Case study of sustainable sanitation projects

Household pit latrines with urine diversion Farchana refugee camp, Chad - draft

Fig. 1: Project location

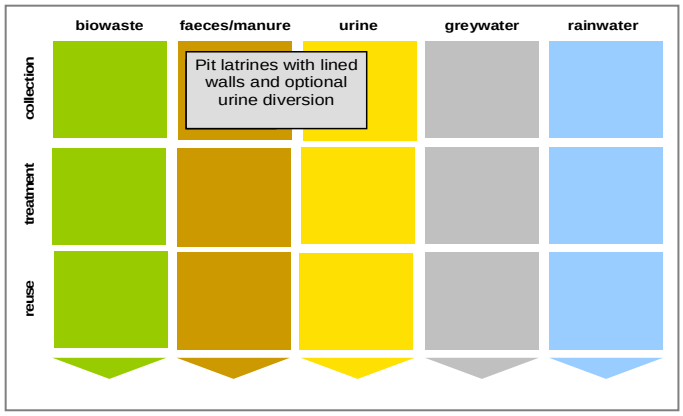

Fig. 2: Applied sanitation components in this project

1 General data

Type of project:
Sanitation for a refugee camp
Family based sanitation, between a pilot scale and a full-scale project

Project period:
Camp established in 2003
Start of planning: 2008
Start of construction: November 2008, 5 years after the refugees arrived
Start of operation:
End of project:

Project scale:
Number of inhabitants covered: about 500 in Farchana (102 pit latrines with lined walls: 80 single pits and 22 double pits; 5 people per household)
Total investment: EUR 36,000

Address of project location:
Farchana Refugee Camp, more precise location: province, region?, Eastern Chad

Planning institution:
SECADEV - a Chadian NGO ('Caritas Chad' - known nationally as SECADEV: Secours Catholique Développement)

Executing institution:
SECADEV (a Chadian NGO)

Supporting agency:
CARITAS, from which country?

2 Objective and motivation of the project

Family pit latrines with lined walls that can easily be emptied have been implemented in the Farchana refugee camp in Chad to address a number of problems. The primary goal has been to find a sustainable solution for sanitation that can be adapted in a protracted crisis context.

Generally, there is a lack of space in the refugee camp to build new pit latrines. In addition, several hundred pit latrines have collapsed in the sandy soil. Therefore, the primary reason to implement the new family latrines is their extended lifespan rather than the ability to make use of by-products.

The most innovative aspect of this latrine project is that it is adopted in a Chadian refugee camp for Sudanese refugees. In addition, it is an opportunity to raise awareness among humanitarian agencies for different existing forms of sustainable sanitation.

3 Location and conditions

Approximately 260,000 Sudanese refugees have fled to Eastern Chad since 2003, in order to escape the socio-political conflict in Darfur, Sudan. Since 2005 ethnic conflicts within Chad and intrusions by Sudanese armed groups have caused a large number of Chadian internally displaced people (IDPs). There are 170,000 people living in IDP sites in 2009.

Fig. 3: Farchana refugee camp in Chad (source: J. Patinet, (2009), Groupe URD).

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From 2007 onwards, displaced communities have begun to return to their villages of origin such as Koukou, Kerfi, Am Timan, etc.

The current situation in Eastern Chad is characterised by the following factors:

- **Permanent instability and insecurity**. Chadian rebel groups which are based in Sudan make regular forays into Eastern Chad. Their objective is to destabilise Idriss Déby Itno's regime by attacking the capital of Chad, N'Djamena. There is an increase in lawlessness in zones with crisis-affected communities. Both, humanitarian aid workers and the local population are affected by the resulting insecurity. Vehicles have been held up, humanitarian bases have been attacked and violence has been directed at civilians.

- **The existence of several different types of issues,** present at the same time in Chad, require different types of humanitarian response. Care and maintenance operations are necessary for refugees and certain IDP sites, despite their increasing self-reliance. Rehabilitation and development activities are needed for returnees and local populations. Finally, new emergency situations call for a better emergency response.

- **Difficulty of coordination** of humanitarian action. There are currently two systems in place that coordinate humanitarian actions in Eastern Chad. One is the UNHCR (United Nations High Commissioner for Refugees) whose operations mainly address refugees. The other one is the UNOCHA (United Nations Office for the Coordination of Humanitarian Affairs), mainly responsible for operations involving IDPs and returnees. Its operations are based on clusters with several levels of coordination (N'Djamena, Abéché, Goz Beida, etc.). Yet, coordination between developmental and humanitarian agencies is limited. The existence of two systems increases the number of necessary meetings for similar topics, which is problematic, given the limitation of human resources.

- **Initiatives to promote self-reliance** involve varying levels of difficulty, depending on the status of population group (e.g. refugees, IDPs, returnees, local people). Many of the humanitarian agencies that work in Eastern Chad agree that there is a need to promote self-reliance among the affected peoples. However, depending on the sector and the "type" of population, the objectives and the means needed to reach them (in relation to land available for cultivation and social, economic, climatic and legal conditions) are not always very clearly defined and communicated.

- **Unsustainable water and sanitation systems** are often set up by humanitarian agencies. Poor excreta management systems like common pit latrines, which lead to a lack of space in the long run, is one obvious example. It is also important to realise that the "host communities" in villages around the camps and also in towns do not have access to sanitation either.

Humanitarian agencies are therefore confronted with a complex, protracted crisis: certain camps have been in place for more than five years. Due to the nature of the crisis, it is very likely that they will be existent for several more years.

This case study focuses on the Farchana refugee camp. There are 21,153 refugees (approx. 5,650 households) in an area of 1.72 sqm, which means a density of 11,849 habitants/square kilometre (source: OCHA, registered refugees camp population, May 2009).

The climate where the camp is located is very dry, with an annual rainfall of about 500 millimetres. The level of poverty of the refugees is unfortunately not well known among the humanitarian actors and should therefore be assessed, in order to better understand in how far people could financially contribute to the facilities provided.

Regarding the legal framework, the Chadian "Schéma Directeur de l'Eau et de l'Assainissement,"[1] which was written before the crisis, rather neglects sanitation issues.

Regarding the camps, the 'Plan Stratégique pour l'approvisionnement en eau et l'assainissement au Tchad 2008 – 2010' (PSEA Tchad 2010) by UNHCR aims to facilitate the transition phase in between emergency aid and the implementation of durable (sustainable) solutions.

The international humanitarian standard suggests that there should at least be one latrine per 20 persons in an emergency situation. After more than 6 years, the strategy currently applied in Eastern Chad camps is one latrine per family (with 5 people per household on average). However, this coverage is very difficult to keep up, as there is not enough space to build new latrines and existing ones get full or collapse.

In Chad the under-five child mortality rate is currently still very high at **209** per 1000 children[2]. By comparison, in 1990 the figure was 201 per 1000 children. Hence, one can see a slight upward trend unfortunately, whereas most other developing countries have had a clear reduction since 1990.

4 Project history

Please provide information on the project history – "milestones". Why was this project initiated? Who did what, why, and when?
How did Groupe URD get involved? And who is managing the overall camp?

5 Technologies applied

Faced with limited space to dig pit latrines in some parts of the camps and the collapse of latrines in sandy areas, SECADEV has been testing its own form of ecological toilet - family latrines that can be emptied. This type of toilet saves space because the pits can be emptied when full and there is no need to dig again.

The **first technical solution** that was chosen in 2008 was a simple deep pit (2 to 3 metres). The side walls are built with terracotta bricks, without a bottom so that it can be cleaned out manually (using shovels and carts). About 80 latrines of this type were built in the Farchana refugee camp. This

[1] National Plan for water and sanitation

[2] The under-five mortality rate is the probability (expressed as a rate per 1,000 live births) of a child born in a specified year dying before reaching the age of five if subject to current age-specific mortality rates (http://www.childinfo.org/mortality.html and http://www.childmortality.org/).

system, with an in-ground pit (without a base slab) assumes a sufficiently low groundwater table.

The **second technical solution** that has been set up in 2009 has two pits, which should be used alternately (following Groupe URD's advice). This improvement aims to avoid the handling of un-sanitised (fresh) excreta, since the filled-up latrine can be closed for several months before being emptied. In the meantime the other one can be used.

About 22 of these double pit latrines have been built in Farchana. Users can separate urine and faeces so that the faeces can dry easily; however there is no specific concrete system facilitating the separation. But Figure 5 indicates exactly this or not? Hence, some families do the liquid diversion because they found that there are less flies and odour when faecal matter is dry. However, others do not do it.

There are a few conditions that favour the implementation of the double pit latrines. The refugees are familiar with soil restoration techniques (e.g. composting, excreta reuse in crop production), since these have already been used in Sudan. In addition, some of the Sudanese refugees already separated liquids from faecal matter (those who already had access to a latrine before arriving in the camp).

Advantages of the double pit latrine:

- Since the groundwater is about 30 meters deep, there is no threat of pollution from the latrine.
- Possibility to reuse by-products/create income generating activities.
- Very long system lifetime and low recurring costs.
- Easy to empty, it can be done by the family.
- Solution that saves space and is therefore adapted to densely populated zones. The work is continuous (the pit is repeatedly emptied), so it is not necessary to dig new pits.

Disadvantages of the double pit latrine:
For the construction of the latrines, kiln-fired bricks are needed. This is unsustainable in the way that firewood is needed which can lead to deforestation.

6 Design information

The pit (1.4 x 1.4 x 2 to 3 metres deep) is reinforced from top to bottom with kiln-fired bricks[3], joined with cement. It will be relevant to assess if the faeces dry out properly despite the 3-metres depth. This sanitation system is built with materials that are more durable and costly than the refugees' shelters.

The small concrete slabs with the drop hole have handles so they can easily be moved aside to allow for emptying. Hence, the pits can be emptied manually (using shovels and carts) so that the contents can be reused in agriculture.

The majority of the liquids (urine and anal-washing water) should flow separately over the slightly inclined slab and drain away to the outside (see Fig 5). But in fact, liquid diversion is done only if the user decides for it: liquids can easily enter the pit.

While the latrine also serves as shower, the bathing waste water drains out in the same way. SECADEV decided to encourage the practice of separating liquids at the source. Thereby, the pit is being reserved specifically for faeces, as it was already a relatively common practice among some of the Sudanese refugees.

The possibility to reuse the latrine by-products in order to restore the soils' agronomic potential is a technique known to the refugees, and previously practiced by some facilitators of the Farchana in Sudan. In the first case (single pit), before reuse, the faeces must undergo a second treatment through composting in pre-designated areas for this use, because faecal matter is fresh when being emptied.

For the first emptying, anticipated to happen after two or three years, SECADEV is currently reflecting on the different technical options.

Fig. 4: Superstructure of a double pit latrine. Is this the material usually used for the superstructure? Fig. 7 indicates a much simpler version. Do the pit latrines not have a roof? Why? What about privacy or similar issues? (Source: J. Patinet (2009) Groupe URD).

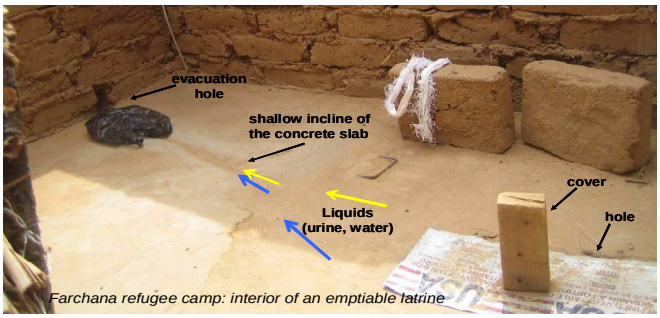

Fig. 5: Single pit family latrine (source: J. Patinet (2009) Groupe URD). Where is the faeces drop hole?

[3] Earth bricks fired in a kiln.

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Fig. 6: Both pictures show the single pit family latrine that can be emptied. Left side: this shows the interior of a pit with lined walls. Right side: the pit is shown with opened slab which indicates how the pits can be opened and emptied (source: J. Patinet (2009) Groupe URD).

7 Type and level of reuse

The main objective of the project was to implement a sanitation system that provides a permanent and sustainable infrastructure, and which preserves space at the same time, since refugees only have very little access to agricultural land.

As in the entire Sahel zone, the soil in Chad is poor or degraded. Agricultural land that surrounds the *wadis*[4] is over-exploited. There is very little vegetation. Moreover, insufficient rainfall and poor soil mineralisation, caused by two highly contrasting alternating seasons, leave the area unfertile. The scare vegetation causes weak soil equilibrium. In general, erosion is very strong.

The refugees have very little, if any, access to agricultural land. Therefore, most manure of small ruminants is not used by the refuges for agricultural purposes, despite the fact that animal manure as well as human excreta after treatment could help to restore soil fertility.

Fig. 7: Double pit family latrine that can be emptied (source: Mahamat Absakine (2010) Groupe URD).

[4] Wadis : Arabic term traditionally referring to a dry riverbed that contains water only during times of heavy rain

Fig. 8: The slabs of the pit latrines, drop hole is at the bottom right in the shaded part of the photo (source: Mahamat Absakine (2010) Groupe URD). When the document is printed black and white, the drop hole is not visible. Use better photo?

The first emptying of the latrine is about to take place in several years time (when roughly?). SECADEV plans to reuse the by-products, but is currently not sure how to do it. Certain aspects relating to the reuse of by-products still need to be clarified. One possibility for the reuse is the reforestation site (15 ha) managed by SECADEV's environment team, located a few kilometres from the camp.

8 Further project components

Responding to the classical WASH camp management, SECADEV provides hygiene promotion through training, sanitation and hygiene committees and hygiene promoters. But "soft" activities (like training, awareness raising campaigns, capacity buildings) are absolutely not sufficient. For example no educative workshops on the reuse of urine and faecal matter in agriculture were conducted.

9 Costs and economics

Each family's contribution to the latrines is less than 10% of the total cost. However, they are responsible for building the superstructure and giving meals to the workers. For the traditional latrines, the refugees are normally required to dig their own pit. However, for this new type of latrine, this work is done by NGOs themselves, since it needs to be done very accurately, as the inside of the pit need to be lined with bricks. In this case, the cost is hence almost entirely covered by the operating NGO.

The construction costs (including labour costs?) for three different types of latrines that are present in the Farchana camp are listed in the following (one family consists of 4 household members on average (but we said 5 on page 1??)):

- Traditional family latrine: 98,000-120,000 FCFA = 150-180 EUR
- "Reusable" family single pit latrine (built under this project): 207,000 FCFA = 315 EUR
- "Reusable" family double pit latrine (built under this project): 325,000 FCFA = 495 EUR

The total construction costs were EUR 36,000.

Is it possible to provide a detailed cost break down? What is the difference in costs if the superstructure is made from bricks compared to a simple wooden structure?

The difference between a traditional family latrine and the "reusable" family single pit latrine built under this project:
A traditional family latrine looks like what 'humanitarian actors' call a single pit latrine. But there is a big difference between the traditional family latrine and the family single pit latrine: the family single pit is a latrine that can be emptied and which is reinforced with fired-bricks and cement (that allows the emptying and explains the higher costs). The traditional family latrine is a simple pit which is less deep than the "reusable" latrines (the former cannot be emptied, except in very hard soil).

10 Operation and maintenance

The first emptying of the latrines is due to take place in several years time. The NGO which is responsible for operation and maintenance (SECADEV) has not yet determined which management model it will use. Information on this will follow.

11 Practical experience and lessons learnt

The first lesson learnt is the importance of 'software' activities such as trainings, participatory workshops, general awareness creation, etc. (which were not sufficient) and also the risk of constructing hundreds of latrines without running a small-scale pilot project before. For example, some refugees were using both pits of the double pit latrine at the same time.

Certain technical issues still need to be clarified such as the management of by-products. Hence, it is essential to give importance to awareness-raising, social organisation and capacity building activities as well as to infrastructure building activities. Whether or not affected people participate successfully is depending on the quality of the dialogue and interaction that will take place with the humanitarian agency.

The main encountered obstacles of the project were:

- A violent and unstable context hinders investment into sustainable solutions and thus forces NGOs to manage projects from distant places or to interrupt them; in this context, monitoring and implementing a real "software" part in the projects is highly challenging.
- Difficulty for refugees to gain access to land.
- Costs are also an obstacle, but this could be overcome by experimenting with different materials to reduce the costs (for example using sundried soil, etc.). Costs could also be reduced if donors make a commitment to support these systems.

Further technical variations to be tested:

- Adding ashes (or dry soil if ashes are not available).
- Reusing the diverted liquids (urine and greywater) for water plants, for example.
- Testing pits which are less deep. So far it is not clear if the faeces dry out properly despite the 3-metres depth.
- Testing pits constructed with sun-dried blocks. This technique requires a double coating over the pit lining (sun-dried blocks). The first layer uses a mix of cement (or lime, if available) and soil, while the second uses a classic coating of cement (or lime) plus sand. The technique reduces costs considerably, since no kiln-fired bricks are needed. In addition, the technique also preserves timber resources, since no kiln is used. The use of soil for the construction of the lower parts of ecological latrines is well known in South America.
- A further project in Aguié (Niger) is also interesting in this respect, because the pits of the latrines are constructed with sun-dried bricks (two rows of bricks) with cement finishing coatings on the interior and exterior.
- Testing other ecological composting latrines. For these types of latrines the faeces are treated through the process of composting (not through dehydration). The composting latrines are sometimes below-ground pits (1 – 1.5 metres deep) (Arborloo / Fossa alterna).

12 Sustainability assessment and long-term impacts

A basic assessment (Table 2) was carried out to indicate in which of the five sustainability criteria for sanitation (according to the SuSanA Vision Document 1) this project has its strengths and which aspects represent weaknesses.

Table 1: Qualitative indication of sustainability of system. A cross in the respective column shows assessment of the relative sustainability of project (+ means: strong point of project; o means: average strength for this aspect and – means: no emphasis on this aspect for this project).

	collection and transport			treatment			transport and reuse[a]		
Sustainability criteria	+	o	-	+	o	-	+	o	-
• health and hygiene	X				X				
• environmental and natural resources		X			X				
• technology and operation	X			X					
• finance and economics			X		X				
• socio-cultural and institutional	X			X					

[a] Not carried out yet

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Sustainability criteria for sanitation:
Health and hygiene include the risk of exposure to pathogens and hazardous substances and improvement of livelihood achieved by the application of a certain sanitation system.
Environment and natural resources involve the resources needed in the project as well as the degree of recycling and reuse practiced and the effects of these.
Technology and operation relate to the functionality and ease of constructing, operating and monitoring the entire system as well as its robustness and adaptability to existing systems.
Financial and economic issues include the capacity of households and communities to cover the costs for sanitation as well as the benefit, such as from fertiliser and the external impact on the economy.
Socio-cultural and institutional aspects refer to the socio-cultural acceptance and appropriateness of the system, perceptions, gender issues and compliance with legal and institutional frameworks.

For details on these criteria, please see the SuSanA Vision document "Towards more sustainable solutions" (www.susana.org).

What have been the impacts of this project (compared to the objectives of the entire project)?
E.g. Success in raising awareness amongst humanitarian workers for sanitation issues and sustainable solutions?

13 Available documents and references

- Groupe URD (n.d.) Programme to support collective learning and improve the quality of the humanitarian response in Eastern Chad, http://www.urd.org/IMG/pdf/URD_Chad.pdf
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14 Institutions, organisations and contact persons

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SECADEV details. What exactly was their role?

Other stakeholders' details?

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