is can only be gauged, by examining training material across the country.
- The tool boxes given to Caretakers indicated an over-supply in terms of tools and spares requirements for minor maintenance.
For example, Cup Washers cannot be replaced by Caretakers, neither handle bearings. A flat file was not a tool necessary in a caretaker’s tool kit. This leads to a number of conclusions that have been discussed elsewhere. It was also a disincentive for users to look for local sources of spare parts.
- Borehole and Pump information was inscribed on two platforms and this was a very good idea.
But such information should be technically accurate. For example, the yield test could not

have been performed if $DWL=16.56$ m and Pump Depth =15.42 m. The pump would have been running dry .it should have also been consistent in the details provided. Also, the information recorded on the two platforms by the same contractor and same NGO should have been consistent.



Handpump platform inscription Nzara Official Residence (left) and Caretakers Tools at Hai Matara I (right), Nzara County



Handpump at Hai Matara I, Nzara County

21 Feb: Discussions with Intersos, CAFOD, UNICEF

- Both Intersos and CAFOD were involved in the usual water supply activities of BH drilling, rehabilitation, repair and training of Water Committees and Caretakers. CAFOD preferred not to do rehabilitation, because of branding disputes. Intersos was governed by the funding constraints and other conditionalities of its projects.
- UNICEF supported the drilling of boreholes through the State level RWSS Department, Ministry of Physical Infrastructure. It also provided spare parts through the central Ministry of Water and Irrigation.

21 Feb: Discussions with hardware shops of Yambio Market

- Two shops were visited. Both were aware of drilling and handpumps. From different perspectives they had arrived at the same conclusion – handpumps were a monopoly market which they could not enter. One store owner was aware of the handpump market in



Abisai & Sons, Market, Yambio

Kampala and had brought in one handpump for a private client, but did not see a business opportunity in handpump spare parts.

21-22 Feb: Meetings with RWSS, Yambio

State level Water Supply data for Western Equatoria

- The State reported that it has 1,101 handpumps.
- On the 974 handpumps with functionality information, 891 were working. Therefore, the overall functionality of handpumps is remarkably good – 91%.

However, this was not consistent with similar information from other sources, or information from within RWSS itself.

e.g.: World Vision reported 50% functionality in part of Tambura County.

The population figures also show wide variance (1.15 million above against 55,365 from W. Vision for the same Counties).

There was a substantial difference in the number of handpumps reported by the Directorate (974/ 1101) as against the report of O&M data at State level (778).

So there was a data reliability issue within the official records.

O&M Data at State Level

- A monthly report for Jan 2012 showed that a total of 77 repairs were done for all the Counties in the State. It gave County-wise details and quantities of different spares used. GI pipes were the most-used item.
- In this report one County reported 54 repairs but provided no details of spare parts used. On the other hand, in Dec 11, the same County's functionality record showed a total of 97 hand pumps with 93 working (96%). This was the case in three other Counties.

This is an indication that the absence of reports of repair events from the four Counties is equated to the lack of need for repairs.

It also calls to question the quality of reports and management oversight.

- The most frequent repairs were replacement of GI pipes, followed by Pump buckets and then Con. Rods, indicating that Below-ground major repairs were common. Perforation and corrosion of GI Pipes and pipe threads were reported to happen often, from a number of Counties. Yet the use of non-corrodible below-ground components had not been tried.

Awareness of technical options?



Reporting of O&M from Counties

- Detailed reports, on a weekly basis, were made from Counties to State.
- Yambio County's weekly report of Aug 11 showed 6 maintenance interventions, all of which

were below-ground repairs. One out of the 6 was not a break-down.

- Static water levels were not particularly deep.
- The need for deep cylinder installations for relatively high water tables needs further explanation.

Cost Sharing

- While the guidelines for cost recovery were perhaps a fraction of the actual cost, cost recovery for spare parts had been in practice for many years, though not uniformly applied in all Counties.
- Funds collected from communities from the cost sharing drive were not used for purchase of additional spare parts. These funds were reported to be used for purchasing construction materials for rehabilitation, and costs for repairs that had to be done free of costs like camps (army/ refugees/ returnees).

Availability of Spare Parts

An inventory showed that there were substantial stocks of tools and spare parts. Some of the items were obsolete.

Spare parts distribution plans

- With reference to the numbers of handpumps in each County, the pattern of spare parts distribution followed a rough relationship for some items and did not follow any relationship, in some other items (GI pipes).
- The need for GI pipes was seen in all Counties.

Did this mean that corrosion of pipes and damage to pipe threads was a problem across all Counties in the State? Was there any water quality data to substantiate this?

The need for Connecting Rods should have followed a pattern similar to that of GI Pipes, if corrosion was a problem. But this was not the case and a clear logic to this was not easily evident.



Spare Parts Store at DRWSS, Yambio

22 Feb: Visit to Makpandu Refugee Camp

- An NGO has managed this Camp from the start, about 4 years ago.
- The Camp currently had a population of about 5,300 Congolese refugees.
- Of the 12 handpumps in the Camp, 5 have a history of depleting and, therefore, cannot be

considered sustainable. On the other hand, closing down these sources does present difficulties.

- In one year, 2011, about 27 major repair interventions had occurred on these 12 handpumps.
- The Camp did not have the capacity and means to maintain its water sources.

How does one judge this situation vis-à-vis sustainability and movement away from an emergency situation? When should such a transition have started?

Visits to Handpumps along the Yambio - Maridi road

At the Nangra Road IDP camp, there was no Water Committee and no process in place for collecting community contributions for maintenance. Though rehabilitated in 2011, the workmanship was poor. The concrete was scoured and waste water was collecting in the platform. Maintenance was done by the Yambio County authorities free of cost.

The second pump was near the Bazmgwa Primary School and was well used. The pump and platform were in good condition. The bore hole was drilled in about 2000. There was no Water Committee. Labour charges were paid for the last repairs by door-to-door collections, with spare parts provided free by the County.

Data provided by Nagero County

Nagero County had 35 boreholes with handpumps of which 3 were not functioning, which made the functionality 91%. These figures were fairly close to the State's records (31 pumps, 26 working). 18 out of the 35 B/H needed repairs in 2011, i.e., the annual maintenance workload was 50% of the number of pumps.

Details of County, NGO and State participation in O&M, spare part used, and nature of payment for O&M by communities were clearly reported.

GI pipes were the most common spare part needed.

The County had small quantities some spare parts in stock.

It is possible to get a fairly clear picture of a County's water supply situation with handpumps, maintenance work load and capability and an overview of the use and stock of spare parts, without too much trouble. Perhaps, the relatively low number of pumps made it easy for the County to provide this information.

Report on Field visits to Warrap State, 24 – 29 Feb 2012

Schedule of meetings and visits

Sl. No.	Dates	Place	Event	Purpose
1.	24 Feb.		Travel: Juba – Wau - Kuajoc	
2.	25 Feb.	Gogrial West, Agok, Ngapkuatjok	Visit to Handpumps	Discussion with users. Understanding how pumps are maintained.
3.	26 Feb.		Sunday	
4.	27 Feb.	Kuajoc	Discussions with OXFAM Intermon	OXFAM Intermon's WASH activities. Water supply status in Gogrial East. Refer Tables 47, 48 & 49.
5.			Meeting with Anjelo Akol, Acting Dy. Director, RWSS, Warrap	Overview of water supply in the State. Refer Tables 50, 51 & 52.
6.		Gogrial West County HQ	Meeting with Joseph Akot Kon, Dy. WASH Coordinator, Gogrial West County. Discussions with Wol Malang Wol, Pump Mechanic	Overview of water supply in the Gogrial West County. Refer Tables 53, 54 & 55. Background of a PM
7.	28 Feb.	Turalei, Twic County	Meeting with Joseph Giir, WASH Coordinator, Twic County	Overview of water supply in the Twic West County. Refer Table 56.
8.			Meeting with ACF Wunrock	ACF's WASH activities in Twic.
9.			Meeting with Goal, Wunrock	Goal's WASH activities.
10.		Alek, Gogrial West County	Meeting with Norwegian Church Aid, Alek, Gogrial West County	NCA's WASH activities in Gogrial West.
11.			Meeting with ACF, Alek, Gogrial West County	ACF's WASH activities in Gogrial West.
12.	29 Feb.	Kuajoc	Meeting with Winrock BRIDGE, Kuajoc	BRIDGE Program's WASH activities in Warrap.
13.	1 Mar.		Travel to Aweil	

Brief Notes and Conclusions

The consultant's field visits in Warrap were coordinated by Winrock International's Sudan BRIDGE Program, Kuajoc. Ariech Deng Ariech, WASH Project Officer of the BRIDGE Program, accompanied the consultant during most of the meetings and visits. A summary of the events of the field trip are describes below, in the chronological order that they occurred.

25 Feb: Visit to 2 Handpumps in Gogrial West County

- The two handpumps visited were at Agok and Ngapkuatjok. Both wells had been drilled and handpumps installed through Winrock BRIDGE.
- Both handpumps had functioning Water Committees and had a history of payment for repairs from the users, if only for labor charges.
- Detailed discussions with both groups of users provided some insight on how the reporting for a maintenance need was made and how it was paid for.
- In both places, the T Bar handle to IM II Extra Deep Well pumps had been removed from the pump to serve as IM II.

This indicated that there was a lack of awareness about quality and specifications and that the driller used this to his advantage.

- Both pumps showed delayed discharge of water, indicating leakage in the below-ground assemblies. Yet the users showed no awareness that problems were imminent.

This indicated a lack of understanding of the signs of poor performance and reflected negatively on the training content for Caretakers.



Discussions with Users at Agok (left), Handpump at Ngapkuatjok (right)

27 Feb: OXFAM Intermon, Kuajoc

- Intermon worked mainly in Gogrial East County, constructed new wells, rehabilitated existing boreholes, trained Water Committees and handpump Caretakers. They monitored the functioning of handpumps on an irregular and random basis. Intermon provided some interesting information on how privately boreholes operated in Gogrial East.
- Intermon had conducted a comprehensive inventory of all water sources in Gogrial East and the data was made available in soft copy. As per this inventory Gogrial East County had a total of 290 boreholes, of which 125 were functional, 97 were nonfunctional and 68 were dry, i.e., a functionality of 43%, which was low by any standards.
- An interesting feature of the data base was that it dealt with the data at two levels. The primary distinction was between functional, nonfunctional and dry boreholes. The second level of the database dealt with O&M and identified the nature of work required on the main components of a borehole and handpump to restore it back to good working condition. This O&M assessment had been completed for only a small part of the inventory and so the maintenance work load and the projection of spare parts requirement had not yet emerged.

The data fields of the inventory should be compared to the WIMS data collection requirements. The Intermon data fields were much more attuned to maintenance management and monitoring.

27 Feb: RWSS, Warrap State, Kuajoc

Warrap State had 6 Counties with a total of 1781 handpumps of which 1402 were recorded as working, i.e., functionality was reported as 82%. The reliability of this data needs to be reconfirmed. The figures from OXFAM Intermon, the State and the Counties varied widely for Gogrial East, Gogrial West and Twic Counties as shown in Table 32 below.

Table 32 Comparison of State and County figures for Handpumps

County		Handpumps		
		Total nos.	Functioning	Functionality
Gogrial East	State figures	301	223	74%
	OXFAM Intermon figures	290	125	43%
Gogrial West	State figures	511	454	89%
	County figures	461		
Twic	State figures	328	286	87%
	County figures	283	207	73%

- Attendance of County WASH Coordinators at WASH Cluster Coordination meetings was poor, primarily due to remoteness of the counties and poor communication.
- Maintenance data came from the Counties intermittently and was said to be compiled at State level, but was not available for verification.
- At the State level, UNICEF was the sole source of spare parts.
- There was a surplus stock of tools and spare parts.
- The critical spare parts most commonly needed in Warrap, GI Riser Pipes, were out of stock. Also, there was no stock of Fast Moving Spare parts kits.

27 Feb: Dy. WASH Coordinator, Gogrial West County

- Gogrial West had 9 Payams with a total of 461 handpumps.
- The County maintained a ledger book for each of its 9 Payams, where the inventory of water sources was created in Sept 2011 with the help of PMs on the County payroll. The ledger books were provided by Winrock BRIDGE program.
- There was a small stock of spare parts.
- Accurate figures of maintenance events in the county were not immediately available. Monthly detailed repair reports were made on a regular basis and sent to RWSS. A consolidated yearly report had also been made but a copy was not available.
- GI Riser pipes were the most frequent item needing replacement because of corrosion.
- Hand dug wells were to be found in Alek Payam of the County.
- Repair requests from communities were received at Payam level by the volunteer PMs. If spare parts were available from the County, the volunteer PMs carried out the repairs.
- The main source of spare parts was for UNICEF stocks, through the State RWSS.
- Norwegian Church Aid (NCA) supplemented spare parts along with ACF in Alek Payam.
- Spares were generally provided free of cost from County or NCA stocks.
- ACF was attempting to encourage local traders to stock handpumps spare parts.
- Communities generally paid volunteer PMs around SSP 120 for labor charges.

28 Feb: WASH Coordinator, Twic County

- Twic County had a total of 6 Payams.
- The total number of handpumps in the county was 283 of which 207 (73%) were reported as working.

- A number of partner agencies were working in Twic in the WASH sector.
- Some provided complete work records of new and rehabilitated bore holes and repairs and some did not.
- Winrock BRIDGE provided ledger books for creating Payam-wise water source inventories in the County, but only 3 Payams had been completed.
- Literacy among the older volunteer PMs was low and that also posed a problem in record keeping.
- Communities paid volunteer PMs small sums for repairs, SSP 60 to 100, and often in kind.
- Record keeping was generally poor. No consolidated annual work report for 2011. No individual site-to-site repair reports from partner agencies with the exception of ACF.
- An inventory of spare parts for 2011 had not been made.

28 Feb: ACF, Wunrock Payam, Twic County

- ACF worked in 5 out of the 6 Payams of Twic County.
- ACF drilled new boreholes, rehabilitated existing ones, repaired handpumps and trained Water Committees and Caretakers.
- Upgrading hand dug wells and installing Rope Pumps was being planned.
- ACF was planning to extend its effort to encouraging local traders to stock handpump spare parts, based on its experience with this in adjoining Alek Payam of Gogrial West.
- During March 2012, a local trader in Twic with connections in Juba agreed to import spares directly from Uganda.
- ACF will continue to try to develop the supply system in its new project phase.

28 Feb: Goal, Wunrock Payam, Twic County

- Goal worked in all 6 Payams of Twic County, drilled new boreholes, rehabilitated and repaired existing ones and trained Water Committees and Caretakers.
- This was the first place where women's participation in
- Goal created a cadre of "Super Technicians", specialist PM for attending to repair requests from communities on payment, but the payment system was not working well. Goal had its own stock of spare parts which were released on request. It was aware of ACF's efforts to encourage communities to buy spares and was also aware of the contradictions in its own approach as compared to ACF's efforts.

28 Feb: Norwegian Church Aid, Alek, Gogrial West County

- NCA drilled boreholes and supported rehabilitation, providing handpump hardware and construction materials to County PMs.
- It provided handpump spare parts to Counties on request. NCA was also supporting the State in conducting an inventory of all water sources.

28 Feb: ACF, Alek, Gogrial West County

- After some initial delays and hurdles, ACF was able to interest a local hardware dealer to stock handpump spare parts.
- When a repair request came, instead of providing spare parts to communities, ACF provided communities with vouchers for 80-85% of the value of spare parts, which communities supplemented to obtain the spares from the local trader.
- Communities paid PMs separately.
- Repairs to 10 water points have been done in Gogrial West following the above procedure.
- The minimum voucher value so far has been 220 SSP and maximum was 3035 SSP, based on assessments of repair needs.

- The next step (during ACF's new project phase of 2012-13) was to increase the scale of the project to make spare parts supply more lucrative to local traders, increase competition among traders to bring down the cost of parts.
- The vouchers will be expanded to cover construction items for surface work repairs (cement, reinforcement bars, etc).
- ACF is actively working with the Pump Mechanic Association (established by SNV's initiatives in all 5 Counties of Northern Bahr-el-Ghazal) in Aweil East to build their capacity to provide service and spare parts by improving their business skills and linkages with regional spare parts dealers.

29 Feb: Winrock BRIDGE, Kuajoc

- The BRIDGE Program's WASH activities during 2010-11 included construction of new boreholes, rehabilitation and repair of existing facilities and training.
- Winrock had brought in its own spare parts for the rehabilitation and repairs components.
- No spare parts were given to communities or to the County. Payam level volunteer mechanics were given bicycles.
- As a part of its capacity building and governance priorities, BRIDGE had introduced handpump inventory ledgers in all Counties of Warrap. There had been partial success in completion of these ledgers.
- WASH activities will be de-emphasized In BRIDGE's activities in 2012 in Warrap.

Report on Field visits to Northern Bahr-el-Ghazal, 1 – 6 March 2012

Schedule of meetings and visits

Sl. No.	Dates	Place	Event	Purpose
1.	1 Mar.	Aweil	Travel – Kuajoc to Aweil Meetings with: – Director, DRWSS – Jacque Bevin, SDC	Overview of the State water supply situation, maintenance and spare parts situations, reporting procedures, Pump Mechanics' Associations. Refer Tables 57 and 58. SDC's WASH program in NBG.
2.	2 Mar.	Mabil Town	Travel to Aweil East HQ Meetings with: – County Officials – Pump Mechanics' Association Visit to two handpump sites	Overview of the County's water supply, maintenance and spare parts situations, Understand operation and status PM Association. Refer Table 59. Interaction with users.
	3 Mar.		Week end	
3.	4 Mar.	Aweil	Weekend Meetings with: SNV representatives	Discussion on PM Associations. Refer Table 60.
4.	5 Mar.	Aweil West	Meetings with: – County Officials – Team Leader, BRIDGE Program, Aweil	Overview of the County's water supply, maintenance and spare parts situations. Refer Table 61. Understand operation and status PM Association. BRIDGE Program's WASH involvement.
5.	6 Mar.	Aweil North	Meetings with: – County Officials – Pump Association members and Payam Mechanic	Overview of the County's water supply, maintenance and spare parts situations, Understand operation and status PM Association.
6.	7 Mar.		Travel: Aweil - Juba	

Brief Notes and Conclusion

The consultant's field visits in Northern Bahr-el-Ghazal were coordinated by Winrock International's Sudan BRIDGE Program, Aweil. Kamulete Moses, WASH Specialist of the BRIDGE Program accompanied the consultant during all the meetings and visits. Detailed notes on the events of the field trip are describes below in the chronological order that they occurred.

1 March: RWSS, Aweil

The County-wise information on handpumps indicated that NBG State had 5 Counties and the Aweil township, with a total of 1,813 boreholes with handpumps. Of these, 1,551 were functional, 194 were non-functional, making the functionality 89%, which was quite good. The range of functionality in Counties varied from 95%, in Aweil East to 78% in Aweil Town. 68 BHs were dry.

- UNICEF provided handpump spare parts to the State which was passed on to Counties.
- NGO Partners gave spare parts directly to Counties, and worked in consultation with Counties.
- A recent shipment of pipes from an NGO to two Counties was of dubious quality. There does not appear to be an easy method of controlling such supplies.

- A recent inventory of spare parts was not immediately available.
- There were spare parts in stock except for GI pipes.
- All Counties reported on a regular basis on a standardized format, on the basis of which the State compiled an annual report.
The reporting format needs substantial improvement to yield critical management information. The present information on the use of spare parts was of very limited value.
- NBG had a large number of NGOs working since it was one of the entry points for returnees.
- Most NGOs worked in consultation with the State for allocation of new boreholes and rehabilitation and more directly with Counties to support handpump repairs. Most NGOs also worked in areas of formation and training of Water Committees and Caretakers.
- Most NGOs reported on their work to Counties and the State, but some did not.

1 March: Swiss Agency for Development and Cooperation (SDC), Aweil

- The SDC project is in its starting phase. It proposes to work in 2 Counties of Aweil Centre and Aweil South, where the NGO presence was relatively less. They propose to drill new wells and rehabilitate existing wells after successful community mobilization.
- They have already started a handpump repair program, drawing spare parts from the State stocks.
- SDC was the only place where a systematic approach was being made to reuse GI pipes recovered from repair and rehabilitation sites.
- SDC indicated interest in participating in any efforts in trying new technologies (like the use non-corrosive pump configurations) and improvements to the maintenance management system.

2 March: Aweil East County

The County's handpump/ borehole statistics as of Dec. 2011 indicated that the County has 8 Payams, a total of 556 boreholes with handpumps, of which 43 were dry, 490 were functional and 23 were nonfunctional. The Functionality, therefore, was 96%, which was very good.

- There was no major deviation in the process followed elsewhere in the process of handpump maintenance.
- The supply of spare parts for maintenance was free but communities were expected to pay volunteer PMs, of the order of SSP 150.
- No site-by-site maintenance reports were maintained. Consolidated figures of numbers of repairs were reported to the State in an approved format.
- The County had a make-shift store with a large quantity of old/ used pump rods in the store, but no old GI pipes.
- The most common requirement for spares was GI pipes. Breakages of flanges of the Pump Pedestal and of the Water Tank were another frequent problem, especially from the deep installations in bores ranging from 75 m to 90 m depths in the highlands of the County.
- An inventory had been done, but the report was not immediately available.



Flange breakage

2 March: Visit to 2 Handpump sites indicated that contributions were collected from user households to pay PMs for labor charges for repairs.

4 March: SNV at Aweil

- A more detailed note on the Pump Mechanics' Associations has been written later.

5 March: Aweil West County

- The County has 9 Payams, a total of 357 boreholes with handpumps, of which 317 were functional and 40 were nonfunctional. The Functionality was 89%, which was very good. Details of dry boreholes were not provided.
- The County had 7 PMs on payroll and about 65 voluntary PMs in different Payams.
- Spare parts were free of cost to the community. The guideline for payment to volunteer PMs was SSP 150, but usual payments were between SSP 20-30. Payments to volunteer PMs were quite irregular.
- No site-by-site maintenance reports were maintained.
- Poor literacy among PMs was cited a major cause for this problem.
- Consolidated figures of numbers of repairs were reported to the State in the approved format, which did not provide details of spare parts used.
- Breakages of flanges were not uncommon at the Pedestal and the Water Tank. If this happened at the Pedestal, it resulted in a major platform reconstruction job. The most common requirement for spares was GI pipes. Other spares in high demand were Cylinders and Cup Washers.
- This was one of the rare Counties which asked for old GI Pipes to be returned to the Store. Pipes were sorted and reused where possible. Rethreading of pipes was yet to be started.
- The County had a regular store. Present stocks in the store were: Fast Moving Kits – 5 boxes X 12 each, GI Pipes – 90.
- The County had just received a batch of 50 nos. GI pipes from UMCOR of very inferior quality.

When asked as to why these pipes had been accepted these pipes, the County felt that it did not have a choice in the matter, given the fact that the County was always short of pipes. The reasoning was that bad pipes were better than no pipes.

That an NGO partner would pass on inferior quality goods does not reflect very favorably on the NGO community. Either UMCOR was unloading an embarrassment from their stock or they were not particular of the quality of goods they passed on. In any case they were not helping the people of NBG.



Poor quality Riser

5 March: Winrock BRIDGE, Aweil

- The BRIDGE Program had focused on establishing community management, through training of Water Committees for collecting water use fees, manage minor repairs, clean, protect and fence the water source as a community asset. BRIDGE had also provided motor cycles and bi-cycles for improving access and monitoring.

6 March: Aweil North County

- The County had 6 Payams. Statistics on the water supply situation showed a total of 476 functional and 28 nonfunctional handpumps (functionality = 94%) in Feb 2012.

The reporting table was a very good example of the high quality of data available at the County level since it included data of motorized water supply systems (which tend to get left out in other places). The report also provided details on the new BH added and those rehabilitated in the reporting period, which could be used to constantly update an inventory or a maintenance database.

- The County had 9 PMs on payroll and 25 volunteer PMs in the Payams.
- The County had a spare parts store nearby and had some stocks – 30 GI Pipes, 4 Fast Moving Spare Parts Kits, 2 Cylinders, 2 sets of Fishing tools

Report on Field visits to Eastern Equatoria, 13 – 19 March 2012

Schedule of meetings and visits

Sl. No.	Dates	Place	Event	Purpose
1.	13 Mar.	Torit	Meeting with Director, DRWSS	Introductory meeting
2.	14 Mar.	Torit	Meetings with: – Director, DRWSS & others – Torit County Asst. Commissioner – AVSI, CRS, NCA	Status of water supply and spare parts at RWSS, Torit, (refer Table 64) and of Torit County (refer Table 65) WASH programs of the NGOs (refer Table 66 & 67).
3.	15 Mar.	Ikotos, Isohe	Meetings with: – LWS/ DWS – AVSI – Ikotos County Executive Director, Asst. Commissioner, WASH	WASH programs of the NGOs. Status of water supply and spare parts of Ikotos County
4.	16 Mar.	Magwi	Meetings with: – County Asst. Commissioner ARC – Visits to Handpumps	Status of water supply and spare parts of Magwi County. ARC's WASH program. User's opinions and reactions. O&M practices.
	17-18 Mar.	Week end		
5.	19 Mar.	Kapoeta South	Meetings with: – County Asst. Commissioner – AAR, Japan – Visit to NSS	Status of water supply and spare parts of Kapoeta County (refer Table 69) AAR's WASH program.
6.	20 Mar.		Travel back to Juba	

Brief Notes and Conclusion

The consultant's field visits in Eastern Equatoria were coordinated by SNV. Emmanuel Manza, SNV, Kapoeta accompanied the consultant on all meetings and field visits. A summary of the events of the field trip is describes below, in the chronological order that they occurred.

13 & 14 March: RWSS, Torit

The State has 8 Counties, of which details were available for 7 Counties. The 7 Counties, as of May 2011, had a total of 1,258 handpumps, of which 990 were reported functional (79%), varying between 89% to 68% in different Counties.

NGOs operational in WASH in the State were: ARC (American Refugee Committee), AVSI (Italian NGO), NCA, AAR (Association for Aid and Relief, Japan), ADRA (in Budi), Caritas (involved only in construction of rock catchments).

Spare Parts:

- Spare parts for handpumps came to the State from UNICEF. NCA, AVSI and ARC provided spare parts to Counties on request. The State was not informed of the supplies going from these NGOs to Counties.
- No major quality related problems were reported on spare parts at State level.
- The most frequently used spare parts were GI pipes and rods, and to some extent cylinders

and Fast Moving Spare parts Kits.

- Perforation and damage to pipes threads due to corrosion were observed in specific areas. The same was also true in the case of well with high iron content.
- The Counties were entitled to 11 persons on their payroll for WASH activities. Often these were only PMs, but this was not uniformly the case across all Counties. The PMs in the County payroll were all trained and experienced.
- Payam level volunteer PMs were not a static group. Training by NGOs was going on all the time and some were moving on to better paying livelihoods.
- There was no fixed payment system or “cost sharing”, for labor for pump repairs. By and large, the response to cost sharing is very low. Often community contributions were just token amounts for food for the volunteer PMs. In Torit County, there was no history of payment at all, in Magwi and Ikotos, payment for repair labor was more common. There was no payment, what-so-ever, for spare parts.
- The general perception in communities was that the water sources belonged to the Government.
- The State has a small spare parts storage facility near the Director’s office. During Jan 2012, most of the spare parts had been distributed to Counties (refer **Table 64**).

14 March: Meeting with Torit County Asst. Commissioner for WASH

The County has 204 handpumps of which 156 (76%) were functional (refer **Table 65**).

Sources of spare parts were UNICEF (through the State Store), ARC and NCA (on direct request).

- The highest consumption of spare parts was in GI Pipes. Corrosion and damaged threads were the usual problems.
- The life of a pump’s GI pipes was between 2 to 3 years.
- Monthly workload was of the order of 20 repairs, which was very high, 10% of the total number of pumps.
- The County had total of 23 PMs on payroll and 30 volunteer PMs.
- All 8 Payams had WASH Inspectors. Some payroll PMs were posted at Payams.
- The County does not have adequate tools.

14 March: Meeting with: CRS

- CRS drilled boreholes with its own 6 drilling rigs, usually 80 bores per year.
- They also did major rehabilitation that includes flushing of wells and replacement of pumps.
- Not much work is done in terms of repairs to handpumps.
- Training of Payam level PM is done, where the training duration is for 2 weeks and the PMs are given tool kits. The training is done on the ratio of 1 PM for every 4 to 5 handpumps or 1 PM per Boma.
- A different level training is done for creating Water Committees and establishing Caretakers.

14 March: Discussions with Users at Torit Borehole, near CRS

- The BH was drilled in 2006.
- There has never been a formal Water Committee, but a group of nearby residents, led by a woman, Milania, performed this function.
- 2 years ago, NCA had trained 3 women of the area. Details of the training were not known.
- No fees are collected from users to drawing water.



Milania with broken handpump

- At the time of maintenance needs, a collection drive is made, asking for SSP 1 per household.
- The maximum collection so far has been SSP 30.
- The money pays for refreshments for the PMs who come to do the repairs.
- Neighbours are requested for vehicles for transporting spare parts. Or they pay SSP 15 towards the cost of fuel to a vehicle owner.
- The last repair was in Dec. 2011, when the handle broke.

14 March: Meeting with Norwegian Church Aid

- NCA works in two Counties, Lopa/ Lafon and Magwi, in Eastern Equatoria.
- NCA funds construction of boreholes and rehabilitation of existing boreholes in consultation with Counties, through contractors and trains Water Committees and Caretakers.
- NCA gives handpump spare parts to Counties on request.
- NCA procurement process is centralised through Juba and comes from East Africa.
- Quality of spare parts was not a problem.
This was NOT the observation in Ikotos.
- NCA gets feedback on utilization of spare parts directly from Counties. Refer **Table 66** for details Repair. These reports could be improved.

14 & 15 March: Meeting with AVSI, at Torit and Isohe, Ikotos County

- AVSI drilled boreholes and rehabilitated and repaired handpumps.
- In the past UNICEF had routed spare parts to Eastern Equatoria RWSS through AVSI.
- AVSI maintained handpumps in the County using its own PM or with Payam PMs.
- Till 2009, AVSI used spare parts provided by UNDP. It now stocked its own spare parts for repairs and to give to the County when requested.
- AVSI gave regular quarterly reports of its work to the County. Its reporting format (**Table 67**) was probably the only report format where the borehole details, maintenance problem were simultaneously described along with site details and spare parts used.



Correct (right) and wrong (middle, bottom left) spare parts

15 March: Meeting with LWF, Ikotos,

- LWF worked in all 5 Payams of Ikotos County. It constructed and rehabilitated boreholes through contractors and trained Water Committees and PMs. PMs were trained at a ratio of 2 PMs per BH and were given full sets of standard and special tools.
- LWS did not repair handpumps repairs and gave only tools to the County.



15 March: Meeting with Ikotos County authorities

- The County has 7 PMs on payroll and 6 volunteer PMs 4 Payams.
- Spare parts came from the State, NCA and AVSI.
- The store had a number of spare parts of questionable quality.

- This was one of the few stores where old riser pipes had been returned to the store for reconditioning, though this work had yet to start.
- Ikotos was a county where there were a large number of Extra Deep Well installations. These pumps tended to have very frequent riser pipe failures because of deep water tables and increased use in the dry season.

16 March: Meeting with Magwi County authorities

- Magwi County had 8 Payams and a total of 296 handpumps.
- About 40% of the pumps had cylinders with ≥ 21 riser pipes.
- During 2011, there were a total of 115 repairs. With a total of 384 handpumps (Table 63), this was not a very high maintenance workload.
- Pipe disconnections were frequent because of the deep installations.
- Corrosion of pipes was reported to be a problem.
- Volunteer PMs did not return old pipes recovered from boreholes.
- The County had 2 PMs on payroll and 12 volunteer PMs in different Payams.
- Spare parts came from UNICEF, ARC and NCA. The County gave utilization reports to the NGOs (refer Table 66).

16 March: Meeting with American Refugee Committee at Magwi

- ARC drills borewells using contractors and trains Water Committees and Caretakers.
- It also supplies the County with spare parts.
- Procurement of handpump spare parts is done through ARC's office in Juba.

16 March: Visits to four Handpump sites on the outskirts of Magwi Town

- All pumps were India Mark II. Three were working and one was dry.
- The three working pumps had Water Committees.
- In each of the pumps small contributions were raised from households to pay the PMs.

16 March: Meeting with Kapoeta South County authorities

- The County has 118 boreholes with handpumps of which 101 were working, i.e., a functionality of 86%. Additionally 3 boreholes had motorized pumps and one had a wind mill. 2 out these 4 boreholes were working.
- Out of the 118 handpumps in the county, 47 handpumps, or 40%, were in Kapoeta town serving a population of 16,500.
- The County had 5 PMs on payroll and 10 volunteer PMs in Payams.
- The usual maintenance workload was about 15 requests per quarter.
- The most common causes of breakdowns were pipe failures – corrosion after 18 m depth, breakage of pipe threads. This was followed by rods unscrewing or breaking after pipe breakage, and handle bearings.
- At this point of time, 12 breakdowns needed to be attended to, but the County did not have transport. AAR (Japanese NGO) had been requested to help.
- Partners do not give reports on repairs and work independently.
- Partners in the County are SNV, AAR, ARD, Pact Sudan, Farm Africa, Carter Centre (working on Guinea Worm eradication only).
- Cost Sharing is due to be implemented soon in the County, in which cost of spare parts will also be included.

- Spare parts were also available from a local source – New Sudan Service & Supply, which was a drilling company in Kapoeta and kept handpumps and its components.

16 March: Visit to New Sudan Service & Supply

- The NSSS workshop was well equipped to undertake maintenance of drilling equipment.
- They also had ample stocks of handpump hardware, some of which was sourced from Addis Ababa.
- The extent to which NSSS made handpump spare parts available to the County and the terms for doing so, were not known.

16 March: Meeting with Association for Aid and Relief (AAR) Japan

- AAR operated in 4 Counties of EE, Budhi, Lopa/ Lafong, Kapoeta North and South.
- Their water supply activities included drilling, rehabilitation and repair of handpumps.
- In Kapoeta South, AAR assisted the County with handpump repairs, providing spares, tools and transport.
- AAR sourced its handpump spare parts from Nairobi.
- During 2011-12, their expenditure on tools and spare parts was about US \$ 30,000.

Annex 5: Detailed Field Trip Reports: Western Equatoria (16 – 22 Feb.), Warrap (24 – 29 Feb.), Northern Bahr-el-Ghazal (1 – 6 March), Eastern Equatoria (13 – 19 March).

Report on Field visits to Western Equatoria, 16 – 22 Feb, 2012 Schedule of meetings and visits

Sl. No.	Dates	Place	Event	Purpose
1.	16-18 Feb.	Yambio	Biannual Coordination Meeting of WASH Sector Agencies	Familiarization, Group discussion on Maintenance Management (Ref: Table 33).
2.	19 Feb.	Yambio	Discussions with Asteway Yigezu, WASH Officer, World Vision	Data on Tambura County (Table 34 & 35).
3.	19 Feb.	Yambio	Discussions with Dennis Igua, WASH Officer, Tear Fund, Juba	Tear Fund's water supply program in South Sudan
4.	20 Feb.	Yambio	Visit to Handpumps in Yambio Town at – Yambio Open Market – Hai Abegyou	Discussion with users. Understanding how water vendors operate and how pumps are maintained.
5.	20 Feb.	Nzara County	Visit to Nzara County Meetings with: – County WASH Inspector – County Commissioner Visits to 3 handpump sites	Overview of water supply situation in Nzara County. (Table 36, 37 & 38). Discussion on O&M with users.
6.	21 Feb.	Yambio	Meetings with: Intersos, CAFOD, UNICEF	WASH activities of Intersos, CAFOD UNICEF
			Discussions with two hardware shops in Yambio market	Availability of handpump spare parts.
7.	21 - 22 Feb.	Yambio	Meetings with Dy. Dir, DRWSS	Information on – State level Water Supply data (Table 39 & 40). – O&M Data at State Level (Table 41 & 42). – Reporting of O&M from Counties (Table 43). – Cost Sharing Guidelines for Spare Parts (Table 44). – Availability of Spare Parts & Inventory (Table 45). – Spare parts distribution plans (Table 46).
8.	22 Feb.	Makpandu & Yambio Road	Visit to Makpandu Refugee Camp	Understanding the water supply and O&M situations (Table 47).
			Visit to Handpumps at : – Nangere Road IDP Camp – Bazmgwa Primary School	Conditions of installations. Discussion with users on O&M.
9.		Nagero County		Data collected by Intersos
10.	23 Feb.		Travel: Yambio - Juba	

Report on Field visits to Western Equatoria, 16 – 22 Feb, 2012: Detailed Notes & Data

The consultant's field visits in Western Equatoria were coordinated by Intersos. Wesley Sigei, WASH Adviser, Winrock BRIDGE, Juba and Henry Bernado, WASH Officer, Intersos, Yambio accompanied the consultant during most of the meetings and visits. Detailed notes on the events of the field trip are describes below in the chronological order that they occurred.

16-18 Feb: Biannual Coordination Meeting of WASH Sector agencies at Yambio.

State summaries of work results were presented.

Very detailed information was presented at State level, by each state, on physical achievements during the past year, especially on the number of new sources created and old sources rehabilitated. Very little hard information was provided on total numbers of water sources by territorial units (State-wise or County-wise), distribution and functionality status of such water sources, population provided with access to water and service level, or the changes brought about in any of these parameters during the past year. A number of challenges seemed common to most states, such as lack of mobility, poor access, and lack of spare parts. Difficulties in drilling conditions, need for hydrogeological data, the lack of reliable data, were some of the other common problem areas mentioned. Some states indicated additional problems of internal and external conflicts, insecurity, floods, etc.

The purpose of Raj Kumar Daw's visit was elaborated by Niall Boot [of OXFAM GB and the current Chairperson of the Technical Working Group (TWG)] to the gathering. Peter Mahal, DG, MWRI, felt that work of this nature should not proceed with parallel approaches. A separate discussion was held (along with Wesley Sigei) where the DG clarified that that was an earlier attempt to study the supply chain question, but this finally did not materialize. The DG felt that the MWRI were not duly consulted and that the earlier background had not been taken into consideration in floating the new consultancy. However, he was assured that all findings would be shared and that State and County officials would be duly consulted all along the process of the assignment.

On the third day of the meetings, group discussions occurred. The consultant was requested to serve as a resource person to the group on maintenance and spare parts. Summaries of discussions were presented in plenary sessions. The summary of discussions on the maintenance and spare parts group is attached as **Table 32**.

Contacts were established with a number of Govt. officials and NGO representatives.

Summary of Group Discussion on Maintenance Management

At the outset, the group agreed that the **Purpose of Maintenance Management** should be to assure sustainability of water supply through improved functionality of water sources. The main points of discussion are summarized below.

Table 33 Summary of Group Discussion on Maintenance Management

What	Why	How	Who	When	Where	Remarks
Information management and collection of data from the State.	No evidence base. Need to understand total functionality of water points.	<ul style="list-style-type: none"> – Collect data using standardized formats. – Electronic transfer (SMS technology). – Templates developed and marketed. – Frequency-biannually. – State coordination meeting. 	MWRI (WIMS), WASH Cluster, State focal points, Cluster leads, PMs, WMCs.	Biannually and reported in biannual P+C meeting	Country level	Consultant to look and recommend a format for data collection.
Identification	Understand	– Community to identify	Local	As soon as	County level	

What	Why	How	Who	When	Where	Remarks
and accreditation of PMs.	available local level capacity Grading system needed for certifying competence level.	PMs. – Set up registration levels – County/ Payam/ Boma. Analyze mobility, empower PMs with tools and transport. – Local authorities' regulation.	government, NGOs and communities.	possible		
Supply chain management.	Bulk procurement undermines local procurement.	– UNICEF Local Bulk procurement and delivery to the respective Counties, financial model, encourage procurement through local market.	Existing institutions, Government, donors, private actors.	As soon as possible, follow UNICEF local procurement initiative.	All levels of government.	
Revenue management.	Transfer burden of cost to the government.	– Pricing policy and reimbursement model. – Cost recovery mechanisms. – Incentive based service charge mechanisms for PMs.	At different levels- institutional/ non institutional/ Community/ County/ State/ National.	ASAP	All levels of government and private institutions.	
Harmonization between emergency and development.	Emergency assistance is not sustainable and creates a lack of ownership of facilities. Need for transition to development.	– Harmonies approach and guidelines. – Special consideration between the government and donor for emergencies. – Setting thresholds.	Government and NGOs, donor community.	ASAP		
Establishing ownership.	Sustainability of community facilities.	– Mobilization by local government. – Contractors/NGO should report to local authorities before starting work. – Completion report and hand-over procedures – Certification of completion. – WMC Chairperson receives the report.	Local authorities, NGOs, contractors, beneficiaries WMC Chairpersons	Progressively, during design, implementation and construction stages.	Country level for policies & strategies County level for implementation.	
Review actions periodically.						

**19 Feb: World Vision's WASH activities in Tambura County
Person met: Asteway Yigezu, WASH Officer, World Vision**

Data on Tambura County, Western Equatoria

Table 34 Population Distribution of Tambura County by Area/ Payam

Area/ Payam	Total Population*
Mupoi	4,459
Source Yubu	25,983
Tambura	24,923
Total	55,365

*World Vision's Data Source: Sudan 5th Housing and Population Census (2009)

Notes: the population data is for the whole County, not only for the Bomas World Vision operates in.

Table 35 Distribution of boreholes with Committees per Boma in Tambura County project area

Payam	Boma	Number of boreholes		
		Total	Functiona	with functional Committees
Tambura	Mangburu	3	3	1
	Tambura West	13	4	4
	Matakurungu	7	4	2
	Gberezigino	2	1	1
Source Yubu	Source Yubu Centre	7	1	3
	Kpatanayo	0	0	0
	Saba mile	1	1	0
	Gboko	5	2	1
Mupoi	Nangume	6	5	2
	Mabia	4	3	2
Total		48	24	16 (33% of 48 BH)
Functionality			50%	

Notes: Not all these boreholes are done by World Vision.

Source of Spare Parts

World Vision supplies fast moving spare parts and maintenance kits to the water committees (at borehole level), after giving them the necessary training. The fast moving spare parts and maintenance kits are estimated to serve for at least two years, which is until the water committee gain strength and start to support themselves.

The source of these fast moving spare parts and maintenance kits is from abroad, from where the pumps are purchased, and are bought together with the pumps.

Water Committees

World Vision organizes water committees with 9 members and water care takers with 3 members. Functionality of handpumps in 3 Payams of Tambura County, W Equatoria, where W Vision works, is of the order of 50%.

Conclusions

World Vision worked in 3 Payams (Mupoi, Source Yubu and Tambura) of Tambura County, W Equatoria, which had a total of 48 handpumps of which 24 were functional, (therefore, functionality was 50%). These three Payams had a total population of 55,365 persons [Source: 5th Housing and Population Census (2009)], making the Population-to-pump ratio (Service level) = 1,153 persons/pump if all pumps were working (and 2,206 with 50% functionality).

19 Feb: Tear Fund's water supply program in South Sudan

Person met: Dennis Igua, WASH Officer, Tear Fund, dmt-southsudan-wa@terfund.org, 0920397174

Tear Fund (TF) operate in Awiel Centre and Awiel East Counties of Northern Bar-el-Ghazal and have a small rehabilitation project in Fashoda, Upper Nile.

In Awiel Centre, TF works in 4 out of 7 Payams.

- The Payams are: Barranayen, Arroyo (furthest, 80 Km), Nyalath (town) and Aullic (town).

- ACF, SNV, Samaritan Purse, Medair and SDC are also working in these Payams,
- Data is scanty. In these 4 Payams, there are 89±5 boreholes with handpumps (+6 new BH), 22 protected hand-dug shallow wells with IM II handpumps and an unknown number of unprotected hand-dug shallow wells.
- Of the 89 Boreholes, 27 were not working in July 2011, of these 15 were rehabilitated.
- Many homesteads have their own unprotected shallow hand dug wells.
- During 2011, TF has been supported by OFDA (Office of Foreign Direct Assistance – USAID) for rehabilitation of 15 boreholes.
- Donors have shown a preference for rehabilitation of existing sources against construction of new ones.

In Awiel East, TF works in 4 of a total of 6 (or 8?) Payams.

- Other NGOs in Awiel East are Samaritan Purse, SNV, ACF, and IOM.
- A 5 years' project partly funded by CIDA had components of WASH, Food Security and Health. The WASH component had drilling of new wells, roof water harvesting and protected hand dug wells. Afridev handpumps were introduced but getting spare parts became a challenge.

Donors have project monitoring frameworks, but these are generally limited to projects in operation. Longer term sustainability monitoring through maintenance data gets lost.

A clear identification of sources creates some problems. A source created by one donor/ NGO gets rehabilitated by another group. Branding of sources helps to some extent.

The Person to Pump ratio is of the order of 600 to 700 on an average, but can vary between 1,200 to 200.

Supplies and Spares

- Supplies related to handpumps for TF came from Davis & Shirtliff , Nairobi, but these are generally limited to supplies needed for rehabilitation.
- TF do not supplement spare parts stocks of Counties.
- Prepositioned stock of spare parts from UNICEF was kept under the stewardship of TF at Awiel Centre for NBS State authorities.
- A County in need of spare parts may ask an NGO (working in that County). The NGO would pass on the request to TF and TF would release the spares.
- The Counties can also indent for spare parts directly from TF, and TF would release such spares with information to UNICEF.
- UNICEF is seeking to transfer the responsibility of managing spare parts to the State.
- UNICEF using NGOs to administer stores is not uniform throughout the country.
- There is no distinction between spare requested under routine maintenance or maintenance under emergency programs.
- Counties also make requests, through NGOs, for transport of spares to specific sites.
- But if spares go to other sites or are not used, there is no method of feedback or monitoring.

20 Feb: Visit to Handpump at Yambio Open Market

- GPS references: N: 04° 34' 10.58", E: 28 ° 23' 54.21"
- India Mark II handpump. Handle wearing slightly against handle bracket.
- Good Platform and Drain. Soak pit full of waste water.
- Discharge test resulted in a yield of 12 liters in 40 strokes, which is satisfactory. No complaint of leakage.
- Used almost exclusively by water vendors who collect water in 20 lit Jerry Can and then sell to users in the town.

- Discussions with Vendors:
 - Vendor Name: Papi: He has being drawing water from this pump for the last 5 years.
 - Vendor Name: Toto: Has a total of 20 Jerry cans. They fill 5 J/c per person at a time. He came to the pump today at 6.00 am.
 - A vendor with 15 J/c can make 3 to 4 rounds per day with all his cans.
 - Price – 1 SSP per can.
 - Clients can be as far as 2 to 3 Km away from the pump.
 - They work the pump up to 7 pm.
- A count revealed that there were 118 J/c-s around the pump, i.e., about 2,400 lit. waiting to be drawn, @ 12 lit per min, 2 hours continuous pumping.
- The last breakdown of the pump was 1 month ago.
 - It was out of order for 7 days.
 - All the vendors went to other pumps during that period.
 - A Govt. PM repaired the pump.
 - No payments were made.

20 Feb: Visit to Handpumps at Hai Abegyou, Yambio

- Two India Mark II handpumps, about 20 m apart. Both privately owned, by the same owner, who has his house in the immediate vicinity. Almost exclusively used by vendors with Jerry cans.
- First pump (nearer to the road) - GPS references: N: 04° 34' 23.71", E: 28 ° 23' 39.86"
- Second pump (nearer to the road) - GPS references: N: 04° 34' 22.97", E: 28 ° 23' 38.85"
- Good Platforms and Drains. Soak pits full of waste water. Adequate discharge, no complaint of leakage.
- There are 19 regular vendors who use the first pumps, registered with the pump owner. The second pump has 12 regular vendors
 - Each vendor pays 75 SSP per month to the owner for drawing water.
 - Each vendor also pays 30 SSP to RWSS for maintenance services and spare parts, for which they said that they are given official receipts.
 - Vendor name: Johnson: He has been vending for 5 years. Makes about 25 SSP per day. Sells anywhere in the town. Does not have regular customers. People wanting water just call him off the street as he goes by.
- The owner of the pumps is the former Governor, Samuel Abegyou.

20 Feb: Visit to Nzara County

Person met: County WASH Inspector, Erineo Paul Gabadi, 0955324805

Table 36 Summary facts of Nzara County

Payams	5	
Bomas	24	
Population	252,509	
Handpumps total (Dec. 2011)	81	India Mark II
Functioning	58	
PMs	4	on payroll

O&M Process

Communities report maintenance needs to Payam level, who report such request to County. Payam level (volunteer) PMs assess the maintenance needs and request for spare parts from the County. If spare parts are available, they are released and repairs are completed. Cost sharing is a long established procedure in the State. Communities are expected to contribute towards cost of both spare parts and labor of Payam PMs. Formal receipts are issued for both these payments. In actual

practice, cost sharing collection is poor, and not at all in the case of refugee and returnee settlements.

NGO assist with creation of new water source and rehabilitation of existing ones. Often they bring their own spare parts. As a part of the process community level Water Committees are formed and trained, along with Caretakers, capacitated for undertaking minor repairs. Usually such communities are given minor maintenance tools and a Fast Moving Spare Parts Kit.

Main Problem

Lack of spare parts.

Last shipment of spare parts from the State was in April 2011.

Current stocks: Nil

Table 37 Request for Spare Parts, Jan 2012, Nzara County

Sl. No.	Item	Requested	Approved by State
1.	GI Pipes	25	10
2.	Connecting Rod	25	10
3.	Cylinders	2	2
4.	Water Tanks	3	3
5.	Fast moving spares kit	10	10

The State has suggested a contribution of SSP 1,000 for the above parts. The County Executive Director has been requested for funds and has committed SSP 850. The balance of funds needs to be found. This payment is as per the guideline that communities must participate in cost sharing for spare parts and labor costs.

An ideal indent for the County for one year would be:

Table 38 Draft Annual Indent for Spare Parts, Nzara County

Sl. No.	Item	Qty required	State Price Guideline	Value
1.	GI Pipes	150	50	7,500
2.	Connecting Rod	150	50	7,500
3.	Cylinders	50	150	7,500
4.	Pedestal	40	75	3,000
5.	Water Tanks	40	50	2,000
6.	Head Assy.	40	150	6,000
7.	Fast moving spares kit	10	150	1,500
Total Value SSP				35,000

O&M Monitoring

- Use of spare parts was recorded on a site-to-site basis.
- Weekly and monthly reports were sent to the State.
- Sr. Inspector of O&M at the State monitored reports at State level.
- During 2011 a total of 46 repairs were done in the County with spare parts and assistance from UNICEF and IOM.
- 23 repairs were still remaining to be completed at the end of 2011.
- At these places, people drew water from nearby unprotected springs and streams. They are advised to use Water Guard or boil their drinking water.
- GI pipes were replaced in large quantities.
- Frequent corrosion of GI pipes was one reason stated for the high demand for these pipes.

20 Feb: Meeting County Commissioner, Elia Richard Box

This was mainly a courtesy call. The Commissioner mentioned the problem of shortage of spare parts, the problems communities face with cost sharing contributions, and the general difficulties with access to water. He mentioned a particular site in Sakuara Payam, where even the Congolese Army comes across the border for water from the single borehole in that area. He felt that budgetary provisions for spare parts needed to be made by the State level Director, RWSS.

20 Feb: Visit to Handpump at Nzara Official Residence (behind Commissioner's Office)

- GPS references: N: 04° 38' 29.00", E: 28 ° 14' 42.66", Altitude: 614 m
- BH drilled reportedly in 1980s. India Mark II handpump, recently rehabilitated.
- Markings on the Platform concrete were:
 - BH No. 026/INT
 - Rehabilitated on 29-30 Nov 2011
 - By Universal Hydro Services
 - Funded by Common Humanitarian Fund
 - Implemented by Intersos, Yambio
 - Depth 20 m
 - SWL 14.43 m
 - DWL 16.56 m
 - Pump Depth 15.42 m
 - Yield 927 lph
- Good Platform and Drain.
- Water Committee members not available for any discussion.

How can the Dynamic Water Level be 16.56 m when the Pump Depth is recorded as 15.42 m. There is an error.

20 Feb: Visit to Handpump at Hai Matara I, Hai Matara, near (south of) Nzara Town

- GPS references: N: 04° 38' 43.15", E: 28 ° 15' 52.35", Altitude: 597 m
- New Borehole, with India Mark II handpump.
- Markings on the Platform concrete were:
 - BH No. 12/INT
 - Drilled on 18-20 May 2011
 - By Universal Hydro Services
 - Depth 54 m
 - SWL 8.35 m
 - DWL 34.30 m
 - Pump Depth 42.42 m
 - Yield 927 lph

Other Observations

- Handpump: Manufacturer – Ajay, New Delhi, Sl. No. 62675
- Good Platform and Drain.

Discussions with Water Committee members: Chairman: Nelson John, Secretary: Joseph John, Mary Uku, James Charles Ambos, Lily Mary, James Edward.

- A Water Committee of 9 members was trained.
- No contributions were collected before construction.
- After construction, 35 families have contributed SSP 10 (for the year).
- The Committee is pursuing other HH to pay. Total of 106 user-households, 1999 people.

- The Committee holds monthly meetings.
- 2 of the Committee were also trained as Caretakers.
- Caretakers received a Training Manual, a tool box with some tools and a Fast Moving Spare Parts Kit.
- The Caretaker's training manual has no mention of Leakage and Discharge Tests.
- The Caretakers clean the pump platform and drain each morning and unlock the pump.
- The pump is kept unlocked during 6 – 11 am and 3 – 6 pm.

20 Feb: Visit to Handpump at Hai Matara 2, further south of Nzara Town from pump Hai Matara I

- GPS references: N: 04° 37' 46.71", E: 28 ° 15' 51.23", Altitude: 614 m
- New Borehole, with U2 handpump.
- Markings on the Platform concrete were:
 - Drilled on 15-17 May 2011
 - By Universal Hydro Services
 - SWL 10 m
 - Pump Depth 36 m

Other Observations

- Handpump: Manufacturer – Ajay, New Delhi, Sl. No. 4882
- This was not an India Mark II handpump. It was a U2 pump.
- Good Platform and Drain.
- Water Committee members were not available.
- Reported number of users: 220 Households

The information on the concrete platforms on different platforms was not consistent. Why was a pump clearly marked "U2" been installed? Was this in the contract? Lack of field supervision? Client was unaware of what the contractor was providing?

21 Feb: Intersos' water supply related activities in Western Equatoria

Person met: Maria Nilsson, Team leader, Intersos, Yambio

Intersos works in 5 out of the ten Counties of Western Equatoria, namely, Yambio, Nzara, Ezo, Tambura and Nagero, and in a limited number of Payams in each of these Counties. The WASH activities involved drilling of boreholes, rehabilitation of existing boreholes, establishment and training Water Committees and Caretakers, hygiene promotion, HH latrines in IDP settlements and rain/ roof water harvesting in schools (in Yambio and Nzara).

Availability of funding sets the primary limits of the activities. In recent months Intersos has been implementing 4 projects.

- Project 1 was supported by Basic Services Fund for a budget of Great Britain Pounds 825,000 for drilling of 18 boreholes, rehabilitation of 5 BH, 10 rain water harvesting structures in schools, 5 new and rehab of 7 school latrines, 100 arbour-loo HH latrines, and capacity building for govt. counterparts and communities. This project was for a duration of 18 months and had ended in Dec 11. The cost of new borehole with handpump and platform in this project worked out to US\$ 13,945. A Ugandan company did the hydrogeological investigations. Dry wells were not paid for.
- Project 2 was supported by UNICEF, for prepositioning emergency supplies such as Jerry cans, chlorine tablets and for promotion of CLTS. There was a cash component of SS Pounds 200,000. The project ended in Dec 2011.
- Project 3 was for hygiene promotion in 2 refugee settlements, for a duration of 3 months, for a value of SSP 40,000 and ended in Jan 2012.
- Project 4 is supported by the Common Humanitarian Fund up to March 2012, for drilling 5 boreholes, rehabilitation of 8 existing boreholes, construction of 200 household latrines, construction of hand washing facilities and hygiene promotion in communities.

Intersos' is an emergency relief agency. Its activities are driven by the objectives of specific projects, limited by strict and short time frames and are not long-term development oriented nor looks closely at sustainability.

21 Feb: CAFOD's WASH Program in Western Equatoria
Person met: Peter Saru, WASH Officer, CAFOD, Yambio.

CAFOD works in 7 Counties - Maridi, Ibba, Yambio, Nzara, Ezo, Tambura and Nagero. Activities include borehole drilling, rehabilitation, repair and training Water committees and Caretakers. CAFOD has been working since 2009 and by 2011 had drilled 33 new boreholes and carried out 44 handpump repairs. They had stopped rehabilitation, since a problem arose with other partners about branding of old boreholes.

CAFOD's Juba office procures spare parts for repairs. No spare parts are given to the State. Tools are given at Payam level, but again, no spare parts.

During 2012, CAFOD's donors had been ECHO, CAFOD-UK, CARITAS (International, Austria, Germany and Spain). The 2012 program is only up to Sept. 12, and aim to construct 8 new boreholes, complete 47 handpump repairs, do Caretaker level training and hygiene promotion.

CAFOD works through a team of up to 6 volunteers at Payam level, who are paid small sums, and repairs are carried out through existing trained PMs. Information about the need for repairs comes through the County or the Catholic Diocese. Information on repairs completed goes back to the County. Similarly, information on new boreholes goes to the State RWSS and County, but it was unclear if drilling logs were also shared. RWSS has asked for detailed data and this is being complied.

CAFOD has had external evaluations of their programs in July 2011 and Jan 2011. CAFOD's objective of providing service to IDP camps was met, but hygiene promotion remained an area of concern.

21 Feb: UNICEF Yambio's WASH activities in Western Equatoria
Person met: Maluk, Communication for Development Officer,

The Communication for Development Officer was holding charge of WASH activities in the absence of the WASH Project Officer.

UNICEF supported the drilling of boreholes through the State level RWSS Department, Ministry of Physical Infrastructure. It also provided spare parts through the central Ministry of Water and Irrigation.

Spare parts go to State level RWSS department which has its Stores to manage the inflow and distribution of spares to Counties. The local UNICEF WASH Officer was informed about deliveries to the Stores and monitored its use. Spare parts were provided free of cost to the Govt. and UNICEF was unaware of any sale of spare parts.

21 Feb: Hezekia Tuu & Sons Enterprises, Market, Yambio
Person met: Kanido Ayeobo

Availability of Handpump spare parts in the open market

This was a hardware store at the edge of the town and was not very well stocked. The shop attendant was aware of drilling and handpumps. He was also aware that drilling crews and rigs carried their own hardware supplies. He felt that there was no market for handpump spare parts.

21 Feb: Discussions with hardware shop, Abisai & Sons, Market, Yambio
Person met: Abisai, Owner, 0955686463, 0907068485

Availability of Handpump spare parts in the open market

This was a very well stocked shop in the heart of Yambio market, next to the KCB Bank. The shop carried a wide range of Chinese and Indian hardware goods and said that the source of the goods was Kampala in Uganda.

When asked about handpumps, the shop owner sent his shop attendant to fetch a handpump cylinder which was a product of SPAN Pumps, Pune, India. He said that he had brought in a complete handpump with cylinder, rods and pipes from Kampala, for a private client. He was aware of the handpump market in Kampala, but he did not bring in any handpump spare parts because he felt that the government and NGO had a monopoly on this and in any case gave spare parts away for free. Therefore, handpump spare parts provided no business opportunity.

21 - 22 Feb: DRWSS, Yambio

Meetings with Stanislaus Bernado, Dy. Director & John Khamis Mabrouk, Sr. Inspector, O&M

State Water Supply data for Western Equatoria

Table 39 Summary Information for Western Equatoria State as of Dec-2011

Table WE09: State O&M Report, Jan 12	DRWSS data	
	10	Counties
48	47	Payams
778	1101	Existing water points (Hand pumps & others)
	974	Operational water points with hand pumps
	75	Non-functional water points, but repairable (hand pumps?)
	22	Non-functional water points, dry, need replacement (hand pumps?)
34	13	Protected Springs
16		Water Yards
	17	Motorized Pumps
25		Roof water harvesting structures
24		Improved hand dug wells
3		Surface water dams

Note: Significant differences in differences in data are highlighted

Table 40 Water Sources in Western Equatoria State as of Dec-2011*

County	Pay-ams	Popula-tion (2008?)	Water Points						Remarks	Func-tionalit y
			Total	Func-tional	Non func-tional	NF / repair - able	Prot-ected Springs	Motor-ised Pumps		
Ezo	6	173,349	69	55	14	14	1			80%
Ibba	5	68,663	47	37	10	10				79%
Maridi	4	129,751	204	200	4	4	6			98%
Mundri East	5	130,441	111	111				2		100%
Mundri West	4	287,797	97	93	4			1		96%
Mvolvo	7		33	31	2	1				94%
Nagero	3	20,666	31	26	5	5				84%
Nzara	5	249,962	75	54	15	14	3	1	1 dry	72%
Tambura	3	1,152,124	95	81	14	14	2			85%
Yambio	5		212	203	9		7	8	8 dry	96%
Total	47		974	891	77	62	19	12		91%
			127	Additional pumps found after the above inventory						
Reported by O&M, Jan 12		778	1101	Grand Total						

Conclusions

- In Table WE 07, the State reports a total of 1101 water points and gives its distribution. Dry and un-repairable BHs are also accounted for. The information on motorized pumps is valuable since it gives a more complete picture of the water supply situation. The total number of handpumps is 1049 (975+75) making the functionality 93% (975/1049). *Therefore, the overall functionality of handpumps is remarkably good.*
- In Table WE 08, a differentiation is made between Non functional (total 77) and Nonfunctional-repairable (total 62). *Does this mean that 15 pumps (77 – 62) are not repairable? This distinction is important in trying to define functionality correctly.* In Table WE 07, this figure of “dry/ needs replacement” is 22.
- In Table WE 08, initially 974 handpumps were identified and later an additional 127 other water sources were found, making the total of 1101 water points. *Hence, the overall figures are consistent.* The functionality computation is also consistent, 92% [891/(891+77)]. *But the total figure of handpumps in Table WE 08 differs with Table WE 07 [1049 – {(891+77) =968}].*
- *In Table WE 07, many of the figures differ substantially with the figures from State RWSS O&M (Table WE 09).*
- World Vision reported 50% functionality in Tambura County from a total number of 48 pumps, as against 85% out of 95 pumps from the data in Table WE 08.
- The population figures also show wide variance (1.15 million above against 55,365 from W. Vision).

O&M Data at State Level

Table 41 Summary Information

10	Counties
48	Payams
220	Bomas
778	HPs
34	Protected Springs
16	Water Yards
25	Roof water harvesting structures
24	Improved hand dug wells
3	Surface water dams

Table 42 Details of O&M of Handpumps for Jan 2012*

		County										
		Ezo	Ibba	Maridi	Mundri East	Mundri West	Mvolvo	Nagero	Nzara	Tambura	Yambio	Total
Sl. No.	HPs repaired		2			54	1		2	3	15	77
	Spares used											
1.	GI Pipes		9							23	13	45
2.	Con Rods		1						1		7	9
3.	Pump Buckets								4		8	12
4.	Handle Bearings										2	2
5.	Check Valve Seal										2	2
6.	Upper Valve Seal											
7.	Inspection Cover											
8.	Sealing Ring								2		1	3
9.	Pipe Socket										2	2

*Data source: Letter from Sr. Inspector for O&M, RWSS, Yambio dated 03 Feb. 12, to Director, RWSS, Yambio

Conclusions

- The monthly report for Jan 2012 showed that a total of 77 repairs were done for all the Counties in the State. It gave County-wise details and quantities of different spares used.
- GI pipes were the most-used item.
(A similar report, as an annual report for 2011, had been prepared, but was lost due to a computer virus. The Sr. Insp. gave an assurance that the data would be made available to Intersos, Yambio.)
Support from NGOs needed for preparation of reports and computing protocol?
- Mundri West reported 54 repairs, with no details. On the other hand, in Dec 11, (Table WE 08) Mundri West's functionality record showed a total of 97 hand pumps with 93 working (96%).
This is very inconsistent. It is a strong indication that the absence of a repair report is equated to a working pump. This conclusion also applies to Ezo, Maridi, Mundri East and Nagero which also do not records and repairs. It calls the earlier functionality figures (Tables WE 07 and 08) to question. It is also a poor reflection on the quality of reports and management oversight.
- The most frequent repairs were replacement of GI pipes, followed by Pump buckets and then Con. Rods, indicating that Below-ground major repairs were common. Perforation and corrosion of GI Pipes and pipe threads were reported to happen often, from a number of Counties. Yet the use of non-corrodible below-ground components had not been tried.
Awareness of technical options?

Reporting of O&M from Counties

Table 43 Weekly update on O&M activities during 22-26/08/2011, report dated 26-08-11

Sl. No.	County	Payam	Boma/Village	Location/Site	Date	Spares used	Well details
1.	Yambio	Gangura	Gangura	Gangura Centre (1)	22/08/11	3 GI pipes, 3 con Rods, 4 Bolts, 4 Nuts, 1 Chain	SWL 6.15 m, Pump depth 12.42 m, Total depth 12.9 m
2.	Yambio	Gangura	Gangura	Gangura Centre (2)	22/08/11	2 GI pipes, 2 con Rods, 1 Chain	Only to increase pipes
3.	Yambio	Bangasu	Nangondi	Nangodi Centre	23/08/11	2 GI pipes, 2 con Rods, 2 Pump Buckets	SWL 19.27 m, P/ depth 30.42 m, T/ depth 31.77 m
4.	Yambio	Yambio	Ngindo	Town market (Water Yard)	24/08/11	2 Pump Buckets, 1 Upper Valve	SWL 12.50 m, P/ depth 42.42 m, T/ depth 55 m
5.	Yambio	Yambio	Ngindo	Hai Bakindo	24/08/11	2 Pump Buckets, 1 Upper Valve Seal	SWL 12.90 m, P/ depth 33.42 m, T/ depth 54.30 m
6.	Yambio	Bangasu	Makpandu	Refugee Camp	18/08/11	2 Pump Buckets, 1 Lower Valve Seal	SWL 20.10 m, P/ depth 51.45 m, T/ depth 60 m

Data: Anthony Ezekiel Ndukpo, Inspector O&M, Yambio

Conclusions

- Detailed reports, on a weekly basis, were made from Counties to State.
- Yambio County's weekly report of Aug 11 showed 6 maintenance interventions, all of which were below-ground repairs. One out of the 6 was not a break-down.
- Static water levels were not particularly deep.
- Three of the 6 wells were over 50 m deep. In two of these three cases, the cylinder installations were quite deep, 42.5 m and 51.5 m, though respective SWLs were 12.5 m and 20.1 m.
The need for such deep cylinder installations for relatively high water tables, needs further explanation.

Cost Sharing Guidelines for Spare Parts

Data source:

Excerpt from letter

	SDG
GI Pipe	50
Connecting Rod	50
Cylinder	150
Pedestal	75
Head Assy. complete with Handle	150
Fast moving spares kit	150

“If you fail to cooperate...our office will fail to cooperate...”

Data source: Letter from Dy. Director, to Sr. Inspector, Yambio County, dated 05-11-10

Conclusions

- While the guidelines for cost recovery were perhaps a fraction of the actual cost, cost recovery had been in practice for many years.
- Funds collected from communities from the cost sharing drive were not used for purchase of additional spare parts. These funds were reported to be used for purchasing construction materials for rehabilitation, and costs for repairs that had to be done free of costs like camps (army/ refugees/ returnees).

Availability of Spare Parts, Inventory

Table 44 Extract of Handpump Spare parts from comprehensive Inventory Report

Sl. No.	Spare Parts	Qty	Unit
1.	Axle	193	nos.
2.	Connecting Rods	240	nos.
3.	Cylinder	75	nos.
4.	Fast Moving Kit	810	nos.
5.	GI Pipes	168	nos.
6.	Head Assembly	50	nos.
7.	Plunger Rods	18	nos.
8.	Pump buckets	4	boxes
9.	Rod Coupling	123	nos.
10.	Sockets	382	nos.
11.	Spacers	105	nos.
	Tools		
1.	IM II Standard Tools Box	29	boxes
2.	IM II Special Tools Box	25	boxes
3.	Standard Tool Kits	15	nos.
4.	Special Tool Kits	4	nos.
5.	Axle Punch	5	nos.
6.	Pipe Lifters	108	nos.
7.	Self locking Clamp	19	nos.
8.	Pipe Vice	15	nos.
9.	Fishing Tool	20	nos.
10.	Spirit Level	2	nos.

Data source: Report from Store keeper, to Dy. Dir. DRWSS, dated 11 Nov 11.

Conclusions

- The inventory shows that there is a substantial stock of Tools and accessories.
- There is also a good stock of critical handpump spare parts (Pipes, Rods, Fast moving kits), and a surplus in some cases (Axle, Spacers, Head assembly).

Spare parts distribution plans

Table 45 Spare parts distribution plans in Western Equatoria, Dec 2011

County	Total HPs (WE08)	Spare parts for distribution					Tools and Accessories				
		Fast moving Spares Kit	GI Pipes	Con. Rod bundle (10)	Cylinder	Extra DW IM II HP	Standard Tool Kit	Special tool kit with tools parts	Pipe Lifter	Fishing Kit	Special Tools Oversize clamp
Ezo	69	10	20	10	5	3	5		15	3	2
Ibba	47	5	20		5			5			
Maridi	204	10	20	10	7					3	
Mundri East	111	10	20	10	5		5	4	9	3	1
Mundri West	97	5	20		7			5			
Mvolvo	33	10	20		5	3	5	5	15	3	2
Nagero	31	10	20	10	5	3				3	2
Nzara	75	6	20		4	3		5			
Tambura	95	10	20	10	7	3	5		15	3	2
Yambio	212		20		10		1	6			2
Total	974	76	200	50	60	15	21	30	54	18	11
	127	Hand pumps found later									
	1101	Total number of handpumps as per State's Inventory of Dec 2011.									

Data source: Report from Inspector O&M, approved by Dy. Director, dated 09 Dec.11

Conclusions

- A spare parts distribution plan had been made in Dec. 2011 by the State RWSS for all the Counties.
- With reference to the numbers of handpumps in each County, the pattern of spare parts distribution followed a rough relationship for some items and did not follow any relationship for some other items (GI pipes).
- The need for Connecting Rods should have followed a pattern similar to that of GI Pipes, if corrosion was a problem. But the distribution of Rods is to 5 out of the ten Counties, and the quantities were 100 (10 bundles) as against 20 GI pipes, to each of the five Counties.
A clear logic to this was not easily evident, except that there was an excess stock of rods and a short supply of pipes at the State.
- The need for GI pipes was seen in all Counties.
Did this mean that corrosion of pipes and damage to pipe threads is a problem across all Counties in the State? Was there any water quality data to substantiate this?

22 Feb: Visit to Makpandu Refugee Camp

The Camp was about 30 Km east of Yambio, on the Maridi road for Congolese refugees. Intersos had been managing the camp, including its WASH activities. The camp had a population of 5320 and was 4 years old. It had 12 handpumps plus one borehole which had gone dry. 10 of the 12 handpumps were working, water was depleting in 5 BHs and these pumps were running dry after a while.

From the start, the handpumps have been maintained by Intersos. They still had a full time person posted at Makpandu for this purpose. Water Committees were formed around each pump and a group of 5 PMs were trained from the camp community. No payments were made for repairs to either Intersos or the camp PMs. Intersos supplied the spare parts.

No Water Management Committee members were present for discussions. Two PMs, Sakpioba Renne and Mborifue Gieudonne, were present. The recent history of the functionality of the 12 pumps, obtained from the PMs is given below. For undertaking any repairs, tools were brought from Intersos. The camp did not have a set of tools. Presently, one broken down pump's pipes had dropped in to the bore. Intersos did not have any fishing tools. These were to be borrowed from RWSS Yambio.

Table 46 Status of handpumps in Makpandu Refugee Camp

HP No.	No. Repairs in 2011	GPS Coordinates		Remarks
		N	E	
1.	1			
2.	2			
3.	3			
4.	2			
5.	5			Depleting
6.	1			
7.	4	04° 45.063'	28° 42.079'	Last repair: Nov. 2011, Pipe threads were damaged. 10 riser pipes, Cylinder Buckets were replaced. 2 old pipes were rethreaded and reused. Pump handle is very heavy. Yield is interrupted. Depleting.
8.	2			
9.	2			Depleting
10.	1			Depleting
11.	3	04° 45.043'	28° 42.097'	100 m depth borehole, originally installed with a submersible pump and generator. Converted to a HP (with 15 riser pipes) due to lack of fuel. Last repair: Jan 2012, Disconnection rods at Cylinder. Repaired with no new parts. Depleting. Water lasts till 2 pm.
12.	1			
13.				Dry borehole
	27	Total repairs		

Conclusions

- Intersos has managed this Camp from the start, about 4 years ago.
- The Camp currently had a population of about 5,300 Congolese refugees.
- The Camp does not have the capacity and means to maintain its water sources.
- Of the 12 water sources, 5 have a history of depleting and, therefore, cannot be considered sustainable. On the other hand, closing down these sources does present difficulties.
- In one year, 2011, about 27 major repair events have occurred across all the 12 handpumps.

How does one judge this situation vis-à-vis sustainability and movement away from an emergency situation? When should such a transition have started?

22 Feb: Visit to Handpump at Nangere Road IDP Camp

- GPS references: N: 04° 42.522', E: 28 ° 37.484'
- A handpump close to the Makpandu – Yambio road, on the left.
- Rehabilitated BH by UNICEF with Japanese assistance in 2011.
- India Mark II handpump in working condition.
- Poor construction of Platform and Drain
- Waste water stagnating within platform and drain.
- No Water Committee was evident.
- Discussion with nearby user, Raba John.
- Last breakdown was in Dec. 11. Details not available. Repaired by Intersos. No contributions/ payments.
- Earlier water source was a stream, 2 Km away.

22 Feb: Visit to Handpump at Bazmgwa Primary School

- GPS references: N: 04° 35.513', E: 28 ° 27.102'
- Close to the Makpandu – Yambio road, on the left, closer to Yambio.
- A working India Mark II handpump proposed for rehabilitation by Intersos, with a platform and drain in reasonably good condition.
- Training of Water Committee was going on in the nearby School building, organized by Intersos.
- Discussion with nearby bi-cycle repair man, Alex Justin.
 - Borehole was drilled around 2000.
 - The pump had 12 pipes (36 m).
 - Last breakdown was in Nov. 11. Details of repairs were not available.
 - Repaired by the Yambio County, probably Payam PM..
 - Labor charges of SSP 250 were paid. No receipt was given.
 - No payment was made for spare parts used.
 - The funds were raised by house-to-house collection of SSP 5 each.

24 Feb: Data on Nagero County, provided by Senior Inspector to Nilsson, Intersos.

Maria Nilsson was travelling to Nagero County and was requested by the consultant to gather some information on functionality of handpumps, maintenance and spare parts. The information provided by the County Sr. Inspector is provided below:

- Nagero Payam: 16 boreholes (2 non-functioning)
- Duma Payam: 7 boreholes (1 non-functioning)
- Namutina Payam: 12 boreholes (all functioning)
- 18 boreholes were repaired during 2011: 5 with CAFOD, 5 with Directorate staff and spare parts from Yambio, and 8 by the Senior Inspector himself
- Spare parts used for the 8 repairs of 2011: 5 pipes, 7 rods, 15 pump buckets, 1 head assembly
- All spare parts used for the 8 repairs were given by State Directorate of Water Supply and Sanitation.
- No money was paid from Nagero County to the State for these spare parts, and the State did not ask the County to pay for them.

- Communities did not pay for the spare parts used for the repairs, but they contributed money for the people who assist in repairing the hand pumps.
- The following spare parts were currently in the store in Nagero: 17 rods, no pipes, 5 pump buckets, 1 head assembly, 1 stand.
- No request has been made for more spare parts during 2012 (but a request will probably be made later on).

Conclusions

- Nagero County had 35 boreholes with handpumps of which 3 were not functioning, which made the functionality 91%.
- 18 out of the 35 B/H needed repairs in 2011, i.e., the annual maintenance workload was 50% of the number of pumps.
- Details of County, NGO and State participation in O&M, spare part used and nature of payment for O&M by communities were clearly reported.
- GI pipes were the most common spare part needed.
- The County had small quantities some spare parts in stock.

Report on Field visits to Warrap State, 24 – 29 Feb 2012

Schedule of meetings and visits

Sl. No.	Dates	Place	Event	Purpose
1.	24 Feb.		Travel: Juba – Wau - Kuajoc	
2.	25 Feb.	Gogrial West, Agok, Ngapkuatjok	Visit to Handpumps	Discussion with users. Understanding how pumps are maintained.
3.	26 Feb.		Sunday	
4.	27 Feb.	Kuajoc	Discussions with OXFAM Intermon	OXFAM Intermon's WASH activities. Water supply status in Gogrial East. Refer Tables 47, 48 & 49.
5.			Meeting with Anjelo Akol, Acting Dy. Director, RWSS, Warrap	Overview of water supply in the State. Refer Tables 50, 51 & 52.
6.		Gogrial West County HQ	Meeting with Joseph Akot Kon, Dy. WASH Coordinator, Gogrial West County. Discussions with Wol Malang Wol, Pump Mechanic	Overview of water supply in the Gogrial West County. Refer Tables 53, 54 & 55. Background of a PM
7.	28 Feb.	Turalei , Twic County	Meeting with Joseph Giir, WASH Coordinator, Twic County	Overview of water supply in the Twic West County. Refer Table 56.
8.			Meeting with ACF Wunrock	ACF's WASH activities in Twic.
9.		Meeting with Goal, Wunrock	Goal's WASH activities.	
10.		Alek, Gogrial West County	Meeting with Norwegian Church Aid, Alek, Gogrial West County	NCA's WASH activities in Gogrial West.
11.			Meeting with ACF, Alek, Gogrial West County	ACF's WASH activities in Gogrial West.
12.	29 Feb.	Kuajoc	Meeting with Winrock BRIDGE, Kuajoc	BRIDGE Program's WASH activities in Warrap.
13.	1 Mar.		Travel to Aweil	

Report on Field visits to Warrap, 24 – 29 Feb 2012 - Detailed Notes & Data

The consultant's field visits in Warrap were coordinated by Winrock International's Sudan BRIDGE Program, Kuajoc. Ariech Deng Ariech, WASH Project Officer of the BRIDGE Program, accompanied the consultant during most of the meetings and visits. Detailed notes on the events of the field trip are describes below in the chronological order that they occurred.

25 Feb: Visit to Handpump at Agok, Gogrial West.

- GPS references: N: 08° 17.989', E: 27 ° 59.477'
- Drilled by East African Aquatech for Winrock BRIDGE.
- Depth - 64 m, SWL – 22.6 m
- Borehole with India Mark II EDW handpump, without T Bar.
- Handpump from AOV International, Sl. No. 4257, manufactured - 03/10
- Good Platform and Drain.
- Pump showing a delay in discharge, requiring 10 idle strokes, soon after pumping is stopped. Indicative of a significant leak in the below-ground assembly.

Discussions were held with some members of the Water Committee (Kon Kon Wol, Den Kon Wol, Wol Kon Wol. (Because of the similarity in names, the Committee has begun to add the mother's name to identify contributors clearly).

- Pump was last repaired in March 2011.
- Problem was with pipes and rods. Earlier, water came only after 5 minutes of pumping. The pump then stopped working.
- Chairman of the Committee went to the Payam to request for repairs. The PM was at the County HQ. So the Chairman went to County HQ. This was a walk for 2 hours.
- The PM came the next day, assessed the spare parts needs, which he got from the County, and came back one day later to repair the pump.
- The Cylinder was leaking. A valve was changed,
- A riser piped was leaking and the rods had disconnected.
- The PM was a volunteer. The Committee paid him SSP150 for the work. There was no payment made for the spare parts. The funds were collected by going house to house, asking for contributions of SSP 5.
- Funds were still being collected. The Treasurer is holding about SSP 100.
- There were 80 user households, but not all were paying the contributions. Returnees who came recently to the village could not afford to pay.
- Users from nearby villages now came to this pump to draw water, and paid.
- Before this well was drilled, the earlier water source was at Rumbki village, 2 hours walking. Only the women went to fetch water.
- One jerry can of water was precious, used only for cooking and drinking. Bathing was not possible.
- Now not only is bathing possible, but trees like mahogany, mango, lemon and neem have been planted. Brick making has started using this water source. A small market has started in the village.

25 Feb: Visit to Handpump at Ngapkuatjok, Gogrial West.

- GPS references: N: 08° 32.388', E: 28 ° 01.874'
- Borehole supported by Winrock BRIDGE. Drilled in July 2011.
- Depth - 60 m
- India Mark II EDW handpump, without T Bar.
- Handpump from AOV International.

Discussions were held with some users around the pump. The village headman also came a little later.

- There was a Water Committee of 9 members, but none were available.
- Users contribute SSP 1 per household per month for drawing water, but this was irregular.
- This village had about 200 households,
- People from 5 surrounding village also came here for water, sometimes walking for 1 hour or more.
- The pump had broken down once since it was installed. A PM from the Payam came to repair it. No spare parts were used. A payment of SSP 150 was made to the PM.
- Presently the pump was working but it took 2 to 3 minutes of pumping in the morning before the flow of water started, indicating a leakage in the below-ground assembly.

Conclusions:

- At both these places, the hand pumps were working, Committees were functional and payment for water and maintenance was now accepted, if only for labor charges.
- Detailed discussions with both groups of users provided some insight on how the reporting for a maintenance need was made and how it was paid for.
- In both places, the T Bar handle to IM II Extra Deep Well pumps had been removed to serve as IM II.

This indicated that there was a lack of awareness about quality and specifications and the driller used this to his advantage.

- Both pumps showed delays in discharging water, indicating leakage in the below-ground assemblies. Yet neither the Water Committee nor the users showed an awareness that there was an imminent problem.

This indicated a lack of awareness of preventive maintenance tests and reflected negatively on the training content used for training Caretakers.

27 Feb: Meeting with OXFAM Intermon at Kuajoc

Persons met: Eunice, Field Manager (092001231), Stephen, WASH Officer

OXFAM Intermon had two program locations in Warrap.

1. This is at Blocks 19 and 40, at the Kuajoc Camp for Returnees. This program does not have strong WASH component.
2. The second base is at Lanykeir, in Gogrial East County, which has a WASH component.

In Block 14, Kuajoc Camp, UNICEF had drilled wells and installed handpumps in 2011. Intermon improved upon the installations since drains were very short and quality of construction was poor. Water Committees were there but had not been trained. Intermon trained/ retrained the Water Committees and Caretakers/ PMs. These PMs were used to repair handpumps that had broken down.

Intermon's work in Gogrial East County started in 2009. By 2011, 17 new boreholes had been drilled and 100 existing boreholes had been rehabilitated. All were with handpumps.

- Training of Water Committees and handpump Caretakers, with tools to Caretakers were also a part of the program.
- The communities are linked to the County RWSS to request for spare parts and maintenance. This referral system is not yet strong.
- Communities pay County PMs. The usual rate paid for a repair is SSP 140. Sometimes communities do not report the need for repairs and such pumps remain broken down for long periods.
- There is no systematic monitoring system from Intermon's side. A few pumps are checked every month. Intermon's estimate is that over 80% of the pumps are functional most of the time.
- There are private boreholes in Gogrial East, which supply water to communities. A group of households commit to pay an annual water use fee and a separate maintenance fee, when maintenance is needed, to an individual. This individual finances the water source and as its owner, also meets the necessary O&M costs. The group of households continues to pay the agreed annual tariff and the actual O&M costs and draw water from this source.

Notes: Unfortunately, further details were not available on the operation of these private wells and compare the situation with the practices around similar wells in Yambio, Western Equatoria. Intermon said that RWSS took such boreholes into their total tally of water sources.

OXFAM Intermon had conducted an inventory of all water sources in Gogrial East. The data for the inventory was also supplemented by an Assessment of O&M needs. The data fields of the inventory and the O&M assessment are provided in **Tables 47 and 48** below. The summary of the inventory results are provided **Table 49**.

Table 47 Water Source Inventory Data Fields

1.	Sl. No.	8.	Year
2.	Village or Site	9.	Agency
3.	Functional	10.	Type of Casing
4.	Non-Functional	11.	Type of Rig
5.	Dry	12.	GPS Coordinates
6.	Total depth	13.	Remarks
7.	SWL		

Table 48 O&M Assessment Data fields

Sl. No.	Payam	Site	Type of Facility		GPS coordinates		Facility current status		Repairable - Action required				Beyond repair	
			BH-IMK II	Water Yard	N	E	Functional	Non-Functional	Platform		Pump		Dry	Damaged
									Minor Repair	Major Repair	Minor Repair	Major Repair		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Table 49 Gogrial East County – Inventory of Water sources

Sl. No.	Payam	Sl. No.	Boma	Function in good condition	Non functional	Dry	Total
1.	Nyang	1.	Gamdhang				
		2.	Mayen-Jur		6		6
		3.	Nyang				
	Sub-total				6		6
2.	Pathuon East	1.	Mayom-Biong	9	10	7	26
		2.	Yiik-Ador	11	10	12	33
	Sub-total			20	20	19	59
3.	Pathuon West	1.	Luonyaker Boma	39	18	12	69
		2.	Majok Boma	15	6	4	25
	Sub-total			54	24	16	94
4.	Toch East	1.	Nyangdit	15	5	7	27
		2.	Thuramuon	7	11	3	21
	Sub-total			22	16	10	48
5.	Toch North	1.	Majaknyuom	5	5	8	18
		2.	Mangol	1	9	2	12
		3.	Mayom-Chol	12	3	4	19
	Sub-total			18	17	14	49
6.	Toch West	1.	Malual-Awien	11	4	5	20
		2.	Panacier		10	4	14
	Sub-total			11	14	9	34
	Grand Total			125	97	68	290

Conclusions:

- Data for the inventory was provided by Intermon as a soft copy.
- A preliminary examination showed that the data tabulation and analysis could be improved upon. However, the overall picture of Gogrial East County emerges fairly clearly.

- An interesting feature was that the data was dealt with at two levels.
- The primary distinction was between functional, nonfunctional and dry boreholes.
- The second level dealt with O&M and attempted to identify the nature of work required on the main components of the water source.
- This assessment had been done for only a small part of the inventory and so the maintenance work load and the projection of spare parts requirement has not yet been made.

The data fields of the inventory should be compared to the WIMS data collection requirements. The Intermon data fields are much more attuned to maintenance management and monitoring.

27 Feb: Meeting with Anjelo Akol, Acting Dy. Director, RWSS, Warrap State, Kuajoc. Warrap State had 6 Counties. Data on water sources in the State from Nov 2011 is given below:

Table 50 Functionality of handpumps in Warrap

County	Bore holes with handpumps			
	Total Nos.	Functional		Non Functional - Nos.
		Nos.	%	
Tonj North	320	248	78%	72
Tonj South	145	94	65%	51
Tonj East	113	97	86%	16
Twic	328	286	87%	42
Gogrial East	301	223	74%	78
Gogrial West	511	454	89%	57
Total	1,718	1,402	82%	316

- Each County has a WASH Coordinator, a Dy. WASH Coordinator, 6 PMs and 3 Hygiene Promoter on regular payroll. Additionally, there are a number of volunteer PMs at Payam level.
- The County PMs on payroll collected spare parts from the State RWSS and passed them on to the Payams. They also generally attend to boreholes needing rehabilitation and to difficult repairs that the Payam volunteer PMs could handle. No payment was made from communities to County and from County to State for spare parts.
- Construction of a new Store in nearing completion.
- An inventory of spare parts reported on Feb 10, 2012, showed the following stocks of parts and tools.

Table 51 Inventory of Spare parts in stock, Feb 2012, RWSS, Warrap

Sl. No.	Spare parts	Qty	Unit
1.	Connecting rod	630	nos.
2.	Cylinder	117	39 Cartons x 3 Cylinders
3.	Cylinder	66	11 Cartons x 6 Cylinders
4.	Pedestals	55	nos.
5.	Head Assembly	182	nos.
6.	Water Tank	83	nos.
	Tools		
1.	Special Tools Kit	8	
2.	Fishing Tool	34	
3.	Pipe Lifters	147	
4.	Special Tool Kit	30	
5.	Standard Tool Kit	26	
6.	Special Tools	26	Boxes

Sl. No.	Spare parts	Qty	Unit
7.	Standard Tools	20	Boxes
8.	Standard Tools	2	Wooden boxes
9.	Heavy Duty Clamp	73	

Note: Obviously there is some ambiguity in descriptions of Special and Standard tools Kits/ Boxes and packaging.

- Spare parts came from UNICEF to the State. There was no intermediate storage point for spare parts (like Wau) and probably came only when imports landed Mombasa. Also small shipments were not sent within South Sudan. A truck would deliver spare parts to three to four States at a time, e.g., NBG, Warrap, WBeG and Lakes. Such arrangements caused long delays between the time spare parts are requested and when they are delivered.
- While information was received from Counties on numbers and details of repairs, these were not used to estimate annual spare parts requirements.
- County WASH Coordinators were expected to come to monthly WASH Cluster Meetings at Kuajoc, but practicalities such as lack of mobility and absence of cell phone communication networks made travel difficult. The brief nature of the monthly WASH Cluster meetings was a disincentive for the Coordinators to travel long distances and bad roads. In the meeting of Feb 2012, not a single Coordinator attended. This made regular reporting and monitoring extremely difficult.
- Coordinators did come on a quarterly basis, but the data they provided was not regularly compiled and was not immediately available.

Conclusions:

- On the basis of the information provided by RWSS, Kuajoc, the functionality of handpumps in Warrap State was 82%, which, at face value, was quite good.
- Data on total numbers and functionality of handpumps exists. However, the reliability of this data needs to be reconfirmed.
- For example, the figures from OXFAM Intermon, the State and the Counties varied widely for Gogrial East, Gogrial West and Twic Counties. This is illustrated in Table 52 below.

Table 52 Comparison of State and County figures for Handpumps

County		Handpumps		
		Total nos.	Functioning	Functionality
Gogrial East	State figures	301	223	74%
	OXFAM Intermon figures	290	125	43%
Gogrial West	State figures	511	454	89%
	County figures	461		
Twic	State figures	328	286	87%
	County figures	283	207	73%

- Maintenance data came from the Counties intermittently. Attendance of County WASH Coordinators at WASH Cluster Coordination meetings was poor, primarily due to remoteness of the counties and poor communication. For the WASH Coordinators, their travel time did not compare favorably with limited agenda of the Coordination meetings.
- Maintenance data was said to be compiled at State level, but was not available for verification.
- At the State level, UNICEF was the sole source of spare parts. There was a very long lead time in between making a request and its delivery.

- There was a surplus stock of tools and spare parts. The critical spare part most commonly needed in Warrap, GI Riser pipes, was out of stock. Also, there was no stock of Fast Moving Spare Parts Kits.

27 Feb: Meeting with Joseph Akot Kon, Dy. WASH Coordinator, Gogrial West County, Warrap State

Gogrial West had 9 Payams with a total of 461 handpumps as shown in [Table 53](#).

Table 53 Gogrial West County, Warrap - Nos. of Handpumps - Sept 2011

Sl. No.	Payam	Nos. of HPs
1.	Gogrial	52
2.	Alek	67
3.	Riau	47
4.	Miyom Toti	61
5.	Akon South	48
6.	Akon North	35
7.	Alek West	28
8.	Kuach North	71
9.	Kuach South	52
Total		461

- Gogrial West maintained a ledger book for each of its 9 Payams, where the inventory of water sources was created in Sept 2011 with the help of PMs on the County payroll. The ledger books were provided by Winrock BRIDGE program.
- The details on the data maintained in the ledger books are listed in [Table 53](#).

Table 54 Gogrial West County, Warrap - Data Fields in Ledger Book

1.	Sl. No.	6.	First Repair date	11.	No. of Returnees
2.	Name of HP	7.	Repaired by	12.	WMC present?
3.	Location (Village)	8.	Date of Drilling	13.	Avg. Water Fees/ m – SSP
4.	Condition (OK/ Not OK)	9.	NGO who sponsored Drilling	14.	Remarks
5.	If not OK, problem?	10.	No. of Host Households		

The above data structure poses some difficulties since it does not distinguish between one-time static data (such as Location, Date of Drilling) with data that changes with time (such as Condition, No. of Households or Returnees). The one-time data and the time-dynamic data need to be separate data bases with linked by a key data field, such as a unique identity process of every water sources.

When a search was made for the pump visit at Agok (25 Feb.), it was not found in the ledger.

- The current stock of spare parts is provided in [Table 55](#).

Table 55 Gogrial West County, Warrap - Current Stock of Spare parts – Feb. 12

Fast Moving Kits	15
GI Pipes	7
Rods	7
Cylinder	2
Head Assy. with	4

handle	
Water Tank	Nil
Pedestal	Nil

- Accurate figures of maintenance events in the county were not immediately available.
- During Jan 2012, 32 handpumps had been repaired, and there had been 10 repairs during Feb (by 27 Feb). The highest number of broken down handpumps reported in a month was estimated at 80.
- Monthly detailed repair reports were made on a regular basis and sent to RWSS in Kuajoc. A consolidated yearly report had also been made but a copy was not available.
- GI Riser pipes were the most frequent item needing replacement because of corrosion.
- Hand dug wells were to be found in Alek Payam.
- The County had a WASH Coordinator, a Dy. WASH Coordinator, 11 PMs and hygiene promoters on payroll. Over and above this, there were 16 volunteer PMs.
- Repair requests from communities were received at Payam level by the volunteer PMs. If spare parts were available from the County, the volunteer PMs carried out the repairs.
- The main source of spare parts was for UNICEF stocks, through the State RWSS.
- Spares were provided free of cost to communities who generally paid volunteer PMs SSP 120 for labor charges.
- If spare parts were not available at the county, requests were made to partner agencies in the county to see if they could provide the necessary spares.
- Norwegian Church Aid (NCA) was also a source of spare parts for the County.
- Rehabilitation work was usually assigned to PMs on payroll.

Discussions with Wol Malang Wol, Pump Mechanic

- The PM was present at the Dy. WASH Coordinator's during the above discussion.
- The first training program he attended was in 1998, held by Save the Children, UK.
- Since then he had attended 8 training programs.
- The deepest installations in the area were up to 36 m in the County.
- There were occasional cases of fishing for dropped below-ground assemblies and they were usually successful.
- He was familiar with installation and maintenance of India Mark II, Afridev and Direct Action handpumps.
- He was on the county payroll.

28 Feb: Meeting with Joseph Giir, WASH Coordinator, Twic County, Warrap State

Twic County has a total of 6 Payams. The estimated number of handpumps in the County was 283 as detailed in Table 56 below:

Table 56 Handpumps in Twic County, Warrap

Payam	Handpumps		Volunteer PMs
	Total Nos.	Nos. Functioning	
Ajak Kuac	27	21	5
Akoc	34	18	7
Aweng	36	26	4
Panyok	56	32	5
Turalei	68	55	5
Wunrok	62	55	4
Totals	283	207	30
Functionality		73%	

Source: Twic County planning document (formulated with the assistance of Winrock BRIDGE)

- A number of partner agencies were working in Twic in the WASH sector, ACF, Goal, PAC Sudan, Winrock BRIDGE.
- ACF provided complete and detailed records of new and rehabilitated wells, as per the prescribed forms.
- Goal used to provide records of their work but have now stopped.
- BRIDGE provided ledger books to complete water source inventories. 3 Payams had been completed. The ledgers were kept at the County since there was no one at the Payams to take responsibility for them. Literacy among the older volunteer PMs was low and that posed a problem in completing the ledger book records.
- Repair requests from communities came through Payams. If spare parts were available at the County, the Payam volunteer PM carries out the repairs.
- Communities paid volunteer PMs small sums, SSP 60 to 100, and often in kind.
- PMs on the County payroll attend to rehabilitation and cases of difficult repair.
- Record keeping is generally poor.
 - There was no consolidated annual work report for 2011.
 - There were no individual site-to-site repair reports and so it was not possible to get an overview of spare parts usage.
 - Monthly work reports on maintenance were made but were not immediately available.
 - An inventory of spare parts for 2011 had not been made.

28 Feb: ACF Wunrock Payam, Twic County
Person met: Michael, Manager, WASH Deptt.

- ACF's operations in Twic go back to 2005 - 06.
- They worked in 5 out of the 6 Payams of Twic County (in Ajak Kuac, Aweng, Panyok, Turalei, and Wunrok and not in and Akoc).
- ACF's work in water supply included new boreholes, rehabilitating existing ones and repairs.
- They also train Water Committees and Caretakers.
- Upgrading hand dug wells and installing Rope Pumps was being planned.
- ACF was trying to encourage communities to access spare parts from a local dealer.
- Traders were with the impression that only NGOs and Govt. were in the spare parts business. Since NGOs and the Govt. gave spare parts free of cost, it did not attract any commercial interest.
- Some preparatory work had been done in this regard to change this perception– workshops had been held at State and County levels. . (Note: During the final month of the project, March 2012, a local trader in Twic with connections in Juba agreed to import spares directly from Uganda.) However, it was too late in the project to start the process. The project is expected to continue in 2012, and ACF will continue to try to develop the supply system.)
- The “voucher system” was not yet working in Twic, but the experience of ACF's work in Alek, Gogrial West, could be used effectively.

28 Feb: Goal, Wunrock Payam, Twic County
Person met: Jack George Rejoice, Manager M&E

- Goal works in all 6 Payams of Twic County.
- In 2011, Goal drilled 10 new BH, rehabilitated between 6 to 8 BH and completed more than 50 repairs.
- Goal's entry point in to WASH activities was by involving local communities, using local authorities like the Payam administration to explain ownership and sustainability.

- If a site is approved for construction of a water source is approved by State RWSS, then Goal reengages with communities to form a Water Committee of 5 members of whom 2 are women.
- The committee is trained in O&M and linkage with Goal.
- Two of the committee members are also trained as Caretakers.
- Goal created a separate cadre of “Super Technicians”, PMs who were trained in handpump maintenance for 5 days.
- Repair request came to Goal either from the County or directly from communities.
- Super technicians attended to such repair requests, accessing spare parts from the County stocks.
- If the County did not have spares, then Goal provided spares from its own stocks. These were given free of cost.
- Payment to Super Technicians from communities was encouraged, but was not on a very firm footing.
- Goal was aware of ACF’s efforts of encouraging communities to buy spares. They were also aware of the contradictions in the two approaches – Goal’s and ACF’s.

Did Twic County not have enough PMs? Was a separate cadre of PMs really necessary? 5 days’ training was inadequate for training a new PM. Or was Goal using existing PMs and calling them by a different name?

28 Feb: Norwegian Church Aid, Alek, Gogrial West County

Person met: Charles

- NCA started working in Alek in 1998.
- They drilled boreholes, which were contracted out.
- At new bore holes supported by NCA, Water Committees and Caretakers were trained.
- NCA supported rehabilitation, where they provided handpump hardware and construction materials to County PMs. In such cases communities also contributed local materials like sand.
- NCA also provided handpump spare parts for county level handpump repair, when the County directed such requests to NCA.
- NCA’s spare parts were sourced by its Procurement section from Kenya and Uganda.
- Data/ reports on utilization of spare parts came from Counties but were not compiled any further.
- Closing stocks of spare parts at the end of 2011 were: 100 nos. GI Pipes, 5 Cylinders, 20 Fast Moving Spares Kits and some tools.
- The budget for spare parts for 2012 was SSP 60,000. So far 250 GI pipes, 25 cylinders and some tools had been received.
- NCA was supporting the State in conducting an inventory of all water sources, supported by UNICEF. The questionnaire had been agreed upon and the inventory has started.
- NCA was dependent on its proposals to donors getting funded.

28 Feb: ACF, Alek, Gogrial West County
Person met: Rangaiya Kanaganathan, WASH Program Manager

The main purpose of this meeting was to understand ACF's attempt to establish local spare parts suppliers for handpump spare parts.

- ACF has been working in Alek since 2006.
- ACF had several rounds of meetings and workshops with various stakeholders on the theme of sustainability of water points.
- At these workshops, it was agreed that local traders from Alek and Gogrial would be supported.
- Out of three local traders, one agreed to stock spares. It took three months of discussions before local traders could be convinced to invest in stocking handpump spares. Then the trader withdrew.
- Now a second trader has entered the process.
- Prices of goods quoted locally sourced from Kampala were a few times higher than Kampala prices.
- Attempts were made to find intermediate sources/dealers at Wau.
- Drub Engineering at Wau, sources some parts from Khartoum, but they had a limited supply.
- Drub was doing a further assessment to gauge the demand.
- ACF gave feed back to Drub to motivate others NGOs (NRC, ACTED) and UNICEF to buy spares from Drub.
- Drub's prices were still quite high, 4 to 5 times that of prices in Nairobi.
- Instead of actually providing spare parts to communities, ACF provide communities with vouchers for part of the value of spare parts, which they exchange with the local trader to obtain the spares. Communities also pay the PMs and transport the spare parts.
- The next step is to increase the scale of the project to make spare parts supply more lucrative to local traders, increase competition among traders, and bring down the cost of parts. The vouchers will be expanded to cover construction items for surface work repairs (cement, reinforcement bars, etc).
- ACF's Twic County and NBG work will also use this linkage to access spares.
- The local dealership in Alek was established in 2011.
- ACF's project finishes in March 2012 and was expected to continue in 2012 – 13.

What did Drub bring in?		What did Drub sell?	
Materials	Qty	Qty/ Set	
G I pipes 3 m	35	7	Drub sold all spare parts as sets, priced at US \$ 900 per set.
Rods 3 m	35	7	
Cylinder head	5	1	
Head Assembly	5	1	
Pedestal	5	1	

The process

1. Request comes from Water User Committee to PM about the problem with the water point.
2. A technical assessment is made by PM to identify the requirement of spare parts. PM and WUC agree on service charges.
3. Communication by WUC to ACF, submitting the assessment forms signed by selected PM. WUC Chairman (or a member with authorization) visits ACF office to calculate the amount of money need and to receive the voucher.
4. ACF provides a percentage of the value of spare parts, as the voucher according to the agreement reached with the WUC representative.
5. The WUC representative visits the trader and collects the spare parts by submitting the voucher and paying the balance (from community collection).
6. WUC transport the spare parts to the village themselves and completes repair with PM. It was agreed during the county level work shop that payment for PM will be from 75 SSP to 150 SSP according to the work load.
7. The trader will submit all the vouchers and invoices every week and collect the money from ACF.

- ACF is actively working with the PM Association (PMA) in Aweil East to build their capacity to provide service and spare parts. In 2012, the PMA was unable to procure spare parts from the international markets due to low capacities, lack of business skills/knowledge, and lack of connections/ relationships with regional spare parts dealers.

Repairs to 10 water points have been done in Gogrial West following the above procedure. [Example: Magak WUC received a voucher for 220 SSP from ACF, they added 80 SSP, which they collected from users. They would get spares of the value of 300 SSP from the trader. The trader will bring the voucher of 220 SSP to ACF to get his money.] The value of a voucher changed according to the assessment. The minimum voucher value so far has been 220 SSP and maximum was 3035 SSP.

29 Feb: Winrock BRIDGE, Kuajoc

Person met: Nicholas Manza, Team Leader

- The Winrock BRIDGE Program in Warrap started in 2009.
- Since then, WASH activities have been:
 - during 2010 – New BH: 8 in Twic, 8 in Gogrial West, 2 in Tonj North, Rehabilitation: 20 through a local CBO, Kaya (Kuajoc Assn of Youth Agents), who also did repairs.
 - during 2011 – New BH: 6 in Tonj North, 2 in Kuajoc Camp (for Returnees).
 - during 2012 – the plan is to drill 9 new BH in Tonj North.
 - training was/ will be done at all the above sites which will include Hygiene, Sanitation, establishment of Water committees and Caretakers.
 - BRIDGE had brought in its own spare parts for the rehabilitation and repairs components. No spare parts were given to communities or to the County.
 - Payam level volunteer PMs were given bicycles.
- There were plans to construct a warehouse for spare parts and other inputs but this was eventually not done.

Report on Field visits to Northern Bahr-el-Ghazal, 1 – 6 March 2012

Schedule of meetings and visits

Sl. No.	Dates	Place	Event	Purpose
1.	1 Mar.	Aweil	Travel – Kuajoc to Aweil Meetings with: – Director, DRWSS – Jacque Bevin Bovier, SDC	Overview of the State water supply situation, maintenance and spare parts situations, reporting procedures, Pump Mechanics' Associations. Refer Tables 57 and 58. SDC's WASH program in NBG.
2.	2 Mar.	Mabil Town	Travel to Aweil East HQ Meetings with: – County Officials – Pump Mechanics' Association Visit to two handpump sites	Overview of the County's water supply, maintenance and spare parts situations, Understand operation and status PM Association. Refer Table 59. Interaction with users.
	3 Mar.		Week end	
3.	4 Mar.	Aweil	Weekend Meetings with: SNV representatives	Discussion on PM Associations. Refer Table 60.
4.	5 Mar.	Aweil West	Meetings with: – County Officials – Team Leader, BRIDGE Program, Aweil	Overview of the County's water supply, maintenance and spare parts situations. Refer Table 61. Understand operation and status PM Association. BRIDGE Program's WASH involvement.
5.	6 Mar.	Aweil North	Meetings with: – County Officials – Pump Association members and Payam Mechanic	Overview of the County's water supply, maintenance and spare parts situations, Understand operation and status PM Association.
6.	7 Mar.		Travel: Aweil - Juba	

Report on Field visits to Northern Bahr-el-Ghazal, 1 – 6 March 2012: Detailed Notes & Data

The consultant's field visits in Northern Bahr-el-Ghazal were coordinated by Winrock International's BRIDGE Program, Aweil. Kamulete Moses, WASH Specialist of the BRIDGE Program accompanied the consultant during all the meetings and visits. A summary of the events of the field trip are describes below, in the chronological order that they occurred.

1 March: Meeting with Director, RWSS, Abraham Aleu, at Aweil (0917800198, 0955537044)

- The County-wise information on hand pumps, provide in **Table 57**, indicated that NBG State had 5 Counties and the Aweil township, with a total of 1,813 boreholes with handpumps. Of these, 1,551 were functional and 194 were non-functional, making the functionality 89%, which was quite good. The range of functionality in Counties varied from 95%, in Aweil East to 78% in Aweil Town. There were 68 were BHs.

Table 57 Handpumps and their functionality in Northern Bahr-el-Ghazal, Dec. 2011*

Sl. No.	County	Preventive Maintenance	Major Repairs/ Rehabilitation	Water Points Fenced	Functional BH	Nonfunctional BH	Functionality	Dry	Total
1.	Aweil East	7	29	17	473	24	95%	45	542
2.	Aweil North				415	34	92%	23	472
3.	Aweil Centre				87	19	82%		106
4.	Aweil West				305	61	83%		366
5.	Aweil South				141	20	88%		161
6.	Aweil Town				130	36	78%		166
	Total	7	29	17	1,551	194	89%	68	1,813

* Source of data: Presentation by Director RWSS at Bi-annual Coordination Meeting at Yambio, Feb. 2012

- UNICEF provided handpump spare parts to the State which was passed on to Counties.
- A recent inventory of spare parts was not immediately available.
- The last shipment of spare parts from UNICEF was in 2011 and had lasted so far, except for GI pipes, which were running low.
- Partners gave spare parts directly to Counties, and worked in consultation with Counties.
- Recently, UMCOR have given two lots of 50 GI pipes to each of Aweil North and Aweil West Counties. These were of very poor quality. But there is no easy method of controlling such supplies.
- Handpump repairs were done by Counties, using Payam level voluntary PMs.
- For major rehabilitation assistance was requested from NGO partners and UNICEF for spare parts and supplies. The PMs on payroll usually carried out the rehabilitation jobs.
- SNV has motivated stakeholders to establish Associations of PMs in all the Counties. The Associations come together under a State level Steering Committee chaired by a Dy. Director, RWSS.
- Since the Associations have been established recently, it is too early to comment on their functioning, but they are unable to access spare parts from the open market.

- All Counties reported on a regular bi-weekly and monthly basis on a standardized format and these were shared with NGO partners at Cluster meetings. The State used these reports to compile an annual report. An extract of this report for items relevant to water supply is provided in **Table 58**.

[Note: The reporting on the use of spare parts is of very limited value. The term “Supply Chain” has been used as an activity of the State/ County RWSS, but is probably an accumulation of numbers of spare parts issued, again probably, mostly pipes and rods. Clarification was not available].

Table 58 Extract from Annual Report of 2010

Sl. No	County	BH Rehabilitated	BH Constructed	Protected Hand Dug Well	WMC Trained	PM Established & Trained	Spare Parts Supply Chain in the County	Fast Moving Kits
1.	Aweil East	107	81	12	173	143	260	18
2.	Aweil North	41	14		135	26	254	31
3.	Aweil Centre	17		3	54	4	105	10
4.	Aweil West	17	27		60	5	195	33
5.	Aweil South	No information						
6.	Aweil Town	94	10		23		752	150
Total		276	132	15	445	178	1,566	242

- NBG had a large number NGOs, estimated to be 25 in total. This is probably because NBG has been a big entry point for returnees.
- Most NGOs work in consultation with the State for allocation of new boreholes and rehabilitation and more directly with Counties for support to handpump repairs. Most NGOs also work in areas of formation and training of Water Committees and Caretakers.
- Most NGOs report on their work to Counties and the State, but some do not.

Meeting with Jacque Bevin Bovier, Head of Office, Swiss Agency for Development and Cooperation (SDC), Aweil, 0956278750, jacque.bovier@sdc.net

- SDC have recently established a presence in NBG, and have agreed with the State to work in 2 Counties of Aweil Centre and Aweil South, where the NGO presence was relatively less.
- SDC propose to drill new wells and rehabilitate existing wells after successful community mobilization.
- They have already started a handpump repair program, drawing spare parts from the State stocks.
- This is the only place where the consultant saw a systematic approach to sort, recondition and reuse GI pipes recovered from repair and rehabilitation work.
- SDC indicated interest in participating in any efforts in trying new technologies (like the use non-corrosive pump configurations) and improvements to the maintenance management system.

2 March: Meeting with Aweil East County Asst. Commissioner for WASH, Paul Anei.

The County's handpump/ borehole statistics as of Dec. 2011 are provided in **Table 59**. The County has 8 Payams, a total of 556 boreholes with handpumps, of which 490 were functional and 23 were nonfunctional. The Functionality column, which has been added later, showed that it was 96%, which was very good. 43 BHs were dry.

Table 59 Aweil East County - List of Boreholes with Handpumps, Dec. 2011

Sl. No.	Payam	Preventive Maintenance	Major Repair/ Rehab.	Platform Rehab.	Functional BH	Nonfunctional BH	Functionality	Dry	Total BH
1.	Malualbaai	3		5	82	1	99%	9	92
2.	Wunlang	2	1		67	5	93%	4	76
3.	Yargot		3	4	61	2	97%	2	65
4.	Madhol	1	3	8	62	4	94%	7	73
5.	Mayomwel		1	8	15	2	88%		17
6.	Mangok	2	2	6	47		100%	3	50
7.	Baac	2	4	9	120	6	95%	14	140
8.	Mangartong		6	5	36	3	92%	4	43
Totals		10	20	45	490	23	96%	43	556

- NGOs active in the County were: Samaritan Purse, Winrock Sudan BRIDGE, IOM, ACF, IAS, Tear Fund, SNV, IRC, NBG Diocese, CAD (Christian Agents for Development), Drop in the Bucket, Amurt International.
- The County had 8 PMs on Payroll and about 45 voluntary PMs in different Payams. Each Payam also had a WASH Supervisor.
- In case of repair needs, Committees or communities reported to the Payam Supervisor or volunteer PMs, who repaired directly if no parts were needed, or who assessed the need for parts, obtained them from the County, and then completed the repairs. If the County did not have the spares, it made requests to partner NGOs.
- NGOs also repaired directly, sometimes using Payam volunteer PMs or their own staff.
- Spare parts were free of cost to the community. Payment to volunteer PMs was expected from communities and was of the order of SSP 150.
- No site-by-site maintenance reports were maintained. Locations of repair sites were not always recorded. Consolidated figures of numbers of repairs were reported to the State in the approved format (which did not provide details of spare parts used).
- The County had a store at Mulual Kon, which was a make-shift arrangement and not very well kept. There was a large quantity of old/ used pump rods in the store, but no old GI pipes.
- The most common requirement for spares was GI pipes.
- Breakages of flanges of the Pump Pedestal and of the Water Tank were another frequent problem, especially from the deep installations in bores ranging from 75 m to 90 m depths in the highlands of the County.
- Failure of pipe threads was common in pipes locally procured from Juba, but this stock has been exhausted.
- An inventory had been done, but the report was not immediately available.
- A Pump Mechanics Association was formed in late 2011 under the auspices of SNV. There was an expectation that SNV would equip the Association, but this has not happened.
- Attempts to contact and meet Association members were unsuccessful.

Visit to Handpump at Malual Kon

- India Mark II handpump.
- Working well, good discharge.
- Good Platform and Drain.
- No soak pit, serious problem of waste water disposal.
- Handpump was being used by children.
- The last breakdown was in Dec 2011.
- At that time, they went to a nearby pump in the same village.
- No further information was available.

Visit to Handpump at Majak Ajong

- India Mark II handpump.
- Working well, good discharge.
- Rehabilitated. Good Platform and Drain. Old drain and soak pit still intact. Fenced.
- No soak pit, slight problem of waste water disposal.
- Handpump was being used by women and a man loading Jerry cans on a donkey.
- The last breakdown was very recent.
- Repaired by the County.
- Each household contributed SSP 5 for paying the PMs a total of about SSP 100.
- At that time, they went to a nearby pump in the same village.
- No further information was available.

4 March: Discussions with Celine Kiden and Issac Tiberio, SNV

- The SNV representatives came to discuss their work on Pump Mechanics' Associations.
- The associations had been registered in the latter half of 2011.
- The idea was to bring all PMs together to rationalize maintenance service provision.
- The Associations were expected to be able to provide spare parts also to communities.
- **Table 60** below gives details of the membership of the associations so far.
- Membership of the association was subject to a one-time payment of token membership that varied between SSP 15 to 50.

Table 60 Membership of Pump Mechanics' Association in NBG

	County	Aweil East	Aweil North	Aweil Centre	Aweil West	Aweil South	Total
Pump Mechanics	Total No. of PMs in the County		26	63	56	32	
	No. of PMs - Members of County Association	26	23	40	56	32	177

- The associations were not finding it easy to obtain spare parts and so were not getting much work.

5 March: Meeting with Aweil West County Asst. Commissioner for WASH, William Wol, 0916758100.

The County's handpump/ borehole statistics as of Dec. 2011 are provided in **Table 61**. The County has 9 Payams, a total of 357 boreholes with handpumps, of which 317 were functional and 40 were nonfunctional. The Functionality (column added later) worked out to be 89%, which was very good.

There was no indication of the occurrence of dry boreholes.

Table 61 Aweil West County - List of Boreholes with Handpumps, Dec. 2011

Sl. No.	Payam	Functional BH	Non-functional BH	Function-ality	Total BH
1.	Achana	11	1	92%	12
2.	Ayat Centre	20	3	87%	23
3.	Ayat East	56	5	92%	61
4.	Ayat West	17	3	85%	20
5.	Gomjuer Centre	60	4	94%	64
6.	Gomjuer East	39	10	80%	49
7.	Gomjuer West	35	4	90%	39
8.	Mariem West	42	7	86%	49
9.	Mariem East	37	3	93%	40
Totals		317	40	89%	357

- The County had 7 PMs on payroll and about 65 voluntary PMs in different Payams.
- Spare parts were free of cost to the community. The guideline for payment to volunteer PMs was SSP 150, but usual payments were between SSP 20-30. Payments to volunteer PMs were quite irregular.
- No site-by-site maintenance reports were maintained. Consolidated figures of numbers of repairs were reported to the State in the approved format (which did not provide details of spare parts used). Poor literacy among PMs was a major cause for poor reporting.
- Dry season work load from repair requests was generally high and could go up to 80 per month.
- Breakages of flanges were not uncommon at the Pedestal and the Water Tank. If this happened at the Pedestal, it resulted in a major platform reconstruction job.
- The most common requirement for spares was GI pipes.
- Other common items of spares in high demand were Cylinders and Cup Washers.
- This was one of the rare Counties which asked for old GI Pipes to be returned to the Store. Pipes were sorted and reused where possible. Pipe rethreading has yet to be started.
- The County had a regular store by the Asst. Commissioner's office.
- Present stocks in the store were: Fast Moving Kits – 5 boxes X 12 each, GI Pipes – 90.
- The County had just received a batch of 50 nos. GI pipes from UMCOR. These were of inferior quality, with no brand embossing on the pipe. While they were painted with a blue band to indicate that they were of B Class wall thickness, they did not have the weight or feel of usual B Class pipe. The quality of threading was very poor; the threads were not deep enough and for a very short length. The pipe couplings were also of very inferior quality.

When asked as to why these pipes had been accepted these pipes, the County felt that it did not have a choice in the matter, given the fact that the County was always short of pipes. The reasoning was that bad pipes were better than no pipes.

That an NGO partner would pass on inferior quality goods does not reflect very favorably on the NGO community. Either UMCOR was unloading an embarrassment from their stock or they were not particular of the quality of goods they passed on. In any case they were not helping the people of NBG.

There was a detailed discussion with the Asst. Commissioner about the PM Association.

- The Secretary of Association, Patrick Chol Noon, was also present.

- He was 21 years old and had been trained as PM in 2011.
- It was governed at County level by a Board, constituted by 9 members, one PM from each Payam.
- Prior to the formation of the Association, there was a group called as the Aweil West Rehabilitation Team, which was also an association, registered in 2009, which had the membership of PMs.
- This Rehab Team took Govt. contracts and NGO contracts (from PACT Sudan, SNV [data collection], Concern [hand drilling 3 BH], ACTED [rehab of 2 BH]).
- The value of the ACTED job for rehab of 2 BH was worth SSP 3,530, in which the working members of the group were paid SSP 1,200, cost of materials was SSP 2,030, and SSP 300 went to the Rehab Team office.
- PMs were member of both the Rehab Team as well as the new Association.
- Since registration of the Association in Sept. 2011, they had done 6 repairs.
- The Association had rented a room which was to serve as their shop, for SSP 500 per month.
- They had reached an agreement with the owner of the room that they would pay him when their business started working. This shop was visited.
- They had managed to buy a complete handpump from a drilling company, Surya, along with the PVC casing pipe needed for a borehole. At the time of the visit, the Association had managed to find a client for the PVC casing pipe, which was about to be picked up.
- They had no funds to buy spare parts after the initial money from SNV, SSP 2,500, was spent.
- Currently they had no spare parts available and did not know where to get them.

5 March: Meeting with Abebayehu Haile, Team Leader, Winrock BRIDGE, Aweil

In terms of water supply activities, the BRIDGE Program had concentrated on establishing community management. This was through training of Water Committees for collecting water use fees, manage minor repairs, clean, protect and fence the water source as a community asset. BRIDGE had also provided motor cycles and bi-cycles for improving access and monitoring.

In NBG a number of factors needed to be recognized when planning or assessing any program.

- The war, which was waged over many years, did not allow permanent settlements.
- The people were semi-pastoralists, moving with their livestock as the seasons and the availability of pasture and water changed. Again this discouraged permanent settlements.
- A large number of returnees came into NBG, and were hosted locally, some with relatives and some in camps. This strained resources which were already limited from the war.
- These factors impacted negatively on the care and use of water sources.

6 March: Meeting with: Aweil North County Asst. Commissioner for WASH, Jackson Atak Akol

accompanied by Dut Deng, Dy. Director, RWSS

Others present: William Lual, WASH PO, Aweil W, John Aken WASH PO, Aweil E, Irene Dut, WASH PO, Aweil N, Barjok Bol Deng, Chairman, + 3 members of the Pump Mechanics' Association.

- The Asst. Commissioner had come to the county only recently and was not very familiar with the existing situation.
- Statistics on the water supply situation (Table 62) was available in the form the County's monthly report to the State RWSS and showed that the functionality of handpumps as 94%.

Table 62 Aweil North Status of Water Source - Monthly Report for Feb 2012

Sl. No.	Payam	New BH	Rehab BH	Functional			Nonfunctional			Dry BH	ty of Handpumps	Functionality = TF/(F+NF)	Total BH = F+NF+ Dry	Fenced WP
				Water Points - BH/ HP	Water Systems	Total - TF	Water Points - BH/ HP	Water Systems	Total - TNF					
1.	Maulal North	2	1	157	2	159	9	2	11	8	95%	94%	178	35
2.	Maulal East	1		123	1	124	6	2	8	3	95%	94%	135	25
3.	Maulal Centre	2		60	1	61	3	1	4	5	95%	94%	70	32
4.	Ariath	3	1	46	1	47	4	3	7	3	92%	87%	57	19
5.	Maulal West			36		36	3		3	3	92%	92%	42	15
6.	Maper Dut Thou			54		54	3	1	4	5	95%	93%	63	20
	Total	8	2	476	5	481	28	9	37	27	94%	93%	545	146

The above table, in its original form did not have the functionality columns. These have been added later.

The table is a very good example of the quality of data that is available at the County level since it included data of motorized water supply systems, which tend to get left out.

Also, this report provides details on the new BH added and those rehabilitated, which can be used to constantly update an inventory or a maintenance database.

- The County had 6 Payams.
- The County had 9 PMs on payroll and 25 volunteer PMs in the Payams.
- The County had a spare parts store nearby and had some stocks – 30 GI Pipes, 4 Fast Moving Spare Parts Kits, 2 Cylinders, 2 sets of Fishing tools
- The operational status of the Association was similar to that of the other Counties. SNV had provided some funds initially, but that was exhausted. They did not have spare parts, because of which they could not undertake any repairs through the Association. They had expectations that SNV would get them spares.
- Since Jan 2012, the PMs have reverted back to repairing handpumps with spare parts from the County.
- During discussions it emerged that each County in NBG had a group called that County's Rehab Team (mentioned earlier). Most were CBOs and they jointly took up hand drilling and rehabilitation jobs on contract.

Discussions with Ngong Gmu, volunteer PM

- Has been a volunteer PM since 2003.
- Last year, attended to about 30 handpump repairs, working in two Payams
- Repairs other mechanical things – bicycles, maize grinding mills.
- Member of the new Association.

Report on Field visits to Eastern Equatoria, 13 – 19 March 2012

Schedule of meetings and visits

Sl. No.	Dates	Place	Event	Purpose
1.	13 Mar.	Torit	Meeting with Director, DRWSS	Introductory meeting
2.	14 Mar.	Torit	Meetings with: <ul style="list-style-type: none"> – Director, DRWSS & others – Torit County Asst. Commissioner – AVSI, CRS, NCA 	Status of water supply and spare parts at RWSS, Torit, (refer Table 64) and of Torit County (refer Table 65) WASH programs of the NGOs (refer Table 66 & 67).
3.	15 Mar.	Ikotos, Isohe	Meetings with: <ul style="list-style-type: none"> – LWS/ DWS – AVSI – Ikotos County Executive Director, Asst. Commissioner, WASH 	WASH programs of the NGOs. Status of water supply and spare parts of Ikotos County
4.	16 Mar.	Magwi	Meetings with: <ul style="list-style-type: none"> – County Asst. Commissioner ARC – Visits to Handpumps 	Status of water supply and spare parts of Magwi County. ARC's WASH program. User's opinions and reactions. O&M practices.
	17-18 Mar.	Week end		
5.	19 Mar.	Kapoeta South	Meetings with: <ul style="list-style-type: none"> – County Asst. Commissioner – AAR, Japan – Visit to NSS 	Status of water supply and spare parts of Kapoeta County (refer Table 69) AAR's WASH program.
6.	20 Mar.		Travel back to Juba	

Report on Field visits to Eastern Equatoria, 13 – 19 March 2012: Detailed Notes & Data

The consultant's field visits in Eastern Equatoria were coordinated by SNV. Emmanuel Manza, SNV, Kapoeta accompanied the consultant on all meetings and field visits. Detailed notes on the events of the field trip are describes below in the chronological order that they occurred.

13 & 14 March: Meeting with Director, RWSS, Torit, Valentino Oryen, 0955047961, 0913034232

Others present: Jacob Sebit, WASH Manager, Antony Kenyi, Sanitation Director, Remis Longa, Driller, Simon Loliang, Driller, Sonia, UNICEF WASH Officer,

An introductory meeting was held with the Director RWSS on 13 March, to brief the Director about the purpose of the consultant's visit and the kind of information that would be discussed.

A more detailed discussion occurred on 14 March at the Director's office, where all the above persons were present. The main topics of discussion were as follows:

Handpump Statistics

Table 63 Handpumps and their functionality in Eastern Equatoria as of 30 May 2011

Sl. No.	County	Total B/H	Functional B/H	Functionality
1.	Budi	-	-	
2.	Ikotos	138	123	89%
3.	Kapoeta East	234	166	71%
4.	Kapoeta North	105	88	84%
5.	Kapoeta South	110	97	88%
6.	Lopa/ Lafon	89	71	80%
7.	Magwi	384	263	68%
8.	Torit	198	182	92%
Total		1258	990	79%

The above information indicates that the State has 8 Counties, of which details were available for 7 Counties. The State was unsuccessful in getting information from Budi County despite many attempts. An Asst. Commissioner WASH had not been posted there. The other 7 Counties, as of May 2011, had a total of 1,258 handpumps, of which 990 were reported functional, making the overall functionality of handpumps in the State as 79%. The functionality in different Counties varied from 89%, in Ikotos to 68% in Magwi.

NGOs operational in WASH in the State were: ARC (American Refugee Committee), AVSI (Italian NGO), NCA, AAR (Japan), ADRA (in Budi), Caritas (involved only in Rock Catchments).

Spare Parts:

- Spare parts for handpumps came to the State from UNICEF. NCA, AVSI and ARC provided spare parts to Counties on request. The State was not informed of the supplies going from these NGOs to Counties.
- No major quality related problems were reported on spare parts at State level.
- The most frequently used spare parts were GI pipes and rods, and to some extent cylinders

- and Fast Moving Spare parts Kits.
- Perforation and damage to pipes threads due to corrosion were observed in specific areas. These areas were localized. The same was true in the case of high iron content, identifiable by red stains on pump platforms.
 - The Counties were entitled to 11 persons on their payroll. Often these were only PMs, but this was not uniformly the case across all Counties. The PMs in the County payroll were all trained and experienced.
 - Payam level volunteer PMs were not a static group. NGOs were training PMs all the time and some were moving on for better paying livelihoods.
 - There was no fixed payment system or “cost sharing”, for labor for pump repairs. By and large, the response to cost sharing was very low. Often this community contribution was just a token amount for food for the volunteer PMs. In Torit County, no payment was made for repairs, unlike Magwi and Ikotos, where payment for labor was more common. There was no payment in any County for spare parts.
 - The general perception in communities was that the water sources belonged to the Government. Efforts such as SNV’s for capacity building were attempting to change this situation.
 - The State had a small spare parts storage facility near the Director’s office. At the time of the visit, the major spare parts in stock, as per the stock register were:
 - Fast Moving Spare Parts Kits – 69
 - Cylinders – 27
 - Connecting rods – 39 bundles x 10
 - GI Pipes – 75
 - Fishing Tools – 8
 - Recently, the Counties had been given substantial stocks of spare parts, as detailed in **Table 64**

Table 64 Spare Parts Distribution to Counties in Eastern Equatoria, Jan 2012

Spare Issued	Counties												Totals	
	Budi	Ikotos	Kapoeta (Greater)		Kapoeta E	Kapoeta N	Kapoeta S	Lopa/Lafon	Lopa	Lafon	Magwi Pageri	Magwi		Torit
	23-Jan-12	25-Jan-12	18-Jan-12	16-Jan-12					26-Jan-12	26-Jan-12	30-Jan-12	30-Jan-12		
GI Pipes	77	77		300					38	38	39	39		608
Con Rods	77	77		300					38	38	39	39		608
FM Spares Kit	61	61	250						20	20	40	40		492
Pedestal	10	10	20	11					5	5	15	15		91
Head Assy.	20	20	46	30					10	10	6	5		147
Water Tank	10	10	33						5	5	5	5		73
Special Tool kit	2	2	10						1	1	2	2		20
Std Tool Kit	1	1	8						1	1	1	1		14
Fishing Tools	2	2							1	1	2	2		10
Cylinder	20	20	100						10	10	15	15		190
H/D Clamps	2	2	12							1				17
Pipe Lifting Spanners	7	7	45											59

Notes: Kapoeta E, N & S were given a joint consignment under Greater Kapoeta (which is not a County), mainly for logistical reasons. Lopal/ Lafon and Magwi are single Counties but each received two separate consignments under Lopa & Lafon and Magwi & Magwi Pageri because of administrative reasons. Torit County had limited storage space and was near to the RWSS, Torit and so lifted spares as and when needed. The current stock in the RWSS store was actually Torit County's share of the above distribution plan.

14 Mar: Meeting with Torit County Asst. Commissioner for WASH, Johnson Oringa

The County's handpump/ borehole statistics are provided in **Table 65**.

Table 65 Torit County - List of Boreholes with Handpumps, Nov. 2011

Sl. No.	Payam	Total B/H	Functional B/H
1.	Bur	20	18
2.	Imodome	12	10
3.	Impotu	12	8
4.	Iyere	-	4 drilled, all dry
5.	Kiyala	15	12
6.	Kudo	20	16
7.	Mubok	15	12
8.	Nyong	110	80
Total		204	156
Functionality			76%

- NGOs active in Torit County were: NCA, SNV, LWF, AVSI, CRS, DOT (Diocese of Torit).
- Sources of spare parts were UNICEF (through the State RWSS Store), ARC and NCA (on direct request).
- Storage space was limited to a shared container with Agriculture Department.
- The highest consumption of spare parts was GI Pipes. Corrosion and damaged threads were the usual problems.
- The life of a pump's GI pipes was between 2 to 3 years.
- Monthly workload was of the order of 20 repairs.
This is exceptionally high, with 10% of the total number of pumps undergoing repair every month.
- The County had total of 23 PMs on payroll and 30 volunteer PMs.
Correct figures of PMs?
- All 8 Payams had WASH Inspectors. Some PMs were posted at Payams.
- Communities made repair requests to Boma Chief, who passed it on to the Payam Inspector. Spare parts were requested from the County Asst. Commissioner. PMs were sent with spares to make the repairs. Usual response time was about a week. Transport was a major problem.
- Spares given to PMs were recorded when issued and their use was reported in detail to Asst. Commissioner, who then compiled it on a monthly basis for the State.
- Repair requests were higher in the dry season, since water levels in boreholes dropped and the demand on pumps increased. Pump usage increased and got mishandled. Disconnections and dropped connections were common in the dry season. Fishing was generally successful.
- The County did not have adequate tools.

14 March: Meeting with CRS

Persons met: Wilfred Owana, WASH Program Manager, Leek Thon, Food Security & Livelihood Program Manager.

- In WASH activities related to water supply, CRS drilled boreholes with 6 drilling rigs that it

- owned and operated.
- The number of boreholes drilled in a year was usually 80, depending on the availability of funding.
 - CRS had a fulltime Hydro-geologist on its staff and a VES sounding was done on each site.
 - Failure rate of new boreholes has been of the order of 15% in Eastern Equatoria. In other States there has been not problem of failed wells.
 - Hydrogeological investigation preceded drilling in Central Equatoria and Jonglei also.
 - In Jonglei, watering animals by blocking drains was common and no cattle watering troughs had been constructed. As a result, platforms and drains were much more prone to damage.
 - CRS also did major rehabilitation that includes flushing of wells and replacement of pumps.
 - For drilling records, CRS conformed to the requirement of recording on BH log formats prescribed by the Govt. and submitted logs to the State as a part of the information that they shared.
 - Not much work was done in terms of repairs to handpumps.
 - Training of Payam level PM was done, where the training duration was for 2 weeks and the PMs were given tool kits. The training was done on the ratio of 1 PM for every 4 to 5 handpumps or 1 PM per Boma.
 - A different level training was done for creating Water Committees and establishing Caretakers.
 - CRS have not seen any local sources of supply of spare parts and feel that the private market needs space from the government for any private enterprise of handpump spare parts to grow.
 - CRS procures rehabilitation handpump hardware from Techno Relief, Juba (Near Airport, Ruksha, 09571103060).
 - During 2011, CRS rehabilitated 95 wells and expect to do rehabilitation of 145 wells during 2012, subject to funding availability.

14 March 2012, Discussions with Users at Torit Borehole

Persons met: Milania Joseph, Susanne Leek

- The borehole is about 1 Km from Torit town, on the road to Katire, just before the office of CRS.
- There are two bore holes, about 2 m apart. One is defunct blocked and filled hole, with a pump pedestal only. This is a very old well, drilled before the war.
- The second borehole is more recent, drilled in 2006 with a functioning IM II handpump.
- When the second well was drilled, there was no habitation around the well. Milania was one of the few people living in the vicinity.
- There has never been a formal Water Committee, but a group of nearby residents, led by Milania, performs this function.
- 2 years ago, NCA took 3 women of the area for training. Details of the training were not known.
- Another man, Odon, who is responsible for looking after another nearby borehole, helps Milania look after this well.
- Odon arranges minor repairs to be carried out free of cost from the Government authorities.
- No fees are collected from users to draw water.
- At the time of maintenance needs, a collection drive is made, asking for SSP 1 per household.
- The maximum collection so far has been SSP 30.
- The money pays for refreshments for the PMs who come to do the repairs.
- Neighbours are requested for vehicles for transporting spare parts. Or the group paid SSP 15 towards the cost of fuel to a vehicle owner.

- Sometimes the connecting rod joints open.
- The last repair was in Dec. 2011, when the handle broke. The head assembly was replaced.

14 March: Meeting with Norwegian Church Aid

Persons met: Ladu Julius, Program Office WatSan, Norwegian Church Aid, Torit.

- NCA works in two Counties, Lopa/ Lafon and Magwi, in Eastern Equatoria.
- NCA funds construction of boreholes, in consultation with Counties, through contractors.
- NCA gives handpump spare parts to Counties on request.
- NCA procurement process is centralised through Juba, usually from East Africa. In 2009 Victoria Pumps, Kampala was a supplier and Davis & Shirtliff, Nairobi, in 2011.
- In 2011 Magwi received 400 pipes and rods, 20 pedestals, 20 water tanks, 150 cylinders, 50 Fast Moving Kits. Lopa/ Lafon were given half the quantities of the same spares.
- Quality of spare parts was not a problem.
This was NOT the observation in Ikotos, where NCA was one of the sources of faulty spare parts.
- NCA gets feedback on utilization of spare parts directly from Counties, as illustrated below:

Table 66 Repair Report 2010 - 11, from counties to NCA - Verification of Spare parts utilization

Sl. No.	Date	Village	Payam	Head Assy. Compl.	Chain	Third Plate	Cylinder Compl.	Sealing Rings	P. Buckets	Pipes	Rods
1	27/07/10	Nyongwa	Pageri							4	4
2	28/07/10	Pageri Pr. School	Pageri	1			1			4	
3	8/10	Loa Centre	Loa					3	2	6	6
4	01/09/10	Arpi Rahing	Pageri					2		2	
5	06/09/10	Melekure	Loa					2	2		
6	07/09/10	Patibi	Opari					2		1	
7	17/09/10	Moi Uji	Pageri								2
8	20/09/10	Arpi Rahing	Pageri		1	1					1
9	23/09/10	Ate Minga	Mohi Tokuro								
10	23/09/10	Garanyu	Mohi Tokuro					4	4	10	10
11	01/10/10	Cacaa	Loa		1					4	4
12	03/11/10	Mohi Odkuria A	Pageri							6	
13	07/11/10	Bworongole	Kerepi				1			2	2
14	19/11/10	Cacaa	Loa							2	
15	26/11/10	Arpi Cooperative	Pageri				1			4	
16	02/12/10	Musina	Opari								
17	02/12/10	Male	Opari							4	4
18	04/12/10	Pageri Centre	Pageri							1	1
19	16/12/10	Arpi Junction	Pageri					2			
20	17/12/10	Dereto	Kerepi		1			2		3	3
21	18/12/10	Illegible	Illegible	1	1				2	2	
22	22/12/10	Ndani (HDW)	Pageri								1
23	23/12/10	Mokolo	Opari					3	2		
24	24/12/10	Jdomi	Pageri				1				
25	05/01/11	Palonurya	Kerepi							3	3
26	15/02/11	Nyakela	Opari				1		4	2	
27	03/03/11	Pageri Market	Pageri	1							
Total usage				3	4	1	5	20	16	60	41

Notes: Site by site details are provided for use of spare parts. In two cases, sites have been clubbed together for their parts need. Details of sites are provided but there are no details of problems. Sometimes there are inconsistencies in the parts used, e.g., a Head Assembly comes with a chain, yet a chain is also used. Similarly, four Pump buckets would be needed for two cylinders, but was that the case in Sl. No. 26, Nyakela?

- Where boreholes were successful, training of Water Committees and Caretakers was also completed.
- Old boreholes drilled by NCA in the 1980s are also rehabilitated, using contractors, with flushing and replacement of the pump and reconstruction of the platform and drain.
- Contractors provide pump hardware, procured mostly from East Africa, as a part of their contract.
- In 2011, NCA drilled 5 new BH, rehabilitated 5 old BH, and supplied spare parts to Magwi and Lopa/ Lafon counties. An approximate cost for a completed BH in 2009 was US \$ 11,500 and in 2012 this was U \$ 13,500.

14-15 March: Meetings with AVSI

Persons met: at Torit - Katerina, at Isohe, Ikotos – Anna Orlandini (Country Rep., Juba), Gabrielele, Andrea, Paula, Onen David Livingstone (WatSan Field Engineer)

Meetings with AVSI occurred at Torit and at their project location at Isohe, Ikotos County.

- AVSI was an Italian NGO and worked only in Ikotos County of EE.
- In 2011, AVSI drilled 9 BHs, 5 in Ikotos and 4 in Torit, at a cost of about US \$ 12,000 per completed BH.
- AVSI paid for both dry and wet wells – 1st Dry well: no payment, 2nd dry: 60%, 3rd dry: 100%. They have had up to 4 dry holes at the same location.
- In such situations, the only alternative was a rock catchment, if the site was suitable, since streams and springs were not always there or were seasonal. [CARITAS built only rock catchment structures in Ikotos].
- In the past (2011?) UNICEF had routed spare parts to Eastern Equatoria RWSS through AVSI. The value of the spare parts was SSP 120,000, all of which AVSI passed on to the State.
- AVSI had no immediate plans for spare parts procurement and distribution in 2012.
- AVSI maintained handpumps in the County using its own PM or with Payam PMs.
- Repair requests came from communities, Bomas, Payams and the County.
- The usual problem with repairs was transport, which the County lacked.
- Till 2009, AVSI used spare parts provided by UNDP. It now stocked its own spare parts which it used for repairs and gave to the County when requested.
- Response time was usually within a week, subject to availability of transport and spares.
- Broken pedestal or water tank flanges occurred sometimes and depended on usage and on whether flange bolts become loose or not. Riser pipe problems were due to thread failures or pipe perforation due to corrosion. Fishing was common and generally successful.
- Contributions from communities come in the form of physical help in repairs, especially when platforms and drains need to be rebuilt.
- AVSI gave regular quarterly reports of its work to the County. **Table 67**. This was probably the only report format where the borehole details and the maintenance problem are both described along with site details and spare parts used.
- The Basic Services Fund (BSF, Dutch) was AVSI's main donor.

Table 67 Repair Report 2010 - 11, from AVSI to Ikotos Counties

Sl. No.	Site Details									Problem	Parts Replaced/ Materials used													
	Date	County	Payam	Boma	Village	BH/SW ID No.	Total depth	Static water level	Installation depth		Pump head	Ball bearing	Axle bolt	Chain and coupling	Nut	Bolt	Cylinder complete	Pump bucket	Sealing rings	Lower valve	Upper valve	Riser pipes	Connection rods	Cement
1.	09/01/11	Ikotos	Lomohidang	Chahari	Iyete					Riser pipe cut														
2.	09/01/11	Ikotos	Lomohidang	Chahari	Chahari centre					Connection worn out, riser pipe worn out				3										
3.	09/02/11	Ikotos	Lomohidang	Chorokol PHCU	Hafolere P.S					Upper valve worn out, riser pipe leaks, sealing ring								1						
4.	14/02/11	Ikotos	Lomohidang	Romula	Hawanga					Riser pipe cut from water tank, chain broken			1	2	2									
5.	16/02/11	Ikotos	Lomohidang	Romula	Kukuk					Connection rod cut,														
6.	18/02/11		Hiyala	Lofi	Ofi					Riser pipe worn out, connection rod cut							2							
7.	23/03/11	Ikotos	Lomohidang North	Mangala	Mangala					Pedestal broken				12	6		1							2
8.	09/05/11	Ikotos	Lomohidang South	Chahari	Iyete					Pedestal broken							2							2
9.	25/05/11	Ikotos	Lomohidang South	Isohe	St. Theresa Hospital					Corroded riser pipe														
10.	31/05/11	Ikotos	Lomohidang South	Lobira	Lobira					Handle broken														
11.	03/06/11	Ikotos	Lomohidang South	Okorohore	Town		49	18	27	Broken pipe	1						2	1					2	
12.	14/07/11	Ikotos	Chahari	Isohe	Skps					Riser pipe leakage, piston unscrewed														
13.	27/07/11	Ikotos	Chahari	Woroworo	Hafoliere PS					Riser pipe leakage, nut, chain				1	3									
14.	16/09/11	Ikotos	Chorokol	Romula	Okorohore		76	45	66	Upper valve worn out & rod broken				2	2		3							
15.	23/09/11	Ikotos	Chahari	Isohe	Isohe center					Bolts & nuts missing				5	1									
16.	26/09/11	Ikotos	Chahari	Isohe	St. Kizito PS					Unscrewed connection rod				1	1			1						
17.	05/10/11	Ikotos	Chahari	Mangala	Mangala Pchu					Broken water tank				4	2									
18.	20/10/11	Ikotos	Chahari	Isohe	St. Kizito PS					Missing nuts				6										
19.	17/11/11	Ikotos	Chahari	Isohe	Isohe central					Broken riser; missing bolts & nuts; pump head	1			8	4									
20.	01/12/11	Ikotos	Chahari	Mangala	Mangala		54	45	51	Hole in riser pipe; cylinder						1								
21.	07/12/11	Ikotos	Chahari	Woroworo	Lhina		36	11	30	Hole in riser pipe														
Total spare parts/ materials used											2			3	46	18	1	10	3		2	14	8	4

15 March: Meeting with LWF, Ikotos

Person met: Lotari Cyprian, WASH Officer, Peter

- LWF worked in all 5 Payams of Ikotos County.
- LWF constructed boreholes through contractors, who came with their own handpump hardware. Draco, Afrimax and Adora from Kampala and Water Africa, Juba were some of the contractors that LWF has used.
- In 2011 it supported the construction of 7 new BHs. Borehole depths were of the order of 80 m to 90 m.
- LWF trained Water Committees and PMs. PMs were trained at a ratio of 2 PMs per BH with full sets of standard and special tools.
Could there be a reporting error here?
- In 2012, LWF planned rehabilitation of 10 wells and training of PMs, with one set of tools per Payam. LWF will use spare parts and PMs from the County.
- LWS did not repair handpumps.
- LWF did not give spare parts to the County, only tools.

15 March 2012, Meeting with Ikotos County authorities

Persons met: Joe Luis, Executive Director, Alphonso Liwa, Asst. Commissioner, WASH

- Spare parts came to the County mainly from the State.
- NCA gave spare parts in 2007.
- The County sent reports regularly to the State on a quarterly basis.
- The County has 7 PMs on payroll, 4 at the County and 3 in Payams.
- At the Payams there are 6 volunteer PMs.
- Volunteer PMs do not get paid.
- The County has a store in a container.
- A recent shipment of spare parts has come from RWSS Torit.
- The store had a number of spare parts of questionable quality.
 - One group was water tanks from NCA which were with 2 ½ inches diameter riser pipe holders suited to India Mark III handpumps. The water tanks had then been modified with reducer nuts for use with 1 ¼ inches diameter riser pipes of India Mark II pumps.
 - A second group was Pipe Lifters which came from AVSI stores and were of a distinctly inferior quality.
 - Refer photos in Annex 4.
- This was one of the few stores where old riser pipes had been returned to the store for reconditioning, though this work had yet to start.
- Ikotos was a county where there were a large number of Extra Deep Well installations. Details of some of these sites are provided below in **Table 68**. These pumps tend to have very frequent riser pipe failures because of deep water tables and increased use in the dry season.

Table 68 Repair Report 2010 - 11, from AVSI to Ikotos Counties

Payam	Boma	Details	No. of Riser Pipes	Depths
Tseretemja		4 pumps	25, 25, 24, 23	75 m, 72 m, 69 m
Chorocol	Lodwara	Tala x 2	25, 25	75 m
		Mangala	24	72 m
		Ramola	23	69 m
Loiste		Lotome	24, 24	72 m
		Bira	24, 24	72 m
Chahari	Chahahri		25, 24	75 m, 72 m

16 March 2012, Meeting with Magwi County authorities

Person met: Richard Okech, Asst. Commissioner, WASH

- Magwi County had a total of 296 handpumps. Further details of Payam-wise distribution and functionality were not immediately available.
- The County has 8 Payams – Magwi, Pajok, Obbo, Lobole, Pagri, Nimule, Mogali, Iwere.
- Most cylinder installations in the County are with 14, 15 or 21 riser pipes (42 m, 45 m, 63 m depths), with IM II EDW handpumps. About 40% of the pumps have cylinders with ≥ 21 riser pipes.
- During 2011, there were a total of 115 repairs, which was less than 50% of the total number pumps per year.
- Pipe disconnections are frequent because of the deep installations.
- Fishing is usually successful. Rod fishing is more common than pipe fishing.
- Corrosion of pipes was reported to be a problem.
- Volunteer PMs did not return old pipes recovered from boreholes.
- The County did not have pipe dies to rethread old pipes.
- The County had 2 PMs on payroll. Shortage of funding has prevented employment of more PMs. One of the County PMs was located at Nimule and the other at Pageri,
- There were 12 volunteer PMs in different Payams, who were paid small sums (SSP 150) by communities for repairs.
- Stock of spare parts from UNICEF via the State came once a year. In 2012 one consignment of 30 pipes and rods had come so far.
- NCA gave spare parts once a year, for which the County gave a utilization report to NCA (refer Table 66).
- American Refugee Committee (ARC) gave spare parts on specific requests.

16 March 2012, Meeting with American Refugee Committee at Magwi

Person met: Justin Obwona, WASH Engineer

- ARC had its offices and store at Nimule.
- It drilled borewells using contractors. Usual depth of BHs were 60 m.
- Drilling logs were sent to the County and State.
- ARC also trained Water Committees and Caretakers.
- It also supplied the County with spare parts.
- Procurement of handpump spare parts was done through ARC's office in Juba.
- ARC's WASH program included School Hygiene programs with construction of school toilets and hand washing facilities, formation of health clubs.

16 March 2012, Handpump site at Kilio, outskirts of Magwi Town

Discussion with Users

- India Mark II pump with a good platform and drain.
- Platform was rebuilt by ARC.
- In good working condition, easy to operate.
- Drilled by CRS in 2005, by Water Africa
- Water Committee formed in 2005 and had rotated its membership.
- 50 to 60 user households.
- Last repair was in Oct. 2011, where pipes and rods were replaced.
- Contributions of SSP 2 per household were raised to pay the PMs.

16 March 2012, Handpump site at Lobure, Pump no. 1, near main road, outskirts of Magwi Town -

Discussion with Users

- India Mark II pump with a good platform and drain.
- In good working condition, easy to operate.

- Drilled by CRS in 2006.
- There was a Water Committee. .
- Last repair in Feb. 2012, where 11 pipes were replaced. Threads were corroded/ damaged.
- Contributions of SSP 3 per household were raised to pay the PMs.

16 March 2012, Handpump site at Lobure, Health Centre

- India Mark II pump, not in use.
- Borehole has gone dry.

16 March 2012, Handpump site at Lobure, Pump no. 3, near Pump No. 1

- India Mark II pump made by Karnataka Water Pumps.
- Platform and drain had eroded and were due for rehabilitation.
- Yield was good and the pump was in working condition.
- The pump was locked by the Committee, as it always is, during mid-day.

16 March 2012, Meeting with Kapoeta South County authorities

Persons met: Tortisio Ohiri, Asst. Commissioner, WASH, Peter Ilukwel, County Water Inspector, Jackson Ejore, Local Capacity Builder

- The number and functionality of water source in Kapoeta South County are provided below in **Table 69**.

Table 69 Kapoeta South County - List of Water sources, Dec. 2011

Sl. No.	Payam	BH with Handpump		BH - Motorised pump		
		Total	Functional	Total	Functional	
1.	Kapoeta Town	47	41	2	1	
2.	Katiko	25	20			
3.	Longeleya	11	10	1	1	
4.	Morwonger	24	19			
5.	Pwata	11	11	1		Wind mill
Total		118	101	4	2	
Functionality		86%		50%		

- The County has 118 boreholes with handpumps of which 101 were working, i.e., a functionality of 86%.
- It also had 3 boreholes with motorized pumps and one BH with a wind mill. 2 out these 4 boreholes were working.
- Out of the 118 handpumps in the county, 47 handpumps, or 40%, were in Kapoeta town. This was because during the war, people for outlying area took refuge in the town. Currently town's population was 16,500.
- Boreholes in the County were in the range of 60 m to 70 m, with SWL at 30 m.
- The deepest cylinder setting was at 72 m, with 24 riser pipes
- The County had 5 PMs on payroll and 10 volunteer PMs in Payams.
- There were Water Committees in some boreholes, especially in the town.
- Breakdowns were more frequent in the dry season, October to April.
- The usual maintenance workload was about 15 requests per quarter.
This converts to an annual repair workload of about 50% of the total number of pumps.
- In 2011 there was a shortage of spare parts.
- The most common causes of breakdowns were pipe failures – corrosion after 18 m depth, breakage of pipe threads. This was followed by rods unscrewing or breaking after pipe breakage, and handle bearings.

- At this point of time, 12 breakdowns needed to be attended to, but the County did not have transport. AAR (Japanese NGO) had been requested to help.
- Spare parts and transport have been available in the past from AAR and PACT Sudan.
- Partners in the County are SNV, AAR, ARD, Pact Sudan, Farm Africa, Carter Centre (working on Guinea Worm eradication only).
- Partners did not give reports on repairs and worked independently.
- The only reporting that did occur was at Coordination meetings.
- No annual work report had been prepared by the County.
- Cost Sharing was due to be implemented soon in the County, in which cost of spare parts would also be included.
- Though a tariff plan had not yet been discussed, a figure of SSP 2 per household per week was being considered.
- Spare parts were also available from a local source – New Sudan Service & Supply, which was a drilling company in Kapoeta and kept handpump components.

16 March 2012, Visit to New Sudan Service & Supply

- It was not possible to meet any one who could give us information on the operations of NSSS. However, it was possible to talk with Jones (0928758175).
- He stated that NSSS undertook repairs of pumps and that the Govt. was one of their clients.
- The NSSS workshop was well equipped to undertake maintenance of drilling equipment.
- They also had ample stocks of handpump hardware, some of which was sourced from Addis Ababa.

16 March 2012, Meeting with Association for Aid and Relief (AAR)

Person met: Ryo Kakutani, Acting Director

- AAR had been operational in Kapoeta since 2006.
- They operated in 4 Counties of EE, Budhi, Lopa/ Lafong, Kapoeta North and South.
- Their water supply activities included drilling, rehabilitation and repair of handpumps.
- In 2011, AAR had drilled 70 to 80 boreholes in the 4 Counties, through 4 or 5 drilling contractors.
- BH logs were sent to the County and the State.
- In Kapoeta South, AAR assisted the County with handpump repairs, providing spares, tools and transport.
- AAR sourced its handpump spare parts from Nairobi.
- During 2011-12, their expenditure on tools and spare parts was about US \$ 30,000.
- AAR closely monitored its support to Kapoeta North and South Counties. Initially the Counties were not reporting on the work done, but now the reporting was regular.

Annex 6: Handpump Maintenance Terminology and Data Banking Concepts*

When talking about water sources, handpumps and their maintenance, it has become necessary to have a common vocabulary, so that there is a uniform understanding among all stakeholders when a particular term is used. Also, this document has been written in the context of South Sudan, where boreholes with handpumps constitute the majority of rural drinking water sources.

A handpumps (HP) is a mechanical device installed to lift water from a water source. For the purpose of simplicity, the meaning of a water source shall be limited to a borehole (also called a borewell) (BH) or a Protected Shallow Open Dug Well (ODW). Descriptions of other types water sources can be added in future, as and when needed.

Like all mechanical devices, the HP needs maintenance. However, the water source, BH or ODW, also needs maintenance, though not as frequently as the HP. When this happens, the term Rehabilitation is generally used rather than maintenance or repair.

The India Mark II and the India Mark II Extra Deep Well (IM II and IM II EDW) are the handpumps commonly used in South Sudan. Therefore, for the purpose of this document, a handpump (HP) shall mean an IM II or an IM II EDW.

Maintainability:

A HP, when installed properly, should work properly. In such a situation, its maintenance needs should be “normal”, as opposed to a badly installed handpump which would demand more or “abnormally high” maintenances attention. The quality of the initial installation, therefore, has much to do the eventual maintenance attention that a HP will require. Intensity of usage, depth of installation of the cylinder and the Static Water Level and water quality are some of the other important parameters that affect “maintainability” of a pump. Hence, these parameters have an important bearing on the data to be recorded and monitored to establish their relationships with the maintenance demand of a pump, a group of pumps with particular characteristics, or a group of pumps in a given territory (a County or a State). Effectively monitoring maintainability parameters is a critical constituent of Maintenance Management.

It is also necessary to distinguish between the maintenance needs of the HP and its water source. For example, aggressive water leads to corrosion of GI pipes and causes unusual demand for this item in HP maintenance. But the poor pump maintainability of such pumps is not due a bad HP installation. The same is true for HPs installed on BHs with deep static water levels or BHs that deplete or go dry in the dry season. HPs on such water sources and are NOT MAINTAINABLE. HP maintenance on such sources is only a stop-gap measure to provide a make-shift water supply solution. Sometimes changing the HP to a more appropriate pump type/ design might provide a solution, sometime rehabilitation of the water source with treatment, cleaning and flushing might improve the yield and sometimes there may be no solution as in the case of BH with poor watter quality or one that has gone dry.

Components of the HP:

A HP has two main groups of components, Above-ground and Below-ground (AG and BG), into which its components are divided:

* Written in March 2012, in South Sudan by Raj Kumar Daw

Group	Above-ground	Below-ground
Main Components	Pedestal	Riser pipes [GI pipes]
	Water Tank	Connecting Rods
	Head & Cover	Cylinder
	Handle	

The terms AG and BG give an immediate indication of which group of components of the HP are being referred to.

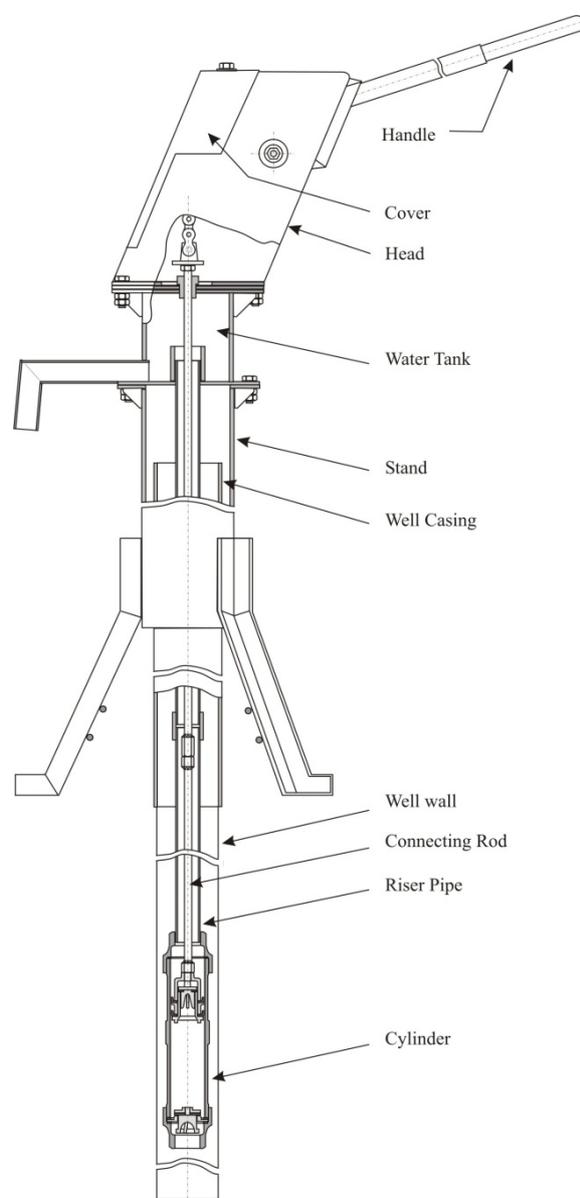
It is a problem with the water source. Therefore, it does not have a solution in terms of HP maintenance

Performance:

Assuming that a handpump has been installed properly, it should be working properly, verifiable by a number of parameters.

- The easiest way to judge the performance of a pump is by measuring its yield, and by feeling and listening to the pump as it is operated.
- For an India mark II, the ideal yield should be 13.5 liters per minute (62.5 mm dia. Cylinder, moving through 110 mm stroke, at the rate of 40 strokes per minute).
- Hence, a yield that is anything less than 13.5 lit/ min (40 Strokes), indicates that the pump is delivering less water than it should. A yield of up to 12 lit/ m is acceptable; at 10 lit/ m a maintenance intervention should be planned in the near future; and at 8 lit/ min the situation is bad and immediate maintenance is called for.
- A second easy measure of assessing the working condition of a HP is called Leakage Test, which is caused by a leakage (of course) in the below-ground assembly of the pump. This leakage could be due to a worn out valve seal (there are 2 valves in the cylinder), a leak from a riser pipe joint or a perforation in the riser pipe string.

Any such leakage causes the water level to drop from the pump's water tank level down to the static water level in the BH. How quickly this happens depends on the size of the leak. The Leakage test is quantified by the number of "idle" strokes, or unproductive strokes of the handle needed before water begins to flow out of the pump's spout. These unproductive strokes are needed to fill the rising main pipe string from the static water level (SWL) to the ground level. Yield within 2 strokes is acceptable; a delay of 5 strokes is worth noting; 10 or more idle strokes calls for immediate maintenance. Sometimes the depletion in the yield of a water source can be signaled by apparent leakage, when the



India Mark II Deep Well Hand Pump

pumping or dynamic water level (DWL) drops below the pumping element, the cylinder, because of poor recharge.

- In actual practice, the Leakage test is carried out first, ideally after letting the pump “rest” without use for half an hour, and once the flow of water starts, the Discharge test can be carried out immediately. It should take 59 strokes to fill a 20 lit Jerry Can.
- There are a number of other signals, but these are generally easy to detect, since they occur in the above-ground assembly of the handpump. For example, damaged bearings are easy to detect visually, by moving the handle laterally, looking for signs of wear on the handle at the bracket, and listening to the handle movement. Similarly, a dry chain or wearing between the rod and its guide-bush is clearly visible when the Inspection Cover is opened.

A pump moves from the condition of “working well” (WW) to a condition of “poor performance” (PP) before it stops working altogether or “breaks down” (BD).

This distinction is very important, since “poor performance” can easily be assessed, long before a break-down occurs. And if this done, then pumps can be maintained or repaired while they are still working.

This fundamental concept needs to be clearly understood.

What follows is very logical.

Maintenance **IS NOT** equal to breakdown repair.

Maintenance **CAN BE** programmed by monitoring pumps for signals of Poor Performance. Problems can accurately diagnosed and appropriate repairs can be carried out before failure/breakdown occurs.

Failure of a component in the handpump is not necessarily a breakdown. The pump can still limp along and deliver water with damaged handle bearings, perforated pipe or a leaking valve.

Breakdowns are unpredictable, it is fire-fighting, waiting for the fire to break out or for the pump to break down. Unpredictably.

Maintenance needs can be classified into two sets of categories, before it is actually described in details:

Major Maintenance	Minor Maintenance
Almost all Below-ground assembly repairs. Some Above-ground assembly repairs, such as replacing Handle bearings, Head, Handle, Water Tank. Almost all repairs that need Special Tools. Replacement of Pedestal by breaking the platform. Sometimes, platform/ drain repairs (more than 1 bag of cement needed). Almost everything that a Caretaker is NOT supposed to do.	That which can be done with two 17x19 mm open end spanners, by a Caretaker. Reconnecting Chain, even though this would have caused a break-down.
Can be “poor performance” correction or “break-down” repair.	Usually “preventive” maintenance. Also, simple break-down repair like Chain coupling disconnection
Preventive Maintenance	Breakdown Repair
Can be both Minor or Major Maintenance	Can be either Minor or Major Maintenance.
Pump is working, usually in the “poor performance” range.	Pump is NOT working,

The above categories are mutually exclusive:

Maintenance is either Minor or Major

Maintenance is either Preventive or Breakdown

This leads to four possible combinations of situations that can describe the generic nature of a maintenance intervention: Minor – Preventive; Minor – Breakdown; Major – Preventive; Major – Breakdown. This has been discussed again later.

There are exceptions, such as a situation where a pump is under field testing, where it can be dismantled for inspection or for installation of a new component, etc.

With this broad distinction understood it is possible to describe the problems and the consequent actions in each of the four categories, depending upon what one comes across at the pumps.

Rehabilitation, which is not Maintenance also needs to be described correctly.

Rehabilitation	
<p>The well needs to be cleaned, flushed. A new platform/ drain/ both have to be built. The pump has to be replaced, either Above or Below-ground assemblies or both,</p>	<p>A clear description of what was done is needed, since there is a range of possibilities.</p>

Well Records and Maintenance Records

In terms of monitoring and data banking, the details of a preventive or breakdown repair are NOT necessary in the first instance. One needs confirmation that pumps are working, working in the “working well” range. One needs to understand the way pumps are moving into the “poor performance” group, and then record the actions taken to bring them back to “working well” condition. Such a data base should be named a Functionality Database rather than a database for repairs.

The maintenance system’s business is to keep pumps working and working well. Its business is not to wait for breakdowns to occur and then repair them. Breakdown repair is an extremely inefficient (technically, economically and socially) condition on which to base maintenance response.

If the maintenance system was based on prevention of breakdowns, then a breakdown repair report would be an exception. The reverse, a maintenance system that responds only to breakdowns, is the present situation in South Sudan.

In terms of data collection for the Functionality Database, therefore, it is necessary to periodically record how many pumps have been in the “working well” (WW) and in the “poor performance” (PP) categories, since pumps from these two groups would keep alternating from one group to the other. And there would be maintenance interventions on pumps in the PP group, all the time, as signaled by the poor performance indicators.

Hence, the data base should start with the inventory list of water sources or the Master Database (which does not need to be detailed, and can be limited to a few key fields. Only one key field needs to be linked between the Master Database, like a unique ID number (or GPS coordinates but only as a cross-check against the unique ID) and the Functionality Database.

The Functionality Database is time-dynamic and so, the date is a key field as are the PP indicators. Only then the Maintenance Database fields become necessary, as a sub-set of the Functionality Database, firstly categorizing the intervention in to one of the four possible situations which describes it best. There is also the possibility that there is no intervention of a PP or BD condition, i.e., No Repair is done for whatever reason. This gives seven possibilities that can describe a pumps operational condition and the category of action taken on it:

	No Intervention - N	Preventive Maintenance - PM		Breakdown Repair	
		Minor	Major	Minor	Major
Working Well - WW	WW				
Poor Performance - PP	PN	PMi	PMa		
Breakdown - BD	BN			BMi	BMa

No Intervention – N can happen on WW, PP or BD

Preventive Minor or Major Maintenance – PMi or PMa, can happen only on a PP condition.

Breakdown Minor or Major Maintenance – BMi or BMa, can happen only on a BD condition.

So some error checks can be set in the data entry system.

The core of the Functionality Database would address the Results level of a program – WAS WATER DELIVERED.

Initially it might be necessary to use WW/ PP / BD as the first level of maintenance data, defining the pump's condition followed by Ni/ Mi / Ma. As people get used to the system, the use of **WW/ PN/ PMa/ PMi/ BN/ BMa/ BMi** can be an adequate initial categorization. Only when Mi or Ma codes are used, there will be the need to detailed maintenance information - was actually seen and what was done [date repaired (which is not the same as date reported or date detected), by whom, was anything replaced (not all maintenance needs replacement of parts), what was replaced, etc].

At one stage, when everybody gets used to the system, in hard and soft copy, the need for PP and BD will be superfluous and the categorization will be reduced to: **WW, PMa, PMi, BMa, BMi** since the use of the P and B suffixes in the codes will directly signify maintenance need and its category.

A link by a key filed, ID, for example can correlate the Master database to the Functionality database.

When the code group **PMa, PMi, BMa, BMi** appear, the data base will then get in to Maintenance Data level, where codes for repairs and parts and other aspects of maintenance can come in.

The maintenance fields in the Functionality Database should be designed to serve the management purpose of monitoring and improving functionality, which is reality is very simple.

WW+PP= Functional pumps.

WW+PP+BD = Total workable pumps

WW+PP+BD+ Dry/ Abandoned/ Failed wells = Total boreholes (which is not same as total workable pumps)

P(Mi+Ma) = Preventive Maintenance done without letting BD happen.

B(Mi+Ma) = Breakdown Maintenance done.

Mi(P+ B) = Maintenance that can be done by a Caretaker.

Ma(P+B) = Maintenance that can be done by a Pump mechanic.

N(P+B) = Pumps in need of repair

Some examples of what can be done with some of the data fields:

In each case of maintenance, an analysis the Date of Installation (DOI) and the Date of Maintenance (DOM), will result in valuable information.

DOM 1 = Date of First maintenance intervention.

DOM 2 = Date of Second maintenance intervention.

DOM (n) = Date of nth maintenance intervention

No DOM = No repairs were necessary (= a pump that has been working without maintenance since

installation or where no maintenance has been recorded).

DOM1 – DOI = Days pump worked without maintenance.

DOM2 – DOM1 = Days pump worked without maintenance between First and Second interventions.

DOM (n) – DOM (n-1) = Days pump worked without maintenance between the nth and its preceding intervention.

The number of records of DOMs = Number of maintenance interventions against a particular pump the pump has needed

Put all this data together, and it is possible how frequently a pump needs maintenance, what type of maintenance, how many pumps need maintenance only one, or more than once, from to to “n” times and what categories were these maintenance interventions.

Recorded and analyzed over a period of time, the maintenance workload can be accurately predicted.

Similar analysis is possible for type of spare parts needed and life of individual spare parts and, therefore, project spare parts requirements for a period of time, and the requirement of funds for this.

Hence, there is the requirement for electronic records that primarily generate periodical reports on the functionality of the ENTIRE population pumps in a given area. This would be supplemented by repair information, which can be based on a site-by-site written report, structured to suit the database, but must have the provision to be descriptive. This supplementary information will form the basis of the Maintenance Database and will yield information like:

Frequency of repairs – by type of repair, by depth of installation, by usage of spare parts, by intervals between interventions, by intensity of use, etc.

At another level, the data would be able to identify territorial maintenance characteristics, project spare parts requirement, make cost predictions, etc.

In order to be able get such outputs, for example twice a year, the maintenance data base must be robustly linked to basic inventory, through the key field, usually an unique ID numbering system. The ID number is best generated using a national Census codification method to arrive at the level of a village and then two to four more alpha-numeric codes to describe the location. Identification by GPS should not be the primary identification since it has a margin of error.

The Master Database, or the permanent well records, of course, needs to be periodically updated. And a new entry in the Master Database should automatically start a new record in the Functionality Database. It follows that a repair record in the Functionality Data base would mean a record in the Maintenance Database.

A number of problem areas will need to be resolved:

Every new hole is one more hole to maintain. Drilling and pump installation are one time activities, and in data banking terms can have a relatively simple structure. Maintenance is a cumulatively increasing system, as each new bore hole is added, is disrupted and then started afresh as a bore hole rehabilitated, stops abruptly when a hole is lost of any reason or goes dry, is affected by water quality, season, intensity of use and a number of other factors that are not always easy to quantify.

The numbers are never static. New holes are drilled. Old holes get a new life after rehabilitation. Old holes dry up. Handpump types change. Handpumps become power pumps and can change back again, as yield deteriorates. Maintenance can go wrong, to the extent that the source is lost. A new hole can come up 2 m away for on old working or not-working hole. And then one of the two might just disappear. In the extreme, an old existing hole can be passed off for a new one, since there is no clear record of what exists.

In actual practice, all this data can be at one place, with data entry formats to suit a particular need – Master, Functionality or Maintenance. Hence protocols on data validation, level of authority for access to data and changing date entries and calling for accountability become necessary.

The three levels – Master, Functionality and Maintenance Databases should be generated at the County level. Once entered and approved, the Master records are virtually sacrosanct, except for the purpose of recording a source degradation or failure or rehabilitation, at which point the Functionality and Maintenance records start afresh. Information from all three levels should be periodically passed on to the State level. The States need to know how to constantly “migrate” in to the new information (it can be done automatically by a program) and then manipulate the data, again by set programs, for standard information outputs. They can also get creative and try some outputs for themselves, defined by their own special needs.

At the national level, it needs to receive data from States regularly, keep tabs on the quality of data coming through, do country level analyses, see the changes occurring from the last report to the new report, monitor the operation of the system, bring in innovations and new technology, do the capacity building, make sure everybody follows antivirus protocols, etc. Juba is the supervisor, and not the place for data entry.