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# Traditional closed-loop sanitation systems in peri-urban and rural Afghanistan: a SWOT analysis

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*The closed-loop-sanitation-system (CLSS), or sustainable sanitation system, has accelerated in recent years and been successfully implemented in many parts of the world. This study explored the strengths, weaknesses, opportunities, and threats (SWOT) of the traditional CLSS (T-CLSS) in both peri-urban and rural contexts within three different provinces in Afghanistan, the first study of its kind in this country. Participatory research tools such as transect walks, focus group discussions, and interactive workshops have been applied to assess the SWOT components of T- CLSS. The results show that T-CLSS is practiced historically in both peri-urban and rural areas by different generations using local and traditional knowledge, skills and technologies. Socio-cultural acceptance of the system is considered as one of the strengths in both rural and peri-urban areas. It is highly recommended that the feasibility of improved CLSS be assessed and implemented in the light of the T-CLSS system.*

## Introduction

The closed-loop-sanitation-system (CLSS) or sustainable sanitation system has been successfully implemented in many parts of the world with systematic means (improved technical and non-technical) in both cold and temperate regions. The principles of this system are to improve the overall water, sanitation and hygiene (WASH), health and environmental situation and to recover resources/nutrients from organic waste streams, particularly from human faeces (Esrey et al., 2001; Uddin et al., 2012; Uddin et al., 2014a, b, c; Uddin et al., 2015).

In Afghanistan, including in urban centres like Kabul and Kandahar, human excreta from dry toilets is applied directly to the agricultural fields without any specific treatment (Patinet, 2012). No systematic research can be found in either scientific or grey literature exploring the existing situation of this traditional practice in both peri-urban and rural contexts and evaluating the efficiency, relevance and sustainability of this kind of traditional closed-loop-sanitation-system (T-CLSS). This study was therefore conducted in Afghanistan in Action Contre La Faim (ACF) Afghanistan's programme intervention areas to examine the strengths, weaknesses, opportunities and threats of the existing T-CLSS with the objective of improving design and plans for future developmental programmes. It may help to improve the existing system in terms of safety, risk reduction for both environment and humans, productivity, market and job creation based on each local context. It can also contribute to finding a sustainable and efficient way of addressing the huge problem of excreta disposal and management in big, often poorly structured, urban centres.

## Materials and methods

### Study area

This study was conducted during the period of January and February 2015 in five different villages across three provinces in Afghanistan (Table 1) where ACF Afghanistan runs WASH, food security and livelihoods, and nutrition programmes. This study was one of the components of the objectives concerning the scope of replicating improved CLSS (Uddin et al., 2015) and knowledge dissemination from the

Mongolian research project jointly executed by ACF Mongolia and University of Science and Technology Beijing and funded by ACF International France.

| Table 1. Study locations and demographic information | | | | |
|---|---|---|---|---|
| **Village, district and province** | **No. of families** | **Population** | **No. of toilets** | **Type of toilet (traditional)** |
| Yousuf Bangi, District 13, Kabul (Peri-urban) | 328 | 2,624 | 328 | Vault with urine diversion |
| Tangi-e-Yaqub, Dar-e-Suf Bala, Samangan (Rural) | 244 | 1,500 | 200 | Vault |
| Chobaki Payan, Dar-e-Suf Payan, Samangan (Rural) | 250 | 1,500 | 250 | Vault |
| Mashi wa Nigeri, Dehdadi, Balkh (Rural) | 1000 | 7,000 | 1,000 | Vault |
| Deh Hassan, Khulam, Balkh (Rural) | 220 | 1,087 | 40 | Vault |

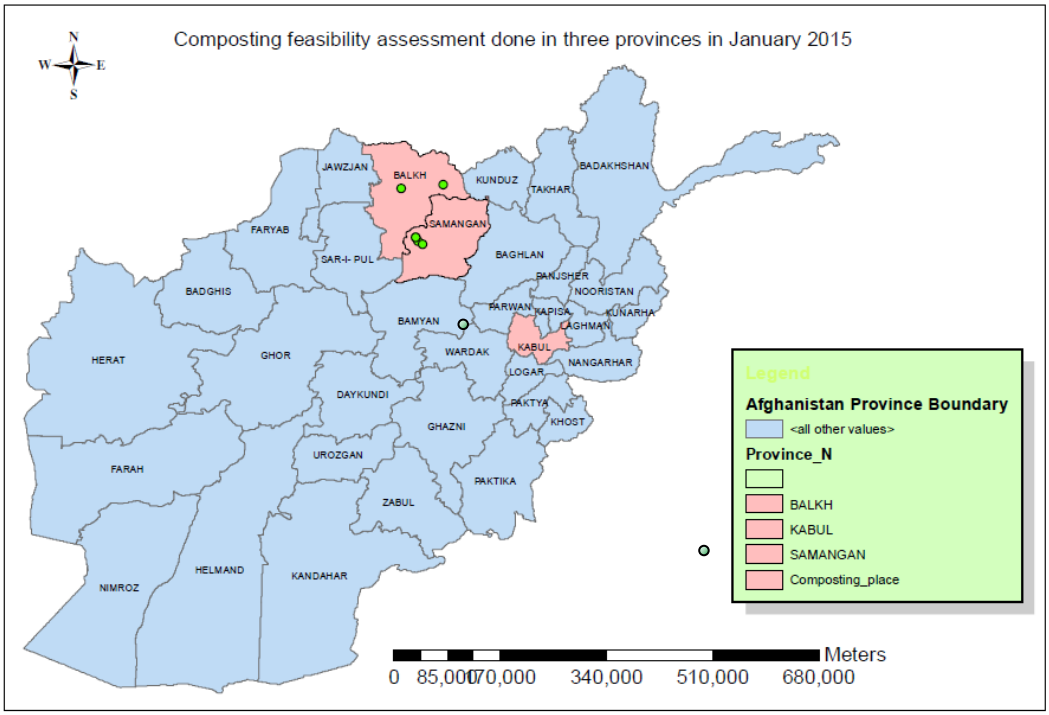


**Figure 1. Study locations**

## Strengths, weaknesses, opportunities and threats analysis

This study applies SWOT as a research tool in the study area. Qualitative field investigations, such as transect walk, focus group discussions (FGDs), and interactive workshops were conducted to address the components of the SWOT analysis.

## Transect walk

Five transect walks were chosen for visual observations in five villages to identify the compost locations, land application of the compost, their technological interventions, toilet situation, and transportation of faecal matter to the land. Photographs were taken during the transect walks to provide image-based scenarios of the T-CLSS for analysis.

### Focus group discussion

Five focus group discussions (FGD) were organised in five villages to assess the existing situation and address the key SWOT components. Farmers, community leaders, elders, the mullah (religious leader), teachers, community development counsel (CDC) members and other villagers were the participants of these focus groups. Each FGD consisted of 10-20 people (primarily men, who are mainly responsible for T-CLSS activities) for spontaneous discussions on previously designed open questions based on T-CLSS in their areas. ACF WASH and FSL (food security and livelihood) team members communicated with the participants to support the principal investigator in translating and facilitating the whole discussion. All FGDs were recorded using audio recorders and analysed by double-checking afterwards.

### Interactive workshops

Small (10 ACF participants) and large (25 participants including other stakeholders) interactive workshops (IWs) were organised (e.g. Skapetis and Gerzina, 2012). Open questions were asked during the IWs based on the research objectives of getting to know the overall SWOT components and validating the information collected from the fields. The information were presented in tabular format to the comparative scenarios of the SWOT components for both peri-urban and rural areas.


**Photograph 1. T-CLSS practices in three different provinces**

## Results and discussions

### Existing T-CLSS situation

Most of the toilets in the peri-urban context are urine-diverting vault toilets, and in rural areas all of the toilets are traditional vault toilets without urine diversion. Most of the toilets in the peri-urban area are emptied by local farmers who apply faecal compost to their land, and in rural areas toilets are emptied by each household and also applied to their own land for agro-productions. In most cases, faecal matter is

transported by either donkey, horse or humans (particularly adult men). The marketing system for selling the agro-products in the local markets was seen only in peri-urban areas. In the case of rural areas, farmers consumed the agricultural products produced by faecal compost themselves.

### Strengths

Table 1 shows the SWOT components of the T-CLSS in both peri-urban and rural contexts in Afghanistan. Results from FGDs and IWs for the peri-urban area of Kabul and rural areas reveal several T-CLSS strengths. One of the major strengths is the socio-cultural acceptability of the system over hundreds of years, particularly the positive approach to dealing with faecal matter and consuming the agro-products produced by faecal compost, rarely seen in many other parts of the world, especially in the contexts of peri-urban settlements (e.g. Mongolia) (Uddin et al., 2015) and in Muslim communities in Pakistan (Nawab et al., 2006). In peri-urban area, a total number of 58 farmers have been running the system throughout the year by collecting faecal matter from traditional urine-diverting vault toilets in the village and also from outside villages to fulfil the demand for agricultural productions and of local markets. The majority of farmers are not interested in using chemical fertilizers due to the negative impacts on their land and prefer organic compost, particularly the fertilizers produced by faecal matter. Between 300-500 Afghani/ 5-9 USD is paid by households to the farmers for each emptying operation, which represents another strength, with the establishment of businesses at the local level. In rural areas, most villagers have their own land where they can apply traditional faecal compost to close the loop of traditional sanitation system. The farmers and communities are in favour with improving the existing system. However, they were not being able to improve the system due to lack of technical knowledge and availability of funding.

### Weaknesses

Several weaknesses were found (Table 1) during the FGDs and IWs in both peri-urban and rural areas. Little/no funding and lack of capacity (technical and non-technical) were found to be the major weaknesses in both rural and peri-urban contexts. Not a single co-operative exists in either area for developing and running the systems properly and generating local funds. In Afghanistan, no policy or regulation exists on human faeces composting or its application, which can be also considered as a weakness for T-CLSS. The existing system needs a long time (average of 1 year) to mature the compost and for application. There is no application during the winter, and it has been also revealed that the composting process was not done properly before application in both peri-urban and rural areas. It may increase the risks of faecal contaminations of both soil and streams where they get drinking water and product agricultural products. In peri-urban area some farmers still face land scarcity for continuing agricultural production by the faecal compost. On the other hand, communities in rural area have sufficient lands for their production.

### Opportunities

There was a list of opportunities identified during the FGDs and IWs. Good quality agro-products can be produced by faecal compost in both peri-urban and rural areas. There are some business and job opportunities created due to the existing system, particularly in the peri-urban context. Results also show that the urine separation system might be possible to introduce in rural areas to reduce the load of work and to decrease the heavy dilation and mixing of urine and faces, as currently there is no urine separating toilet system in the rural areas. The evidence from existing system may catalyse to advocate government and related stakeholders for improving the system and to reduce the T-CLSS-borne risks and hazards.

### Threats

There were very few threats raised in both peri-urban and rural areas. One of the major threats is the health and environmental risks of the T-CLSS transmitting water-borne diseases and environmental contaminations. There was strong possibility of contamination of the streams alongside the villages in rural areas where almost everyone collects water for drinking and other purposes. Unsafe handling of faecal matters during emptying, collection, transportation, and application presents the potential risk of infections and contamination of food and the environment. Application of chemical fertilizers was also considered as one of the threats, particularly in rural areas due to insufficient and incorrect organic and faecal compost.

**Table 2. SWOT on T-CLSS in peri-urban and rural Afghanistan**

| Peri-Urban | Rural |
|---|---|
| **Strengths** | |
| • Socio-cultural acceptance of faecal matter application.<br>• A good number of farmers using this system.<br>• Demand of marketable products produced by faecal matter both in local and city central markets.<br>• Non-interest in chemical fertilizers.<br>• Existing historical system; introducing a completely new system, rather than improving the existing system, is not required at the moment.<br>• Higher production by T-CLSS than low-quality chemical fertilizers.<br>• Farmers' interest in improving the system.<br>• Availability of agricultural land among farmers.<br>• Customers know the faecal matter products.<br>• Faecal matter is available in sufficient quantity and they also receive money from the community. | • Socio-cultural acceptance of faecal matter application.<br>• Almost every household has been using the existing system for hundreds of years.<br>• People are interested in improving the system.<br>• Most of the people have their own farming land where they can apply faecal compost.<br>• A new pit system has been introduced during the last two years.<br>• Equal production compared with chemical fertilizers.<br>• Interested in coordinating with NGOs/institutions.<br>• Interest in creating co-operatives among the farmers using the system. |
| **Weaknesses** | |
| • Lack of funding and capacity to improve the system.<br>• Lack of policy and regulation.<br>• Lack of skilled human resources and lack of technical knowledge on the system.<br>• Lack of technology innovation.<br>• Little/no support/subsidies/actions from central or local government.<br>• No farmer co-operatives exist in the area and they are not organised for the existing system.<br>• Not enough production based on demand.<br>• Some farmers still face land scarcity. | • Traditional compost is not sufficiently available.<br>• The existing system takes more time (almost 1/2 year) to build up the compost.<br>• No cooperatives, no interest in a large group to manage faecal composting.<br>• Lack of funding and capacity to improve the system.<br>• Lack of policy and regulation.<br>• Lack of skilled human resources and lack of technical knowledge on the system.<br>• Lack of technology innovation.<br>• Little/no support/subsidies/actions from both central and local government and NGOs to improve the system.<br>• No application during winter. |
| **Opportunity** | |
| • Job and business creation through existing system marketing and technology innovation.<br>• Interest in creating co-operatives among the farmers using the system.<br>• Production of good quality ago-products by using the existing system rather than chemical fertilizers.<br>• Advocacy for clear regulation and policy interventions by the government.<br>• Development of traditional and improved CLSS.<br>• Application of urine for agro-production.<br>• Income generation. | • Production of good quality ago-products by using the existing system rather than chemical fertilizers.<br>• Advocacy for clear regulation and policy interventions by the government and NGOs.<br>• Development of the traditional system into improved CLSS.<br>• Possibility of improving soil fertility.<br>• Urine-separation system can be developed for land application.<br>• Income generation. |
| **Threats** | |

| | |
|---|---|
| • Health risks due to transmitting infectious agents and pathogens during traditional CLSS.<br>• Environmental threat (especially to aquifers).<br>• Climatic condition.<br>• Complaints in neighbourhoods due to the bad smell in the areas concerned.<br>• Land will be decreased because of migration from rural areas to Kabul city.<br>• Future plan for septic tanks due to modernisation can impact household budgets. | • The streams where they collect water might be affected by this system.<br>• Health risks due to transmitting infectious agents and pathogens during traditional CLSS.<br>• Climatic condition.<br>• Application of chemical fertilizers. |

## Conclusions

Participatory research tools have been used to analyse the SWOT components for the T-CLSS in peri-urban and rural Afghanistan. The results show that T-CLSS is socio-culturally acceptable in both rural and peri-urban areas of Afghanistan and it can be considered as one of the strengths for future improvement and replication of the system. There are opportunities and interests to develop new system and improve the existing system to reduce the threats of improper dealing with human feces. Therefore, it is highly recommended that the feasibility of improved CLSS be assessed, taking into account the T-CLSS in terms of its socio-technical, economical and institutional aspects. As the overall quality of soil in Afghanistan is poor in terms of low organic content, unavailability of nutrients, higher pH and calcium carbonate, and low water-holding capacity (UCDAVIS, 2013), faecal compost might improve the quality of soil if properly produced and applied. Alternatively, it might be possible to apply urine after separation to the agricultural fields, an option that might need to be explored with proper scientific and social research.

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