

The challenge to implement affordable and sustainable sanitation in the new EU countries Romania and Bulgaria

Review of experiences with source oriented sanitation based on urine diverting toilets

Margriet Samwel*, Claudia Wendland**

* Women in Europe for a Common Future, WECF, PO Box 13047, NL - 3507 LA Utrecht
(E-mail: margriet.samwel@wecf.eu)

** Institute of Wastewater Management and Water Protection, Hamburg University of Technology,
D - 21073 Hamburg
(E-mail: c.wendland@tuhh.de)

Abstract In rural parts of Bulgaria and Romania there is a lack of adequate and affordable sanitation. As both countries are new EU member states since 2007, European financial resources are made available to improve the water and sanitary conditions. In rural areas big parts of the population are however disconnected from this financial support and suffer continuously from the poor hygienic situation. Since 2002, WECF has built sanitation projects for demonstration to improve the hygienic situation on household and small community level jointly with local partner. Low-cost toilet systems were installed, that produce a nitrogen rich fertiliser, which is separately collected urine and a soil conditioner, which is treated faeces. The results show that these systems can improve the situation in terms of hygienic situation and public health, protection of groundwater and supporting agriculture. The source oriented sanitation systems are affordable and can be installed on site and immediately.

Keywords sustainable sanitation; Romania; Bulgaria; water reuse; nutrient reuse; urine diverting toilet

Introduction

In the EU, the standard of water supply and wastewater treatment is access to a central drinking water supply combined with a central sewerage system. In countries like Bulgaria or Romania, since January 2007 member states of the EU, drinking water sources are limited and there is a high absence of adequate sanitation. In Bulgaria (7.7 million total population), 45% of the people are living in rural areas. The seven largest cities of Bulgaria are connected to a central sewerage system. In Bulgaria 3 Million people are without adequate wastewater treatment.

In Romania (20.4 inhabitants), the situation is even worse. Romania has over 10 million inhabitants not connected to a centralised sewer system and who do not have access to safe sanitation. 8 Million mostly rural inhabitants rely on drinking water from unprotected wells.

Many surface and ground waters in the European countries are contaminated with pathogens and nutrients, where non and poorly treated wastewater from single households and municipalities are identified as polluters.

European financial resources are made available to improve the water and sanitary conditions in these countries, e.g. for implementing the Urban Wastewater Directive. However, the rural areas where big parts of the population are disconnected from this financial support and suffer continuously from the poor situation.

EU wastewater legislation

The objective of the EU Directive 91/271/EEC on urban wastewater treatment is to protect the

environment from the adverse effects of the abovementioned wastewater discharges. However, the directive covers only agglomerations with more than 2000 population equivalent (pe). According to Bodik and Ridderstolpe (2006), approximately 150 million inhabitants live in the Central Eastern European (CEE) countries of which 30 million, or 20%, live in rural settlements with less than 2000 inhabitants. Of this rural population, about 3.5 million persons are connected to big town wastewater treatment plant (WWTP) systems and about 1.5 million are connected to small municipal WWTPs. The remaining 25 million rural people in the CEE countries are not connected to centralised wastewater treatment systems. The perspective until 2015 is that 75–90% of the total CEE population will become connected to the centralized sewerage systems. This leaves a gap of 10–15%, corresponding to about 20 million rural inhabitants, who will remain without any proper sanitation systems.

To fulfil the EU requirements on wastewater treatment, high investments are needed for example in Bulgaria or Romania. Urban wastewater treatment plants are planned for 430 cities with populations over 2000 by 2015. Romania requires an estimated \$24 billion in water and wastewater system upgrading by 2018 to meet EU requirements (Trade mission, 2007).

International support programs of e.g. the European Union or World Bank focus on the first place on cities and large communities with more than 2,000 pe. However, also for the at least estimated 20 million European who are not covered by the EU Directive 91/271/EEC, affordable and sustainable sanitation solutions should be provided.

The directive on urban wastewater treatment and the directive on sewage sludge recycling (EU Directive 86/278/EEC) generally encourage the reuse of wastewater and of sludge. But the products of source separated sanitation systems are not covered by the regulations so there is a lack of knowledge for decision maker how to approve these systems.

Why are affordable solutions a need for the rural areas?

In the new EU member state Romania, the level of unemployment and poverty is high predominantly in rural areas. In a WECF project village all surveyed households use wood stoves; usually only one stove per house is in use to limit the costs. Most households buy the wood and spend on average 3 million lei (100 euro) per winter season for heating. The poorest households, especially Roma families, go to collect wood themselves, carrying it home on their back (Bentvelsen, 2003).

Building new toilet costs money and poverty prevents most respondents from investing in their sanitary conditions. The income level of most families is so low that they can hardly provide enough food for themselves (Samwel et al., 2005).

What is affordable and sustainable?

Saving water. Central sewage systems are in the first place intended for the transport and the treatment of human excreta. Drinking water is required to transport the human faeces and urine from the toilet to the wastewater treatment plant, followed by disposal to a water body. One person produces about 500 litre of urine and 50 kg faeces per year (Vinnerås and Jonsson, 2002). To flush them away, at least 15,000 litres of drinking water are needed. In drought-prone countries like Bulgaria, Romania and the Mediterranean countries, water saving systems would have an advantage.

Saving money. As centralised system are unaffordable for most rural areas, Stracke (2007) gives some data about the costs of three different decentralise wastewater systems for a Romanian village with 2,000 inhabitants. The annual values include investment, reinvestment costs of different toilets, network and treatment systems, and running expenses over a duration of 80 years.

As comparison the following numbers were calculated:

1) flush toilets connected to septic tanks, 221,469 Euro yearly costs

- 2) dry urine diverting toilets and greywater treatment in ponds 65,799 Euro yearly costs and
- 3) dry urine diverting toilets and greywater treatment in soil filter, 80,431 Euro yearly costs.

The systems with urine diverting toilets are by far the most cost efficient technologies.

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 a mainly conventional technical construction regarding material/devices, even if they are used in completely or partly new way (Richert Stinzing et al., 2006)). 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 agriculture, according to the guidelines of the World Health Organisation on reuse of human excreta (WHO, 2006).

Sustainability and Contribution to MDG's. The urine-diverting toilet contributes not only to an improvement of sanitary conditions, but also to food production and to the elimination of poverty. The United Nations General Assembly adopted the Millennium Development Goals (MDGs) on 8 September 2000 (United Nations General Assembly, 2000). According to the WHO, the MDGs most directly related to the use of excreta and greywater in agriculture are:

Goal 1: 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.

The principal forces driving the increase in use of excreta and greywater in agriculture are:

- Increasing water scarcity and stress, and degradation of freshwater resources resulting from the improper disposal of wastewater, excreta and greywater;
- Population increase and related increased demand for food and fibre;
- A growing recognition of the resource value of excreta and the nutrients it contains;
- The MDGs, especially the goals for ensuring environmental sustainability and eliminating poverty and hunger (WHO, 2006).

Experiences of WECF on sustainable sanitation systems in Romania and Bulgaria

In cooperation with local partner, WECF has implemented projects on dry urine diverting toilets for public facilities and households in Bulgaria and Romania as well as in Central Asia and Caucasus. In 2003, WECF and its local partner introduced the first dry urine diverting (UD) school toilet facility in Romania, in the village of Garla Mare for approx. 180 children and 10 staff.

In 2006 the first dry UD toilets and soil filters for a cultural house, public place and households were introduced in Bulgaria. One of the aims of the projects was to improve the sanitary conditions – replacement of the common pit latrine by dry UD toilets and installing hand wash facilities - and to manage the human excreta and greywater in an affordable and sustainable way, whereas the protection of groundwater against infiltration of human excreta had a high priority. The projects can serve as examples, which prove that even without access to piped water or sewage systems, the sanitary conditions can be improved easily and quickly, whereas the users have access to comfortable, hygienic, odour and fly free toilets (Samwel et al. 2006).

The unclear status of water and nutrient reuse in the EU

Dry urine diverting toilet systems implement the reuse of human excreta in agriculture. In 2006, the WHO published the guidelines on the use of wastewater, excreta and greywater in agriculture,

provided recommendations on the sanitising procedure of faeces and urine from large and small scale toilet facilities (WHO, 2006). Because of lack on directives or regulations on national or EU level, the WHO guidelines serve as a base for the sanitising process of human faeces and urine and its reuse in the WECF sanitation projects. Unfortunately besides the lack of financial resources, the gap in the EU regulations and/ or directives on the safe reuse of human excreta in agriculture is a severe obstacle for the acceptance and up scaling of the sustainable sanitation approach.

Conclusions

In order to enable small communities access to safe and sustainable sanitation and protect the environment against human excreta, decentral and source separating sanitation approaches are urgently needed. In order to meet the MDG's in the EU, sustainable and affordable sanitation in villages with less than 2,000 inhabitants must be accepted and supported. With the current policies more than 20 million European people won't have any access to safe sanitation in 2015. In WECF sanitation projects dry urine diverting toilets and soil filters were tested and demonstrated successfully in e.g. Romania and Bulgaria.

Although the urban wastewater treatment directive recommends the recycling of wastewater and sludge, directives are lacking behind a regulation on the treatment and safe reuse of modern source separated wastewater flows such as urine and faeces.

The WHO guidelines and the sludge directive could be the base for the development of a European regulation on the safe reuse of human excreta in agriculture, whereas the terms and properties of sanitised urine and faeces need to be redefined. On European and national level source separating systems have to be promoted as a possible safe and sustainable way of the management of human excreta.

References

Bentvelsen K., 2005. Socio-economic and gender survey of Garla Mare,

http://www.wecf.eu/english/publications/2004/Romania_Report.php (assessed 21 March 2008)

Bodik I., Ritterstolpe P., 2006. Sustainable sanitation in Central and Eastern Europe - addressing the needs of small and medium-size settlements, <http://www.gwpceeforum.org/?page=35> (assessed 21 March 2008)

Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31986L0278:EN:HTML> (assessed 21 March 2008)

Mission Statement; http://trade.gov/doctm/environ_tech_1007.html (assessed 21 March 2008)

Richert Stintzing A., Jönsson H., Schönning ., Hinkkanen K., Kvarnström E., Ganrot Z., 2007. Urine Diverting Toilets in Climates with Cold Winters,

http://www.wecf.eu/english/publications/2007/ecosan_cold_climates.php (assessed 21 March 2008)

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,

http://www.wecf.eu/english/publications/2006/ecosan_pitlatrines.php (assessed 21 March 2008)

Samwel M., Gabizon S., 2008. Case study „Rural development for All“
http://www.wecf.eu/english/publications/2006/sustain_all.php
(assessed 21 March 2008)

Stracke I., 2007. Cost comparison of alternative wastewater systems for a Romanian village, Project Work, Institute of Wastewater Management and Water Protection, Hamburg University of Technology, Germany

Technical description of the ecosan school toilets Garla Mare, Romania,
<http://www.gtz.de/de/dokumente/en-ecosan-pds-011-romania-garla-mare-2005.pdf> (assessed 21 March 2008)

Urban waste water treatment, Directive 91/271/EEC
<http://ec.europa.eu/environment/water/water-urbanwaste/directiv.html> (assessed 21 March 2008)

Vinnerås, B., Jonsson, H., 2002. Faecal separation for nutrient management - evaluation of different separation techniques. Urban water, 4, 321-329

WHO, 2006. Guidelines for the safe use of wastewater, excreta and greywater, Volume 4 , Excreta and greywater use in agriculture.
http://www.who.int/water_sanitation_health/wastewater/gsuweg4/en/index.html (assessed 21 March 2008)