

1 PAPER: THIRD INTERNATIONAL CONFERENCE ON ECOLOGICAL SANITATION

Title	From Lübeck to Durban – international progress on the 10 Recommendations for Action from the 2 nd international symposium for ecological sanitation
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Photograph attached (jpg)	

Introduction

At the 2nd International ecological sanitation symposium in Lübeck in 2003, the 350 participants from 60 countries clearly stated that ecological sanitation should have a key role to play in sustainably achieving the sanitation target of the Millennium Development Goals and the Johannesburg Plan of Implementation. The participants called for a change of paradigm in sanitation, with sanitation systems needing to move away from linear, expensive and energy intensive end-of-pipe technologies, towards ecosystems based approaches and the closure of material flow cycles. They also called for the resource value of human excreta and domestic wastewater to be recognised and that these resources be made available for reuse to reduce health risks related to sanitation, contaminated water and waste, to prevent the pollution of water resources, to prevent soil degradation and to optimise the management of water and nutrient resources.

To advance this agenda the conference adopted the “10 Recommendations for Action” to accelerate the promotion and up scaling of ecological sanitation around the world.

In the two years that have passed since the adoption of the 10 Recommendations for Action, ecological sanitation has assumed an increasingly prominent position in the international discourse on sanitary provision and is now routinely recognised as an innovative approach, which could play an important role in achieving the MDGs when scaled up (e.g. in the Dakar Statement from the 2004 Global WASH Forum). Much progress has been made, but much more is still needed before ecosan will be recognised as the standard approach to sanitation, and the required paradigm shift results in current conventional systems forming the minority of sanitary solutions on the practical implementation level.

This paper will evaluate progress on the recommendations for action and will provide an overview of national and international developments and advances since their adoption. Each recommendation will be considered and progress will be critically evaluated. Positive developments will be highlighted, and the need for further efforts and progress will be presented where appropriate.

1. Promote ecosan-systems as preferred solutions in rural and peri-urban areas

A variety of ecosan solutions, ranging from low to high-tech, exist for rural and low-density urban areas. In the last two years these have been receiving significantly more attention and successful ecological sanitation systems and larger scale projects for rural and peri-urban areas have been implemented. In China, progress has been extremely rapid with around 700 000 urine diversion toilets having been installed in 17 provinces in the last 7 years. In addition to this, the well-known 4-in-1 and 3-in-1 closed-loop systems (using anaerobic digestion to produce biogas from human and pig excreta with the resultant nutrient rich sludge and effluent being used in agriculture) are installed in 10.2 million households in north and south China! (Zhou et al., 2004; ix)

Although on a much more modest scale, ecosan systems have also been successfully introduced throughout sub-Saharan Africa (for example in Benin, Botswana, Burkina Faso, Cote d'Ivoire, Guinea, Mali, Mozambique, Namibia, South Africa, Senegal, Togo and Zimbabwe) and the positive results obtained should lead to a much larger scale adoption. Similarly, throughout South-east Asia, particularly in the Philippines, Vietnam and India, ecosan systems are being tested and optimised, and in rural areas in Europe, particularly where a connection to a central sewerage network has proven expensive, there is a growing interest.

However, several obstacles remain in the way of ecological sanitation being accepted as standard for rural and peri-urban areas. On the part of decision makers and planners there remains an information deficit, which limits the range of choices available to them. Even when information is available, it is often insufficient, leading to assumptions such as the cost of ecological sanitation systems being higher than conventional systems. The lesson learnt from existing systems must therefore be better documented and disseminated. More practical knowledge on system construction, operation and maintenance and on the safe use

of the products needs to be developed, and more attention needs to be given to the evaluation of sanitary system costs.

2. Accelerate large-scale applications of ecosan principles in urban areas

Urban areas with their rapidly growing populations and high population densities are in particular need of closed-loop sanitation systems, not only to protect human health, but also out of an increasing need to use available resources (including water, nutrients, energy and organics) efficiently. In comparison with two years ago, there is now quite a number of relatively large-scale ecosan systems either being planned or in implementation in urban areas around the world. For example in the Erdos Eco-town project (see Figure 1), which is supported by the Swedish EcoSanRes programme and currently under construction in inner Mongolia, northern China, 7000 people in 1600 households in 1, 2 and 4 storey buildings will be using a dry urine diverting system, with the urine, faeces and greywater being collected separately and recycled. First large-scale feasibility studies have also been carried out in China investigating the possibilities of ecosan systems in large towns and cities.

In Sweden, the European country with most experience in implementing ecological sanitation, urine diversion is used in several urban housing areas for families in Stockholm, e.g. Palsternackan (50 apartments), Understenshöjden, (44 apartments), Gebers (30 apartments) and the newest Kullan (250 apartments). In Germany, several new urban systems are being under construction, including a vacuum sewerage system followed by a bio-membrane reactor with anaerobic digestion to produce biogas and electricity for 2 research institutes, 6 industries and 100 houses, and with pathogen free effluent in Knittlingen near to the city of Pforzheim, and, in the course of the renovation of the GTZ's main office building, waterless urinals and urine diversion toilets will be installed, with research being carried out to concentrate the nutrients in the urine prior to its agricultural reuse.

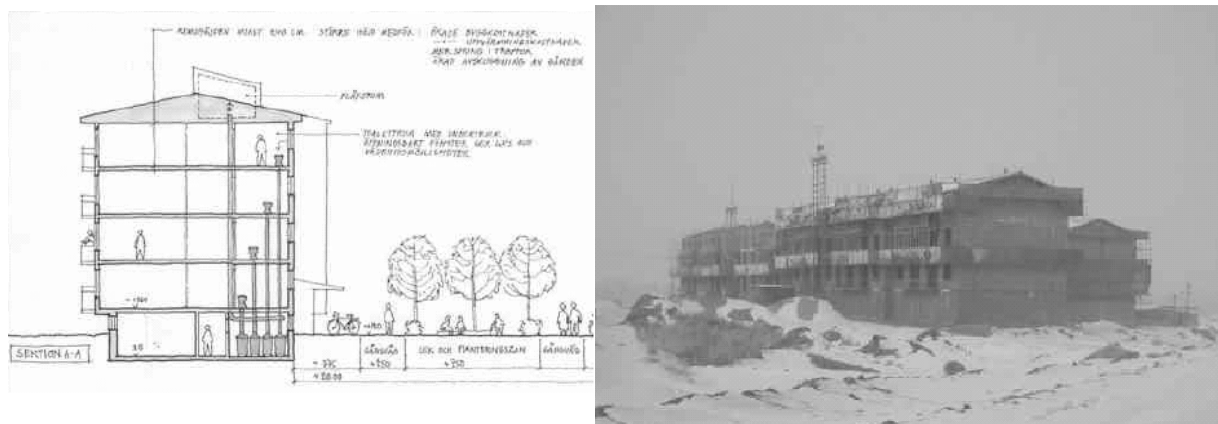


Figure 1: Side elevation of the sanitation system planned for 4-storey apartment buildings in Erdos (left). The apartment buildings under construction (right) (source: EcoSanRes)

In Ethiopia, plans are also underway to work with the private sector in providing ecosan systems for an already extremely successful low cost housing initiative being carried out by the government with the support of the GTZ.

In India, urban ecosan systems are being implemented and optimised, including urine diverting public toilets, with the urine and composted excreta being used to fertilise a nearby banana plantation, producing 50 t of bananas per year.

These few examples illustrate that urban applications of ecosan are now receiving more attention. However, they are mostly all implemented in relatively homogenous contexts, and complex systems, covering a range of household types, income levels, cultural and geographical conditions within one urban area are still extremely rare. These complex systems are needed to develop a variety of technological, organisational and economically viable solutions for densely populated urban areas and to obtain results concerning the costs

and performances of different systems in both industrialised and developing nations. Only a few private investors have shown a readiness to invest in closed loop sanitation systems for urban areas – which would be an important pre-condition for these systems being widely applied and accepted as standard.



Figure 2: Idealised flow scheme from a complex citywide ecosan system. In the less densely settled areas outside of the city centre, flow streams can be collected decentrally and used locally in gardens or urban agriculture. For the more densely settled city centre, urine, faeces and greywater may have to be collected using (semi-) centralised systems and used to irrigate green areas or for food production outside the city limits (source: GTZ)

3. Promote agricultural use

The acceptance of the agricultural reuse by farmers of the fertiliser products of ecosan systems has proven to be unproblematic, and the need to carefully manage finite resources, particularly phosphorous, has added an extra impetus to the necessity of nutrient recovery. All around the world farmers are, for the most part, open to the ecosan concept and recognise the nutrient value of urine and excreta. Indeed, in research activities in West Africa there were reports of urine theft in farming communities (CREPA, 2004). In the framework of a watershed management project in India, the reuse of organics has been embraced with the aim of improving soil structure and water retention capacity, whilst in northern Mozambique, a marked improvement in harvests has contributed to the popularity of ecosan systems, and to the project receiving international media attention (Peta, 2004). In some cases however farmers have been concerned about how consumers would view their products if they were fertilised with treated urine and excreta, and the effect, this might have on sales. One part of addressing this issue is to keep the risk of disease transmission to a minimum. This willingness to reuse received significant support with the publication of guidelines for the safe use of urine and faeces in ecological sanitation systems, and guidelines on the use of urine and faeces in crop production in 2004 by the SIDA supported EcoSanRes programme. A series of three upcoming WHO guidelines on the safe use of wastewater in agriculture, and in aquaculture and the safe use of excreta and greywater will further help promote safe agricultural reuse.

In light of the dwindling phosphorous reserves, the fertiliser industry has also begun to get involved in discussions on nutrient recovery in ecosan systems, with recent contacts with

ecological sanitation professionals taking place in the Netherlands (as part of a multi-stakeholder dialogue on sanitary systems) and in China.

Agricultural reuse has therefore seen a huge amount of progress in two short years. However there is an active ongoing debate, driven mainly by European researchers, on the potential risks of micro-pollutants such as endocrine substances and medical residues in wastewater, particularly urine, which may as a result require specific precautions or treatment. Nevertheless, when compared to the present risk posed by discharging these substances into our water bodies and contaminating our drinking water resources, ecosan practices of applying treated faeces and urine to topsoil can be considered a much safer practice. In the soil the substances are exposed to a greater amount of oxygen and biological activity, and their degradation can be expected to occur much more quickly than in water – however this must be confirmed by further practice oriented research. Reuse options for ecosan fertilisers also need further field testing at medium and large scale and appropriate pre-treatment, distribution, marketing strategies and guidelines for the safe handling and use for different local conditions need to be developed or optimised. In many cases, existing legal frameworks may also need to be reviewed to enable nutrient recovery, particularly from urine.

4. Raise awareness and create demand

The increasing number of ecosan systems being installed around the world is testament to the fact that there is an increased awareness amongst many different groups, leading to a greater demand. On an international level, ecosan has been prominently discussed at the last two annual sessions of the United Nations Commission for Sustainable Development (CSD) at the UN Headquarters in New York, and closed loop approaches to sanitation are recognised by the WHO in the upcoming guidelines as a sanitation approach which can reduce poverty. Ecosan was also discussed at the recent WASH forum of the Water Supply and Sanitation Collaborative Council where it was recommended as an innovative approach which could be used to help reach the MDGs. More international organisations are also becoming engaged in ecosan, including UNESCO, the WHO and the European Space Agency. International awareness raising is supported by the GTZ ecosan newsletter, which appears every three months, is published in Chinese, English, German, French and Spanish and has a readership of over 10 000 people.

Initial information workshops at national level has led to the establishment of intra-disciplinary ecosan networks in several countries including Vietnam, the Philippines and India, with these national initiatives resulting in further awareness raising. Recent multi-stakeholder meetings in the Netherlands have also served in highlighting the potential of ecosan.

Pilot systems, allowing stakeholders to actually experience how the system works have also served to create demand all around the world. However, whilst there has been a steady increase in demand, further advocacy and lobbying is needed to help mainstream ecological sanitation, and there remains an urgent need to showcase ecosan systems at a municipal or large neighbourhood level to convince decision makers.

5. Ensure participation of all stakeholders in the planning, design, implementation and monitoring processes

The adoption of a household or neighbourhood-centred approach in ecological sanitation received great support with the publication in 2004 of guidelines for implementing the Bellagio Principles in urban sanitation. These guidelines promote the use of the Household Centred Environmental Sanitation Approach (HCES, as developed by the WSSCC), which responds to the knowledge, needs and demands of the users. The ecosan-source book, currently being finalised by the GTZ ecosan team, adapts the steps given in these guidelines to the specific issues that involve ecosan projects. The publication “Open planning of Sanitation Systems” (Kvarnström and af Petersen, 2004) also provides some information to ensure participation throughout the planning, design, implementation, and monitoring process.

Almost all ongoing ecosan projects have used a participatory approach, at least to some degree, which has led to a great degree of interest and enthusiasm to adopt ecosan, even in areas where initially it was believed there would be a very low degree of acceptance. There is however still a need to gain further field experience on the use of household centred approaches and to develop skills for participatory processes within all relevant institutions and stakeholder groups conducting sanitation projects. The participation of the private sector as a stakeholder needs to be further encouraged in order creating a range of options and services, allowing users to select the services they desire, and gender issues need to be further highlighted, investigated and integrated into processes.

6. Provide for decisions on an informed basis

In order to help users, planners, decision makers and other stakeholders to make an informed choice a lot of work has been carried out in the last two years. At a local level numerous workshops with presentations from both local and international practitioners have helped start a dialogue, as well as encouraging the use of a holistic approach to sanitation. Such workshops have taken place in Benin, Botswana, Burkina Faso, Chile, China, Costa Rica, Ecuador, Eritrea, the Netherlands, India, Iran, and many, many other countries. Through these workshops people have been encouraged to become involved in assessing a range of ecosan options addressing their needs, thus placing decisions for the type of system they wish to use directly in their hands. There is now a wealth of experience and material available for such workshops that can be used and adapted for similar events.

To further assist stakeholders in informing themselves on the closed-loop ecosan philosophy, the use of the sanitary facilities and the safe treatment and application of the recyclates with respect to hygiene and the environment, a range of data sheets on specific ecosan technology modules and interesting case studies has been prepared and published via the internet by the GTZ. Further documentation that would support informed decision-making is being prepared by other organisations, including the Dutch NGO WASTE and the International Water Association (IWA).

However, investigations and information on the health risks posed by different sanitary systems (from the collection point through to the transport, treatment and end use of the excreta) is still needed, to provide a clear overview of what the dangers and benefits are. Economic information and analysis of different sanitation systems is also sorely needed to provide a fair and balanced comparison of the financial implications of different systems (including a consideration of all the externalities that they may incur) and provide a good base for informed decision making.



Figure 3: National multi-stakeholder ecosan workshops (left, Zambia, right, Burkina Faso)

7. Promote education and training for ecosan

In most universities and technical training colleges for sanitary engineers, as well as in most courses for agriculturalists, ecological sanitation is not yet present on the curricula. However, individual instructors have added ecosan to their lectures and several initiatives have begun

to introduce ecosan to the curricula of universities, schools and vocational training centres, one example being the course on ecosan in the developing world for both students and professionals on offer at the Norwegian University of Life Sciences (<http://www.nlh.no/research/ecosan/hoved/education/>). At the UNESCO-IHE in Delft, there are plans to introduce ecological sanitation to the course for sanitary and environmental engineers, and the web-based myNetworks platform has offered a course on ecological sanitation via the internet. Professional training has so far been limited to the international courses organised by EcoSanRes, and in francophone West Africa CREPA has started offering training courses for sanitary professionals in the region. The German Association for Water, Wastewater and Waste (DWA) are planning to launch a course aimed at engineers planning to work in developing countries. UNESCO has also become engaged in developing education material for ecosan with a handbook currently in preparation for further and higher education. However, as can be seen, most of these courses concentrate on engineering in developing countries, and the much broader multidisciplinary education and training approach needed for ecosan still needs to be urgently addressed. The engineers, architects, farmers, developers, constructors, consultants, municipal planners, economists and authorities concerned still do not have enough opportunity to learn about the concept, the wide range of existing technical and organisational ecosan solutions and the hygienically safe treatment and reuse of the recyclates. Ecosan principles still need to be integrated into capacity building and continuous learning programmes for all the actors involved.

8. Adapt the regulatory framework where appropriate

The adaptation of existing regulatory frameworks to accommodate a closed loop-approach to sanitation is expected to be a slow process with many technical and regulatory bodies tending to wait until all the evidence on ecological sanitation is submitted before they begin to change existing legal frameworks. However, since the Lübeck symposium there has been an impressive amount of movement on this front with the announcement by the WHO to produce guidelines on the safe use of wastewater in agriculture and aquaculture and the safe use of excreta and greywater, transforming the results of pilot-projects into guidelines reflecting the interdependencies of water supply, sanitation, waste management, health, hygiene, environment, agriculture and energy supply. It is hoped that these guidelines will form the basis for the development of new regulatory frameworks in countries where these are lacking and that they will provide an impetus for change in other countries where the framework is outdated and not geared towards resource efficiency. Another very significant contribution was made to this process last year by EcoSanRes with the publication of a set of five different guidelines, ranging from the safe use of excreta to a guide to norms and attitudes towards ecosan and other sanitation systems.

In Germany the Association for Water, Wastewater and Waste (DWA) has also formed a working group that will look into what changes may be necessary in standards to accommodate ecosan systems. The technical data sheets published by the GTZ may help to form a base line against which standards for ecological sanitation can be set, and work carried out by the GTZ, EcoSanRes, WSSCC, Urban Water, Stockholm Water and the Mexican NGO CECIPROC on criteria to assess the sustainability of sanitation systems could be used to help define new technical and treatment standards for sanitation systems.

Despite these advances however it is clear that in northern and southern countries alike the regulatory frameworks still requires a lot of labour intensive revision to facilitate the use of ecosan systems.

9. Finance ecosan

International development co-operation has seen the need to increase financing for ecological sanitation, and budgets have been increased accordingly to support ecosan projects. The recently launched European Water Facility for African, Caribbean and Pacific countries stated clearly in the call for proposals that project proposals containing ecosan would be particularly well received. Other bilateral donor agencies have also increased their budgets for ecological sanitation.

However appropriate financing instruments that help to finance the users investment for on-site and neighbourhood systems have not yet been developed. There is still a need for financial systems that recognise ecosan systems have a different cost structure from conventional sanitation systems. Innovative financing alternatives including start-up funds, community based finance programmes and cost recovery mechanisms have yet to be widely used. A recent amendment to support guidelines for communal water management in Austria does represent a first step in this direction, with the extra costs for the interior installations for source separation now being legible for support.

There is also a need to improve the mechanisms for private sector participation in ecosan systems that would open opportunities particularly for small and medium-sized enterprises and lead to job creation. Some business (e.g. the German based Hans Huber AG) having recognised the market potential, are investing in the development of innovative systems for the international market, and several private manufacturers of dry toilets based for example in South Africa, China or Sweden have also been selling their products overseas. However these tend to be the exception rather than the norm and there is a need for a market development for ecosan. This will therefore be a topic for discussion at an ecosan conference planned for 2006 in Mexico.

Recent calculations have shown that despite initial claims to the contrary, even a relatively expensive ecosan installation in a household can, within a relatively short period of time, cover its constructions costs through the production of agricultural inputs. Such preliminary investigations are very encouraging, however further studies and research into the economic side of ecosan and comparing it on an even basis with conventional end-of-pipe approaches to sanitation is still sorely needed.

Research activities for ecosan have however been receiving increased attention and funding in Germany, with several new research projects starting in the last year, looking for example at the use of anaerobic digestion of wastewater to produce energy (in Knittlingen in southern Germany), or on at the effects of medical residues in urine when applied as a fertiliser.

10. Apply ecosan principles to international and national Action Plans and Guidelines

Although having received increased international recognition in the last two years, ecosan strategies have for the most part not yet been integrated into national and international action plans including the Implementation Plans for the MDGs (Millennium Development Goals), PRSPs (Poverty Reduction Strategy Papers). However the UNEP GPA (Global Programme of Action for the Protection of the Marine Environment from Land-based Activities) has called for ecosan approaches to be adopted in the framework of National Plans of Action. It is hoped however that with continuing high profile recognition of ecosan (such as at the UN CSD, and with the upcoming WHO guidelines) it will be integrated into national strategies.

Conclusion

In the two years since the formulation of the 10 Recommendations for Action for the further promotion and up scaling of ecosan there has been quite some progress on all the issues the recommendations addressed. Ecosan is being seen increasingly as a serious, realistic, mainstream alternative to provide safe sanitation, reducing the health risks associated with poor sanitation, protecting water resources and soil fertility, and optimising resources management.

However, despite this positive development there remains a huge amount of work to do before a real paradigm shift in sanitary provision can occur. There is still a pressing need to develop the economic arguments for ecosan and to illustrate, using real case studies, that it does make economic sense, and need not be a more expensive sanitary solution – indeed, if one can include the benefits obtained through better health protection, increased food production and security, improved water resources quality, environmental conservation and local market stimulation ecosan systems should clearly prove economically more credible.

With 10 years to go to reach the MDGs by 2015, and with 2,6 billion people world-wide still without access to adequate sanitary facilities, the need for sustainable, holistic approaches is

greater than ever. We must therefore continue to use the 10 recommendations as a basis to help guide our work, aiming to have ecological sanitation recognised as the state of the art approach to sanitary provision.

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