

Innovative urine diverting dry toilet (UDDT) designs from East Africa

This paper presents different UDDT designs from East Africa, which are responding to their users' preferences and needs.

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Abstract

Toilets are commonly not viewed as being attractive or interesting. They are normally designed only to serve a certain purpose - a function called excreta management, which is already unattractive by itself. In combination with the need to develop low-cost solutions, design is often neglected. In East-Africa urine diverting dry toilets (UDDTs) are constructed since almost 15 years. But still most of the UDDTs have a similar design with very few adaptations. The paper presents different designs of UDDTs which are based on experiences from more than 10 years of sanitation system planning in the region.

Introduction

Planning in sanitation was and still lies mainly in the hands of technicians. Solid and liquid waste management, treatment and disposal are solved purely on a technical basis, neglecting the fact that sanitation is more than just a technical problem (Müllegger and Lechner, 2005). However, during the last years sanitation marketing has become a keyword which captures the sanitation sector. The WSP Field Note "The case for marketing sanitation" even states that "development of the sanitation market is the only sustainable approach to meeting the need for sanitation in the developing world. [...] Marketing has been more successful than anything else in changing the behaviour of people when they can see direct personal benefits." (WSP, 2004) Choosing a (social) marketing approach means that the attractiveness of the product is one important factor among others. Consequently toilet designs must respond to what people want, rather than what sanitary engineers believe they should have (WSP, 2004). A range of different products are needed to suit a variety of pockets and circumstances. Hence it is important to keep toilets affordable and that the market offers a range of products with various price tags. Garduños (2005) gained experiences how important design and affordability is in Mexico and assumed that "it seems that the paradigm is changing, as owning a WC

is no longer a status symbol. The reference point now is simply a dignified and efficient sanitation system, and the dry toilets seem to fully satisfy those expectations." Based on that, Garduño has developed a variety of innovative sanitation solutions, which are architecturally designed and developed with community involvement. The following examples are all based (1) on a constant adaptation of toilet designs over the last 10 years and (2) on a participatory planning approach, meaning that the users were included in system development right from the beginning and they decided how the particular toilet shall look like.

1. UDDTs with underground chambers: Most UDDTs are constructed above the ground with steep stairs to enter the toilet. Where soil conditions allow, the substructure can also be constructed into the ground, providing a comfortable design especially for handicapped or elderly. Kitgum Town Council in Uganda decided to construct a barrier free toilet for their staff.
2. Indoor UDDTs: Flush toilets are commonly the only sanitation facilities which are constructed indoor. Two examples from Uganda show that UDDTs can also be integrated into a house, aiming to increase the users' comfort.

Key Messages:

Choosing a (social) marketing approach shows that attractiveness of the product and the appropriate price is the key. Consequently:

- toilet design must respond to what people want,
- toilet design has to be attractive, and
- toilets have to be affordable.

3. UDDTs attached to the house: Integrating UDDTs into a closed compound maybe a comfortable solution for row houses as described in an example from Uganda.
4. Combination of toilet and bathroom: Users often prefer the combination of bathroom and toilet. An example from Nakuru (Kenya) illustrates how a sanitation facility with UDDT and bathroom for a private household can look like.
5. Waterless urinals for women and urinals for children: Female urinals are not a new invention but rarely constructed in practice. In Nakuru three waterless female urinals were put up for school girls and evaluated very positively by the users. Urinals for children were constructed for a nursery school in Nakuru (Kenya), which reduced misuse dramatically.

UDDTs with underground chambers

Location:	Kitgum Town Council (KTC), Kitgum, Uganda.
Planning institution:	ROSA project team Kitgum and EcoSan Club.
Timeframe:	In operation since 2009
Users:	Employees of KTC
Technological details:	The toilet block (Picture 1) consists of three individual UDDTs separated for men and women. The men toilet is additionally equipped with a waterless urinal to reduce misuse. The faecal collection chambers are constructed underground with sealed walls to prevent water entering. The faeces mixed with drying agent (ash) and cleansing material are collected in plastic containers, which allow a convenient removal of the material.
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Picture 1: UDDT with underground faecal collection chambers at KTC (Kitgum, Uganda).

Indoor UDDTs (1)

Location:	Office building, Arua, Uganda
Planning institution:	EcoSan Club
Timeframe:	In operation since 2006
Users:	Staff of office building
Technological details:	The UDDT (Picture 2) is constructed in an office building and used by women and men. It is additionally equipped with a waterless urinal. The user interface is a sitting toilet seat (Picture 3) which separates faeces and urine. A hand washing facility is additionally provided on the corridor in front of the toilet. The faecal matter, ash and cleansing material are collected in a plastic container and urine in a jerry can underneath the toilet. Emptying takes place from the backside of the building, by opening a small metal door which allows a convenient removal.
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Picture 2: Indoor UDDT for an office building (Arua, Uganda).



Picture 3: Sitting UDDT for an office building (Arua, Uganda).



Picture 4: Indoor UDDT for hospital staff (Kitgum, Uganda).

Indoor UDDTs (2)

Location:	St. Joseph Hospital, Kitgum, Uganda
Planning institution:	EcoSan Club
Timeframe:	In operation since 2008
Users:	Hospital staff
Technological details:	<p>Four UDDTs have been constructed for hospital staff. The toilets are accessible from the corridor within the hospital building (Picture 4). They are squatting toilets and the facilities for men are additionally equipped with waterless urinals. Every toilet has a hand washing facility within the toilet cubicle, which is connected to a soak pit.</p> <p>Urine is collected in a jerry can and faecal matter (with ash and cleansing material) in plastic containers. The emptying takes place from outside the hospital building (Picture 5). Faeces are further treated at a central roofed composting area and the urine either used for composting or fertiliser in the hospital gardens.</p>
Further information:	<p>Charles Omona, EcoSan Club Uganda (charles.omona@ecosan.at). Elisabeth Freiberger, EcoSan Club Austria (elisabeth.freiberger@ecosan.at).</p>



Picture 5: Emptying doors at the back of the building (Kitgum, Uganda).



Picture 6: UDDT and bathroom attached to a staff house (Naggalama, Uganda).

UDDTs attached to the house

Location:	St. Francis Naggalama Hospital, Naggalama, Uganda
Planning institution:	EcoSan Club
Timeframe:	In operation since 2004
Users:	One family with two children.
Technological details:	<p>Row houses have been constructed for hospital staff in Naggalama in 2004. Each house has a small compound which is closed to the outside. To increase the comfort of the users a UDDT, a bathroom (Picture 6) and a kitchen have been constructed within each house. All three facilities are accessible from the compound, but are emptied from the backside of the house (Picture 7).</p> <p>Urine gets infiltrated via a soak pit into the ground. Faeces (with ash and cleansing material) are collected in wooden baskets and treated in a roofed composting area.</p>
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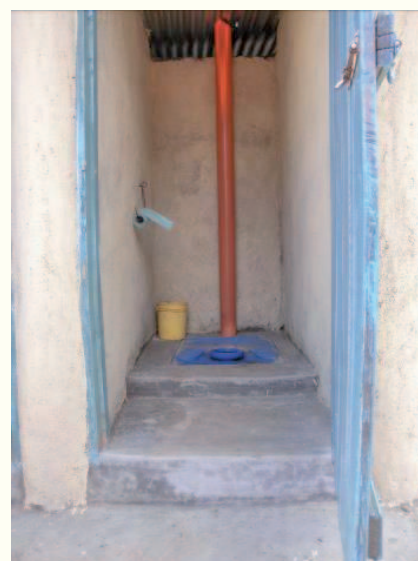
Picture 7: UDDT from the backside of the house (Naggalama, Uganda).

Combination of toilet and bathroom

Location:	Private household, Nakuru, Kenya
Planning institution:	Egerton University / ROSA Project.
Timeframe:	In operation since 2002
Users:	One family
Technological details:	<p>Mr. Kilonzo has constructed a UDDT within his private compound in Nakuru, mainly because of the rocky soil conditions which make digging nearly impossible. For his family's comfort he decided to attach a bathroom to the toilet block (Picture 8).</p> <p>The toilet (Picture 9) consists of a separate men and women toilet (the toilet for men equipped with a waterless urinal) and an additional bathroom. The water from the bathroom is infiltrated. Urine is collected in jerry cans and the faeces in plastic containers. For emptying he hires either a local service provider or he is using the material in his own garden, depending on his need for soil conditioner.</p>
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Picture 8: Private UDDT with bathroom (Nakuru, Kenya).



Picture 9: UDDT for a private household (Nakuru, Kenya).

Urinals

Waterless urinals for girls (1)

Location:	Crater View Secondary School, Nakuru, Kenya.
Planning institution:	Egerton University / ROSA Project.
Timeframe:	In operation since 2009
Users:	About 120 school girls and 10 teachers.
Technological details:	<p>The masonry toilet block (Picture 10) consists of 8 stances UDDTs with urinals for girls and boys, a urine storage tank, and roof water harvesting connected to hand washing facilities for a population of total 200 students.</p> <p>The girls section was provided with 5 cubicles (25 students per toilet), 4 female urinals (Picture 11) and a space for changing clothes. On the other side the boys were provided with 3 cubicles and 9 waterless urinals.</p> <p>The girls' urinals are additionally provided with a waste bin for cleansing material and sanitary pads.</p>
Further information:	<p>Muchiri, E. W., Raude, J., Mutua, B. (2010). UDDTs and grey water treatment at Crater View Secondary School, Nakuru, Kenya - Draft. Case study of sustainable sanitation projects. SuSanA.</p> <p>http://www.susana.org/lang-en/case-studies?view=ccbctypeitem&type=2&id=125</p>



Picture 10: UDD toilet at Crater View Secondary School (Nakuru, Kenya).



Picture 11: Waterless urinals for girls at Crater View Secondary School (Nakuru, Kenya).

Waterless urinals for girls (1)

Location:	ROSA project office building, Arba Minch, Ethiopia.
Planning institution:	ROSA project team Arba Minch.
Timeframe:	In operation since 2008
Users:	Employees of the ROSA project and visitors.
Technological details:	<p>The Ecolily (Picture 12) is a very simple technology and consists of three locally available parts: a funnel with a pulp and a 20 litre jerry can. The pulp prevents that urine is getting in contact with air and avoids the development of odour.</p>
Further information:	<p>Shewa, W.A., Teklemariam, A., Meininger, F., Langergraber, G. (2009): Resource-oriented toilets - a sustainable sanitation option adopted in Arba Minch, Ethiopia. 34th WEDC International Conference "Water, Sanitation and Hygiene: Sustainable Development and Multisectoral Approaches", Addis Ababa, Ethiopia, 2009.</p> <p>http://rosa.boku.ac.at/images/stories/Public%20Docs/34th_wedc_2009_ayeleshewa_et_al_2.pdf</p>



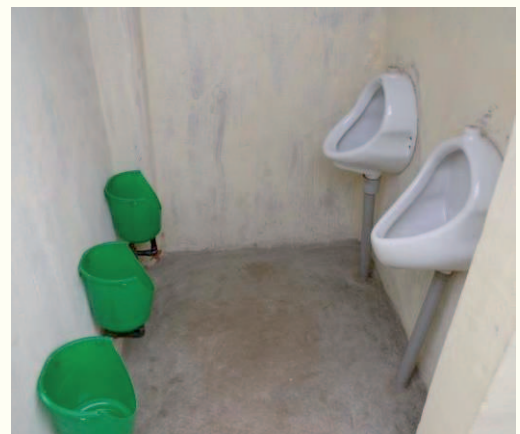
Picture 12: Ecolily – a female urinal (Arba Minch, Ethiopia).

Waterless urinals for boys

Location:	House of fire ministry church and nursery school, Nakuru, Kenya.
Planning institution:	Egerton University / Rosa Project.
Timeframe:	In operation since 2008
Users:	The church congregation of about 50 members and 25 nursery school children between 3 – 7 years.
Technological details:	This masonry toilet block (Picture 13) consists of two single vault UDDTs, one double vault UDDT and male urinals for a population of 50 church members and 25 children. The men’s section consists of one single vault UDDT and a urinal cubicle with five waterless urinals (Picture 14). Two of the urinal bowls are standard ceramic urinal bowls while the other three are specially designed for children out of 5 litre plastic containers and fitted lower to the floor level (300 mm compared to standard level of 600 mm) to allow ease of use by the boys.
Further information:	Muchiri, E. W., Mutua, B. (2010). UDDTs at a church and nursery school Nakuru, Kenya-Draft. Case study of sustainable sanitation projects. http://www.susana.org/lang-en/case-studies?view=ccbctypeitem&type=2&id=127



Picture 13: UDDT at House of fire ministry church and nursery school (Nakuru, Kenya).



Picture 14: Waterless urinals for men and boys (Nakuru, Kenya).

Conclusion

Far more attention needs to be given to the design of a sanitation system, in order to offer practical, user-friendly and aesthetically pleasing designs which can be adapted according to the economic and socio-cultural situation. Our experiences over the last years have shown that acceptance of (urine diverting dry) toilets increases if the facilities are also attractive and not only functional.

References

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