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Ecological sanitation: Principles, technologies and project examples for sustainable wastewater and excreta management

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Abstract

In order to reach the UN Millennium Development Goals for significantly reducing the number of people without access to adequate sanitation, new holistic concepts are needed, focusing on economically feasible closed-loop ecological sanitation systems rather than on expensive end-of-pipe technologies, thus enabling all countries to finance and maintain sustainable sanitary systems. Such ecological sanitation systems advance a new philosophy of dealing with what to date has been considered as merely waste and wastewater. They are based on the systematic implementation of the reuse and recycling of nutrients, organics and water as a hygienically safe, closed-loop and holistic alternative to conventional solutions. Over the last few years an increasing number of pilot and demonstration ecosan projects have been implemented worldwide. These have contributed to the further development of a variety of ecosan technologies and operating and reuse options and have provided a large amount of experience with this new, holistic approach. In the following, the principles of ecological sanitation are presented, an overview on the range of ecosan technologies is given and several successful ecological sanitation projects are described.

Keywords: Ecosan; Sustainability; Best practices; Project examples; Reuse

1. Introduction

Current conventional approaches to wastewater management and sanitation fall under the category of either waterborne or dry systems. In both cases the system design is based on the premise that excreta is a waste, and that waste should be disposed. It also assumes that the environment can safely assimilate this waste. Unfortunately, many years of experience have shown that such conventional approaches are unable to make a significant impact on the sanitary backlog of nearly half of the world's population, and even in cases where conventional approaches have succeeded in providing a functioning sanitary system; their long-term sustainability is questionable, as is their

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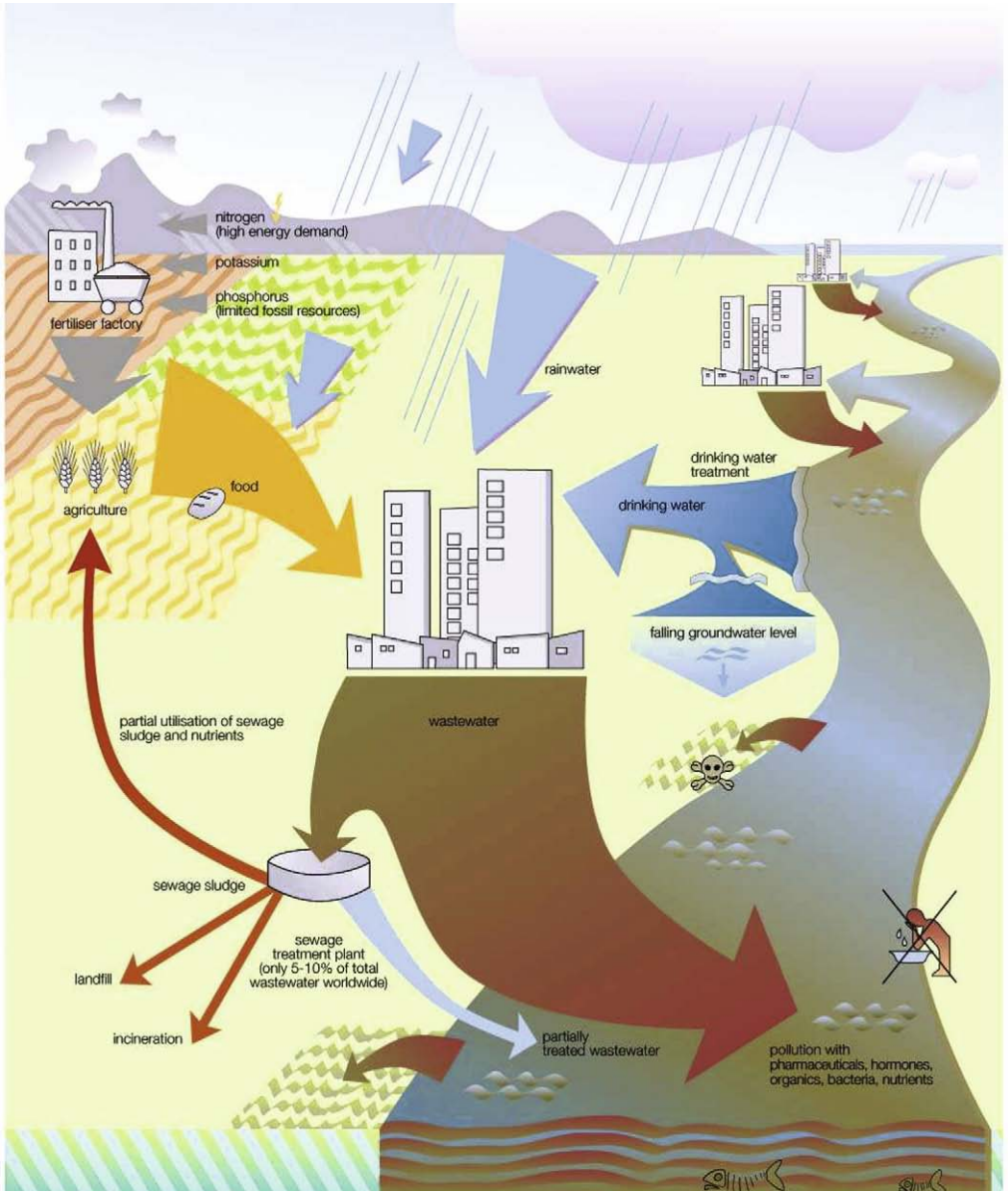

Fig. 1. The main disadvantages of current, conventional approaches to sanitation (source: GTZ).

appropriateness to address the MDGs. The main disadvantages of conventional approaches to sanitation can be seen in Fig. 1.

The main disadvantages of current, conventional approaches to sanitation are as follows, also showed in Fig. 1.

- Unsatisfactory purification or uncontrolled discharge of more than 90% of wastewater worldwide
- Pollution of water bodies by nutrients, hazardous substances, pathogens, pharmaceutics, hormones, etc.
- Severe environmental damage and eutrophication of the water cycle