

Fact sheet on Sanitation

Classification of sanitation systems



If a community demands an improvement to its sanitation provision, it is advisable to consider the following key issues before investing in large a sewerage and wastewater treatment combination. Designers should look at the availability of water as well as financial, technical, institutional and socio-cultural resources by answering the following questions:

1. Is there sufficient water to run through a conventional sewerage system?
2. Do the climate conditions favour the construction and operation of a conventional sewerage system?
3. How much money is available for firstly design and construction and secondly the operation and maintenance of the sanitation system?
4. Are there trained or trainable personnel available to operate and maintain this system?
5. Do the institutional, environmental and social conditions support the construction and operation of a sewerage system?

The answers to these questions provide an insight as to the influence exerted by each of these aspects on the feasibility of different sanitation systems.

<u>Aspects:</u>	<u>Factors of influence:</u>
Technical	Availability of technical expertise
Environmental	Availability of resources: water, energy and nutrients
Financial	Financial capacity
Institutional	Public or private operators
Policy/legal/political	Urban or rural setting
Socio-cultural	Low, medium or high income customers

By considering the different aspects of the sanitation system and identifying the influence they will play in its function it is possible to select the most appropriate option from the wide range of sanitation systems available e.g. piy latrine is not appropriate for an area with a high water table.

The most common categories for human excreta and grey water collection, transportation and treatment i.e. sanitation systems, are given in terms of whether they are¹:

- *Wet or dry;*
- *On-site, off-site or hybrid; and*
- *Separated or mixed at source.*

¹ Based on: Taylor, K., J. Parkinson, J. Colin, *Urban sanitation; a guide to strategic planning*, London, 2004

Wet or dry:

This refers to the use of water to transport excreta²:

- *Wet* systems depend on water to transport excreta.
- *Dry* systems don't transport excreta at all or use other means to transport excreta, such as vacuum trucks, etc.

On-site, off-site or hybrid³:

This refers to the final disposal or recycling of excreta and grey water:

- *On-site* systems retain both excreta and grey water on or near the point at which they are generated.
- *Off-site* systems remove both excreta and grey water from the vicinity of the plot for disposal elsewhere.
- *Hybrid* systems are a mixture of on-site and off-site systems. They are used for systems that retain solids on or near the plot but remove wastewater elsewhere.

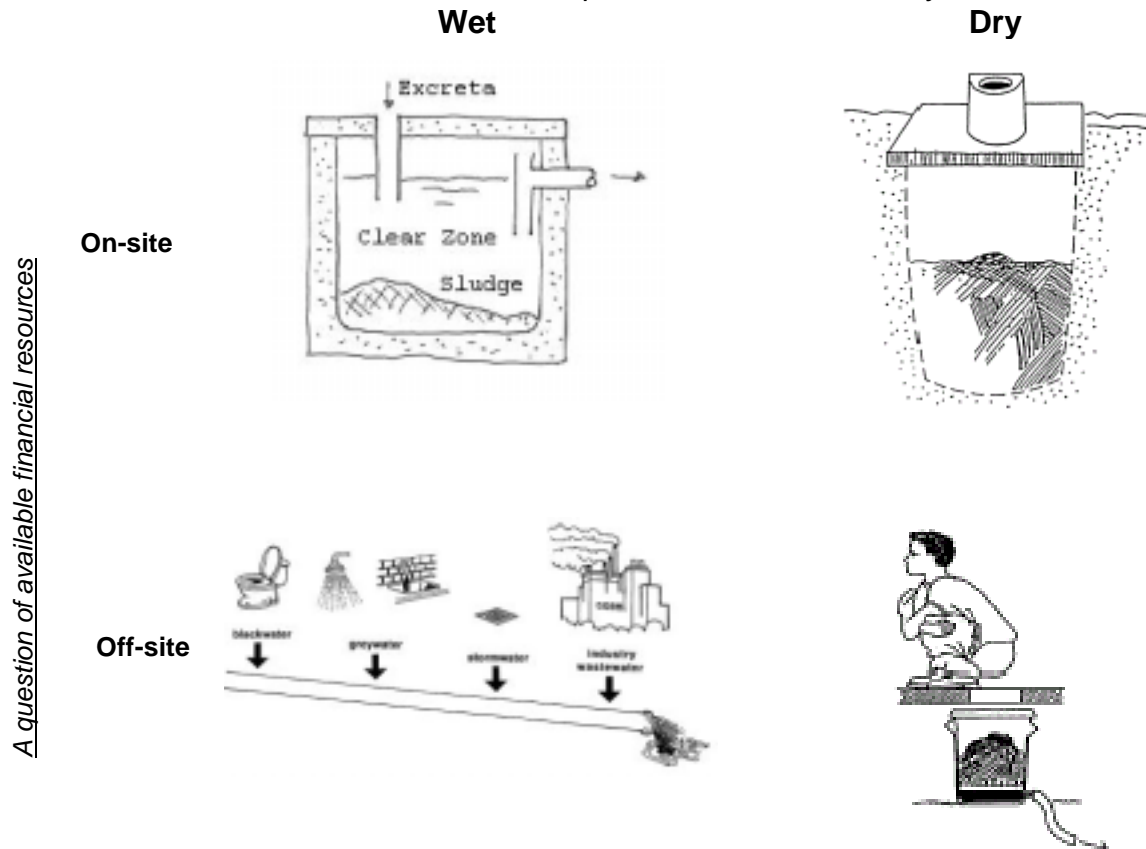
Separated or Mixed at source

This refers to the level of separation applied to different wastewaters and/or human excreta flows e.g. separation of black water from grey water or separation of faeces from urine etc.

² Anal cleansing is not taken into account

³ Other terms, which are often used with respect to on-site and off-site systems are respectively *decentralised* and *centralised*.

A question of water availability



Illustrations are derived from SIDA and SANEX

A question of financial resources: On- or off-site sanitation systems

Off-site sanitation requires the transportation of waste material to a different place where it can be treated. Conventional sewerage systems are the most common wet off-site sanitation method where urine and faeces are mixed with water (black water), which is transported off-site via a network of sewers to a wastewater treatment plant.

The choice of on- or off-site sanitation for a specific waste material flow (urine, faeces, grey water) directly affects the volume of material that is collected and therefore needs to be treated. In on-site systems e.g. pit latrines, pour flush toilets etc., treatment is carried out in situ and transportation of material is unnecessary. The transportation and treatment of large amounts of contaminated water significantly increases the cost of conventional sewerage systems as compared to other wet and dry on-site methods.

A question of water: Wet or dry sanitation systems

Dry sanitation systems, which do not rely on water for transportation, are very common in arid areas. Various forms exist, both on-site and off-site systems. The most common dry on-site system is a conventional pit latrine. The basic feature of a pit latrine is a pit or chamber, in which excreta is collected and stored. This pit is usually unlined and moisture leaches into the

surrounding ground. A new latrine is constructed when the first one is full. The VIP latrine (Ventilated Improved Pit latrine) is a pit latrine with a ventilation pipe introduced into the pit to reduce odour and pest problems.

Single and double pit latrines can be designed to permit emptying and re-use. However, in most cases it is more convenient to employ a twin-pit latrine for this purpose. The first pit is used for a given time until it is full. It is then closed and the second pit is put into use. When the second pit is also full, the first pit is emptied and used again. A period of at least 12 months is left before the emptying of the latrine, which serves to stabilise its contents and reduces the risk from pathogens in the excreta. Where there is a risk to drinking water through the leaching of latrine contents the pit may be sealed. This also permits mechanical

emptying of the latrine by vacuum trucks. Alternatively, householders may empty the pits by hand and use the material as a soil conditioner for food production.

The most common wet off-site system is the conventional sewerage and wastewater treatment combination discussed previously. A common wet on-site technique is the pour-flush toilet, which operates in combination with either soakage pits or septic tanks. The pour-flush toilet is adapted from the pit latrine design. However, the use of water to remove the excreta means that the pit does not have to be directly below the toilet but can be at a distance of some metres. The choice of soakage pit or septic tank depends upon soil conditions and the risk of contaminating drinking water sources through leaching from the pit. Septic tanks will need to be de-sludged periodically.

A question of resource recovery - Separated or Mixed at Source

When considering the implementation of sanitation systems in households, it is necessary to consider a number of different material flows. A household produces not only black-water (excreta mixed with water), but also grey water from kitchens and bathrooms. In addition, rainwater is collected from roofs etc. All these streams can be collected at once and combined into one

stream of wastewater as is the case for a conventional sewerage system. Alternatively, these wastewater streams can be collected and treated separately.

The level of separation at source, depends on a number of factors, but is influenced by the final destination planned for the material flow. For example, if we plan to use rainwater for irrigation purposes (be it for gardens or fields) it should not be mixed with black water and grey water. Alternatively, if we are attempting to recycle nutrients found in excreta back to the soil it is necessary to separate the different elements of excreta (urine and faeces) and also to ensure that these are separated from grey and rainwater.