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Viability of ecological sanitation in urban areas in Kenya -a case study of Nakuru town

The ecosan concept has to date not been widely tested as a viable alternative to conventional sewerage systems in Kenya, despite its considerable potential advantages and cost savings. Limited awareness and socio-cultural barriers on handling of human waste have been constraints for large-scale adoption of this technology. The market for agricultural reuse of nutrients resulting from ecosan activities is also not well developed. The few cases tried have been on pilot scale and are confined to small areas within some towns. These include Kisumu and to a lesser extent Mombassa (these are the second and third largest towns in Kenya).

For example in Kisumu only 8 out of 15 families involved in the study project were using the ecosan toilets in a proper manner after six months. A high population density in the study area and hence lack of space for agriculture made the onsite reuse of nutrients impossible. As a result there was no demand for the ecosan products. At all study sites, there was rejection in handling of human waste, which can be attributed to lack of awareness and cultural differences.

This paper describes the selection process to determine the suitability of ecosan technologies for domestic wastewater management within the municipality of Nakuru. The main objective of this study is to conduct a complete review of the available sanitation technologies that could be appropriate for the customers in Nakuru. This is done in the context of the local situation. We have applied the ISWM concept¹ to assess the current situation and to plan for a more 'ecosan-oriented' strategic sanitation plan.

Another important aspect for ecosan in Kenya is the reuse of nutrients and water. Agricultural activities should not to be seen simply as a potential "outlet" for ecosan products (chiefly nutrients), but the farmers' exact needs must be examined and understood. Hence, another objective of our study is to examine when, how, how much and at what cost the farmer might consider to use nutrients and treated wastewater from the city.

Nakuru town is located on the floor of the rift valley between the extinct Menengai crater and lake Nakuru, about 160 km northwest of the Kenyan capital Nairobi. It is the fourth largest city in

¹ Integrated Sustainable Waste Management (ISWM) is a concept in which stakeholders play an important role. All elements of the waste management system are considered when intervening and the entity is checked against six sustainability criteria.

Kenya with a population of 360,000 and serves as the provincial capital for a rich agricultural hinterland producing cereals, flowers, dairy and horticultural products. The municipality covers an area of 74 km².

Nakuru is currently experiencing serious environmental and sanitation problems: Only 19% of the built-up area is seweraged. Cesspools and septic tanks serve the other areas within the municipality. The sludge and wastewater from these sources is disposed of in open drains or discharged into nearby lake Nakuru. In the high-density areas, lack of adequate sanitary facilities lead to alternative unsanitary methods like defecating in the open, or use of "flying toilets". Liquid contents of unlined pit latrines and leaking cess pools may also be transported underground to the lake along geological fault lines, which causes contamination of the ground and surface water. Drains are often blocked by plastic bags. Furthermore the wind blows, and the rainwater flushes, various types of solid waste into the park and into the lake.

The town is able to meet only 67% of the daily water demand. Besides this being a challenge to maintain water-driven sewerage disposal systems, it affects the residents because the price of water increases during periods of severe shortage. For residents to purchase water just to flush toilets is an added financial burden that few can afford.

Nakuru city was selected as a case study here after a process of identifying the most suitable city using the programme's criteria: size of the city, complexity of the problems, expected co-operation of public and private parties, political climate, room for experiments and presence of suitable partners. Other cities that will become part of the ISSUE's East Africa programme are: Lugazi near Kampala (Uganda) and Dar es Salaam, harbour of Tanzania.

The ISSUE programme (Integrated Support for a Sustainable Urban Environment), developed by WASTE and its partners, is designed to encourage the adoption of the ecosan principle for achieving a better environmental sustainability. The ecosan concept is promoted as a viable alternative to conventional sewerage systems,

We used the following methodology in our study:

- ◆ We performed an ISWM assessment of previous ecosan projects in Kenya and comparable countries
- ◆ Data on climate, geology, land use, availability of water supply, sewerage networks and other existing sanitation services was collected and analysed.
- ◆ We divided the town into different zones depending primarily on availability of water supply and existing sewerage network, population density and income levels. A selection for the most suitable ecosan system for each zone was then made to derive a concept for the entire city.
- ◆ We identified the main stakeholders namely the Municipal Council, Non Governmental Organisations, Community Based Organisations (CBOs) such as: Kenya Wildlife Services, Egerton University, the Nakuru Business Association, financing institutions, (small scale) industries (the Jua Kali), the residents. We organised ISWM assessment and training sessions.
- ◆ Based on the principles of strategic planning a consortium of partners identified and carefully analysed obstacles and potentials on the way to a more environmentally sound city and created short and longer term solutions.
- ◆ All types of solutions, be they technical, managerial or methodological have been used in a 'modern mixtures' concept. As such the existing sewerage system was where possible, incorporated into an overall sustainable sanitation concept for the entire town.
- ◆ The demand for processed products from ecosan practices was quantified and qualified, trials were done and an attempt was made to develop a distribution system linked with the existing agricultural trading systems.

The full paper will detail the selection and consultation process and the finally recommended ecosan systems for each of the key zones of Nakuru.