

Good Practice 7

Rural EcoSan Systems

Ecological sanitation ('EcoSan') systems comprise a urine-diverting toilet (see GTZ, 2005) with greywater collection and use. The diverted urine ('yellow water') is collected in a container and, after storage for around one month (longer if the temperature is below 20°C) and then dilution with (grey) water, used as a fertilizer on, for example, a greywater-irrigated garden plot or field. The faeces and any flush water ('brown water') are dehydrated and partially composted within the toilet vault and, after removal, used as a soil conditioner on the same garden plot or field.

There are two above-ground vaults used alternately in the same way as the vaults in UD-VIV latrines ('Good Practice 3'), alternating twin-pit VIP latrines ('Good Practice 2') and alternating twin-pit pour-flush toilets ('Good Practice 4'): one vault is used for a year, then the other vault used for the following year, towards the end of which the first vault is emptied and its contents used as soil conditioner. The brown water may or may not also contain used anal cleansing water ('beige water'): some EcoSan toilets mix brown and beige waters, other keep them separate (Rosemarin et al., 2007). A typical EcoSan toilet suitable for use in rural areas and low-density small towns and large villages and a ceramic urine-diverting squat-pan are shown in Figures 1 and 2. There are several other designs available (see 'Further Information' below).

EcoSan systems thus seek to keep all the various waste flows (yellow, brown and grey waters, sometimes also beige water) separate, so that the nutrients (nitrogen, phosphorus and potassium, which are mostly in yellow water), the organic fraction (mostly in brown water) and the water (mostly in greywater) can be used optimally to 'close the loop' between the waste we produce and the food we eat. This is the basic 'philosophy' of ecological sanitation - we each excrete almost enough nutrients to produce all the staple carbohydrate (maize, rice, potatoes, etc.) that we eat, so we should seek to recycle our waste nutrients and not waste them.

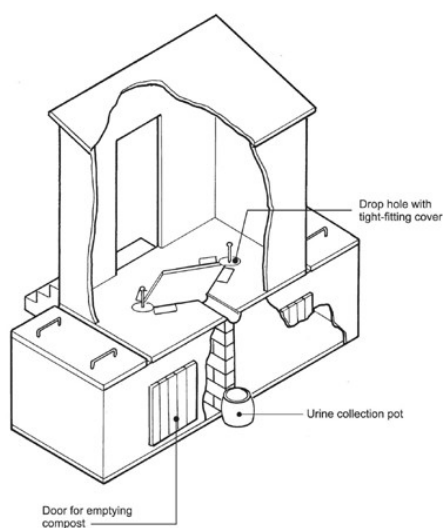


Figure 1. Typical urine-diverting double-vault dehydrating/composting latrine (from Scott, 2004).



Figure 2. Ceramic urine-diverting squat-pan (urine diversion on the left, faeces deposition on the right). Some versions also separately divert beige water.

Provided the EcoSan system is properly designed and built and well operated and maintained (see Mvuramanzi Trust, 2005), this use of human waste products is safe - i.e., it does not pose significant health risks (Peasey, 2000; WHO, 2006). Recent (unpublished) work in Vietnam, where an EcoSan system, the Vietnamese urine-diverting double-vault composting latrine, has been in widespread use since the 1950s (well before EcoSan became 'fashionable'), has shown that almost all *Ascaris* eggs are dead or at least non-viable after only six months retention in the vault not in use.

Note 1: Urine-diverting alternating twin-vault ventilated improved vault latrines (UD-VIV latrines or 'eThekwini latrines' - see 'Good Practice 2') can easily be converted to be 'proper' EcoSan toilets: the diverted urine would be collected in a container (as above), diluted and used as a fertilizer, and the dehydrated/composted faeces would be used as a soil conditioner in a greywater-irrigated garden plot or field.

Note 2: Arborloos (see 'Good Practice 1') can also be considered a rural EcoSan system.

References

- GTZ (2005). *Urine Diversion Toilets* (Technical Data Sheet for Ecosan Components). Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, Eschborn, Germany; available at: <http://www.gtz.de/de/dokumente/en-ecosan-tds-01-b1-urine-diversion-toilets-2005.pdf>.
- Mvuramanzi Trust (2005). *Taking Care of Our EcoSan*. Mvuramanzi Trust, Harare; available at: www.personal.leeds.ac.uk/~cen6ddm/EcoSan/TakingCareOfMyFamilyEcosan.pdf.
- Peasey, A. (2000). *Health Aspects of Dry Sanitation with Waste Reuse*. WELL/WEDC, University of Loughborough; available at: <http://www.lboro.ac.uk/well/resources/well-studies/full-reports-pdf/task0324.pdf>.
- Rosemarin, A., Kvarnström, E., and others (2007). Ecosan systems that accommodate anal washing. *Zer0-M Journal* (5), 9-14; available via: <http://www.zer0-m.org/phpatm/index.php?&direction=0&order=&directory=Zer0-m%20Journal>.
- Scott, R. (2004). Urine-diversion composting latrines, available at: <http://www.irc.nl/page/22831>.
- WHO (2006). *Guidelines for the Safe Use of Wastewater, Excreta and Greywater - Volume 4: Excreta and Greywater Use in Agriculture*. World Health Organization, Geneva; available at: www.who.int/water_sanitation_health/wastewater/gsuweg4/en/index.html.

Further information (with links to many publications on EcoSan systems) is available at:

- Stockholm Environment Institute 'EcoSanRes' (www.ecosanres.org)
GTZ EcoSan (www.gtz.de/en/themen/umwelt-infrastruktur/wasser/8524.htm)
University of Leeds (www.personal.leeds.ac.uk/~cen6ddm/EcoSan.html)

Prepared by Duncan Mara, University of Leeds, UK, December 2007 (amended April 2008)