GERMANY

INNOVATIVE SANITATION CONCEPT SHOWS WAY TOWARDS SUSTAINABLE URBAN DEVELOPMENT

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Germany can build on a long experience in water and waste water management at the national level, in particular drawing from the experience after the reunification. It has equally long standing commitments and experiences in water and sanitation within its development cooperation program.

One major task following German reunification on 3rd October1990 was ensuring the same level of environmental protection throughout the country by 2000. There has been a continuous improvement in water quality and hence in biological water quality as a result of the increased wastewater purification measures in the Old Laender since the 1970s and changes in production profiles, the closure of major industrial plants and the construction of new sewage plants in the five New Länder since 1990. Efficient utilization of irrigation water is achieved by means of water recycling systems and almost all citizens have a connection to public drinking water supply. Thanks to the construction of over 8,000 biological sewage treatment plants in the municipal sector and intensive treatment of wastewater and complementary internal measures by industrial facilities, inputs of oxygen-depleting organic wastewater constituents and of pollutants into waters were considerably reduced. The proportion of the population served by wastewater treatment facilities increased to 95% in 1998 in the Old Laender and to 71% in the New Laender. With 93%, the level of connection to public waste water systems has reached the limits of what makes economic sense.

Description of the Initiative: Ecological Sanitation (ECOSAN)

The further development, testing and dissemination of alternatives to conventional wastewater and sewage disposal systems is becoming more and more indispensable for both economic and ecological reasons. There is a need to move away from linear, expensive and energy intensive "end-of-the-pipe" technologies to sanitation based on ecosystem approaches and the closure of material flow cycle. Germany therefore supports the research and development project **ecosan** (http://www.gtz.de/ecosan). Ecosan stands for "Ecological Sanitation" representing a possible solution for the problems caused by conventional sanitation systems in a more holistic approach towards ecologically and economically sound sanitation. The key objective of this approach is not to promote a certain technology, but rather a new philosophy of dealing with what has been regarded as wastewater in the past.

Ideally, ecological sanitation systems permit the complete recovery of all nutrients from faeces, urine and greywater, benefiting agriculture and minimising water pollution, as well as allowing economical use of water and its maximal reuse, particularly for purposes of irrigation. These approaches are based on the systematic realisation of a material-flow-oriented recycling process spanning the full range from strictly low-tech solutions to expressly high-tech solutions. Elements of ecosan systems can range from compost latrines or dehydrating latrines with urine separation to complex, mainly decentralised solutions. Ecosan systems permit acceptable and affordable sanitation for poor and rural areas, as well as for high-income areas and industrialised countries and do protect freshwater resources with the same token. Thus, these projects clearly address the commitments of the UN-Millennium Declaration and of the World Summit of Sustainable Development (WSSD) to halve the number of people without sustainable access to basic sanitation and safe drinking water by the year 2015.

There are national projects as well as projects of development cooperation in which ecological sanitation concepts are being applied. For instance, in Luebeck-Flintenbreite, the innovative sanitation system of source separation was realized in an entire housing estate in Germany for the first time. The housing estate, with 350 inhabitants and 3.5 ha, is an example for a densely populated rural area. To reduce consumption the houses are also designed as low energy houses. The construction of the

technical equipment and the buildings started in February 1999. By 2002, 28 houses for 95 inhabitants were completed. The project demonstrates the feasibility of the source control system combined with water saving technology as well as fertiliser and energy production.

The area of the housing estate is not connected to the central sewerage system. The main technical equipment is installed in a central community building. All components of the sanitation concept are in use in different fields of application since many years and therefore well developed. The sanitation system consists mainly of the following components:

- vacuum toilets with vacuum-sewer system and anaerobic digestion with co-treatment of organic waste in a semi-centralised biogas-plant, recycling of digested anaerobic sludge for agriculture with further storage for growth periods. Utilisation of biogas in combined power and heat generator (heating for houses/digestor and production of electricity) in addition to natural gas
- decentralised treatment of grey water in vertical flown constructed wetlands (reed-bed filters) with interval feeding
- storm water retention and infiltration in a swale system.

The vacuum toilet system has been running for two years without any technical problems. The flushing system which has been optimised during operation needs only about 0.7 l per flush. Therefore the drinking water consumption is significantly low compared to the German average. The long time drinking water consumption in Lübeck-Flintenbreite is carried out to be only 77 l/(p∗d).

The average amount of blackwater is found to be approximately 6 l/(p∗d). The average amount of greywater is about ten times higher. Regarding the nutrients in these two water flows, the source separation is very effective. Almost 90% of the nitrogen load is found in the blackwater. Accordingly, the blackwater composition shows a high concentration of organic substances and nutrients compared to conventional domestic wastewater.

To find out the acceptance of the vacuum system by the users, a questionnaire for the inhabitants was carried out. The evaluation showed that the vacuum toilets are as accepted as the conventional system. An number of residents see vacuum toilets as being even more hygienic. As an overall result of the questionnaire it can be emphasized that the residents are very satisfied with the vacuum toilet system.

The semicentral system is capable to recover resources and energy in more densely populated housing areas up to 5000 people. Despite the high technical approach the operation costs can be much lower than for conventional sanitation systems.

Mainstreaming and Sustainability

The ecosan approach is mainstreamed into national as well as international waste water management projects supported by the government. As well, in any water supply project the status of waste water and faeces disposal, the resulting problems from an ecological and residential sanitation point of view and the consequences the project will have on these factors must be examined. As far as the existing disposal problems become exacerbated by a water supply project (through induced waste water flows) or unacceptable disposal deficits emerge, measures for a coordinated disposal of waste water and faeces have to be included in the planning and, if possible, their funding has to be secured.

For the period 2001-2008, the Federal Ministry for Economic Cooperation and Development allocated a total of 5.3 Million Euro to the ecosan project which is coordinated by the German Agency for Technical Cooperation (GTZ).

Replicating the Initiative

The experiences of German development projects show that the ecosan approach can be adopted very successfully in rural as well as urban areas to improve drinking water quality and sanitation services. For example, following the German "Water and Waste Water/Sanitation Management"- project in Botswana, there is now an appreciation by the Botswana government that adopting ecological sanitation systems can sustainably protect water resources, contribute to agricultural productivity and poverty alleviation, and provide sanitary solutions for both rural and urban areas at a lower cost than conventional systems. The approach is now being promoted on a national level. Similar initiatives have been started in the framework of the Stability Pact, in the Regional Environmental Reconstruction Program for South Eastern Europe (REReP) and in the Palestinian Territories.

The lessons learnt show that respecting the individual needs of the households by adapting processes and systems to suit them can help overcome difficulties, as can sharing information and learning by seeing with regard to the correct use of the toilet and the application of the products for gardening. Training of households and technicians and a locally based support programme have also contributed to the ongoing success of projects in international cooperation. It has been found that people, once adequately informed, are open to new technologies and recognise the value of the reuse of collected and treated urine and faeces. Households voluntarily accepted to invest in the construction of the superstructure of the toilets and thus moved from a highly subsidised to a self-help system.