

ecosan – principles, urban applications and challenges

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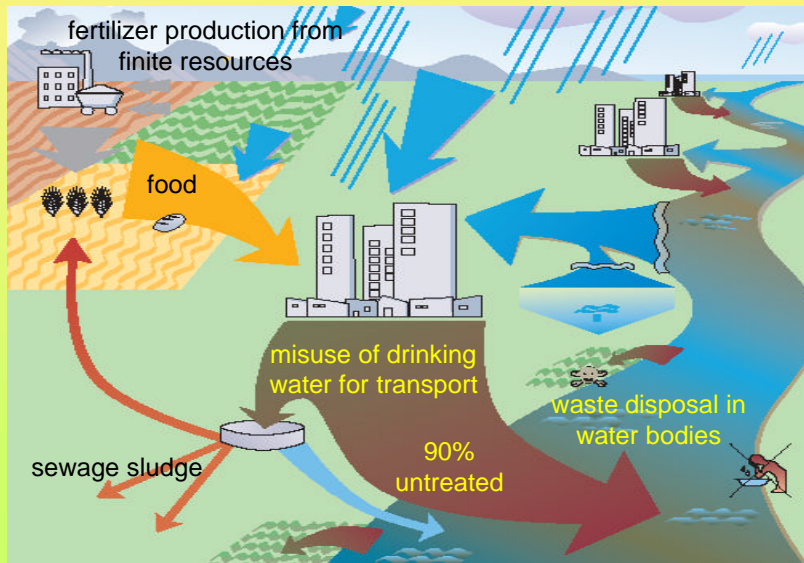
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**Ecological sanitation – principles, urban application and
challenges**

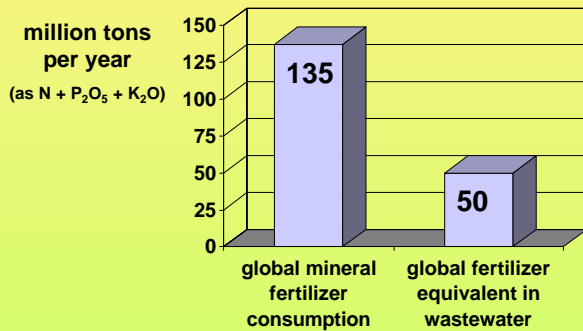
misconception of current sanitation



Good morning ladies and gentlemen.

The idea, that human excreta are wastes with no useful purpose is a modern misconception. It has led to the development of so-called “drop and store” or “flush and forget” sanitation solutions, where precious drinking water is used to transport excreta into the water cycle misusing our rivers, oceans and aquifers as a sink for untreated waste.

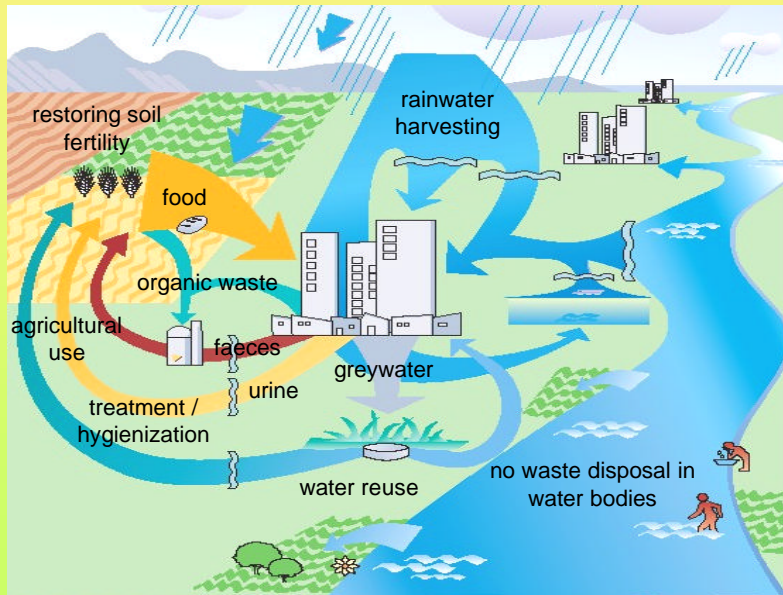
excreta are a valuable resource



- more than 1/3 of global mineral fertilizer consumption can be covered by the reuse of human excreta
- over 15 billion US\$ fertilizer equivalent are annually flushed down the toilet

On the other hand, farmers around the world yearly require 135 Mio tons of mineral fertiliser for their crops, while at the same time conventional sanitation dumps 50 Mio tons of fertiliser equivalents flows into our water bodies - nutrients with a market value of around 15 Billion US dollars.

Closing the loop between sanitation and agriculture



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In nature however, there is no waste.

All products of living things are used as raw materials by others as part of a cycle. Considering the environmental damage, the health risks, and the worsening water crisis, a revolutionary rethink of our current sanitation practises is urgently needed. To solve our self made sanitation problems, ecosan applies the basic natural principal of closing the loop by using modern and safe sanitation and reuse technologies, thereby continuing the historic tradition of recycling human wastes once applied in most farming societies.

Eco-sanitation opens up a wider range of sanitation options than those currently considered. To optimise cost efficient, high quality treatment and recycling options, two principles are very often being applied in ecosan systems:

- Firstly, flow streams with different characteristics, such as faeces, urine and greywater, are often collected separately. Rainwater harvesting and the treatment of organic waste and animal manure can also be integrated into the concepts.
- Secondly, unnecessary dilution of the flow streams is avoided, for example by using dry, low flush or vacuum transport systems. This minimises the consumption of valuable drinking water and produces high concentrations of recyclables.

benefits of ecological sanitation

- safe sanitation



Source: Johannes Heeb

ecosan-toilets in Bangalore, India

- healthy environment



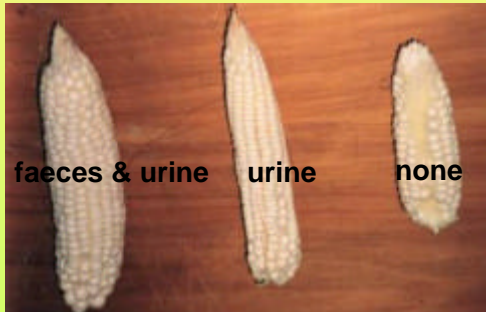
(http://www.virtualmuseum.ca)

Benefits of ecological sanitation comprise:

- the protection of human health through safe sanitation,
- the preservation of clean waters, and a safe and healthy environment

benefits of ecological sanitation

- restored soil fertility through nutrient reuse



- improved soil quality through reuse of organics



- the reuse of plant nutrients as valuable fertiliser restoring soil fertility and substituting expensive mineral fertilizers from limited natural resources
- the reuse of organic matter for improving soil quality, especially its water and nutrient retention capacity

benefits of ecological sanitation



Source: Peter-Jenssen

- **recovery of energy content**
(covering about 20% of cooking energy needs for a typical family in a developing country)
- **energy savings in fertilizer production & wastewater treatment**
- **reuse of water**

- the recovery of energy contained in excreta and wastewater for example through the production of biogas
- and the reuse of water for irrigation, service water or groundwater recharge

examples of ecosan technologies



Source: Aussie Austin

urine-separating dehydration latrine



constructed wetlands



membrane technology



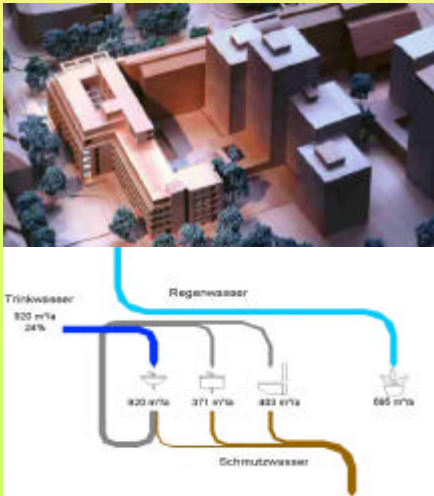
biogas plant

(<http://www.abr-w.de>)

Initially, when Scandinavian pioneers first began promoting the advantages of urine separation and nutrient recovery in the '80's, the focus was on dry sanitation systems for rural areas only. Since then however, many different technical options have been developed, ranging from low cost systems - such as composting toilets, urine diverting dehydration latrines and constructed wetlands - to high tech waterborne applications - such as vacuum sewers, anaerobic treatment, chemical processing or membrane technology, most suitable for use in densely populated urban areas all over the world.

examples of urban applications

KfW headquarters, Germany



Vacuum blackwater collection and greywater recycling

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GTZ headquarters, Germany



Urine separation and nutrient recovery planned



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One of the most recent examples in Germany can be seen at the headquarters of the KfW banking group in Frankfurt, where vacuum technology, best known from trains and aircraft, is used to collect blackwater and greywater is being recycled to flush toilets, while at the GTZ main office, urine separation and agricultural use will be implemented in the course of the ongoing renovation of the building.

main challenges

- increasing awareness
- integration of reuse into planning
- revision of legal frameworks & technical standards
- establishment of full cost analysis and risk comparisons
- finding innovative investors and adapting financing instruments
- **implementation of large scale urban projects**



Source: Petter Jenssen

Greywater treatment in Norway

However, there are still some challenges to be faced before ecological sanitation systems are widely adopted:

- Awareness of the alternatives offered by ecosan has to be increased
- Resource reuse needs to be integrated into sanitation planning processes from the very beginning
- Legal frameworks and technical standards need to be revised
- We need a full cost analysis and comparison of the environmental and health risks of all types of sanitation
- Innovation-friendly investors are required, as well as new financing instruments supporting private households investment
- And, most important of all, we need large scale implementation of ecosan projects in urban areas for show casing the technical feasibility and the benefits of this new approach

Conclusion

- “business as usual“ will not allow us to meet the MGDs, as conventional systems have failed
- we cannot continue to waste our non-renewable resources
- ecological sanitation must be recognized and introduced as the new promising holistic and sustainable approach to provide safe and decent sanitation, reduce poverty, contribute to food security, preserve our environment and maintain our natural basis of life on earth



We all recognise that a “business as usual” approach to provide sanitation will not allow us to meet the MDGs,. Despite more than 100 years of experience and trillions of dollars of investment, conventional systems have failed. But we still continue to waste our non-renewable resources as if they were in infinite supply. Due to its huge potential, ecological sanitation must be recognised and introduced as the new promising holistic and sustainable approach to provide safe and decent sanitation, reduce poverty, contribute to food security, preserve our environment and maintain the natural basis of life on earth.