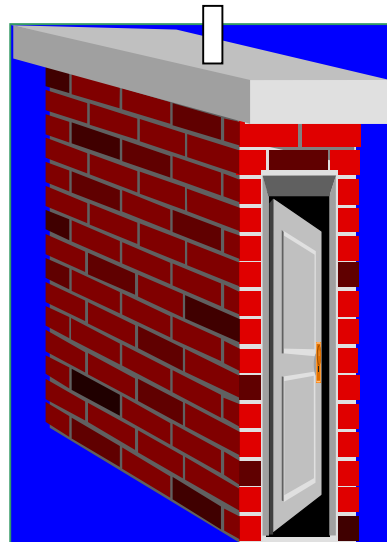
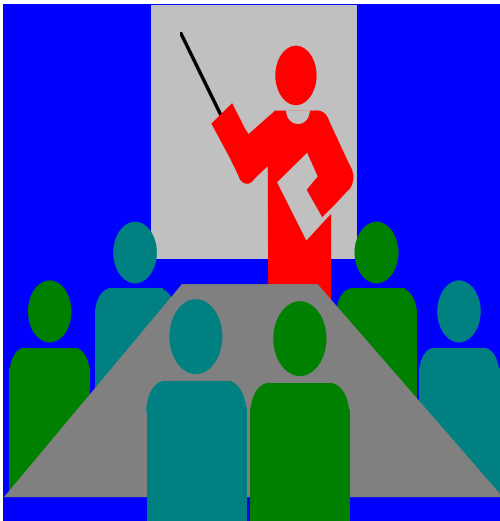


# SOUTHERN WATER AND SEWERAGE COMPANY LIMITED

## REPORT ON THE INTERNATIONAL TRAINING COURSE IN ECOLOGICAL ALTERNATIVES IN SANITATION FROM 11<sup>TH</sup> TO 22<sup>ND</sup> NOVEMBER 2002 – KIMBERLY, SOUTH AFRICA

---



**CC: Managing Director  
Director Finance and Commercial  
Director Human Resources development  
Director Operations  
Advisor Institutional  
Advisor Technical  
Manager GWK Consult**

## **Terms of reference**

On Sunday 10<sup>th</sup> November 2002 the two CROs were sent to attend a training course in Ecological Alternatives in Sanitation in Kimberly, South Africa. GKW Consult also sent two officers to the same.

Since GKW is currently working with SWSC and one officer who attended the training is present; a decision was arrived at to write a joint report.

In this report, the sanitation situation in Zambia especially in the Peri-urban areas is looked at, so as to see how the knowledge gained could be utilized in order to minimize sanitation problems experienced in such areas.

## **Background**

The course was organized by the Department of Water and Environmental Studies, Linkoping University in collaboration with the Department of Water Affairs and Forestry, Pretoria, and funded by the Swedish International Development Cooperation Agency (SIDA).

The course was conducted in Kimberly, South Africa from 11<sup>th</sup> to 22<sup>nd</sup> November 2002. There were 26 participants from four (4) different countries, namely; South Africa, Zambia, Malawi and Botswana. The teaching staff included Dr Strenstrom and Dr Jan-Olof Drangent (course coordinator) from Linkoping University, Dr Hakan Jonsson from Swedish University of Agricultural Sciences, Professor Thor-Axel Stenstrom and Dr Caroline Schonning from the Swedish Institute for Infectious Disease Control, Mr. Heinz-Peter Mang from GTZ, Mr. Richard Holden from Mvula Trust - South Africa, and Mr. Julian Conrad from Geohydrological and Spatial Solutions– South Africa. Other resource persons who were involved in the training programme were from the Eco village.

## **Objective of the training**

The objective was basically to enable participants to acquire information and knowledge about options in sanitation in order to support urban dwellers in reducing environmental health risks, improving their nutritional status and protecting their water sources.

## **Course content**

- Water and nutrient cycles in time and space, and related routes of contamination.
- Management options for improved urban environmental sanitation, especially dry systems and ways of utilizing nutrients in human waste as a resource in urban agriculture.
- Risk assessment including hygiene risks in handling sanitized urine and faecal matter, as well as residents and professionals' attitudes and norms concerning such risks (pathogens and diseases).
- Environmental costs and benefits of dry sanitation systems compared with current alternatives.

- Exchange of experiences of household efforts to improve well being through safe excreta disposal and protection of both ground and surface water.
- Skills training in social inquiry.
- Study visits.

## **Methodology**

The training was conducted through various methods.

1. Lecture method coupled with question and answer sessions, as well as homework.
2. Group discussions and presentation of different case studies.
3. Field work (observations and interviews).
4. Study visits

Three study visits were conducted.

### **Visit to the Galeshewe Eco-village Pilot Project**

This Eco-village pilot project is supported by SIDA. Here the key innovation is the alternative dry sanitation system involving urine diversion and composting of faeces in two containers requiring rotation twice a year. This system saves significantly on water use, conventional sewers, and thus both capital and operating costs. Within this housing unit, gray water does not go to waste since it passes through sand filter sumps before collecting in a common pond for irrigating vegetable gardens and fruit trees. Since Galeshewe Eco-village is a pilot project, it serves as a learning experience to the implementation of the ECOSAN concept.

### **Visit to Kimberly waste water treatment plant and some Peri-urban areas**

Here participants saw how water borne sanitation option is managed and how the products of the system can be separated and reused, that is solids for Biogas and water for watering lawns, etc.

The visit to Peri-urban areas exposed participants to some of the sanitation options that still exist, that is the bucket system and the suction tanker.

### **Visit to Cemforce Factory**

This factory manufactures Cemforce Easy Loo systems, which consist of lightweight precast concrete panels that are fixed together to form a toilet structure. These are made from cement mixed with glass fibre and polystyrene. This concrete is known as Glass Reinforced Cement (GRC). The panels resemble a sandwich of two 6mm GRC skins and a 28mm lightweight polystyrene concrete core. These panels are factory made and transported to the site for assemble. The panels are durable, lightweight, economical, compatible, easy to construct and can be assembled by hand.

## Management options for improved urban environmental sanitation

The training programme distinguished among three different types of human excreta disposal.

1. *Flush-and-discharge (Water borne sewerage sanitation system)*: These are managed by water experts and chemists.
2. *Drop-and-store (pit latrines, VIP toilets)*: These are managed by users and extension workers.
3. *Sanitize-and-reuse (dry sanitation: ECOSAN/Urine diversion toilet)*: These are managed by ecologists, agriculturalists and users.

Flush-and-discharge and Drop-and-store options do not offer sustainable solutions to the urban sanitation problems experienced in many countries. Flush systems face many operational difficulties and possess environmental problems. Due to population increase, cost of sewerage treatment, difficulties in treatment of waste water owing to the explosive increase in the use of chemicals by man, water shortages and the growing awareness of the limited supply of phosphorus on the globe to support biomass production, the conventional sanitation system is by far environmentally unfriendly. Rivers and life in them have not been spared by this system. On the other hand, the drop-and-store system is in most cases responsible for both surface and ground water pollution/contamination, putting many urban dwellers sourcing domestic water from open wells and rivers at high health and hygiene risks.

Owing to environmental unfriendliness of the above systems, the training programme put much emphasis on the need to seriously consider the implementation and commercialization of the Dry ecological sanitation as a sustainable solution to urban problems. ECOSAN seems to be a better alternative as it is based on the principle of 'sanitize and reuse' of the human excreta. This principle builds on recirculation of nutrients. Urine and composed faecal matter are returned to the land. Hence, it is seen as a sustainable environmentally friendly principle for reuse of nutrients after they have passed through the human body.

### Specific remarks on dry sanitation

- a. The training programme did not only bring out issues of nutritional and environmental benefits of the dry sanitation, but also risks attached in handling of urine and faeces, as well as safe ways of doing it. This was done by highlighting the pathogens found in excreta and diseases that they transmit. Most pathogenic microorganisms are found in faeces. Fortunately, there are ways of getting rid/killing them.
  - (i) Making compost since the high temperature and low moisture rate are detrimental to their survival. It is recommended to keep the compost for six months to ascertain that pathogens and ova are killed.
  - (ii) Controlling the pH since pathogens survive in a specific pH, increasing/reducing it e.g. adding ash or lime in the toilet reduces the risk of pathogens.

Unlike faecal matter, urine can be used as a fertilizer straight away. If some faecal matter enters the urine, it is advisable to store the urine for six months. The high pH in the urine will kill the pathogens.

b. As the concept of ECOSAN is being introduced to urban dwellers, one has to be mindful of people's perception about human excreta especially when it comes to recycling. Attitudes and perceptions about health hazards and revulsion to excreta vary between cultures, and often people's ideas about urine differ from those about faeces. People may easily handle urine but may regard handling of faeces as offensive and unpleasant, or a taboo.

Results from a crop fertilized by faecal matter and urine from a pilot project can be the best tool to initiate and change people's negative attitudes and perceptions towards the use of human excreta as a fertilizer. However, careful and planned holistic and integrated approaches need to be considered when sensitizing the community on the new concept.

## **SANITATION SITUATION IN URBAN ZAMBIA**

### **Types of sanitation options**

The common sanitation systems found in Zambia are flush toilets linked to sewer lines or soak-away, VIP (Ventilated Pit latrine), Traditional pit latrine and bush facility. These sanitation options are distributed according to housing category as indicated below.

### **High, Medium and Low (former council houses) residential areas**

In this particular residential area, the predominant sanitation option is the water borne flush toilet. The Water and Sewerage Companies maintain this system. For instance, SWSC maintains the water borne flush toilet linked to the sewages in most towns of Southern Province. This sanitation option demands that users (of flush toilets) pay for the service every month in order to enable the CU's to meet the cost that is required for the smooth and effective management of the waterborne sanitation system. Although, this sanitation concept offers a better option to some residents, it has several disadvantages. The following are some of the outstanding disadvantages:

- Many users especially those from the low cost houses end up having the service being disconnected. In turn the company loses out in terms of revenue and this has a technical implication. In addition households whose water supply have been disconnected due to non payment of water tariffs Intel that the system cannot function properly.
- The system is environmental unfriendly especially if the refuse is discharged in streams and rivers.
- Often uses piped treated drinking water for flushing.
- Maintenance of the infrastructure is expensive
- Blocked toilets and leaking sewers are a serious health risk(ground water pollution)
- Soak-away contributes to ground water pollution.

### **Peri-urban and, Site and Service residential (SAS) areas**

Pit latrines mainly characterize the peri-urban and SAS residential areas. However, it should be stated that within SAS a limited number of households own flush toilets that are either linked to a sewer line or soak-away. Many residents in such areas have expressed a number of concerns over the pit latrines, as this sanitary facility faces many problems and difficulties as stated below.

- *High water table* – this means that the latrines get filled up fast and easily collapse. Due to high water table, the sanitation situation worsens as latrines over flow, polluting open wells. However, in some areas, where latrines don't overflow, open wells still get polluted from subterranean communication. Users of these open wells situated just next to the
- latrines are always at high health and hygiene risks.

According to the study done by GKW Consult in July 2002 in Central Province it came out that residents in most peri-urban areas of Zambia consider sanitation to be one of the major problems household face.

- *Life span of pit latrine* – geology, pedology and Hydrology influence the durability of latrines, e.g. pit latrines in sandy or water logged areas collapse so easily.

(The following may as well be contributing factors as to why some residents do not have pit latrines especially in the peri-urban areas of Zambia.)

- *Geology (rock and soil type)* – residents without pit latrines attribute such a development to the rocky and sandy nature of the topography. For instance, Ngwenya compound in Livingstone has a geology, which is characterized by hard rocks. On the other hand some compounds in Zambia do not have pit latrines due to sandy nature of the soil. However, these hindrances are limited to certain parts of the compound, but surprisingly enough, other households who are not affected by geological factors, still do not have an acceptable sanitation facility.
- *Small yards* – most peri-urban areas of Zambia are characterized by small yards. Small yards do not give enough space for the construction and shifting of pit latrines especially if the source of water is an open well which lies within the same yard.
- *Cultural background* – within most peri-urban areas, some residents do not have latrines mainly due to cultural background. For instance, it's true that Nakatindi in Livingstone has sandy soil, but it's not the only reason why people opt to use the busy facility. There, should be a cultural meaning behind such an act.
- *Laziness* – as one moves across a Zambian peri-urban compound, chances of being 'greeted' by 'dumped' faecal material are very high. Ask-who 'dumped' it – an energetic young man or woman. The reason for the act being that people are just lazy and they expect things to be done for them or they wait for some one to start and implement a concept and later if told to do so they may or may not follow. For instance, some residents in Zambia compound in Monze proposed that SWSC should construct toilets for them.
- *Insensitiveness to health and hygiene risks* – a good number of people in peri-urban areas are generally insensitive to health and hygiene risks. Owning an acceptable and affordable sanitation facility has very little meaning to them, especially if the 'dark' and the 'tree' can provide privacy. Faecal matter as a route cause of water pollution and, cholera in turn, is the least thing they would think of. However, with a Public Health Education Sensitization package they may change and adopt any affordable sanitation concept sold to them.

## CONCLUSION

The training programme on ecological sanitation went on well and covered a wide range of topics, such as social inquiry and urban hydrology among others,

which are directly or indirectly related to sanitation and water supply. The onus is on the participants to share the knowledge gained in this field with other stakeholders so as to introduce and implement the dry sanitation concept, which is a better environmental friendly, cheaper and easier to manage option.

## **Recommendation/Proposal**

With the knowledge and experience gained from the ecological alternative in sanitation course, we propose to the company to carry out a pilot project on ECOSAN as it would slowly solve the sanitation problems in the peri-urban settlements as most CU's in Zambia do not offer sustainable sanitation options. However, as the project is being implemented, the following issues should be critically analyzed so as to ascertain the success of the ECOSAN pilot project:

- *Socio-economic and cultural constraints* – this includes analysis of the financial, social, cultural, religious and legal practices of the people that may have a negative implication on the pilot project and upon the diffusion of the new sanitation concept.
- *Objectives and benefits of the new sanitation concept* – the objectives and benefits of the sanitation concept have to be well defined and explained in details to the prospective users so as to make them know and understand the need to adopt such a sustainable sanitary option.
- *Acceptability of the ECOSAN concept* – those households that would easily accept the concept but would not be willing to use the compost in their fields if at all they have, CU's should contact commercial farmers or any farming institutions such as ZNS, Prisons, Boarding schools, etc, as these farming communities could offer an alternative market for the product (compost).
- *Demand driven* – implementation of the sanitation concept to be demand driven especially after it has been fully explained to the people.

It should however, be stated that other peri-urban areas of Southern Province who meets the conditions below could be introduced to other sanitation concepts such as VIP other than ECOSAN which meets so much cultural constraints.

Conditions for peri-urban areas that qualify for VIP.

1. Sources of drinking water should not be open wells within the yards.
2. The water table should be relatively low.
3. There should not be a concentration of hand pumps in the area.
4. Soil texture should not be sandy.

## **Activities preceding the pilot project**

Have information on the following and carry out the tasks accordingly:

- *Inventory of the existing sanitation situation* – analyze density of households, latrines and yard open wells and to some extent hand pumps. Look at the existing sanitation options and see if they satisfy the residents.

- *Community involvement in gardening and farming* – existence of usage of manure from cattle, chicken and what crops are grown.
- *Physical conditions* – water table levels (rain and dry seasons), soil and underlying rock type.
- *Presentation and group discussions* – these are aimed at exchanging a lot of information and views on the ECOSAN concept with the community members.
- *Developing a feasible approach* – this includes establishing the tasks and responsibilities of all stakeholders including the financial implications and obligations of all parties involved.

---

## Abbreviations

CRO:	Community Relations Officer
CDE:	Community Development Expert
CU:	Commercial Utility
ECOSAN:	Ecological Sanitation
GRC:	Glass Reinforced Cement
GTZ:	German Technical Cooperation
SAS:	Site and Service
SIDA:	Swedish International Development Agency
SWSC:	Southern Water and Sewerage Company
VIP:	Ventilated Improved Pit Latrine
ZNS:	Zambia National Service

## Bibliography

*Draft implementation and operation concept for Decentralised Sanitation, Implementation of the Water Supply and Sanitation Project in Southern Province and the City of Livingstone, GKW consult/BCHOD and Rankin (July 2002) Lusaka Zambia*

---

**‘Many thanks go to all institutions and people who made the wonderful training course a success.’**

---

Brian Haangoma

Johnson Phiri

Precious Simasiku

---

CRO

---

CDE

---

CRO