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Sphere and sustainability: A matter of time

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Abstract

The Sphere standards have been devised to ensure that people affected by disasters will receive an adequate level of assistance; these standards are used across the world and apply both to natural and complex emergencies. The latter tend to be lasting events that often create a displacement of the population and it is argued that in such situations, where prolonged assistance is required, the Sphere standards may be counterproductive. By using examples of water supply interventions, it is highlighted that in some circumstances the Sphere standards for water quality may only be achieved with systems too complex for the displaced population to operate and maintain on their own. The case of two war-affected areas of Eastern Chad are presented to illustrate the importance of the temporal aspects of the Sphere standards in complex emergencies, and raises important questions regarding the long-term sustainability of adopting such standards for displaced populations.

Keywords: Sphere Project, sustainability, complex emergencies, IDPs, water supply, Chad.

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Sphere and sustainability: A matter of time

Introduction

Since the early 1990s, donors and aid agencies have been increasingly concerned about quality and accountability in disaster response (van Brabant, 2002). One of the consequences of these concerns was the creation of the Sphere project, which consists of a rights charter and quality standards for aid agencies involved in providing assistance to people affected by disasters. Sphere applies to disasters caused by natural hazards and human-induced complex emergencies; the standards encompass the provision of water, sanitation, and hygiene, food, shelter, and health services (Sphere, 2004).

Sphere determines suitable levels of assistance that should be provided in post-disaster situations until individual and collective coping mechanisms can be put in place by the affected population, local authorities or both. The assistance strategy underpinning Sphere conforms to the 'conventional' definition of disasters: "*serious disruptions of the functioning of a society*" (UNISDR, 2004:Annex1). This implies that emergency situations resulting from disasters are time-bounded events, and assistance is confined within a certain timescale.

This may be pertinent for most disasters associated with natural hazards but experience has shown that it is much less so in the case of complex emergencies, which are not linear events with well-defined beginnings and ends. Such events tend to be drawn out over months and years (Goodhand and Hulme, 1999); examples are many, in particular in Africa where countries such as Somalia, the Democratic Republic of Congo, Sudan, Uganda, Burundi, to cite a few, have experienced unresolved conflicts rooted in the 1990s or earlier. The affected population often needs to leave their homes and it may take years before they are able to return. Consequently, when displaced populations do not become integrated into the host population, they may live in 'emergency conditions' over prolonged periods.

The levels of assistance recommended by Sphere have not been formulated to be provided over an extended timescale, therefore, when crises perpetuate, agencies are unable to sustain full support and the affected population has to find coping mechanisms within their new environment; for instance to find new livelihoods such as farming, fishing or selling firewood to substitute food aid. When it comes to assistance involving infrastructures such as water supply, the problem which often arises is whether the displaced population possess the skills and resources to maintain the systems put at their disposal in order to compensate for diminishing external support. In other words, after some time, the issue of the sustainability of such systems becomes increasingly important.

This problem is quite common, especially in very poor countries, where the sophistication of the systems installed by aid agencies may be far above what both local and displaced population are used to. Drawing upon observations and quantitative surveys conducted during field visits in Eastern Chad, this paper highlights some of the key problems associated with applying the Sphere standards to complex emergencies and raises important questions regarding the long-term sustainability of adopting such standards for displaced populations.

The Displaced Population of Eastern Chad

Chad is located in the centre of the Sahel region, a semi arid fringe crossing the African continent, south of the Sahara desert. Since the end of the 1960s, Chad has been one amongst many African countries that has been affected by long-lasting crises associated with a number of civil wars; two of Chad's neighbours, Libya to the north and Sudan to the east (see Figure 1) allegedly played a significant role in this civil unrest by supporting rebel groups (Decalo 1980; Collins 2007). In recent years, the displacement of people affected in the Eastern region of Chad has been largely the result of both the war in the Sudanese region of Darfur and the armed rebellion to the government (BBC, 2009). Since 2004, about 250,000 non-Arab Sudanese refugees have arrived in Chad, fleeing the violence by the *Janjawid* Arab militia. They regrouped in a dozen of camps along the border, most of which are located north of the regional capital Abéché. The number of refugees increased by about 12,000 in the first half of 2008, following renewed violence in Darfur (ICG, 2008: 22).

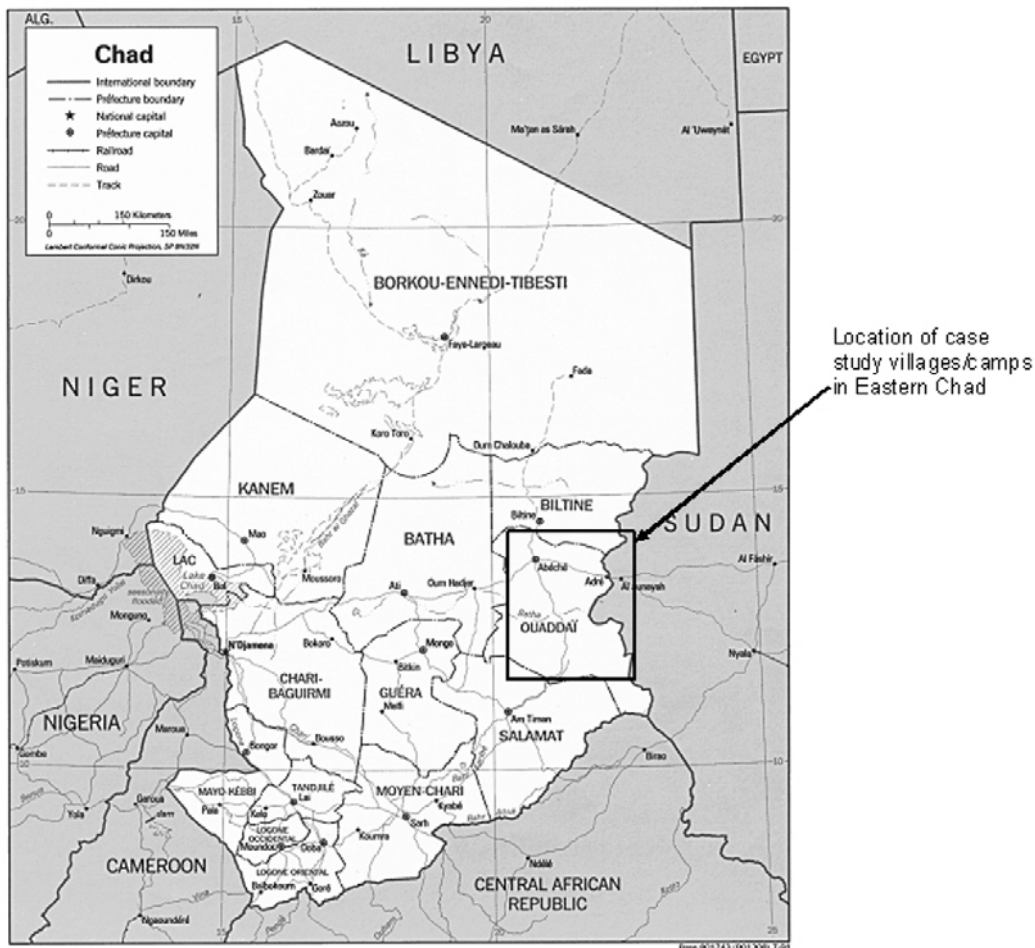


Figure 1: Map of Chad indicating the location of the case study camps (Base map provided courtesy of the University of Texas at Austin)

In September 2005, the Chadian population was for the first time attacked by the *Janjawid*, allied to Chadian Arab tribes. This took place in a border village of Dar Sila ‘département’ (district), southeast of Abéché (see Figure 2). Subsequent attacks, which intensified in December 2006, led to the displacement of 120,000 people in Dar Sila alone. The majority of Internally Displaced Persons (IDPs) took refuge in Dar Sila and in the neighbouring ‘départements’ of Djourf al Ahmar and Ouara. In Dar Sila, most of the IDPs went to Goz Beida, Koukou Angara and Dogdoré while others went to Adé and Kerfi (see Figure 2). They received assistance from a large number of organisations including Non-Governmental Organisations (NGOs), the United Nations and the International Committee of the Red Cross (ICRC) (ICG, 2008: 24).

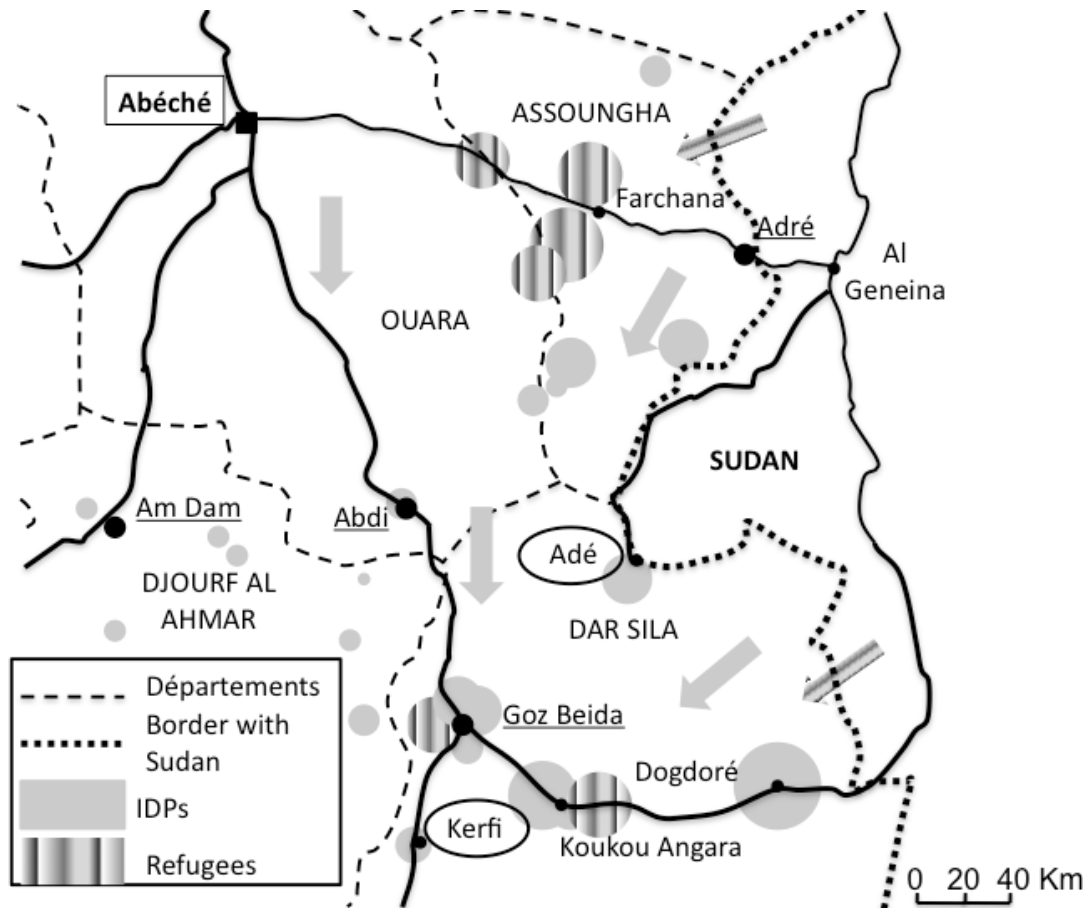


Figure 2: Displacement of population towards Dar Sila (Map based on ICG 2009:27)

In addition to consequences related to the war in Darfur, Eastern Chad also suffered from the effects of armed rebellion. Rebel groups have been active in the region ever since the 1960s and in recent years, they have been supported by the Sudanese government and found a sanctuary in the Sudanese border city of Al Geneina (see Figure 2). Despite the presence of the Chadian armed forces and of international peacekeepers, their raids occurred frequently in 2008. Reports have stated that these armed rebels regularly attack and steal from the local population, displaced people and international organisations alike, thereby maintaining a climate of insecurity (ICG 2008; Sokpoh *et al.* 2009). Therefore the prevailing and socio-political conditions in Eastern Chad have contributed towards a long-term complex emergency and consequently a situation where important questions, regarding the long-term sustainability of adopting the Sphere standards for displaced populations, need to be addressed.

The research that was undertaken

Adé and Kerfi are two towns with IDP camps in the Dar Sila ‘département’ where the NGO ‘Médecins Sans Frontières’ (MSF) run clinics providing essential curative health care. Adé is located on the border with Sudan while Kerfi is located to the southwest of Adé (see Figure 2). They were chosen as case-study sites because they possess characteristics that illustrate the typical level of access to water by IDP populations and its possible evolution over time. Although the camps are small compared to those in Goz Beida, Koukou Angara and Dogdoré, the diversity of water systems, especially in Adé, cover most of the possible water supply options that can be found elsewhere. Moreover, the relatively small size of these towns provides advantages for conducting detailed survey-based research.

Camp population data was provided by MSF and field observations were used to calculate average levels of water access in Adé and Kerfi. In addition, a quantitative survey carried out in Adé in May and June 2009 involved interviews of camp dwellers as well as local families. Its initial purpose was to help define the MSF water supply strategy, however, the results were also useful for informing the issues discussed within this paper.

Access to Water in Adé and Kerfi IDP Camps

IDPs started settling in Adé and Kerfi mostly as a result of the December 2006 attacks by *Janjawid* militias and the population of these towns has burgeoned in light of subsequent incidents. By 2009, the flow of IDPs had considerably reduced but had by no means stopped. The assistance they received, from a number of organisations consisted of food aid and nutrition, plastic sheeting and other non-food items, water supply, sanitation systems, hygiene promotion and health services.

Water access in Adé in June 2009

Adé’s IDP population in June 2009 was estimated by MSF between 9,000 and 12,000 people, while the host population was about 3,000 people. In addition, a contingent of 3,000 to 4,000 Chadian Army soldiers was present. IDPs were divided into two camps both located near to a *wadi* (in this context, this refers to a seasonal stream), which at the time was dry. IDPs received assistance from a number of organisations including the ICRC, MSF, and the French NGO “Solidarités”. All three organisations were involved in the provision of water supplies.

Adé town had the rare privilege for this region of Chad to be equipped with a water distribution network. The scheme used 33 tap-stands fed by two boreholes through an overhead tank. The system was run by Solidarités who managed the pumping of water into the overhead tank. The organisation paid operators salaries and fuel for the generator supplying the pumps. It also disinfected the water with chlorine. Daily pumping time was 13 hours in the dry season. The tap-stands opened six

hours a day, every day and were used both by the local population and IDPs. In addition, Solidarités built five hand-dug wells, covered, and equipped with foot-operated Vergnet pumps (one of the wells was equipped with two pumps). There was an additional hand-dug well, built by the ICRC, near to the *wadi*. It was lined with concrete but not covered, and had a particularly large diameter (about two metres). People fetched water with their own buckets; many could get water simultaneously.

Finally, MSF was also running an emergency water supply system. It consisted of a hand-dug well dug into the bed of the *wadi*, with a well-head that was protected with sandbags (to help protect the well from being washed out during the rainy season). A motor-pump extracted water from the well and supplied two 15,000 litres flexible emergency tanks equipped with three 'six-taps' distribution ramps, one of which was exclusively reserved for use by the armed forces. The time of the visit coincided with the end of the dry season and the level of water in the well only allowed five minutes of pumping-time per hour, which considerably reduced the quantity of water actually supplied to the population.

Besides protected or semi-protected water sources, the *wadi* was another essential water source, both for IDPs and for local population. Despite its poor quality, it was widely used, in most cases for laundry and to water animals and small gardens. It is also likely, given the long queues at taps and pumps that many people chose to drink water from the *wadi* to avoid waiting, a habit they had already adopted in their village of origin.

Situation in Kerfi in June 2009

Kerfi's population was about 10,000 people, 5,000 of whom were IDP and the remaining 5,000 the sedentary host population. Up to 10,000 people from adjacent villages or nomadic populations were also present. Like in Adé, Kerfi IDP camp was located near to a *wadi*. Kerfi's *wadi* offered a source of water even more essential than in Adé given the greater water scarcity in the area. Kerfi's protected water sources consisted exclusively of ten deep boreholes equipped with Vergnet pumps (see figure 3). These boreholes were drilled by the NGO Oxfam and replaced an earlier installed emergency water system.



Figure 3: Hand-pump in Kerfi (Photo by Claire Grisaffi, compressed version)

Compliance with Sphere

Sphere water supply standard number one sets the following objective in terms of water quantity:

“All people have safe and equitable access to sufficient quantity of water for drinking, cooking and personal and domestic hygiene. Public water points are sufficiently close to households to enable use of the minimum water requirement”. (Sphere, 2004:63)

Some of the key indicators specified are:

- 15 litres per person per day;
- Maximum distance from any household: 500 metres;
- Maximum queuing time: 15 minutes;
- Flow sufficient to fill a 20-litre container in less than three minutes.

The level of compliance with Sphere standards in terms of water quantity of water supply in Adé and Kerfi is summarized in tables 1 and 2, based on MSF estimations from June 2009:

Table 1: Level of compliance with Sphere standards in terms of quantity of water supply in Adé

Source	Yield m ³ /h	No. hours pumped per day	Total m ³ /day
33 taps (Solidarités)	7.5	13	97
Flexible Emergency tank (MSF)			30
Manual pump 1 (Solidarités)	1.8	10	18
Manual pump 2 (Solidarités)	1.7	10	17
Manual pump 3 (Solidarités)	0.75	10	7.5
Manual pump 4 (Solidarités)	1.7	10	17
Manual pumps 5 & 6 (fit on one well, Solidarités)	3.0	10	30
Open well (ICRC)	0.75	10	7.5
Total			224 m ³ /day
High hypothesis: per person for 19,000 population			11.7 l/day
Low hypothesis: per person for 15,000 population			14.9 l/day
Sphere minimum volume of water per person			15 l/day

Table 2: Level of compliance with Sphere standards in terms of water quantity of water supply in Kerfi

Source	Yield m ³ /hour	No. hours pumped per day	Total m ³ /day
10 manual pumps (Oxfam)	0.9	12	108
Per person for 10,000 population			10.8 l/day
Sphere minimum volume of water per person			15 l/day

The specified number of hours of usage of manual pumps and open wells is based on observation.

Sphere standards for water quantity were barely achieved in Adé in the case of the low population hypothesis, and not at all in Kerfi, which was significantly under the required 15 litres per person per day. The calculated amounts are conservative since they assumed there were no water losses. This reflects a situation of water scarcity affecting the whole region, with serious impacts on health, especially during the driest months. In May 2009, MSF clinics in Adé and Kerfi received respectively 22% and 10% patients with diarrhoeal diseases, the highest incidence of the year.

The average daily volume of water calculated should however be taken with caution since, as pointed out in the guidance notes to the standards: “*measuring solely the volume of water pumped into the reticulation system or the time a handpump is in operation will not give an accurate indication of individual consumption. Household surveys, observation and*

community discussion groups are a more effective method of collecting” (Sphere, 2004: 64). The house-to-house survey carried out by MSF in Adé, with more than 100 families showed significant differences in water access between IDPs and the local population:

- 50% of IDP households of the main camp were getting less than 20 litres of water per person per day while, among local population (living near to tap-stands from the water scheme), this figure was only 20%.
- 40% of IDP household of the main camp complained of long waiting time at the water point. This figure was 20% among local population.

This survey revealed discrepancies hidden in calculated average values relatively close to Sphere minimum levels. IDPs were found to be in a worse situation than the local population. This can be partly explained by certain water systems (especially tap stands) being located in town, further away from the camps. Another factor was whether the household owned a donkey; this was an important factor because donkeys can assist with carrying far greater daily volumes of water. From a more general standpoint, it shows that in spite of the commitment of aid agencies to comply with Sphere standards, this goal was not achieved for a significant proportion of their primary target population.

In terms of water quality, Sphere water supply standard number two recommends that:

“Water is palatable, and of sufficient quality to be drunk and used for personal and domestic hygiene without causing significant risk to health” (Sphere, 2004: 66).

Key indicators in this case are:

- The absence of faecal coliforms (bacteria indicating the occurrence of faecal contamination);
- Steps taken to minimise post-delivery contamination;
- Disinfection revealed by the presence of residual chlorine if post-delivery contamination is suspected. This implies low turbidity (measured in Nephelometric Turbidity Units (NTU). Clear water has a turbidity level below 5 NTU).

In Adé, water quality varied considerably depending on the source as shown in table 3:

Table 3: Level of compliance with Sphere standards in terms of water quality of water supply in Adé

Source	Turbidity measure (NTU)
Overhead tank (Solidarités)	<5
Flexible Emergency tank (MSF)	<5
Manual pump 1 (Solidarités)	60
Manual pump 2 (Solidarités)	20
Manual pump 3 (Solidarités)	100
Manual pump 4 (Solidarités)	20
Manual pumps 5 & 6 (combined on one well, Solidarités)	<5
Open well (ICRC)	100

Note: In Kerfi, all ten pumps provided water with turbidity levels below 5 NTU

The survey showed that in Kerfi water provided, while insufficient in terms of quantity, was of good quality. In Adé, a majority of sources did not meet Sphere water quality standards however; a vast majority of IDPs considered that they had less water but of better quality than in their village of origin.

Only the water distributed through the Adé's network and at the MSF emergency water supply facility was disinfected with chlorine. Disinfecting water from manual pumps in both locations would have been useful given the high probability of post-delivery contamination. This aspect is covered by Sphere water supply standard number three, which specifies that people should have "*adequate facilities and supplies to collect, store and use sufficient quantities of water for drinking, cooking, and personal hygiene, and to ensure that drinking water remains safe until it is consumed*" (Sphere, 2004:69). IDPs received jerry cans both in Adé and Kerfi, however, these utensils got dirty quite quickly and no initiative was taken to disinfect them.

Possible long-term scenarios

In June 2009, IDPs living in Adé and Kerfi had been away from their home place for two to three years. If the situation described by the International Crisis Group as a 'powder keg' (ICG, 2009) did not improve, it would be unlikely that they could return home soon. However, the level of assistance they received from the agency had been steadily reducing. In terms of water supply, it had remained stable until the first months of 2009 but strategies since evolved towards trying to achieve greater sustainability:

- In Adé, MSF was planning to dismantle their emergency water supply system by September 2009, when two new wells equipped with manual pumps built by Solidarités would be ready to use. Solidarités then planned to substitute the diesel generator by a solar system and to train municipal staff to run it. In the camps, the agency

promoted the creation of water committees in charge of organising the maintenance of the manual pumps. Repair costs would be funded by Adé's residents given that the IDP population had very little cash.

- A similar strategy was envisaged for the maintenance of manual pumps in Kerfi, where Oxfam promoted the creation of a water committee, which would organise the selling of water by the jerry-can in order to fund repair costs.
- In both locations, spare-parts would have to be purchased in Goz Beida, where pump mechanics can be found.

In June 2009, no money had actually been collected in Adé nor in Kerfi and this did not look like an easy task given that water committee members were at some point expecting to be paid by their supporting NGO only to attend meetings. In Adé, Solidarités would not acquiesce and was consequently in the process of facilitating capacity building of water committees. In Kerfi, Oxfam, based in Goz Beida since January 2009, somehow managed to work around the problem and achieved reasonable attendance from committee members but at that stage little else. Both NGOs were at the time of the visit ensuring the maintenance of the pumps, providing both spare-parts and manpower with the result that all the pumps were in satisfactory working condition.

Once support from Solidarités and Oxfam ceases, the water committees that have been established will be expected to take over the maintenance of the pumps. However, it is more than likely that the quality and regularity of the maintenance of manual pumps is going to deteriorate. Initially, because implementing cost recovery is going to be difficult amongst a displaced population with little cash and other important priorities; this is particularly problematic if long-term maintenance costs have not been factored in at the earliest planning stages (see, Harvey and Reed 2006). Harvey and Reed (2007) found that while community management (largely through the establishment of water committees) has been the prevalent model for donors and aid agencies such as Solidarités and Oxfam, this approach has not been the panacea it is often presented to be. Based upon research conducted in Ghana, Kenya, Uganda and Zambia, Harvey and Reed (2007) conclude that there is a strong need to distinguish between 'community participation' which is a prerequisite for sustainability, and 'community management' which is not (Harvey and Reed 2007).

In addition to this issue, managing the operation and maintenance of manual pumps by the recipient community is difficult to undertake within a non-conflict or emergency scenario. For instance Harvey and Reed (2006) found that many rural water supplies in sub-Saharan Africa demonstrate high operational failure rates. They conclude that integrated service provision, appropriate technology choice and, where necessary, non-profit sector options can provide a more multifaceted and sustainable solution (Harvey and Reed 2006). Operational failure rates can therefore be exacerbated for IDPs who may lack formal education, are accustomed to drawing water from the *wadis* and with little capacity for independent management.

In this regard an assessment of NGO's action in the region (including Adé and Kerfi) carried out by Groupe URD in May 2009 points out insufficient dialog between humanitarian actors and the affected population, which leaves little hope for future community management of their newly acquired water systems. The report (Sokpoh *et al.* 2009) stresses the greater importance given to 'hardware' compared to the 'software' component of interventions, in other words, the preponderance of water system construction or installation (e.g. boreholes and handpumps) over equally important aspects such as hygiene promotion or social mobilisation. The authors explain this by a preponderant accountability of humanitarian actors towards donors, in that it is more difficult to show the outcome of 'software' interventions compared to 'hardware' interventions that are always there to be seen. Reaching specific Sphere standards may also have played a role. In Adé and Kerfi, it is clear that, without regular external support, manual pumps are likely to break down one by one. The same applies to Adé's solar system due to maintenance and renewal costs. IDPs and local population will then have to resort back to their traditional water source: the *wadi*.

The dilemma behind water quality versus sustainability

The situation in Adé and Kerfi illustrates a common problem that agencies involved in water supply in complex emergencies have to face but that Sphere does not adequately consider; the sustainability of water systems used in emergency situations. This translates into a difficult technological choice:

- Deciding to set up systems quickly effective and providing quality water but the systems are subsequently too complex or expensive for the recipient population to operate and maintain;
- or opting for simpler systems, which may take longer to complete and may not always meet Sphere water quality standards but requiring little or no maintenance and are affordable to the recipient population.

This choice has potential consequences, especially on health. The issue may therefore be considered as a moral one since aid agencies have to decide whether it is morally acceptable to lower water quality standards, and potentially expose recipient populations to disease in order to ensure sustainable service. In other words, they have to decide whether it is better to supply good quality water for a limited time period or average quality water over a longer time period.

Technological options, timing, and sustainability

A wide range of technological options are available to aid agencies in an emergency. Water can be transported from a distance by truck if no water source is locally available. Water may also be available locally, in which case possible sources are rainwater, surface water, springs, dug wells and boreholes. In the IDP camps of Eastern Chad, water trucking, springs and rainwater are not really feasible options and surface water is only seasonal (*wadis*). Dug wells and boreholes are therefore the only possible options, as it shows when looking at the existing water systems in Adé and Kerfi. Water from dug wells can be extracted by buckets or by manual pumps. Most manual pumps are produced industrially (e.g. Vergnet), some models however such as rope and washer pumps are designed to be built and maintained with local materials (suitable until approximately 20 metres depth). Water from shallow boreholes could be extracted with Blair buckets, which are the borehole version of ordinary buckets used in dug wells (Skinner 2003). In most cases however borehole water is pumped with industrially produced manual pumps.

In an emergency, time needed to set up a water system is an important parameter when selecting a technology:

- Dug wells are labour intensive and require a lot of equipment and expertise, especially for state-of-the art construction. Time needed to dig and equip a well obviously depends on the depth of the water-table and on the nature of the geological formations found (usually between one week and two months);
- Many technologies are available for drilling boreholes. These range from hand-drills, that are adapted for shallow boreholes, to drilling rigs that are suitable for accessing deep watersheds. Drilling rigs are expensive and in most cases, they are mobilised for a campaign of several wells, which requires expertise and important logistical means. Jetted wells are another method very commonly used in emergencies. This method consists of circulating water down through a small diameter steel pipe; the water fluidizes the soil and allows the pipe to sink. This technique is only suitable for loose formation, especially alluvial, deposits besides rivers (Davis and Lambert, 2002). Jetted wells require specific hand-pumps because of the small diameter or the casing (usually 50 mm). Well jetting is probably the fastest drilling method although it cannot go very deep. Mobilizing a rig takes longer, although once it is on the spot, it can create a large number of new water points relatively fast (albeit with the risk of a few 'dry holes').

Once a technological option is chosen, operation and maintenance of the system may depend to a great extent on support from the aid agency. When the emergency situation perpetuates, this becomes an important factor when looking at the sustainability of the system:

- Dug wells don't require external support when water is extracted with rope and bucket. The sustainability of the system is more questionable when water is extracted with a manual pump. In this respect, rope and washer pumps seem to be the best option because they may be built and repaired locally. However, they can only reach a limited depth of about 20 metres. Nonetheless, if the community is unable to repair a manual pump set up on a well, it is likely to remove it and revert to using rope and bucket.
- Boreholes can be equipped with electric submersible pumps powered with solar energy, or with manual pumps. The former is more expensive to set up but may function without external support, at least during a certain time provided a few members of the community are trained to operate them and as long as the solar panels are not stolen. The operation and maintenance of manual pumps depends on locally available spare parts, and on the ability and willingness of the IDP population to pay for the maintenance. Blair buckets are only suitable for shallow boreholes and when the number of users is not too extensive. They may also break but can be repaired locally.

The various technological options, the time needed to set them up and their level of sustainability are summarised in Table 4:

Table 4: Water systems options: Timeframe and constraints versus sustainability

Technological Option	Timeframe/ Constraints	Sustainability
Dug wells	May take time to dig and equip (up to a month), involves heavy logistics.	<u>Open well equipped with rope and bucket:</u> Does not require specific external support.
		<u>Well equipped with conventional manual pump:</u> Depends on the efficiency of a water committee, on the availability of spare-parts and on the ability and willingness to pay from users. Pump can be dismantled and the well used with rope and bucket.
		<u>Well equipped with rope and washer pump:</u> Depends on the efficiency of a water committee and on the presence of a mechanic able to build and maintain the pump. Pump can be dismantled and the well used with rope and bucket.
Boreholes	<u>Drilling rigs:</u> May take time to mobilise and involves heavy logistics. Once on the spot, can drill several wells	<u>Borehole equipped with a conventional manual pump:</u> Depends on the efficiency of a water committee, on the availability of spare-parts and mechanic and on the ability and willingness to pay from users.
		<u>Boreholes equipped with solar pump:</u> Depends on people in charge of basic maintenance and on solar panels not being stolen.

	relatively fast.	
	<u>Jetted well:</u> Fast to drill, basic handpumps	<u>Jetted well equipped with a specific hand-pump:</u> Depends on the efficiency of a water committee, on the availability of spare-parts and mechanic for this hand-pump and on the ability and willingness to pay from users.
	<u>Hand-drilled well:</u> Fast once a team is trained and equipped.	<u>Hand-drilled well equipped with Blair bucket:</u> Does not require external support but depends on the presence of a mechanic able to repair the bucket when needed.

Technological options, water quality, and impact on health

A choice has to be made between dug wells and boreholes. The latter may be faster to drill and equip and tend to provide a water of a better quality (as was observed in Kerfi). Nonetheless, in terms of sustainability, a dug well equipped with a rope and bucket can be a far superior option.

Boreholes water may contain iron and manganese, which affects taste, odour and colour, but has little or no impact on health. In certain regions, more severe problems, such as the presence of fluoride and arsenic may be observed. However, in general, borehole water is clear and at the source, pathogen-free. In contrast, dug well water may be turbid, especially in the case of shallow wells dug next to rivers and are vulnerable to contamination, especially from the bucket, when no manual pump is used.

The impact on health of this technological choice is determined by the difference in quality between dug well water and borehole water. Measuring health impact of water and sanitation interventions has been the object of the large number of studies. A well-known article by Esrey *et al.* (1991) reports on a meta-analysis of a large number of studies. The authors conclude on the respective effects of improving water quality, water quantity, sanitation and hygiene on morbidity and mortality due to waterborne and excreta-related diseases. One of the conclusions of the article is that increasing water quantity alone contributes to a reduction of 20% in diarrhoeal diseases while the result is 15% for water quality. These results are nonetheless contradicted by a similar analysis carried out more recently by Fewtrell and Colford (2004), which concludes on a greater effect on diarrhoea morbidity of water quality interventions. However, the water quality interventions reviewed in this study refers specifically to point of use water treatment and not to the delivery of high-quality water at the source, which may be contaminated later on due to the conditions of storage. In this respect Kerfi is a perfect illustration:

water may be of excellent quality at the pump, but the dirtiness of water vessels used by IDPs cast doubts on its quality when consumed.

These studies show that the importance given to the delivery of high quality water at the point of extraction, often at the cost of water quantity and sustainability of supply cannot be justified on health grounds. Other important factors such as conditions of storage must be considered. This makes dug well technology appear more acceptable on moral grounds. It is argued that adoption of a less technocratic approach (i.e. not using the large machinery required for drilling boreholes) would not necessarily pose an increased threat to the health of the populations that agencies such as 'Solidarités' and Oxfam intend to help. Encompassing water quality and sustainability would even be possible according to the research carried out by Sutton and Nkolomo (2003) in Zambia. The authors suggest that simple structural improvements for dug wells (such as lining the top parts of the wells with bricks or concrete and providing a suitably designed concrete apron at the surface level of the well) can considerably improve the bacteriological quality of the water. Community members may then gradually improve their water supply adding items such as storage facilities or water extraction systems ranging from windlass to handpumps or even solar pumps and water schemes (Sutton and Nkolomo, 2003). This may be hard to imagine in Adé and Kerfi but aid agencies can easily dig state of the art improved dug wells (Solidarités and ICRC have already achieved this in Adé), with or without handpumps. The quality of the water at the point of use could then be intrinsically linked to the effectiveness of the hygiene campaigns carried out by agencies. For that to be successful it is important for the agencies to initially improve their dialog with communities as recommended by Groupe URD (Sokpoh *et al.* 2009). More health benefits could also be drawn from promoting point of use treatments such as the individual sand filters tested by Solidarités in Adé and adapted both to the treatment of dug well and *wadi* water. Groupe URD considers this initiative as beneficial provided the organisation find a way of building them with local materials that would make the solutions more sustainable (Sokpoh *et al.* 2009: 22).

Conclusions

"Size doesn't matter in effective humanitarian response: timing, access and competence do". (Gostelow, 1999). The author of this statement refers to what is the conventional understanding of timing and competence in this context: timing for assistance and competence to deliver aid as fast as possible with specific quality standards. This paper intends to show that, in the case of water supply in complex emergencies timing and competence may have multiple dimensions. Time is also to be considered when adopting a strategy for assistance to populations that may be stranded away from their familiar environment for ages. Likewise, considering long-term solutions also require from those in charge of designing assistance operations, different competences, comparable to what development professionals need.

The cases of Adé and Kerfi, which are certainly not unique, show that achieving the quality levels in water supply recommended by Sphere may jeopardise the very existence of water supply in the long term because of technological choices that may be imposed. The corresponding levels of water quality are therefore seen as linked to the rights to dignity that Sphere is meant to ensure for the affected population (Sphere, 2004:5). However, the purposely universal character of Sphere makes it difficult to select which set of moral values this right is based upon (Dufour *et al.*, 2004). Nonetheless if it is accepted, as stated by Walker that “*humanitarianism is cast in the mould of the West*” (Walker, 2005: 333), it is probably Western values that are taken as reference. This means opting for delivering water of a quality compatible with what Westerners would accept to drink, even if such levels of quality may be far-fetched from what the affected population is used to drinking, and could afford without external support.

If the rights promulgated by Sphere cannot last beyond the withdrawal of agencies providing assistance, then some of the Sphere standards may, in the long run be counterproductive. Moreover, agencies accepting this situation may see their accountability towards the affected population questioned.

A possible solution could be that Sphere adapts its standards introducing a temporal dimension. The large number of ‘lasting emergencies’ requires ‘lasting relief’, which would be in line with developmental relief, as pointed out by Walker (2005). In such circumstances, the standards or their guidelines should encourage agencies to consider the evolution of the type of assistance provided over time. This concern is in part addressed in guidance note 4 of ‘Common Standard 1: Participation’, which states: “*A disaster response programme should support and/or complement existing services and local institutions in terms of structure and design and be sustainable after the external assistance stops*” (Sphere, 2004:29).

However, this note does not define indicators that would estimate the sustainability of the response. Water supply guidelines mention that “*Water sources and systems are maintained such that appropriate quantities of water are available consistently or on a regular basis*” (Sphere, 2004:63), but do not specify who should ensure this maintenance and how it should be carried out. In this respect, considering indicators such as the level of maintenance required, the availability of spare parts and the presence of trained personnel, would provide criteria on how to plan a maintenance system. Agencies would then have to accompany their withdrawal by gradually substituting the quickly set-up, and too often unsustainable systems, with a system that the recipient populations can afford to operate and maintain. The key is then to minimise the gap between the systems installed by aid agencies and what IDPs/refugees are accustomed to. Insecurity that may lead to premature withdrawal or limited presences of agencies makes the realisation of ‘sustainable relief’ even more fundamental.

Sustainable water systems require appropriate technological choices. In a context such as Eastern Chad, boreholes equipped with manual pumps may be justified at the early stage of an emergency but they should be seconded with hand-dug wells,

which can provide acceptable water quality if they are properly designed and equipped (gravel pack filtering systems may be especially important). Hygiene promotion / community mobilisation are also important factors contributing to sustainability and water quality by encouraging people to maintain hygienic conditions both at the point of water extraction and at the point of use.

This strategy is a trade-off between technological solutions and sustainability, which should in the long run bring appropriate and sustainable health benefits. It is only a matter of time.

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