EUROPEAN COMMISSION
DIRECTION GENERALE POUR L'AIDE HUMANITAIRE & LA PROTECTION CIVILE
Regional Support Office for East and Southern Africa (Nairobi)

RAPPORT DE MISSION

Subject: **SUDAN WASH RO Mission**
Auteur: **Jerome BURLOT (WASH Adviser/RO Nairobi)**
Date: **27th of March - 8th of April. 2016**

Main partners and visited sites list:

Khartoum:

- UNICEF: Adnan Mohamed (Emergency WASH Coordinator), Simon Odong (WASH Sector led), Stephane Pichette (Chief of Emergency section)
- IOM: Riad Marrow (Head of preparedness and response unit)
- INGO: CARE, IOM, OXFAM US, TGH: WASH Manager
- UNEP: Robert Bekker (Sr Programme Advisor)
- WHO: Naeema Hassan AlGasser (Representant), Humanyun Asghar (Regional Advisor, Public Health Laboratories)
- Delegation EU: Cosimo XXX (Chief of Infrastructure)
- DFID: Clara Barrington (Sr. Infrastructure Advisor)
- OFDA: Lorry Carruthers (Advisor)

White Nile Province:

- UNHCR: Elsadig Mohammed Zin (WASH Specialist)
- UNICEF: Mohamed Ali (WASH Specialist)
- State Water Company/WES: Elkhlifa Abd Algbar (Supervisor/Engineer) and his staff
- SRCS[1]: Mohammed XXX (WASH officer)

Appendices list:

- Supportive answer document from UNICEF following our questions and document request
- Comparative analysis table from UNICEF to select the water resources (supposed to be an eco-technical comparative analysis)
- Water supply for HC and Sth Sudanese refugees WNP (supposed to be a feasibility study)

[1] Sudan Red Crescent Society

Table of Content

1. EXECUTIVE SUMMARY

The mission took place between the 27th of March and the 08th of April, 2016. The main objectives of the mission were:

- Technical support in developing a sectorial strategic matrix and funding orientation
- Monitoring of White Nile province intervention (South Sudanese refugees)

During the week in Khartoum, several meetings have been held with WASH partners and various stakeholders (UN's agencies, Sector coordination, EU delegation).

Most of the meetings were aiming to feed our strategic thinking, nevertheless very few relevant outputs can be highlighted from those meetings.

The main findings might be the information given by UNICEF/Sector coordination regarding the development of a "Safe Water Master plan" supposed to gather all technical guidelines, supportive document and legal framework proposal necessary to ensure a minimum of framework to the action led as well as coherency and efficiency. However, the document hasn't been shared yet and its implementation will have to be following up.

In addition to that, the meeting with UNEP demonstrates that there is still a clear gap of synergy and coordination among the stakeholders.

The problem with what would be the most appropriate role to play by WES (local Water agency in charge of refugees and initiated long time ago by UNICEF) remains (*see previous WASH RO NBO report*).

Regarding the White Nile province intervention, former monitoring had highlight serious problem of coordination and confusion in responsibilities with regards to the achievements. UNHCR and UNICEF mentioned that I have learnt from that experience. However, within the new MoU between them: UNICEF is in charge of design and implementation and UNHCR in supporting the operating and maintenance of the water equipment. Such division of work will not improve partner's responsibilities, as if problems happen one will say it is because of the design and the others that it is because of inadequate operating and maintenance…

In addition to that, we noticed that whereas the hand over between UNICEF and WES supported by UNHCR should happen the following week of the visit, not any technical

documentation regarding the equipment implemented (in particular the “fancy” water treatment unit) has been provided to UNHCR by UNICEF.

The planning of the intervention is very weak. UNICEF implements new equipment for water treatment and after several months no technical documentation have been provided to the field and no training has been delivered to the operators. Although, the handover of the equipment was supposed to happen the following week of the visit and the systems are already operated somehow for several months. No clear date and outline have been provided about this expected training.

The main issues highlights by the White Nile visit are related to the type of water treatment unit selected and then implemented by UNICEF with State Water Corporation. UNICEF had implement a “fancy” treatment unit usually found in urban set up and very rarely implemented within the framework of an emergency-post emergency response, especially in such context with small poor rural host population left away from any service from the state for long time, South Sudanese refugees not yet in protracted situation.

Then the visits of those systems and interview of the staff in charge have shown:

- Very weak and even sometime irrelevant technical and contextual justification of the system including provision of wrong information related to the quality of the raw water which could eventually justify technically the resort to such type of system. No assessments of existing water treatment unit in the area and no eco-technical comparative analysis have been produced. The maintenance cost have not been estimated.
- Lack of local capacity to operate and even more maintain the system properly. Whereas the systems are operate for several months for some of them no O&M manual or technical documentation, clear and comprehensive instructions have been provided to operators and to UNHCR.
- Lack of local capacity (contractor) to implement properly such costly system (each unit cost 280 000USD and four have been implemented so far). Internal surface of the treatment unit facilities were already quite corroded, cracks already happen on the concrete structure on which those equipment’s have been laid. Generators have been implemented in a way that the outlet is in a confined environment which will affect the reliability and lifespan of the generator.
- Lack of coherency with others interventions with regards to South Sudaneses refugees including using the same type of water resources (Malakal, South Sudan).
- Lack of backup to the system which will make it be very limited in terms of performance when it will have to cope with the highest turbidity for which is supposed to have been selected. For instance no backup generator which led to a shortage of water during 5

days in one of the site visited (generator breakdown). UNICEF and WES were then pumping directly water from the Nile and chlorinate it without any treatment, which is pretty incoherent given the type of equipment selected for water treatment.

- This type of system produce big quantity of sludge which cannot be dumped anywhere. No information have been provided regarding the disposal of the sludge.

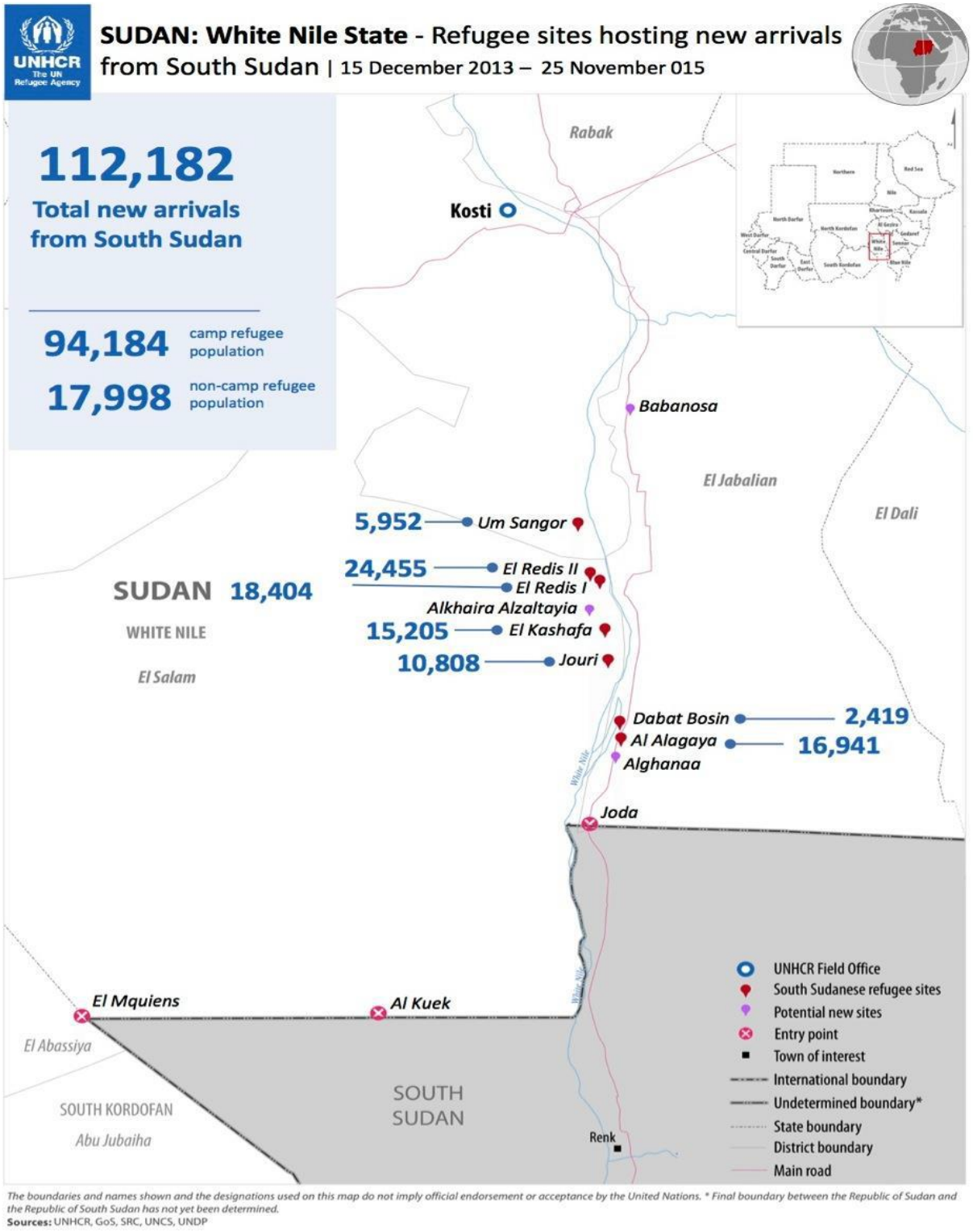
Others problem noticed during the visits were:

- 40 Water point have been built too high to ensure access for children and will have to be destroyed and rebuilt (*apparently UNICEF with their own fund*).
- Need to improve the management of latrine to decrease high cost of desludging
- Need to improve the contractor achievement to ensure latrines are better hygienic: cap on drophole and insect net on the vents pipe apparently planned in the design but not done by the contractor.
- Need to improve drastically the presence of the partners on the ground and the supervision/monitoring in general as well, especially, given the low capacity of the partners.

The implementing partners and contractor capacity and proficiency pretty weak. Even, taking into account the complexity and the tricky aspect of the context, some of the issues listed up there are quite inacceptable in such context of fund limitation and needs.

2. MEETINGS FINDINGS:

2.1. Overview of the sites location:



2.2. UNICEF/Sector lead:

One of the main challenges raised by UNICEF and sector was the problem of fund flexibility in case of emergency.

The 3 key areas of the sector are:

- Accountability
- Quality
- Accessibility

The sector look at trying to decrease the investment made to maintain water supply system in protracted displacement situation, as it represents 60% of the sector budget. One of the main solution mentioned by UNICEF and sector is the solarization of BH pumping (despite of the fact that it cannot be achieved in every situation).

The sector emphasized as well the ongoing improvement in mainstreamed protection in WASH intervention.

One of the main outcomes from the sector and UNICEF seem to be the development of the so-called Safe Water Plan. This document is supposed to establish, legal framework for water equipment management, cost recovery grid, clear standard and guideline in every aspect of the WASH sector intervention.

Though, UNICEF mentioned that UNEP is involved in what they are doing, it seems that this collaboration should be much more enhanced. Actually, some of the objectives pursued by UNEP and UNICEF in their respective programming seem to be similar: guidelines for training of water equipment maintenance staff, water board/water equipment management, etc…

To conclude, it still not clear what could be the role to be played by WES in the WASH response to Idp's situation.

2.3. Meeting with DFID/OFDA:

Main problem highlighted:

- Timely procurement (because of local procedure)
- The sector should be more representative of the partners
- UNICEF: problem of strategic thinking
- WES issue, position of DFID: UNICEF creates it and now they have to deal with it and improve the situation of WES failure in most of the case with impact on the quality of delivery of our partners.
- White Nile intervention: problem of assessment

Main information shared:

- 50M pounds (DFID) invest in water and livelihood in State capital of Darfur (urban and peri urban context). 1st phase: focus on increasing the water production; 2nd phase: focus on increasing the coverage of water equipment
- DFID support UNEP for their project in El Fashier

2.4. Meeting with WASH partners:

IOM appointed by the sector is performing a survey (North and Central Darfur) with regard to management of water equipment in order to identify good practices.

The approach developed by the sector is consolidating bottom-up approach, which is a positive direction. ***Let's see the output/outcome…***

The sector/partners look to have a WASH plan per camp in order to ensure contextualization.

One of the problems highlighted by the meeting was to ensure harmonized understanding of concept fostered by the sector.

The partners in general mentioned solar pumping system as a potential good solution to decrease the 0&M cost of the water equipment and ensure more sustainability.

The sector would like to implement in each State capital of Darfur an information manager. Given the limited resources this activity could be ensured by the WASH specialist in charge of the sector coordination on the field.

2.5. Meeting with UNEP/UNOPS:

The UNEP program includes (focus on Darfur):

- Survey/analysis related to cost recovery and water service management including legal framework
- Water resources management (implementation of measurement devices; data collection and analysis; etc…) and livelihood (agriculture; natural resources management; …)
- Conflict around access to water resources
- Ground water assessment (Darfur) with development of a mathematic simulation model (end of project in 2 or 3 years).

The main findings from the meetings are:

- UNEP haven't been consulted on the document produced by UNICEF and the sector related to El Nino response
- They have been consulted but only briefly about UNICEF strategy

2.6. Meeting with EU delegation:

Main findings from the meeting:

- About 150M euros will be invested for El Nino mainly bin Food assistance. Some action on water are already planned notably through ZOA consortium (6M euros) + 4M for East Darfur

- 8,6M euros are committed to climate change link to resilience
- About 2M euros for UNEP/UNOPS project focusing on Darfur
- Delegation mentioned that they could share with us an assessment of COOPI they made.

The meeting was not very interactive.

2.7. Meeting UNHCR:

The response in White Nile Province in wake with the influx of refugees from South Sudan has faced up to 700 refugee's incoming in 2 days at the peak of the influx. Most of the population come from region close to the border are Nuer and Shiluk.

UNHCR got 7M USD from SURF for the White Nile intervention.

The White Nile emergency response main challenges mentioned by UNHCR:

- Problem of space to properly implement latrine and shelter
- Access (improvement has been made with regard to this issue)
- Relocation of congestion sites prior to the rainy season

Former monitoring of the White Nile intervention highlighted coordination problem between UNICEF and UNHCR and their respective partners with as consequence confusion in terms of responsibilities in the different aspect of the response implementation.
UNHCR mentioned that they have learned from their experience and a MoU have been signed with UNICEF to clarify every level of responsibilities among them. According this MoU, UNICEF is in charge of designing and building equipment (water supply) when UNHCR is in charge to support O&M of those systems.

Within the framework of this MoU, the existing water supply system in White Nile are supposed to be hand over to State Water corporation (WES) supported by UNHCR around the 15th of April, meaning about 1 week after our visit to White Nile.

The main actors (IP's[2]) involved in the WASH sector are: CAFOD, PLAN, ADDRA and the SRCS[3] as main camp manager.

3. CAPACITY OF THE PARTNERS:

3.1. WASH SECTOR:

[2] Implementing Partners
[3] Sudan Red Crescent Society

According the presentation made by the sector it seems that many good orientations have been issued by the sector led. Although, it is still difficult to understand clearly the output of it within the current interventions of most of the WASH actors (at least the White Nile response does not demonstrate the progress achieved by the sector led). Some output like the Safe water plan seems to be very relevant despite of it has not been provided.

So, it seems that some progress are effective, but it require more time to focus on the sector output to better understand the progress made prior to the new sector led currently in charge. The feedback from the partners remains very general and not very relevant. Together with UNICEF, the sector had issue some interesting map as well (hydrogeological map focus on Darfur). The WASH strategy issued by the sector seems to have some relevant output.

Most of the discussions with the sector have remains very general as meeting with the sector was part of a broader meeting including UNICEF WASH section.

Need to improve the coherency of the response and the value for money (economic comparative analysis) seems to be one of the main challenges with regards to White Nile response. The sector should also better promote and disseminate relevant source of technical data, for instance UNEP reports.

3.2. UNICEF:

At national level the discussion had remains very general and focuses on the production of the safe water plan together with the sector.

In the meantime, UNICEF mentioned that they are working on cost efficiency of the water supply system and notably focusing on reducing the O&M cost of the equipment. To achieve this objectives UNICEF foster use of solar pumping without mentioning the problem of proficiency and feasibility (as solar pumping are not always relevant: problem of resources, proficiency, safety,…).

Given the White Nile response and the implementation of “fancy” water treatment (quite oversized) unit for which no maintenance cost have been provided, it seems that there is clear room of improvement with regards to cost effectiveness of system selected and implemented.

When trying to assess the level of performance of UNICEF and all partners in general, we have to take into account the difficulty to deal and advocate with the government in Sudan.

UNICEF White Nile:

The WASH specialist meet on the ground was quite new (arrived last January) and then he could not or barely answer most of questions (and some of the answer demonstrate that he did not understand the question or was not comfortable with) related to the water treatment unit implemented:

- Way to operate it: consumption of water for filter backwashing and indicator to perform it; reagent consumption; water quality control, fuel consumption, pumping program, etc…
- Level of performance and limit of the system

- Justification for the selection of the equipment implemented
- Contingency plan to cope with rainy season and turbidity peak
- Etc…

No technical documentation was present on the field and then it could not be provided. There is a clear gap in terms of formalization. It was not possible to understand the logic of the action and the justification of the system selected for the water treatment given the level of information provided.

Most of the system have been design and follow up by UNICEF Khartoum but nobody from Khartoum office accompanied the visit.

The UNICEF WASH specialist always explains that it is the State Water Corporation (WES) which is responsible to provide answer to questions related to the water supply and treatment unit, whereas UNICEF are supposed to coach their staff until complete hand over.

Some documentation has been provided by UNICEF Khartoum office, but most of it is not really relevant to justify such technical choice in such context. Many data or information needed to select the type of system has been produced after its selection and even after their implementation. In addition, some of the document provided mentioned contradictory information and sometime wrong information.

The ***O&M manual is not yet ready when the hand over is supposed to take place on the 15th of April***. So, then UNICEF won't be responsible anymore. In addition, the contractor is the one supposed to produce the manual. The same contractor has according UNICEF long experience with several of those type of system, then the O&M manual should be already more or less ready (*the plant are already operated for several months for some of them*). In addition to that the O&M manual is supposed also to provide instruction on how to deal with the high variation of turbidity during the rainy season which is supposed to happen in June. ***Difficult to understand this gap/this delay!!!***

3.3. UNHCR:

At level of White Nile, it is tricky to understand the added value from UNHCR as they are supposed to support State Water corporation after hand over which did not yet take place. They are also supposed to be in charge of the whole coordination of the response and in charge as well of O&M of the WASH facilities in general within the camp, through their implementing partners WES and SRCS.

As UNHCR do not implement directly any activities, the main added value from UNHCR especially in such context of poor proficiency and capacity from the local partners/contractors, should be in supervision and monitoring of the intervention through permanent field presence ensuring as well technical support to the partners.

Although, it seems that during the visit UNHCR and UNICEF specialist were discovering the situation and the issues in the meantime. Then, both of them barely understood how the system was working or is supposed to work.

The level of understanding of the UNHCR WASH specialist of the WASH intervention seems to be more or less just acceptable.

UNHCR despite of the lesson learnt from the past intervention, did not get any technical documentation with regards to the water equipment (including those "fancy" water treatment unit) supposed to be hand over to them in the following week (18th of April).

4. MAIN FINDINGS FIELD VISIT WHITE NILE:

4.1. White Nile intervention implementing partners overview

SRCS:

The SRCS is involved in WASH, health sectors as well as livelihood through an implementing partner. The main role of SRCS is the camp management. They are in charge in all the camp.

As challenges/problem SRCS mentioned:

- Problem of space (1 shelter can host up to 6 families)
- Shelter which need substantial rehabilitation (emergency set up; 2 years old structure)
- Immediate need of food assistance when refugees pass the border
- Risk of outbreak
- 1 site can be enclave during the rainy season
- Even boarder close refugees find their way and then it becomes even trickier to track them.
- People should move to the new site in April, but the new site is still far from being ready to host people.

ASSIST (Arrived in 2014 in White Nile):

Involve in:

- Livelihood sector in 4 sites.
- Special action toward PSN/disable people
- NFI: winter cloth distribution, etc…
- Food security with UNDP support
- Livestock (with support from CAFOD) and fish processing

ADDRA (since 1980's in White Nile Province):

Involve in:

- WASH: pit latrine and water tank rehabilitation/construction (new site)
- Ferry rehabilitation
- Livestock for refugees and host communities

FDPO (Arrived in 2013 in White Nile):

FDPO is the implementing partners of many actors. They are involved in almost every sector:

- Education in emergency (CHF fund)
- WASH (supported by PLAN) and health
- Livelihood; cheese factory and fishing/agriculture for host communities
- Training
- Support to disable persons

Challenges mentioned: need to reconstruct 180 latrines

PLAN SUDAN (in White Nile since 1990):

Involve in:

- WASH: especially hygiene promotion, latrine construction
- Livelihood
- Shelter
- Child protection: child friendly space (CFS)

Challenges: CFS WASH facilities; local materials access

CAFOD:

They built 170 latrines for host communities in 2015 using CLTS approach.

Involve especially in the WASH sector: water point construction and latrine construction (UNICEF, support from ECHO); involve in latrine management as well partially with their own fund.

Challenges: latrine management: desludging, door destruction, cleaning… ; 4 different designs of latrines exists on the sites.

Conclusion:

The response is limited in terms of partners by the problem of access. The UN agencies and INGO mainly intervene through local partners (local NGO) with very limited capacity and proficiency in the various sectors. In addition, as listed in the previous section, every partner is involved almost in every sector out of proficiency in the sector, and in various sites.

It becomes quite difficult to understand who is in charge of what and where. The response structure should be more rationalized to better use the resources, facilitate monitoring, synergy among the partners and harmonization of the approach, as well as to avoid overlapping. Ideally, we should not have more than one partner per sector and at least per camp.

4.2. Water supply:

4.2.1. Focus on Joda, reception center:

Joda is the main reception center next to the border. No refugees were there during our visit and border was close.

On the site, we could found 3 non segregated latrines almost full. The latrine had no roof, and cannot be considered hygienic as no cover on the drophole and no vents pipe. The drophole is quite big and apart that he could be dangerous for child, it also enable to drop big solid into the pit which will hamper the desludging.

Despite of the presence of PE[4] water tank of 2000L on the site, the water access is ensured by 200L plastic drums equipped with a cup to fetch water (not tap on it and lay on the ground). Another 200L drums is present in the kitchen.

The water is provided by a small treatment plant (40m3/day) located in the host communities and build 2 years ago with South Korean fund. ***At the question is the water chlorinated SRCS and UNHCR reply yes, but actually the water is not chlorinated***.

The treatment plant is operating by State Water Corporation (same structure supposed to operate and maintain water treatment unit implemented by UNICEF). The process is very basic and based on sedimentation tank, slow sand filter and pumping up to an elevated water tank supplying a taps stand without chlorination as they run out of reagent 2 months after the equipment has been commissioned. ***This system built recently*** *(2 years ago)* ***was already pretty deteriorated and it was operate somehow without any control.*** The sand of the slow sand filter has never been washed.

It was interesting to visit this system also as it ***can give an idea of the capacity of the State Water Corporation to operate and maintain a water equipment after departure of the partners.***

4.2.2. Raw water, intake and water treatment plant assessment:

Water quality control at treatment plant location:

No water testing results have been provided regarding the water resources (only after treatment). Only measure of turbidity performed at water intake by a State Water Corporation staff in charge of water quality control have been provided. ***According this specialist of State Water Corporation, the turbidity in the White Nile river*** use as water resources to supply the refugee's sites ***is quite stable along the year between 15 and 25 NTU, apart the two months of the rainy season*** which can see the ***turbidity peak reaching*** about ***700NTU*** (seems to be realistic).

[4] Poly ethylene

The water quality specialist from State Water Corporation mentioned also the problem faced with turbidity during the dry season due to low level of water in the river and sub optimal positioning of the water inlet in the river which led to turbulence at the inlet and then mud from the bottom put in suspension.

If the intake water pumps are equipped with back up and are located on a floating structure, the ***positioning of the inlets of water is sub optimal*** *(see pic aside)* at least on the one visited (Al Hashat site) as too shallow. Furthermore, whereas the pumps are located on a floating structure to adapt to the variation of level of the river, the inlet was fixed on a piece of wood jab into the bottom. The inlet should have been fixed to a floater and a weight to enable to be kept under the surface (*to avoid pumping of floating materials*) and enough above the bottom (*to avoid putting in suspension mud*).

All the treatment plant implemented by UNICEF (at least they are the same) treat water from White Nile river.

Water treatment plant basic description:

The process of water treatment is based on: sedimentation – coagulation – decantation (lamellaire) – gravity filtration – chlorination.

The treatment unit comes in container where is located the mixing chamber for the coagulant; the lamellaire decanter and the filtration. From the filter the water runs down to buried water tank before to be pumped up to an elevated tank to ensure water point supply by gravity.

The process and especially the lamellaire decanter is a very efficient treatment process. Lamellaire decanter are usually found in urban context as it enable to save a lot of space compare to normal static decanter. The coagulant used is poly aluminum chlorides (PAC), which is a very effective, mixed of polymer which enables to perform efficient coagulation and flocculation and then can deal with very bad water quality (turbidity).

The performance of lamellaire decanter with inclined lamella is quite high. ***The whole process should enable to reach high quality of treated water unless it is NOT operate and maintain properly.*** Otherwise, the quality of the outgoing water would not be higher than with others basic process.

Assessment of water treatment unit selected relevancy:

The matter is not link with the performance of the system; the ***matter*** is ***link to***: ***is this process the most adapted, the most sustainable and the most cost efficient in the context it has been implemented***? And ***How the technology has been selected?***

Here below are several concerns and issues about the technical solution selected highlighted by the field visit:

1/ **Raw water quality and technical relevancy of the system:** based on the quality of the raw water: as already mentioned the State Water Corporation (SWC) water quality specialist in charge of UNICEF treatment plants control mentioned that the turbidity (confirm by his log book) in the river quite stable around 20NTU, only 2 months per year during the rainy season the turbidity peak can reach 700 NTU. For a raw water quality of 20 NTU, the process implemented is clearly and totally over dimensioned/sized. Treatment based on static decanter and slow sand filter with chlorination could be enough, or ultra-filtration unit… Basic backup/alternative system (SWAT or others means) could be implemented to cope with this two months.

The process implemented is not the simplest and robust, as well as it is not the most cost efficient given the average raw water quality.

The ***UNICEF Khartoum office*** documents received after the visit mentioned all a ***peak of turbidity*** use to design the system at ***24 000 NTU***. ***This value is not realistic and not possible***. More likely they mean 2400 NTU which is still very high and should occur only very rarely and not very year. In the meantime, the ***operating of those treatment units with this level of variation will be quite complex*** for the staff operating the equipment's to handle.

In addition to that:

- the operating cost will drastically increase (not estimated so far) with this level of turbidity,
- the production of sludge as well,
- and the need for filter backwash will also increase
- which means that the production will be drastically reduced as well, as there is no backup treatment line and then the systems need to stop to backwash the filter, in the meantime this means also much treated water which will have to be used for backwash.

2/ **Initial assessment and feasibility preliminary survey:** No comparative techno-economic analysis of various treatment solutions has been provided to justify the selection of this system.

The ***documents provided by UNICEF Khartoum do not constitute a technical review of different technologies performances for water treatment*** (*e.g.: biological sectorized retrofiltratio, lamellaire decanter densadeg, lamellaire decanter actiflo, slow sand filter and decantation, filter under pressure, etc…; ultrafiltration unit as fine tuning, …)* **.** The ***analysis does not take into account adaptation/relevancy to the context:*** type of population, the situation (refugee's, post emergency, …), the local capacity and environment criteria. It compares ***without providing figures*** only solutions such as water trucking, ceramic filter/HH treatment, use of groundwater abstract by BH, rainwater harvesting system.

In addition to that, ***no any economic analysis*** is presented in the document provided.

3/ **Justification of the system, contextual relevancy and profile of population benefiting:** ***Main justification brought*** by UNICEF to justify the selection ***of this treatment unit*** was based on the facts that ***already 7 units are operate in the region by the SWC*** and that after departure of the refugees those systems will still benefit to the host communities. ***Although, no assessment (mentioning the current conditions of the equipment and the level of performance of the process) of those systems have been provided,*** only information mentioning that the contractors had built many of those system 15 or 20 years ago.

In the meantime, ***the type of population supplied by the 7 units*** mentioned and implemented prior to UNICEF intervention, ***can be considered more as peri urban population compares to the ones benefitting from UNICEF system***s (*host communities*).

The host communities benefitting from the same service of the refugees can be more considered as ***small poor rural communities, left away from any services for long time*** (*e.g.: electrical grid is passing in their village but they don't have any connection…*). The ***host communities used to tap water from hafirs***, then the new system constitutes a drastic changing for them. For the time being, the staff in charge of to operate the treatment plant get incentive from partners, but we can be suspicious about the ***capacity of the SWC to continue to operate those systems for those small communities when the incentive will stopped.*** In addition, the host communities represent less than 20% (*about 69 000 refugees and 19 000 pp from host communities*) of the population supplied by those systems that are already quite oversized (apart for the two months of rainy season). Then, the system will more costly per user. The SWC mentioned that they are planning to implement system of water payment, but they don't whether those communities are willing to pay for such service and if yes how much they could charge them.

In addition to that, the ***whole response seem quite incoherent*** in a way that we speak about ***waiting point*** (Sudanese government) and not settlement or camp, which means that whenever they want the ***local authority can move the people*** and then investment will be wasted. Furthermore, ***the latrine component of the WASH response is still an emergency or post emergency set-up, when the water supply component can be more considered as LRRD or development approach.*** We are not in a protracted situation.

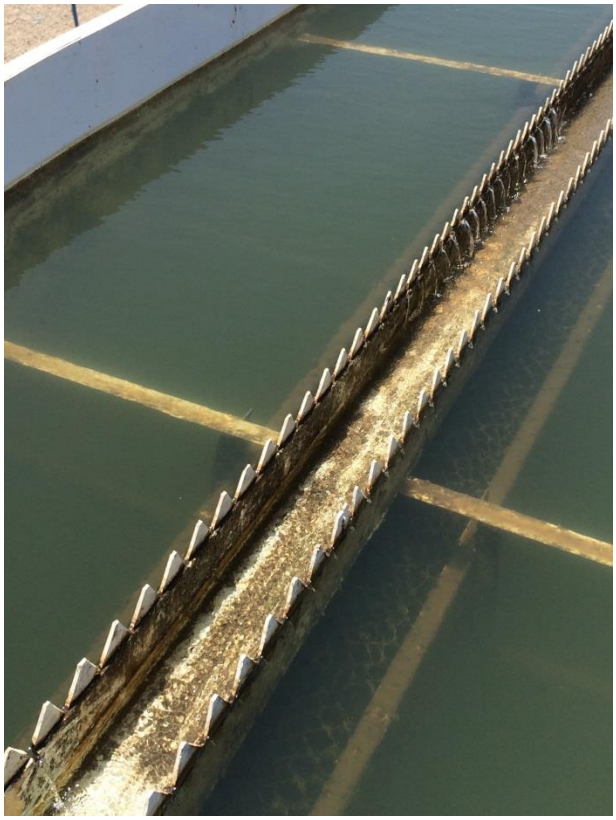
In ***Malakal*** (upstream to Kosti on ***White Nile River*** in South Sudan), the water supplied of an Idp's POC (Over 120 000Ppp) is still ***done with an improved SWAT system*** (*using ultra filtration to fine tune the water quality and reduce consumption of aluminum sulfate and chlorine ; average peak of turbidity over there very rarely exceed 400 NTU*).

4/ **O&M cost of the system:** When asking about the O&M cost of the system, it seems that only the operating cost of the treatment unit (during dry season; cost during the two rainy season months can be expected much higher) has been calculated, based on the document provided and named O&M cost. Apparently, ***the maintenance costs have not been estimated.*** Only the operating cost of the 4 systems (*out of the two months from the rainy season, cost will be much higher during this period*) would be about 15 000USD/month or 180 000 USD/year (*without any maintenance*).

5/ **Level of proficiency of staff in charge of system O&M and technical documentation availability**: ***No any technical documentation was available on the field*** including the O&M manual or pump data sheet... ***None of the operators*** meet (as well as the UNHCR and UNICEF specialist) at the treatment plant location ***knew clearly how the system works, its limits of performance, the way to adapt the treatment to the raw water quality variation, the procedure to follow for cleaning/washing of decanter or the filter, the quantity of treated water use for filter backwashing…*** Actually, it seems that the ***decanters have never been cleaned*** since commissioning of the equipment.

Most of operators were very confused in their answer to question which demonstrate a clear lack of instruction, follow up and formalization after only few months operating. According the UNICEF WASH specialist, the O&M manual and all the necessary available technical documentation are supposed to be available at Khartoum UNICEF office. Nevertheless, it was not provided yet despite of it has been requested. The point is that ***the hand over to SWC supported by UNHCR is supposed to take place in a week, and UNHCR still did not get any documentation about the system.***

Even the engineer in charge to oversee all the plant and coach the operator was not very proficient with the system. He was ready to increase the water production regardless of the limits of performance of the system. Then, he thought that the backwashing of the filter should be performed when the flow rate of the plant production go down under a certain threshold and measured by the flow meter. This could have been a good instruction to perform cleaning of the filter; the problem is that the flow meter is located after two storage tanks. Then, it will be a significant delay between the moment when cleaning is needed and the moment you can notice it by reading the flow meter. The level of water on the filter could be a good sign to follow up in order to ensure appropriate timing of the filter cleaning.



6/ **<u>Water quality and process efficiency control:</u>** ***Only one person*** (quite old technicians from SWC) ***is able and equipped to control the water quality*** (inlet and outlet) of all the plant and adjust the dosing rate in accordance. This person is ***supposed to pass every two days in each site***. There is no water quality control equipment at treatment plant location.

7/ **<u>Present level of operating the system:</u>** 3 of those treatment units have been visited. ***2 equipment did not seem to work properly and clearly not optimally:*** One had the coagulant dosing pump unplugged when we arrived and then the water after treatment was still quite turbid. The others one (*see picture aside*) had a problem of level (*hydraulic regulation*) in the sedimentation tank and then as well in the decanter (*as the system work in gravity*), then the overflow of the decanter and then the production of water of the plant was sub optimal.

8/ **<u>Follow up of consumable and fuel consumption:</u>** ***Log book*** where the fuel consumption is supposed to be recorded is ***not systematically filled up***. In addition, it was not possible to understand clearly the consumption of fuel of the Al Hashat Treatment plant. ***The discussion with the operator was confused and took a lot of time, when the answer should have been clear and direct*** (especially given that fuel is usually one of the main items subject to diversion).

9/ **<u>Level of achievement on the implementation part:</u>** ***Internal walls of the coagulant mixing chamber were already corroded*** *(see picture aside)* ***in two of the plant and concrete based of the decanter was already crackling*** at Al Hashat treatment plant. UNICEF mentioned that the system is under warranty and the contractor is supposed to apply a new coating (meaning no water for the time of the operation), but one more time when??.

10/ **<u>Cost effectiveness of the initial setup and reliability of the water treatement unit:</u>** Treatment plants have ***no backup generator***. Thus, ***in Dabat Bosin a generator breakdown led to a short cut of water of 5 days***. ***UNICEF together with SWC was pumping water directly from the White Nile River performing chlorination without any treatment during those 5 days***. This a ***bit incoherent***, especially given the type of system implemented.

In addition, the ***generators seem to be over sized*** 30kVA. The estimation of the generator power rate have been made by SWC by addition of the all the power needs which are multiply per 3. Normally the power have to be multiply per 2,8 to cope with the over tension imply by the starting of the system. The point is that normally they are not supposed to start all the devices in the same time, then they should consider the device with the higher power demand, multiply per 2,8 and then add the power rate of the others devices. Following this way to estimate the size of the generator, the generator could have been maximum 20kVA with lights including almost 20% over sized for safety.

The generators are located in a confined room with inlet inside, which ***led to generators breakdown and will contribute to drastically reduce their lifespan as well*** (*problem of sustainability*).

11/ **Sludge disposal from the treatment unit:** ***No information*** was provided about the way to dispose the sludge coming from decanter and filter cleaning.

12/ **Capacity building:** When raising the problem of proficiency and understanding the process/equipment or water treatment, the engineer of SWC mentioned that it is plan that the capacity of their staff is going to be built by a ***JICA training center*** supposed to be implemented at Kosti. The problem once again is that's only assumption and the systems are already operated for months without the staff in charge to be properly instructed.

The UNICEF and UNHCR present on the field during the visit are clearly not proficient enough to coach the SWC staff on how to operate and maintain the water treatment unit.

Conclusion:

The relevancy of the water treatment unit type implemented by UNICEF in such context remains to be justified, especially given all the issues and concerns previously mentioned.

The level of assessment, the confused information provided the lack of technical analysis and justification, accentuate by the context of the intervention made such technology implementation difficult to understand.

Out of the relevancy or not of such equipment in the context:, the absence of technical documentation on the field; the current level of proficiency of not only the operators but also their supervisors (WES, UNHCR, UNICEF meet on the field); the gap in estimating the maintenance requirement and cost; the setup of the system; and the current conditions of some of the equipment's of the treatment plant (as well as the one visited implemented in the past) enable to be ***quite suspicious about the sustainability of such system.***

In addition to that, the context of the intervention with:

- Some activity implemented in emergency/post emergency set up (latrine…) and some in more LRRD or development approach for protracted crisis.
- Operators and supervisor have not yet been trained (when?), whereas they are already operating those systems since several months for some of them.

- The full hand over to SWC (WES) supported by UNHCR is supposed to happen in the week following the visit whereas not any technical documentation have been provided to UNHCR
- Those refugee's sites are still considered as waiting point which could enable local authority to move the refugee's at any time
- The type of host communities supposed to be benefitting from the equipment after the departure of the refugee's (small rural population usually left away from any services, for instance an electrical grid is passing through their village but no connection has been set up for them; in addition the equipment will be clearly oversized to cover only their needs, meaning more costly running cost),
- The water quality of the water resources,
- The need to ensure coherency and cost effectiveness in humanitarian response,
- The level of needs and the limitation of fund in Sudan

All points listed allow to clearly put the system in question especially as ***no clear explanation have been provided to explain such system selection and implementation.***

4.2.3. Water network:

The water network is made mainly of HDPE pipe. The design have of all water network have been made by the SWC engineer and the dimensioning seem to be more or less adequate. The supply is of the distribution network is made by gravity from elevated water tank, which is cost effective way of regulation of the system.

In some location it seems that the pipes are buried too shallow which can generate high temperature at water point. The water tank as well are made of steal and then some shade should be implemented, even just by covering it with thatch, it will decrease the temperature of the water (high temperature of water mean also consumption of chlorine).

The water points are more or less all the same. They are concrete structure with one stairs to reach the taps. Most of them are fenced. ***The main problems come from the height of the taps*** and the concrete structure which prevent most of the child to access the taps. This issue has been raised by UNICEF which was also in charge to build with its implementing partner. ***Thus, about 40 structures have to be demolished and rebuild.*** Apparently, it is going to be done by UNICEF with their own funds (***to follow up!***).

Water quality at water point level:

The water quality monitoring is supposed to be performed on daily basis at taps stand. There is no formal plan for this activity and it does not seem that the results are recorded. The MoH is supposed to be in charge with supervision from SRCS and monitoring of UNHCR. The SRCS WASH officer was very confused to explain the way the activity is organized and his involvement in it.

Few test made during the visit reveal very low level of FRC[5] < 0,1mg/L, even at the closest tap from the chlorination injection point. This mean that for sure the furthest taps stand might not have any chlorine left and then the action on post contamination is clearly undermined.

In addition to that ECHO WASH policy is clear when expressing the fact that the water quality control have to take place as well at HH level as the objectives of the action should be to ensure safe water before consumption. ***No water quality testing are performed at HH level.***

4.3. Sanitation:

4.3.1. Latrine design:

There 3 and now 4 different design of latrine scatter in the different sites. The last being the one of UNICEF using ceramic block made of clay. The design is supposed to include a mosquito net on the vents pipe (most of the time present which is very rare) and a cover on the drophole which could not be found in most of the latrine. According the UNHCR WASH specialist the contractors is supposed to put them but they are already in used for some time now.

The design with concrete slab get a quite big drophole which can be dangerous for child is they stuck their legs in it and which enable user to drop big solid which will hamper the capacity to desludge them.

Most of latrine cannot be considered as hygienic (*see pic aside*).

The latrines have been build using local contractors capacity of the contractors are pretty low in the area (*many latrine slab in concrete already had cracks*). The average cost of a latrine stance is about 700USD, which is quite high for the region cover by RO NBO.

Most of the pit are lined with 3 steel drums of 200L (pit = 600L) which is quite small and impact the lifespan of the pit and the cost of the response.

Only the under construction MSF latrine at Dabat Bosin site have much bigger pit but it was not possible to get the cost of it.

One of the main challenges, apart the space, for the latrine are:

- The presence of black cotton soil with almost no seeping capacity (which means that latrine pit filled up faster)
- The use of latrine for shower by the refugees as they have no bathing facilities available. So, given the type of soil, it means that the latrine pit filled up even faster.
- The cleaning of latrine as for the time being latrine can still be shared by numerous families.

[5] Free Residual Chlorine

4.3.2. Latrine management:

The good point of this White Nile response seems to be the absence of incentive to clean latrine. Whether the latrines visited were more or less clean, some of them had also evidence of open defecation around it. Most of the latrine blocks are equipped with light. The approach is supposed to be family share latrine, the families sharing as well the cleaning.

The problem is that up to date, the lifespan of the latrine pit is about 3 months before need of desludging.

The desludging cost about 300SDG/stance (about 45USD/stance). So, with the assumption of about 5000 latrines to desludge 4 times /year, we can reach a budget of 900 000 USD/year. This is not bearable and the strategy should evolve to make it more affordable. In addition, it was not possible to get the clear capacity of the desludging of the area: number of contractor, number of equipment, etc…

Furthermore, most of latrines pit visited were close to full. Some of them had very dry content of the pit, which will hamper the efficiency of the desludging and will require use of additional water to enable desludging (*see pic aside*).

4.3.3. Drainage:

From the experience of the last rainy season, some location needing drainage have been identified. The fact is that at time of the visit, no drainage implementation has yet started whereas the rainy season is supposed to start in one and a half month. The shelters need also improvement of their drainage before the rainy season.

4.3.4. Solid waste disposal :

Numerous garbage beans are scatter around the sites. The HH are supposed to drop their garbage in those beans. From the beans people from the refugee's community getting incentive are supposed to collect the garbage with a tractor and disposed it in a dump site few kilometers from the sites. The garbages are normally burn at dump site. The approach seems to be adequate.

4.4. Hygiene promotion:

The hygiene promotion component of the intervention is quite standard. The approach is quite holistic and based on public health concept rather than targeted and adapted to the population.

Most of the approach consists on door by door visit by hygiene promoter with very limited interaction with people given the time spend on the visit. Cleaning campaign seems also to going on with some

positive output (given the observation in the environment) but not very formalized and it does not seem regular.

Jerricane cleaning awareness is going on and it seems to have very variable level of success among the sites. At some location, we could still notice very dirty jerricane and in some locations we could impressive result with at least on the water point visited all jerricane pretty clean (Um sangor site; same delivery time), but still all of them without led. The quality and commitment of staff in charge to implement such awareness activity is for sure one of the key condition for success but of course not the only one.

One of the good points is also the presence at some of the water point of awareness notice board with key hygienic message related to water uses. Few awareness materials could be noticed at the latrine blocks location. It remains that adaptation of those awareness materials should be done with the target population to appropriate adaptation.

The main partners acting in hygiene promotion are CAFOD complement by SRCS volunteer (Sudanese Red Crescent Society). The SRCS volunteers are getting a monthly incentive regardless the activity they do.

5. RECOMMENDATIONS:

5.1. WASH Sector:

- Improve interaction and synergy with UNEP/UNPS program, notably in terms of information (technical data base, lesson learnt, good practices …) analysis and dissemination, approach/strategy in the sector, technical feasibility assessment…
- Improve coherency of emergency responses (e.g.: White Nile Province)
- Improve accuracy of design and sizing of Water equipment: pump, generator, pipe diameter… to ensure cost effectiveness and value of money for the actions led;
    - Solar powered pumping cannot be the only solution to decrease the cost of O&M of the water supply system.
- Ensure a minimum of economic analysis (capital and running cost) when selected the technical solutions for an intervention
- Improve the strategy and methodology for capacity building (apparently planned within the framework of the Safe Water plan).

5.2. UNHCR:

- Ensure a permanent presence on the field of the WASH specialist to coach partners and supervise contractor
- Improve and formalized the monitoring with clear reporting
- Improve the latrine strategy to reduce as much as possible the cost of the management (desludging, …). The size of the pit, the use of IMO (enzyme to reduce volume of sludge and

decrease risk of nuisance…), the materials to be used (arborloo latrine…), etc… should be carry out to find way to decrease the cost of the desludging.

- Improve the way to operate the water supply system and formalized it.
- Develop an appropriate, adapted and realistic hygiene promotion approach
- Improve MoU with UNICEF: everybody should be in charge of a full activity for instance design, building and O&M of water network and water point for UNHCR and design, building and O&M of water treatment plant and water intake for UNICEF. This would ease and clarify the division of responsibility (*in such way everybody is in charge of his own work*).
- Hygiene promotion:
    - Improve the hygiene promotion strategy: ensure dynamic (interactive and not repetitive) and targeted approach (selection topics to be addressed should come from issues noticed within the settlement/site, …), adapted (tools/awareness materials and activity should be designed and tested with a representative sample of the target population, …)
    - The hygiene promotion capacity could be better used as they are the one most present of the field, to report on any type of issues noticed (identification of: open defecation area, unstable shelter structure, standing water location/drainage issues, area with risk of fire, and others gaps/risk/concerns in general…) and within the sites and findings from interaction with population. Then, they could be used to mobilize and engage communities to address the issues highlighted by their walkabout within the sites.
    - The funds being quite limited for the White Nile intervention, it became crucial to ensure synergy among partners and activities, and then the hygiene promoter could be used in a more transectorial approach/strategy.
- Continue to reduce the incentive especially for the daily activities (cleaning of latrine, disposal of garbage into the beans, …)

5.3. UNICEF:

- Develop a relevant protocol to select a technical solution considering as well the situation and the context and including a real technico-economical comparative analysis.
    - Improve the adaptation of technical solution to: the situation and context (protracted, emergency, camp, site/settlement, waiting point, reception center, …); the type of population (refugees, host communities, small rural community, urban or per urban population, ….); the capacity of local authority to hand over a system and to financially ensure its viability in time and after the departure of refugees and relief; the type of water access previously get by target population …..
- Improve the planning of activity, to avoid gap in instruction to operate/manage facilities, control quality, ensure optimization of system/infrastructure implemented in terms of set up, operating and maintenance, etc…
- Ensure that the value for money is meet in designing a WASH response, as well as coherency with what is done in the region and notably for White Nile province what is done in the neighborhood displaced population in South Sudan, e.g.: Malakal (to avoid also pulling factor).

Then, it would be worthwhile to improve dissemination of lesson learnt and good practices from for Malakal.

6. CONCLUSION: Strategic matrix 2016-2017

FOCUS on EL NINO RESPONSE		
General orientation	The duration of drought can be tricky to predict. The impact of the drought do not affect directly all the resources, the one relying on yearly rainfall recharge will be the most affected, but most of the deep resources have a buffer capacity and should be able to cope with a one year drought but could be affected in the future… The location supplied by aquifer such as the Baggara basin, the Rubawa formation and in general the Nubian sandstone formation given the size of the aquifers won't be affected at short or mid term Identification of the most sensitive water resources to drought, for instance shallow wadi aquifer, etc… should have been achieved by partners in the location they are working in, as preparedness activity. Out of drought, flood risks and then response should also be taken into account. What could be the size of the flood is also not really predicable in such context (*climate change*) and then it make tricky to design appropriate mitigation measure	
Type of activity in case of flood	• Pre identification of flood prone area and then improvement of drainage system, • protection in the spot prone to landslide, • protection of diverse facilities: latrine pit (elevated latrine and drainage), water point, water resources, …	

Type of activity in case of drought	Note: that there is section about that in my last monitoring report page 6 and more information disseminate in various section of the report as well as in the appendix.
	• In terms of mitigation measure:
	  ○ Identification of all the water resources in the sensitive location (type of water resources and sensitivity to drought) and among them the most sustainable one
	  ○ Plan contingency stock to be able to store and truck water
	  ○ Rigorous monitoring of ground water table, recovery time of BH etc… with fixing of a threshold in terms of depletion of the ground water to start saving on water for essential needs in case the level dropped down under the threshold with alternative water resources and capacity to exploit already identified, etc…	

Sub sector	**Orientation and principles**	**Activity**
WATER		
General orientation	Most of the funding should go to improve and secure water access in Idp's camp with a clear and realistic progressive exit strategy. Nevertheless, it is relevant to consider some funding as well for the rural area (resident communities) in parallel (the needs are there, to avoid more displacement due to water access, to facilitate return if possible…) mainly focus on equipment reparation and	

<table>
<tr><td></td><td colspan="2">improvement and training of operator. Intervention on urban water supply system should be avoided as much as possible. In extraordinary case, it could be considered to invest small budget (about 50-100 000 euros) into urban water supply system if the situation request it (to avoid total collapsing of a system…) and the intervention should have a clear high quick impact for a limited investment (for instance Nyala town). By principles, all activities developed by our partners should be based on community approach and contribution from community should progressively increase in time (to reach quasi-autonomy of communities/institution for operation and small maintenance within 3 to 5 years after intervention).
All technical solution within the framework of emergency response or to a response to a protracted situation should be selected taking into account the type of service and access to safe water which used to or which get the targeted populations. The technical solution should be as close as feasible (to ensure safe water access at least for the refugees given that usually they are not used to leave in dense habitat which can bring its own public health issues) to the existing one to access safe water or to the level of service than used to get the targeted population. The technical solution should also be selected based on an relevant technico-economical comparative analysis. Then, the technical solution selected should integrate as well:
• the situation and context (protracted, emergency, camp, site/settlement, waiting point, reception center, …);
• the type of population targeted (refugees, host communities, small rural community, urban or per urban population, ….);
• the capacity of local authority to hand over a system and to financially ensure its viability in time and after the departure of refugees and relief;
• the type of water access previously get by target population …..
By principle, water treatment solution should be the most robust, basic, affordable and easy to maintain to ensure sustainability. As much as possible consumable should be limited (apart chlorine) to ensure sustainability and reliability of the system (no shortage).
A clear and effective water quality monitoring plan has to be present in every site. The water quality control as to be ensured at strategic locations from the water intake to the HH on representative sample of HH and following an appropriate frequency.
<u>Idp's camp:</u> For the new caseload (1-3 years) whom did not yet generate income by development of livelihood activities, the subsidy of the water supply system should be adapted. The population should be informed from the beginning that they will have to contribute and that this contribution will have to be increased in time as the relief will decrease. New facilities should be limited and consider only at last resort or in new settlement when no others local alternatives to access safe water.
<u>Host communities and refugees sites:</u> The host communities should benefit from the service provided to the refugees when feasible, economically realistic, and when there is a huge gap between the levels of service get by Host communities compare to the refugees. The intervention should be designed at first considering the refugees population. Contribution from the host communities is frequently focusing only on the land access for the refugees. The host communities should start to contribute to at least to the operating cost of the water supply system unless the government can subsidy the service.</td></tr>
<tr><td><u>Specific orientation</u></td><td>The water supply equipment implemented has to ensure in selection of its different technical elements the best compromised between flexibility in the system performance and cost efficiency to decrease as much as possible the running cost of the equipment and then make it affordable for the population. When relevant private sector involvement could be facilitated or promoted to ensure sustainable operation and maintenance of the equipment</td><td>✓ Implementation, capacity building/technical assistance and monitoring of Water user committee with implementation of a sustainable and fair system of financial contribution collection
✓ Subsidy of water supply system operating should be phase out as soon as possible (ideally within a maximum of 3 years after the beginning of the intervention).
✓ Maintenance and upgrading (to improve</td></tr>
</table>

	implemented with ECHO funding. When it comes to capacity building the partners have to demonstrate at the end of the project effectiveness of the capacity built which should in the following project led to a decreasing of the partner's involvement in the activity/topics subject of the training. The ground water table has to be monitored regularly and recorded. The system of hydraulic equipment management system and financial contribution mechanism by users have to be adapted and tailored according the context and the existing resources and capacity (*exit strategy based on private body to manage O&M of the hydraulic equipment users being still owner of the facilities and involve in pricing with a special treat for the most vulnerable people can be considered*).	*system performance and to make the system more affordable/cost effective by replacement of some of the elements or modification in the set up*) of existing hydraulic equipment ✓ Implementation of solar direct pumping system can be considered and promote when: the security situation is stable as well as the camp population, the partners demonstrate proficiency in the sector, the financial save is demonstrate, local supplier are accessible – by principle funding of Solar powered pumping station could be considered case by case ✓ Implementation of water resources management plan with inventory and monitoring of the different type of resources available according the use of water (*human, …, animal*) ✓ Water quality monitoring from water intake to HH ✓ Building of new facilities (*water treatment plant, borehole especially small water yard, retention and recharge dam*) should be considered as last resort

SANITATION	***Orientations and principles***	***Activity***
<u>*Latrine*</u>	***Should be considered only in Idp's or refugee's camp***. By principle users in camps/sites should not be paid to clean the latrine unless the rate of user is above 40pp/stance. The contribution from the partners to subsidy latrine implementation should be limited to providing of slab and lining (if loose ground and risk of flood). Only communal latrine in the first phase of emergency or when there is a problem of space availability could be built by contractor. In flood prone area, elevation of latrine must be fostered. A rigorous and systematic monitoring combined with technical assistance must be applied to ensure stability of the structure and appropriate drainage. Especially, when it comes to rainy season preparedness. New case load and vulnerable people have to be the priority target of this activity and according the situation could get also subsidy for the shelter. According motivation of population and fund available limited assistance could be provided (slab) to old case load in need. The latrines must be hygienic, meaning that latrine should constitute a barrier on a route of transmission of disease: drop holes have to be covered, vents equipped with insect proof net, etc... By principle the construction materials to build latrine should match the one used for the shelter. In the meantime, in area where for instance wood is rare,	✓ Providing of slab, lining (if necessary) and technical assistance // subsidy for shelter of latrine facilities could be considered if justified by special situation (new emergency related to movement of population, flood, …) or for the most vulnerable people. ✓ Monitoring and correction of default/rehabilitation ✓ Solidarity mechanism as to be promoted but special subsidy/contribution for the construction of the latrine could be considered for certain category of vulnerable people ✓ Communal latrine only for the first phase of emergency (0-6 months) and if problem of space can be considered. ✓ Capacity building of the

	alternative materials (e.g.: PVC pipe filled up with ground to be used as pot or frame, …) should be fostered to minimized the impact on the natural resources/environment. The management of latrine has to be the most cost effective as possible within the context. As soon as possible, communal latrine should be upgraded to family share or HH latrine to facilitate and reduce cost of their management. When problem of space: ➢ The arborloo[6] type of latrine should be fostered in terms of family or HH latrine. The users should be trained ➢ The size of the latrine pit should be as big as possible to minimize the frequency of deslduging or decommissioning needs.	targeted population to: decommission; desludge, rehabilitate or build a latrine; with clear deliveries and assessment of the capacity and skill acquired by trainees.
Drainage	In such dry environment, drainage seems to don't be an issue. However, given the lack of habits and the violence of rain sometime which led to flash flood can affect seriously the idp's settlement. The main flood prone area should be identified. Primary drainage channel should be dug before the rainy season. By principle in general implementation, upgrading or rehabilitation of drainage system should be ensured prior to the rainy season. The drainage system should have an appropriate slop to avoid standing water. By principle and especially in dry environment re use of waste water should be as much as possible urged.	✓ Tools providing with technical assistance and community organization/mobilization ✓ Cash for work (as it is not a regular activity…) ✓ If needed topographic system, basic calculation and tracing of the drainage network.
Sludge disposal	Sludge from latrine pit or water treatment should be properly disposed in order to don't generate any public health or environmental threat/risks. Not a priority according the fund available compares to the needs but important to take it into account as much as possible/feasible, especially in protracted situation.	➢ Sludge disposal equipment providing ➢ Basic treatment to stabilized (given the heat and dryness of the environment: manure spreading prior to burying) sludge at adapted disposal sites ➢ Capacity building with clear deliveries and assessment of the capacity and skill acquired by trainees.
Solid waste	The public health risk generate by solid waste should be investigated. The dump site should ensure no nuisance and no pollution especially of the water resources. Apart in case of a new settlement the management of the solid waste within the camp should be handled by the population of the camp.	✓ Implementation of safe incineration site ✓ Collection and disposal of the waste after incineration ✓ Organization of the communities for the collection within the camp ✓ If relevant container providing

[6] http://www.ecosanres.org/pdf_files/PM_Report/Appendix1_The_Arborloo_book_a.pdf

HYGIEN PROMOTION	The investment in hygiene promotion apart special situation such as an outbreak should be at minimum. The door by door activity should be considered only for the new case load and should be limited in time. By principle, hygiene promotion has to be creative and adapted. Mass communication and use of adapted/tested posters are fostered as well as focus group discussion and activity with clear noticeable deliveries (cleaning campaign…). Tools and activities should be designed and tested prior to wide implementation, with a representative sample of the targeted population. Instead of implementation of a comprehensive package, hygiene promotion should be targeted (*the action should be based on issues practically noticed on the field which can be different from one area to another and not based on an holistic approach*), dynamic (*activities cannot be always the same otherwise people lose interest*) and interactive (*should aim to facilitate the natural of thinking process of target population by questioning approach rather than to teach them)*.	✓ Development, production, and implementation of poster campaign with various topics are fostered as well as implementation of notice board notably at public place and water point ✓ Jerrican cleaning campaign ✓ Camp/site cleaning campaign in the first phase of emergency (*afterward a system to ensure cleaning of the site should be implemented*) ✓ Mass communication or event ✓ Focus group ✓ Door by door <u>in certain case</u> ✓ Hygiene kit distribution in priority for the new case load.