Ecological sanitation in humanitarian contexts

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Introduction
According to UNICEF, 2.4 billion people in the world currently live without improved sanitation and 892 million people practice open defecation. Providing sanitation solutions in crisis contexts is a major challenge for humanitarians because, in order to be effective, they need to be implemented over a longer period than the normal timescale of humanitarian action, and they need to be integrated into the existing institutional system. Whether traditional or ecological, there are three links in the sanitation chain:

1. Access – this involves collecting the waste water and excreta produced by a user (household, business or administration), and storing these in a pit or tank (non-collective sanitation) or directing them into a sewage network (collective sanitation);
2. Evacuation – this involves transporting waste water and excreta away from buildings to a sewage treatment plant. This can either take the form of drainage (non-collective) or a sewage network (collective);
3. Treatment – this stops the waste water and excreta from being environmentally damaging and makes them harmless from a health point of view before they are re-used or disposed of.

Human excreta include:

- **Organic or carbonaceous matter** found in faeces, which is biodegradable;
- **Nutrients** (nitrogen, phosphorus and potassium), which are mainly found in urine and which are required by plants for their development;
- **Pathogens**, such as viruses, bacteria and parasites, that are found mainly in faeces and can cause infectious diseases. Urine is rarely contaminated unless it is mixed with faeces.

In humanitarian contexts, the most common sanitation solution is the ‘pit latrine’, which is a simple pit dug in the ground. These can pollute surface water and groundwater. In comparison, ecological sanitation has several advantages:

- Health and environmental risks are limited in the short term, but also in the long term, because after the users have left (refugees, IDPs or others) and the facilities have been dismantled, the ground where the ecological toilets were located is healthy;
- The cost of agricultural production is reduced by replacing chemical fertilizers with natural fertilizer from the toilets;
- Technology that is often simple to set up and which can be reproduced at home by those who use them temporarily in emergency situations.
The characteristics of ecological sanitation:

Ecological sanitation solutions, which are more commonly used by development organisations, are gradually being put in place by humanitarian actors in emergency and post-emergency contexts (e.g. the installation of vermicomposting toilets in Cox’s Bazar camp in Bangladesh by Oxfam).

Based on the principle that sanitation is a process that allows people to live in a healthy environment, ecological sanitation goes further than traditional sanitation by recycling biomass and nutrients and respecting the organic matter cycle. Ecological sanitation has several objectives: reducing health and environmental risks related to sanitation, reducing bad smells and the number of flies, and improving the quality of water and soil by recycling organic matter.

Ecological sanitation is based on the following concepts:

- Differentiating between types of matter (faeces and urine);
- Treating and re-using residues;
- Using energy-saving techniques;
- Applying a local approach;
- Considering ‘waste’ as a resource.

Examples and models:

1. **VIP (Ventilated Improved Pit)**

   The VIP (Ventilated Improved Pit) latrine was initially designed to reduce the number of flies, which are vectors of disease. The double pit VIP (urine separation) also has an environmental objective and, thanks to the two pits, makes it possible to alternate between the two. Thus, the first pit is used for a certain length of time depending on the size and the frequency of use. Once it is full, its defecation hole is closed and the hole of the second pit is opened and then used for a certain duration. While the second pit is being used, the composting process takes place in the first pit, making evacuation easier and less risky, and potentially providing fertilizer for agricultural use. The defecation hole of the second pit is then closed and the hole in the first one is then re-opened, and so on.

2. **Eco-San Toilets**
A simple 60 litre container is placed under the toilet seat to recuperate the solid matter and direct the urine towards a separate container. This allows the re-use of the waste for agricultural purposes after distinct sanitisation processes for the urine and the solid matter. The container needs to be replaced regularly and an agricultural re-use system needs to be established.

### 3. Vermicomposting toilets

These toilets have a pit in which there are faeces-consuming worms. In the right conditions, the advantage of this process is that it considerably reduces the need to empty the waste as it is digested and transformed by the worms. The vermicompost (the pile that is formed after treatment by the worms) can be re-used for agricultural purposes, which requires a specific design so that it can be removed.

### 4. Arborloo toilets

The Arborloo is based on the principle that human excreta (urine and faeces) are a resource for plants. This simple technique uses a pit into which the excreta fall over which a seat is placed. Once the pit is full, the movable seat is then place over another pit and a tree is planted above the full pit so that its roots are nourished by the excreta.

**Re-use of excreta:**

Re-using excreta is an important part of ecological sanitation but it is often difficult to implement because it requires a lot of awareness-raising about hygiene and re-using human excreta, which is often taboo or perceived negatively, and a collection-treatment-re-use system needs to be established.

It should be pointed out that the sanitisation of excreta can be a complex operation. Urine can be sanitised by being stored in airtight containers in the sun for between 30 and 60 days (during this conservation period, the urea contained in the urine is broken down to form ammonium/ammoniac. This reaction is accompanied by a change in pH – which becomes basic – thus allowing the elimination of...
any infectious germs). For the faeces, the sanitisation is more complex and requires an increase in temperature which can either be natural (compost pile) or artificial, and of varying duration.

However, even though re-use is an important part of ecological sanitation, it is possible that in certain contexts it will not be possible or too complicated to put in place. In certain cases, ‘ecological’ sanitation solutions can therefore be implemented without re-use because they still help to preserve users’ health and environment.


**Particular care is needed regarding the following points when implementing an ecological sanitation project compared to a more traditional humanitarian sanitation project:**

- There is a need for more awareness-raising and support for beneficiaries in order to limit the misuse of dry toilets (e.g. solid waste thrown into the toilets, the use of chemical products for cleaning, etc.) and to combat cultural reticence about re-using human waste;
- The transportation and re-use of excreta need to be done in the right conditions in order to avoid health and environmental risks;
- Analysis of agricultural opportunities is required before the project is implemented.

**To explore this subject further:**

There is still relatively little sharing of experiences related to ecological sanitation in humanitarian contexts (whether positive or negative).

Nevertheless, here are a few references to explore this subject in greater depth:

- [https://www.toilettesdumonde.org/ressources/](https://www.toilettesdumonde.org/ressources/)
- [http://www.elrha.org/project/oxfam-tiger-worm-toilets/](http://www.elrha.org/project/oxfam-tiger-worm-toilets/)
- [www.eawag.ch](http://www.eawag.ch)
- [www.gret.org](http://www.gret.org)
- [www.susana.org](http://www.susana.org)