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THE FUTURE OF WATER, SANITATION AND HYGIENE:  
INNOVATION, ADAPTATION AND ENGAGEMENT IN A CHANGING WORLD

**Promoting ecological sanitation:  
sharing NKKD WATSAN experiences**

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*During a visit to the Centre for Advanced Technology (CAT) in North Wales in 2006, the technology that particularly inspired the author was the ecological sanitation latrine (Ecosan), as having a potentially useful application in the rural areas of SW Uganda. The first task was to turn CAT's demonstration latrine into live application in SW Uganda, to prove Ecosan technology there. Several Ecosan latrine installations have already been constructed by NKKD WATSAN Project, and are now in use. These include an indoor "Twin-Pit" toilet unit in the Diocesan offices, Rukungiri. For an ecological latrine to work, two aspects are of key importance: liquid/solid separation, and venting. Conventional approaches to sanitation (traditional pit latrines or long drops) still pose health and environmental risks to the population. Ecological sanitation latrines are completely free of environmental pollution and the water table is safe.*

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**An historic visit to the Centre for Alternative Technology (CAT)**

While on a tour of the UK in the autumn of 2006, promoting awareness of WATSAN, the opportunity was taken to explore the new technological developments on display at the Centre for Alternative Technology (CAT) at Corris near Machynlleth, in North Wales. The technology that was particularly inspiring was the ecological sanitation latrine (Ecosan) as a potential alternative to the other types of latrines (traditional pit latrines, ventilated improved pit latrines with a san-plat). There was a convincing case to introduce this technology, through WATSAN's ethos of working closely with local communities. Funding was accessed from TearFund for a pilot project.

**Application**

Initially the proposal for the construction of a pilot Ecosan toilet in the Diocesan office at Kinyasaano Rukungiri was neither understood nor welcomed! It met understandable opposition from people who knew that latrines should be located far from habitation, and that the deeper the latrine the more sustainable and hygienic it would be! John Pickford's advocacy<sup>1</sup> of deep latrines - 42 feet deep - has sunk in deep here! It was argued that a shallow latrine located indoors was a disaster in the making.

As a central place where people would see and experience the new technology, the Diocesan Offices seemed an ideal location. Disquiet with the proposal was however deeply felt and widespread, and escalated to the attention of the Diocesan Bishop, who, fortunately, after a personal investigation into the project, gave the go-ahead.

This first task was to turn CAT's demonstration latrine into live application in SW Uganda. If properly constructed and managed, Ecosans could become an important facilitating initiative in helping the rural poor to progress out of poor health and poverty in the near future. The application of this technology is at present confined to institutions such as schools, churches, clinics and hospitals, where Ecosan latrines are now being demonstrated and monitored. The project has been confined to date to institutions for a number of reasons:

- A management and supervisory structure is in place at institutions to ensure proper supervision of use, and a high standard of maintenance of the facilities themselves, and of the valuable by-products.

- Institutions are hopefully centres of progressive thinking, influence and training.
- The scope for use of by-products, both liquid and solid, for horticultural purposes, addresses what is a key aspect of institutional welfare in Uganda, by facilitating and encouraging self-sufficiency in local food production
- Ecological sanitation facilities are more likely to be affordable at an institution.  
Selected implementation in homesteads may follow, subject to our assessment of this technology, and the relative importance and significance of the pros and cons in local circumstances.

### **Construction of ecological sanitation latrines in Rukungiri and Kanungu districts**

The following Ecosan latrine installations have already been constructed by NKKD WATSAN, and are now in use:

- Complete indoor Ecosan/ "Twin-Pit" toilet unit in the Diocesan offices – Rukungiri. There are two chambers: red and blue squatting pans, for alternating use. After 6 months in Uganda the manure is inert (biodegraded), although this is climate dependent. There is a bucket with wood ash, and wind pipes for smell control. In the experience of all users, including visitors, this latrine does not produce unpleasant or unacceptable smells.
- At Bishop Ruhindi (Kebisoni) High School- Rukungiri, a 4-stance Ecosan toilet for boys at the school (see Photographs 1 and 2), and a similar toilet for use by the teachers with 2 stances, have been constructed. The school has established a school garden to utilize the human urine and manure.
- Two further single stance Ecosan toilets have been provided, one at a church in Rukungiri District, and another at a primary school in Kanungu District.

As the first emptying cycle for several of these installations draws near, the latrines are all being used carefully and hygienically. Users add wood ash after use; liquid separation and unassisted venting are evidently effective, as there is no bad odour and no flies. Urine is already proving its value as a fertiliser, specifically for maize, banana and green vegetable crops. As might be expected, children's/students' toilets are filling up first! In short, all are performing well to date.



**Photograph 1 - 4-stance Institutional Ecosan with urine container & hand washing facility**



**Photograph 2 - Rear view showing access panels**

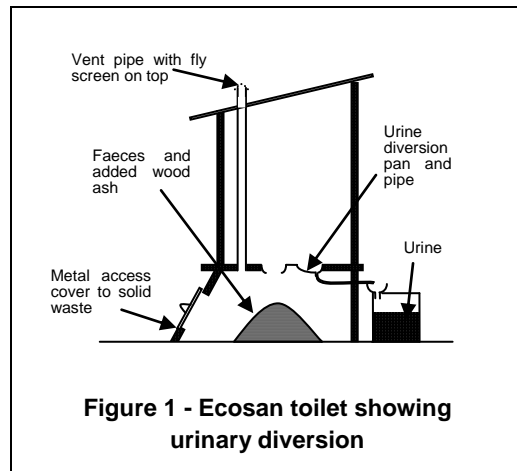
### **Lessons in construction of Ecosans**

For an ecological latrine to work, two aspects are evidently of key importance: liquid/solid separation, and venting. Respectively these deprive pathogens of a wet environment to thrive in, and prevent smell and spread of flies. Early experience with the first pilot project at the Diocesan Offices taught this lesson.

- It has often been observed, "Men will not sit down". Hence a separate urinal for men, draining into the same receptacle as the liquid diversion from the main toilet, is an approach which NKKD WATSAN has used with conventional latrines, and continues to be advantageous with Ecosans.
- Plastic squatting plates/pans, with diversion, are manufactured in Uganda and are widely available across the country. Hinged access panels and metal frames can be fabricated locally.
- Poorly built latrines usually lead to an increase in the population of flies carrying faecal pathogens. At institutions, resources are available for the super-structure to be of brick, mortared as necessary. In rural homesteads it would be envisaged that local materials could be used, after construction of the base, but attention to quality during construction will be important.



**Photograph 3 - Urinal inside the pilot toilet, Rukungiri**



**Figure 1 - Ecosan toilet showing urinary diversion**

- A fan in the vent can address any residual smell, but requires a small power supply, which in rural homesteads would have to be solar derived.
- Affordability is an issue for rural homesteads, but use of unskilled community labour, and local materials such as sand, hardcore, aggregate, mud and wattle construction, and thatch on the roof, reduce substantially the full cost of a brick built institutional toilet.

### Lessons in the use of Ecosans

Sound and comprehensive health and hygiene education is essential to get the best of the benefits out of an ecological sanitation latrine. Potential users must be sensitized and educated <sup>2</sup> in the use of these facilities, notably in careful use and cleansing of the toilet area, personal hygiene and hand washing with soap, and in the use of both urine as fertiliser and solid waste as manure <sup>3</sup>, including hygienic aspects of these processes. Experience at the Diocesan Office has indicated people's sensitivity to reuse of human waste, and the need to approach this aspect carefully, with close attention to the health and safety aspects, as well as the benefits.

The use of an optimum quantity of sawdust or wood ash (an abundant by-product in rural Uganda), by users or an operator, for soaking up any liquid, is extremely important. Over-zealous use of additive materials leads to premature filling up of the chamber, and may be a factor in the rapid filling of children's/students' latrines. Evaluation of required and appropriate amounts of wood ash is ongoing. Application by an operator at institutions, and certainly in public toilets, may be preferred for better control and to keep volumes of the materials down to the optimum level, that is, enough to soak up liquid, and no more.

Urine, diluted 1:3 or 4, is applied into soil, never directly onto plants, using, for example, a bucket with holes or shallow trenches around plants. Manure for horticultural application needs to be stockpiled, <sup>4</sup> both for the purposes of elimination of pathogens and worms, and to await the growing seasons, whilst surplus urine, at a school for example, is diverted to a carefully located soakaway.

NKKD WATSAN, being a lead agency in a recent government led hand-washing campaign, knows very well that limited benefits will be achieved from a well maintained ecological sanitation latrine unless the users wash their hands after using them. Provision for hand washing is an integral part of NKKD WATSAN's sanitation program. This normally consists of a foot operated tippy-tap located near the latrine, providing simple hygienic facilities for rural people. At institutions the facilities are plastic tanks. The paper concludes with a summary of the main advantages and disadvantages of this technology, based on NKKD WATSAN's limited experience to date of the construction, operation and maintenance of Ecosan toilets in an institutional context.

### Advantages of Ecosans

- Ecological sanitation latrines are free of environmental pollution and the water table is safe.
- Ecosan toilets provide an alternative to flushing toilets in places where water supply and/or main drainage are not convenient or are unreliable. For example in Rukungiri Town there is widespread pollution from pit/long drop latrines (which led the Town Council Health authorities to (unsuccessfully)

ban the use of all the spring water), and there is inadequate water supply for flushing, such that the Town Council is now advocating Ecosans.

- Ecosans recycle human waste, both liquid and solid, extremely effectively, making human excreta a valuable resource rather than waste, providing continuous adequate supplies of fertilizer, manure and soil conditioner. In South Western Uganda, an area of relatively high population density where people depend on subsistence farming, much of the soil is exhausted due to over cultivation.
- Ecosans work in both rocky and waterlogged areas, where pit latrines are not feasible, and in areas of collapsing soils (e.g. at Bishop Ruhindi Kebisoni High School and Nkambi Primary School).
- Their permanent location leads to economical use of land, saving money and other resources.
- Location can be much more convenient to users, e.g. inside the Church office, close to classrooms, or indoors in the household etc.

### **Disadvantages of ecological sanitation?**

- Ecosans are more expensive, although not greatly so, but may nevertheless be less affordable for rural homesteads.
- Failure to use and manage Ecosans properly, and maintain them hygienically, may lead to a local environmental disaster.
- Lack of utilization and management of excess urine-overflow to a carefully located soakaway can also lead to serious problems.

The concept of re-use of organic human waste is still unknown and poses a serious challenge to some individuals and communities. Practical demonstration of effective utilization of manure from human excreta will be an important aid to convincing people of the real value of ecological sanitation.

### **Conclusion**

There is a Biblical rudimentary sanitation measure - "Designate a place outside the camp where you can go to relieve yourself. As part of your equipment have something to dig with, and when you relieve yourself, dig a hole and cover up your excrement." (*Deut 23:13, New International Version*). Is it stretching the context to regard Ecosan toilets as a development of this principle? But, thankfully, it will no longer be necessary to go outside the camp!

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<sup>1</sup> Pickford, John (ed.) (1995), *Sustainability of Water and Sanitation Systems*. Conference Proceedings, 21<sup>st</sup> WEDC Conference Kampala, Uganda (1995).

<sup>2</sup> Kerr, Charles (1995): *Community Health and Sanitation*, Intermediate Technology Publications Ltd.

<sup>3</sup> Morgan, Peter (2007): *Toilets that Make Compost*. Intermediate Technology Publications Ltd., trading as Practical Action Publishing, Schumacher Centre for Technology and Development.

<sup>4</sup> Cairncross, Sandy and Feachem, Richard G. (2<sup>nd</sup> edition) (1993): *Environmental Health Engineering in the Tropics. An Introductory Text*. John Wiley & Sons.