

## ***Ecological sanitation history, Sweden-Ethiopia***

In 1994, the Society for Urban Development in East Africa (SUDEA) submitted a proposal to Swedish Sida for a sanitation project in Ethiopia. The project was named ECOSAN, an acronym devised by the SUDEA project leaders to project the composite idea of Economy, Ecology and Sanitation. The proposal generated a lively dialogue between SUDEA and Sida. There were many doubts and questions as to the viability and do-ability of the system. At the initial stage there was the question of the value of urine as fertilizer. When that was proven and accepted, there were a variety of suggestions as to how this should be utilised. Another major issue was whether to mix water with the urine before use and in that case how much. This Ethiopian pilot project has resulted in many different ways of using the urine, where one of the techniques is urine deposition (see below) and after many trials, the composting of human faeces together with all biodegradable household refuse, which has given very good results.

Some of the other questions were

- Can fertilisation with human excreta be done in a clean and safe way?
- Is it possible to change attitudes to handling human excreta so that people can be taught how to compost human faeces in a safe way?
- Would different cultures accommodate this system at all?
- Is ECOSAN cost-benefit effective?
- Squatting or sitting? The issue of adapting the model to cultural preferences.

Thus a pilot project with an integrated approach was conceived and conducted in Ethiopia from 1996 to 2002. The proposal and its implementation have been supported by multi disciplinary professionals at Stockholm University, Umea University, Uppsala University and Addis Abeba University. The pilot project was first financed by Belgian DISOP and Sida and later by Sida through the Forum South organisation for Swedish volunteering. The latest financier has been the Belgium Embassy Co-operation fund.

When the pilot project started in Ethiopia in 1996 there were not many points of reference or relevant data to hand as can be found today merely, for example, through "Google". But thanks to our reference group of nine academicians from different disciplines, SUDEA managed to answer most of the questions raised.

### **The sitting urine diversion toilet for use in Ethiopia**

One of the first modern urine diversion (UD) toilets (SEPTUM, to the right) was developed by the late Dr. Torsten Modig, Umea University, who had already in 1992 developed a portable version that we used in our introductions as a demonstration tool when approaching Ethiopian authorities and communities in early 1994. The demonstration of the technique generated many laughs and jokes in Ethiopia, but the ECOSAN system was accepted by many with enthusiasm. One of the doubts was whether it would be affordable for the poorest people who needed it most. In October 1994, after this initial sounding, the project proposal was submitted to DISOP in Belgium and to Sida in Sweden. At the same time, another project proposal was sent to the EU by Professor AnnMari Jansson from the Institute of System Ecology, Stockholm University, in collaboration with Umea University and SUDEA.



The project proposal had the following main criteria:

- Natural resource management through
- Urine diversion – sitting or squatting
- Composting of faeces together with household refuse
- Food production through urban agriculture or home gardening

These criteria are still valid and an integral part of sustainable sanitation. Setting the criteria for the system has generated both constructive and destructive dialogues, where the need still remains for a genuine, open forum to discuss diversification of the technique without compromising the demands of hygiene, safety or environmental effects. On the repeated questions of affordability and acceptability it is necessary to arrive at some kind of common ground. SUDEA's pilot project has largely solved the above issues but remains less known due to financial constraints and a pervading spirit of competition rather than co-operation among propagators of the various sanitation systems.

The first study of the pilot project conducted by SUDEA in Ethiopia in collaboration with qualified advisors proved the system of urine diversion to be affordable, safe and acceptable. A simple UD system that works with both squatting and sitting was designed by project leader Gunder Edström from used plastic Jerri cans and bottles. A few years later a modified, neater, more conventional ceramic device was developed by Gunder and Torsten that is still serving the systems in Ethiopia. The cost of this ceramic urinal is 5 dollars.

Through the years, three different sitting urine diversion toilets have been designed by Gunder that cost about 30 Euros each.



### **Why sitting rather than squatting?**

For family use most people in Ethiopia have chosen sitting rather than squatting for the following reasons:

- Comfort
- Dignity
- Child friendly
- Pregnancy friendly
- Aged and disablement friendly

## Urine Diversion, squatting

At first, Gunder also designed two different types of Squatting Urine Diversion devices from material available in Ethiopia, one made of cement and another of Terrazzo. The samples were taken to many families in Addis Abeba, Harar and other places. Both sitting and squatting techniques were introduced to the beneficiaries, but no family chose the squatting version for private household use. The usual comment was that the squatting version would be more suitable for public toilets used by many and a great variety of people. A third squatting urine diverting device designed by Gunder was submitted to the Tabor Ceramic Factory for production but this never transpired. After some time the Tabor Ceramic Factory modified the device in collaboration with GTZ but it is still not in production.

During the 11 years of practical experience of ECOSAN in different parts of Ethiopia, the sitting device has consistently been preferred by individual households.

## Why Urine Diversion and not mixing?

- Urine is the perfect natural fertiliser (Urea, N, P, K etc)
- Urine is hygienically safe and easy to store and handle
- Urine is particularly good for the rehabilitation of trees
- Urine can also function as a pesticide when properly applied
- Urine can be used for “dry deposition”
- Non-mixing avoids bad odour
- Non-mixing avoids the breeding of flies etc
- The separate composing of faeces together with other biodegradable household refuse takes the best possible care of the disposal problem (needs extra training, however).

## Urban agriculture or home gardening

The introduction of ECOSAN by SUDEA has always included agriculture to complete the Eco-system approach without compromising the environment, by the clean and safe usage of human excreta to produce food, fodder, flowers and trees.

When urine and faeces are not mixed the usage of urine is safe, easy and clean. One important method for a safe usage is training the users with confidence. Cleanliness in the usage of both urine and faeces is ensured by different techniques. It is important to manage to produce safe compost but more important is how to use it. In brief - place the compost and/or the urine under the topsoil.

SUDEA Ethiopia has developed many useful techniques



- Eco-sandwich
- Eco-basket
- Eco-walls
- Eco-containers
- Eco-flowers and trees

All techniques use human excreta as fertilizer and urine functions also as a pesticide.

### **Household refuse management (composting)**

One of the ECOSAN components in the integrated approach is to recycle all biodegradable household refuse. It is important to train the families in the sorting of refuse from the kitchen and garden. The training conducted in Ethiopia includes building toilets, urban agriculture or home gardening, not mixing refuse, different ways of composting, using solar energy for cooking, and avoiding the use of plastic bags by producing alternative bags which are environmentally friendly. The above mentioned techniques add up to the household economy in particular and save the environment in general.

One of the more challenging issues was to secure the safety of the compost when faeces are included. A special composting experimental study conducted in collaboration with SUDEA by Linda Evjen and Karin Ahlgren, two Swedish university students doing Minor Field Studies, established that monitoring the inner compost temperature with temperature sensors is an indicator of correct procedure. SUDEA learned from Karin and Linda how to use the temperature sensors and continued the study. This trial continued for some months after they left and we finally in a compost mix called Globe-compost managed for two weeks to achieve the critical temperature of 55<sup>o</sup> C. The experience from these tests has been used as a guideline on what to mix, how to mix, how to cover, how to test, etc. This has been one of the most useful and important trials for our success in composting human excreta and other biodegradable household refuse. It is important to teach users that compost must not come into direct contact with either the hand or the edible part of the vegetables, but that it should be used with care and placed only under the topsoil. The above-mentioned recycling techniques have been adequately tried, are well studied, and the cleanliness of the method and safety for consumption of the edibles produced with this method in Ethiopian households is well proven.

### **Solar Energy for the food produced**

An integrated approach to poverty reduction should nevertheless include a final step, where the food produced is prepared with renewable energy. The solar cooker introduced by SUDEA has been found to be a wonderful complementary device. We have used it for boiling water and for cooking food and it would certainly greatly reduce the need to harvest firewood through cutting down trees (deforestation) or using chemicals to purify unsafe water. The families who have tried the solar energy cooker have showed genuine appreciation and expressed the wish to procure one if affordable. But it was included only as an experimental training material and is unfortunately of poor availability, even if people are prepared to pay for it.

### **Nutritional Value Education**

During the pilot project one important need observed was also to include Nutritional Value education and to encourage the diversification of eating habits. As traditional food is nutrient wise rather unbalanced as well as being time and energy consuming to produce, creation of awareness about the rewards of diversification of eating habits was very important. At the beginning, most people believed that there is always danger in eating such produce as leafy vegetables and tomatoes uncooked because of the contaminated soil and water. But this was overcome through individuals from SUDEA sitting down together with the beneficiary and eating the vegetables - fertilized in a clean and safe way by human excreta together - with them. The repeated explanation and demonstration of how the fertiliser is used is necessary for people to avoid the suspicion of contamination. SUDEA had been warned that people of the Muslim faith would neither accept to compost nor eat the food fertilized with human excreta even if the safety was assured. During the initial studies we were advised to try the integrated ECOSAN system in Harar where the majority are Muslims. The study from Harar has proven the importance of clean usage, knowledge exchange and training both for the beneficiaries and the trainers. The use of human excreta in agriculture is known by many farmers throughout the world. But the important input, how to safely and aesthetically use human excreta, remains largely untouched.

## What makes the above vision and effort bloom?

This is needed

- Training, training and again, training of trainers and beneficiaries
- Trainers with a genuine belief in the system and a thorough knowledge of its implementation
- Respect for and maintenance of a constant dialogue with the beneficiaries and others directly concerned
- The ability to not be frustrated by constructive criticism and all the other challenges involved
- Awareness that this is a matter of knowledge exchange and not only of knowledge transfer
- The knowledge that you are doing good and that the task is time-consuming but do-able
- Awareness of the absolute necessity of acknowledging and showing appreciation for the contribution of beneficiaries and others. Being acknowledged and appreciated definitely helps
- Never to stop building on and developing what has already been achieved
- Monitoring and evaluation

Further

- In countering opposition, always listen carefully to criticism and when it is motivated naturally take heed, but never lose hope or give up. It also helps to accept that frustration is part for the course since it takes time and an unimaginable degree of patience to introduce any new approach.

## The best technique to kill the ECOSAN system

- Uninformed introduction to the system as a whole
- Ignoring the whole sustainability, economical-ecological approach and introducing only snatched parts of the system
- Destructive criticism of knowledgeable introducers
- Introducing counter-productive alternative techniques
- Employing a donor-driven approach

One of our saviour mentors said the following which made us feel strong:

***“Almaz, remember that there will always be 20 percent of the audience who will not like you or your ideas, but enjoy the supporters who do and even the silent majority who appreciate but need some time to digest them.”***

## The ECOSAN toilet ladder

### ECOSAN luxury toilets

- Factory produced urine diversion indoor toilets for villas and apartments
- Made of ceramics, glass fibre or enamelled iron
- Price 600 – 1000 EURO



Left:  
Urine diverting toilet with  
water spray for urinal cleaning (<1 dl)



Almaz and Gunder, 2007-04-13

### Medium-cost toilets

- Factory or locally produced UD toilets for villas, apartments or lodges, suitable for indoor use and/or ECO-pits
- Made of ceramics, wood or plastic
- Price 40 – 60 EURO



Tabor UD toilet and ECO-lily

*ECO lily is a complement to any toilet (WC, UD, pour flush, pit or sanplat) for collecting urine - a well balanced fertiliser (cost 3 EURO).*

ECO-pit – a pit latrine for storing faeces while urine is collected separately. (An “arbour loo”, but sitting and with urine diverter). One of the findings is that the eco-pit non-mixed and

odour-free can then be used for planting trees, since it has been shown that the high concentration of urine in mixed excreta tends to kill the seedlings.



### School toilets

UD toilet with six seats for girls and six seats plus two urinals for boys and two glass-fibres tank each 500 litre for urine

- Locally built from bricks
- Serves up to 250 students
- Superstructure 4,500 – 5,000 EURO
- UD equipment incl. tanks 500 EURO



Almaz and Gunder, 2007-04-13



Left: Three classroom school with four ECOSAN units and rainwater harvesting 50 m<sup>3</sup>  
The school garden producing food for the school is located at the back.

### Low-cost toilets

UD toilets made of locally available material

- UD equipment cost 10 EURO
- Superstructure cost 150 - 200 EURO



Left: UD toilet with washing facilities

### Emergency and mobile toilets

Down left: UD toilet (Rescue) made of recycled plastic, and used initially with plastic bags for faeces and later with buckets or ECO-pits. Urine is collected and used as fertiliser.

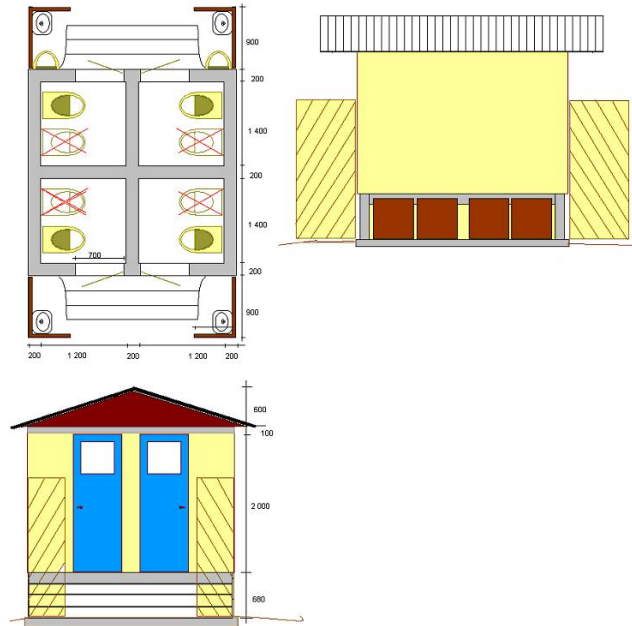
- Price: 50 EURO



Above right: Mobile toilet used for demonstrations, weddings, funerals and other public gatherings.

- Price: 200 EURO

## Drawings Twin ECOSAN



**ECOSAN school double vault toilet**

### Acknowledgement

Our sincere thanks go to the advisory group, old and new members and particularly board members of SUDEA, students who have worked with us in Ethiopia and the SUDEA youth group in Ethiopia.

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