EXPERIENCES IN SETTING UP ECOSAN TOILETS IN SHORELINE SETTLEMENTS IN UGANDA.

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Key words

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Abstract

Lake Victoria Environmental Management Project (LVEMP) funded by the World Bank (WB) through the industrial and municipal waste management component (IMWM), implemented by NWSC, Uganda identified the use of Ecological Sanitation (ECOSAN) as the most appropriate sanitation method in pollution control for high density, low income fisher communities along the northern shoreline of Lake Victoria. In 2000, three pilot ecosan toilets of 4 stances, 1 urinal and 1 shower each were setup in two districts. The type of the ECOSAN employed was the separate and dehydrate technique where urine was considered for direct use in farming and the dehydrated faecal matter composted and reused. Operation and maintenance (O&M) by the end users proved a nightmare since sustainability, multicultural and religious - conflict of faith - issues were some of the aspects initially not considered. This led to the failure of the system to separate faeces and urine and be able to dehydrate the former. Further sensitisation of the population was repeated and after 3 months the O&M of the system improved. The ECOSAN technology has picked up in Uganda and it is expected to assist in sanitation and pollution control within the Lake Victoria catchment. In the long-run the health of the population and the environment is expected to improve.

Introduction

Lake Victoria has undergone accelerated degradation in the last 50 or so years (Talling, 1987; Kaufman, 1992). One of the contributing factors is the ever increasing population growth that

has led to development of human societies and cities (Bugenyi and Balirwa, 1998). This has led to increased urban and industrial run-off that finds its way through watercourses and wetlands to the lake (LVEMP, 1997-2002; NEMA, 2001). Increased human settlement along the shoreline as well as in the lake islands has substantially contributed to the continuous disposal of untreated human waste into the lake water, resulting in an increased pollution load. This has been further aggravated by the degradation of fringing wetlands (MONR, 1995).

The Lake Victoria Environmental Management Project (LVEMP) set up in 1997 under the three riparian East African governments, has as one of its corporate goals to ensure alleviation of further degradation of the lake in regard to industrial and municipal waste. National Water and Sewerage Corporation (NWSC), the lead agency for the management of industrial and municipal waste, in partnership with Uganda Fisheries and Fish Conservation Association (UFFCA) conducted a lake-wide outreach programme to assess the sanitation conditions of the fishing villages and prepare recommendations for possible assistance in alleviating the identified constraints. The programme covered 11 districts within the Lake Victoria Ugandan catchment (Fig.1).

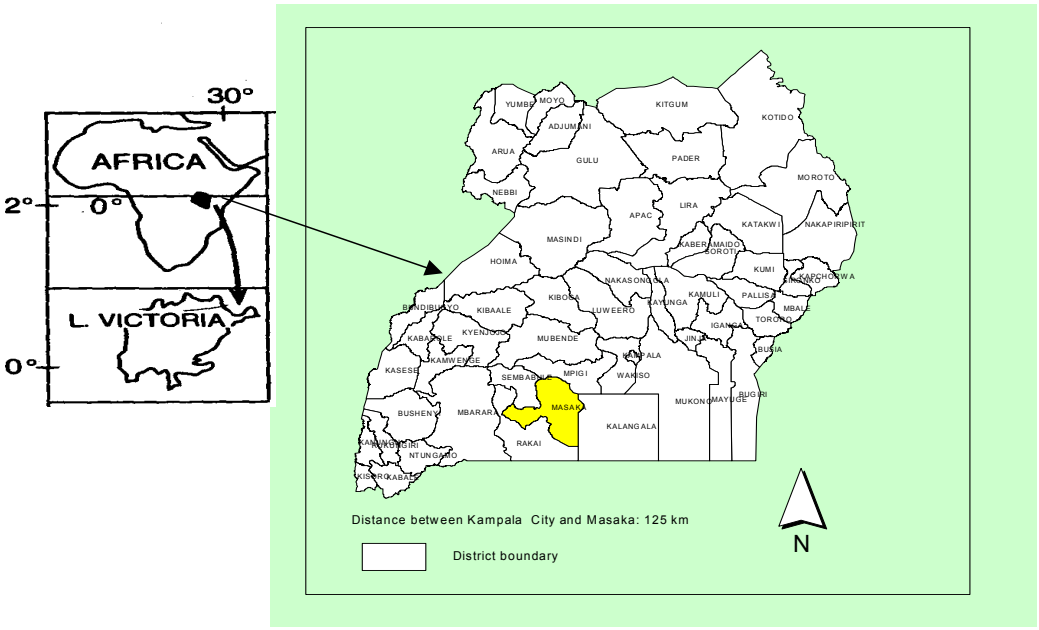

Figure 1: Map of Uganda showing the location of the site

Over 124 fishing villages/shore line settlements were visited. It was found that most fishing villages did not have safe drinking water, lacked pit latrines and health facilities (LVEMP, 1997-2002). Poor sanitation ranked as one of the biggest problems with sewerage coverage found to be under 20% (Mott MacDonald, 2001). Though the population appreciated the need for pit latrines, construction costs were very high due to the high water table and sandy soils. A VIP toilet with two stances cost about 4,500 US $. However, better community hygiene and sanitation conditions is of great importance in relation to health and an assurance to good quality fish for human consumption for both local and export markets. However, most fishing villages do not have the necessary facilities to guarantee the health and sanitation conditions for the fisher community. As a result, unorthodox and unhygienic wasy of disposing human waste was a real problem. Defecation into polyethylene bags (*kavera*) and nearby bushes is a common site. 'Helicopter jets' / flying toilets have resulted into widespread communicable diseases among the fishing communities in particular the children (The New Vision, 2002).

ECOSAN toilets are based on dry sanitation which completely sanitizes excerta (urine and faeces) hence decreasing the preverence/transmission of diarrhoel diseases. The ECOSAN technology enhances crop production through recycling of nutrients this reduces eutrophication of surface and ground waters (GTZ, 2003). ECOSAN is based on three main principles;

- **Safe sanitation** i.e. prevents diseases and promotes health by successfully and hygienically removing pathogen risk excreta from the environment
- **Environmentally sound systems** that do not contaminate ground water and,
- It is a **valuable resource** that can be recycled back into the environment.

Dry sanitation is a step towards poverty alleviation and improvement of gender status. The free nutrients from the excreta are of great value to the households in improving crop production. ECOSAN systems also go a long way in reducing health problems experienced at the shoreline settlements. The dry sanitation approach results in reduced pathogenic microorganisms in faecal matter but it is not safe to handle (Strenström, 2001). The adverse environmental factors in these systems such as pH, temperature, long residence time, reduced moisture and nutrient content provide a conducive environment for the reduction of pathogens (Esrey *et al*., 1998). ECOSAN toilets can be built in one place and do not have to be closed off (like pit latrines) when full.

Methods

In the initial assessment of the sanitation needs within the Lake Victoria catchment on the Ugandan side, a survey was carried out to assess the sanitation status in 124 shoreline settlements in 11 districts namely Busia, Bugiri, Iganga, Jinja, Mukono, Wakiso, Kampala, Mpigi, Rakai, Kalangala and Masaka (Fig. 1). 21 fishing villages were visited where formal and informal interviews were held with the local community. Open-air *baraza's* were also held in 7 villages. In these *baraza's* the community was sensitised on the need for improved sanitation. After group discussions the communities came up with their own proposals on how to best solve the sanitation problems they were facing. In all cases the need for toilets ranked highest.

Figure 2: The old disused VIP toilet (note the raised structure due to ground water table)

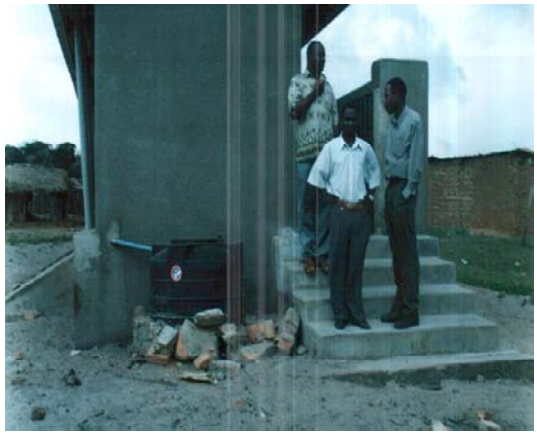

Figure 3: The newly built Ecosan toilet for the shoreline fisher village in Dimo Rakai District, Uganda. In the fore is the urine container.

In Ddimo with a population of over 2500 people, handling 8 tonnes of fish and 120 boats landing daily we could find only 25 pit latrines a ratio of 1 toilet per 100 capita (Mott MacDonald, 2001). In addition, sand soils, sloping terrain and high table made construction of the VIP toilets very costly and with no guarantee for no collapse (Fig. 2). The quest to overcome the above constraints and look forward to achieving better and proper sanitation conditions at the fishing village level drove NWSC and its partners to devise strategies to avert the poor sanitation

conditions in the fishing villages by the application of Ecological alternatives in sanitation (ECOSAN). ECOSAN toilets were found ideal for these two villages for they overcame the problem of high water table and sandy soils. Using funds secured from the World Bank (WB) under LVEMP, 1 block of ECOSAN toilets were constructed in Musonzi, Kalangala district (one of the islands in Lake Victoria) and 2 blocks in Ddimo fishing village, Masaka district.

In each village, the local authorities provided land on which the toilets were built. Each block of toilets had 4 stances, 1 urinal and 1 shower room. Figure 3 show one of the completed blocks in Ddimo. The cost of construction the two units blocks was US$ 15,000, that is US$ 6 per person in Ddimo. In each village, a micro project committee was set up that comprised of 6 people including a representative of the women. This group then administered the account. A contractor was employed who carried out the design, preparation of bills of quantities (BOQ) and supervision of the works. The community contributed 10 % of the total cost. Construction of the toilets took 15 weeks, being slowed down by scarcity of some materials particularly cement availability which had to be got 32 Km away in the case of Ddimo and for Musonzi an island it took 2 hrs on water from the mainland. The toilets were then commissioned within a month of completion. To sustain the system a monthly fee of US$ 0.6 per family or US$ 0.06 per person per use/visit was fixed. Wood ash was to be used every after each defecation; to absorb moisture making it less attractive to flies, and to reduce odour. The use of human waste as a valuable by-product was another positive aspect of this technology that was considered useful to the community.

Results and Discussion

In Ddimo, less than two months after the commissioning of the first block the toilets were in a terrible state. The stench from them was unbearable. This was due to poor understanding of the ECOSAN technology by the locals, poor participation of the local community in the implementation (i.e. construction was left to the committee alone) resulting in lack of a feel of ownership by the locals, poor operation and maintenance (O&M) practised, affordability of the user (the small fee levied was found to be quite high), lack of on going Technical assistance after the system was handed over and cultural – religious aspects. When the NWSC team visited the site and requested the faeces' closet tank to be opened the flies flocking to the area were unbearable. The locals said the whole place was a mess and unfit for use. They said the ECOSAN was a failure. On holding discussions with the toilet attendant and the locals it was found that the commissioning had failed due to poor propagation of the technology.

Understanding the ECOSAN technology

The community took some time to be convinced that the ECOSAN technology would solve their problems. This was clearly seen during the early stages of construction when the locals raised a number of worries and concerns related to the viability of such a system. Many of them were sceptical, which discouraged the committee. A number of sessions had to be held with the community to convince them that the new technology they were getting would work. The conditions and issues considered for selecting the ECOSAN were explained to the people and are listed in Table 1 below.

Table 1. Conditions and issues considered for selecting ECOSAN toilets over VIP toilets

Conditions	ECOSAN	VIP toilets
Sandy soils	No need to go more than 2 m deep.	At least 6 m depth required.
Unstable soils	Can be built at low cost.	Need to be stabilised at a high cost
High water table	Ingestion of water is controlled	Ingestion of water difficult to control.
Cost	Construction cost lower at US $ 15,000 for 2 blocks (4 stances, 1 shower and one urinal each).	Expensive US $ 18,000 for 2 blocks: 4 stances each due to increased construction costs in such areas.
Use of by products	Dried faeces and urine suitable for agricultural purposes. **	Normally no use.
Maintenance costs	Low	Low (need for a cesspool emptier from time to time).

** *At the time of writing this paper, by-products in both villages had not been utilised.*

Furthermore, the committee overseeing the project took it upon themselves to organise a trip to Kisoro a town on the Uganda-Rwanda border, in the south of the country where such a system had been built. The committee found it prudent to include some of the political leaders of the village in this visit. They hoped that these leaders would be a good mouthpiece.

Community involvement in construction and operation of the system

Initially, the local community participated in identifying their sanitation needs in an open-air *baraza* that was held a year before the construction of the ECOSAN toilets. Having identified the need to build toilets, the District Fisheries Officer and the local committee chosen, prepared a proposal that was submitted to the LVEMP Micro-projects component for approval. However, during the design preparations, contracting of the contractor and the construction itself the local community played a low-key role. Despite the fact that the local community had to contribute 10 % of the funding (either in materials or funds), the feel of ownership was greatly lacking. One can argue that for better control of the funds a smaller committee was necessary, however, one still sees the lack of adequate involvement of the local community during the construction process. The 10 % would have had more value had the community participated in some of the manual labour on voluntary terms.

Operation and Maintenance practice

Maintenance of the facility that included an attendant, buying of toilet paper and soap was not initially considered when setting up the facility. Wrong use of the system i.e. use of water for anal cleansing by one religious faithful led to complete failure of the system. Initially, there was lack of wood ash - a by product of fire wood used for cooking - as the people are poor and generally they are mostly migrant fisher-folks who have no time to prepare food. Hence application of wood ash was hardly done resulting in the stench and flies flocking the place. The whole system had to be emptied and restarted. This lead to a cost of up to 100 $ that had to be met from the meagre coffers of the local authorities.

Affordability

Prior to the construction the locals thought that levying a charge on toilet usage would not prove a problem. But since the fisher folk do not have a steady income, this proved a problem. The charges levied on the user were received with mixed feelings, particularly since the community felt that the toilets had been given free! (World Bank funds). The cost of Uganda shillings 100 only (US$ 0.06) per person per visit was considered too high while others thought this was okay for sustainability of the system. Some members suggested that a fee be levied to all income earners on a monthly basis but this was rejected by the majority. The trend of the toilet usage and resulting income generated is shown in Table 2.

Table 2. Average number of visits and revenue generated per day 2000-2002

#	Visit	Units	Year		
			2000	**2001**	**2002**
1.	Urinal (men)[a]	no./day	0 ± 1	0 ± 1	≥ 3
2.	Toilets – men	no./day	2 ± 1	-	3 ± 1
3.	Toilets – women	no./day	4 ± 3	3 ± 2[b]	≥ 15
4.	Shower	no./day	2 ± 1	-[c]	3 ± 2
5.	Total revenue generated	(US $/day)	0.40 – 1.10[d]	≤ 0.60	≥ 1.10

[a] *Few visits as men do not want to pay.*

[b] *The ECOSAN failed hence a drop in visits.*

[c] *The operator was not providing water for bathing hence no visits.*

[d] *Collections increase > 1.10 US $ on the day fish trucks collect fish from the fishing village.*

Technical assistance

Provision of post construction technical assistance after commissioning the toilets was not taken into consideration during the whole project. It was assumed that once the concept of ECOSAN toilets was fully grasped, there would be no need for this. Due to the problems raised above and some design errors, it was inevitable that technical assistance from experts be rendered from time to time.

Cultural aspects

Inadequate training initially given to the local community did not consider the issues pertaining to culture, religion and other taboos. It was found that due to some taboo, some members particularly the women in pregnancy do not use toilets, for fear for losing their babies. Negative attitude regarding addition of ash to feaces, moreover by a second party is considered devilish and malicious; as they feared to be bewitched (Okotto-Owour, 2002). Religious beliefs and practices had also brought some problems, e.g. the moslems practice anal cleansing. Some people did not believe it necessary for children to use toilets. The perception and attitude towards use of urine collected and the dried faeces was very negative; the Ddimo society being faeco-phobic (Drangert, 2001; Okotto-Owour, 2002). The locals did not even want to consider the benefits of such waste particularly for agricultural practices.

Strategies developed

Further open-air meetings (3 in number) were held with a randomly picked audience and teaching and sensitisation sessions held. The community was asked to raise the issues they felt had led to the failure of the system. Emphasis was laid on proper operation and maintenance of the toilets particularly the need to apply wood ash from time to time. The need for improved sanitation, minimal human contact with the dry feacal matter for at least six months was also stressed (Stenström, 2001). Health hazards arising from poor sanitation practices were highlighted. A sub-committee was established that was charged with the responsibility of improving sanitation in the whole village.

Three months later a team from NWSC and UFFCA visited Ddimo and found the toilet working well with no major problems and the second toilet almost complete using their sourced local funds, a sign of acceptance of the technology. A number of clientele visits per day and income generated have also increase, refer to Table 2. A local petrol station has also constructed a two-stance ECOSAN toilet due to popular demand.

Conclusions

There is ample proof that the concepts of use and re-use do work. Ecological sanitation systems when properly managed do function well. The three main prerequisites for the successful introduction and adoption of ecological sanitation found are:

- Full understanding of the basic principles of operation and maintenance of ECOSAN toilets by the planners, designers and constructors.
- Local conditions and environment must be taken into consideration.
- End users must be fully involved in implementation and operation of the systems.
- Where there is a will there is a way.

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References

Bugenyi, F.W.B and J.S., Balirwa, 1989. Human Intervention in Natural Processes of Lake Victoria Ecosystem. The Problem. Symp. Biol.Hung. 38. In: Sulanki J., and Herodek, S. (ed). *Conservation and management of lakes*, Academia Kiado, Budapest. pp 311-340.

Drangert, J.O., 2001. What would make EcoSan a privileged solution? . In: *Proceedings of First International Conference on Ecological Sanitation*; 5-8 November 2001, Nanning, China.

Esrey, S.A., Gough, J., Rapaport, D., Sawyer, R., Simpson-Hébert, M., Vargas, J., and Winblad U. (ed), (1998) Ecological Sanitation, SIDA, Stockholm. 92 pp.

GTZ, 2003. ECOSAN- Ecological Sanitation-Subject; Advantages of Ecosan concepts. www page. http://www.gtz.de/ecosan/english/thema2.htm

Kaufman, L., 1992. Catastrophic Change in Species – Rich Freshwater Ecosystem. The Lessons of Lake Victoria. Bioscience Vol. **42**. No. 11. pp 846 – 857.

LVEMP (Lake Victoria Environmental Management Project), 1997-2002. Annual Reports, LVEMP Secretariat; Government of Republic of Uganda, Entebbe, Uganda.

MONR (Ministry of Natural Resources), 1995. The Natural Environmental Action Plan for Uganda. Governmental publication of the Republic of Uganda.

Mott MacDonald, 2001. Management of Industrial and Municipal Effluents and Urban Runoff in the Lake Victoria Basin. Final Report Vol. I, II, III, IV.

NEMA (National Environmental Management Authority, Uganda), 2001. State of Environment Report for Uganda 2000/2001.

Okotto-Owour, L.G., 2002. Social-Cultural issues in Ecological sanitation. In: *Proceedings of an International Regional workshop on Ecological alternatives in sanitation course*, 4 –14 February, 2002, Kabale, Uganda.

Strenström, T.A., 2001. Reduction efficiency of index pathogens in dry sanitation compared with traditional and alternative wastewater treatment systems. In: *Proceedings of First International Conference on Ecological Sanitation*; 5-8 November 2001, Nanning, China.

Talling, J.F., 1987. The phytoplankton of Lake Victoria (East Africa), pp 229-256. In: Munawar (ed.) *Physiology of large lakes of the World*. *Arch. Hydrobiol. Beih. Ergbn. Limnol*. **25**.

The New Vision, 2002. Most Protected Springs in Kampala are Polluted. An Article in the newspaper dated 5th May 2002, and a cartoon in the same paper of 6th May 2002. http://www.newvision.co.ug