Case study of sustainable sanitation projects

Large-scale peri-urban and rural sanitation with UDDTs South Western region, Uganda

Fig. 1: Project location

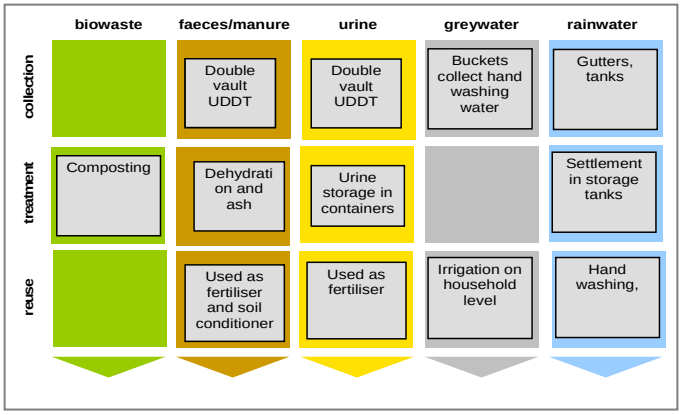

Fig. 2: Applied sanitation components in this project (UDDT stands for urine-diverting dry toilet).

1 General data

Type of project:
Large scale urine diversion dehydration toilets for peri-urban and rural households

Project period:
Start of construction: 1996
End of construction: Toilet construction is an ongoing process (15 days to construct one toilet)
Start of operation: Directly after construction of each toilet
Project end: 2013 (funds for four more years beyond 2013 might be forthcoming)
This project has so far gone through three phases: South Western Towns Water and Sanitation Project (SWTWSP):
SWTWSP I 1996 - 2002
SWTWSP II 2002 - 2006
SWTWSP III 2006 - 2013

Project scale:
Number of toilets built: 927 in households (serving 6-8 persons per household) and 10 in schools (serving 200 students per toilet)
Number of people with access to toilets: over 10.000
Total investment for sanitation part: EUR 420,000
Number of people covered with water supply: 530,093 (this is the total population in the project towns (regional growth centres and small towns))

Project location:
All south - western districts and some of the districts in western Uganda

Planning institution:
Ministry of Water and Environment, Directorate of Water Development, Kampala, Uganda

Executing institution:
Water and Sanitation Development Facility – South Western Branch (WSDF-SW),
P.O. Box 575, Mbarara,
Uganda

Supporting agency:
Austrian Development Agency, European Union, Government of Uganda

2 Objective and motivation of the project

The overall objective of the SWTWS project's sanitation programme is to improve the living conditions of the population in Uganda by ensuring better sanitation practices, personal hygiene and food security through better management of human excreta.

The specific objectives of ecological sanitation (ecosan) promotion are:

- Equip the national and district technical staff with capacity to advocate for, plan, construct, operate, maintain, promote, sensitise the communities on the health benefits of ecosan.
- Build the private sector capacity in the planning, construction, operation and maintenance of ecosan facilities through practical training for construction and operation and maintenance.
- Sensitise the user communities on the resourcefulness of human excreta towards food security through the recycling of sanitised faeces and urine in agriculture as soil conditioners and source of plant nutrients.
- Offer as an alternative, a sanitation technology option to difficult areas of pit latrine construction, areas with high water table, soft soil formations and/or rocky grounds.

Fig. 3: Inhouse UDDTs constructed in semi-urban areas (source: Hans Schattauer, 2012).

3 Location and conditions

Climate and geographical conditions
The project is located in rural growth centres with a population above 500 but below 5,000 people, and small towns with a population ranging from 5,000 to 10,000 people in South Western Uganda covering 24 highland and lowland districts. The topography is mainly green, interlocking and heavily cultivated hills with spectacular valleys. The altitude of the districts ranges between 1,115 meters and 2,347 meters above sea level. This altitude makes it colder than the rest of the country. Temperatures average about 18°C during the day and fall to about 10°C at night.

The area topography ranges from mountainous (in the districts of Kabale, Kisoro, Kanungu, Rukungiri, Kasese, Kabarole, Kyenjojo and Bundibugyo) to the relatively small hills with swamps in the valleys and dry plains in the districts of Kiruhura Sembabule and Rakai.

The settlements are semi-urban, and concentrated along roads with buildings close to one another.

Fig. 4: A household ecosan toilet (UDDT) (source: SWTWSP II project, 2005).

General water and sanitation situation
The project started at a time when the sanitation situation in the region was dire. Most of the towns' water sources were surface and ground water which was susceptible to contamination by poor sanitation. Furthermore, not all the households in the project towns had pit latrines either out of negligence, inaccessible rock structure, soft soils or a high water table.

A large percentage of existing pit latrines were not sound. Various problems of the latrines included: collapsing substructures, not thatched, poorly thatched with grass, no doors and some which only consisted of substructures. Household waste was disposed in the banana plantations and surrounding bushes. Very few households in each of the towns had compost pits. The sanitation surveys included assessing the following: cleanliness at household level, ventilation of houses, animal sheds, bathrooms, the hygiene status of the water collection containers and drinking water containers.

During the sanitation surveys which involved moving from house to house; people would be advised on how best to improve their sanitation standards.

Economic situation
The people in the project area are subsistence farmers while others operate small scale retail business. Most of them are middle income earners.

Institutional and legal framework
The Ministry of Water and Environment via the Directorate of Water Development (DWD) co-ordinates funding for infrastructure development, information management and sets standards for monitoring and evaluation. The directorate promotes the provision of safe drinking water and improved personal, communal and institutional sanitation practices at national and district level. It is through this role that the DWD takes an active role in physical infrastructure development, monitoring of standards, information management and community training.

Socio-cultural conditions
People are not comfortable talking about faeces in public, let alone handling them in agriculture. The women are mainly responsible for hygiene promotion in the household.

Health aspects
In Uganda, the under-five child mortality rate is currently[1] 99 children per 1000, with a clear downward trend compared to 1985 when the value was 180 child deaths per thousand.

4 Project history

The South Western Towns Water and Sanitation (SWTWS) Project was created in 1995 to provide water supply and improve sanitation in 19 small towns and rural centres in South West Uganda. The implementation of the program started in 1996 with a grant from the Austrian Government.

The focus was on providing water supply and sanitation systems with low operation and maintenance costs to ensure sustainability giving the low-income levels of the households. Basic sanitation, i.e. at least a pit latrine with a sanitation platform (sanplat) for each household was the mandatory requirement before safe piped water was provided.

In 1997, a hydro-geological study carried out by the SWTWS Project discovered the possibility that the Kisoro town community in the project area, which predominately utilises pit latrines, could be contaminating their spring water source through digging pits. The study showed that the veins of their Chuho water spring were passing beneath the town. Hence there is a possibility that the seepage from the pit latrines was finding its way into the water veins which are feeding Chuho spring.

Muhanga, one of the towns in a water logged area had a problem of collapsing pits and thus was not suitable for pit latrines. It was then that ecological sanitation (ecosan) was identified as a possible solution for both towns.

[1] The under-five mortality rate is the probability (expressed as a rate per 1,000 live births) of a child born in a specified year dying before reaching the age of five if subject to current age-specific mortality rates (http://www.childmortality.org/).

An attempt to introduce ecosan was initially met with stiff resistance by the communities, as it was unheard of to reuse human excreta. The very first attempts to construct ecosan units were not successful. Double vault solar heated compost (DVSHC) toilets faced O&M challenges since they required addition of other materials like dry grass. This proved to be too demanding for the communities. Introduction of urine diverting double vault solar heated units (or urine-diverting dry toilets; UDDTs in short) had challenges too: the UDDTs constructed on site were not standard, as each mason would construct differently.

The first DVSHC toilets had shallow pits where urine and faeces were mixed, but these were later abandoned in favour of UDDTs that were totally constructed above ground. Maintaining DVSHC toilets was too difficult for the community. Since they looked more like the traditional pit latrines, people either failed or neglected to add dry material like ash, dry grass, peelings etc. At other times ground water found its way into the chambers and affected the composting cycle.

Later in 1999, SWTWS staff in collaboration with Linkoping University and the Swedish EcoSanRes program received training in ecosan. Through the EcoSanRes program, the SWTWS project acquired urine-diverting pans from China and a mould from Mexico. Later a private company in Uganda (Crestank) started manufacturing plastic urine diversion pans that made it cheaper for the community to access the pans.

After a series of experiences in the South Western region, workshops and discussions, it was agreed that ecosan concepts would be beneficial for the entire country and especially for those problems areas where for one reason or another it was not easy to construct pit latrines. Measures to promote the concept countrywide started to be taken, spearheaded by DWD and the Ministry of Health (MOH).

During 2001, the DWD and Environmental Health Department (EHD) in collaboration with the Water and Sanitation Programme Africa (WSP-AF) began the process of establishing a National Advisory Committee on Ecological Sanitation (NACES), drawing members from relevant line ministries and stakeholders; Ministry of Water and Environmental (MWE), Ministry of Health (MOH), Makerere University Kampala (MUK), and the Kampala City Council (KCC). The committee on their fourth sitting developed a National Strategy to promote ecosan countrywide, which was approved in 2003 and adopted in 2004.

Based on the National Strategy, the team of stakeholders (DWD, MOH, EHD, MUK and KCC) came up with a programme to promote ecosan while building on and strengthening existing experiences as a starting point. These stakeholders play a major role in the promotion and implementation of ecosan in the country.

The ecosan programme would eventually cover the whole country but the pilot projects were in areas that already had ongoing ecosan activities, namely the South Western towns. Ecosan promotion thus became one of the major sanitation activities in the project towns.

The policy of the WSDF[2] (Water and Sanitation Development Facility) is that 100% latrine coverage needs to be achieved before opening the water supply. In total five demonstration ecosan units are constructed in each trading centre: for interested institutions (schools, mosques etc.) and private persons (ideally leaders in the community).

Fig. 5: UDDT constructed for a household where the by-products from the toilet are used in the surrounding banana plantation (source: Hans Schattauer,2004).

5 Technologies applied

The technology being promoted now by the project is a double vault urine-diverting dry toilet (UDDT). Most of the facilities constructed have been double vault toilets although single vault facilities have also been constructed in schools, some households and at water source areas.

In the project, two types of UDDTs have been promoted; the Double Vault Solar Heated Compost toilet (DVSHC) that was initially promoted, and the Double Vault Solar Heated dehydrating toilet (DVSHD) that was later introduced and is still promoted to date. These have been promoted at the household, institutional and public levels.

Treatment facilities:
Treatment of the faeces is done on site by reducing the moisture content to kill pathogens. The moisture content of the faeces is reduced to about 25% or less. Dehydration is usually achieved by drying and addition of ash. People are advised to add dry soil or sawdust if ash is not available. The faeces are stored in the toilet vault for at least six months which gives time for most pathogens to die and render the dried faeces sufficiently safe (helminth eggs are likely to survive though).

[2] WSDF: see Section 14 for explanations about the WSDF.

Fig. 6: Top: Doubled chamber UDDT with only one chamber in use at a time. The other urine diversion squatting pan is kept covered. Bottom: Ash and toilet paper is added to the vault by the user (source: Hans Schattauer, 2012).

Collection and application requirements:
Dried faeces are removed from the vault after six months of drying (starting from the time that the vault is closed and no fresh faeces are added anymore), put in a shallow pit and covered for at least two weeks. This allows for further decomposition into humus. The decomposed material is then removed from the pit and applied to the gardens by incorporating it in the soil during land preparation or at planting.

Transportation distances:
The transportation distances are usually short (less than 100 m) because treatment is done on site and most households have their gardens close by.

Justification of technology (why UDDTs have been chosen):
UDDTs are preferred over the traditional pit latrines that are common in the area because they do not contaminate ground water sources, faeces can used as fertiliser in gardens and the toilets do not smell or attract flies.

How were future users involved in the process?
The future users are sensitised about the technology, construction, use, management, and its advantages over other technologies, and asked to select seven households where demonstration toilets are constructed. They also select two masons in each town who are given practical training such that skilled capacity to construct these toilets remains in the towns once the project ends.

6 Design information

Design information that has been used in planning for the project:

Basic design parameters:
- Structures are sited as close to the house as possible
- In areas with slopes, these slopes are used instead of having steps going up to the toilet entrance
- Ramps instead of steps are built for people with disabilities and the elderly to easily access the facility
- Proper plumbing is used to avoid urine leaking into the chambers
- Urine discharge pipes of ¾ or 1 inch work well to avoid blockages in the pipe
- Structures are made watertight, and a polyethylene sheet is placed on the floor to stop water from the ground and dampness to enter into the chamber (in the project this material is also called “Damp Proof Membrane”).
- A vent pipe is added for aeration
- Solar heating with inclined vault doors is added to fasten pathogen die-off and quick drying of faecal matter – based on the assumption that the sun is always available for heating the black metallic sheet at the box of the toilet[3].

Assumptions:
- There is an average of six persons in each household.
- Each person defecates about 50 kg of faeces per year.
- Faeces are stored for at least six months (without addition of fresh faeces) before emptying the vault.Ash for adding in toilet is readily available.
- People are willing to recycle the excreta and use it in gardens.

Applied design and construction methods:
For constructing a brick masonry UDDT, care has to be taken when constructing the substructure. Two watertight vaults of the same size are constructed above the ground to allow easy emptying and to prevent water from getting into the vaults. This also prevents the contamination of ground water. The vaults are constructed on a concrete floor with a ratio of 1:3:6 (relating to the ratio of cement to sand to stone aggregates).

The brick walls, measuring 150 mm (6 inches) are bonded with a cement and sand mortar mixture in the ratio of 1:5 and are then erected. Thereafter the reinforced concrete (1:2:4) slab (ratio of cement to sand to stone aggregates) is cast and the urine diversion squatting pans fitted at least 75 mm above the slab to avoid water entering the vault during cleaning.

The superstructure walls are 150 mm thick. They are constructed using clay or stone masonry. The roof consists of corrugated iron sheets supported by timber purlins of 100 x 50 mm, on timber rafters 100 x 50 mm, on 100 x 75 mm wall plate and fascia board 225 x 25 mm. A vent PVC pipe with 100 mm diameter is installed such that it is at least 600 mm above the roof. Generally, the vent pipe should be slightly higher than the roof ridge or the highest point of the roof, such

[3] However, experiences elsewhere have shown that the inclined vault doors add complexity and costs to the construction without having much of an effect on the drying performance.

that the flow of air is not impaired. The vent pipe should have a mesh at the top to trap flies as well as a cover to prevent rain from entering the vaults through the pipe. The solar heaters (vault covers) consist of a metallic sheet which is painted black and is placed in such a way as to trap as much sunshine as possible.

Choice of materials:
The toilets are usually constructed with naturally existing or manufactured materials depending on the economic status of the owner; thus, the technology caters for both the poor and the rich.

- For low income earners one could construct a UDDT entirely from locally available natural materials like stones, mud, clay, water, tree poles, logs, reeds, ropes and grass for thatching (mud and wattle structure).
- For middle income earners, one could construct the structure using stones/hardcore, crushed aggregates, sand, bricks, cement, steel bars, PVC vent pipe, plastic pipes for urine diversion, door (timber or steel), iron sheets, nails, timber, steel covers for the solar heating, polyethylene sheets (damp proof membrane).
- For the rich, the structure could be roofed with tiles and the floor and walls made up of tiles, terrazzo etc.

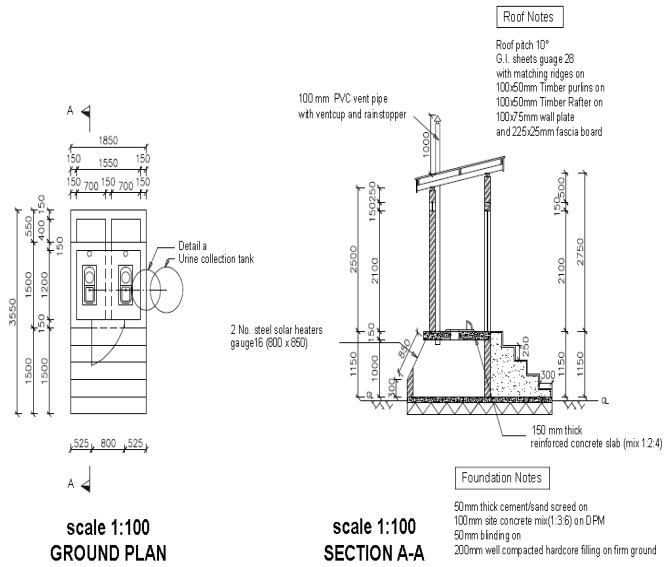

Fig. 7*:* Drawing of a UDDT (source: WSDF-SW).

7 Type and level of reuse

Most people in the area practise subsistence farming; engaging mostly in growing food crops. The soils found in the area are: oxisols, utisols and inceptsols.

Application of urine as a pesticide and fertiliser:
Urine is used as a pesticide and fertiliser. Urine is first stored in an airtight container for at least a week, before use. For use as a fertiliser, it is diluted: 1 part of urine to 2-5 parts of water depending on the level of soil fertility. For insect pest control, a higher concentration is required. The diluted solution is sprinkled around the plants/crops in the root zone for plant uptake, and in case of bananas it is sprinkled around the banana stem. The appropriate concentration is applied once every week.

Fig. 8: Urine collected in a urine tank and used as pesticide and fertiliser on crops.

Faecal manure is also used in agriculture although the quantity collected in a year is too little to sustain the volume of agricultural activities in that particular year.

Experiences in the use of ecosan products
Ecosan products have been used in experimental gardens at the office of the South Western Towns Water and Sanitation Project office in Kabale, and in the project areas and they have shown improvements in the growth and yield of some crops. There was a field of about 20 x 30 m in the office compound in Kabale with bad soil where the first trials were made.

Examples for reuse trials:

- Sorghum (in Kabale in 2003)
  Use of urine on sorghum resulted in larger stems than those of the control group that grew under natural conditions. Urine also enhanced the growth rate by early flowering (90 days after planting) with the control flowering later, after 101 days. However, birds ate all the grains hence yield could not be evaluated.
- Cabbage (in Kisoro in 2002/2003)
  The maximum cabbage head weight for the urine test and control plots were 6.6 and 6.1 kg respectively while the mean cabbage head weight for the test and control plots were 3.1 and 2.3 kg respectively.
- Beans (in Rukungiri in 2002)
  Beans were planted in September 2002 in Rukungiri in 3 plots, each measuring 9 m^2. In one, urine was applied as a fertiliser; the second plot received faecal manure and the control plot was only watered. Yield results were as follows:
  a. Urine test plot 3.07 kg (3.4 metric tonnes/ha)
  b. Faecal manure test plot 2.80 kg (3.1 metric tonnes/ha)
  c. Control plot 2.40 kg (2.7 metric tonnes/ha)

Conditioning effect of faecal manure:
At harvesting time (97 days after planting) most of the bean plants in the faecal manure test plot were still with green foliage. This confirms the conditioning effect of faecal manure on the sandy soil, by improving its water holding capacity. These cases show that treated human excreta improves agricultural productivity.

Faecal-phobic attitudes in communities are fading. People are now ready to eat food which they know has been grown using treated human excreta. Examples include:

- In Rukungiri, maize from an ecosan demo garden was stolen and eaten before harvesting.
- In Kisoro, farmers ate cabbages grown with ecosan fertiliser and appreciated the use of this fertiliser in crop production. Each member took a cabbage head home for consumption.

So far, no studies have been carried out to find out how much reuse is actually taking place in the households.

8 Further project components

As part of the up-scaling activities, apart from promoting the technology in the project area, ecosan training was also held for organisations like Plan International, Kampala City Council and Wajir Township in Kenya. Technical officers from 56 districts countrywide were also trained in ecosan design, construction and usage.

Promotion of ecosan and UDDTs is now a country-wide affair as part of an "Ecosan Strategy"[4] and all the other water and sanitation development projects that have been set up (in Northern, Eastern and Central Uganda) have an ecosan promotion component.

9 Costs and economics

The total investment for the sanitation part in this project was EUR 541,000. This includes training of the users and masons, drama shows for awareness raising of the benefiting community, and construction. This is approximately equivalent to EUR 584 per toilet (with project overheads and software).

The capital cost per UDDT is approx. EUR 453 to 512 as shown in Table 1 and Table 2 below. This is the cost for a middle income household, and is considered affordable for them as per their income and house structure. The prices vary as per the site conditions and location.

The project has also developed designs for lower income households, where UDDT superstructures are built out of local materials (grass and mud). If the conditions are okay and the building materials are readily available, then a lower cost UDDT in this project costs in the range of 265 to 300 Eur.

However, ADA was of the opinion that implementation at the lowest income level does not create replications. *Who wants to be poor and who copies what poor people have?* People copy what successful people have and with this in mind the project wanted to get these technologies out and spread through leaders and schools as the first priority.

Table 1: Average construction costs and annual operating costs for a household UDDT (based on a household of 6-7 people with the emptying done every 6 months[5]).

	Cost in EUR
Construction costs	
Materials	313
Labour (15 days @ EUR 9.4 per day)	141
Average total construction costs	**453**
Operating cost per annum	
Ash (50 kg/month at 0.03 EUR/50 kg)	0.36
Emptying (twice per annum/ one hour of workforce needed per emptying at 0.63 EUR per hour)	1.26
Average total operating costs per annum	**1.62**

Table 2: Cost break-down for construction costs (material and labour) for one household UDDT (exchange rate: 3300 UGX = 1 EUR). The prices vary as per the site conditions and location. This is one for the worst scenario, where the site is not easily accessible.

Description	unit	Qty	Rate in UGX	Amount in EUR
SITE CLEARANCE				
Clearing site and excavation of topsoil	sm	12	300	1.1
FOUNDATION				
Hardcore	Trips	0.5	40,000	6.1
Sand	Trips	0.3	80,000	7.3
Cement	Bags	1.5	30,000	13.6
Aggregates	Trips	0.2	80,000	4.8
Damp proof membrane	sm	6.6	3,000	6.0
SUBSTRUCTURE(Including plastering of walls)				
Bricks (230x100x75mm)	No.	320	100	9.7
Sand	Trips	0.2	80,000	4.8
Cement	Bags	4	30,000	36.4
Aggregates	Trips	0.2	80,000	4.8
10mm square twisted high yield reinforcement bars	Pcs	3	25,000	22.7
Binding wire	Kgs	1	4,000	1.2
Timber (12x1") for shuttering	Pcs	5	10,000	15.2
Eucalyptus poles (for scaffolding)	Pcs	2	5,000	3.0
Wire nails(3", 4",5")	Kgs	3	6,000	5.5
SUPER STRUCTURE				
Bricks (230x100x75mm)	No.	630	150	28.6
Sand	Trips	0.3	80,000	7.3
Cement	Bags	2	30,000	18.2
Eucalyptus poles (for scaffolding)	Pcs	8	5,000	12.1
Nails (6")	Kgs	1	6,000	1.8
STAIRS /RAMP				
Bricks (230x100x75mm)	No.	80	150	3.6
Sand	Trips	0.2	80,000	4.8
Cement	Bags	1.5	30,000	13.6
Aggregates	Trips	0.2	80,000	4.8
Hardcore	Trips	0.6	40,000	7.3
Marrum	Trips	0.5	40,000	6.1
ROOFING				
wall plate (100x50) well preserved	Pcs	1	8,000	2.4

[4] Additional information by Charles Niwagaba on 3 May 2012: "It is true that the 10 year ecosan strategy for Uganda 2008-2018 has as an overall strategy goal: 'In 2018, quality of life in Uganda is improved as water resources and human health are protected by safe excreta management through sustainable ecological sanitation systems which are implemented at least at 15% of the total sanitation coverage in the country'. However, even if the strategy goal is nicely stated, there is no dedicated effort to commit resources to increase the coverage of ecosan in Uganda." See this link for more details: http://forum.susana.org/forum/categories/17-fertiliser--soil-conditioner/1393-examples-of-ecological-sanitation-at-scale#1495.

[5] Costs have been converted to Euros with an average exchange rate of 1 EUR= 3200 UGX.

Hoop Iron	Kgs	1	2,500	0.8
Rafters (100x50mm)	Pcs	1.5	8,000	3.6
Purlins (75x50mm)	Pcs	2	8,000	4.8
Corrugate Iron Sheets	Pcs	3	40,000	36.4
Nails (6")	Kgs	2	6,000	3.6
Roofing Nails	Kgs	1	6,000	1.8
PLASTERING/RENDERING				
Cement	Bags	3	30,000	27.3
Sand	Trips	1	80,000	24.2
FITTINGS				
Door (800x100mm)	No.	1	50,000	15.2
Sola Heaters (800x800m)	Pcs	2	50,000	30.3
100mm Diameter PVC pipes (with stopper)	Pcs	1	15,000	4.5
PLUMBING				
11/4" PVC Pipe	Pcs	1	20,000	6.1
11/4" PVC Tee	Pcs	3	4,000	3.6
11/4" PVC Elbows	Pcs	1	4,000	1.2
11/4" PVC Plugs	Pcs	2	3,000	1.8
PVC Cement	Tin	1	9,500	2.9
Squatting pans	No.	2	35,000	21.2
Urine Tank	No.	1	30,000	9.1
ADMINISTRATIVE COSTS				
Skilled labour	mandays	14	10,000	42.4
Unskilled labour	mandays	14	5,000	21.2
Total				**515**

10 Operation and maintenance

Every user has the responsibility to ensure faeces go into the faeces hole and urine goes into the urine pipe. After defecating, the user adds about two plastic cups of ash into the faecal chamber. A bucket full of ash is usually kept inside the toilet cubicle. When the faecal contents are dry, a cone builds up and this is levelled from time to time to ensure maximum use of the chamber. After the chamber has been filled, the contents are left to dry and users start using the other chamber. After a minimum period of six months, the contents in the first chamber are dry and are then removed to be applied in the gardens.

Cleaning and maintenance:
Women and children manage the household toilet more than men. Women's primary responsibility of housekeeping also includes toilet management.

Collection of tariffs:
Using these toilets has no cost attached because they are basically on a household level, ash is free, and the toilet is used by members of the household. They manage them and empty them when they are full. For public toilets constructed at water offices in the towns they charge about 100 UGX or 0.03 EUR per use.

11 Practical experience and lessons learnt

The technology was at first met with resistance as users were used to the conventional systems like the drop and store and wanted nothing to do with having faeces above the ground and recycling them for agricultural purposes. This was countered through continuous sensitisation and community involvement through demonstration gardens.

The applicability of the UDDTs for the Muslim communities was difficult, because they are anal washers. This was countered by making a design that fits their religious requirements and allows for anal washing with water (drained separately and not allowed to enter the faeces vaults).

Designs for the aged and people with disabilities had to include a ramp instead of steps.

There has been replication of the UDDT toilet technology by District Local Governments, on personal initiative and by NGOs.

However, the following challenges have become obvious recently:

- Whenever parts of the toilets that were provided wear out, the users do not replace them.
- There is a lot of replication but the quality and standard of design and construction is highly compromised and the technology ends up not serving the purpose.
- The rising rates of replication are not backed by training on use and management and the users thus fail to use them properly.
- There is generally nobody charged with following up on use, management and continuous training after WSDF-SW has phased out, and this is the reason why people abandon or mismanage the UDDTs.

There is a need to discuss these challenges and to review the strategies on promotion, subsidization and allocation criteria. Strategies which could be adopted for functionality and sustainability are also required.

12 Sustainability assessment and long-term impacts

A basic assessment (Table 2) was carried out to indicate in which of the five sustainability criteria for sanitation (according to the SuSanA Vision Document 1) this project has its strengths and which aspects were not emphasised (weaknesses).

Table 3: Qualitative indication of sustainability of system. A cross in the respective column shows assessment of the relative sustainability of project ("+" means: strong point of project; "o" means: average strength for this aspect and "–" means: no emphasis on this aspect for this project).

	collection and transport			treatment			transport and reuse		
Sustainability criteria:	+	o	-	+	o	-	+	o	-
• health and hygiene	X			X			X		
• environmental and natural resources	X			X			X		
• technology and operation	X				X			X	
• finance and economics		X			X		X		
• socio-cultural and institutional		X			X			X	

Sustainability criteria for sanitation:
Health and hygiene include the risk of exposure to pathogens and hazardous substances and improvement of livelihood achieved by the application of a certain sanitation system.
Environment and natural resources involve the resources needed in the project as well as the degree of recycling and reuse practiced and the effects of these.
Technology and operation relate to the functionality and ease of constructing, operating and monitoring the entire system as well as its robustness and adaptability to existing systems.
Financial and economic issues include the capacity of households and communities to cover the costs for sanitation as well as the benefit, e.g. from fertiliser and the external impact on the economy.
Socio-cultural and institutional aspects refer to the socio-cultural acceptance and appropriateness of the system, perceptions, gender issues and compliance with legal and institutional frameworks.

For details on these criteria, please see the SuSanA Vision document "Towards more sustainable solutions" (www.susana.org).

With the country wide coverage of ecosan toilet promotion programmes, and other sanitation programmes there will be improvement of health by reducing the sanitation related diseases, however there are no studies that have been done on this.

13 Available documents and references

Photos are available here:
http://www.flickr.com/photos/gtzecosan/sets/72157631001526388/

Documents:

- Project documents (The Project Document, Ecosan training manual, Ecosan Toilet Design, Cost Estimates). Not available online except for this design manual from Ecosan Club in Austria: http://www.susana.org/lang-en/library?view=ccbktypeitem&type=2&id=1175
- Ministry of Water, Lands and Environment (2003). Ecological Sanitation Design and Construction. Ministry of Water, Lands and Environment; Directorate of Water Development - South Western Towns Water and Sanitation Project, Uganda - Austria. (http://www.susana.org/lang-en/library/library?view=ccbktypeitem&type=2&id=1678)
- SUSAWARES (2005). Analysis and Documentation of Ecological Sanitation Experiences. Not available online.

14 Institutions, organisations and contact persons

Ministry of Water and Environment
The South Western Towns Water and Sanitation Project was a government programme implemented under the Ministry of Water and Environment. The Ministry was thus responsible for planning for investments, setting standards, providing guidelines and quality assurance.
Web site: www.mwe.go.ug
Contact: Herbert.nuwamanya@mwe.go.ug

Austrian Development Agency
Funds for implementing projects under the South Western Towns Water and Sanitation Project were from the Austrian Development Agency. For Phases I and II, ADA was the sole donor, and for Phase III it was ADA with co-funding from the European Union. Through all the phases of the project the Programme Officers Water and Sanitation from ADA have always been available to provide technical backstopping.
Website: www.entwicklung.at
E-mail: kampala@ada.gv.at; Robert.Burtscher@ada.gv.at
(Also Hans Schattauer Hans.Schattauer@gmail.com)

WSDF-SW
South Western Towns Water and Sanitation Project started in 1996 – adopted as the official implementation structure for Watersupply and Sanitation into the Ministry of Water and Environment in 2006 as "Water and Sanitation Development Facility – South Western Branch (WSDF-SW)". It is a funding mechanism through which funds are channelled to develop water supply and sanitation systems for rural growth centres and small towns in South Western region of Uganda. SWTWS III is a project implemented under WSDF-SW.
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SuSanA 2012

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