1.0

Background

1.1 State of Water and Sanitation in Kampala City: Where is the Problem?

Water shortage and critical environmental degradation are affecting Kampala city just like many other developing world cities. It is well documented that only close to 60% of urban dwellers in Uganda can access safe-clean water. This means that two out of five people in Kampala lack access to safe water (Kwagala, 2002). Slum communities of Kampala city are the worst hit by the problem (Agarwall *et. al.,* 1999). Water shortage, poor health, sanitation and hygiene problems in Kampala slums are thought to be associated with inadequate town planning, deficiency of political framework and absence of participatory planning among others (Kwagala, 2002).

To solve such problems, town planners and officials responsible for water, housing, sanitation and health need to have innovative and integrated programmes towards solving the water and environmental sanitation problem. One of such innovative and innovative approaches is ecological sanitation (EcoSan). EcoSan take the principle of environmental sanitation a step further. According to Esrey (2000a), EcoSan means keeping our surroundings (the environment) clean and safe and preventing pollution.

EcoSan is a type of sanitation in which human waste is separated into its solid (faecal) and liquid (urine) parts. After this separation, the pathogens within the human waste can now be destroyed and the waste used as soil additives, due to their richness in crop nutrients. Therefore, EcoSan has an advantage over the traditional sanitation approaches of drop and keep (latrine) and the drop and flush (W C). The later wastes water, while the former is known for spreading sanitation related diseases like cholera and dysentery. Therefore, a city like Kampala, that has majority of her persons living in slum settlements, requires a type of sanitation like EcoSan. This is because EcoSan takes care of improved sanitation while conserving water. Unfortunately there is no clear data on which to base the establishment and successful implementation of EcoSan technologies. It is, therefore, against this background that this study was designed to establish the potential of EcoSan as a water conservation and cleaner sanitation option for Kampala slum communities.

1.2 Ecological Sanitation, what is it?

1.2.1 The Concept of EcoSan Toilets

Ecological Sanitation (EcoSan) is a closed-loop system that treats human excreta as a resource. Using the technique, faecal materials are separated from urine, and then the excreta are processed locally on site until they are free of pathogens. Thereafter the sanitized excreta may be recycled into the agricultural soils as fertilizers. By closing nutrient loops, environmental cleanliness, soil fertility and crop yield per unit space may be improved. The EcoSan technique, therefore, replenishes soil nutrients, improves sanitation and health of communities while conserving the environment. In turn, EcoSan can contribute to poverty alleviation. Unfortunately, the technique is not popular and is likely to face resistance due to social cultural beliefs, knowledge and attitudes of the local communities.

So far, Ecosan has made little progress in Africa despite decades of promotion by donors. The practical and environmental benefits of 'closing the loop' (i.e. recycling the nutrients in excreta) seem remote to most poor African households. There are, however, a number of physical conditions – including high water table and hard rocky ground - which can increase the comparative advantage of many forms of Ecosan technology.

1.2.2 Principles of EcoSan Technology

Eco-sanitation is based on three main principles:

- It offers a safe sanitation solution that prevents disease and promotes health by successfully and hygienically removing pathogen-rich excreta from the immediate environment.
- It is environmentally sound as it doesn't contaminate groundwater or use scarce water resources.
- It creates a valuable resource from what is usually regarded as a waste product.

A person produces about 500 litres of both faeces and urine in a year and human urine contains about the same levels of Nitrogen, Phosphorus and Potassium as commercially produced fertilisers.

1.2.3 Attributes of EcoSan Toilets

- Minimal use of water
- Dehydration/aerobic composting (with or without urine separation)
- May require drying/bulking material (ash, dry soil, lime, crushed sea shells etc.)
- May be above ground to facilitate contents removal
- Nutrients and sanitized excreta as end-products

1.2.4 Types of EcoSan Latrines in Africa

In the late 1990s African NGOs introduced three types of EcoSan latrines:

- Skyloo: a raised latrine with urine diversion and separate collection of urine and faeces in a permanent structure that requires periodic (6-12 months) emptying of the receptacle and transportation to a composting site.
- Arborloo: a portable superstructure and no urine diversion covering a shallow pit that fills in approximately one year after which the superstructure is moved and a tree can be planted in the filled pit.
- Fossa Alterna: two permanent pits and a portable superstructure, so that when one pit is full the superstructure is moved on top of the other pit. The digested contents of pit not in use can be safely emptied after a year.

Fossa Alterna and Arborloos work best when quantities of soil, wood ash and leaves are added periodically to produce balanced compost. Skyloos require some ash to dry the faeces and increase pathogen destruction.

1.2.5 Experiences with Ecological Sanitation in Uganda

The Directorate of Water Development (DWD) has been working on an EcoSan programme in Kisoro and other townships in south-western Uganda. The programme is intended to address different sanitation problem from those of Malawi, Zambia and South Africa (WSP, 2002). The locality is densely settled and needs a good sanitation system, but water is at a premium, the terrain is rocky, and due to the nature of the geological formation, urban water supplies are easily contaminated by polluted wastewater discharge. Ecological sanitation was introduced in an attempt to solve this problem. Between 1999 and 2001, 140 compost toilets and 107 dehydration toilets were installed in households, as well as seven dehydration public/school toilets (Robinson, 2002).

Unfortunately, MoH (2001) has reported that EcoSan technologies in Uganda had some operational difficulties encountered due to leakage, overuse, and lack of maintenance, most of which have been resolved. The public toilets, operated as a private business, are functioning well. But persuading some of the families to switch over to using their new facilities in place of their old pit facilities has not been easy. The difficulties surrounding the promotion of ecological sanitation in a faecophobic environment were seriously under-estimated. In spite of these obstacles, a visionary plan has been developed to take EcoSan forward in the country as a whole with a greater emphasis on awareness building and education (WSP, 2002).

From the above analysis, one can conclude that urine-diverting toilets are on the threshold of being accepted as a standard component in some low-cost housing developments. No one

doubts that reaching the world's 400+ million people currently without proper means of sanitation in Africa is a major challenge. Commitment from government and the private sector is needed, and the growth of an institutional framework that can offer alternative technologies including EcoSan, balancing environmental concerns with the demands of water consumers is long overdue. Available literature in regard to EcoSan technologies as an alternative to solving the current water and sanitation problems in Kampala city slums revealed gaps indicated below:

- Unexplained slow progress in achieving water and sanitation targets
- EcoSan technologies introduced in Uganda without proper in-depth studies to highlight difficulties associated with EcoSan technologies
- Lack of enabling policies and frameworks that through which EcoSan environmental and sanitation technologies (EST) could be promoted

It was, therefore, the purpose study to bridge the observed gaps.

2.0

What Research Methods Were Applied?

2.1 Study Design

A combination of non-participant case study and cross-sectional survey designs has been used for this study. This is the case because respondents to this study have varied education backgrounds, survey and interview techniques were used for eliciting information. The hybrid design was found appropriate for this study since it enables gathering information from different respondents (cross-sectional survey) who have not participated in 'EcoSan technologies (non-participant case study).

2.2 The Study Area and Selection

The study area comprised high population density areas of Kampala slums. The areas studied were purposively selected on the basis of water and environmental sanitation problems. The criteria for selecting the study area comprised: High population density, evidence of water pollution by the sewage system, wetland or swampy settlement. Five slum areas, one from each of the five (Central, Kawempe, Makindye, Rubaga and Nakawa) divisions of KCC were used in this study. The areas studied are shown in table 1 below.

2.3 Study Sample and Sampling Procedure

The study was conducted in five purposively selected settlements, one from each of the five divisions of Kampala. From each slum area, 50 residents were randomly selected for interviewing. Additionally, 10 and four (4) local council official and technical staff respectively from each of the five divisions were purposively identified for being responsible for and knowledgeable about water and environmental sanitation issues. The study also included the nine (9) Members of Parliament who represent the five divisions of Kampala. Another set of respondents was that of 10 garbage collection staff. This research therefore had a total of 329 respondents.

2.4 Instruments and Data Collection Methods

	Instrument	Respondents
1	In-depth interview questionnaire	9- members of parliament
2	Focus Group Discussion Guide (FGD)	250- local slum residents
3	Interview guide	250 – local slum residents
4	Interview guide (water, environment, health, education)	20- technical personnel
5	Key Informant In-depth Interview Guide (KIIIG)	50 - local Councillors (local leaders)
6	Key Informant In-depth Interview Guide (KIIIG)	10 – garbage collection staff

Figure 1: Table of instruments

2.5 Data Collection

Data was collected from the 250 slum residents and the 50 local councillors using questionnaires, interview guides and Focus Group Discussion Guides (FGDs). Two single sex FGDs one for men and another for women were conducted for the slum residents in each of the five research sites, therefore a total of 10 FGDs were conducted with the respondents. Also one FGD per division was conducted with the local councillors, giving a total of 5 FDGs for the Local Councillors. Therefore, a total of 15 FGDs were conducted. The rest of the 99 respondents i.e. MPs, Technical staff and Ministry official were subjected to In-depth Interviews (IDI).

Additional data was collected from policy documents, other publications from the divisions, KCC district headquarters, National environment management authority (NEMA), Directorate of Water development (DWD), MoWLE and online published and unpublished reports.

2.6 Data Analysis

Data collected using FDGs, and IDIs, was analysed qualitatively using the following steps: Transcription, including translations from local languages to English. The transcribed information was then; organised, indexed and coded using Nudist (N6) Qualitative Analysis Software (QAS). The coded data was interpreted using content analysis techniques. After content analysis, the information were summarised into this research report.

On the other hand, data collected from the 250 residents using survey questionnaires were analysed using simple descriptive univariate statistics. Results from both analyses (qualitative

and quantitative) was triangulated to facilitate drawing of strong conclusions and making valid policy recommendations. Analysed information was presented in form of; illustrations, frequencies, percentages, tables and charts.

3.0
What are the Key Results?

3.1 Water and Sanitation Related Policies

3.1.1 EcoSan Technologies and Policy Performance

There are more differences in access to latrines around Uganda than in access to improved water supplies. Sanitation access in schools is below the target while in rural areas sanitation in not doing so bad. Also, evidence collected so far suggests that hygiene practices in households are inadequate. The performance as measured against the hand-washing indicator is the most worrying of all the water and sanitation indicators.

A review of the national Water Policy, 1999; the National Water and Sewerage Co-orporation and the Uganda water action plan, 1995) revealed that there is increasing recognition in the sector that sanitation and hygiene has been given insufficient emphasis in the past. If maximum impacts of improved water supplies are to be attained, then more emphasis on sanitation and hygiene activities and investment is required. In order to improve latrine coverage and hand washing it is necessary to revitalize the Kampala Declaration on Sanitation (KDS), which spells out the roles of all stakeholders from household, community, leaders and institutions ion regard to water and sanitation. Analysis of available policy documents reveal that when fully revitalised, the KDS would cater for EcoSan technologies as they are found to be effective for high population density communities like the Kampala slums from which this study was carried out.

3.1.2 Gender Policies and EcoSan Technologies

One of the six critical requirements set out in the water sector framework (MWLE, 2002) focuses on the meaningful involvement of women. The water and sanitation sector framework stipulates that before any water technology is implemented, community mobilisation should have achieved the following minimum requirements that:

- That the composition of Water User Committees (WUC) and Water and Sanitation Committees (WSCs) shall include at least 50% women; election of women as chair and treasurer of the WUA/WSC is encouraged; half of the water point attendants and hand pump mechanics shall be women;
- Training shall target women and their male colleagues;

- The entire community shall be involved in discussing the siting of water sources with men and women initially consulted separately;
- All communications to communities shall be to both men and women

As regards use of EcoSan technologies in slum areas of Kampala is concerned, the involvement of both male and female users is even more critical. For EcoSan, the role of women would be very critical as they would be more efficient at ensuring cleanliness of the EcoSan toilets and would ensure efficient collection of the separated urine.

3.2 Sanitation Problems among Slum Dwellers in Kampala

3.2.1 Living Conditions and Sanitation problems among slum areas: Implications for EcoSan

Figure 1: Living Conditions of slum Dwellers

The five slums in which the study was carried out were largely situated in illegal swampy settlements characterised by water logging at the slightest drizzle. On average the number of persons living in an average living unit of 6x5 feet was found to be four (4). This means that on average the per-capita space for one person is calculated to be 30/4 (7.5 sq ft per person). This is indeed very small a space for an individual. As if this is not enough, residents of these slum dwellers have to use either raised toilets that are very close to the dwelling units or resort to flying toilets. Flying toilets refer to a practice of passing out human waste into temporary storage (in most cases Kavera), at an opportune time, the Kavera and its contents are thrown away through the air (hence the code name flying toile). This kind of disposal has been pinned down to be one of the causes of diseases like dysentery and cholera, which are so common among these slum communities. The above discussed situation indicates that unless innovative approaches to water and sanitation are applied, the conventional approaches do not offer enough options to solve the sanitation problems of the slum dwellers. Ecological sanitation (EcoSan) therefore has

potential of solving at least to some extent the problem of sanitation among slum dwellers. The nature of housing in these slums offers opportunity of development of EcoSan technologies.

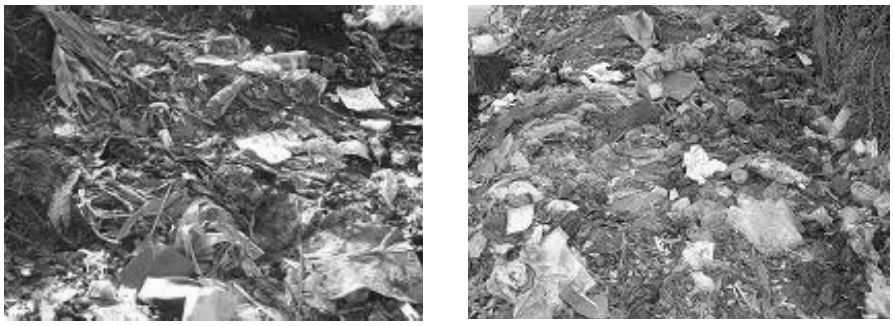

Figure 2: Flying toilet

3.2.2 Water quality in Kampala Slums

When asked whether water used for domestic chores was safe, majority 156 (62.4) indicated that they use water that is contaminated. Further investigation regarding causes of poor water quality revealed that besides industries sanitation systems especially the congested toilets are potential causes of pollution. Actually 178(71.2%) of the respondents believed that their sanitation systems pollute water they use for household chores.

3.2.3 Cost and affordability of water among slum communities

Preference by respondents was use of tap water. Unfortunately, tap ware was found not to be easily affordable to all users from Kampala slums. Study results indicated that of the households connected to tap water systems, only 87 (34.8%) found water bills affordable while 73 (29.2%) indicated that water was very expensive for them. Overall data obtained on affordability of water concludes that indicated that water is generally unaffordable by the Kampala slum dwellers. This finding is supported by the data from National Water and Sewerage co-operation (UNWSC). Figure 14 below, indicates the UNWSC tariff structure in Kampala. For example public standpipe and domestic water from NWSC cost Uganda shillings (UGX) 521 (USD $0.28) and 806 (USD $0.44) Uganda shillings per cubic metre respectively. This is quite an enormous amount of money, since majority of the slum residents 67.8% survive on less than $1.0 per day (Participatory poverty assessment, 2004).

Despite the fact that cost of water is increasing basing on market rates, government of Uganda is working hard to ensure that her citizens acquire meaningful access to water and sanitation services. When interviewed on the issue of cost reduction, slum dwellers indicated that they have

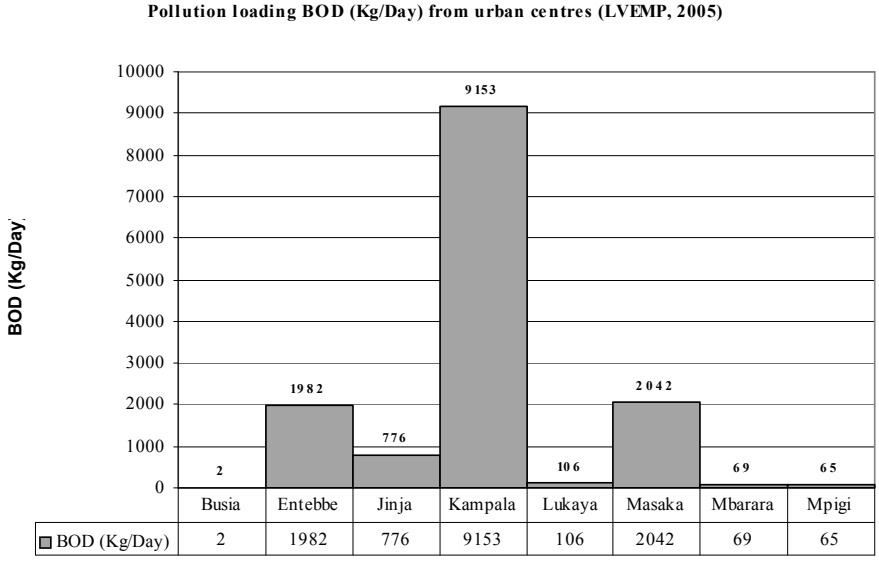

Figure 3: Domestic water pollution in BOD (Kg/Day): data obtained from Lake Victoria Environmental Management Programme, 2005

adopted: rain water harvesting, minimising washing frequencies and recycling waste water for other house hold water needs like moping. Therefore from results of this study, one can easily deduce that slum dwellers are keen at use of conservation methodologies like recycling of water and water use minimisation. This therefore indicates that EcoSan sanitation technologies that use less water than the WC is a very good option for the water scarce Kampala slum communities.

3.2.5 Domestic Waste Disposal

Figure 16 above shows that among the 250 slum households in which the research was conducted, 229 (91.6%) were not connected to the city sewage system. Reasons why these households are not connected to the city sewer line range from lack of money, sustainable use flush toilets to illegality of the settlements in which they live. The settlements are referred to as illegal in that many if not all slum settlements world over, the five slums in which the study was conducted (Bwaiise-Karerwe, Katwe, Nateete, Kamwokya-Kifumbira and Naggulu slums) are informal settlements. Therefore with this kind of status, it wouldn't be possible for a legal entity like NWSC to invest there, lest they loose their investments.

The implication of over 91.6% of the households not being connected to the city sewer line is that majority of these dwelling units use pit latrines and flying toilets. This type of sanitation poses great danger and is a potential contaminator of the nearby domestic water sources and supplies. Figure 17 below indicates coverage of sanitation types in the study area. Both shared and unshared covered pit latrines constitute the largest proportion of sanitation used by the slum dwellers in the study area. The figure further indicted that 31(12.4%) of the total sample had no recognised toilet facilities. This is the famous flying toilets, which are indeed very dangerous to human health.

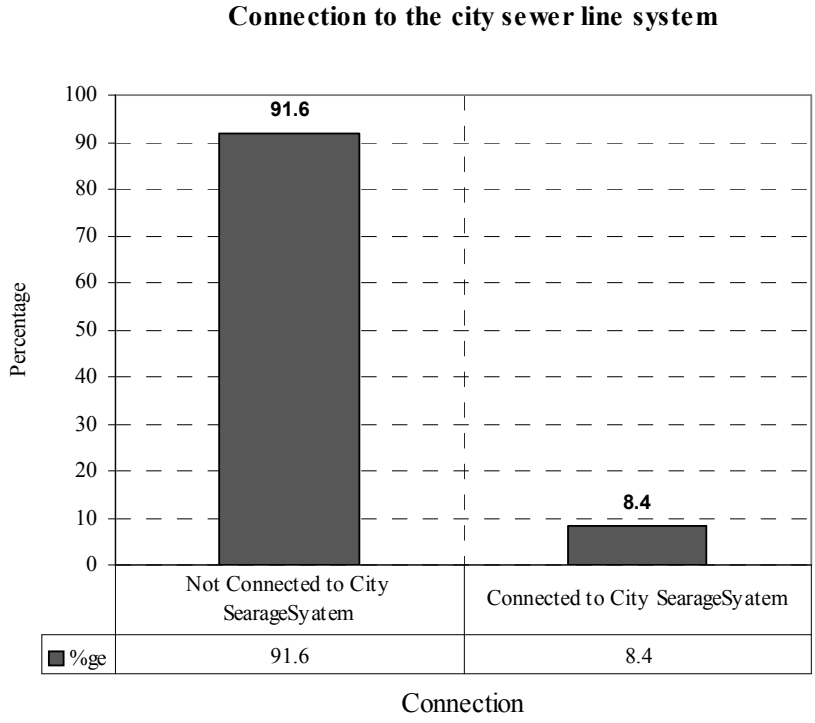

Figure 4: connection to the city sewer system