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

RAPPORT DE MISSION

Subject: **South Sudan WASH RSO Mission (WASH in camp in Bentiu)**
Auteur: **Jerome BURLOT (WASH Adviser/RSO Nairobi)**
Date: **Du 12 au 17 January 2015**

Main partners and visited sites list:

Bentiu:

- UNICEF: Ainga (HoSO), Chris (WASH Specialist)
- IOM: Rainer Gonzalez (WASH Specialist – Drainage temporary assignment), Vincenzo (WASH Specialist Water supply/latrine), Maria (WASH Specialist Hygiene Promotion)
- CONCERN: Subut (Sub WASH Cluster lead)

Juba:

- IOM: Antonio Ortiz (WASH Coordinator)

Specific attended meeting list:

- WASH cluster meeting in Bentiu, led by CONCERN WASH Specialist Subut
- Meeting in Juba with the WASH Coordinator from IOM

Appendices list:

- 1: Preliminary design of the drainage system of Bentiu POC's
- 2: Topographic and implementation map of Bentiu POC's
- 3: UNICEF topographic survey report
- 4: Drainage project lay out
- 5: Cross section

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1. EXECUTIVE SUMMARY

The mission focuses on Bentiu POC's WASH situation in Unity State. The field visit in Bentiu took place from the 14th to the 16th of January with Jose Benavente South Sudan TA.

The main purposes of the mission were:

- General monitoring of the WASH situation in Bentiu 3 months after the major flood which damaged numerous structure of the POC's, premises and jeopardized the public health.
- Follow up the POC's drainage project lead by IOM (and co-funded by ECHO) to prevent further flood occurrence

The main partners interviewed were: IOM, UNICEF, Cluster lead (Concern), plus the drilling contractor.

The mission occurs 3 months after the acute emergency generate by the floods. This period should start to develop strategy to improve the sustainability and cost efficiency of the action led and improve the overall living conditions of the POC's. The interviews and observations force to state that a lot of improvements have to be made in Bentiu.
Whether the water supply starts to be more or less acceptable (we can note that for most of the drilling the partners came back to generator for pumping instead of Solar direct pumping for question of performance), the general sanitary condition of the POC's is an area quite of concern. Most of the latrine and bathing facilities are not up to the standard but furthermore they are in very bad hygienic conditions with a lot of missing materials (plastic sheeting, door, …).
One of the main problems noticed within the population occupying the POC's is the lack of ownership from the communities with many problem of looting materials and equipment from the facilities. This issue undermines part of the attempt to improve the situation. Apparently, open defecation have been slightly reduced despite of it is easily noticeable when walking about within the POC's area (according the partners the influx of people from remote rural area practicing only open defecation enhanced the problem).

The level of contribution of the POC's population in any activities (speaking about real contribution without incentive payment) is close to zero and no strategy or reflection has been developed to improve this situation. Only UNICEF is trying to take it into account.
However, the level of the partners on ground (UNICEF, IOM, cluster) is quite acceptable despite of most of the staff are new. We expect improvement in the following month.
It has been agreed that POC's area will be extend to increase the hosting capacity and decongestion the POC's. When the extension will be effective (In the next three months depend on drainage project progress) many of the current problem will be mitigated. The creation of a new area should be an entry point to try to change the way to involve and work with communities.

In spite of in most of the proposal from our partners planned implementation of IEC/awareness materials such as posters, none can be observed on the field. The hygiene promotion is pretty static and standard with very little relevancy (apart the cleaning of jerricane), nevertheless the recently arrive new Hygiene promotion specialist from IOM seems to be pretty dynamic and committed. She start to

develop and adapt some tools to the context and to build proximity between the hygiene promoter and the communities per sector.

The public health situation during the visit was not alarming. The partners must get ready for the rainy season which might come with many issues to handle.

The drainage project is very challenging and whether IOM seems to have relevant staff on ground, given the last IOM monitoring, the project progress should be monitored very regularly to prevent major delay or others problem of completion.
During the visit we notice that already some delay have been taken and some can be foresee at short term, mainly (with a risk according the delay to have to postpone the work completion to the next dry season with high additional unplanned cost):

- Delay in machineries deliveries (problem of road access which will be even more problematic when the rainy season will start)
- Delay in design: the drainage system of the extension had to be designed
- Delay in moving people from place to another (as very few information so far have been delivered to the population about this project and the extension of the camp)

Certain aspect of the project seems also to be still confused:

- Contribution of the communities for the implementation of the tertiary drainage (drainage around the shelters)
- Involvement of the design consulting firm
- Sustainability of the system (the pump station which will be implemented will have very high running cost (only for fuel estimate at over 200 000 euros per year, plus maintenance of very specific equipment, etc…

Those aspects will have to be followed up frequently with a lot of rigor.

Another problem has been raised during the visit. This problem is related to the pulling factor generate by the level of service within the POC's compares to the original place of the Idp's, and thus the needs to think about some way to balance the service provision in certain case when it is feasible.

2. BACKGROUND TO THE EVENT

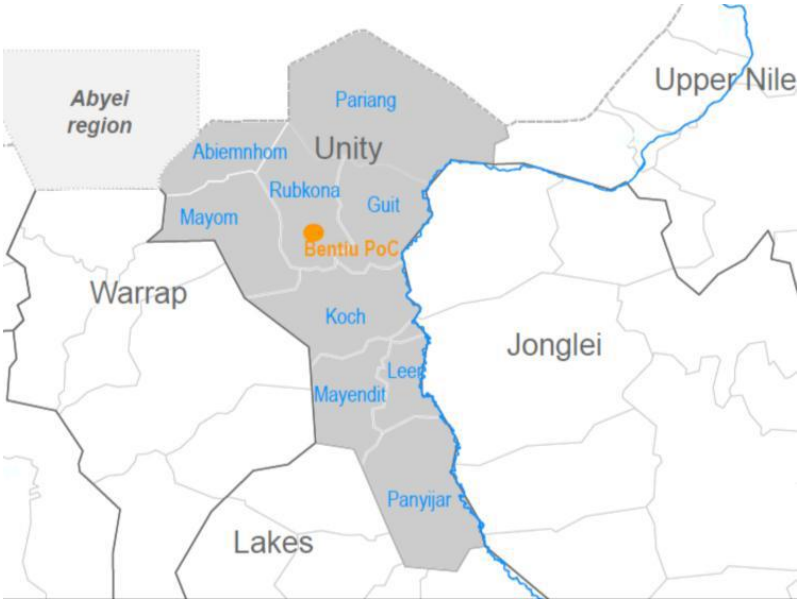
2.1. General situation of Unity State

A year after the conflict began the situation in most parts of Unity State remains dire, marked by brutal armed conflict and human rights violations. Most of the population has been displaced from their homes and forced to shelter in overcrowded and makeshift camps. The conflict has taken an especially heavy toll on children, with insecurity limiting humanitarian access to the most vulnerable.
Fighting destroyed health, nutrition and WASH facilities, with the provision of basic services totally interrupted in many parts of the state. Levels of malnutrition have increased while access to nutrition treatment has been constrained. There are also increasing risks from mines and explosive remnants of war. Children, even those living in areas not witnessing active conflict, are experiencing high levels of psychological distress. Many have resorted to negative coping mechanisms such as forced marriage and child labour. Girls and women face increasing levels of sexual violence while many boys have been recruited and are being used by armed forces and groups.

2.2. General Bentiu POC situation

The IDP population sheltering in the Protection of Civilian (PoC) site in the UNMISS base in Bentiu, Unity State has increased from 4,464 IDPs in March 2014 to over 43,000 IDPs in December according to the IOM biometric survey. Sixty-three per cent of those registered were under 18 while 25 per cent were under 5. Most of the newly arrived populations are from Koch, Leer and Guit Counties, as well as from others payams in Rubkona (Nhialdiu and Jazeera) fleeing violence as well as severe food insecurity.

Bentiu PoC was extensively flooded in July-August 2014 and then again in October. The flooding greatly deteriorated living conditions; collapsed latrines; and increased the spread of disease. Flood waters forced many temporary learning spaces and child friendly spaces to close, further disrupting the lives of children. Those floods had with very serious consequence on the population situation and brought chaos within the settlement. The collapsing of latrine and filling of pit brought the rate of people per latrine to over 121 persons, many shelter was destroyed, some water point not accessible or not functional anymore, etc… wit very serious concern about the public health. The fact that not major outbreak happened can be partially considered as an evidence of appropriate reaction of the partners on ground. The fact is that, the flood implies another emergency intervention that needs 3 months after the last flood to fine tune and improve quality and sustainability of the action led.



The POC is planned to be extended to double the Idp's hosting surface by 2015, aiming to decrease the crowdedness of the POC.

Bentiu POC has been under fire in August 2014, when Nuer forces took over the town for a while and government took it back.

In May/June 2014, there were on average 12 child deaths per week. The combined efforts of the humanitarian community in Bentiu have resulted in a sharp decrease in child mortality in Bentiu PoC. However, while child mortality is now below the emergency threshold, children continue to be threatened by disease, including the recent outbreak of circulating vaccine-derived poliovirus.

A general MUAC screening conducted on 18 December in the PoC showed 3.5 per cent of children under 5 suffering from severe acute malnutrition (SAM) and 15.3 per cent from moderate acute malnutrition (MAM). Late presentation of malnourished children as well as the cycle of infection/malnutrition remains aggravating factors.

2.2.1. Profile of the population:

The populations of the Bentiu POC are Nuer whom mainly flew from Bentiu and Rupkona (small town next to Bentiu) town when the clash between government and big part of the Nuer population reached Unity state. Afterwards the conflict have spread to the surrounding area and as consequence brought more rural population in the POC with different habits and practices.
Within the 6 POC's of Bentiu, one is security wise remote from the rest of the population as the people of POC 1 are Nuer (about 6000 pp) supporting the current Dinka government. Whether the relationship with others communities of the POC more or less acceptable, tension can occurs at any moment and that's why UNMISS decided to keep a buffer area between this POC and the others ones. ***The population in last November (2014) was about 33 000 persons after bio registration, and the target capacity after extension of the POC will be 44 000 persons.***

2.2.2. Accessibility and security:

Access to the areas outside of the PoC is very challenging due to unavailability of flights from Bentiu to other areas of the state; road access is also very difficult, and can be impossible during the rainy season. The latter particularly limits the heavy equipment required for WASH infrastructure and drainage. Inaccessibility, combined with a lack of communications infrastructure, also limits coordination with partners.
The main supplies road is coming from Juba through Wau. Some portion of the road between Wau and Bentiu are under the control of non-governmental troops (SPAL IO), which make the road a strategic military objective

and then make it sensitive a topic. This sensitivity is especially effective, when it comes to rehabilitation of the road to ensure humanitarian access for supplies and machine (drainage project).

During our visit in Bentiu, it seems that non-governmental forces are located around Bentiu and get closer few decades of kilometer. Apparently, according local sources (security specialist from UNMISS and IOM…), the non-governmental forces get some heavy military weapons as exchanges of mortar shooting have been noticed. It seems that in the city of Bentiu, there is presence of militias/mercenaries from Sudan.
Bentiu remains a tricky security wise location; last monitoring visit planned in august 2014 had to be cancel because of the attack of the town. The point is that the non-governmental forces found out that taking over Bentiu from government forces is not relevant as they cannot defend it, that's why it seems that now they focus on economical routes and area to affect the income of the government in place.

At time of our visit, IOM was told that the road to Wau have been rehabilitated by the non-governmental forces (but no confirmation), as it impact the delivery of the machineries require to complete the drainage project.

2.2.3. Bentiu survey:

The total area of the Bentiu POC and surrounding areas surveyed in about 6 km2. The area of PoC Bentiu is located in the swampy catchment area of the Rubkona River with some part of the PoC located in a seasonal river bed. At the moment, drainage work is being carried out to evacuate the water about 2.5km from Bentiu POCs to the nearest seasonal river bed as temporary measure to minimize the damage of the flood in the area. This is being done using drainage channels and plumbing of water from the POCs to these channels.

The flood could create other water-related health problems in the camp where mortality rates are already high and the IDPs vulnerable. At this moment evacuation of the flood water from the camp is the only solution to improve the living situation of the affected IDPs from the submerged area. However to prevent any further repetition in the next rainy season and to develop a better drainage systems for the longer term period, a good

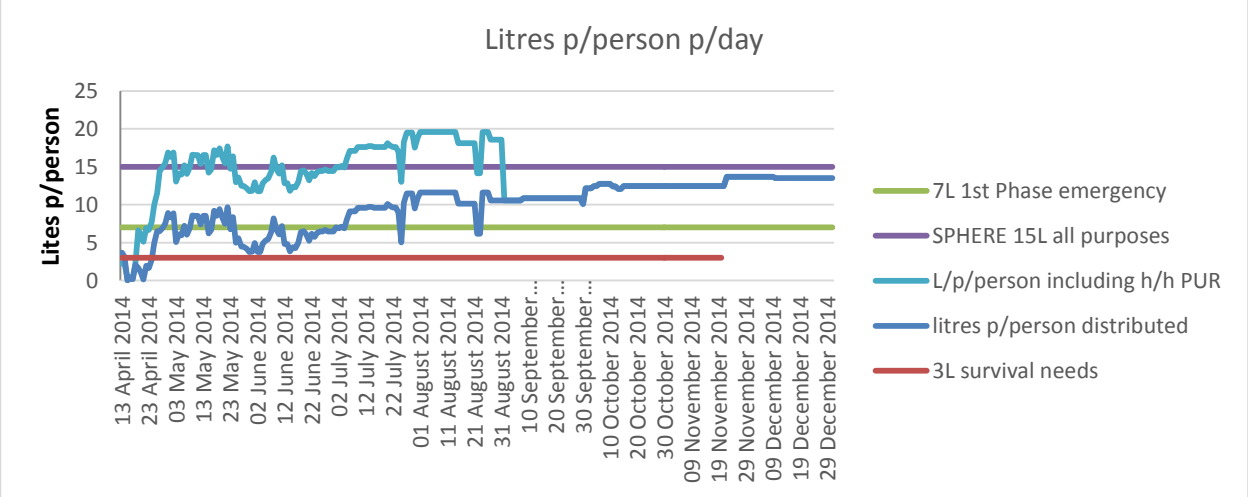
contour map and topographical map is needed to create better understanding of the whole area in the POC and surrounding area, so that the water from the POC Bentiu can be evacuated naturally through the advantage of natural gradient. Therefore this topographic survey is being done as the first step for preparing a detailed surface water management and site plan.

2.3. General WASH situation in POC's:

2.3.1. Water supply:

The water supply of the population is mainly made by bladders and taps ramp supplies by groundwater pump in several boreholes (some equipped with solar panel and generator and some only with generator) catching water in the second confined multi thin layer aquifer. MSF has set up in addition a SWAT system on a temporally stream to supply mass water to the hospital.

The following graph shows that during the rainy season PUR have been distributed to the population as the access to water was limited and the presence of small retention pond with dirty water encourage people to fetch water from this type of resources.
Currently, the average quantity of water per person is about 13,6L/pp/day according the POC. The POCs disposed of a total of 10 water point and about 18 to 24 taps per POC, meaning about 260 persons per taps and the average fetching time at water point of almost 3 minutes for 20L. The water point are open between 7-11h and then from 17-20h. Each water point is normally managed by a care attendant with different level of efficiency.

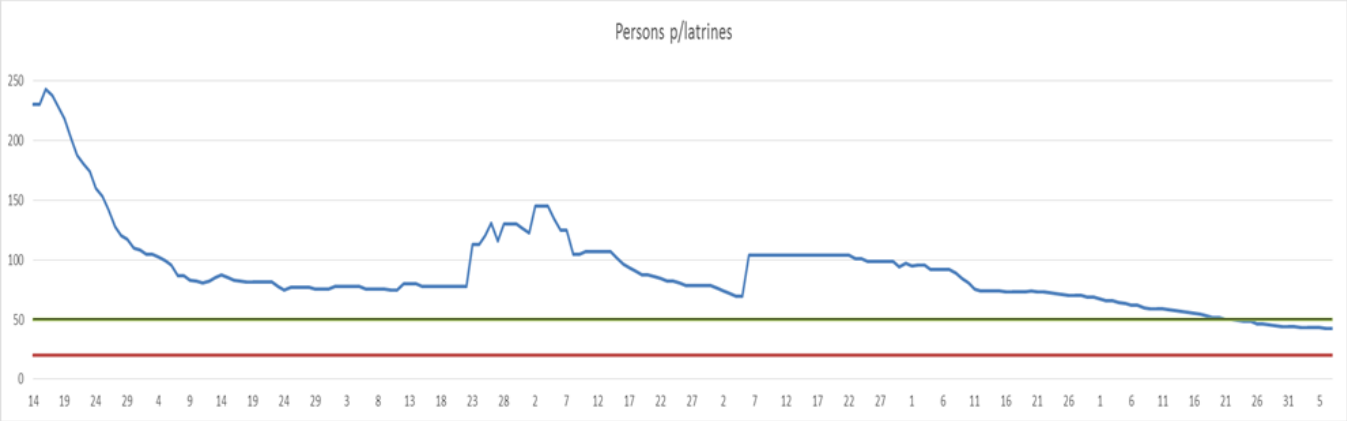


2.3.2. Sanitation:

The latrine are mainly ***very basic emergency latrine built with magic slab*** (equipped with a foot cap fixed to the plastic slab, good point), ***plastic sheeting and wood frame but without vents pipe***. The latrine blocks are usually composed of 4 stances with an average depth of pit at 2,7m. The ***last floods*** faced by the POC population have ***led to the collapsing of many of the latrine structure plus the need of deslduging after water intrusion in the pit.***

The partners on site are trying to improve the latrine access situation but the original habits of the people, especially the ones coming from rural area, make them (especially the men) reluctant to use latrine and when they use it, they don't use it properly meanings that they make it dirty, child do no poop in the opening of the slab but aside, the cap is not closed after using, ***a lot of materials have been looted.***
IOM latrine should be clean 3 times per week, although the ***latrines are usually pretty dirty with cap open. Even in emergency, numerous latrines and bathing unit built by the partners have been implemented with very low quality level to don't say improperly*** (with much less consequence for the bathing unit). We can note that MSF built what is called child latrine in much smaller size than the others ones (meaning less material as well). In spite of it, the open defecation remains very high and easily noticeable within the POC.

The following graph (*period from June 2014 to January the 5th 2015*) seems to show ***two peaks which can be consequence of the two floods*** which destruction of numerous latrines and thus increasing of the access rate to latrine for the POC population, although the first date does not seems to match the dates of the first flood.



The solid waste situation has to be improved; plastic bag has been used so far and dropped in drums by the HH and then dropped on an open space waiting for a truck to collect it and disposed the garbage bags into a dump site few kilometers from the site. ***About 15m3/day of solid waste is disposed. Irregular wild burning of the solid waste occurs at the site.***

The sludge disposal is also quite tricky, IOM is in charge. Actually because of problem of accessibility and lack of equipment the desludging team is pumping the sludge in the pit to a 200L plastic drums which is afterward carry by a tractor equipped with a trailer to the disposal site. ***Basically so far the sludge is just dropped further from the POC location at one or two kilometers in an open pond***. In POC 4***, the need of deslduging has been increased during the last three months which could be a sign of more people using latrine and thus some effectiveness of the hygiene promotion***. However, ***in many others locations the pit filling demonstrate low use of latrine***. The main use of latrine are nearby the market and in the densest location, the less use seems to be at the edge of the POC near by the facilities and near the drainage channel. In the location where latrines are quite use the desludging period is about 45 days.

The drainage was one of the main if not the main issue following impact of the floods occurred within the POC. ***The POC can be considered as a bucket, surrounding by big embankment and with silty undersized drains.*** That's why the project to handle this problem rely on implementation of big drainage channel network, existing ponds or excavation to be used as buffer storage capacity and two huge pump stations to drive the overflow from the POC location into a natural outlet running down until the river. (*See next part about this topic*).
The project is implemented by IOM with multi donors funds. ECHO being among the main one and according a design made by Grontmij B.V. a Dutch consulting firm funded by the Dutch government.

2.3.3. Hygiene promotion:

The hygiene promotion is pretty standard and has been improved with the arrival of a specialist from IOM. ***The level of efficiency is pretty hard to notice***. Apparently, after this specialist try to develop a more consistent, inter active and better adapted approach the open defecation have slightly reduced.
One of the main problems of the camp is the total lack of ownership from the communities, the lack of care and use of latrines (with OD consequence) and the regular looting of the equipment by the population. Hand washing are present but not systematically filled with water and with soap (partners put very little of soap every day to avoid stealing).
The hygiene promotion starts as well with relevant jerricane cleaning campaign at water point and does distribution of soap
Open defecation and lack of hand washing with soap seems to be ones of the main hygienic breaches.
A team of sprayer is also moving around in the camp to spray chlorine solution on stool.

3. MAIN ISSUE DISCUSSED:

3.1. Water supply:

During the mission, ***the problem of quality work and proficiency of the drilling contractor have been raised***. Actually few problems have been notice like:

- ✓ Fine sand pumping in one of the borehole
- ✓ Improper functioning of pump (POC3) (assumption: could have been damaged by pumping of particles)
- ✓ Under sizing of the solar direct pumping system (solar sizing should be fix based on the current water demands and generator could give additional contingency capacity by increasing the pump rate but especially by pumping at night if storage capacity enable it…) which struggle to barely match the demand

This could be a sign of:

- ✓ borehole structure problem (casing and screen implementation, not adapted sealing of the intra annular space between casing and ground and between casing tube…)

- ✓ improper drilling development (under estimate development…), but not applicable to this case as after sometime the sand pumping should stop which is not the case…
- ✓ inappropriate installation and positioning of the borehole equipment (level of installation of the pump or the screen; for instance start of the pump will generate hydraulic turbulence and if the pump is installed at the same level of screen it will impact the surrounded underground environment…; wrong sizing of the screen opening compares and the gravel pack or absence of gravel pack…)
- ✓ irrelevant pump test (which could have as consequence over pumping in the borehole, …)
- ✓ improper design of the solar direct pumping equipment (under estimate); actually in a table the contractor or UNICEF is mentioning that the solar pumping equipment have be selected by Davis and Shirtliff but most the pump installed are not the ones recommended by this famous provider (see below).

The consequence can be:

- ✓ Impossibility to use the borehole pumping sand
- ✓ If still in use, with decantation of the sand, it could affect the structure of the ground and then the borehole structure itself
- ✓ For the solar system: it disable to match the demands of the people without generator resort

In one of the document provided by UNICEF (here below), it was mentioned that Davis and Shirtliff (famous pump provider) advice about the type of pump to implement in the first 3 drilling despite that the following document demonstrate that for two on three the recommendation from this provider haven't been followed.

BH NO.	LOCATION	TESTED YIELD (m^3/hr)	CURRENT PUMPING RATE (m^3/hr)	TYPE OF PUMP INSTALLED	RECOMMENDATION FROM DAVIS & SHIRTLIFF	REMARK
1	POC 3	6.2	5	SQ 5-70	SQ5-70	At the completion of the 1st 3 bhs, data was provided to Davis & Shirtliff which is a reputable international firm specialized in borehole pumps to indicate suitable pumps and gen sets.
2	POC 2	4	3.6	SQF 2.5-2	SQ 3-65	
3	POC 1	12	5	SQ 5-70	SP 8A-15	
4	POC 5	5	3.6	SQF 2.5-2		
5	MSF CLINIC	9	4.3	SQF 3A-10		
6	POC 4	8	3.6	SQF 2.5-2		
		44.2	**25.1**			

Source: UNICEF documentation

The point is that there is not enough reliable and accurate data to understand the problem. Although, the partners dealing with water like UNICEF and IOM are monitoring the groundwater table level with installed dip meter. However, only for the MSF and UNMISS borehole record about pump test completion are presented, even the recharge time is not clearly and systematically mentioned in the report.

Actually ***within the documentation provided it was not possible to find a proper pump test report*** with dropping and recharge time according different pump rate and level of the pump. ***The level of reliability and relevancy of some of the technical document provided can be put in question***. For instance, the lithological profile provided by the contractor which seems clearly to have been done only based on inaccurate observation of the cutting but without any laboratory analyze (which should be specified in the contract ToR). The technical specification in the contract were very basic and not enough accurate and comprehensive, when most of it should be pretty standard to any drilling operation, same for the borehole design chart (as mentioned in the contract as well).
This could be understandable in an acute emergency operation but in anyway it will have to be improved a lot.

In addition, the water quality testing report provide by the contractor for instance of POC1 borehole were mentioning:

- ✓ a conductivity about 1500mS (south Sudanese standard limit at 1500mS??) when all the test perform by MCI show a conductivity of more than 2000 mS with some above 1800 mS,
- ✓ same for the pH which is mentioned at 8,4 (South Sudanese standard limit 6,5-8,5) by the contractor report (very rare for groundwater), when the result from MCI show pH between 6-6,5 (more coherent with the resources and the context),
- ✓ and same at different level for the TDS with at 777 mg/L (south sudanese standard max. 1000 mg/L), when most of the test performed by MCI mention value around 1200 mg/L

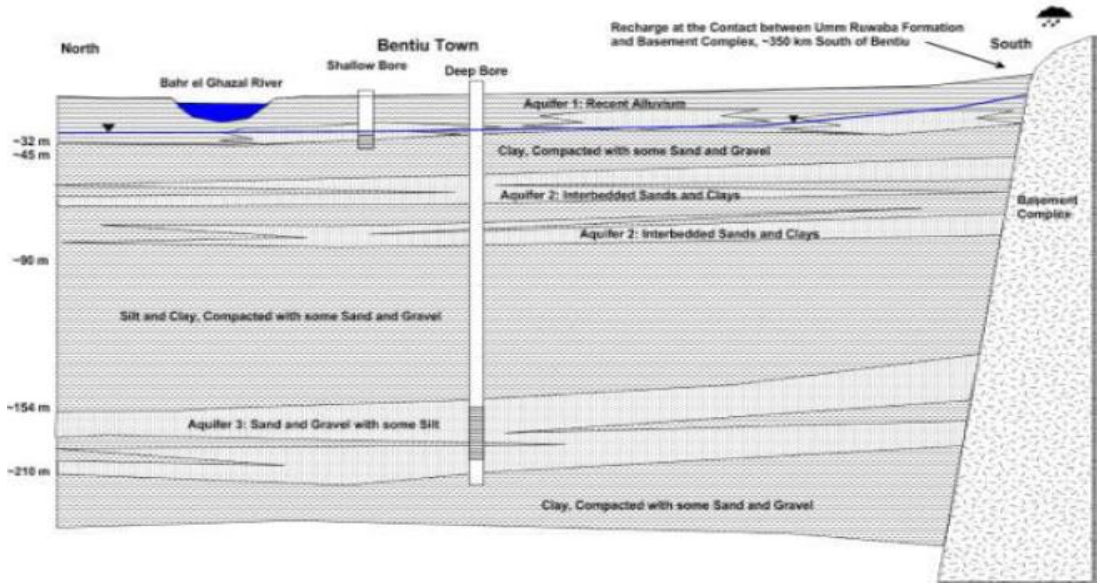
The result from MCI about mentioned parameters seems to be much more coherent with the resources and thus more reliable. The water quality of the groundwater cannot vary that much from one test to another on those types of parameters. ***We can be wandering about the potential falsification*** (by contractor in touch with the laboratory) ***of the results*** to ensure the water quality to match the drinkable standard of South Sudan.

It was difficult to communicate with the contractor who can barely speak English. The point is that no clear, proper, reliable and comprehensive documentation or explanation have been provided to us, neither from UNICEF (whom sent a big bench of document with anything in it: email exchange, empty template, relevant document, …) or by the contractor.

For all the reasons and the points describe up there, we can be suspicious about the quality level of work made the contractor as well as his proficiency or professionalism. The point is that it is the only contractor available in the area and that it is tricky to find a new one to bring. In this case and knowing the points rose up upthere, ***the contractor should be supervised consistently on daily bases and contract technical specification should be clear and comprehensive***. As well, the partners have to ensure to have those documents and be able to find it easily. Apparently most of the documents were not present on site where it is the most useful.

The current water supply set up is mainly based on an emergency configuration which will need to fine tune consistently in the following months. Contingency measure to protect borehole from potential water intrusion in case of flood should also be developed. The 8 boreholes (including UNMISS, MSF and the new borehole of POC 6 made by MCI) are catching water from what seems to be the second aquifer. ***The water is a bit salty*** (by taste and in most of the water test made by MCI the groundwater is above 2000mS (when

contractor found about 1550 mS??, limit of South Sudan for drinkable water) ***and former hydrogeological studies*** (Scheme down there; *source: SMEC International 2012*) ***seems to identify more fresh ground water aquifer under the one exploit but much deeper (about 200m deep). UNICEF has in plan to build a deep drilling to investigate and use this more suitable aquifer.***

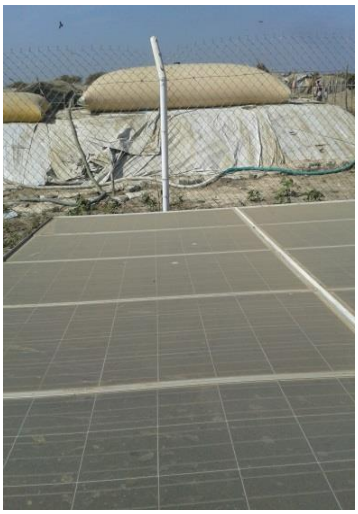


We have to note as well that for a question of performance (performance dropped from 4,8 m3/h on one borehole to 3m3/h with solar panel) and occasionally stealing of equipment, ***in some of the boreholes the solar direct pumping system have been abandoned to go back to generator energy supply of the pump.***

<u>During the visit, we notice that:</u>

- some of ***the solar panel has been stolen***,
- that ***the partners did not know the type of solar panel technology they are using*** (and purchase) and
- Especially that ***most of the solar panel were very dirty***.

Despite, the cleanness of the solar panel is crucial to ensure appropriate performance of the system but also to avoid electrical circuit burning and thus need of replacement of expensive solar array. One of the new IOM WASH specialist is an hydrogeologist and on one borehole he ask to clean the panel and they notice improvement by filling the 20m3 bladder in 4 hours instead of over 5 hours before.



Furthermore ***the generator implemented in some location are totally oversized which impact a lot the fuel consumption*** (in a place it is difficult and costly to get it). For instance in POC 4 for a pump which could work with 5kVA, the generator is 14,5kVA and in the POC 5 is 16Kva.

The water points are managed by care attendant paid by partners with different level of efficiency. For instance, in POC 1 the care attendant was pretty good and the access to the water point fairly organize when in some

others place it was a bit more chaotic.
The few residual chlorine checked were positive, but the bladder in which water is stored are directly under the sun and the temperature of water as mentioned by the regular water test (temperature, TDC, Conductivity, coliforms, turbidity and residual chlorine) made by MCI showed ***water temperature pretty high around 30 degrees which will accelerate the consumption of chlorine. Otherwise, the parameters selected for the regular test are quite ok and relevant.***

3.2. Sanitation:

3.2.1. Latrine and bathing unit:

Even whether the situation have been slightly improved about open defecation (according the partners), still it is a pretty high concern. The situation seems to be worse than in most of the site visited in South Sudan, as it was highly noticeable within the dense area, but especially at the edge of the different settlement. In addition, many of the latrine blocks (most of it having 4 stances) seems to be not regularly used (level of pit filling compares to last desludging…). Numerous of the visited structures were in very bad shape with many missing part of the facilities: plastic sheeting, doors…

3 main problems which can explain partly the lack of use of those facilities:

- ✓ Original habits of the people
- ✓ Bad shape or non-functionality of the equipment (pit fill up, no privacy, smell and flies…) enhanced by stealing of materials from the communities
- ✓ Lack of ownership and appropriate awareness

During our visit we notice, especially on part of POC 4, POC 5 and 6 (normally CARE was in charge) ***numerous abandoned unfinished or damaged latrine, pit or bathing unit structures*** which constitute:

- ➢ A high source of contamination jeopardizing the public health situation
- ➢ A physical risk of injuries for the camp population and child in particular

The fact is that the quality of the latrine facilities achievement is pretty low in Bentiu. ***The completion is not up to the standard*** (backfill of the pit, doors missing, cap open, plastic sheeting ripped,…) until a certain level the work completion can have been ***compromised by the recent flood***

3 months ago and especially by the ***numerous looting*** of the facilities materials by the POC populations. However, the quality level of the work was expected to be higher. ***3 months after*** the last emergency (flood), ***it is time for the partners to work on a drastic improvement on regard to this aspect.***

The problem is that this aspect is also related to the lack of ownership of the population and the original practice. Whether you compares with others site like Malakal or Mingkaman where the original practice of OD for the POC population is pretty similar, the quality of facilities is higher.

The latrines does not have vents pipe but the partners plan to include the vents pipe in the design of the new latrine.

UNICEF is trying to address this issue by getting people organize to share and care about one facilities with smaller latrine block, and they plan in the future to work on HH latrine build with real contribution from beneficiaries.

IOM is trying to address this issue more through hygiene promotion.

Most of the latrine gets a noticeable segregation sign for male and women, and the partners built as well small ***latrine for children***, start by MSF. The point is that those latrines need less materials to be built and then are most cost efficient, however it seems that ***the child like it that much that many of them spend their time at the location of it, playing with the facilities which is unfortunately not desirabl***e.

3.2.2. Solid waste and sludge disposal:

The solid waste disposal is organized using plastic bags at HH level. The plastic bags are carrying from HH location to one central spot by the community workers getting incentive payment and then the community workers load a collection truck and offloaded at disposal site. The system have to be clearly improve in terms of efficiency as still in many spot within the POC's solid waste spread around are noticeable and in terms of community contribution. The collection of garbage up to the central spots should be made by HH without any incentive payment. ***At the disposal site, the management has to be improved with clear guideline apply consistently*** (stabilization of the waste by incineration and burying in safe place.

The desludging is performed by IOM***, the equipment of protection of the workers seems to be correct***, as the way it is organized. The capacity is limited and will even more limited whether the percentage of population using latrine increase. After the extension of POC, the space will be available to ensure accessibility for deslduging truck to operate directly next to the facilities. To date, IOM is using desludging pump to fill 200L

plastic drums which have to be rolled on the gateway until the tractor equipped with trailer can access to transport the drums to the disposal site.

The disposal site, located at a bit more than one kilometer is wild and consists only of a raw huge pit/pond. Attempt to decrease the pollution load from the sludge should be implemented at some point based on phyto remediation (even without very accurate design).

3.2.3. Drainage:

As previously mention Bentiu had two faces two majors flood last year (2014) which drastically affect the living area of the POC's and the sanitary situation. With regards to this serious issues, IOM with the support of UNICEF and the Nederland Government start to develop a project to address this problem. The technical preliminary studies and design have been made by a Dutch Consulting Company, Grontmij B.V.. UNICEF fund the topographic survey of the site which has been used for the design. The topographic survey report provide by UNICEF is quite poor in analyze and conclusion regarding the potential of complete gravity system.
Up grading of the ground level was not feasible as well, because the materials to do such should come from far and the volume of materials needed imply an unrealistic number of trucks within the context.

The drainage system planned proposes to build a network of drain connected to buffer storage basin and two huge pump stations. The assumption of the design is that there is no at all potential for complete gravity system and that's why appropriate pump station have to implemented to dispose water in a natural outlet. The topographic data provide does enable appropriate assessment of the gravity potential which in such context should be very accurate.

To date, we assume that it the pump station were compulsory. The design of the drainage channel network has been performed by using old mathematic model but still relevant. The accuracy level of rainfall data did not enable accurate dimensioning of the pump station as the record provided were on monthly basis and not on daily basis. In addition, the calculation took into account a safety factor of 20%.

Initially, the Dutch company did a design only for the current POC's location, but since ht extension have been approved the extension area have to be included in the design and at time of the visit IOM were working on it. The work implies a huge volume of excavation and various others earth work. The drainage channel network will be constituted by three different level of drainage ditch:

- Tertiary drainage around the shelter
- Secondary drainage between the shelter to the main drainage system
- The primary drainage system constitute of huge channel of with the widest part at 8m. The drains shape will be triangle to enable running down at small and bog flow. The slop of the channel bank have been calculated to mitigate the erosion risk (in site test have been performed).
- To give a buffer capacity to the system (as the peak flow is calculate on monthly basis and not daily), existing pond, excavation will be promoted as buffer storage or storm basin.
- The extension area will be surrounded by an embankment of about 3m high and 4m wide
- The two pump station will discharge water into two natural outlet connected to the Nile river. The total pumping capacity will be about 1200m3/h. The pumps have been already purchased by IOM with CHF fund.

During the work completion certain aspects shall be supervised with a particular attention/caution, notably:

- The stability of the drainage channel bank
- The appropriateness of the channel slop
- The appropriateness of the channel shape (cross cutting profile) to ensure running down of water even when the discharge is small
- The implementation and installation of the pump station (and protection of the equipment)
- The protection of the POC's population as heavy machineries will move around on the site

IOM have already completed the contracting part of the work, to speed up the start of the work and despite the design for the extension area was not completed. ***About 128 various machineries*** (different size of excavator, grader, roller, dump truck, etc…) are expected on the site. ***The problem is the access to Bentiu for the machineries that can mainly ensure during the dry season*** which is not lasting long.
Apparently most of the machineries are in Wau which is not far from Bentiu, however ***there is few spot on the road which should be upgraded to enable the passage of the engine.***
The problem is that along the road are located non-governmental forces and the governmental forces are reluctant to let IOM rehabilitated the road to avoid to ease access to Bentiu to the non-governmental forces. ***During our visit, UMISS was also reluctant to escort IOM for security reasons*** (menace have been made).

The fact is that the road problem might generate delay and even potentially major delay in the work completion. ***Whether most of the machineries cannot be delivered in Bentiu before the start of the rainy season, it could postpone the work to the next dry season.***
It has been requested during the visit from IOM to provide us a risk analyzes with related contingency measures according the different assumption of delays, etc…

Some concerns, issues and problem have been noticed during the visit regarding this project:

- The ***main concern*** is the ***respect of the tight timeline for a challenging work***, especially has already some delay can be noticed and foresee:
    - Delivery of machineries
    - Design of the extension area
    - Deliveries of the machineries
- The movement of the different settlement of the POC's to the extension area has to be planned in advanced and population informed as early as possible to avoid chaos within the premises
- The ***crucial involvement of the consulting company*** at major stage of the work completion is not clear today
- As in Bentiu, the ownership is a real issue; it was plan at some stage that the ***POC's population*** will have ***to do by themselves*** with support from IOM in terms of technical assistance and tools providing, the ***tertiary drainage*** meaning the one around their shelter which is pretty relevant and feasible. To date, it seems that this contribution is not clearly acknowledge by the various actors
- Given the level of the local contractor usually notice in South Sudan, the ***work completion have to supervise regularly and with high level of rigor***

- ***The running cost of the pump station*** is going to be pretty high; ***Only in terms of fuel*** the fees have been estimated at more than ***200 000 euros per year***. The sustainability of such system can be put in question according its lifespan, actually according the assumption of the time that POC's will remains…

3.3. Hygiene promotion:

In terms of hygiene promotion, we mainly try to discuss about resistance on using latrine and the problem of looting materials and equipment of the facilities which could be a sign of lack of ownership among others issues. Within the POC's there is not all awareness posters neither at water point, latrine blocks and bathing units, public place…only few standard posters implemented in a random manner with only cholera message mainly in writing. Most of the hygiene promotion consists on focus group discussion (mainly with child), mass message diffusion with megaphone (very repetitive and little efficiency). ***The hygiene promotion is pretty static, standard with holistic targeting.*** The messages are mainly based on public health concept. The leaders do not demonstrate interest for it.
However, the recently arrived IOM HP specialist organized her team to have Hygiene Promoter dedicate to a specific area to get more familiar from the environment and the people. Relevant jerrican cleaning campaign session at water point are also happening, presence of led on the jerricane is also address during those sessions but few jerricane can be notice with it.
The same specialist is developing a tools box for hygiene promotion with adapted and tested activities and materials. ***The IOM specialist is very committed to her work and seems to be very dynamic and innovative as well. So, we expect the level of HP to improve in the next month.***

One evidence of awareness problem is the fact that even community workers in charge to clean the latrine, left the cap open after cleaning, meaning they don't understand the purpose of the latrine or at least haven't been brief properly about their task (hygiene promotion start by the staff in charge of hygienic task).

Tips: last year Hygiene promotion had to address very specific issue when hepathitis E cases start to occurs in the POC's, as people were referring the cause of the disease to the use of yellow jerricane by analogy between the colors of the eyes (which gave Hepathitis) and the color of the jerricane.

3.4. Global level of performance estimation by partners:

3.4.1. IOM:

Globally, for the basic WASH in the POC's IOM seems to have put on ground relevant staff (but many new people). Despite the level of achievement and the situation remains quite tricky on site (especially regarding the open defection and use of latrine…), ***there is a dynamic of improvement on the ground.*** IOM have the most consistent team on ground, especially in the sector of WASH. ***However, given the technical breach noticed in Malakal as well as the investment and technical challenge of the drainage project, IOM should be monitored (not necessarily only on the field) substantially on regular basis, to be able to early identify major delay, problem or non-conformity***. ***The planning of completion should be follow up frequently***. The consultant in charge of the design of the drainage system should be on ground during at the main stage of the project. The sanitation part of the work remains the most challenging one for IOM.

3.4.2. UNICEF:

The UNICEF team is more limited that IOM and globally the level within the context can be considered as close to acceptable. The same statement as IOM can be made for UNICEF, the visit revealed ***numerous problem notably of supervision, contract management (technical aspect), technical guidelines*** (for instance: the minimum technical requirement for a borehole construction should be available on site***…); however logic of improvement seems to take place*** as well. ***UNICEF is trying to think in advanced***. Notably UNICEF shared concern about the balance of service provision to mitigate the pulling factor from the POC's. As well UNICEF is trying to develop different concept for latrine implementation to ensure appropriate use, improve the ownership by real contribution from the POC's population and thus care and maintenance. UNICEF is expecting also a new staff specialist in hydrogeology, the current only WASH Specialist on ground being civil engineer.

3.4.3. Cluster/Concern:

The cluster lead in Bentiu was close to departure at the time of visit, ***he seems to be pretty relevant technical wise and as well in terms of cluster meeting management.*** The person got quite acknowledges by WASH cluster attendants and get technical legitimacy to facilitate guideline production to the cluster members. The monitoring tools are relevant, but the visit of the site with the observation of many abandoned or unfinished latrines structure which should have been properly decommissioned, plus the condition of some others, demonstrate somehow ***a lack of presence on site*** which can be due to the fact that the person was leaving soon after long assignment. In addition, the cluster in Bentiu seems to be a bit weak and what is related to community contribution, ownership and sustainability strategy. Globally the level of performance seems to be one of best observed in South Sudan.

3.4.4. Miscellaneous:

The presence of the UNICEF representative in Bentiu during our visit enables us to have an interesting discussion about the pulling factors from the POC's and the need of balance in the service of provision with the resident place. Apparently, ***UNICEF is trying to develop some action in this direction***, which is pretty relevant. ***The level of services in most of the places from where POC's population comes from is much lower than in the POC's, especially of course in the rural area.***

The phenomenon of looting facilities by the POC's population must be seriously addressed as it bound many improvements in the sanitary living condition of the population. This issue is related as well to ownership and community contribution problem.

The last point will be the necessity to ensure safety and ***mitigation of various risk identify within the POC's*** such as:

- the risk of fire due to wild fire made within the dense part of habitat constitutes of reed or grass shelters and presence of wind
- the risk of injuries due to fall in non-protected excavation
- etc…

4. RECOMMENDATION (valuable for all the partners, only drainage is specific to IOM):

4.1. Miscellaneous recommendations/propositions:

Looting of materials and equipment:

- The looting of materials and equipment is a very serious issue and it is pretty tricky to address within the context. Trying to rise up the responsibilities of formal or informal leaders by involving them in safety of the equipment based on their legitimacy and credibility as acknowledged leaders of the population. The idea should be to play on the pride of the leaders to keep their face to rise up their involvement in safety (some equipment might be located near their living place if there is no bad impact on accessibility…). This is just a proposal to be assessed in terms of feasibility and in accordance test or not at pilot scale level with appropriate monitoring

Safety in camp:

- A risk assessment of the various risks present within the camp should be conducted and contingency measures hold for instance to address fire risks as notice in the camp (people burning some waste in a middle of the gateway between the shelters in grass or reed and with strong wind…)/ of course the flood problem have been consistently take into account by IOM and others partners

Balance of service provision:

- The partners should have an understanding or at least an estimation of the level of service provision in the original living place of the POC population to avoid too much pooling factor by rising up the level of service in the POC too high compares to it
- At some point action should be taken to start when possible and when security risk approximately managed, to start small quick impact action to improve the essential service provision in the original living place of displaced people…Strategy should be developed on this point, notably for Bentiu town as it could enable large portion of the POC population to return if security is ensured

4.2. Water supply

- All partners/operators in charge of management of water supply system using solar pumping must ensure cleanness of the solar arrays. Staff in charge have to be briefed and solar panel have to be cleaned regularly (daily bases given the dust present over there) with caution to avoid scratch on the module
- All solar panel have to be marked with indelible ink or with inlay to be able to recognize them in case of stealing (even if in the area solar panels are pretty rare, no local supply…)
- The generator use for pumping should be fine tune to ensure cost effectiveness of the fuel consumption (few generators were oversized which means higher fuel consumption, for instance 16,5kVA for a pump which requires at start maximum 5kVA)
- All project manager should move around the camp with a pool tester to ensure appropriate water quality monitoring by cross checking of information provided by the team in charge
- The contractor in charge of the drilling of borehole must provide all technical information require to properly managing the pumping without affecting the quality of the water and the stability of the drilling. In case of resort of solar system, the specifications of the contract should mentioned expected performance from the solar system to avoid big difference with fossil fuel pumping and then in the satisfaction of the water demands.
- Given the level of proficiency, quality and relevancy of document provided (log profile, pump test report, lithological cross section…) and the problem of sand pumping notice on one borehole in particular, the contractor should be supervised by the partners substantially on daily bases to ensure reliable record of the development of the drilling, the level of installation of the various equipment, the relevancy of the screen compares to the gravel pack, the appropriate sealing of inter annular space between casing and ground…
- The partners should start to work on a strategy to make water supply more sustainable in the camp
- Even the drainage is a tricky issue within the POC, the drainage of water point should be enhanced waiting for the drainage system to be built
- The borehole have to be protected from water intrusion in case of flood
- All technical documentation have to available on the field and well recorded
- The bladders have to be installed under shade by using appropriate shade materials
- Clear and comprehensive minimum technical requirement and specification should be part of the contract with drilling contractor. The partners must check and cross checked the reliability and relevancy of the information provided by the contractor.

4.3. Sanitation

Latrine:

- Given the situation of the latrine uses and care, and open defecation present within the POC, innovative solutions have to be tested at pilot level and eventually combined:
    - At the edge of the camp the open defecation is widely noticeable despite the presence of latrine around. In this case and given that the purpose of having latrine is to constitute a barrier on the routes of contamination, partners could test implementation of a defecation field well marked with wood gateway and a person providing spade to bury the stool at the entrance

  - Distribution of locked latrine per identified group of families sharing the maintenance
  - Trial to make volunteer/ motivate partners- beneficiaries contribute free to build HH latrine
  - The partners should aims to only provide equipment and product to clean the latrine but the population should be in charge of the maintenance
- Latrine in bad shape and filled up with various solid waste, open large hole/pit present within the POC must be decommissioned
- Latrine structure stability has to be ensured and in case of risk on one structure to be decommissioned or repaired
- The slab use for the latrine construction are equipped with a feet removable cap, and then awareness should take into account the closing of this cap
- No abandoned and unfinished structure/excavation can be left without appropriate protection
- Proper vents pipe (with insect proof grid on the opening) should be installed on the latrine
- Even whether it is nice that children like the child latrine, child should not spend their to play in such environment (presence of open defecation around the latrine…) as it could jeopardize their health
- Given the problem of desludging (linked with the wide presence of black cotton soil), three solutions could be tested according the lifespan assumption of the POC/camp and combined according the result of pilot test:
  - Short term: already mentioned defecation field when applicable (space…)
  - Short and mid-term: use of IMO in the latrine pit. IMO is an enzyme complex which boosts the bacteria strains growth and contributes to reduce nuisance and volume of the feces. It is normally cheap and easy to transport. It should enable in addition to reduction of smell and flies to reduce the resort to desludging from about 30%. The IMO need about 4 to 6 months to optimize their performance.
  - Long term duration: arborloo type of latrine (when space available and when HH latrine; the arborloo latrine consist on a superficial pit with a removable structure, once the pit is 2.3 filled up another pit is dug and the structure relocated, a plant or trees is plant in the former pit backfilled which will accelerate the mineralization of the feces and thus the pit could be used again after about 2 years to dig a new pit, then no need of desludging…). The point is to plan space enough to have for instance 4 pre identified locations…

Drainage:

- The drainage around the shelters (Tertiary drainage) should be achieved by the HH as a free contribution with special care of the most vulnerable,
- As the drainage system will have to be maintained properly after or before each rainy season because of silty deposit in the drainage to ensure appropriate running down and capacity, the communities have to be in charge of this regular work as a free contribution at least for tertiary and secondary drainage channel. The strategy of contribution in the O&M of the drainage channel network have to be built and communicate to the people, and way to get organize negotiated with appropriate representative of the people
- Planning of extension site data collection and “design” completion has to be produced as well
- A risk management plan have to be drawn by IOM regarding the completion of the main drainage system, taking into account the various potential cause of delay with impact on the work progress and the contingency plan in case identified risk are effective…

- Resort to buffer storing capacities have to be ensured in the design, working as storm basin in case of violent overflow
- The completion work by the contractor will have to be substantially supervised on daily bases by IOM
- Designing consultant should monitor especially the most critical stage of the work completion

Solid waste:

- The solid waste management has to be improved, appropriate containers (to avoid plastic bags left along the road, damage and spreading of the waste in the environment…) should be implemented to dispose garbage plastic bag by the community before transport and disposal in the dump site.
- Until the garbage truck the collection should be ensured by the population as free contribution.
- The dump site should enable safe and systematic incineration of the garbage to enable its stabilization and avoid nuisance, thus solid waste should be buried

4.4. Hygiene promotion

- The strategy should focus on informing/aware people rather than to as a priority aims behaviors changes and getting people organize to use properly and care about the existing water and sanitation equipment of the POC, and rise the ownership to tackle as well problem of looting the equipment materials. Behaviors changes should try to be addressed by implementation of participatory activities focusing on the already motivated portion of the population rather than to try to apply this type of approach on the whole population regardless of the interest and open mindless of people for it
- The hygiene promotion should be dynamic, ludic and innovative to avoid too much repetition to get people bored
- The resort to soft awareness like using appropriate and well adapted notice board and posters according the different messages/topics addressing the main hygienic undermining the public health situation in the camp. Notice board could be used as well to inform the population about different topics and for different reasons
- At least and as mentioned in most of the partners proposal, systematically awareness posters (mainly based on drawing and pic) have to be implemented at each water point (about water uses and so on), each latrine and shower block, main gathering place (market, public health facilities…)
- Every awareness tools, method or posters have to be prior to large implementation tested with a sample of population and adapted according the result of the consultation/feedback
- Jerricane cleaning campaign should continue and presence of cap/led on the jerricance should be addressed as well

5. CONCLUSION:

To date, the access to latrine have to be drastically improved in terms of fostering people to use it and to get them organize to care about, but also to improve access rate and make the facilities more user friendly. For this reason, the quality of the facilities have to be improved and innovative approaches in terms of implementation and maintenance have to be tested and adapted to the various populations present in the camp.

The main challenge encounter by the partners is the open defecation and the proper use of latrine facilities. This challenges is related to problem of communities ownership towards the facilities provide to them, itself related to the contribution of the POC's population at least on the daily care of the facilities and services.

Regarding the IOM drainage project, the risk of delay and even major delay is quite high and thus the project progress has to be followed up frequently and the partners have to provide a risk analyze and contingency plan to mitigate the risk.

In general, the WASH partners have to be prepared for the coming rainy season and sanitary situation has to be upgraded to prevent any potential outbreak.

The visit emphasized particular concern about the running cost of the WASH services (with high level of incentive payment and running cost of pumping equipment with overs sized generator, …) and especially of the pump station plan to be built within the framework of the IOM drainage project. Given that only for the fuel of the pumps over 200 000 euros per year will have to be spent, plus operation and maintenance fees.

The extension of the POC's should facilitate the improvement of the sanitary situation and should be an entry point to make evolve the way to work with the communities, especially in terms of contribution which is crucial to build ownership and then sustainability. The incentive payment should be apply only for non-regular task or activities to do, but not on daily care of their "own" facilities otherwise it generate more dependency and then vulnerability whereas we want to mitigate the vulnerabilities. To exit a strategy of incentive payment it is needed time and it has to be thought in advanced.