Ecosan technologies for rural schools in Ukraine (The experience of NGO MAMA-86 in eco-sanitation project implementation)

G. Tsvietkova*, Y. Berezha, N. Gudkova
All-Ukrainian Environmental Nongovernmental Organization MAMA-86
Mikhailivska str. 22, 01001, Kyiv-1, Ukraine
Email: atsvet@mama-86.org.ua
Website: http://www.mama-86.org.ua
Tel: +380 44 278 77 49, fax: +380 44 279 55 14

*Corresponding author

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ABSTRACT

First results of eco-sanitation pilot project and practical experience of NGO MAMA-86 are stated below. The project has been implemented in cooperation with NGO Women in Europe for Common Future (WECF) and experts from Hamburg University of Technology, with the intentions to develop an ecological sanitation toilet model to solve water supply and sewage problems in rural areas of Ukraine. Eco-san project in Ukraine is based on WECF and "Medium & Sanitas" experience on installation of Ecosan-toilet for school in Romania. The experience on building first ecological double vault urine diverting toilet in Ukrainian village school is pointed out.

INTRODUCTION

In accordance with the data of State Sanitation and Epidemical Services there are 20,961 secondary schools in Ukraine, where 6 million pupil study. The lack of the access to safe water and sanitation is the main problem for the rural schools. According to the official statistics 4,000 rural schools (20 % of total number) are not connected to centralized water supply. In the same time 32% of drinking water samples in Ukraine do not meet sanitary and hygiene standards and 23% of samples do not meet bacteriological standards. 7,300 rural schools (35 % of total number of school) have no canalization. In rural areas school pupils usually have no safe drinking water and must use the wells or transported water of low quality. They use cold, dirty and old pit latrines located 50-100 m away from school. Lack of the basic conditions has a negative impact on the children's health, such as genito-

urinary diseases and methemoglobinemia, lowered organism resistance, and as another consequence the increase of infectious and oncology diseases.

MAMA-86 is implementing project “Co-operation for Sustainable Rural Development” in co-operation with WECF and experts from the Hamburg Technical University, Department of Industrial and Municipal Wastewater management. Since November 2003, the project has been implemented in 3 villages: Bobryk, the Nizhyn district of Chernigiv Oblast; Vorokhta of Yaremche district of Ivano-Frankivsk Oblast; Gozhuly, the Poltava district of Poltava region. Besides promoting the public activity and participation towards improvement of the environment and development of democracy, the establishment of an affordable groundwater protecting sanitation system with involvement of local authorities is the major aim of this project.

The project in Gozhuly is aimed on improvement of the school sanitation facilities and access to safe drinking water by implementing ecosan toilet designed by Stefan Deegener, an expert of the University Hamburg-Harburg, and developed by WECF and “Medium & Sanitas” in Garla Mare village, Romania in 2003 [1]. It was the project task to adapt the eco-san toilet design to Ukrainian building standards. This work was made by local engineers. The Gozhuly ecosan toilet was built in October 2004. The toilet consists of 3 double vault urine diverting toilets, 3 waterless urinals and 2 urine tanks of 2 m^3 each. Plastic squatting-pans were selected for hygienic reasons. Each toilet is equipped with two easily accessible composting-chambers (vaults) with a sealed floor. Ventilation pipes are installed from the faeces-chambers to above the roof to supply the vault with oxygen and avoid odour and flies. The urine from the toilets and the waterless urinals is collected to a urine tank. 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. The two tanks are necessary for the resting time in which many pathogens are killed or at least reduced. Most important is that urine and faeces are properly separated, collected and stored. After storage of the urine during 6 month and composting of the faeces during 2 years, it can be used as a fertilizer [1].

The total cost of the eco-toilet building with VAT (20%) was 61 000 UAH (nearly 9 000 Euros). In Ukraine the cost of conventional toilet restoring is 50,000 UAH and pit latrine building is 18,000 UAH [2].

MAMA-86 is monitoring the operational expenses, water, hygienic materials and reagents' usage. There is a good result on water saving, as water is used only for washing hands and cleaning the squatting-pans and the toilet rooms. In average 50 liters per day are used by school for sanitation reasons now. The cost for maintenance is substantially low in comparison to conventional sewerage. In case of Gozhuly school the water supply and canalization services payment is 0.63 UAH per month per capita. School had to pay 107.1 UAH per month (1285.2 UAH per year) in year 2004 [2]. Hygienic reagents and materials with chlorine-content substances are not used for ecosan toilet maintenance. The instructions to eco-san toilet use and maintenance are developed according current legal framework.

155 pupils (6-16 years old) and 30 staff members have been using this facility since November, 2004. So it was very important to carry out broad education work especially for teachers. MAMA-86 has organized 2 workshops for the teachers, children and the caretaker on the beginning of the usage of ecosan toilet. Since January 2006 the pupils of the school have 3 lessons about ecosanitation and hygiene per month. MAMA-86 provided school with some informational and educational materials on ecosan, among them are the Ukrainian variant of the WECF-publication "Ecological Sanitation and Associated Hygienic Risks" and posters on eco-san, MAMA-86's booklet on ecosanitation and other booklets translated into Ukrainian. The instructions were put on the toilets' doors. It was shown, that with proper education children of all ages quickly understand how to use the diverting toilets. The 1,5 months' interruption of water supply did not cause any problems at school in November-December 2004 because 3 double vault urine diverting toilets were working well. And after three months eco-toilet operation it was clear that children were using toilet correctly; the school administration was happy to have it [3].

The implementation of the new eco-toilet is especially reasonable in schools, because in such way we can spread ecosan knowledge not only among the pupils, but also among their parents and teachers. During the process of new toilet system implementation we faced with technical, legislation and education problems.

During the project implementation we had some problems. After a month of toilet maintenance there was a smell of ammonium in the room with 3 waterless urinals because of constructional problems, such as:

- conventional urinals construction has a lot of holes that contributes in increasing of bed smell,
- wrong tubing angle and short tubing which was not properly put deep in the tank,
- lack of mini-vent system in the urinal room.

These problems were partly solved with the help of Stefan Deegener, Hamburg University expert, by closing the most flow-off holes in the urinal bowls, correction of the tubing system and its installation.

The problem with bad smell is also related to urine tanks buried under the soil. They were not strong enough and under the load of soil they were deformed. As a result of the deformation, rain waters infiltrated inside the tank. In August-September 2005 the tanks were changed on new ones and the local authorities helped with construction of a concrete hole for tanks' allocation and protection from the soil pressure damage. Additionally the storm water gathering system was installed in spring 2006.

The smell problem was decreased significantly but still in the cold time when the difference with temperatures inside and outside the building is big, the bed smell comes into the school corridor from toilet. It was decided to install doors to separate the toilet corridor from the school corridor and to install a mini-vent in urinal room in spring 2006.

On introduction of ecosan technologies the main problem is related to the development of Ukrainian legal framework to accept in general the eco-san approach, and in practice the ecosan technologies for school sanitation facilities, and approve the recycling of nutrients (urine and faecal compost). It is difficult for local SES or other authorities of low levels to take a responsibility for introduction of a new technology which has no analogies in the country. Lack of legislation regarding the applying of urine and composted excrements as fertilizer creates some problems as well. It was shown that urine is an excellent fertilizer for its richness in nutrients like nitrogen, potassium, phosphorus and other microelements, and for its safety after storage [1]. The Ukrainian hygienists asked for own research concerning this issue and were ready to participate in this work. The solution of all these problems requires future work and resources.

In April, 2005, MAMA-86-Poltava has carried out survey among 160 school pupils in Gozhuly school [4]. In that time the problems with bad smell were topical and it was reflected on the results of the survey. According to year 2005 survey 60 % of pupils were happy users of the school toilets and 40 % of children were not satisfied of eco-toilet. Among the last group of school children 40 % of pupils (mostly boys) there were complaints with the smell; for the rest of unhappy pupils (mostly girls) responded that they didn't feel comfortable or could not adapt to use ecosan toilet. In March 2006 the same survey was done and the results were the following: 75 % of pupils were happy to use school toilet and the number of children still having problems with eco-toilet use had decreased to 25 % of pupils. The survey among teachers of the school showed that 90 % of them liked eco-toilet, but had complaints about bad smell, now 20 % teachers prefer to have dry diverting toilets at home and almost 50 % of teachers have thought about applying urine and composted excrements as fertilizer in their garden or fields.

Based on the results of surveys some recommendations can be done for ecosan advocacy at a local level:

- To complete the solution for smell problems (active ventilation of urinals room, smell elastic stopper in the urinal tubing, additional door);
- To use more comfortable type of sitting eco-toilet for youngest children;
- To carry out systematic and regular educational work with pupils and public on ecosanitation and hygiene;
- To carry out regular monitoring of eco-toilet use and maintenance.

In the Bobryk village of Nizhyn district, Chernigiv region, the local organization MAMA-86-Nizyn is implementing the project of the eco-san toilet building inside the local school. Ukrainian engineers have already made the technical documentation for the toilet building. Some modification of the previous design of checkroom reconstruction was made. On the beginning of June the building of school ecosan toilet will started.

In September, 2005, MAMA-86-Yaremche together with ecosan expert organized a training "Sanitation as a part of sustainable development" for local dwellers of Vorokhta village on building household dry urine diverting toilet. During the seminar the expert

explained the functioning of the ecosan toilet and how urine and composed faeces can be re-used as fertilizers in private garden. Educational posters were disseminated among training participants. After seminar some families were interested in the replacement of their pit-latrines (a hole in the ground, often polluting ground-water sources) to the new ecosan model. As a result of this training 2 private ecosan toilets were build in different parts of Vorokhta. The cost of this eco-toilet building was approximately 350 EUROs [5].

MAMA-86 is planning to construct similar eco-toilets in the other private farms in Vorokhta, Goghuly, Bobryk and other project areas. MAMA-86 uses the obtained experience to promote ecosanitation approach and technologies in rural areas of Ukraine.

RESULTS

NGO MAMA-86 in co-operation with NGO WECF and experts from the Hamburg Technical University carry out a three-year project to build the first ecosanitation toilets in rural areas of Ukraine. This new technology can be used as a good alternative to the traditional pit latrines for rural schools and households because it doesn't result in groundwater contamination and produces good fertilizer. It may be appreciated as sustainable and affordable water-protecting solution because it also does not require water for flushing. Further dissemination of eco-sanitation education is necessary anyway, as well as development of elaborate legislation for eco-sanitation.

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