Putting Sanitation on the Sustainable Development Agenda

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Sanitation is now a top priority

The UN Millennium Project and Commission on Sustainable Development have over the last two years helped put sanitation on the global policy agenda. Although sanitation may be a top priority now, the related policy and infrastructure discussions show very little innovative thinking and principles of sustainability are completely absent. The MDG Task Force on Water and Sanitation (UN Millennium Project, 2005) has set its target on "improved" sanitation. Ecological sanitation is not dealt with in any way in this report. The only mention is that ecological sanitation is lumped together as the recommended improvement for open defecators (Table 1).

Table 1. Improved and unimproved sanitation facilities according to the MDGs.
(UN Millennium Project, 2005)

Improved	Unimproved
connection to public sewer or septic tank	service or bucket latrine
pour-flush latrine	traditional latrine
pit latrine with slab	public latrine or shared toilet
VIP latrine	open pit or pit latrine without a slab
ecological sanitation	open defecation in bush or field

The report has missed out on the development of soil composting pit latrines for Africa (Morgan 2004), the fact that the WHO is in the midst of developing guidelines for the safe reuse of excreta and grey water, and the widespread recent introduction of urine-diverting dry toilets in many countries, primarily China (Winblad and Simpson-Hébert, 2004) just to name a few examples. Also, there are appropriate and affordable ecosan upgrades available for all types of sanitation toilets ranging from shallow pits, to dry vaults, to high standard urine-diverting porcelain pedestals, dry urinals, etc. But ecosan goes beyond just the toilet, it also provides capacity to sanitise and produce safe products for reuse in soil systems.

The Millennium Project Report (2005) does assess the various impediments to improved sanitation citing that gender inequality prevents sanitation from developing, there is ignorance about hygiene and health and there is a lack of willingness to pay for sanitation services. It also names a few key elements that help promote improved sanitation e.g. the need for privacy, convenience, dignity, safety, community status,

reduction of odours and flies, access to improved sanitation as a right and shared responsibility, and the fact that the benefits outweigh the costs. Finally the Report states that policy innovation is necessary suggesting that traditional linkages to only water require re-examination and new linkages are necessary. This means new opportunities if the following sectors are included e.g. solid waste, schools, health, agriculture, rural/urban development and town planning. Also new inroads can be made with small-scale service-minded entrepreneurs, if sanitation is made affordable and appropriate and if subsidies can be turned into incentives.

The message provided by the WHO report (WHO, 2004) on costs and benefits of sanitation released during CSD 12 in 2004 was in fact quite sensational. It reported that the introduction of any sanitation has considerable positive benefits ranging from 3 to 34 times the investment costs. But it left much of the professional community with the main conclusion that any sanitation will do, since sustainability criteria were not included. As a result, the MDG action plans now being put together will reflect mainly conventional off-the-shelf thinking. These significant activities to increase sanitation coverage will therefore not benefit from the principles of sustainability. What is needed is a clear appraisal of the various sanitation options available for various environments and community settings, including the level of health and environmental protection, the short and long-term costs as well as social acceptance. The new revised WHO guidelines on reuse of human excreta and grey water which are presently being drafted for publication by the end of 2005 will provide some insight into the strengths of using ecologically-sound sanitation approaches.

Estimates by the UN Millennium Project (2005) state that to reach Target 10 (the water and sanitation targets) will cost ca. 1-2% of the GDP or 5-8 USD/person/yr for the target countries, and that the cost to reach all the MDGs is around 100 USD/person/yr for the poorest countries. It is within these limits that ecosan is to find its niche if it is to make an impact on the MDGs over the next 10 years. For this to happen there is a need to shift from water to soil as the end recipient of sanitation services. A dialogue needs to be initiated on the many choices/alternatives involved that are sustainable and capacity building, awareness raising and training is necessary among stakeholders (Simpson-Hébert et al. 2005).

The Urban Challenge Ahead

The daunting need for *improved* sanitation targeting 2.6 billion people all over the developing world has been put into focus. In order to meet the MDG Target 10 for water and sanitation, 2.1 billion must receive “basic” sanitation by 2015 (Table 2).

Table 2. Number of people (millions) to gain access to improved sanitation by 2015 in order to meet MDG Target 10 (from WHO and UNICEF, 2004).

Region	**Urban**	**Rural**	**Total**
Sub-Saharan Africa	178	185	363
Middle East & North Africa (MENA)	105	34	140
South Asia	263	451	714
East Asia & Pacific	330	376	705
Latin America & Caribbean (LAC)	132	29	161
Former Soviet Union (FSU) & Baltic States	24	0	24
Total	1 032	1 076	2 108

Calculated on a global basis, the challenge is divided equally between rural and urban populations. Examining the regions individually, shows a much more varied challenge where LAC, MENA and FSU are dominated by the need for urban sanitation, South Asia and South East Asia by the need for rural sanitation (with high urban needs as well) and Sub-Saharan Africa by both rural and urban sanitation. The present growth of the world's population is almost entirely in the urban centres of the developing world (Rosemarin, 2005) (Fig. 1). Solutions for improved urban sanitation therefore require urgent innovation.

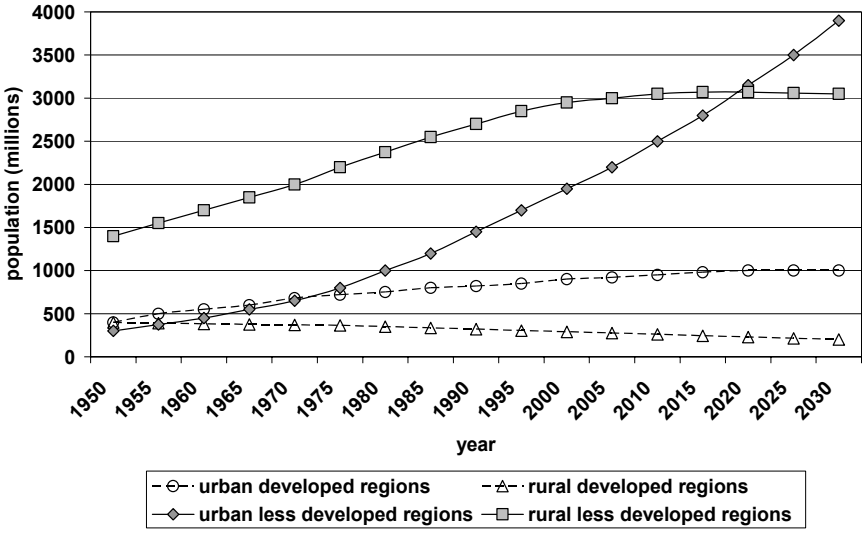


Fig. 1. Estimated and projected urban and rural population of the more and less developed regions, 1950-2030. (UN, 2004)

Most urban planners and engineers retain that centralised waterborne sewage is the ideal solution for urban centres. These concepts have their roots in the planning of cities from the mid- to late-1800s (Del Porto, 2004). But the evidence today is clear that such systems are usually not affordable to build or maintain. The concept of moving human excreta in sewage pipes requires water. That drainage of rainwater is also a major concern in cities has often led to a combination of the two systems and the labelling of the entire volume as wastewater requiring treatment. This leaves the challenge of keeping these systems tight from leakage and the treatment of the resultant volumes of water. Experience shows that very few cities in developing countries have managed to achieve the minimum standards for health and environmental protection using these centralised systems. And peri-urban areas are often left without adequate sanitation creating major health and environmental effects.

One might ask why has sanitation been immune to the debate surrounding sustainable development? Sustainable sanitation systems are in fact very hard to find anywhere in both the North and South. Within the EU at least 100 major cities lack sewage treatment facilities and this number is increasing as the EU expands eastward. Even the most advanced sewage treatment systems in highly industrialised countries produce large amounts of toxic sludge that cannot be safely recycled. The lack of resilience of today's centralised sewage systems is exemplified by their breakdown and collapse in former Soviet Union countries, requiring enormous restoration investments. London in the UK is now facing a major required investment of 1.5 billion pounds in order to better accommodate the mixed storm water and sewage effluent that now overflows every month into the Thames (Brown, 2004). The long-term costs of our urban sewage systems are not defendable but somehow the myth surrounding *Cloaca maxima* as a solution to dealing with human excreta prevails.

Where then is the guiding light? The 1990s was the decade of the EU Urban Wastewater Directive which failed to provide sewage treatment coverage throughout the EU (EU, 2001). This instrument has now been over-shadowed by the EU Water Directive which is a water-basin IWRM activity providing sustainable and integrated sector thinking. But even within this rather sophisticated process, innovative or sustainable approaches for sanitation are, thus far, non-existent and the sewage treatment plants which should have been built during the 1990s will have to wait another 10-20 years until the watershed assessments are ready.

Sustainable Sanitation

What then is sustainable sanitation? The essential features are proper containment allowing for sanitisation and recycling - things that conventional sanitation normally fails to do; closing of the nutrient and water loops; the ecosystem approach; the Polluter Pays Principle; protection of downstream health and environment; decentralisation of infrastructure; local management and financing; affordability; and equitable service for all (poor and rich, young and old, men and women). The other aspect of sustainable sanitation is that it goes beyond the water and sanitation sector and is integrated into the solid waste and agriculture sectors and is linked strongly to housing, town planning and schools.

Ecosan solutions for cities include decentralised systems allowing for more flexibility and choice of possible options. This means that a variety of resilient technologies can be provided depending on the immediate community requirements and ability to finance. Source separation of urine, faeces, grey water, kitchen organics and solid wastes is the ideal goal allowing for relatively smaller volumes of higher quality materials that can then be reused following treatment or processing (Fig. 2). But we are not there yet and major breakthroughs are required before this becomes mainstream.

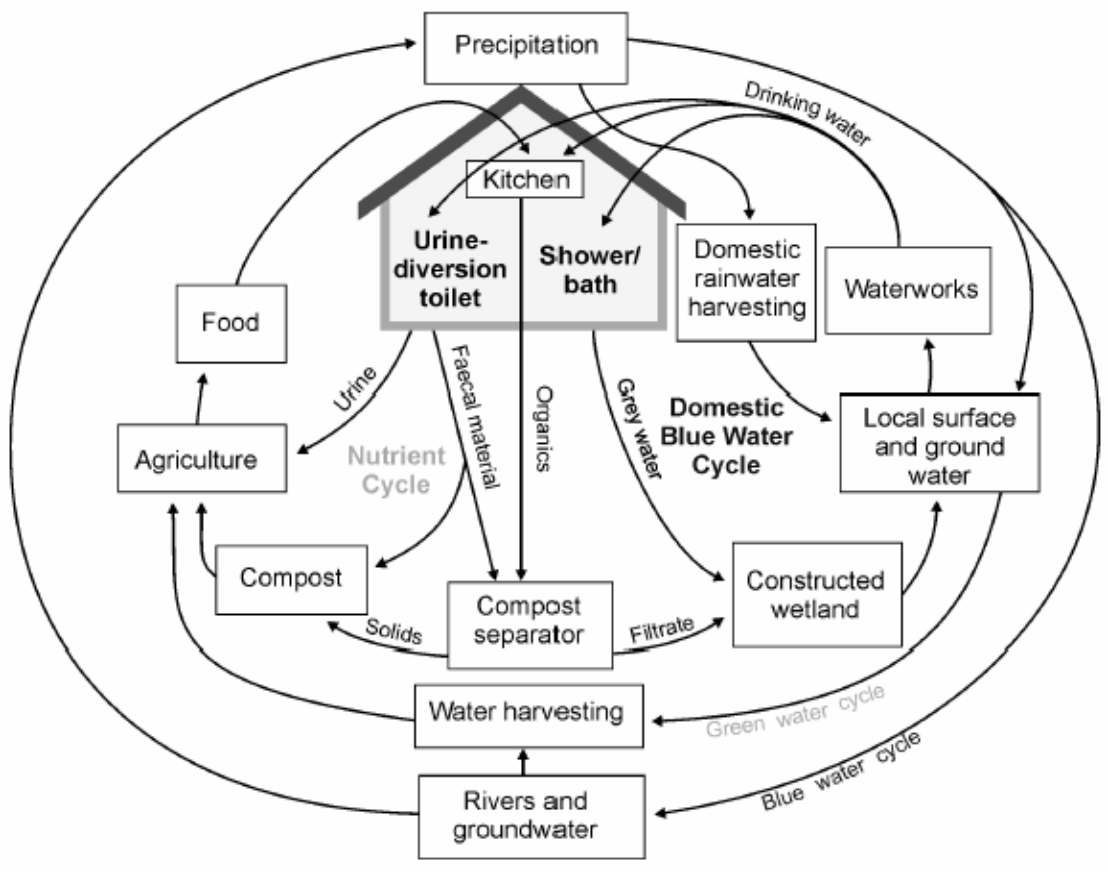


Fig. 2. Complete household ecosan and eco-water use (modified from Otterwasser).

What then are the options available? Communities need to be made aware of the various options at hand. And the corps of professionals involved in making decisions also need to be pressed to provide more sustainable solutions that are both appropriate and affordable. Although water may be a convenient means of transporting human excreta, it is less capable as a medium for sanitisation and breakdown of the organic material into recyclable components. Decentralised systems with source separation and eco-stations to treat the grey water and compost the organics are sustainable options now available. A shift in attitude from using water as the receiving system to using soil is therefore needed. And if the resulting products are fed back into agriculture we can then begin the long trek towards sustainability.

New Driving Factors

What critical drivers exist that can tip the scales and catalyse the push towards sustainable sanitation? One is the precarious global supply of phosphorus (Rosemarin, 2004a). No country is presently equipped to deal with a global economy steered by the price of phosphorus. Yet this could be a reality within 25 years. 70% of the economically exploitable reserves are found in but two countries (Morocco and China) (Fig. 3). And the reserves in the US will be depleted within 30 years (Fig. 4). The geopolitics of phosphorus could soon make eco-sanitation and eco-agriculture a necessity.

With high phosphate and food prices source-separation of solid wastes, kitchen organics, urine and faeces will become commonplace complete with recycling to soil systems.

Fig. 3. Distribution of remaining economic reserves of phosphate rock (data in thousands of metric tons).

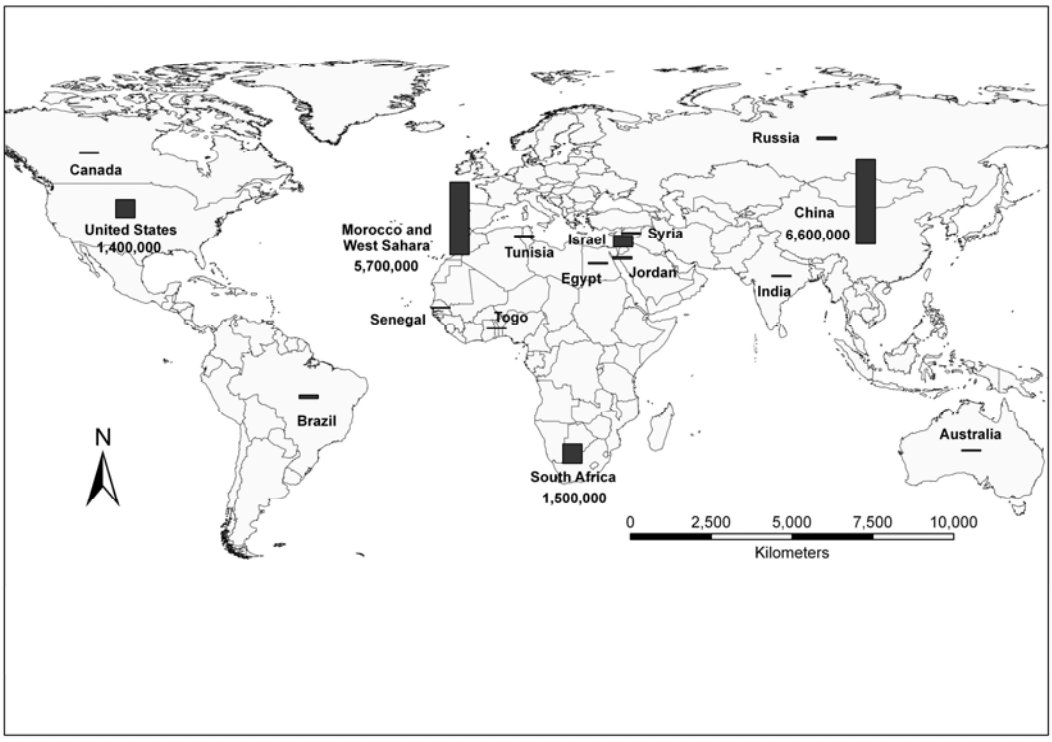
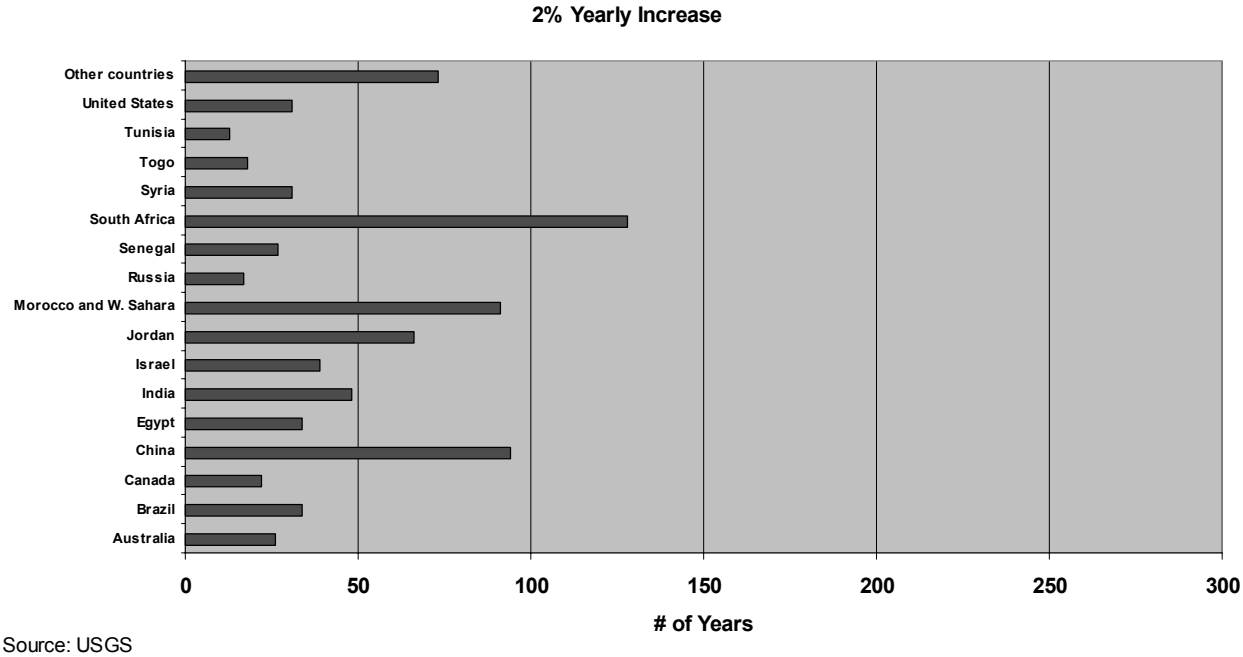


Fig 4. Phosphate rock - years of extraction remaining with a 2% yearly increase based on current economic reserves from 2005 (Source: USGS).



Source: USGS

The EcoSanRes Programme

The Swedish-sponsored EcoSanRes Programme along with other similar programmes is attempting to promote innovation and awareness within the sanitation sector. In addition to communications and policy initiatives, studies have been carried out, guidelines proposed and pilot projects initiated in order to show that sustainable solutions are viable and affordable. In particular, the proposed guidelines for treatment and safe reuse of nutrients in agriculture are being applied to the current revision of the WHO guidelines for excreta and grey water. The pilot project in Erdos, northern China is showing that a modern town can be built using ecosan approaches (Rosemarin, 2004b). It also shows that eco-sanitation can be provided within the normal cost of housing. The other pilot projects in Mexico, South Africa, West Africa (CREPA) and India all are providing valuable experience in this quest towards sustainable sanitation.

In order to further develop and promote ecological sanitation approaches, major efforts will be required in order to increase awareness and capacity. To make an impact in the MDG work, a global programme needs to be developed with a network of centres of excellence, something similar to the CGIAR (Consultative Group on International Agricultural Research) network which was set up in the early 1970s to promote agriculture in the developing countries. A “Sustainable Sanitation Programme” lead by Sweden, for example, would include about 12 nodal organisations in various parts of the world, a global fund for capacity building, R and D, training and demonstration projects, soft loans for scaling up and implementation and a central administrative body and international advisory council.

References

Brown, P. 2004. Sewage Dumped in Thames Every Month. In: The Guardian Monday December 20, 2004. Main Paper, p. 2.

Del Porto, D. 2004. Urban and industrial watersheds and ecological sanitation: Two sustainable strategies for on-site urban water management. Ecological Engineering Group, Concord, Massachusetts, USA 12 p.

EU. 2001. 2nd Forum on Implementation and Enforcement of Community Environmental Law: Intensifying Our Efforts to Clean Urban Wastewater.

Morgan, P. 2004. Ecological Sanitation Alternatives for Africa. EcoSanRes Programme. Stockholm Environment Institute. 14 chapters and 2 appendices www.ecosanres.org

Rosemarin , A. 2004a. In A Fix: The Precarious Geopolitics of Phosphorous. Down to Earth June 2004. Centre for Science and Environment. Delhi. pp.27-31.

Rosemarin, A. 2004b. The Building of China's First Ecosan Town in Inner Mongolia – Aspects Relating to Sustainable Urban Water and Sanitation. In: Proc. 14th Stockholm Water Symposium. Aug. 2004. Abstract Volume. p.63-65.

Rosemarin, A. 2005. Sustainable Sanitation and Water in Small Urban Centres. In: Proc. 14th Stockholm Water Symposium. Aug. 2004. IWA. (in press)

Simpson-Hébert, M., Rosemarin, A. and Winblad, U. 2005. Ecological sanitation: reaching for the Johannesburg Summit target. In: The Business of Water and Sustainable Development. Chenoweth, J. and Bird, J. (eds.) Greenleaf Publishing. Sheffield, U.K. 392 pp.

UN Millennium Project. 2005. Health, Dignity, and Development: What Will it Take? Task Force on Water and Sanitation. 206p.

UN. 2004. World Urbanization Prospects: The 2003 Revision. Population Division of the UN Department of Economic and Social Affairs. 34 p.

WHO. 2004. Evaluation of the Costs and Benefits of Water and Sanitation Improvements at the Global Level. 87 p.

WHO & UNICEF. 2004. JMP for Water Supply and Sanitation: Meeting the MDG Drinking Water and Sanitation Target: A Mid-Term Assessment of Progress. 25p.

Winblad, U. and Simpson-Hébert, M. (eds). 2004. Ecological Sanitation – Revised and enlarged edition. EcoSanRes Programme. Stockholm Environment Institute. 141 p.