The sanity of ecosan

Ecological sanitation systems allow users to cut water use and obtain a source of fertilisers, but is there any financial incentive to install such systems? Proponents of ecosan were challenged on this. **BILL McCANN** reports on the debate this challenge sparked.

Construction work on the Erdos project in Dong Sheng, Inner Mongolia, where the whole town will have ecosan toilets. All pictures courtesy Arno Rosemarin.

An academic's stinging attack on the feasibility and even the sanity of ecological sanitation (ecosan) has provoked a storm of protest and many well-reasoned counter-arguments, not only from advocates of the technology but also from practitioners with extensive experience of its application in developing regions.

The criticisms of ecosan have been made by Duncan Mara, a professor of civil engineering at the University of Leeds, England and a member of the editorial panel of *Water21*. In making his criticisms (see opposite), Professor Mara has focused entirely on the initial cost of ecosan toilets and the monetary value of the nutrients that can be saved and used for food production when such systems are used. Since that is to look at the issue from an extremely narrow viewpoint, one can only conclude that Professor Mara has taken that stand purely to provoke debate. As the text indicates, he firmly believes that single pit pour-flush toilets, ventilated improved pit (VIP) latrines or local simplified sewerage networks are much the better option for the world's poor in rural or peri-urban areas.

Not surprisingly, the proponents of ecosan do not dispute that 'their' toilets are more expensive to construct. They do, after all, need separate chambers to retain urine and faecal matter while pour-flush and VIP toilets need only one. But that, say the ecosan people, is to ignore the main issue.

Paul Calvert, with 15 years or more working for Ecosolutions in Southern India and Sri Lanka, makes the point very clearly: 'It is true that a double vault toilet (ecosan) costs more than a single pit toilet but, where groundwater is not threatened by simple pit latrines and pour-flush latrines (PFLs), who is arguing against them? What Duncan simply ignores is the fact that there are many people living in densely settled areas where simple PFLs would penetrate the water table and where people depend on that shallow aquifer for their water needs. Just because it is cheaper to pollute groundwater, does it make sense?'

That view is expressed rather more vividly by Professor Ralf Otterpohl, Director of Hamburg University's Institute of Municipal and Industrial Wastewater Management and long-time opponent of Duncan Mara on the merits of the alternative systems. He too homes in on the essential fact that a general characteristic of pit latrines is that they leak. With some sarcasm, he asks: 'Why waste money on pits when it is even cheaper to defecate by the roadside? In Senegal I have visited settlements with groundwater that had up to 400 mg/l of nitrate, a severe health risk to infants below six months. The pollution comes from pits. It is very expensive to pollute your groundwater. It is not an acceptable practice to dig holes and flush excreta into them. Many pits are leaky and pollute groundwater, not only with the mobile nitrate but also with pathogens. It is a task of society to provide hygienically and environmentally safe sanitation.'

While Otterpohl characterises Professor Mara's comments as polemic, he and his 'ecosan colleagues' seem open to acceptance of alternative systems in appropriate circumstances.

One such alternative is simplified sewerage. 'I must agree with (Professor Mara's) views, especially when he talks about a peri-urban resident in a South African city,' says Brazilian engineer Dr Maurício Luduvice. 'I have no doubt in my mind that simplified sewerage is by far the best solution for sewerage collection in urban areas of developing countries or even new urban developments in the developed world. We have been using simplified/condominial sewerage in Brazil for over a decade. It is the standard

An ecosan dry toilet being emptied following the 12 month sanitisation cycle in Tamil Nadu, Southern India, is a good indication of the dry, conveniently handled output of these systems.

solution for sewerage since the early 1990s and is being used in both wealthy neighbourhoods as well as peri-urban areas in the capital Brasilia, a city of over two million people. The adoption of simplified sewerage has allowed CAESB (Companhia de Saneamento do Distrito Federal) to reach almost all residents in the Federal District of Brasilia with sewage collection and treatment. The cost reduction is significant and the efficiency compares to conventional sewerage. Simplified sewerage cost in the city is around US$40 to 60 per capita.'

The salient points here of course are that, when simplified sewerage began, a properly operated conventional sewerage system already existed in the central city, discharging to a well-operated sewage treatment plant, all in the hands of CAESB, a well-organized municipal operating company with well-qualified, experienced staff. Furthermore one might infer that the city does not suffer from shortage of water.

When these points are put to Ralf Otterpohl, he agrees entirely that the solution, in this case the use of simplified sewerage, does indeed fit the specific situation but, he points out, 'The situation has to be checked for every project. The ecosan principles of containment, treatment and reuse can result in very high performance at very low costs if both design and operation are done in a proper way. On the other hand, for example in the Middle East, every drop of wastewater goes to agricultural use except at the coastlines. If this reuse is done well, with appropriate treatment, it also results in high performance from an emissions point of view. The other face of reuse is avoiding emissions, protecting natural waters.'

Elsewhere in South America, another Otterpohl colleague, Ron Sawyer, who has worked for many years in Mexico, is equally ready to accept some aspects of the Mara case. While noting that ecosan enthusiasts are all very aware of the environmental advantages and potential agricultural and food security benefits of such systems, he accepts that it is difficult to cost the whole operation. One reason for that, he says, is that 'we simply don't have the experience to work out the full costs to collect, transport, store, process and apply the liquid and solid fractions from the toilets - particularly in an urban setting. Where Duncan really makes sense is that the individual users at the household level need to be convinced that the advantages of ecosan sufficiently outweigh any potential disadvantages or added costs. For that to happen at any scale there will need to be rigorous costing of the conventional sewerage systems in terms of depleted water resources, negative environmental impact and nutrient depletion.'

No such even-handed approach is evident on the part of Professor Mara, who concludes by stating: 'The ecosan advocates need to convince me (and, I suspect, many others) that ecosan toilets are appropriate - in any part of the world (other than in atypical 'communes' in industrialized countries). Can they really persuade us that ecosan is indeed 'eco-sane' and not remotely 'eco-insane'? I think they've got their work cut out.'

A neutral observer might, however, disagree. Without decrying the use of pour-flush latrines, VIP latrines or simplified sewerage systems in appropriate circumstances, evidence presented to *Water21* indicates that ecosan clearly has a vital role to play in a sustainable water future and is already doing so in many countries.

In a comprehensive response to this magazine's inquiries, Arno Rosemarin, communications director of the Stockholm Environment Institute (SEI), talks of over a million twin chamber, urine-diverting toilets installed in China over the last five years, all without subsidy and at a current cost of US$50 per unit, including superstructure. At current exchange rates he says that amounts to 2150 rupees, not so far off the 1900

Ecological Sanitation - an unaffordable option?

Ecosan may be good for the environment - but if it costs too much, is it feasible? asks **DUNCAN MARA.**

The basic philosophy of ecosan is beguilingly attractive: we each produce enough nutrients in our excreta to grow all the maize or wheat that each of us needs. We need to use, not waste, these nutrients; if we waste them by mixing our yellow, brown and grey waters together (to form domestic wastewater), then we end up spending a lot of money removing them at wastewater treatment plants, or else they get into our rivers and lakes where they may cause eutrophication.

The Indian NGO, Gramalaya, has on its website (toiletsforall.org) bills of quantities and construction costs for various on-site sanitation technologies (see table). Assuming these figures are correct, the key question which ecosan advocates need to answer is: 'If I'm a poor rural villager in India, why should I spend 4200 rupees on an ecosan toilet, rather than 1900 rupees for a single-pit pour-flush toilet?'

Assume I've a wife and four children. Counting the kids as half an adult, that's a total of four adults. An adult excretes ~4.55 kg N, ~0.58 kg P (= 1.33 kg P_2O_5) and ~1.27 kg K (=1.53 kg K_2O) per year (Esrey et al., 1998), so my family produces the equivalent of around 30 kg NPK per year. NPK fertilizer costs close to 10 rupees per kg (Ghosh, 2003), so the NPK in our excreta is worth some 300 rupees a year. Now supposing my ecosan toilet will last for 10 years and using a discount rate of 10 percent, I can work out the present value of 300 rupees for each of years 2-10 and then sum these to give me the present value of the benefits from my ecosan toilet. This works out to be 1725 rupees, so the net (present value) cost of my ecosan toilet is (4200-1725) = 2475 rupees - not so attractive really. I think I'd rather pay just 1900 rupees for a single-pit PF toilet (and, in any case, it's going to be difficult enough for me to save 1900 rupees, never mind 4200).

Relative costs aren't too different in South Africa: a urine-diverting ecosan toilet costs ZAR 3000-4000, a single-pit pour-flush toilet ZAR 2000-3000, a single-pit VIP latrine ZAR 600-3000, and simplified sewerage ZAR 2500-3000 (DWAF, 2002; exchange rates in February 2002 were: ZAR 1000 = EUR 100 = USD 87). If I were a periurban resident in a South African city, why should my community go for ecosan toilets, rather than choosing to have a local simplified sewerage network? And if I were living in a rural area, it would take a lot to convince me not to choose a single-pit VIP latrine. Furthermore, not everyone likes urine-diverting toilets (Jackson, 2004).

The ecosan advocates need to convince me (and, I suspect, many others) that ecosan toilets are appropriate - in any part of the world (other than in atypical 'communes' in industrialized countries). Can they really persuade us that ecosan is indeed 'eco-sane' and not remotely 'eco-insane'? I think they've got their work cut out. ●

Duncan Mara is professor of civil engineering at the University of Leeds, England and a member of the editorial panel of Water21. Text based on a longer item.

Construction costs of on-site sanitation technologies in India*

Sanitation technology	Construction cost (INR, 20 April 2004**)
VIP latrine	2,150
Single-pit PF toilet	1,900
Alternating twin-pit PF toilet	2,500
EcoSan toilet***	4,200

**Source: www.toiletsforall.org. **Exchange rates for 20 April 2004 from www.economist.com: INR 1000 = USD 23 = EUR 19. ***Without urine diversion.*

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Esrey, S.A., Gough, J., Rapaport, D. and others (1998). Ecological Sanitation. Swedish International Development Cooperation Agency, Stockholm.

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rupees quoted by Professor Mara for the single pit pour-flush latrine in India.

Addressing the latter's fertiliser calculations, Rosemarin looks to a medium term future when, he believes, phosphorus prices will go sky high.' The US cheap reserves will be depleted in 30 years,' he says.'China will stop exporting phosphorus this year and Morocco will have a world monopoly on bulk and refined exports.The US signed a free-trade agreement with Morocco in March 2004 giving them negotiable access to the Moroccan reserves. India is a vulnerable importer and now subject to pricing they cannot control.'

Noting that the three principal characteristics of ecosan are containment, sanitisation and reuse, he records an impressive list of countries where, under its EcoSanRes programme, SEI is involved in a number of urban ecosan projects; Inner Mongolia (China), Kimberley and Buffalo City (South Africa), Tepoztlan (Mexico) and Kampala (Uganda). Under the same programme there are rural projects in five states in India and pilot rural projects in seven West African countries.

Rosemarin's photograph of an ecosan dry toilet being emptied following the 12 month sanitisation cycle in Tamil Nadu, Southern India, is a good indication of the dry, conveniently handled output of these systems. One hesitates to think of the equivalent output from a twin vault water flushed latrine and the hygiene education that is necessary for safe handling of that material during emptying.

In China, SEI has installed many dry urine-diverting toilets in single and two-storey houses; ash is mixed with faeces, with alternate chambers being sealed for six months before emptying.

In the more ambitious Erdos project now under construction in Inner Mongolia, sawdust will be the drying agent in ecosan toilets for the entire 8000 population of this new town in the city area of Dong Sheng, 100km south of the Yellow River. Here the system will be used mainly in four-storey apartment blocks with straight drop shafts to wheeled bins in the basements.

Calvert's work in South Asia has also included installation of urine diverting toilets inside houses and flats, although his greater focus has been on waterlogged and water-scarce areas where he says 'users proclaim that these toilets are the only suitable option'.

Pointing to the state of Indian rivers, he believes that ecosan is more important for cities than rural areas. Municipal sewers and pour-flush toilets are highlighted as the root cause of the gross river pollution.'After using precious and scarce water, they empty directly into the rivers that millions depend on for their drinking water.'

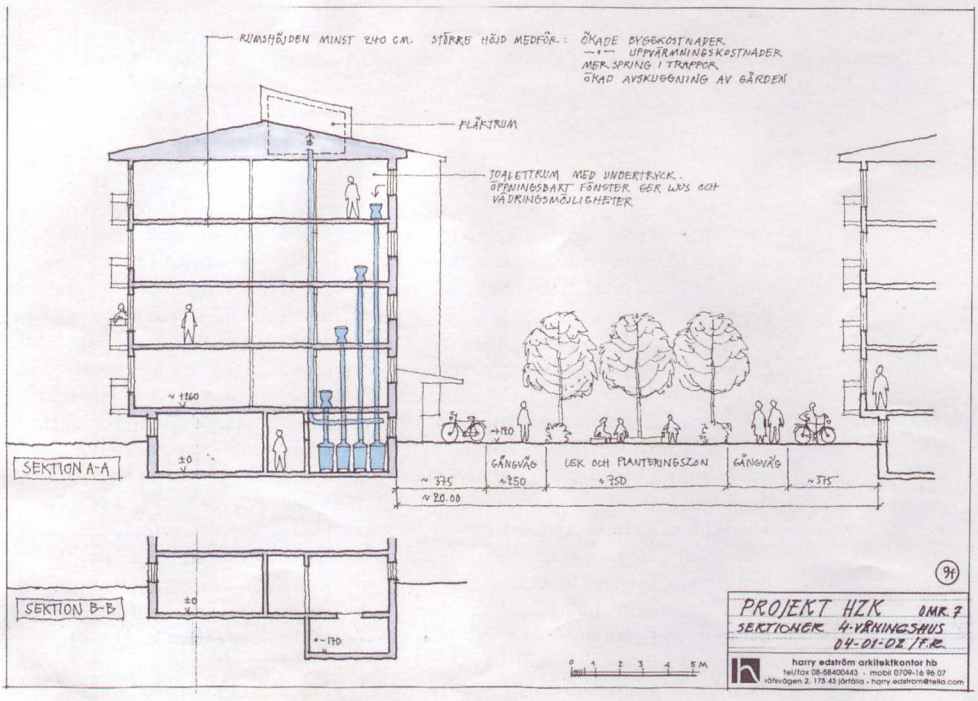
With those thoughts, Paul Calvert is not so far away from the eminent Peter Wilderer, a man whose achievements in water and sanitation need no introduction here.When speaking to *Water21* after receiving the 2003 Stockholm Water Prize, Professor Wilderer remarked that sewers were one of the greatest sins of engineers.

His more recent comments on Professor Mara's statements are perhaps the best way to conclude this article. He says (in summary):'In a way Duncan Mara is right.When you restrict the economics to just the buying of one toilet or another, then the separation toilet is financially not competitive. But things are not that simple. One would also not argue that buying a BMW is nonsense because you can get a bicycle for much less money. Ecosan, as I understand it, is a concept which goes way beyond the level of a toilet and the recovery of fertilizer from urine. As in the DESAR (de-centralised sanitation and re-use) concept, an integrated approach is taken according to the fundamentals of integrated water management.

'Water supply, sanitation and recovery/re-use of water and other valuable materials are seen as pillars of a sustainable water system for both municipal and rural areas.Which toilet system is to be used and how small the system under consideration is to be scaled down are secondary aspects and must be treated on a case to case basis.'

Professor Wilderer goes on to concur with the one apparent area of agreement by all parties here in saying that a rigorous economic study is long overdue.'It would be good if anybody would take over this task and deliver an overall financial survey.' ●

Double vault, dry, urine-diverting toilet, Guangxi, China.



Ecosan toilets will serve a population of 8000 in the Erdos project, currently under construction in Inner Mongolia. The plan shows the project's system of four-storey apartment blocks with straight drop shafts to wheeled bins in the basements.

The ecosan debate continues

Responses to the article 'The sanity of ecosan' and the accompanying comments by Professor Duncan Mara in 'Ecological sanitation – an unaffordable option?' that appeared in the April issue of Water21 (p28-30).


WASTEWATER MANAGEMENT

The sanity of ecosan

Ecosan – both economic and eco-sane

In the April issue of Water21 (p28-30), Prof Duncan Mara, using an example from India, argues that ecological sanitation (ecosan) is more expensive than conventional sanitation. However, he is misled by a faulty calculation. When this is corrected, his example convincingly shows that ecosan is economical, and thus eco-sane, using Prof Mara's criteria and terminology.

The following data from India were given by Prof Mara. The cost of a pour-flush toilet is 1900 rupees and that of an ecosan toilet is 4200 rupees. The family in the example consists of two adults and four children and their total excretion is assumed to be the same as from four adults. The excretion of one adult is given as 4.55 kg N, 0.58 kg P and 1.27 kg K and the cost of NPK fertiliser as 10 rupees per kg.

The yearly excretion of this Indian family of six is approximately 18.2 kg N, 2.3 kg P and 5.1 kg K, which adds up to 25.6 kg of the nutrients N, P and K. However, chemical fertilisers do not only contain N, P and K, but also oxygen and hydrogen, etc. Therefore, the amount of nutrients in the excreta corresponds to around 75 kg of NPK 25-2-6[a] fertiliser, which according to the data above costs approximately 750 rupees in India. The present value of 750 rupees over years two to ten at 10% interest rate is about 4300[b] rupees. Thus, over a ten year period the ecosan toilet not only pays for the extra investment compared to a pour-flush toilet, but for the whole toilet investment! Furthermore, the excreta fertilisers are of even higher value to the poor, as they can normally not afford any fertilisers. Thus, ecosan is advantageous from the perspectives of poverty alleviation and gender, as most poor are women and children.

However, sanitation systems should not be chosen only on economic criteria. Health and risk of disease transmission, short and long term environmental and resource aspects are essential for the long term sustainability, as are institutional and socio-economic factors. And all of these should be evaluated for the whole systems, including sustainable treatment. One such important aspect in the Indian example is the risk of contaminating the groundwater. In many villages and periurban areas around the world, a large proportion of the poor population use shallow groundwater for drinking and this precious resource is well protected by ecosan toilets, but seriously threatened by pour flush toilets. How much will it cost the Indian family over a ten year period if they have to buy the drinking water instead of being able to use a private or communal shallow well?

Furthermore, there are now many new, improved and at the same time cheaper ecosan toilet designs available (see the revised and enlarged version of 'Ecological sanitation' by Winblad et al., available at www.ecosanres.org). With one of these cheaper designs, naturally the investment cost would be lower and the pay-back time shorter.

Thus, the scenario described by Prof Mara convincingly shows that ecosan is, using his own criteria and terminology, eco-sane, as it is wise not only from an environmental point of view but also from an economic one! Ecosan toilets can in fact be seen as profitable fertiliser factories, which is exactly how ecosan now are marketed in Vietnam. ●

Håkan Jönsson, Christine Werner, Ralf Otterpohl, Arno Rosemarin, Paul Calvert, Björn Vinnerås

[a] The numbers in NPK 25-2-6 Nordic type specification refer to the content of N, P and K respectively in % of the total weight of the fertiliser. The way NPK fertilisers are specified differs widely between different countries. In many countries, e.g. India, the P and K numbers refer to the content in % of P_2O_5- and K_2O-equivalent, respectively.

[b] If instead the calculation is done for NPK 10-5-20 Indian type specification (containing 10% N, 2.2% P and 16% K), currently selling at 5.50 INR, the nitrogen and phosphorus in the excreta corresponds yearly to around 160 kg NPK 10-5-20 fertiliser, selling at 880 INR and with a present value over ten years of above 5000 INR.

Duncan Mara responds

Bill McCann is right: I was being deliberately provocative. It's good to have it out in the open that ecosan systems do cost more (this information doesn't readily appear in the ecosan literature). And I agree that the reuse of the water and nutrients in wastewater is really important (I've been a staunch proponent of wastewater reuse for a good number of years), but I'm not sure that ecosan is the best reuse system. If it costs too much, and it is poor and very poor people who have to pay this cost (and we have to consider here the 'no subsidy' situation), then frankly I don't believe it has a chance of being a widely adopted sanitation technology. You may say that this is a great pity, and I might agree, but really it's up to the ecosan proponents to reduce ecosan costs so that it becomes more viable. And if I've at least got some ecosan proponents to think about cost reduction (even costs), then that can only be a good thing.

One really has to admire the passion and confidence of those in the ecosan 'camp'. (I know as I've worked closely with two 'ecosanologists' over the past two years - at first we could only argue vehemently, but over time we slowly began to appreciate each other's point of view.) Sometimes, however, their confidence can be a bit overwhelming: for example, the opening session of the second international conference on ecological sanitation held in Lübeck, Germany in April 2003 was entitled 'Ecosan - a realistic tool to achieve the Millennium Development Goals' (www2.gtz.de/ecosan/english/symposium2-proceedings-eng.htm). This seems to me, and I suspect to many others also, to say very clearly that ecosan is able (or perhaps that it was hoped, even expected, that it would be able) to make at the very least a major contribution to the achievement of the MDGs. However, this is possible only if an extraordinarily large number of ecosan systems are installed in developing countries by 31 December 2015. Is this a likely scenario? I think not. Why? Because actually not that many ecosan systems are in place now and there is no real evidence that this is likely to change in the next ten years. There may have been a million ecosan toilets installed in China over the last five years, as noted by Arno Rosemarin, but even an extra ten million over the next ten years would not actually make a significant contribution to the achievement the Sanitation MDG globally (for which over 400,000 people have to receive improved sanitation per day during 2001-2015). (Regarding costs, Mr Rosemarin should know better: the fact that ecosan toilets in China cost about the same as pour-flush toilets in India is not a meaningful comparison - we need to know the cost of pour-flush toilets in China.)

Very interestingly the term 'ecological sanitation' appears just once in the recent definitive UN Task Force report on the water and sanitation MDGs ('Health, dignity, and development: what will it take?' Earthscan, London, 2005; available at www.unmillenniumproject.org/documents/WaterComplete-lowres.pdf), whereas 'low-cost sewerage', 'simplified sewerage' and 'condominial sewerage' appear a total of 11 times. Brazilian simplified sewerage is one of the seven sanitation case studies in the report, as is the Orangi Pilot Project, another low-cost sewerage programme; but there's no case study on ecosan.

One of the problems with ecosan (the classical source-separating type) is urine diversion. There may be no problems with the social acceptability of urine handling in the Far East, but Africans reportedly don't like it (B. Jackson, 'Sanitation and Hygiene in Kenya: Lessons on What Drives Demand for Improved Sanitation', Water and Sanitation Program, 2004). Professor Otterpohl's group recommends storing urine for six months prior to reuse - but the cost of the urine storage tank increases the cost of an ecosan toilet. In periurban areas there's often also the costs of urine sewers and grey water sewers (and the minimum diameter for urine sewers is 50 mm, so as to avoid problems with crystalline deposits). Professor Matsui of Kyoto University reported at a seminar last year at the Hanoi University of Civil Engineering that in Japan urine is regarded as 'all bad' as it contains high levels of endocrine disruptors and pharmaceuticals; it is collected separately to facilitate its disposal - by incineration! Björn Brandberg, of SanPlat fame, writes 'For a long time we have said: don't mix water, urine and faecal matter. Maybe we were wrong. Maybe we should have a second look at our waterborne [sewer] systems. Maybe they can be improved to become ecologically sound. Maybe we should promote both systems and compare [them] - giving both of them a fair chance' (www.sanplat.com/ecologic.htm). Need I say more?

One of the problems with ecosan is urine diversion. There may be no problems with the social acceptability of urine handling in the Far East, but Africans reportedly don't like it.

Groundwater pollution is, of course, an important issue and one which sensible advocates of on-site sanitation systems have long been concerned about. In 1982 IRCWD (now SANDEC) published the report 'Risk of groundwater pollution by on-site sanitation in developing countries: a literature review'. A recent update is the 'ARGOSS (Assessing the risk to groundwater from on-site sanitation) Manual' published by the British Geological Survey in 2001 (www.bgs.ac.uk/hydrogeology/argoss/home.html). There are a few simple techniques which can be used to minimize groundwater pollution.

I'm not wholly convinced about ecosan saving the world from the impending phosphorus crisis. I think more important approaches are to reduce excessive NPK use by farmers in all parts of the world and to replace P compounds in domestic and industrial detergents. Advocating more costly ecosan toilet systems for poor and very poor people in developing countries because they recycle P seems to me to be placing an unnecessary burden on these people - after all, they're not the ones causing this impending global P crisis.

Professor Wilderer states that sewers are 'one of the greatest sins of engineers', but this is a mistaken view. Conventional sewerage, together with good water supplies, has saved more lives during the past 150 years than any medical intervention during the past few millennia (and this includes lives saved by vaccinations). The disadvantage of conventional sewerage as a sanitation system for poor and very poor people in developing countries is its very high cost (John Kalbermatten was one of the first to realise this some 30 years ago), but simplified sewerage is very much cheaper and it has the advantage that, simply because it is a sewerage system, it is more readily adopted by water and sewerage authorities than non-sewerage systems (i.e., on-site sanitation systems, including 'classical' ecosan) - this has been a major factor in its wide adoption in Brazil, for example.

I find it rather interesting that the IWA specialist group on ecosan changed its name at the IWA biennial conference in Marrakech to the Resources Management Sanitation group, although today (1 May) the IWA website still has it as the ecosan group (the group started in Berlin in 2001 as the Sustainable sanitation group and became the Ecological Sanitation group in 2003 - details at www.tu-harburg.de/susan). Perhaps the emphasis is changing from 'classical' source-separating ecosan to something wider? One very distinguished ecosanologist e-mailed me recently to say that any sanitation system that reused the water and nutrients in human excreta or domestic wastewater was ecological sanitation (even a bucket latrine with urine diversion would apparently count as ecosan). Thus simplified sewerage followed by wastewater treatment and reuse for crop irrigation and/or fish culture can clearly be considered as ecological sanitation. So I've unknowingly been an ecosanologist all these years. Now there's a sobering thought! ●

Professor Duncan Mara, University of Leeds, UK.

A shift to resources management sanitation

IWA president Laszlo Somlyody has stated that sanitation options are urgently needed because unserved people are still a major part of the world population. Conventional solutions are unfeasible in many regions, wastewater treatment tends to fail if built at all where flush sanitation has been installed. Spreading of faecal matter creates a major hygiene hazard, it contributes to the death of millions every year, most of them babies and children under five. Action is needed, now and from us! A major step is to implement viable sanitation options on a massive scale and to find ways of professional operation. One option can be to help upgrade the pit toilets that are used by more than two billion people. Keeping urine and all water out of them will minimise smells, flies and leaching of nitrogen and pathogens to groundwater.

What can sanitation options look like? They can be designed for resources management and there are many examples built already. On the high-tech end there are projects with vacuum toilets, collecting and treating blackwater (toilet only) with the major load of nutrients and pathogens together with biowaste. Advanced research on this is for example performed by the Centre of Competence for Water in Berlin, partly owned by Veolia Water. There is a pilot project of the Linz AG, the utility of this Austrian city, applying urine diverting flush toilets with solids separation integrated with vermi-composting. It is designed by Otterwasser GmbH and presently built for 100 people and a school. Huber Technology AG is researching source separation for its new office building for 200 employees and already markets components of such systems. It is also applying urine diversion, that was rediscovered in Sweden around 15 years ago. The well known university professors Gaze Lettinga and Peter Wilderer created the name 'DeSaR' (Decentralized Sanitation and Reuse) for the source separating sanitation systems (see the IWA book of the same name). The dry options on the low-tech low-cost end are those that are so dramatically needed to help solve the sanitation crisis. So far, they are mostly promoted and installed by the development community and called 'Ecological Sanitation' ('ecosan', free book at www.ecosanres.org). The water profession is still largely ignoring these options despite their immense potential.

Resources management sanitation approaches are not necessarily decentralised systems but include sewered systems that are designed for reuse of water, nutrients, soil conditioners and energy. A study of the Hamburg wastewater utility has explored ways for the future to collect urine in large parts of the city to capture most of the nutrients in high concentration, run a fertilizer factory and get away from nutrient removal at the large central treatment plant.

Asset management for utilities in my point of view needs to include a look into the far future, too. In the long run, over 50 or 100 years, there are sanitation options to be considered. Membrane technology in particular used in integrated decentralised concepts combined with a different type of stormwater management can make expensive water networks and sewerage systems unnecessary – this can be a threat as well as a better option for a utility if included in an overall strategy. The option to bring freshwater consumption down to around 20% and have fertiliser factories in the system is available already, e.g. with the patented blackwater cycle system of Intaqua AG, and opens new opportunities for areas with limited resources.

'Resources management sanitation' was suggested by the IWA ecosan group in Marrakech 2004 as a technical term that includes dry and wet source separating solutions like the ones described above as well as safe reuse of the effluent of conventional systems for fertilising or aquaculture. Please give your feedback – we are grateful for better names. The website of this group is www.ecosan.org and we will also be happy for your application for membership. ●

Ralf Otterpohl
Chair of IWA Specialist Group 'Ecological sanitation'

Support for the dissent

Professor Duncan Mara's clarity of thought in bringing together the fertiliser value and the economic present cost of the ecosan composting latrine was excellent – it takes the emotion out of decision making.

The British government Rural Hygiene and Sanitation Project in Kyrgyzstan faced similar affordability problems. Although villagers supported the flush lavatories, with 60% of the wage earners on less than US$12 per month, the poverty line, it was clear that this was not affordable. The demonstration project switched to the VIP latrine and immediately got village support.

The objective of the project's hygiene behavioural change campaign was the safe disposal of excrement to cut the 80% enteric disease morbidity. To burden villagers with a latrine more expensive than absolutely necessary would have added to, not reduced, their poverty. ●

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