

Ecological sanitation

Ecological sanitation (ecosan) is aimed at closing the nutrient and water cycles in a safe way, while wasting few resources. Nutrients from human excreta are returned to the soil to fertilize crops. A shift towards ecosan needs to take into account the prevailing social contexts and physical environments.

Variations in sanitation and water arrangements

Sanitation arrangements vary in the six peri-urban settlements that have been assessed in the study*. These six settlements are: Addis Ababa, Ethiopia; Cuernavaca, Mexico; Kabale, Uganda; Majumba Sita, Tanzania; Manyatta, Kenya; and Stockholm, Sweden. Characteristics of these arrangements include:

- Access to water – this can vary from indoor tap water to wells and vendors. Most areas face water shortages at least during the dry season or from supply failure.
- Variation in toilet facilities – this can vary from a complete lack of sanitation to full coverage of WCs.
- Wastewater disposal - in most locations wastewater is discharged into nearby ravines or onto the ground, and the sewers often leak into the streets. Pit latrines and septic tanks often overflow and/or collapse during the rainy season, causing environmental as well as health problems.
- Reuse of nutrients from human excreta - this can vary from extensive use in situ to no reuse at all.

People's perception of faeces and urine

Culture, economy, urban/rural population pattern and gender are among the factors influencing how people perceive human excreta and arrangements and devices for managing faeces and urine. Moving to urban centres seems to lead to changes in many views held in rural areas.

There is a general view that the odour and appearance of faeces is more repulsive than that of urine.

But over time the odour of urine can become worse when the urea in urine converts to noxious ammonia gas. Odour from intestinal gases from others is seen as repulsive, but people tolerate their own odour while actually using a toilet.

There seems to be a general societal norm that touching or handling fresh excreta should be avoided. However, babies and sick people in the home need assistance to manage defecation and disposal of fresh excreta. Women are often said to be conditioned to accept this task, and the faeces of babies are considered less offensive than those of adults. This causes unhygienic practices with few or no barriers to the transmission of pathogens, e.g. there appears to be little concern about disposal of the wastewater from washed diapers. Only rarely was it acknowledged that people come into direct contact with their own faeces, and the important issue is how hygiene is maintained.

In most societies it is common to observe the faeces and to a lesser extent the urine to determine a person's health status; this is even more so for babies. At the same time, there is an expressed view that faeces should not be seen. If, however, the faecal matter is treated by dry storage or composting it then resembles soil or humus, and the avoidance behaviour disappears.

People seem to have a more relaxed view on urine, to the extent that it is often used for treatment of minor ailments such as small wounds and as an insecticide to kill banana weevils. In some societies it is recommended to drink small amounts of urine to cure allergic reactions or measles.

People perceive cow dung as safe and have little or no reservations to touch it. However, pigs are considered dirty for religious reasons or because of their scavenging habits. Hens and dogs are also scavengers, but only dogs are usually not acceptable as human food.

Changing to ecosan

A shift away from installation of conventional solutions such as pit latrines and flush toilets to ecosan may be promoted when there is a lack of water for flushing, or if water-logging or rocky ground makes pits and sewer ditches inappropriate. Also, pits in sandy soils may collapse or pollute the groundwater.

Population density affects both how crowded dwellings are, and how much open space there is between houses. Crowding often restricts the kind of sanitation that can be built in a dwelling, while the house plot size determines whether reuse of human-derived nutrient fertilizer is possible. Socio-cultural reasons for a shift to ecosan include factors such as the need to reduce malodour and limited investment and running costs. Improved health seems to be important only in the event of an epidemic. Dignity and status may also become more important factors as toilet improvement is promoted.



Figure 1: Urine-diverting double-vault dry toilet built indoors (Guangxi Province, China)

The question whether to install an ecosan toilet in or attached to a dwelling remains an open issue. It is well known that the WC has gained popular support by being placed indoors, thus simplifying access and maintenance, and increasing privacy and security, especially for young females. Residents without ecosan

experience may worry about possible odour and sanitation engineers may fear that an indoor ecosan toilet may exclude possible future installation of a WC.

Reasons for not adopting an ecosan solution include, apart from the fear of malodour and lack of space, a perception that it is antiquated and not allowed by authorities. It is therefore necessary to manufacture high standard toilets that are appealing and to include ecosan in national sanitation strategies.

Health and design

A shift from conventional pit or flush toilets to ecosan will be more easily accepted if there is little or no odour from the excreta. Covering the faeces with ash or lime effectively reduces the smell, and zero smell can be achieved by ventilation. Transforming the faeces, paper and ash to a hygienic product which looks like soil or humus makes handling acceptable. For advice on treatment methods and reuse in agriculture, see EcoSanRes Fact Sheets 5 and 6.

Gender and age differences

Women seldom urinate in the open. But men are excused when doing so. Defecating in public is never considered acceptable, with the exception of small children. Faeces from babies are often perceived to be free from pathogens and less offensive than those originating from older children or adults.

There is some concern about disposing of menstrual blood in the ecosan toilet, and in some communities such a practice poses a challenge for reuse of urine as fertilizer.

In households with more than one person, it is usually the task of a woman to clean the bathroom and/or toilet. In the case of urine-diversion toilets, the new tasks of emptying the urine container and the faecal bin seem to be that of males. Thus, ecosan-related tasks may not contradict societal norms about the division of duties while ideas about whether or not to recycle nutrients can introduce new values.

Expectations and values

There seems to be a common view that urban sanitation services should be provided by a city council, an NGO or some other organisation. The relationship between residents and politicians is sometimes described as an exchange of votes for favourable services. Poorer sections of society may not be favoured in this way and sanitation designs that are installed and operated by the household can be a tempting alternative for the less influential.



Figure 2: Dry urine-diversion toilet (Source: Wostman Ecology)

Residents are generally prepared to pay a fee for services provided. One of the most valued aspects of a sanitation system is that it should operate securely without failing.

A number one priority for the toilet facility itself is cleanliness. People tend to choose the clean one first, regardless of design or type.

Environmental effects

The awareness of environmental effects of sanitation arrangements varies among residents. In the absence of solid waste collection, households use the toilet, also the dry toilet, as a waste bin for hazardous products. Thus, the quality of the sludge or compost may be unfit for reuse in gardens.

People who rely on groundwater for drinking seem to be aware that this source can become contaminated by leakage from sewers and dug latrines, causing health problems.

Pollution of surface waters is obvious in many places, and therefore even

better understood. In some areas the authorities are blamed for this pollution, since the treatment of pollution is regarded as a municipal responsibility rather than an individual one.

Greywater is claimed to be smelly, dirty and unpleasant to handle, but rarely hazardous. It is considered easier to treat than blackwater, and may be infiltrated in the soil.

Reuse of the products

Urban residents often have an interest in gardening. Depending on available space, garden activities range from flowers in flats to plots with trees and vegetables. There is a common view that residents should be using the treated urine and faecal matter in urban agriculture. But there are few records of this occurring. However, trees are being planted on abandoned latrine pits.

There are also disincentives to gardening, such as diffuse security of land ownership, produce being destroyed by dogs and chickens, and theft. Farmers, on the other hand, seem to have a positive view on the fertilizing capacity of the products from ecological sanitation. For dense urban communities it is more feasible to organize a system where the products are used on the surrounding farmland.

Possibilities of a shift towards ecosan

The goal of closing the nutrient and water cycles is yet to be fulfilled on a large scale. However, most people agree that it is wise to reuse nutrients and to save resources. It is therefore possible that recycling practices can be incorporated into daily routines. This process of change can be lengthy, and may not be easily achieved. However, it is important to show that a shift towards ecological sanitation is possible. Different societies often use different sanitation solutions, and it is important to provide a choice of ecosan solutions according to the specific needs of the community.

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EcoSanRes is funded by the Swedish International Development Cooperation Agency (Sida)