



The first International Conference on Ecological sanitation: Summary report

After some years of scientific research, technological development and practical experience on the ground, the concept of Ecological Sanitation recently reached the stage of maturity when an international exchange in all these areas was needed. The result was the first International Conference on Ecological Sanitation, held in Nanning, China, from 5-8 November 2001.

Around 300 participants from 30 countries met to share experiences and exchange information and views on sanitation systems based on ecological principles. As the Conference demonstrated, there has been significant progress with the approach – technically, operationally and scientifically – over the past few years. In the view of participants, the Conference has brought ecological sanitation to a new threshold of credibility.

One important reason for growing interest in the ecological approach to sanitation is increasing anxiety about contemporary pressures on freshwater resources and the pollution of water and soil by human excreta. Environmental concerns favour an eco-system approach to the monumental task of their treatment and disposal – a task of great urgency in an increasingly insanitary world. However, application of this revolutionary approach, and understanding of its implications for public health, agricultural gain, economic benefits, and institutional requirements – especially in modern urban settings – are still in their infancy.

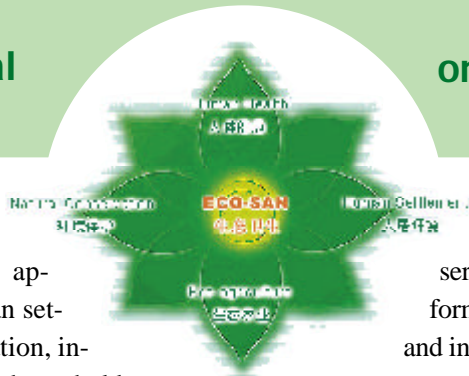
Putting the case for Ecosan

Ecological sanitation was defined by the Conference as an approach to sanitation which respects ecological integrity, conserves and protects freshwater, promotes healthy living, and recycles nutrients from human excreta for agricultural production.

The Conference focused initially on the case for ecological sanitation in today's water-short and polluted world. Presentations in this area explored the concept of a 'closed loop' between the consumption of food, its passage through the human digestive system, the sanitization of the pathogen-loaded faeces, and the recycling of nutrients in plant growth and food production. The extravagant use of water in conventional sewerage systems and their serious threat to ground-water as well as surface water quality were underlined, as was the need to integrate human waste disposal with other aspects of waste management and habitat improvement.

In China, where the use of nightsoil in agriculture is traditional, an approach based on sanitary improvement and safe recycling of the nutrients in human excreta has been greeted with official and popular enthusiasm. Significant Conference time was devoted to reviewing the Chinese experience with modern ecosan technology. Participants visited 'Eco-villages' in Guangxi Province, where altogether 30,000 household facilities have been installed. This is by far the most widespread use of the technology to date. Plans exist to extend the approach to densely populated urban areas in the near future.

Despite the strength of its case, ecological sanitation has faced obstacles in winning credibility, as Conference contributors confirmed. However, scepticism on the part of public health officials in particular is beginning to dissolve in the face of greater public acceptability. The main difficulty is that, in the ecosan model, excreta do not 'disappear' into pipes, tanks or pits, and their recycling and reuse requires a different kind of engagement by the household. In some cultures this can pose problems in anticipation, especially with the handling of decomposed faeces. Public acceptability is, however, promising if sensitivities are addressed and public education carried out.



Favouring the adoption of the approach in many poor rural and urban settings is the absence of proper sanitation, insecurity in using facilities beyond the household, or the unpleasantness and lack of human dignity current facilities afford. The 2.4 billion people who are in this predicament are strongly motivated to consider alternatives – especially women who value privacy and domestic cleanliness. Practitioners at the Conference suggested that, in these settings, ecological sanitation needs to be made available as an affordable on-site option. Where it has been, it is often selected over traditional or improved pit latrines.

An approach and a technology

To maximize efficiency, both of pathogen destruction and of nutrient re-use, ecosan favours the separate collection at source of urine and faeces and many facilities are designed accordingly. Examples of these were presented to the Conference, and their characteristics explored. In places where they have been enthusiastically adopted – in rural China, for example – they are much preferred to the facilities they replace. Those developed as a substitute for the standard water closet can be as aesthetic and convenient as conventional toilets.

Although urine diverting facilities are those most closely associated with ecosan, the key characteristics of ecological sanitation are ‘closed loop’ thinking, water con-

servation and protection. Therefore, other forms of facility which minimize water use and involve on-site destruction of pathogens were reviewed by the Conference as part of the ecosan family. Biogas, which is widely used in China in an integrated household energy, food production and waste disposal system, was the subject of several presentations.

In various countries, including Japan, Sweden, Germany and Norway, commercial interest has already developed in water-saving toilets, some of which are designed to divert urine. Many models use water minimally, as opposed to not at all. In Sweden, presentations explained that several such models are already on the market and ecological sanitation is being installed in a growing number of housing developments.

Developing a scientific foundation

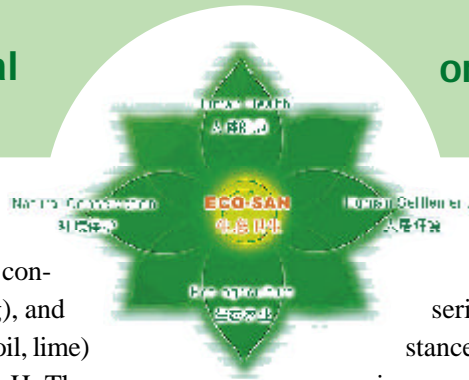
The Conference examined the results of a number of scientific research studies relating to ecological sanitation. This is a new field, and the accumulation of a body of science is still in its infancy. Efforts so far have mainly focused on health and safety aspects relating to pathogen destruction. Some work has also been done on the use of nutrients in agriculture; social and cultural acceptability; and institutional systems for implementation at scale.

Technical issues relating to health include comparisons between different methods of pathogen destruction

† **Mozambique:** Despite the scepticism of public health officials, ecological sanitation is being successfully introduced into rural communities in Niassa Province, Mozambique, by ESTAMOS and WaterAid. Facilities are seen as more congenial than standard pit latrines – they are odour-free – and have the advantage of yielding compost. There are two types: the *fossa alterna* with two shallow pits, so that wastes can decompose in one while the other is in use; and the *Arbour loo* in which a single pit is covered with soil when two-thirds full, and a tree planted over it. In both, users apply a soil/ash mix to cover excreta, keep flies away and raise pH to help decomposition. The *fossa alterna* requires people to remove the decomposed faeces and apply it on their fields.

The *Arbour loo* is usually used at seasonal farming locations for growing orchards. So far, cultural acceptability has not been a problem.

† **China:** The use of nightsoil as fertilizer is far from new in China. Around 93% of agricultural households utilize human excreta in this way. However, what is new is the introduction of a sanitation facility which allows for the diversion of urine and the treatment of faeces so that the practice can be safe and the facility pleasant to use. Modern-style ‘ecosan’ began in 1999 in three provinces under a pilot project supported by Sida and UNICEF. In Guangxi, ecosan is promoted as a comprehensive drive for a better village environment, including paved lanes, improved kitch-



for different climatic and geological conditions (dehydration vs. composting), and the use of different substances (ash, soil, lime) for absorbing moisture and raising pH. The use of urine as a fertilizer compared to other organic and inorganic fertilizers, and of sanitized excreta as a soil conditioner, have also begun to be tested.

Among the most important findings shared at the Conference was that, from a health and safety perspective, ecological sanitation can be as or more effective than conventional wastewater treatment in destroying pathogens. However, sound maintenance and usage practices are required, especially as the processes by which pathogens are rendered harmless are complex and survival rates vary considerably.

When it comes to the end-product, by far the majority of nutrients are in urine (around 80% of nitrogen and 50% of potassium and phosphate), and as a fertilizer on cereals, effectiveness is nearly equal to that of chemical fertilizer, but with much lower concentration of heavy metals. Thus urine is a very clean fertilizer.

Experience with ecosan in developing countries

A variety of practical on-the-ground experience with ecological sanitation from Africa, Asia and Central America was presented to the Conference.

ens, biogas digesters, and other amenities. There are now 100 'ecosan villages' in Guangxi; around 30,000 private tiled washrooms have been built. Ecosan facilities have also been constructed in schools. The programme is so successful that rapid expansion, in Guangxi and elsewhere, is planned. Most provinces in China have either already embarked on ecosan activities, or are at the planning stage.

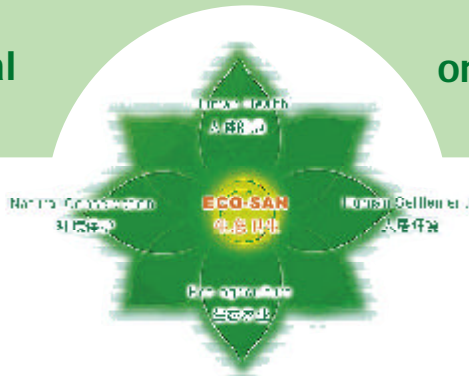
† **Mexico:** The model for ecosan systems in Mexico came originally from Vietnam. This is the double-vault dehydrating toilet, built above the ground on a solid non-permeable base, with a squatting slab which allows urine to be diverted. Its vaults are small compared to standard deep-

The approach is beginning to be taken seriously in a wide variety of circumstances. One important Conference conclusion was that there is no one technological formula, nor one set of motivating factors. Water conservation and protection may be the main driving force in one setting – in Mexico and South Africa, for example; human dignity and convenience in another – as in India and Uganda; public health and nutrient re-use in a third – as in China; respect for environmental integrity in another – as in Norway, Germany and Sweden.

Programmes need to be sensitive to local conditions, and to be accompanied by education for users about ecosan principles, correct usage of facilities and maintenance needs of the system. Flexibility and an undogmatic approach are required. Many practitioners emphasized the importance of choice for consumers of services, and the need to allow women to play an equal role with men in decision making and implementation.

The question of financing and the use of subsidies in sanitation – in major infrastructural installations as well as household systems – was raised in a number of discussions. Approaches were favoured which allow genuine user participation in technology selection and respond to demand. The likelihood that a new toilet system would be accepted and well-managed over time was increased if it was compatible with existing sanitation practices and behaviours.

dug latrine pits: this is a major advantage of urine-diverting systems in cramped living areas. The model has been further developed in Mexico and has today the look of a standard WC but with urine diversion and no flushing. The appeal of the facility is that it is odour-free, conserves water, is affordable and eco-friendly. The facilities – *Sanitario Ecologico Seco* – are manufactured in small community-owned workshops. Made in polished concrete or fibreglass, they cost around \$20 and sell mainly to lower- and middle-class households. The moulds for production of the pedestals are sold to local groups setting up workshops, of which there are now 15 in Mexico. The technology has also been exported to Philippines, South Africa, and Zimbabwe.



Recommendations from the Conference:

The International Conference on Ecological Sanitation made the following recommendations:

- † Further research is needed, especially into health aspects; economics and financing; institutional implications; use in agriculture; market development; and toiletry behaviours, attitudes, and practices.
- † There should be more widespread extension of pilot studies into urban and peri-urban areas.
- † Awareness-building of ecological sanitation principles and 'closed loop' thinking is needed at all levels of society and with all stakeholders.
- † There should be wider implementation of ecological sanitation in both developing and industrialized country settings.
- † Ecological principles should be systematically incorporated into conventional water and waste management systems and national sanitation policies.
- † Stronger links should be forged between proponents of ecological sanitation and partners in agriculture, energy, health, urban planning, water resources, and environmental security.

To implement these recommendations on a significant scale, financial resources, technical support and endorsement will be needed from government at all administrative levels, external support agencies, professional bodies, NGOs and the private sector. To generate this support, strong political will is required.

Ecosan and the wider sanitation picture

Ecological sanitation fits within the framework of the recently articulated *Guiding Principles for Environmental Sanitation*. These principles have been widely endorsed internationally, including by the global Water Supply and Sanitation Collaborative Council.

They are as follows:

- † The purpose of environmental sanitation is to promote human dignity, health and environmental security
- † Both providers and consumers of services should participate in decision-making
- † Human excreta and wastes should be perceived as potential resources
- † Sanitation issues should be dealt with as close as possible to the source of waste generation.

Participants believed that the Conference had assisted this process and recorded their appreciation for Swedish International Development Assistance (Sida), which has played a leading role in investing in this pioneering work.

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This report was prepared by Ingvar Andersson, UNDP and Maggie Black, Conference Rapporteur

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