IMPROVING SCHOOL SANITATION IN A SUSTAINABLE WAY FOR A BETTER HEALTH OF SCHOOL CHILDREN IN THE EECCA AND IN THE NEW EU MEMBER STATES

Margriet Samwel [1], Sascha Gabizon[2]

[1] Women in Europe for a Common Future, WECF, Utrecht 3507 LA, PO Box 13047 the Netherlands, email: margriet.samwel@wecf.eu
[2] Women in Europe for a Common Future, WECF, Utrecht 3507 LA, PO Box 13047 the Netherlands, email: sascha.gabizon@wecf.eu

Abstract: In the World Health Organisation (WHO) European Region, 120 million people do not have access to safe drinking water, and even more lack access to hygienic sanitary facilities. Better management of water and sanitation would prevent over 30 million cases of water-related disease per year in the region. Few data are collected or known about the access to adequate water supply and safe sanitation for public institutions such as schools. Since the independency in former Soviet states like Ukraine, Moldova, Armenia and others, existing central water and sewage systems are often badly maintained and no longer functioning. Women in Europe for a Common Future, WECF, gained experience on issues of water and sanitation in the rural areas of the new assessed EU countries Romania and Bulgaria and in 10 EECCA countries. WECF observed in the rural areas of those countries the most worse conditions of school sanitation: Groundwater is polluted by infiltration of nitrates and micro organism. Visiting the latrine is a threat to children's health. The toilets are far away from the school, do not give privacy and are unhygienic. As much as possible, children and school staff try to avoid a visit of the facility by a low intake of liquids. During the period of menstruation girls prefer to stay at home.
In demonstration projects, WECF has improved the sanitary condition of the schools and shown how to manage human excreta in an affordable, safe and sustainable way. It was shown, that even without a connection to the central water or sewage system, the dry urine diverting toilet is a very fast and easy tool to improving the sanitary conditions of schools in an affordable and sustainable way, and to protect groundwater against infiltration of human excreta.
School sanitation is an issue that needs the attention of regional, national and international policy makers. In order to improve the sanitary conditions in schools, regulations on the adoption of urine diversion systems and the reuse of the human excreta in agriculture are needed.

Keywords: Sustainable school sanitation pit-latrine urine-diverting toilet

Introduction

In the European region, a lack of safe water and adequate sanitation has been recognized as a major cause of child mortality and morbidity, especially in the eastern countries. In the World Health Organisation (WHO) European Region, 120 million people do not have access to safe drinking water, and even more lack access to hygienic sanitary facilities, resulting in waterborne diseases such as hepatitis A, diarrhoeal diseases and typhoid fever. Microbial contamination has been recognised as a prime concern throughout the European Region. Better management of water and sanitation would prevent over 30 million cases of water-related disease per year in the region [1].
Big disparities in water and sanitation are in the countries grouped in the WHO Eur-B sub-region (Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Georgia, Kyrgyzstan, Poland, Romania, Serbia and Montenegro, Slovakia, Tajikistan, the former Yugoslav Republic of Macedonia, Turkey, Turkmenistan and Uzbekistan. Collected data are based on the situation of the total population living in households. Few data are collected or known about the access to adequate water supply and safe sanitation for public institutions such as schools.

Lack of safe sanitation and safe drinking water in the EECCA countries and the new EU member states Romania and Bulgaria.

Since the independency of former Soviet states, such as Ukraine, Moldova, Armenia and many others, existing central water and sewage systems are often collapsed or badly maintained due to the lack of ownership, expertise and adequate financing system for operation and maintenance. According to Ukraine National Report on Drinking Water (2004) only 26% of the rural population is connected to a central water supply system; while only about 6% has a direct in-house connection[2]. However, access to a central piped water supply system and access to flush toilets is not at all a guarantee for

adequate sanitation. Regular interruptions, up to some weeks or month are common and hinder the users access to safe sanitation. For example, even though a large number of the urban people in Kazakhstan have modern toilets, 82% of them suffer from irregular water supply, at which time their toilets do not function [3].
In the new EU member state Romania, a country with 20,7 million inhabitants, only16 percent of the rural population had in 2004 access to improved drinking water sources [4]. Sanitary sewage is available at homes of 83% of urban residents and of 11% of rural population. Such poor coverage, especially in the rural areas, creates a risk of contamination of drinking water sources and can be the reason for still high incidence of gastro-intestinal infections [5]. The rural areas of the new EU member state Bulgaria had according to UN Common Database in 2002 a coverage of 100% for access to safe water and improved sanitation [6]. However a survey on the status of school sanitation and hygiene showed, that 21% of the schools (32% of the settlements) are served on planned intermitted water supply, and do not have water supply for 2-3 hours or even during all the time the children spend in school. [7].

WECF projects and observation of the state of sanitation

Women in Europe for a Common Future, WECF, is a network of organisations and individuals in Western and Eastern Europe, the Caucasus and Central Asia working for sustainable development, protection of human health and environment, and poverty reduction. WECF works to raise awareness about the root causes of environmental health effects and promotes preventive action to eliminate the problems at their source. WECF together with a local partner carried out and has ongoing integrated projects in the rural areas of the new accessed EU countries Romania and Bulgaria and in 10 EECCA countries (Ukraine, Belarus, Moldova, Armenia, Georgia, Afghanistan, Kyrgyzstan, Kazakhstan, Tajikistan, and Uzbekistan), and has gained experience concerning issues of water and sanitation. The projects were and are mainly financed by the Dutch ministry of Foreign Affairs and by the Fondation Ensemble, France.
In many rural communities of the WECF project countries lack of access to safe drinking water is an important issue. However WECF gained the impression that the problem of the lack of safe sanitation is even worse, particularly among the schools. Official data about the coverage of access the water and sanitation often do not include the quality of the facilities and the hygiene aspects.
WECF and others observed that the state of the so-called “improved sanitation” can be far beyond being considered safe. In the dissertation of Susanne Herbst, 2006, it is mentioned in-site sanitation facilities can create hazards to personal and public health via groundwater contamination and unsanitary conditions. Unhygienic sanitation facilities contain high faecal-oral pathogen loads posing a high risk of infection of its users. Moreover, desludging -predominantly carried out by family labour – is a risk of infection for those involved in this work [8]. It is not only the households who often have to deal with bad-smelling and unhygienic pit latrines, but in particular, for schools, the sanitary conditions in general are in an in-acceptable state [9].

Figure 1. A latrine for 160 pupils, bad smelling and therefore far away from the school (source WECF)

Conditions of school sanitation in rural areas

WECF found worse conditions of school sanitation in the rural areas of all its working countries, for example in Romania, Moldova, Armenia, Ukraine or Uzbekistan; not because the citizens or school staff do not take care of the sanitation facility, but because the system itself cause many problems. In pit latrines faecal are disposed together with urine in a pit and hence the materials get a high humidity, causing a very bad odour and attracting flies.

Missing comfort

Due to the system the pit latrines are extremely bad smelling, and in summer visited by high amounts of flies, which poses a health risk. Because a latrine can have an extremely disgusting odour, the facilities are located far away from the school (figure 1). In areas with very cold winters, where temperatures are far below zero visiting the school toilet during wintertime is a threat to children's health. For example in Armenia, Belarus, Moldova, Romania or Ukraine temperatures of 15 degrees Celsius below zero are during wintertime not unusual. The latrine user, in particular the girls and women, are affected by the cold and bladder infection was mentioned by school staff as a problem during wintertime for themselves and the pupils.

Another inconvenience during freezing temperatures is slippery floors of the latrine. Usual the floors of the school latrines are wet by displaced urine and will freeze at cold temperatures below zero. Pupils of an Armenian school complained to be scared to slip on the frozen bottom of the latrine facility and to fall down in the dirt. No privacy is guarantied for the users; doors cannot be locked or there are no doors at all. Some times the pits are assembled or are in a line in one communal space (figure 2). Often there is no separated latrine for girls and boys. Mostly children and school staff try to avoid a visit of the facility as much as possible by a low intake of liquid, like tee or water. The general rules for a healthy living style are enforced: promoting the risks of bladder infections and bladder stones. During the period of menstruation girls prefer to stay at home and are allowed by the school staff to take off some days from school. School exclusions have a gendered aspect; girls who are unable to access clean, safe and separate toilets and hand washing facilities, may disproportionately drop out of school at puberty. Or even earlier [10].

Missing Hygiene

As already mentioned, the humid faecal materials are attractive for flies and hence pose a risk for the transfer of pathogens from the faecal material to food and in open reservoirs of stored drinking water.
Mostly in the sanitation facility there are no anal cleansing material available for the facility user. In some schools the user (mostly school staff) bring for them self toilet paper from home, or in summer time children use leaves for anal cleaning (observed in Romania), or children do not clean at all. In many visited schools no hand wash facilities or even any water at all was available for washing or drinking purposes. Using and managing a pit latrine is related with soil infiltration and handling of unsafe human excreta. A safe treatment or reuse of the faecal material is not implemented.
The pits are mostly constructed in such a way that the bottom is permeable allowing an infiltration i.e. liquid, urine contaminated with pathogens, in the soil. Depending on the local geo hydrological condition ground water can be contaminated with faecal bacteria and nitrates. Very high concentrations of nitrate and bacteria were found in WECF project villages with a high density of population and pit latrines, for example in Romania or in Ukraine [11].

Figure 2. Latrine for 360 pupils: no privacy, unhygienic, cold and slippery during wintertime (source WECF)

Although all those countries have institutions like hygienic inspections or regulations on the sanitary conditions of a school, children and teachers often lack the basic sanitary facilities. A hygienic and a dignified stay at school are not guarantied. The authorities responsible for school sanitation and policies are not aware of the situation or just ignore it and are not interested in handling the issue. The Water Supply and Sanitation Collaborative Council express this behaviour as the following: "Lack of

efficient and accountable local governments and municipal authorities has been the most common barrier for progress [12].

Introduction to sustainable and safe school sanitation: dry urine-diverting toilets

One of the aims of the WECF projects in cooperation with a local partner was to improve the sanitary conditions of the schools and to manage human excreta in an affordable and sustainable way. However, the projects should also serve as examples, which prove that even without access to piped water or to sewage system, the sanitary conditions can be improved easily and quickly. In 2003 WECF and a local partner introduced the first dry urine diverting school toilet facility in Romania in the village of Garla Mare for approx. 180 children and 10 staff.

Principles of a urine-diverting toilet

A urine-diverting toilet has two outlets and two collection systems; one for urine and one for the faeces, in order to keep these excreta fractions separate. Other than that, the system has mainly conventional technical construction material/devices, even if they are used in a completely or partly new way [13]. By using urine diverting seats or slabs, nitrogen rich urine and pathogenic holding faeces are diverted, stored and treated separately (figure 3). For public toilets, storage of urine is recommended for at least 6 months, which removes eventually low concentrations of microorganisms. The faeces are covered with soil and ashes or lime; this causes a dry alkaline environment where bacteria will cease to exist. For each toilet there are two easily accessible faeces-chambers (vaults) with a sealed floor made from concrete. The vaults are designed as such so that one is in use for minimum of one year, and then allowed to rest for one year while the other chamber is used. The urine from the separation-toilets and the waterless urinals is collected in two urine tanks. The two tanks, similar to the faeces chambers, are necessary for the resting time in which many pathogens are killed or at least reduced[14].

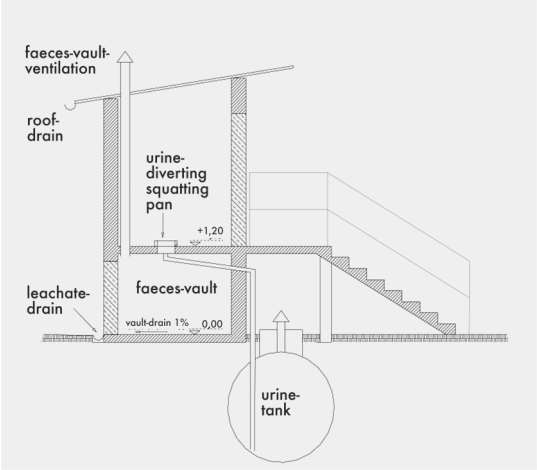

Figure 3: Schematic cross-section of urine-diverting dry toilets (source: Deegener S., TUUH, Germany)

The system does not need water for flushing and implements a safe storage and sanitising process of the separated urine and faeces, followed by a reuse of the sanitised excreta in the agriculture, according to the guidelines of the World Health Organisation (WHO) for the safe use of human excreta [15]. The urine-diverting toilet contributes not only to an improvement of the sanitary condition, but also to food production and to the elimination of poverty. The Millennium Development Goals (MDGs) are eight goals to be achieved by 2015 that respond to the world's main development challenges. The MDGs are drawn from the actions and targets contained in the Millennium Declaration that was adopted by 189 nations-and signed by 147 heads of state and governments during the UN Millennium Summit in September[16]. According to the WHO, the MDGs most directly related to the use of excreta and grey water in agriculture are "Goal I: Eliminate extreme poverty and hunger" and "Goal 7: Ensure environmental sustainability." The sanitation target in Goal 7 is to halve, by 2015, the proportion of people without access to adequate sanitation. Household- or community-centred source separation is one of the alternative approaches that are rapidly expanding in order to meet this target. It also helps to prevent environmental degradation and to promote sustainable recycling of the existing plant nutrients in human excreta for food production[17].

The first double vault dry urine-diverting toilet in Romania

There is no central water supply system In the Romanian village of Garla Mare. All the villagers have pit latrines in their back yards. The primary school has its own well, but was not functioning when the project started. Hence, no means were provided for children to wash their hands after using the toilets. Investigation of groundwater quality showed that the groundwater was extremely polluted with nitrates and faecal bacteria [18]. The pit-latrines in the schools were badly built with the floor sloping towards the entrance door. The children therefore had to first wade through wastewater before getting to the latrine.

A toilet facility with 4 double vault dry urine-diverting (UD) toilets and 3 waterless urinals was installed in September of 2003 at a primary school with approx. 200 pupils (aged 6–10 years) and 7 teachers[19]. The Hamburg University of Technology (TUHH) and WECF supported the practical implementation and installation of the UD toilet facility. For the boys additional urinals were installed. The local stakeholders could not imagine that the dry UD toilets could function odour and fly-free, even without water for flushing, therefore the wish to construct an out door school toilet facility was followed. The urine and faecal material were separated and stored in reservoirs or chambers allowing a sanitising procedure and reuse in agriculture according the WHO guidelines[20]. The school well was restored, serving three washbasins for washing hands.

A survey on the acceptance and the sanitation in the village was carried out among the users and the citizens after one year using the facility. The results showed, almost all of the children find the UD toilets easy (65%) and pleasant (29%) to use (figure 4). Only 6% of the children said the toilets are complicated or unpleasant. The children also like the design of the toilets. Most citizens chose the ecosan toilet as the best choice for toilets at the school (66%), followed by the water flush toilets (26%), and finally pit latrines (2%). The others had no preference (8%). The owners of the pit latrines all agree that the bad odour is the biggest disadvantage of a latrine. Other problems that are generally mentioned are the nuisance of the flies (68%) and the emptying of the pit (47%). Among the interviewed pupils very few complained about the appearance of bad smell or flies in the new toilet facilities[21].

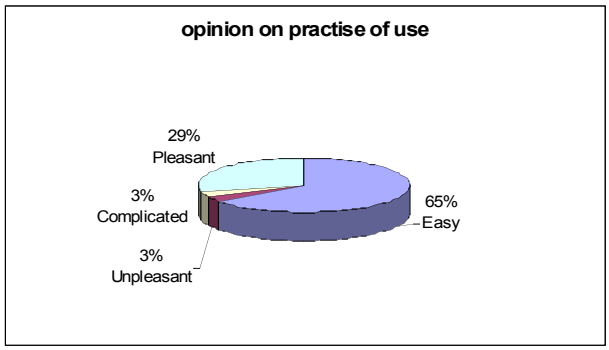

Figure 4. Results of a survey among the school children

The first double vault dry urine-diverting toilet in Ukraine

The kindergarten, primary and middle school of Gozhuly, Poltava oblast, are situated under one roof and offer education to 160 pupils. The village has a central water supply system (cwss) and a wastewater system, which was not function any more and in a desolate condition. The school is connected to the cwss and has two water flush toilets for the smaller children. The older pupils still had to go outside far away from the school, to the very unhygienic, smelly and in wintertime, very cold latrines. For these children, the first ecological sanitation toilet facility in Ukraine was built, with 3 double vault dry urine-diverting toilets (squatting models) (figure 5) and 3 waterless urinals. Due to the very cold Ukrainian winters, the school staff and parents appreciated very much having a toilet facility which is accessible from the school so that the pupils do not have to go outside in the cold or in the rain for a toilet visit.

With the support of the Hamburg University of Technology a design was developed and the facility was constructed in conjunction with the school [22]. With the new gained experiences of large-scale indoor school sanitation facilities, other sustainable indoor school sanitation pilot projects in Afghanistan and Armenia [23] were successful implemented by WECF in cooperation with local

partners. WECF and partner planned to construct for the coming 3 years at least 50 urine-diverting school toilet facilities in Bulgaria, Romania and in the EECCA region.

Figure 5. Interior of a double vault dry urine-diverting toilet: Hygienic, safe and easy accessible without leaving the school (source WECF)

Experiences and observation regarding the implementation of urine-diverting school toilets

It was shown, that even without a connection to the central water or sewage system, the dry urine-diverting toilet is a very fast and easy to realise tool to improve the sanitary conditions of schools in an affordable and sustainable way, and to protect groundwater against infiltration of human excreta. The UD toilets do not need water for flushing, do not need connection to a sewage system and lastly, bad odour and flies are absent. To have access to an indoor toilet facility without having to walk through the cold or rain was a real improvement for the users. A very crucial factor is the real understanding of the dry urine-diverting facility and its effects by the stakeholders, although with proper education also young children understand the principle of urine-diverting toilets as a part of ecological sanitation. This was addressed in workshops, which were held before and after the installation of the toilets, and by performances and comprehensible posters for children. Furthermore, for proper operation and maintenance of the sanitation facility it is important to have an appointed caretaker, who knows his tasks and knows how to sanitise the urine and faeces fractions according the guidelines of the WHO. The final success of urine-diverting toilets partially depends on the involvement of local farmers, who should be well informed and be willing to use the sanitised products on their fields as fertiliser.
On local level there is very limited access to information on environment or water quality and a low awareness. The local development and implementation of a sustainable sanitation approach requires authorities, which create a good action plan with the involvement of all stakeholders and experts. However, local governments are often lacking experience, expertise and financial resources.

The challenge of up-scaling sustainable school sanitation

In most EECCA countries there is no effective rural state program, which focus on school sanitation, moreover the governments often neglect the desolate situation in the rural areas. Since ecological sanitation is a new concept to many authorities, it takes much time and effort to obtain their approval and the permits needed to construct an UD toilet facility. Lack of knowledge about alternatives to pit latrines, about safe management of human excreta and ecological sanitation systems makes the decision makers reluctant. The lack of national and international (e.g. EU) recognized regulation on source separating sanitation systems can be a reason not to promote the approach of urine diversion systems. Finally, the lack of interest in school sanitation and hence the lack of financial resources are for many communities the main barrier to any improvement of the sanitary conditions in schools. The absence of local ecological sanitation experts and equipment in the project countries is a barrier for the further spreading of the ecological approaches. As local and national authorities pay very little or none to the problems of school sanitation, it is important to involve the local population and NGOs in identifying the main issues, as well as finding and implementing solutions.

Conclusions

WECF and partner observed in its projects in rural areas of the new accessed EU countries Bulgaria and Romania, and in the EECCA region a severe lack of safe school sanitation, where outdoor pit latrines far away from the school without hand washing facilities, are commonly found. It was shown, that even without a connection to the central water or sewage system, the dry urine-diverting toilet is a very fast and easy tool to protect groundwater against infiltration of human excreta. It was found that the new approach of ecological (sustainable) sanitation improved the sanitary conditions of the school

in an affordable and sustainable way, and thus improved health conditions. It was also shown that indoor water less urine-diverting toilets for schools with for example 360 children (Ukraine and Armenia) contributes greatly to the comfort and safety of the children and thus improved learning capacity. School sanitation is an issue that needs the attention of regional, national and international policy makers, although good examples of sustainable school sanitation attract the attention of the decision makers. But a better regulation on the adoption of urine-diversion systems and the reuse of the human excreta in the agriculture is a condition for a scaling-up of urine-diverting facilities. Students of universities, local experts and NGOs should be trained for implementation and spreading information.

Acknowledgements

We would like to thank the Dutch Ministry of Foreign Affairs and the Fondation Ensemble, France, for their support. Without their financial support the presented sustainable sanitation pilot projects would not been realised. We also would like to thank our local project partners, the citizens of the project villages, and their local and regional authorities; without their co-operation and contribution the realisation of the entire sanitation pilot projects would not have been possible. In particular we would like to thank the children and staff of the schools of the project areas for their support, patience, enthusiasm and willingness to participate. They all played a very crucial role in the project activities. Furthermore, we would like to express our gratitude to Prof. R. Otterpohl and Stefan Deegener of the Hamburg University of Technology, Germany, for their co-operation, contribution and support.

References

[1] World Health Organisation, Regional Office for Europe, about water and health, 2008, http://www.euro.who.int/watsan/issues/20030903_1

[2] Babyak S, Wolters M, Mohr A, (2006) Co-operation for Sustainable Rural Development, Involving citizens and local authorities in rural Ukraine in improvement of drinking water, sanitation and agricultural. A Case Study, WECF, the Netherlands, pp. 8, http://wecf.eu/cms/download/2007/ukrainecasestudy_301007.pdf

[3] The Committee for Water Resources Ministry of Agriculture of the Republic of Kazakhstan Report „Access to Drinking Water and Sanitation in the republic of Kazakhstan“, UNDP Project, 2006; pp. 71, http://www.voda.kz/new/en/doc/report_eng.pdf

[4] World Health Organization (2007), Annual report on global public health and key statistics, WHO, http://www.who.int/countries/rou/en/

[5] United Nations (2004), Sanitation Country Profile Romania, http://www.un.org/esa/agenda21/natlinfo/countr/romania/romaniaSanitation04f.pdf

[6] UNEP (2002), Bulgaria: Population with access to improved sanitation,. http://globalis.gvu.unu.edu/indicator_detail.cfm?Country=BG&IndicatorID=34#row

[7] WASH Bulgaria, Water and Children, 2004, http://www.worldwaterday.org/wwday/events/view.php?id=16

[8] Herbst S. (2006) Water, sanitation, hygiene and diarrheal diseases in the Aral Sea area (Khorezm, Uzbekistan), Ecology and Development Series No. 43, 2006, pp. 126, Cuvillier Verlag Göttingen.

[9] Herbst S. (2006) Water, sanitation, hygiene and diarrheal diseases in the Aral Sea area (Khorezm, Uzbekistan), Ecology and Development Series No. 43, 2006, pp. 127, Cuvillier Verlag Göttingen.

[10] Water Supply and Sanitation Collaborative Council and World Health Organization, (2004) WASH, Sanitation and Hygiene Promotion, pp. 8. http://www.wsscc.org/fileadmin/files/pdf/publication/Sani_Hygiene_Promo.pdf

[11] Samwel M, Gabizon S. (2006), Sustainable Development for All, Reducing effects of polluted drinking water and inadequate sanitation on children´s health in rural Romania, WECF, the Netherlands, pp. 8, http://www.wecf.de/cms/download/2006/SD_all.pdf

[12] A guide to investigation one of the biggest scandals of the last 50 years, WASH, WSSCC, pp.5, http://esa.un.org/iys/docs/san_lib_docs/WASH_media_guide_en%5B1%5D.pdf

[13] Richert Stintzing A. (2007) Urine Diversion in Climates with Cold Winters, Technical, agricultural and hygienic considerations, WECF, the Netherlands, pp. 8, http://www.wecf.de/cms/download/2007/WP-26_web-07.pdf

[14] S. Deegener, C. Wendland, M. Samwel, S. Gabizon, R. Otterpohl. (2004), Ecological Sanitation at A School In Rural Eastern Europe, Marrakech IWA WWC Conference Proceedings #116806

[15] WHO, 2006, Guidelines for the Safe Use of Wastewater, Excreta and Greywater, Volume 4, Excreta and greywater use in agriculture, World Health Organization, Geneva.

[16] United Nations Development Programme, Millennium Development Goals, http://www.undp.org/mdg/basics.shtml

[17] WHO (2006), Guidelines for the Safe Use of Wastewater, Excreta and Greywater, Volume 4, Excreta and Greywater Use in Agriculture, World Health Organization, Geneva, pp. 13.

[18] Gabizon S, Jacobs I. (2004), Reducing the effects of polluted water on children`s health in rural Romania, WECF, the Netherlands, pp. 6, http://www.wecf.eu/cms/download/effect_poll.pdf

[19] Samwel M, Technical description of the ecosan school toilets Garla Mare, Romania, GTZ data base, Germany (2007), http://www.gtz.de/de/dokumente/en-ecosan-pds-011-romania-garla-mare-2005.pdf

[20] WHO (2006), Guidelines for the Safe Use of Wastewater, Excreta and Greywater, Volume 4, Excreta and Greywater Use in Agriculture, Executive Summary, World Health Organization, Geneva

[21] Samwel M, Gabizon S, Wolters A, Wolters M. (2006), From pit latrine to ecological toilet, Results of a survey on dry urine diverting school toilets and pit latrines in Garla Mare, Romania; Experiences and Acceptances; WECF, the Netherlands, pp 15-20. http://www.wecf.de/english/publications/2006/ecosan_reps.php

[22] Samwel M, Tsvetkova A (2007), Technical description of the Dry urine diverting school toilets Gozhuli, Ukraine, GTZ data base, Germany (2007), http://www.gtz.de/de/dokumente/en-ecosan-pds-024-shool-toilets-ukraine-2007.pdf

[23] Samwel M, Anakhasyan E (2007), Technical description of the dry urine diverting school toilets Hayanist, Armenia, GTZ data base, Germany (2007), http://www.gtz.de/de/dokumente/en-ecosan-pds-025-shool-toilets-armenia-2007.pdf