

PAPER: THIRD INTERNATIONAL CONFERENCE ON ECOLOGICAL SANITATION

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3. Headings: Upper case bold. No indents. One blank line before and after each heading.
4. Photographs, figures and tables: Do not use colour. Shading and hatching are permitted.
5. Referencing should follow the Harvard method.
6. The paper should not be longer than 6 pages.
7. Save the paper using the format "paper-author's name.doc" and submit via e-mail to the conference organiser, Ms Carla de Jager, at cdejager@saice.org.za.
8. Final deadline for submission is **Monday 18 April 2005**.

Title	Ecosan– a step towards sustainable rural development in Eastern Europe
Keywords	ecological sanitation; double vault urine diverting toilet; nutrient cycle
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Short CV for Introduction Purposes (100 words max)	
Photograph attached (jpg)	

Abstract

In this paper the implementation of double vault urine diverting toilets and waterless urinals in a rural Ukrainian school as a pilot-project is presented. As a sustainable sanitation system this kind of toilets offer all the benefits of Ecological Sanitation: Protection of water resources, recovery of nutrients and minimisation of water-based infections.

Special attention was turned towards the education of the toilet-users and interested locals, maintenance of the toilets and the hygienically safe reuse of the recovered products (stored urine and decomposed faeces) in horti- and agriculture. Urine with its high content of nutrients and trace elements is an excellent fertiliser and faeces, when treated properly are a good soil conditioner. This is important for the mainly poor population, that cannot afford chemical fertilisers. It was shown that the installation of double vault urine diverting toilets is a low cost, very fast and easy to realise possibility to protect the groundwater and thus improve health conditions. The establishment of ecological sanitation is especially reasonable in regions with no central water supply and no sanitation system except pit-latrines.

Introduction

In rural Eastern European areas most of the population is not connected to a central water supply, in particular after the breakdown of the former Soviet Union. In Ukrainian settlements with less than 20000 Inhabitants only 26% are connected to a central water supply and only 9 % are connected to a sewerage (Tsvetkova 2004). So the majority of the rural population get their drinking water mostly from shallow, private wells. The groundwater is often polluted, mainly by nitrates and faecal bacteria. While part of the nitrates are from agriculture related sources, the faecal bacteria and part of the nitrates have their roots in the traditional and widespread pit-latrines, which are not sealed to the ground and often located close the drinking water wells. Part of the rural population is ill due to the polluted drinking water and shows symptoms of waterborne diseases.



Figure 1: Photos of the old (left) and new school-toilets (Source: Deegener)

In the scope of the project “Co-operation for Sustainable Rural Development“ 3 villages in Ukraine were selected by the NGOs wecf from Netherlands/Germany and Mama-86 (Ukraine) to start pilot-projects in co-operation with the Institute of wastewater management from Hamburg University of Technology (Germany) due to very high levels of nitrate and faecal bacteria in the drinking water. Besides promoting participatory democracy and raising public awareness (the people do not realise that the water makes them ill, because it looks and smells well), the establishment of an affordable groundwater-protecting sanitation system with involvement of the local administration is the major aim of this project. In the following the focus will be on the construction of new school toilets in the village of Gozhuli,

Poltava district (population: 3600).

Sanitation system

For this pilot-project a toilet facility with 3 double vault urine diverting toilets and 3 waterless urinals was installed at a school with 160 pupils (grade 1-9) and 15 teachers. The principle and use of double vault urine diverting toilets (or variations) has been established for many years in countries like Mexico, China and Vietnam (Esrey1998, Del Porto 1999). The introduction of the new technology is rather done in a school than in private homes or other public facilities because of the multiplying effect (not only the children and teachers, but also the parents of the pupils are introduced to the new toilets).

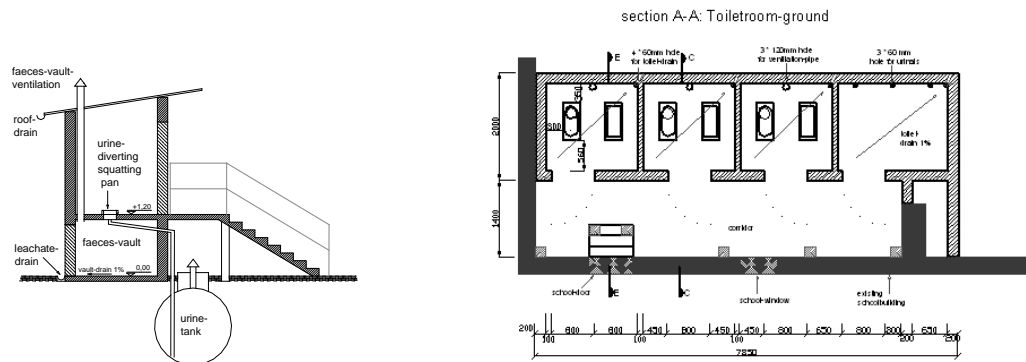


Figure 2: Schematic cross-section of urine-diverting dry toilets (left) and ground plan of the new school toilet

The new toilet is built directly to the school building with the entrance to the toilet from inside the school. So the children do not have to go out in the cold (in Ukraine during winter sometimes minus 30° Celsius) like they had to do before.

For each toilet there are two easily accessible faeces-chambers (vaults) with a sealed floor made from concrete. The vaults are designed such that one is in use for minimum 1 year, then allowed to rest for one year while the other chamber is used. Ventilation pipes were installed from the faeces-chambers to above the roof to avoid odour and flies. By the special design of the compost-chamber-dividing-walls only one ventilation pipe was installed for both chambers (compared to former designs where every chamber has one pipe).

The urine from the separation-toilets and the waterless urinals is collected in two urine tanks of 2 m³ each. The two tanks, similar to the faeces chambers, are necessary for the resting time in which many pathogens are killed or at least reduced. The urine-pipe is guided to the bottom of the tank to avoid ammonia stripping and thus bad odour and nitrogen-losses when fresh urine is deposited into the tank.

Plastic squatting-pans were selected instead of seating pans for hygienic reasons. The pans were elevated 10 cm from the floor for a more comfortable defecation position and to avoid water from cleaning the toilet rooms entering the faeces chambers.



Figure 3: Inside the new school toilets

Maintenance

Maintenance is crucial therefore it is recommended that the users cover after defecation the faeces with dry earth, ashes, sawdust or a mixture of these to minimise the water content and thus odour and flies (cp. Fig. 4). The faeces-chambers and the urine-tank have to be monitored, when one tank/vault is full (faeces-vault up to app. 80%), the urine/ faeces should be directed to the other compartment.



Figure 4: Applying sawdust after defecation (left); applying stored urine in Agriculture (in Romania)

Education

Some ecosan projects failed, not due to a lack of the system, but due to not understanding the system and a lack of maintenance (Austin 2003, Del Porto 1999). Therefore several workshops were held already before installation of the toilets to educate the users (children and teachers) and caretakers of the facility. For the children, easy to understand posters with pictures were developed to explain the correct use of the toilets. It is important that the users keep the urine and the faeces separate as most of the pathogens are contained in the faeces, while the urine (from healthy persons) is mainly aseptic (Otterpohl et al., 2002). But cross-contamination can never be totally avoided.



Figure 5: Photo of workshop for teachers and education material for Ukrainian children

Also the users of the collected urine and faeces have to be educated well. The urine should be used very carefully, e.g. not on edible plants that are consumed raw until more information about the health-risks are available (Vinneras, 2003).

Results and Conclusions

It was shown that the installation of double vault urine diverting toilets is a low cost, very fast and easy to realise possibility to protect the groundwater and thus improve health conditions. It was also shown that with proper education even 6 year old children understand the principle of diverting toilets as a part of Ecological Sanitation because even in the critical first weeks of usage no problem occurred. The new toilet system was accepted very well by the teachers and the pupils. The interest of the parents and citizens in Ecological Sanitation is very high and many want to install ecosan toilets. Also the administration is committed to the benefits of ecosan and want to promote ecological dry toilets especially for rural and peri urban areas.

This pilot-project can act as an example not only for other Ukrainian villages, but for many (Eastern European) countries, which are facing similar groundwater- and health-problems.

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