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

RAPPORT DE MISSION

Subject: **Sudan WASH RSO Mission (WASH in camp)**
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Main partners and visited sites list:

Khartoum:

- TGH: Julie Lagardere (Programme Coordinator)
- NCA: Sarah Jensen – Funding Manager
- UNICEF: Simon Peter Odong: WASH sector CO Lead, Adane Bekele WASH Manager
- ICRC: Danielle Brunton (Water and Habitat Coordinator), Mulan Giovannini (Deputy Head of Delegation), FILLION Eloi (Head of delegation)
- Tearfund: Douwe Djikstra (Country Director)
- GOAL: Hashim Billal (Deputy country Director), Dinkneh Asfaw (Country Director)
- CARE/CIS: Zia Zia Choudhury (Country Director)
- UNEP: Dr. Hamid (Senior Consultant)

Nyala:

- CARE/CIS: Mohammed Al Tayeb (WASH manager)
  UNICEF: Elias Machingambi (WASH Specialist)
  ICRC: Gisella McGuiness (Wathab delegate)
- WES: Head of operation unit
- MoH: Head of epidemiological unit

Gereida:

- CIS/CARE: WASH staff
- WES: local representative

El Fashier:

- ICRC: El Fasher: Yann Fridez (Head of Sub delegation), Luc Soensen (Wathab delegate)
- UNEP: Magda Nassef (Project Manager)
- IOM: Getachew Alefe (WASH manager)

Appendices list:

- 1: We no longer share the land, *Oxfam GB report*
- 2: Improving natural resources management in Sudan, *US institute for Peace report*
- 3: Darfur water supply in a vulnerable environment, *Tearfund report*
- 4: Darfur, water resources assessment, *World Bank report*
- 5: Water resource management in humanitarian programming in Darfur: A case of drought preparedness, *UNEP report*

Table of Content

[1] CARE International Switzerland

1. EXECUTIVE SUMMARY

The WASH RSO mission had focus on Darfur context and water access in Idp's camp given the general environmental context of Sudan and the investment of ECHO fund in the WASH sector.

Though, the increasing incoming of refugees from South Sudan to Blue Nile, White Nile and South Kordofan should also be follow up at some point.

In general, the camps are spread and not too dense compare to others situation in the region (e.g.: south sudan…). Most of the HH are settled on small compound which are usually clean, especially compare to the public space full of plastic bags. This aspect promotes a more healthy environment and decrease the risk of disease due to lack of hygiene, although it does not mean that there is no risks at all. Apart the hepatitis E (apparently endemic in the area) outbreak there is no major outbreak due to water or hygiene which recently occurs. Pick of diarrheal disease occurs traditionally at the beginning of the rainy season.

Most of the camp had last more than 10 years now but still new case load occurs due to the various conflicts still going on. Most of our partners are tried to implement community based approach with promotion of the financial contribution of water supply system users implement in progressive manner. This type of strategy contributes also to build resilience within the population by reducing dependency on the humanitarian relief and promoting local capacities.

The main challenges encountered by our partners are:

- Access and lack of will to facilitate humanitarian actors action by local authority (*government strategy is more focus on to move the international humanitarian actors out of the country)*
- Lack of legal framework to promote community based approach
- The difficulty to implement fair and sustainable cost recovery system (in particular regarding the financial contribution collection) as well as general management of hydraulic equipment
- The failure in service delivery of local water authority involve in water supply of the idp's as well as host communities in area where our partners are working
- Lack of coordination (in progress of improvement)
- Conflict related to land and competition in certain areas between humanitarian water supply and private stakeholders

Whether the water resource is quite significant in Darfur, it is not properly exploited for various reasons including the lack of data to enable appropriate water resource management and design. Whether few criterias about partners and context are filled (*see section conclusion*), solar direct pumping remains a relevant technology to improve sustainability of water access in idp's camp.

The level of coordination used to be pretty low to don't say inexistent. There are many challenges to develop synergy, lesson learnt and good practices among the partners; advocacy to facilitate land use issues and community based approach; harmonization of strategies, tools, and guidelines, development of data base… UNICEF seems to be committed to improve this situation and started by implementation of a committed national WASH sector lead.

The CIS/CARE performance is quite correct. Although, few fields should be substantially improved:

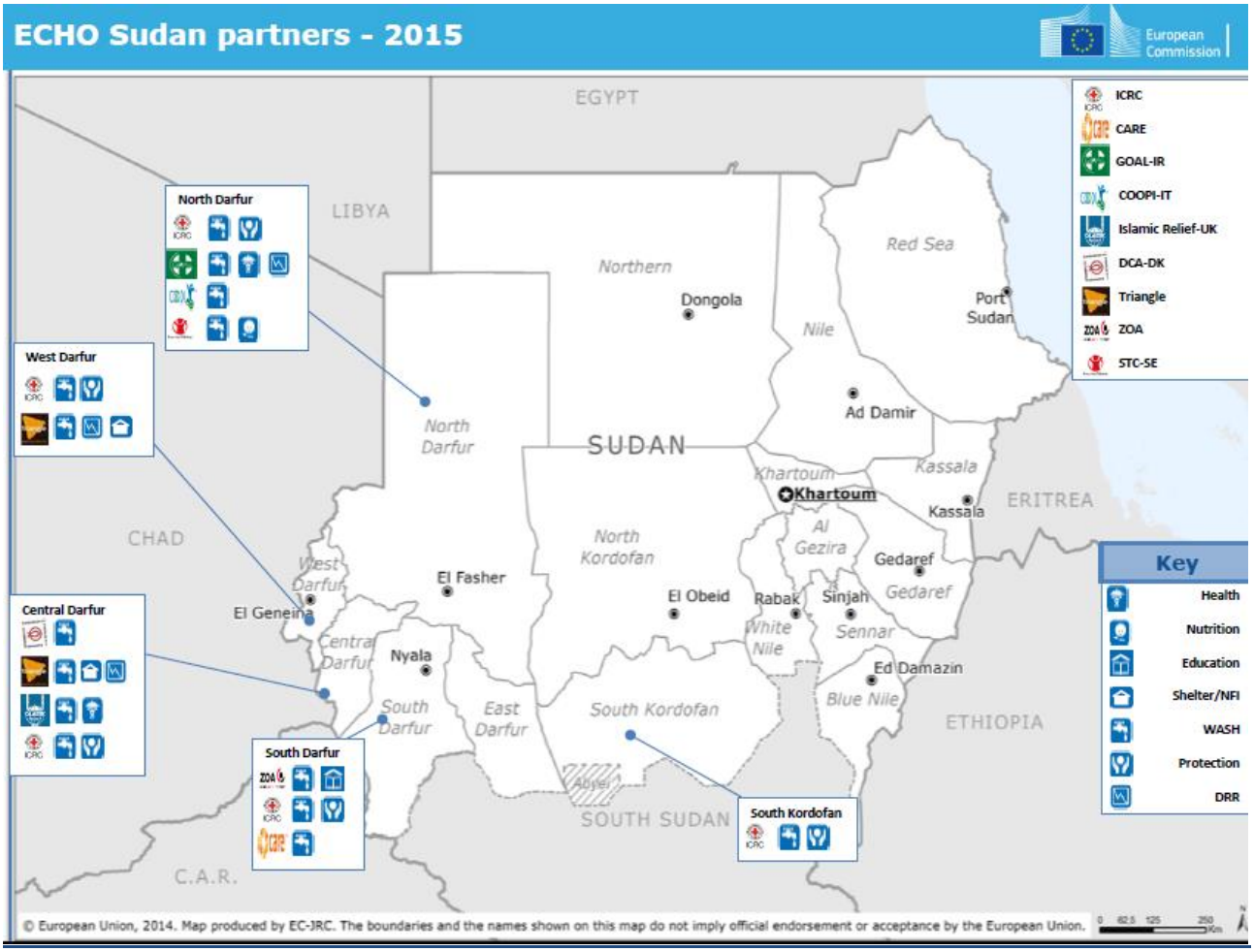
- Technical skill in hydraulic equipment designing and set up with need of a senior WASH advisor/coordinator (*in progress of improvement*)
- Monitoring of the activities (*quality of achievement, effectiveness of water user committee, cross checking of free access and special care for the most vulnerable people, fuel consumption…)*
- Development of a more fair and sustainable financial contribution (O&M of water supply equipment) mechanism (*notably money collection and pricing grid*)

2. BACKGROUND

2.1. ECHO WASH funding and partners in Sudan

2.1.1. Funding

The total fund allocate to the ***WASH sector in Sudan*** within the framework of the ***HIP 2015*** is about ***7,5 Million euros*** through ***9 partners distribute as below:***



2.1.2. Few partners meet overview:

UNICEF and sector coordination: at Khartoum level, the team seems to be committed and aware about the problem and challenges. They try to decrease their collaboration with WES, but WES exists today and in anyway

we have to deal with it at some point. UNICEF rise their concern about the situation of south Sudanese refuges in White and Blue Nile where UNICEF intervene with SURF and DFID support.

The sector coordinator at national level is new and also committed and very active. The challenge is huge at this level and the sector lead seems to want to address too many issues in the meantime. Nevertheless, changes are going on in a positive way. Let's give sometime to him to demonstrate added value and then we could be involved as ECHO to support coordination. The level of commitment and awareness about the issues and challenges seems to be very different at field level and at least in Nyala, where the WASH specialist in charge do not seems to be very acting and relevant.

TGH: the WASH coordinator of TGH seems to be very relevant but she was leaving. The experience and approach developed by TGH pretty interesting and relevant. Long presence in the country.

NCA: The meeting was not with technician, but NCA is one of the oldest ngo present in Darfur. They also develop community approach and they are trying to improve their knowledge and lesson learnt about solar direct pumping system.

GOAL: seems to be one of the weakest partners in terms of WASH but they are also in a process of improving their capacity. They had a big security issues and they are present in a strategic area in terms of needs.

TearFund: they used to be quite involved in WASH but less today. They produce some interesting and very useful report and approach based on community. They have very good experience and then knowledge of the area and the water management situation.

ICRC: good and proficient technical staff either local or international. The approach is different and complementary to others actors. The access remains the main challenges for them as they work in rural area affected by conflict.

IOM: the new WASH manager of IOM seems to be pretty committed and relevant in trying to establish a logic of improvement. He's got a good knowledge of the water access situation in Darfur in general. He get as well relevant analyze trying to go beyond the relief by trying to get better understanding of the situation and developing lesson learnt by former action.

2.2. Land use and right issues and impact on livelihood

The access to land became more and trickier in Darfur. Actually, when in the past the pastor nomads and agricultural communities used to live in symbiosis, things have changed a lot. In the past, the pastor moving from north to south according the season, use to cross the agricultural field of permanent resident communities out of the season of planting which enable better fertilization of the ground by the animals feces and grazing of the cattle. At this time both communities used to share the water resources and the land in a way to coexist peacefully to their mutual interest.

Nowadays and enhanced by the Darfur conflict, the situation is totally different as pastors nomads are crossing agricultural land during the crops growth with as result destruction of the crops and thus conflict among communities. The most common problem are coming from: displacement of the agricultural communities due to conflict (tribal as well as government and rebels) which led to empty the original living area of those populations and in other area where agricultural communities start to run more stable crops way. ***In the meantime, the***

nomads communities change their way of life as more and more they look for settling down to have access to education, health, etc… Thus, they occupy more and more the land which led to conflict again. *See the Oxfam report on this topic: "We no longer share the land" in appendice*.

This issue enhanced by the problem of climate change also affects and modifies nomadic traditional movement within a context of traditional and institutional conflict resolution mechanism failure. In addition, livestock and animals are the main water users in Darfur exerting great pressures on water resources. The livestock move along a number of known nomadic/migratory routes during the summer and rainy season for pasture and water. In years of low rains, the earlier movement of the camel nomads from the north into the south and in Jebel Marra area, before farmers finish harvesting their fields, is one of the main causes of conflict in Darfur. Out of 49 recorded conflicts during 1953 and 2000, 39 of them were pasture and water- related.

The problem of land access due to security reasons resulting from conflict implies as well problem to access dump site area, sometimes sustainable water resources, and affect livelihood by less and less agricultural land exploit in Darfur.

The conflict has negatively impacted on environment and agriculture by removal of vegetation around the IDPs camps, overgrazing, disruption of the nomadic pattern, intensification of deforestation, weakening of the traditional governance structures of environment, deterioration of watsan services around the urban centers, destruction of some water supply sources, enhancement siltation/erosion, and reduction in crops production by more than 50%.

2.3. Water resources sustainability in Darfur region

2.3.1. Type of resources and sustainability (recharge, rainfall, groundwater storage, climate change impact)

Hydrological wise the Darfur region is divided into town main basin: the Nile river basin and the Lake Tchad basin. Northern of North Darfur is the most affected area in terms of depletion of water resources and climate change impact. 60 to 75% of the water production from water yard is consumed by livestock. The ***groundwater resources in Darfur have very high potential*** in most of the place and it is under or inappropriately exploited.

Water resources in Darfur are very much constrained by wide seasonal and annual variations, poor accessibility, limiting capacities of water storages facilities and data base. No sustainable peace can be achieved in Darfur in the absence of sustainable solutions to the water resources problem. The present conflict in Darfur has negatively impacts on water resources and sources.

Surface water and rainfall:

In summary, though ***surface water resources in Darfur are apparently abundant; they are time dependent, mainly during the period June to October and spatially variable***. They are in need of real quantification by installation of flood gauge stations along the major Wadis and watersheds and use of modern technologies(such as satellite – based hydrology) to fill in knowledge gaps and providing leapfrogging platform. Presently the measured volumes of surface water are far less than the estimated quantities based on the total area of the watersheds and average rainfall. In view of realization of effectiveness of surface water harvesting to increase and sustain crops productivity quantification of surface water is a pre-requisite.

There is mounting evidences of long term regional climate change witnessed by a very irregular, but marked decline in rainfall in Darfur. Although, we can note that the level of rainfall has increased since 2007.

- ✓ Climatic models (Tearfund, 2007) predict that in Darfur the length of the growing periods will reduce and the percentage of the failed harvests will increase.
- ✓ Without undermine to other factors, the impact of the climate change in Darfur is considered to be directly related to the conflict in the region, desertification and low land productivity, and has added significantly to the stress on the rural communities, forcing them to move south for pasture and livelihoods options
- ✓ More livelihood options are needed to cope with the impact of climate change in the area.

Rainfall records in Darfur dated to 1917(el Fasher air port station) and presently rainfall data including daily, monthly and annual rainfall, are available from 28 rain gauge stations distributed all over Darfur, however about 16 are nonfunctional for the last two decades. It is important to re-operate these gauge stations in additional to installation of extra ones with good coverage all over Darfur.

- ✓ The overall trend in rainfall appears to show a recovery since the low points in the 1980/1984.
- ✓ Most significance is the increased frequency of drought, as 16 of the 20 driest years on record in North Darfur have taken place since 1972
- ✓ More localized research is needed to determine the interaction between global climate dynamics and Darfur Region, which would also appear to be influenced by the lower rainfall caused by deforestation (UNEP, 2008)
- ✓ The risk of receiving inadequate rainfall, mostly leading to crop failure amounts 1 in 3 years in the central parts of Darfur and 2 in 3 years in the northern parts of Darfur. And only in the Jebel Marra area and in the Savannah zones the risk of rainfall failure is low.
- ✓ Comparison between monthly rainfall and evapo-transpiration indicates that most of the areas of more than 300mm annual rainfall, entertain a water surplus during the peak of the rainy season

Groundwater:

The main water – bearing geologic formations in Darfur include: the fractured Basement Complex, the Nubian/Um Ruwaba Formations, the Tertiary Volcanic rocks and the alluvium (Superficial) deposits.

The ***Nubian sandstone covers 60% of Darfur region and underlies most of the north and eastern Darfur and constitutes the main groundwater basins in Darfur***; named as the Baggara Basin in South Darfur, the Um Kadadda , Sag elNaam, Shagera and the Sahara Basins in north Darfur and Dasi basin in west Darfur.

The ***Sahara Basin*** is part of the Nubian sandstone trans-boundary aquifer shared between Sudan, Egypt, Libya and Chad. In Darfur It covers an area of more than 100,000km2 north/ northwest of North Darfur state and sub-divided into several, mostly interconnected sub-basins. The groundwater in-storage within the top 300m of the Nubian Aquifer in the Sahara Basin is estimated as 4000 cubic Km, while the annual recharge is estimated as 50 million m3 (*under exploited so far*). Highly saline area exists (Atroun area), where salt is retained from evaporated groundwater for commercial uses and salt trade (sodium carbonate- sodium bicarbonate) is well established across the desert in north Darfur and North Kordofan states.

The ***Shagera Basin*** is a Nubian outlier of an area of 1250km2 at 13km west of El Fasher town and composed of medium to coarse grained sandstone intruded by Tertiary basaltic sills.

In the ***Sag el Naam basin*** a tube well can yield up to 200m3/hour. Availability of large volumes of surface and groundwater resources permits conjunctive uses for sustainable irrigation and crops production, enhanced by high fertility of more than 150000 feddans of volcanic soils in Sag El Naam area. However assistances in design and development of effective irrigation methods are needed.

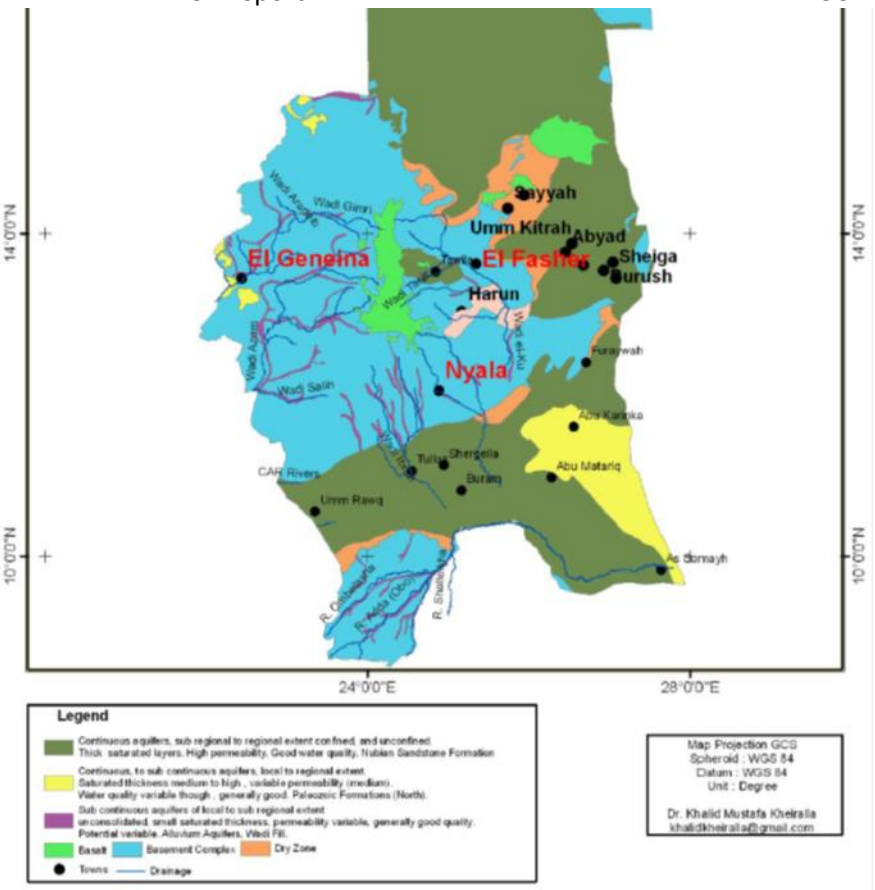


Fig. (11): Main groundwater basins

The ***Um Kaddada Basin*** covers some 55,000km2 in the east central part of north Darfur. The depth of water ranges from 20 to 50m below the ground surface. The groundwater salinity gradually increases as groundwater moves from the recharge areas near the water-divide (70 mg/liter) to the centre of the basin (2500mg/liter), however localized pockets of exceptionally high salinities as high as 2500 mg/liter -14,000 mg/liter are present.

The Alluvial (Wadi-fill) aquifers underlie most of the seasonal streams (Wadis) of Darfur. They are the source of considerable volumes of good quality groundwater, which is currently utilized for domestic, livestock and supplementary irrigation uses. Groundwater in the alluvial aquifers generally occurs at an average depth of 1m - 10m below ground level and receives a full recharge yearly through influent seepage from the seasonal runoff, then this type of aquifer is very dependent on the rainfall. Alluvium aquifers are feasible for groundwater development for different purposes, since they are shallow, rechargeable (renewable resources) and of high yield.

Weathered/ fractured basement aquifer covers about 40% of South and North Darfur and more than 70% of West Darfur. ***The fractured basement aquifer is mostly tapped by hand pumps for provision of domestic water supply for small rural communities (mostly settled farmers) and to the IDPs in the camps.*** The ***average yield*** of the fractured aquifer, tapped by a hand pump is in the range of ***2.5-6m3/hour***, with a salinity of about 500-1,200mg/l, however groundwater ***salinity values as high as 2,000mg/l are not uncommon***. More studies on occurrences, development and management of groundwater in the basement and its hydraulic characteristics are needed for sustainable provision of water to the IDPs and in potential areas of the returnees and re-settlement in Darfur

Main groundwater resources of Darfur (table below):

Basin	*Location*	*Area (km2)*	*Static water level (m)*	*Total storage (Mm3)*	*recharge Mm3/yr*	*Abstraction (Mm3/yr)*	*Salinity (mg/liter)*	*Present/Future uses*
Baggara Basin	South Darfur	60,000	20-100	300,000	250	7	130 – 450	Domestic and livestock supply
Sahara Basin	North of North Darfur	150,000	3- 45	4,000,000	50	>1.0	60 – 400	Suitable for windmills /nomadic settlements
Um Kaddada Basin	East of North Darfur	5,500	20-50	30,000	21	2	70 – 1200	Domestic and livestock uses
Sag El Naam	SE of North Darfur	2,250	60-95	100,000	20	0.5	250 – 450	27 BHs are present/ irrigation /domestic uses.
Shagera	ELFashr	1,250	40-70	20,000	15	5	300 – 550	EL Fasher supply
Dasia	El Geneina	1,750	30-60	20,000	10	0.4	80 – 175	Town water supply
Alluvium Basins	Along the Wadis	2,000	1-30	5	2,000	20	90 – 250	Domestic, livestock, irrigation uses.
Basement	49% of Darfur	65,333	30-60	1.5	3	2.2	500 – 1500	Villages water supply by HPs

Source: Salam, 1977, Omer 2007, DJAM Report.

2.3.3. General idp's camp situation in terms of water access

Camp / Community	Geology	Population IDP / Total	Geology	Comments
North Darfur				
Abu Shouk	BC	54,141 54,141	Water supply is from fractured basement aquifer. Construction of Haloof dam will increase recharge to the aquifer. Presently 12-15 wells are dry. Monitoring is required to assess the effect of the dam on groundwater recharge in Abu Shouk area.	
Al Salaam	BC	48,788 47,788	Low recharge potentials of the BC aquifer and no apparent wadi catchments area and variable rainfall. Monitoring is required.	
Zamzam	Wadi / BC	49,824 49,824	The aquifer is predominately fractured basement overlain by thick superficial sediment. Wells located on what appears to be a buried channel linked with Wadi El Ku receive recharge. A surface depression ponds water beyond the rainy season and promotes recharge through the buried channel. Wells away from the buried channel are likely to receive less recharge and are subject to more rapid decline in water levels.	
Kebkabiya Town	Wadi / BC / VR	42,926 63,254	Sustainable high runoff from high lands of Jebal Marra results in recharging the shallow alluvium aquifer. Groundwater depletion towards end of the dry seaon may occur. Saline zones are not uncommon in the wells tapping fractured basement–volcanic rocks. Groundwater and surface water monitoring is needed.	
Kutum Rural	Wadi / BC / NS	40,284 95,479	This is an area of dispersed settlements included on the list due to its particular aridity. Away from the catchments and wadis recharge is low. Wells in the Nubian Sandstone outlier are of low, but sustainable yield. There is little recharge to the Nubian Sandstone aquifer.	
Tawila Town	Wadi / BC	32,846 39,902	This site lies at Wadi Tawaila which is a branch of Wadi Golo/El Ku. Recharge of the deep aquifer of the Shegara basin, mostly originates from Tawaila area. Recharge as much as 3.5m has been recorded in previous years. Recharge potential is moderate to high. Monitoring of groundwater levels and flood stages is required.	Poor security
Kutum Town	Wadi / BC	26,418 43,944	The alluvium basin of Wadi Kutum receives annual recharge from run-off which originates from the highlands and flows to the south east. Water production rates are high. Monitoring is needed.	
Saraf Omra Town	Wadi / BC	24,110 54,800	Due to presence of shallow and permeable wadi deposits and high recharge, depth to groundwater shallow, as the name (Saraf) implies. More wells (hand pumps) can be drilled and monitored.	Poor Security
Kassab	Wadi / BC	23,102 23,102	High water availability. The aquifer is part of Wadi Kutum alluvium basin. Recharge potential is high. It shares with Kutum Town the same source(s) of recharge.	
Meilit Town	Wadi / BC	9,830 26,855	Basement terrain mostly of granitic rocks. They have little fracturing and are of low groundwater storage capacity. Potential groundwater recharge is limited due to a lack of adjacent catchment areas, high variability and low rainfall/runoff. Wadi Meilit is incised through a narrow channel, especially close to the town and only provides limited recharge. This is reflected by the low yield and/or dryness of the drilled wells – a high rate of drilling failure.	
South Darfur				
Otash	BC	63,304 63304	No apparent catchment and recharge concentration surface area, notwithstanding sub-surface flow through fractures. Monitoring is required.	
Dereig	BC	25,561 25,561	No or little recharge by surface runoff. Recharge potential is poor. Additional drilling is not advised. Groundwater monitoring is required.	
Kalma	Wadi / BC	78,730 78,730	The aquifer recharge mechanism, especially from Wadi Nyala has not yet been analysed. Groundwater monitoring is recommended to continue and to extend it to Wadi Nyala area.	
Kass Town	Wadi / BC	95,908 125,253	Recharge potential is high. Water availability (produced) is low compared to the large number of IDPs in the camp. This puts the aquifer under stress. Monitoring activities are recommended to include upstream and downstream wells. High fluoride levels are reported in Kass.	
East Jebal Marra	Wadi / BC / VR	76,813	The alluvial aquifer that overlies the basement rocks is thin. Recharge to groundwater can take place through fractures on the bare rocks. Runoff is fast because of the high gradient. Groundwater recharge is rated as moderate to low.	
Muhajirya	Wadi / BC	44,124 125,253	The camp lies on the lower reach (delta) of Wadi El Ku. Only in years of good rains and floods does Wadi El Ku reach beyond Muhajirya. Recharge of the coupled shallow alluvium-fractured basement aquifer is affected by this variability of runoff.	
Beleil	Wadi / BC	22,947 22,947	Beleil is at the lower reach of Wadi Nyala. The downstream aquifer of Wadi Nyala is rich and prone to high recharge annually, despite lowering of the water table to critical depths in late summer months. Monitoring is required and should be analysed together with Kalma.	
West Darfur				
Golo AU	Wadi / BC / VR	16,000 25,471	Very low produced water, despite the apparently high recharge from the wadi's runoff and possibly the base flow initiated from volcanic ashes (cone) on the Jebel Marra. Extra wells can be drilled to increase water yield (at least 10l/c/d) to cope with the high IDP population.	
Umm Dukhun	Wadi / BC	32,992 55,540	The coupled alluvium/fractured basement aquifer probably secures high water production. Recharge potential is moderate to high. Fluoride concentration in the groundwater is high. Monitoring is required for both water quantity and quality.	
Kereinik	Wadi / BC	35,455 37,457	High water production. Recharge potential is moderate. Monitoring is required.	
Seleah	Wadi / BC	22,031 58,738	Coupled alluvium/wadi aquifer with possible high recharge potential from Wadi Saleah and high rainfall in the area. High concentration of fluoride. Monitoring is required.	Recent major conflict
Kulbus	Wadi / BC	15,879 25,584	The Kulbus area has limited groundwater storage capacity in the fractured rocks. Geophysical surveys are required to locate productive wells. Recharge potential is low. The current groundwater production rate is high. Monitoring to groundwater behaviour and recharge is required.	
Abu Surug	Wadi / BC	18,618 18,618	The main aquifer is fractured basement rocks. Recharge to groundwater is limited and constrained by the limited catchment area and narrow khors and wadi. Geophysical methods can be used to identify potential groundwater sites for drilling extra wells to increase the water supply to the camp. Groundwater monitoring is required.	Recent major conflict

Apparently the camps abstract water from fractured basement aquifers which are very much dependent on recharge by run off from seasonal streams. Though during the last four years of the conflict rainfall in most parts, especially in South and West Darfur experienced improvement, the probability of occurrence of low rainfall or dry year (s) is still high (Tearfund,2007 and UNEP, 2008).

This implies that water supply sources in the camps are vulnerable to depletion in year(s) of low average rainfall. UNEP (2008) has proposed drought preparedness projects aims to implement mitigation measures to secure sustainable water supplies in the camps (e.g. construction of recharge dams, implementation of water resources management plan with contingency assumptions, promotion of groundwater catchment of the most sustainable hydrogeological formations…)

2.3.4. Main challenges and issues (tracks for LRRD)

Impact of the conflict in all Darfur:

⇒ Destruction of water supply sources, especially water-yards, hafirs and hand dug wells
⇒ Reduction in water supply and coverage in the rural areas (Darfur,Adila, Greida).
⇒ Enhancement of erosion and siltation due to removal of vegetation and trees (Jebel Marra area)
⇒ Depletion of groundwater resource and change in quality (Abu Shouk and Mureni) . .
⇒ Restriction of nomadic movement to the traditional summer grazing areas in the north putting more (Kuma, Greida, Melliet)

In general there is a ***huge gap in terms of coordination*** not only between development and humanitarian actors but also within the humanitarian WASH actors. The quasi absence of technical guidelines, lesson learnt, institutional and legal framework advocacy (community base project, land use, access …) in such tricky context with many issues and challenges to be addressed undermine the quality and sustainability of our partners. This situation is enhanced by the failure in service delivery of the local institution in charge of water supply (as well WES for Idp's or the State Corporation for the resident population) which affect directly the quality of service provide by our partners (as the water point they manage become the most attracted ones…). Whether the ***new sector national coordinator from UNICEF seems to be pretty aware about the problem and committed to improve the situation*** (even if he seems to want to address too issues in the meantime), some of people meet on the field (Nyala) seems to be far from this commitment and level of understanding of the challenges to handle…

There is a need to form a regional authority or IWRM council in the states with linkages to the locality levels to be responsible for planning, design tariff setting, water policy and mobilization. Integrated Water Resources Management can be considered as a must in terms of guidelines document to ensure appropriate and sustainable development around water demands in such dry area.

Main problems and challenges that underlie urban water supply include the following:

- ✓ Serious leakage of existing elevated steel storage tanks due to corrosion and/or structural damage.
- ✓ Limited house connections i.e. low coverage.
- ✓ Aged distribution network and frequent pipe burst, leakages, high water losses and low efficiency.
- ✓ Inadequate water- generated revenue to enable sustainable operation and maintenance i.e. water tariffs are not cost effective and the prospects for attaining full recovery and therefore commercialization are

limited. This aspect is enhanced by an inappropriate financial management system at Water Corporation (*see section on water supply of Gereida in main findings part of the report*)

- ✓ Link inadequate water supply system management structure; need to foster community based management but no clear legal framework on it. The government in general is reluctant to allow implementation of community organization which could led to some autonomous of the community.
- ✓ High investment costs required for improvement of urban water supply partially due to limited capacity of near- town water resources, especially for Nyala, El Fasher and Melliet towns.
- ✓ Limited capacity of the institution in charge, the technical staff, especially in the field of design, management and monitoring
- ✓ Lack of political will to improve situation in Darfur

The apparent poor performance of rural water sector can be improved by building the capacity of the technical staff, provision of adequate operational tools, enhancing community-based management approach, consolidating sense of ownership and adoption of cost recovery system.

There is a real need for quantification and measurement of water supplied by the different water sources and the water demand by different uses.

LRRD tracks:

- ❖ Building capacity at close to the needs in terms to the water supply system management
- ❖ Development of several sustainable system of financial contribution according the difference patterns of situation and capacity highlighted by necessary studies
- ❖ Implementation of water monitoring/measurement equipment (groundwater, surface water and rainfall), such as observation borehole, gauging and rainfall station, … ; for implementation of an Integrated Water Resource Management Plan. The water resources of Darfur are part of international waters and contribute to a very fragile and important ecosystem (Lake Chad) which supports many million people and rare biodiversity. The flow that leaves Jebel Marra (Sudan) to Chad averages about 375 million cubic meters per year, mainly during period July to October. The foreseen plans for development of surface water resources aspired by the government of Sudan and Darfur states, soon will necessitate formulation and setting of agreements and common vision among Chad , Central Africa Republic and Sudan to benefit from these shared water resource of Wadi Azum and Wadi Kaja.
    - ***Rainfall:*** Due to the high variability of rainfall both in space and time, high risks of drought occurrences and vastness of Darfur region, there is a need for establishment of rain gauge stations to strengthen the rain data quality and coverage in Darfur.
- ❖ Implementation of part of hydraulic equipment which can be used for development project but which could have an immediate impact on water access. For instance: borehole, check dam[2] (*improve recharge capacity and then sustainability of water access*), reparation of main leaks of pipeline when a project is planned to increase the

[2] Given the potential violence of flash flood and the quality of ground, building check dam require high skill in civil engineering

water production …

- ❖ Training for budget management to Water users committee members
- ❖ Training for operating and minor maintenance of hydraulic equipment for Water users Committee technicians
- ❖ Development and advocacy for a legal framework for community based water supply system management
- ❖ Optimization of hydraulic equipment design in order to ensure affordability of the operation and at least basic maintenance cost by the users:
  - Appropriate needs assumption (right balance between accurate for the present needs and their evolving),
  - Appropriate selection of the various element of a water supply system (ensure the lowest price of water, and flexibility to adapt to the evolving of the needs…),
  - Promotion of solar system when relevant and feasible (security, supplies chain in place, technical features and economy of scale, proficiency of the partners….)

2.4. Water supply management

2.4.1. Main type of hydraulic equipment

Water development and supply systems (sources) in Darfur include:

1. ***Groundwater resources development systems***
   a. ***water-yards (deep boreholes)***
   b. ***slim boreholes fitted with hand pumps (commonly known as hand pumps)***
   c. ***Open shaft hand-dug wells and traditional open wells***
2. ***Surface water Development Systems***
   a. ***Hafirs and natural water ponds and depressions.***
   b. ***Earth dams and earth embankments***

1.a: water yards are the main equipment and the most suitable so far in semi urban, urban and large rural locality

1.b: hand pump are adequate/reliable when small yield (about 1-2m3/h) and shallow aquifer (no over 30m after even if some pump can work the strength to use it make it difficult to use for children often in charge to harvest water. Hand pump are also relevant when it comes to small settlement/small demands and low income to afford the fuel of a water yards. Most of hand pump catch water from the wadi alluvial aquifer (*see section on type water resources and sustainability here above*) and hand pump are the hydraulic equipment which encounter the most problem of drought due to depletion of the resource but also it seems that it can be due as well to inappropriate construction: no gravel pack and no proper development of the drilling with as result pumping of fine in the borehole tube and accumulation of the sediment inside. In Zanzan camp (Masalit) for instance on ***68 hand pump, about almost of them are not working.***

1.c: open well are usually very shallow, very sensitive to pollution and to the rainfall.

2.a: hafirs are suitable in particular for livestock. Even if some Hafirs can be improved in terms of protection of the quality of the resources, way to use and maintenance, it remains not really safe in terms of public health.

2.b: Earth dam and earth embankment are convenient for rural community but as hafirs mainly for livestock despite it largely use for human supply as well. This type of equipment is suitable especially when they are use as recharge dam for the aquifer.

2.4.2. Institutional background

The present institutional structure and regulations that govern development, utilization and regulation of available water resources in Darfur is under auspices of the Ministry of Physical Planning and Public utilities at the state level, though at the federal level, the key sector is the Ministry of Irrigation and Water Resources. Under the ministry of irrigation and water resources are the National Water Corporation (NWC), and the Groundwater and Wadis Directorate (GWWD).The NWC has the mandate to plan and implement national water supply projects, and provides technical support regarding planning, up keeping of standards, specifications, training and issuing of polices. The GWWD has the mandate for exploration, monitoring and controlling of development and utilization of all surface and groundwater resources in Sudan. Though GWWD is responsible for monitoring of water resources, their monitoring role is hampered by limited financial and human resources and provided services are therefore inadequate, lack adequate monitoring and operational equipment such as gauging stations and data analysis facilities.

At the state level the focal institutions dealing with water supply and sanitation are the State Water Corporations and Water Sanitation and Environmental Programme (WES), working under the auspices of the Ministry of Physical Planning and Public Utilities. Responsibilities and functions of the State Water Corporation (SWC) include: planning, design and execution of water projects in the state, manufacturing of the water equipment, formulation and implementation of water policies, operation, maintenance and management of water supply sources, protection of water resources and up keeping of the technical data and information on water supply sources in the state.

WES project is a UNICEF and PWC – supported project established under the auspices of SWC at the state level with effective coordination and supervision by the National Water Corporation and UNICEF. WES was responsible for: construction of slim boreholes fitted with hand pumps, improvement of hand dug wells, construction of improved latrines, health education and awareness, community capacity building to foster village level operation, maintenance and management of hand pumps and coordination of the works of the NGOs involved in WATSAN activities. Nowadays, the hygiene and sanitation component of WES mandate has been transfer to the Ministry of Health.

The present organizational and institutional set up of the water sector in Darfur present a number of issues and challenges including: overall weakness, mainly lacking adequate technical, managerial and financial capacity to carry out the assigned responsibilities, unfavorable/unattractive working conditions, unclear delineation of lines of authority, roles and responsibilities, instability and unclear relationship between NWC and SWC and lack of central coordination to oversee management of the water resources in an integrated manner. Also the sector lacks clear policy and strategies for an integrated water resources management system over Darfur Region. At locality level Water Corporations and maintenance centers lack skilled staff and the necessary logistics to foster sustainable maintenance and provision of adequate services and the communities and water users lack sense of ownership of the water supply systems and their participation in decision making at the state and Locality levels is limited.

Clearly the reform of the intuitions in the sector including redefinition of their roles and responsibilities are necessary for improved performance

At private level, there are more than 40 private companies registered, of them 9 are Darfur based and remainder is based in Khartoum, but can operate and execute contracts in the field of drilling, construction of dams/hafirs and other civil works, all over the country including Darfur. Most of the companies and the consulting firms are of limited capacities in terms of technical staff, equipment and machineries and therefore are not able to take up large consulting and/or construction contracts.

There are also about 36 NGOs in collaboration with UNICEF provide water supply and sanitation services to the IDPs and host communities. Local NGOs need capacity building to undertake large multi -sectoral programs.

The development, utilization and environmental regulations of available water resources have been governed by various policies, strategies and acts under different sector ministries at the federal and state levels. Such polices and Acts include the following:

- The Water Resources Act (1995) emphasized the mandate of federal and state level institutions.
- The Environmental Acts (1975 - 2000) and the Public Health Act (1975), which made provisions for regulation of water and air pollution as a result of human activities including solid and liquid waste disposal, and protection of fauna and flora..
- Recently (2008) the National Water Corporation, supported by UNICEF, have drafted a national Water Supply and Sanitation Policy to ensure equitable and sustainable utilization and provision of safe water and sanitation with view of achieving the MDGs. The thrust of the watsan policy is 'polluter pays'

This institutional aspect is one of the most tricky to ensure sustainability of water supply management given that the bodies in charge are failing in most of the case to ensure the delivery of service. A relevant strategy in such context should be to ***promote local adapted solution***.

In one context could be a ***mix solution*** with community owning the hydraulic equipment but the operation and maintenance and thus the water payment manage by a private body. In another context, the hydraulic equipment could be managed by representative of the communities only, etc… The fact is that the ***community based management=Water user committee needs a legal framework*** some experience has shown positive result base on cooperative structure.

2.4.3. Official Price of water, HH water demands and main mode of organization

The consumption of water is estimate at 20L/pp/day but this is a very rough estimation with very high variation according accessibility to the water source. The State Water Corporation usually recommend for rural area 40-50L/pp/day and 100L/pp/day in urban place. To date, the effective daily water consumption due to water resource availability is about 5L/pp/day as an aggregate for the whole Darfur's population. In Darfur, the main water users remain livestock with 60 to 75% of the consumption at Water yards.

In urban/town environment the price of water is about ***1SDG for 80L*** of water at public tap connected to a water distribution network or to a water yards. The price of water in case of private connexion varies according the diameter of the connexion pipe. In case of hand pump most of the tome the users do not contribute unless there is a breakdown.

In rural and remote area, in case of water yard, the most common contribution from the user to operation and maintenance of the equipment focus on covering the fuel supplies and sometime minor maintenance and salary of operator. Most of the time in rural area, water is manage by the local power structure with a technician to operate and do minor repair on the system. Two main types of contribution can be highlighted:

- ✓ at the water point according the number of jerricane (1SDG for 80L usually) and/or according the size of the livestock of the user
- ✓ at monthly basis price being between ***1 and 2 SDG/month*** (some variation can be noticed for high consumption user)

We can note as well for rural area, that usually the main livestock owner of the village being most the time the most wealthy one afford as much as possible price of maintenance, as he is also the one whom relies the most on the system. ***In Al Salam***, we notice that idp's mainly use private well for water supply and ***the price at those private wells are double*** compare to the official and common price (***1SDG/40L***).

As mentioned in the monitoring section of this report, many donkey cart owner selling water in camp pay the same price or even cheaper price than water point users. For instance in *Masalit camp*, a ***donkey cart of 200L*** will pay ***2SDG*** when ***normal users pay 2SDG for 160L***. As donkey cart owner make benefit from selling the water fletch at the water point to the most wealthy people who do not go until the water point, ***donkey cart owners should pay more*** and then it could help to ***reduce the contribution from normal users*** making it ***more affordable*** for them.

For information, IOM did a survey regarding the demands of water per householder at water point out of livestock needs. In the result they got a high percentage of consumption close to 1000L for one family. The analyze of IOM made them suspicious regarding the access to water as it is not possible that one family use that amount of water daily. They think that a category of people could be obliged to buy water from intermediary seller.

Category	Frequency of water consumption	Consumption (rural) Liter	Tariff (	Industrial use(flat rate/month)	Urban use(flat rate/HH/month
Human	Daily	3 – 4 jerry cans 56-80/family	0.1/Jerrycan	60	15 – 20
Cattle	Every other day	40	0.2	-	-
Camel	Twice /week	80	0.3	-	-
Sheep	Every other day	20	0.1	-	-
Goat	Daily	20	0.1	-	-
Donkey / Horse	Daily	40	0.2	-	-

(One US$=2.000 SDG in 2008. Source: State Water Corporations, Darfur 2007)

2.4.4. Examples of various positive experience on water supply system management and lesson learnt

In Sudan, the ***community based water supply system management*** seems to be in many circumstances the most ***successful especially in camp and rural area***. In a place ***where the local authorities are failing in their mission*** to deliver services it is ***better to bring the competence as close as possible to the needs*** to ensure appropriate regulation of the service delivery. In many cases, the users have to develop their own management system in parallel of the institutional one.

The ***main problem*** for such approach implementation will be the ***lack of legal framework*** supporting the concept. The Water State Corporation is collecting money from the users and the money is transferred to central (regional or national headquarter) and then the money is rarely available to ensure covering of the maintenance fees. That's one of the reasons that the government is not keen to promote self-management by the community keeping money on site. Few years ago, ***STC UK*** try to develop in specific place an ***approach dividing the revenue from water sale based on "who do what",*** which shows some ***success*** at the beginning as the local authority did not know how to go against this type of ***approach based on reality of effectiveness of the service provider***… ***This approach could have some potential of replication.***

1st example:

In the area no control by government like in North West of north Darfur, the community are used to manage by themselves and are pretty autonomous with some success so far. ***For instance in Um Baru***, ***after failure by the community to ensure appropriate management of the hydraulic equipment, the community found an agreement with a local private actor***. The local private actor is in charge to operate and maintain the equipment (e.g.: he bought so far a new pump and a new generator…) as well as to collect the fees at water point. Within the fix duration agreement the Water users committee is still owner of the equipment and reasonable price is ensure with control on it by the committee. The agreement plan as well a free access to the most vulnerable people but to way to ensure reliability of the list is not clear so far. In anyway, the system work properly so far and people are pretty satisfied with the service provided.

2nd example:

Another example deserves to be mentioned as it could also be a track for the future to sustain water supply system management. In West Kordofan, ***IFAD in early 90's developed a community based water supply system management approach***. The outlines of the approach were:

- The government refused to let the community manage themselves their system, ***so the community with the support of IFAD succeeds to convince the water authority to sell them the water yard equipment*** for a price of 250 000SDG.
- The ***payment*** was made through ***3 installments***; ***the first one*** of an amount of 80 000SDG was made thanks to a ***loan from the agricultural bank***.
- IFAD have trained the community representative committee to open and manage a bank account and a budget
- The 2 ***others installments have been covered by the revenue coming from the water sale***, as well with all the rehabilitation of the equipment
- The committee in charge to manage the equipment made a contract with a private company to ensure heavy maintenance

- Start in early 90's, ***now the initial committee own 6 water yards which are working and well manage***
- They are now register as a cooperative only legal tools to give them an official status

2.5. Focus on Nyala water supply (link to ICRC proposition of intervention)

2.5.1. Current situation of the water supply of Nyala

The ***network coverage is estimate at 20 to 25%*** of the population for the time being and others water resources are used by the population hand pump catching the shallow open aquifer and private small or bigger water yards selling water to the population and also harvesting water from this shallow open alluvial aquifer (over exploitation). Furthermore, the ***presence of pit latrine in this very dense habitat, enhanced by solid waste dump site scatter within the town and the presence of a huge market nearby the Wadi*** (the Wadi divide the town in two sectors) ***generate a high source of pollution***. This situation with the natural slop of the town driving run off water to the Wadi where ditch and temporary well imply direct contamination of the aquifer and thus jeopardize the public health ***with very high incidence of diarrheal disease with a chronic pick at the beginning of the rainy season every year***.

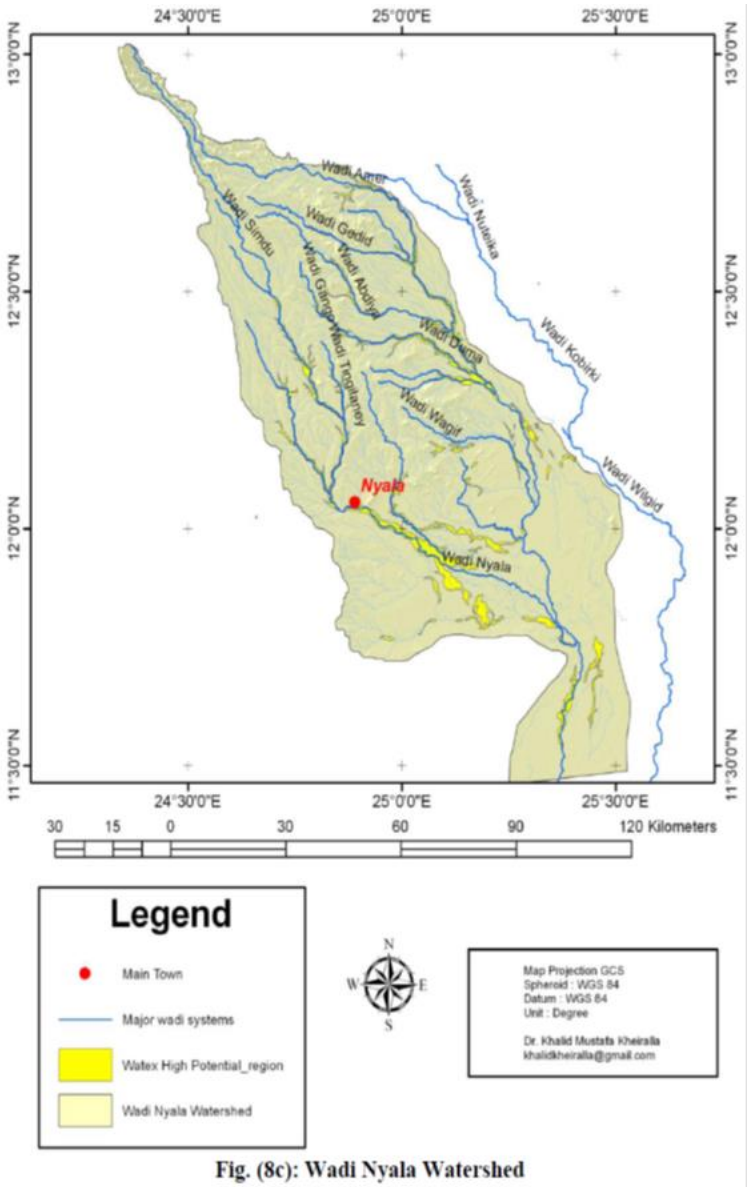


Fig. (8c): Wadi Nyala Watershed

For all those reasons, Nyala water supply can be considered as the main trickiest place in terms of water access (quantity and quality) with high negative impact on the public health.

2.5.2. Development project going on

A project initiate by the Darfur Transition Authorities is going on (start with Chinese fund and Chinese company and now implemented by Sudano-Egyptian company) to build a surface and sub-surface dam upstream of Nyala on Nyala Wadi. The surface dam is relevant to improve sensitively the recharge of this shallow alluvial deposit aquifer. Nevertheless the sub surface dam according local expert (source: Doctor Hamid Omer, Sr. Hydrogeologist consultant at UNEP) is put in question as the idea is to block the running down of the groundwater, whereas the main problem of depletion (occurs in June) within the Nyala water resources is due to over exploitation and due to the high transmissivity of this open alluvial aquifer, the recharge is very quick (august) and start before the beginning of the rainy season. The Wadi is supply by earlier rain occurring in the Djebel Mara area. Furthermore, the outflow of groundwater

downstream of Kundua (Nyala area) and which should be retained by the sub-surface dam is negligible compare to the quantity of water pumped in the aquifer to supply Nyala. ***The depletion of the groundwater resources is chronic in Nyala then the city water supply is very sensitive to rainfall.***

That's why another project also initiate by Darfur Transition authority is going on (but budget is not secure and funds are expected from China) ***to bring water from Gereida 83km away***. In Gereida the project plan to harvest water from the huge Baggara basin aquifer (interconnected with the Nubian sandstone formation), which is a complex (Nubian sandstone portion of the aquifer being more productive than the Ruwaba sediments part) multi layers aquifer composed of loose to semi consolidated fine and various sediments. This aquifer can be considered in general under 100m depth as quite protected and with very high potential of exploitation (very important yield can be expected by this aquifer; recharge capacity estimate at 250M3/year with as main recharge/catchment area the end of the the main drains of Nile basin named Bahar El Arab wadi and its tributaries in a lower point in South/West Darfur; due to aridity, seepage and evaporation only good year rain reach the catchment area of Bahar El Arab).

The problem is that the design have been don long time ago based on a demographic assumption totally obsolete nowadays and with a target daily consumption per capita at 70L. The pipeline have been designed to delivered 45 000m3 per day (without consideration for the network efficiency, which should be around 50 to 40% of loses nowadays; it means about 28L/pp/day).

2.5.3. Main features of Baggara Basin

The bulk of recharge of the Baggara Basin is through influent seepage from the seasonal floods of the wadis, Behar El Arab and its tributaries, natural water depression (pool) and the detached ox-bow channel (locally known as Regabs). ***The total annual recharge to the Baggara Aquifer Complex is estimated to be around 250 million cubic meters and its annual safe yield is about 1km3.***

The present (2008 data source) utilization of groundwater in the Baggara basin is mostly restricted to domestic uses employing about 330 tube water wells (235 water yards) producing about 7million m3 annually, which is insignificant compared with the groundwater in storage or even to the annual recharge safe yield of the aquifer.

Groundwater tapped from Baggara aquifer complex is fresh and suitable for human consumption with low sodium adsorption rate (SAR) and classified as good to excellent for irrigation purposes.

Despite the huge storage capacity in the Baggara basin (300 cubic km), it is recommended to monitor the fluctuation of the aquifer's water level and to quantify the recharge in order to ensure proper management of the resources.

2.6. CIS[3] WASH strategy/approach and overall performance

The WASH monitoring visit of CARE activities took place in Al Salam idp's camp near Nyala and in Idp's camp of Gereida, in South Darfur.

Al Salam camp is located about 14km from Nyala town. The last bio registration of the camp was done in 2011 by IOM and revealed a figure of about 73 000pp. Nowadays, it seems that the camp reach the above 136 000 pp according CIS estimation and far over 150 000pp according local government and UNHCR estimation. The camp is

[3] CARE International Switzerland

divided in 16 sectors. The visit of Al Salam last about 3hrs and was pretty in the rush for security reasons (to don't spend too much time in the camp) which made tricky an appropriate collect of information. For instance we could not see the CIS water point working (see below).

In general, CARE performance is correct and is oriented to community based approach, involving as much as possible the communities in the management of the facilities in place. The involvement and input from CARE regarding construction of latrine has decreased in time and the new strategy from late 2013 focus only on the new case load. When in El Salam, CARE has just started the water supply activities and the water supply is free for the population being new case load. In Gereida, where CARE is involve in water supply for more time and dealing as well with old case load, CARE strategy focus on community based operation and management of the water supply system and set up with the communities a system of cost recovery focusing mainly for the time being on operation and minor maintenance fees. The approach implies a relevant progressive increasing of the community contribution. The new arrivals are informed from the beginning that they will have to contribute after a certain time following their arrival, and that will timely increase.

CARE is involved in water supply of both camps at different level, in sanitation (mainly latrine implementation and solid waste management) and in hygiene promotion. Given the environment the trickiest aspect remains the water supply.

The involvement of CARE in water supply is mainly focus on new case load from 2011 until now. In both camp CARE share the responsibility of water supply with WES. WES being a state company in charge of water supply in emergency and in Idp's camp. Until last year WES was also in charge of sanitation but this sub sector is now under the Ministry of Health and its different representation.

In terms of sanitation and hygiene promotion CARE is in charge of the whole sanitation of the Al Salam camp in partnership with Ministry of Health. In Gereida camp, CARE is in charge of sanitation and hygiene promotion together with ARC (no funded by ECHO).

3. MAIN FINDINGS:

3.1. Monitoring CIS:

3.1.1. *Water Supply*

3.1.1.1. NYALA, El Salam camp:

Within the camp, CIS operate one borehole since one or two weeks when WES is supposed to operate 6 boreholes. The CIS borehole location have been selected among 6 geophysical profiles performs by CIS and its contractor. The boreholes is shallow the depth being about 22m (pump being install at 16m), catching the water for an open aquifer (fracture) and have a yield of about 8m3/hrs (pumping test has been done in the middle of the dry season when it should have been done at the end). The capacity of recharge of the aquifer is usually not known (risk of overexploitation quite high).

Those types of boreholes are quite sensitive to the rainfall for the recharge but then could be also sensitive to surface pollution. CIS pump in the borehole about 14hrs (with a drawdown according them at 0,6m so quite ok) per day which means about 135m3/day for a ***population*** estimate by ***UNHCR at 65 000pp and at about 40 000pp***

by CIS. Which means out of consideration for the network leaks (new network and small length) ***about 3,4 L/pp/day in the CIS site*** (based on the figures estimate by CIS which seems to be more realistic). Given the increasing of the water demands and the quick recharge by the rain, CIS increase is pumping those days with risk of exhausted the aquifer exploited as the rainy season is close to occurs. This is understandable but in the meantime it is quite dangerous is there is any consistent delay in the rainfall.

The pump station is equipped with one generator as backup.

The borehole is located about 3km from the camp where nomads are used to pass by and then CIS to deal with land issue, ensure a fair approach and limit risk of conflict implemented also 5 taps near the boreholes for the nomads.

From the borehole the main supplying pipe supply an elevated storage tank of 40m3 (bottom of the tank at 4m) and then by gravity water is supply to the water taps at 1,5 km using also the natural slop of the ground.

The monitoring of the ground water table is not systematic for the time being and it is planned to be implemented by CIS.

CIS has installed so far about 2 water points equipped with 12 taps each, means about 1666 pp/water point, which is out of all standard. Given that the yield of the borehole is 8m3/h and that a tap could flow about 0,15 to 0,2 L/s (meaning between 2min15s to 1min.40s, the taps can supply maximum 280 jerricanes of 20L considering 8hours of people coming to fletch when it is more likely max 6hours), the flow of 24 taps when they are all working in the meantime should be, about 17,28 m3/hrs. Then, with a 40m3 storage tank without consideration for the hydraulic loses (pressure at tap) there is no way to add more taps with one drilling, and it is not possible to pump 24hrs in the borehole.

Furthermore, there is no topographic survey regarding the pipeline between borehole and storage tank and between storage tank and water point. This point is quite sensitive especially as the water is planned to distribute from the elevated storage tank by gravity to the water point. Therefore, ***it became very important in particular in such quite flat environment (difficulty to identify the natural slop) to secure an accurate topographic survey to ensure reliable hydraulic calculation about the capacity of the system.*** Level device should purchase and use especially in case of gravity system with more than 1km of pipeline to ensure appropriate design of the system. ***The problem might come from the local authority to use this type of device within the country as it is sometime consider as strategic equipment.***

The water consumption has been estimated by survey from CIS at about 9L/pp/day, but it seems to be not realistic moreover most of people interview (22 pp between Gereida and Nyala-Al Salam camp) express more a daily consumption more close to 20L (between 6 to 9 jerricanes of 20L for family between 7 and 9 persons) per people per day. According the reliability of the survey made by CIS, the low consumption could link to the difficult access to water (*the survey should include questions/observation which enable cross checking and triangulation of the data; for instance how much do you time store water, how many jerricane do you have, observation of volume of the jerricane, how many times they are fill per day; did you have more jerricanes or/and did you go more at the water point when you were in your village…*).

Apparently, most of the population (about 70% according CIS) get access to water at 8 private water point located at about 30 minutes walking distance from the camp (which can generate problem of access for the most

vulnerable people: elderly, disable… however it seems that solidarity mechanism within the population are taking care of this category of population). ***Within this 70%, 17% for financial reason (water being more expensive at private water point) going to basic dug well located in the Wadi bed. The waiting time at the private well water point is from 30 minutes to 1h30.***

The opening schedule of the CIS water point is not clear for the population and for themselves as when we visit the water point a queue was there when the system did not have water. Apparently, they are in fine tuning of the system and the water point had been stopped 1hours before our arrival. The CIS technician explains that it is because the water tank was empty and then they were refilling at minimum level to open the valve. Clear effective performance of the system has to investigate to ensure appropriate operating of the water point. It seems that performance of the system has been quite over estimate by CIS. Some of the water tap noticed were not very sustainable but apparently it is the only ones they found on the market.

As first step towards to the progressive implementation of the ***community approach for CIS*** in terms of ***community contribution the pump operator is paid 750SDG/month and the HH using the water point collect the money to ensure the payment of his salary***. ***The problem is the system is only based on trust and many people who used the water point do not contribute which could undermined in time the existing level of contribution of the people, as perceived as unfair.***

The price of water at private water well is about 1SDG for 40L which is pretty expensive within the context and especially for Idp's category of population. For instance, to ensure covering of the running cost of the system, the strategy of CIS target a lump sum payment of about 1 to 2SDG/month/HH excluded of maintenance fees (same for Tearfund). To compare, the state water corporation sell water at 1 SDG for 80L in Nyala and Gereida meaning that the private well owner sell water two times more expensive for much less costly hydraulic equipment.

CIS encountered several problems to ensure the delivery of its service of water supply. The main one being the ***difficulty to ensure the security of the pump station and pipeline as the borehole is located in a place consider as unsafe*** for the time being and raised a lot of ***issues with land owners***. The ***result*** of that is ***several damaged in purpose on the pipeline, with high suspicion on the private well owner*** as the water supply system of CIS is perceived as concurrent for them. ***UNICEF and OCHA should work on the land owner issues but so far no result*** and no feedback from then on which step they reach in solving this problem.

Another serious problem is the very low capacity of the CIS system compare to the needs and the general failure in old case load camp sectors in delivering water by WES facilities (see section on WES). Especially the sector 10 of the camp nearby the new arrival location (CIS sector of intervention) from where people go to the CIS water point to fletch water despite of the fact that the CIS water point are already pretty over crowdie.

<u>Focus on WES:</u>

The people meet from WES in Nyala seems to be proper technically wise.

The boreholes operate by WES are most of them within or very close to the camp only is a bit further. Their drillings are between 45 and 50m deep (pump 24m depth, no information about the static level and its seasonal variation) with a drawdown between 2 to 3 m according the season of the year. Within the camp many water storage facilities are not in used anymore due partially to water shortage in the network. According the WES staff, they have data logger connected to dip meter to have a permanent monitoring of the ground water.

During our passage, ***very few water point working within the WES sectors have been noticed.*** On the only one actually***, we measured a flow at taps of about 20L in 8 to 16 minutes which is out of all standard and imply a more than limited access.*** Furthermore, ***those water points are working from two to one hour per day***, and exceptionally for few of them 3 to 4 hours, some of them not working for more than a year according the population. ***This situation made them almost negligible and cannot be considered as a water access.***

WES mentioned that they ***want to start also to implement a system of financial contribution*** of the population/users for the operating and minor maintenance of the system.

According the population among the 16 sectors of the camp only the sector 3, 4, 6 are getting water regularly but only 1hrs per day with very low flow at the taps and high waiting time (from 1h to over 1h30), and the sector 8 do not have any water for the last 2 years. During our meeting, WES try to reduce the level of failure of the system in the case of the water point not working for 2 years, the WES representative endorsed only 2 months, so it might a right balance between.

In the meantime, ***WES justifies some of the failure by:***

- Problem of access sometime for fuel as it is a sensitive product for the security service and then they sometime don't get authorization to transport fuel to the camp, plus 2 months with any access to the camp before the election.
    - possible but no way to check
- Problem with private well owner which led to about 16 breakdown on the system in 1 year
    - Again possible, but in the meantime most of their borehole and equipment compare to CIS are located within the camp (for sure some people of the camp are linked with the private well owner but how far this can be the reality it is tricky to answer)
- Problem of yield of their borehole compare to the one of CIS, with higher drawdown in the borehole. They cannot pump more than 2hrs and then they needs to wait for two hours to get back the initial static level
    - Very likely but in anyway the water supply should perform much better in terms of water availability within the camp
- Problem with one generator but finally they got a new genset from UNICEF that they are ready to install
- Problem in one the drilling/borehole of groundwater depletion
    - Possible but according most of the interview of WASH actor of Darfur, the main problem in terms of depletion in borehole is coming from the depletion of the groundwater but from need of borehole generation as the screen is getting clogged along the time

It is clear that the business of water in such environment is pretty lucrative and without any evidence of embezzlement, there is high presumption of a system implemented to share benefit of this activity between main stakeholders. In the meantime, the fuel is a very valuable product within the area and subject to diversion. Despite of it is as well very sensitive to address those problems; system of control of fuel notably should be rigorous and efficient with information cross checking. Even, it is not possible to ensure not loses on it, as much as the system of control is rigorous and well adapted as much to decrease the loss. ***Whether the people do not fill any control at different level of the supplies, the level of diversion can be drastic and jeopardize the whole water access.***

3.1.1.2. GEREIDA idp's camp:

In Gereida, the camp is almost merged with the existing town (initial population of the town about 20 000pp). ***The Gereida idp's camp gathered about 120 000pp, estimate at 90 000pp by CIS.***

When the town is supplied in water through two boreholes/water point only (price of water: 80L=1SDG) operate by the State Water Corporation company, the water supply of the camp is ensured by the exploitation of 6 boreholes (4 being operate under CIS supervision and 2 by WES).

The boreholes are catching the groundwater storage of the huge Baghara basis aquifer. The Baghara basis aquifer is a multi-layer aquifer with a recharge zone located at Bobai Geressa in West Darfur, where numerous Wadi are accumulated the run-off water and then create a high recharge potential. This aquifer shows very high yield in borehole exploitation. The borehole of Gereida idp's camp are more or less 230m deep with two borehole (CIS) at 168 and 180m. The dynamic level is about 55m deep and the drawdown of the water varies between 2 and 4m for most of the borehole but the two more shallow have a drawdown at 25 and 35m (should be monitored regularly). The yield of the boreholes are pretty high between 14m3/hrs until 30m3/hrs with a total of 140m3/hrs so with 6hrs pumping time: 840m3/day until 1120m3/day with 8hrs of pumping/day: 7-9,3L/pp/day with 120 000pp and until 9,3-12,4L/pp/day with a population of 90 000pp (this calculation does not integrate leaks on the system).

Each water point is equipped with a storage tank, usually onion tank of 70-90m3 (10 of them are installed). Within the camp area are located about 21 water point equipped with a total of 427 taps in the area supervised by CIS and 18 water point equipped with a total of 218 taps managed by WES. The total number of water point is 39 and the total of taps 645 for a population of let say 120 000pp, meaning about 187persons /taps, which in theory demonstrate a quite good access to water.

The ***context of Gereida idp's camp water supply system management is pretty interesting as it CIS start a community based water supply management approach since 2011.*** In 2011, the Water user committees have been established at each water point and effectively manage them today. The structure has been enhanced in November 2013 by the creation of a central water user committee. The ***approach developed by CIS implies progressive increasing of the financial contribution from the users of water point with a special free access for the most vulnerable people*** (about 2 to 3% of the population are considered as within the most vulnerable and get free access). ***Nevertheless, there is not formalized monitoring system to ensure cross check of the list of vulnerable people and effective free access to water point for them.***

<u>Focus on WES:</u>

WES start to be involved with this community based water supply management approach in 2013. For the time being, CIS calculate the operation and maintenance fees on monthly basis and the recovery cost on ten years. Regarding the O&M fees, the community contributes at 36% of the whole fees. CIS target 50% of the O&M fees by the end of 2015. In addition, the community contributes to 7 to 125 according the water point to the fencing of it. Practically, the community pays mainly all the HR fees, some small fittings and 25% of the fuel.

The ***O&M cost of the system manages by WES are more expensive than the one of CIS in terms of fuel consumption***. For instance in theory CIS produce 80% of the water supply but consumes only 60% of the whole fuel consumption. The fact is that the generators used by WES are oversized: 40kVA instead big maximum 20kVA which means one more liter of fuel per hours in the consumption.

The biggest problem when it comes to the WES water point, is that despite of the schedule of water point have been mentioned between 8-11am and 2pm-5pm at WES water point and between 7am and 6pm at CIS water point, most of ***the water point visited manage by WES were barely working and when they used to work they work mainly 2hrs per day instead of 6***. ***For the CIS was, the water points are working according the schedule*** in most of case. Only break for breakfast and sometime prayer have been noticed.

Within 5 water point manage by WES visited 1 only was working but with very low flow. One others water point was worked the day before for 1hrs but according the neighborhood the water point is most of the time not working. ***The weirdest point is when we checked the notebook recording the pumping hours at the borehole manage by WES, they were pumping according the schedule, so the water should be much more available at the water point. In this regard, we can be pretty suspicious about the reliability of the fuel consumption with the high possibility of fuel diversion*** (furthermore WES were mentioning at some point that it happens they pump up to 10hrs per day, which seems to be quite unlikely given the water point functioning).

The ***main consequence of the malfunctioning of the WES water point*** is that given the shortage of water supply in the area manage by WES in terms of water access, the ***people are going to CIS water point from many sectors of the camp and then the water point are overcrowded***. So, ***the failure of WES and the limitation of water supply in town affect directly the quality of service provided by CIS.*** The problem of the town water supply system is largely due in addition to lack of equipment, to the fact that all money collected at water point is going straight to the regional headquarter of state corporation water company and the local water board has to struggle to cover fees of the system.

Among 20 people interviews at the CIS water point, 9 of them were coming from sectors (Urika, Um Zagarat, Al Salam…) ***normally supplies by WES***. All of them, report the lack of water or the absence of water for month or even years (for 1water point) in the WES sector they are coming from. Some people mentioned as well difference price of water, 4SDG/month instead of 2SDG/month at a water point called Naga and manage by WES.

Most of the people interviewed were quite happy with the CIS water point; they mentioned an average consumption of 6 to 9 jerricane of 20L per day for a range of family between 6 and 9 persons (meaning about 20L/day/pp). Based on that and the daily water production, it seems that the population of the camp should be more close to 90 000pp than 120 000 (taking into account a large portion of livestock water needs). In the meantime, some figures from 2008 present different consumption more close to 10L/pp/day in rural area.

The accumulation of problem reported and noticed during the visit demonstrates a serious failure in the WES water supply management *(see potential way to address this issue in section 3.1.1.4).*

<u>Meeting with Water User Committee:</u>

During the meeting with ***the Central WASH committee,*** the members seem to ***have not been aware about most of problem noticed during the visit***. This aspect put in question the communication among the water user committee and the central committee and, then the relevancy of this central committee in terms of ensuring synergy.

The meeting with the central Water Users' Committee members reveals as well that the system of community contribution collection is not reliable and not sustainable. Actually, the committee explains that the longest (as far as they remember) time they remain with a breakdown not handle was 2months. The necessary time to repair this breakdown (on WES pipeline) was due to the fact that the only moment they succeed to collect the

community contribution is at the WFP Food distribution and that during this period no food distribution took place, then they could collect the money to repair the pipeline. ***In the meantime, the system in place is not fair in a way that there is no list of users and contributor***. So, many people including the ones coming from the WES water points do not contribute to the functioning of the water point they use to fletch water. As this system is not fair, some people might decide to stop contribution given that some of users do not contribute. Another aspect should be taken into account in elaborating a system of water pricing and collection of contribution, actually some people going to water point are going with a ***donkey cart of 200L*** which they fill to sell water in different sector (to the most wealthy people more likely). Then, the ***people making business with water should pay a different amount than one coming to the water point to fletch water for their family***. This could be a way also to decrease the amount of contribution for the less wealthy ones.

The idea of the centralized Water committee was I guess to ensure mutualization/pooling of the means (synergy), but at the end that are not (or pretend…) aware about the issues faced the various water points and dynamic of power within the central committee seems to be based only on existing leadership structure composed by the different representation of the different type of population living in the camp with no real vocation and no evident mutual interest.

In addition and to conclude this section ***a substantial need of monitoring improvement on CIS side have been noticed during the visit with high needs of regular refreshing of the water point operator*** in terms of task to do (*checking free residual chlorine…*) and filling the monitoring form (*see more in the section Recommendation/issue to follow up*).

3.1.1.3. Strategic funding note about water supply system management (*in a context where our partners is affected by failure from WES*) and exit strategy:

In general in Darfur (or at least South Darfur), it is tricky in such context to define a single holistic strategy. In certain context (Al Salam in Nyala), the old case load have access to water through the private well. It is for them quite a big financial charge but so far they manage. The new case load as they are recently arrived cannot afford at the beginning fees on water as they did not have time to implement some kind of livelihood activities to cope with their needs. We cannot decide that CIS will manage all the water supply system of the camp otherwise we contribute to deprive WES of responsibility as they should the main body in charge at long term. Meaning doing that, we contribute to jeopardize exit strategy. In the meantime, as WES seems to generally failed in service delivery but we cannot avoid them, the strategy could be to rely as much as possible to the communities in terms of operating and management of the system, and then to consider WES more as technical assistant for the communities monitoring the capacity building and ensuring heavy maintenance. This should be address at policy level with Sudanese authority as in most of the context the government do not allow the community to manage water supply system (apart apparently in some place of North Darfur as they don't have access).

In particular for a place like El Salam, the strategy could be to use CIS as technical assistant for WES doing some kind of mentoring to them in terms of water supply system management and system of control (fuel).

In the meantime, ***given*** that the ***failure of WES*** in water supply of the camp ***affects directly the activities implemented by CIS***, we could have a ***realistic strategy based on two main assumptions***. We could for instance consider that in any way (trying to target mainly the most vulnerable people as much as it is feasible), let say that 20-25% of the old cases will fletch water in the new sector manage by CIS (the one located the closest to the area). Then by assumption we could fund CIS to ***ensure a minimum of survival needs*** (3L/pp/day) for the whole

population of the new and old case load (20-25% according the result of the calculation and water availability). In case the situation of old case load in terms of water access improve, the strategic assumption will enable a ***more standard supply*** of 15-20L/pp/day of the new case load. ***The problem is that at some point, private well owner should be involved in the process as they could be a high source of nuisance and dysfunctioning of the system, and get some benefit in terms for instance of rehabilitation of their well with the conditions that the price of water they apply to idp's should be controlled and realistic.*** The idea could be to supply survival needs and for the rest of the needs continue to let the population fletch water at their water point, then we reduce the global cost of water for the people, ensure that private owner well get some benefit and do not create nuisance, as also in case of problem of access or so on, they constitute a good backup capacity.

In any way, for the water supply system of the camp, ***the system of cost recovery*** (mainly for operating and minor maintenance) ***planned to be implemented by CIS should go on with harmonization with WES. We cannot have two strategies in terms of water access in the same environment.***

Another strategy could be to rely on private actors (see section 2.5.4) to operate and maintain the equipment and collect financial contribution from the population. This strategy could be achieved with the users still owner of the equipment, free access for the most vulnerable people and definition of the water price in a collegial way between the private actor and the representatives of the users.

In any way there is no one and only one way to organize the management of hydraulic equipment and every management system implemented should be based on the context and local capacity. For instance, in El Salam camp (Nyala) most of the population gets access to water through the resort to private wells located close to the camp. The problem is that there is no control on it at all about*:*

- Water quality
- Price of water (double than usual and official price)
- Special care for the most vulnerable (the poorest going to open shallow hand dug well usually contaminated)

The improvement of the private facilities by some partners could promote a better and fairer access to water for the idp's by agreement with the owner. This way could lead together with control from local institution and partners to a sustainable water access and to an effective exit strategy.

3.1.2. Sanitation:

3.1.2.1 Latrine:

The sanitation approach of CIS is pretty harmonized today. ***The approach gives a relevant place to community contribution but there is still room for improvement***. Until late last year, CIS were providing items of latrine construction to all new arrival and basically to HH of the camp (when they noticed gap). Now, because of budget limitation as well, they provide materials only to a certain amount of vulnerable people. Despite, they mentioned that the latrine are shared between few HH, it seems that in most of the case, the latrine is used only by the targeted family.

The process of latrine implementation start with identification of the families beneficiaries (the cross checking of the list have to be formalized and systematic). Then, the family dig the pit, since this is done CIS brought the materials for the shelter, the slab and materials to ensure some lining of the pit when loss ground. The fact is that on those camp most of HH have their own compound surrounding by fences (made of special type of grass) and then are pretty able to make the latrine shelter.

Furthermore, the ***shelter is made of bamboo strips import from CAR*** and then locally not really available and affordable for the community. ***When this type of materials is pretty relevant to use as liner of the pit, for the shelter, the strategy should move forward self-construction for the beneficiaries***, and thus only slab and lining should be provided. The bamboo strips shelter does not ensure privacy in the latrine by the way it is made.

The price of a latrine for the time being and including the shelter materials is about 400SDG/latrine, meaning about 65USD/latrine.

The lining has recently been included in the latrine construction pack after the collapsing of numerous latrines last year during a flash flood. The point is that lining is not relevant everywhere.

In addition, ***CIS in flood probe area try as well to rise up the level of the slab to protect against water run-off*** intrusion. The ***problem is the backfill they use is not compacted and might be swept away after the first rain***. Then, to conclude and as a general problem noticed by CIS, a detailed formalized monitoring should be implemented by CIS to ensure that all latrine at least are stable and protected against water intrusion.

The problem of space according the filling rate of the pit should also be investigated at some point.

3.1.2.2. Solid waste management:

Apart the numerous plastic bags (main problem of this is animals eating them and dying) stuck on the fences made of thorny shrub, the camps are quite clean. The ***main problem in terms of solid waste management*** remains once again the story of ***land owner and safety to access the dump site. Incineration in El Salam is done in pit but the risk of fire related to this practice should be investigated***. The problem is also that from the camp to the dump site, CIS have to pay the people to collect the garbage and load the dump truck. Apart pit with masonry wall, there is not container in the camp (problem of luting has been reported).

3.1.2.3. Drainage:

Usually in such dry environment the drainage is barely taken into account, whereas in such environment the run off of rainfall can led to huge flash flood with serious consequences on the facilities and habitat structure. Most of the time, there are few spot to be identified (lower point) where the quantity of run-off water can damage structure. CIS try to address this issue in El Salam after the flood encountered last year, but the way to address it should be consistently improve, notably the implementation of main drains in the trickiest point, improvement of the protection of the latrine pit, etc…

3.1.3. Hygiene promotion:

The hygiene promotion seems a bit to be included to ensure comprehensive WASH package delivery.

In El Salam (Nyala) for instance, there is 43 hygiene promoters paid about 150SDG/months (meaning aout 25USD/month) which is reasonable as a financial input, but still at some point need an exit strategy. In the meantime, they are not working full time. The hygiene promotion component of the project is ensure by mainly 43 Hygiene promoters doing door by door visit to diffuse standard hygienic messages based on public health concept. The door by door visits are relevant when it comes to new population who need substantial support especially to understand the use of the facilities and functioning of the camp, but after too many repetition about same topics people usually loss interest. Few focus groups have been implemented, health child club have been implemented but we could not see them during our visit.

Some drawings have been developed and are presented in very few places such as the meeting room of CIS. In both camp, we could not noticed any posters or notice board at any of the water point, health structure, school or the public place of the camp. Although, ***we noticed a lot of misunderstanding or absence of information about price of water and schedule of water point at the level of the users/commun***ity. However, regarding ***the latrine***, ***most of the ones visited were clean and in used.***

The hygiene promotion component needs a lot of improvement and need to be reduced at minimum in time (*see recommendation and issue to follow up section*).

3.1.4. ***Capacity of the partners:***

So far the capacity of the CIS WASH staff is quite ok especially when it comes to usual/common type of water supply equipment of the area, meaning small and big water yard and hand pump. The lack of proficiency technically wise is mainly related to hydraulic calculation and regulation of water network. Since, in such environment such as El Salam where the distribution is done by gravity from an elevated tank 1,5km from the water point, there is a need of technical support to ensure appropriate supply of the taps (see section main findings).

CIS need a senior WASH staff that is already planned and expected at short term to take his position in Sudan. For the time they try to ensure some remote technical assistance very tricky to be efficient when it comes to practical technical problem encounter on the field.

Otherwise, they need also to improve the skill of team in terms of elaboration and implementation of survey (dynamic frequentation of water point and water consumption for instance), as well as in formalizing the approach developed and the monitoring. Appropriate monitoring tools and guidelines with check list and relevant reporting should be developed and implemented with the arrival of the senior WASH Advisor.

Regarding ICRC, the delegate and especially the one of El Fashier, are very proficient and experimented. The Coordinator seems to be less technically proficient and still trying to get ban overview of the situation but seems as well dynamic and committed with a proper technical background. The national engineer whom is the ones going to the field gave a very good impression as well in terms of proficiency in the sector and knowledge of the water and sanitation situation where they are working.

Operational (quality of implementation, …)

The progresses of activities implementation seem to be proper according the initial work plan.

The monitoring of implemented Water user committee capacity building should much more improve and continuous refreshing should be delivered in situ to the operator.

Quality of the monitoring and training/briefing to the Water user committee members in general should be improved and constitute one of the main recommendation coming from the field visit. Each field visit should be the occasion to refresh the knowledge of the water committee members.

The system of financial contribution and fees collection constitute a very relevant approach from CIS which seems to be very committed on it. Nevertheless, the system of fees collection so far is not sustainable (based on WFP food distribution) and need together with the community to much improved to ensure regular income and fair approach.

The dynamic and methodology of hygiene promotion should be pretty improved and based as much as possible on the community and environmental/sanitary problem identified.

Quality of taps implemented should also be improved to ensure better sustainability of the system. This aspect has been mentioned by CIS but they have been limited by the availability on the market.

Storage tank insulation form the heat should also be improved. Given the temperature the water during the day is pretty warm and this will also affect the efficiency of the chlorination.

The access of the water storage tank for instance to ensure injection of chlorine or cleaning should be improved and made safer.

Some of the generator mainly backup are too oversized and should be replaced at some point by more appropriate one to avoid excess of fuel need. The point is that the water supply system of Gereida has been hand over from ICRC to Oxfam and then to CIS who fund the setting this way.

The quality of the privacy of latrine should be also ensured. In addition, the drainage of latrine but small elevation on backfill should be enhanced by compaction of the backfill (ideally mixed of gravel and clay compacted should be used according the local availability) to avoid that it is swept away at the first heavy rain. In regard to the risk of flooding, which could be considered as useless in such dry environment should more taking into account and risk mitigate by for instance temporary drainage before the rainy season. The experience of last year in an area prone to flood with the collapsing of few hundreds latrine should enable identification of natural slop and the area to be drained. Nevertheless, CIS learn from this episode and that’s why they start to elevate the latrine in the area.

The targeting of the most vulnerable people benefitting from special services should include a formalized cross checking system.

In general, the quality of intervention led by CIS according the findings of the monitoring can be considered as correct within the context. Mainly but not only fine tuning is necessary.

4. RECOMMENDATIONS / ISSUE TO FOLLOW UP

CIS:

Water supply:

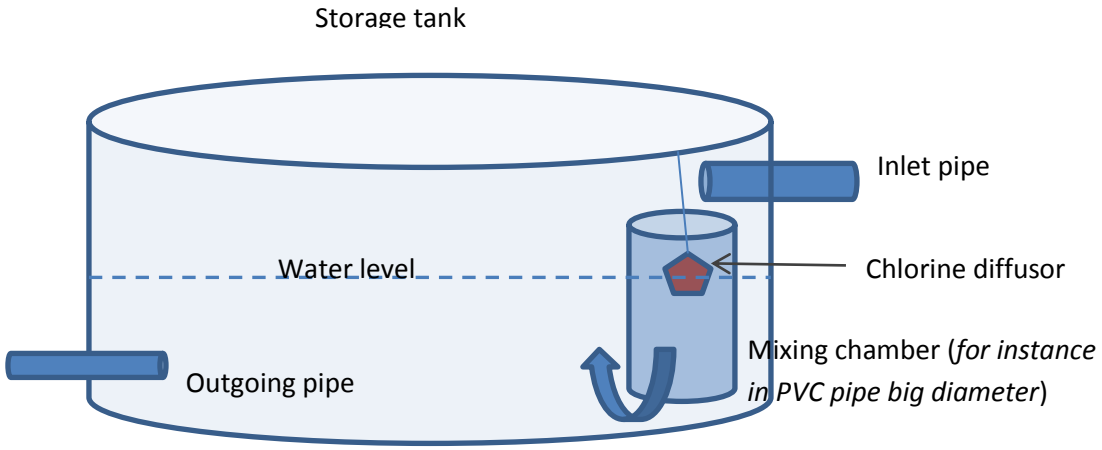
- Some storage tank should be better protected from the heat (for instance at the health structure of El Salam camp…). For instance, within CIS compound the staff install a cover made of "banda" kind of leaves) and it reduce consistently the temperature of water in the tank.
- Ensure accurate design and selection of the hydraulic equipment and in particular pump and generator to as much as possible reduce the running cost of the system and make it more affordable and then sustainable for the community within the framework of community approach in protracted situation. Furthermore, this aspect is also crucial to appropriate exploitation of the performance of the system and management of the system capacity and service delivery.
- The sustainability and reliability of the system of community contribution and especially the fees collection part must be improved together with the community. Pilot approach could be tried in different water point/sector and then after a fix duration each approach could be assessed and eventually replicate according the level of efficiency.
- Ensure appropriate and sustainable exploitation of the groundwater resources. Systematic monitoring and recording of groundwater table should be measured:
  - Static level before pumping
  - Dynamic level after pumping
  - Time to come back to initial static level
  - Seasonal variation of the groundwater table, as well as dynamic level
- The partners should take reasonable risk I terms of stressing the groundwater resources (especially in very dry season to avoid temporary depletion of the ground water at a crucial time of the water. In the meantime, the partners should identify alternative water access to anticipate potential failure. Those alternative resources (most permanent resources, inventory of potential resources: existing dug well in Wadi be, private well owner, closest reliable water supply system, localized aquifer less exploited, …) should be promoted within the framework of a kind of contingency plan (with what means should be needed, for instance at last resort water trucking from Nyala and so on or others most reliable resources…). Given the level of data available facing of a decanal drought can be encountered at any time, and then it is always better to anticipate especially in such tricky environment in terms of water access.
- As much as possible (given the problem of topographic data) hydraulic calculation should be performed by the partners to ensure appropriate exploitation of the system. For instance in Al Salam, given the existing capacity of the system, additional taps seems to be not feasible whereas CIS had planned to increase the number of taps (see main findings).
- Clear information about the schedule of water point should be deliver to the users
- As much as possible and not exaggerate, equipment of water taps should be more sustainable. Better to invest a bit more at the beginning for an equipment that can last several years, rather than implement bad quality equipment which will need to be changed every year, especially when come time of hand over to the community and as much as availability of equipment.
- Access to the water tank to perform chlorination should be ensure, and clearly improve and safer for the staff in charge.

- Improved the fuel consumption control at each step of the supply chain crossing information with generator consumption, pumping time and then water (quantity) production
- Improved the system of cost collection to ensure more sustainability and fair payment among the users; also define pricing according level of consumption to ensure that people who fletch big quantity of water (donkey cart) to re sell it after pay more than normal domestic users
- Storing of chlorine must also be improved as for the time being at Water user committee level the chlorine is stock in the house of committee member (where there is no ventilation and so on); CIS should consider to promote for instance to store chlorine at committee level in superficial excavation (30-50cm deep) to ensure less risk in efficiency losses for the chlorine which also affect the rate of chlorine injection (*when you have a chlorine product with 70% of active chlorine, the product will lose in percentage of active chlorine along year; chlorine being very volatile and sensitive to humidity and heat, he should be stored in a dry and cool place*). This type of practice is even more important if we consider that at some point the committee should operate on their own and might store chlorine for long time.
- Given what have been observed during the visit, clear and regular refreshing should be delivered by CIS to the water committee member in charge to operate the system, notably regarding:
    - Chlorine injection
    - Chlorine storing
    - Free residual chlorine test performing
    - Filling of monitoring form
    - Regulation of the system by valve
    - Refilling of tank to avoid that the tank become totally empty before refilling; the outlet pipe need to be always submerged to avoid air intrusion in the system which could create clogging and lost in performance at water tap level (observed during the visit in the WES sector)
- Appropriate survey should be implemented regarding water consumption and frequentation of water point. It could contribute to a better fine tuning of the system, improvement of the water delivery coverage and localized the main tricky area in terms of water access (questions should include where come from the person interview). To enable crossing of information the survey should be performed at water point and at householder level and combined with observation. The questions and observation planned within the survey should be adapted to the type and capacity of answer of the population, and then it should be tested with a sample of population before implementation.
  For instance, given that the concept of time or volume can be not very accurate and understandable for the population, when it comes to for instance the question about the waiting time, instead of to ask how much time did you wait for at the water point, ask number of people or better jerricane before her/him. Then, knowing the time to fill one jerricane at your point you can easily estimate the time accurately. Or, instead of to ask how much water do you consume ask how many jerricanes do you fill when you come to water point and how much time per day, then observe the type of jerricane to estimate the volume (in case you can also have for instance a bottle of 1L and then gauge the capacity yourself), etc…
- Appropriate monitoring of the capacity building should be implemented to ensure its sustainability and the good management of the water point and all activities undertook not only from the water user committee (by the way CIS staff should be monitored as well). The monitoring should ensure to identify gap in terms of for instance capacity of the water user committee member, performance of the water supply system, etc… Systematically at each monitoring every water point manager and water user committee should be assessed (by observation of their task and maybe questions) and level and gaps should be recorded. The strongest element according the task should be identified and their capacity rose

further in terms of level task to be able to complete. Those persons could be promoted at some point a focal point for the others in terms of supervision and capacity building to impulse an internal dynamic of improvement.

- Given the numerous data collected the central monitoring tools should be in two stages. A dashboard of monitoring enabling crossing of information should be implemented to enable in one look to identify potential problem in the different aspect of the project and then in the same excel file for instance others sheets should record others data recorded in the various template/forms implemented (notebook at pump station, forms used by water point manager, residual chlorine data, etc…) and be linked to the dashboard for automatic update. The main parameters /indicators of appropriate activities implementation and water supply system management for instance should be identified and constitute the dashboard. The source of information of those indicators should enable to cross information. Since an incoherency has been identified or suspected by consulting the dashboard the numerous data collected could be used to investigate more deeply the problem together with oriented field visit. In the meantime a monitoring with no comments and no problem identify should make you aware that the monitoring might have not been performed properly. For instance the fuel consumption is one fundamental parameter (see source of information below), together with quantity of chlorine used (see source of information below), water production as they are indirect to the water delivery, etc…
- Monitoring should be regular and guideline with crossing of information in regular monitoring should be produced with systematic cross checking of information and observation. For instance:
    - FRC: coherency of free residual chlorine should be in random manner assess, if all the figures are more or less the same, it means that deeper control should be performed as it is not realistic.
    - Chlorine rate: quantity of chlorine use correlate with rate of chlorination, quantity of water deliver (water meter) could enable to identify serious issue in water chlorination
    - Fuel consumption: hours of pumping per day or week or month, with quantity of fuel release from the stock, level of stock at pump station level and quantity of water delivered could enable to ensure limited risk of fuel diversion
    - Schedule of water point: form fill by water point manager with schedule of opening and water meter record with during monitoring observation of water meter figures (at pump station and at water point) could enable to assess the real schedule apply to the water point
    - Etc…

- Way of chlorine mixing within the tank should be also improved by better location of the chlorine diffusor or if possible installation of a kind of mixing chamber by using a big diameter of pipe by instance.



Sanitation:

Latrine:

- Formalized the monitoring of the latrine which should be systematic (as it seems to be indeed) as the community install the slab and do the work. The four main points is to ensure that:
  - The slab is stable and there is no risk of collapsing
  - The drainage is ensure and there is no risk of water intrusion
  - That there is a cap on the latrine hole
  - The privacy is ensure in the latrine, especially when the latrine is not in the compound of the owner or share
- Privacy of latrine has to be improved as a lot of shelter of latrine present space between the different bamboo strips uses as construction materials. The bamboo are imported from CAR apparently and expensive within the context but more sustainable than the grass/straw use usually to build fence around compound. The potential of replication remains weak, even if the sustainability is much higher than the local materials used (need to renew it every year). The idp's being able to build big fence around their compound and their shelter, they should be able as well able to build the latrine shelter. Thus, the strategy of CIS should evolve to remove this item from the CIS contribution. The bamboo strips use by CIS remains a very good solution for the lining of the pit in case of loose ground.
- The backfill around the latrine to ensure drainage of the equipment should be compacted otherwise it will be swept away at the first rain. Mixed of clay and gravel should be implemented whenever is locally available materials.
- The presence of cap on the latrine hole should be also improved.
- The identification of vulnerable people should be cross checked with various source of information and process to do so should be formalized as well.

Solid waste management:

- Risk of fire (given the construction materials of the camp) should be taken into account when incineration of the solid waste inside the camp; prior to incineration, wind should be checked

Drainage:

- In Al Salam camp, temporary main drain should be implemented with community participation using as much as possible the natural slop to mitigate the risk/impact of flooding in the affected place of last year (300 hundreds latrines collapsed in this area prone to flood).

Hygiene promotion:

- The hygiene promotion need to be dynamic and to be better target on sanitary issue concretely noticed /identified within the camp instead of standard and holistic messages
- Notice board have to be implemented at all water point
- Awareness posters adapted to the context and to the level of literacy must design, tested with a sample of target population and produced

Meeting with ICRC:

- The number of beneficiaries will be reviewed and should not exceed 250 000 pp. The way of calculation has been explained and seems to be proper

- It has been confirmed by all discussion with WATHAB staff that the main priorities remain rural intervention with access to water (including sustainability of equipment care and maintenance) has main core activities; sanitation (latrine) is only considered in case of movement of population (idp's/refugees)

- The urban intervention is a minor component of the intervention: about 10 shallow boreholes are planning to be built in Nyala where people are supplied 2hrs per week apparently and many idp's has increased the town population in the last ten years. Before the conflict the resident population of Nyala was about 400 000pp, when nowadays it is estimate at about 1,6M.

- The remaining of urban intervention focus on rehabilitation of equipment with mainly replacement of few pumps (El Fashier and Nyala) and reparation of main leaks on the network (made of asbestos pipe, which are undermining public health and are nowadays forbidden). The Urban WASH intervention is also a way to ease relationship with the local authorities with improvement of rural access as objectives. Most of the interventions proposed seems to be the most relevant whether you have to work on it, as it bring added value to water availability. Normally, the first action to be taken should pipe replacement to improve efficiency of the distribution network (less leakage) and improve water quality in the meantime (by decreasing of risk of contaminated water intrusion in the system when valve/pump are manipulate…). However, given the situation of the Nyala network working only on this aspect would be very costly and require implementing measurement device at strategic point. So, to start main leak reparation of the main supplying pipe and improve the quantity of water at source level (so less depression in the system as the system will be more in charge, and then less risk of pollution of the network water…) with replacement of the pump damaged and few shallow drillings construction (this is the main activities that

if needed ot cut could be cut but then the negotiation with local authority might be more tricky for ICRC). So, quick impact and cost effectiveness can be considered at some point.

- A small hygiene promotion should be added when the problem has been identified which could be cleaning of jerricane (which seems to be a serious concern and source of post contamination of the water in the context) mainly and foster of good sanitation practices especially in case of public health issues related to these types of practices. In the meantime, and paradoxically to the level of hygienic practices, according the information collected by ICRC from various sources there is no in rural area specific high incidence of diarrheal or gastric disease

- The training component has been also explained and the strategy seems to be very relevant. They plan to first request some minimum skill to select the attendees (for instance mechanical skill like motorbike reparation and so on…). Then the training impact will be assessed prior and after the training by testing the effective skill acquisition of the people and then monitoring of the attendees will be made on the field with adapted refreshing on what has been identified as gap on case by case bases. Number of attendees will be limited to ensure appropriate support from the trainer. The people to be trained will be from RC volunteer only when the skill of the individual is appropriate and it will be mainly for hand pump reparation. Since water board/water committees are effective, people from water board will be targeted. In addition, the training will be mainly practical which is a good point is. The training should last 2 weeks and will take place in the very well-furnished ICRC workshop in El Fashier. There is in the workshop all necessary equipment to practice in real situation considering the different type of hydraulic equipment existing in the area.
  For the replacement of the pump in urban place, a consultant will be hire by ICRC to ensure that the effective replacement is used as a practical training for people from the water board as well.

- ICRC organize their action in rural by pre collection of information for several sites at El Fashier or Nyala level and then, all the equipment needed to handle the rehabilitation/reparation are load in truck (they move in convoy of two trucks) and the do itinerant rehabilitation with selection of training attendees. One of the main failures in functionality of some of the hydraulic equipment planned to be rehabilitate within the project are coming from destruction in purpose by different armed group. However, many of the diagnosis made by ICRC staff so far on the field revealed as well breakdown (most of the breakdown encountered affect the electrical component of the pump rather than the hydraulic part) coming from misused of the equipment for instance:

    - People by passing the control panel to increase water pumping and then overused of the equipment which led to breakdown

    - Also by pass of control panel when one of the electrical protection component (such as fuses, circuit breaker…) is out of order and then no more protection of the pump motor from over tension and intensity peak due to short circuit or insulation problem of the cable, …

    - Few of the submerged pump (mainly small water yard) are not equipped with protection device on order to stop the pump in case of too important drawdown which led to pump cavitation and then breakdown

ICRC does not pretend to address efficiently and with consistency those issues. Nevertheless, they try to mitigate the risk by appropriate training and awareness of operator (see section about training), and monitoring visit. In addition, ICRC is implemented the most robust equipment and ensure appropriate protection device to improve the lifespan. ICRC ensure ass well that they take into account accuracy in the design (keeping a buffer capacity) to ensure cost efficiency of the element implemented such as pump, generator and so on…

- Given the way that organization are working with WES and the lack for the time being of effective coordination, it is important that ICRC ensure coordination with others actors when it comes to providing some spare apart (to the communities in most rural area) as WES can play a game with it and in case of monitoring of their stock use the ones provide by an actor to show to another actor and then divert some part of the relief for the own benefit.

- Source of verification should be added: as mentioned in the comments, as well as revision of indicator 1 baseline and target value

- The agreement with Ministry of Water is not yet signed, but it is apparently quite understandable given the political agenda at short term of the country which led to functionaries which are reluctant to take any decision for the time being as it could affect their career

- In general, the WATHAB coordinator as delegate/engineer on field arrived 3-4 months ago so should be present for the whole project completion and seems to be quite proficient with good knowledge of the situation. The approach or logic of intervention seems to be coherent. The entire WATHAB staffs meet were very open for discussion and demonstrate good will to address/satisfy ECHO comments and ECHO policy/tech guideline. To conclude, the meeting was pretty constructive and so far questions/comments have been answered properly in general. So proposal should be reviewed and in general in line with our policy and tech recommendation.

- NB: apparently a lot of misunderstanding came from the fact Geneva wrote the proposal and inputs from the field haven't been systematically taken into account or understood by fundraising unit.

ICRC funding orientations note:

The main tricky aspect in funding ICRC in WASH for the time being remains the capacity of access they are going to get. The local authority including security services at (El Fashier feedback) seems to have no problem with ICRC doing WASH in the rural area, but given the relevancy of this type of statement from this institution, only the practice of it will give us an idea of the level of access and the feasibility of their plan to be completed. For instance, since ICRC came back in El Fashier and resume activities meaning about 4 months ago, only 5 field trips have been managed by the WHATHAB team. So far, there is no plan to send expatriate/delegate on the field (they stay in Nyala and El Fashier and do remote monitoring), their local engineers seems to be quite proficient in their tasks. That's why, on my point of view reallocation of the funds should be considered from the beginning in case of no access restriction leading to difficulty to absorb the budget planned.

Given this level of risks and the fact that the reinstallation of ICRC in the country is recent, the best option should be to start with a limited budget (1MEUR maximum) to divide the funding in two portions, for instance 600

000EUR for 6 months, check the level of budget absorption (link with the level of access they will have) and then in accordance to release the remaining 400 000EUR.

Otherwise, given the type of ECHO funding going on in Darfur, the ICRC proposed intervention seems to be quite complementary, in a way that it gives us as well through our partners to be also present in the rural area from where sometime the idp's population benefitting of the ECHO investment come. It can ease when possible (event that it might not be very frequent) returns of population. As well, it could contribute to mitigate risk of additional displacement or influx in idp's camp due to problem on water access, and will give us as well an idea of the level of service and organization effective in rural area.

Furthermore, it is clear that access to supplies, spare apart and then maintenance of system has been indirectly affected by the conflict and this protracted situation.

5. CONCLUSION / Funding general strategic orientations

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 (ICRC) 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 improvement and training of operator. Intervention on urban water supply system should be avoided as much as possible. In extraordinary case, it could consider 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 could a huge 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). *Idp's camp:* 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 but population should be informed from the beginning that they will have to contribute and that this contribution will have to increase 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.	
Specific orientation Idp's camp	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 promoted to ensure sustainable operation and maintenance of the equipment 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 led to a decreasing of the partners involvement in the topics considered in the following project *(regarding training see ICRC method*). The ground water table has to be monitored regularly and recorded. The system of hydraulic equipment management and financial contribution 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 the equipment with the user still owner of the facilities and involve in pricing and a special treat for the most vulnerable people can be considered).	✓ Implementation, capacity building/technical assistance and monitoring of Water user committee with implementation of a sustainable and fair system of financial contribution collection ✓ Maintenance and upgrading (to improve system performance and to make the system more cost efficient 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 and hydraulic load of the equipment under 2000m4/hrs – by principle Solar could be accepted case by case ✓ Implementation of water resources management plan with inventory of the different type of resources available according the use of water (human, …, animal) ✓ Building of new facilities (borehole especially small water yard, retention and recharge dam) should be considered as last resort

SANITATION	***Orientations and principles***	***Activity***
Latrine	***Should be considered only in Idp's camp***. By principle users in camp 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). 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. 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 latrine holes have to be covered.	✓ Providing of slab, lining (if necessary) and technical assistance // subsidy for shelter of latrine facilities could be considered if justified by special situation ✓ Monitoring and correction of default ✓ Solidarity mechanism as to be promoted but special contribution for the construction of the latrine could be considered for certain category of vulnerable people
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	✓ Tools providing with technical assistance and community organization ✓ Cash for work (as it is not a regular activity…)
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

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 limited in time. By principle, hygiene promotion has to be dynamic, creative and adapted. Mass communication and use of adapted/tested posters are fostered as well as focus group discussion. Instead of implementation of a comprehensive package, hygiene promotion should be targeted on issue noticed.	✓ 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 ✓ Mass communication or event ✓ Focus group ✓ Door by door in certain case