

## Workshop 8 (synthesis): challenges of expanding ecological sanitation into urban areas

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**Abstract** After seven papers discussing specific examples of ecological sanitation projects, the workshop considered the background, motivation and feasibility of this technology. It was agreed that ecological sanitation could help tackle water scarcity, health protection and , by recycling water and nutrients into agriculture, food scarcity. Dense cities are probably unsuitable for its implementation, but rural, town and peri-urban areas are promising. Key issues that remains are: the microbiological and chemical risks associated with the technology; the need for major information, education and support programmes; effective linking to reuse schemes; tailoring systems to meet local physical, socio-economic and cultural circumstances.

**Keywords** Ecological sanitation; nutrient recycling; sanitation

### Introduction

In the workshop seven papers on different aspects of ecological sanitation were presented, followed by an intensive dialogue.

#### **Paper “Microbiological studies of ecological sanitation in urban El Salvador”, presented by**

**Ass. Prof. Christine L. Moe, Emory University, USA**

Professor Moe presented a field study of 62 households with DVUD toilets (double-vault urine diverting) in a small, densely built, low-income urban neighbourhood near the centre of San Salvador. Over half of the households were reported to be moderately to very satisfied with the system. Almost none of the households used the end product for agricultural purposes. The hygienisation of the end products was in most cases disputable due to low temperature. The need of better designs, better information and a closer co-operation between the urban communities and the rural communities was stressed.

#### **Paper “Introducing ecological sanitation: some lessons from a small town pilot project in**

**Mozambique”, presented by Edward D. Breslin, Wateraid Mozambique**

Mr. Breslin reported on the efforts of ESTAMOS (a local NGO) to introduce a community-based development programme that combines participatory methodologies and social marketing techniques. A field study was conducted in the small town of Lichinga. The conventional technique of latrine slabs (SanPlats) was developed in order to reduce the space needed, to include the use of local materials, to reduce costs and to introduce new thoughts on pit depths.

**Paper “Lessons learnt from expanding household sanitation services in urban district of Khabul, Afghanistan”, presented by P. Jansen, Red Cross**

Mr. Jansen presented the efforts of the Red Cross, together with local administrations, to construct and renovate the sewerage systems in Afghanistan after the wars. The programme involved the construction of 10,000 improved latrines per year, the support and training of night soil collectors in the districts, assistance to local administrations, and development of educational material and campaigns. The programme is based on private-public co-operation and to reuse the excreta in agriculture. A market, buying and selling compost products and night soil, has been developed. The efforts of the authorities presently focus on the need to regulate and restrict this market.

**Paper “Ecological sanitation: prospects and problems in Bangladesh”, presented by M. Habibur Rahman, Professor, BUET, Dhaka**

Prof. Rahman told about the efforts in Bangladesh to protect the water-courses and reuse the nutrients in agriculture. The technologies were focussed on the production of duckweed and the production of bio-gas in local plants. The socio-economic viability and the sustainability of these technologies are being evaluated. Presently about 250 biogas plants are in operation, using human and animal excreta as raw material. The best operated biogas plants have had a pay-back period of 1 to 5 years. The end products are partly used in agriculture, but improved methods for making these products hygienically safe are needed.

**Paper “Urban groundwater and sanitation in developed and developing countries”, presented by M.H. Barrett, Robens Centre for Public and Environmental Health, UK**

Dr. Barrett stressed the need for better hydro-geological knowledge and studies in order to protect the groundwater resources. Examples were given from Nottingham, UK (industrial and sewage contamination), and Kampala, Uganda (sewage contamination).

**Paper “Provision of sanitation in some mega-cities of Asia: need for political will”, presented by Dr. Chia Lin Sien, Soka University, Tokyo**

Prof. Sien compared the waste water systems in some mega-cities in Asia. Tokyo, Hong Kong and Singapore all have well developed and operating wastewater systems, whereas Metro Manila, Jakarta and Bangkok are in a much worse situation. The situation in each city was described. The development in the cities was said to be dependent mainly on the political will of the government. In the absence of commitment of the government, community-based schemes should be developed so that local systems can be built, managed and shared by the people themselves.

**Poster “Family and schools demonstrations on the use of faecal matter and urine in crop production in Zimbabwe 2001”, presented by Edward Guzha, Mvuramanzi Trust, Marlborough**

Mr. Guzha reported on a study in a small housing area and a school. Different crops were fertilised by excreta (decomposed faecal matter mixed with ash and cleansing materials”) and compared to fertilising with mineral fertiliser. A control crop was also used. The results were clear for the family-cultivated crops: the excreta fertiliser was many times more effective, yielding a much higher crop. For the school, the results were unclear, probably depending on cross-flows of the fertilisers.

## Discussion

Four important issues were put forward as a basis for the dialogue:

- urban appropriateness
- reliable operation

- nutrient reuse feasibility
- exchange of experiences.

The dialogue was introduced by Dr Steven A. Esrey (UNICEF). Dr. Esrey gave a broad background and motivation for ecological sanitation, and reported on some trends. He argued the need for, and appropriateness of, ecological sanitation also in the growing, large, densely populated cities of the developing world. Main arguments were water scarcity, health protection and scarcity of food. The food scarcity could be met by urban agriculture, utilising the nutrients made available by ecological sanitation.

In the dialogue and the discussion on the presented papers, the feasibility (strengths and weaknesses) of ecological sanitation was brought forward. Ecological sanitation was reported on for rural areas and towns (El Salvador, Mozambique) and also for the large city of Khabul. The concept of bringing ecological sanitation into densely populated areas was not really addressed in the workshop presentations, but was covered in the dialogue.

It was convincingly demonstrated that ecological sanitation has possibilities in rural areas, towns and peri-urban areas with low-rise buildings and lowish population density. It was not concluded or demonstrated that ecological sanitation can be used in dense city areas. Reasons for this are a) the huge investments in existing infrastructure; b) a growing public demand for water for a variety of uses, e.g. bathing and home laundry; c) cultural and organisational restrictions and political will.

Ecologically sound, hygienically safe and economically reasonable alternatives for city areas exist and are presently being introduced in some countries, e.g. Sweden and Germany. These alternatives may be dry systems or water-borne systems. The local biogas plants in Bangladesh is one example. In Bangladesh water is used for cleansing after the toilet visit, thus making dry systems less favourable.

The concept of urine diversion in existing water-borne systems was brought forward. This concept is technically possible to introduce at a reasonable cost, makes the reuse of nutrients possible, and improves the function of the treatment plants, thereby decreasing the pollution of the receiving waters. Local and decentralised systems are possible, and in many cases probably favourable. Further development is however needed, e.g. the treatment, concentration (crystallisation), transport and spreading of urine.

The ecological sanitation concept needs further development in order to become a practical and wide-spread solution. Among the points raised were the following.

- The microbiological and chemical risks associated with ecological sanitation are not fully studied and understood.
- Substantial information, education, technical support and soft loans are crucial to help poor people.
- The reuse of the end products is an inherent part of the ecological sanitation concept, but was not practised in the presented cases except in Khabul. However, also in Khabul only the excreta was utilised, while the urine was soaked away. This issue has to be further studied.
- The design of the toilets has to comply with many different conditions and requirements in different countries. A practical, accepted and easy-to-operate toilet is a condition for success. Making use of solar energy for improving the composting processes seems to be an interesting challenge.

Common challenges for both centralised pipe systems and ecological sanitation are:

- Bridges have to be built between the urban communities and the rural communities in order to close the nutrient cycles. The acceptance by inhabitants in the city to comply with needed restrictions concerning water use and responsible behaviour has to be matched by acceptance by farmers to receive the nutrients from the city (acceptably treated and hygienically safe).

- A co-operation between private enterprises, public organisations and city administrations is needed whichever solution is chosen. The development of a market for the end products will considerably enhance the possibilities for closing the nutrient cycles.
- The agricultural use of nutrients from human waste is in many countries hampered by the availability and low cost of mineral fertilisers, often subsidised by the governments. The real value of the nutrients in human waste has to be quantified and communicated.
- The scale of the system may be from one household up to city-wide, and should be negotiated locally, depending on the local possibilities and preferences.
- It should be observed that regardless of the choice of system for taking care of the human excreta, other types of wastewater must be handled. Examples are grey water, industrial effluents and rain water.

In the comparison between central pipe-systems for wastewater and ecological sanitation, the questions raised for ecological sanitation are to a high degree valid also for centralised pipe-systems. Examples are the microbial and chemical risks involved, the reuse of nutrients, public acceptance and many more.

It was also concluded that protection of the environment and closing the nutrient cycles is not just a poor country problem – it is a worldwide responsibility.

The idea of constructing demonstration sites was brought forward. At these sites different systems for taking care of human waste should be demonstrated at full scale and in operation, in order for people to study and consider. Probably many such demonstration sites would be needed in many countries, all designed to fit the local conditions and the preferences of the local people.