



---

# **One step closer to sustainable sanitation**

---

**Experiences of an ecological sanitation project in  
Malawi**

**A Report by Steven Sugden – WaterAid, Malawi**

**August 2003**

# **Contents**

---

- 1 Introduction**
- 2 What is meant by ecological sanitation?**
- 3 Types of ecological sanitation latrines**
- 4 What happened at Embangweni**
- 5 Why are eco-sans proving so popular?**
- 6 Further benefits and observations**
- 7 Steps towards a sustainable latrine building programme**
- 8 Conclusions**

## **Appendix:**

**Brief overview of the project from a social marketing perspective**

# **1 Introduction**

---

The Central Church of Africa Presbyterian (CCAP) in partnership with WaterAid has for the past 18 months been developing a latrine building programme at Embangweni in the Northern region of Malawi. The latrines built have been those of the ecological sanitation design (eco-sans). In this time 250 such latrines have been constructed using small-scale private sector organisations and a social marketing approach.

This report outlines some of the experiences of the project to date (august 2003) and reflects on how the stimulation of demand for eco-san latrines has enhanced the possibilities of developing a truly sustainable latrine building programme. This is shown by the fact that the latrines continue to be built after subsidies and external support have been removed.

## **2 What is meant by ecological sanitation?**

Many cultures have understood the value of urine and faeces for agricultural purposes for centuries, and latrine designs based on the concepts of ecological sanitation have been used in Asia and parts of Africa for hundreds of years.

Put simply, an ecological sanitation latrine (or eco-san) is a type of latrine whereby the human waste is not disposed of, but retained and rendered into an economically useful fertiliser.

Eco-san is based on three main principles:

- It offers a safe sanitation solution that prevents disease and promotes health by successfully and hygienically removing pathogen-rich excreta from the immediate environment
- It is environmentally sound as it doesn't contaminate groundwater or use scarce water resources
- It creates a valuable resource from what is usually regarded as a waste product

Key facts pertaining to eco-san use are:

1. A person produces about 500 litres of both faeces and urine in a year
2. Human urine contains about the same levels of nitrogen, phosphorus and potassium as commercially produced fertilisers.

All the eco-san latrines promoted and built at Embangweni work on the principle that when soil and ash are added to faeces, it rapidly breaks down to produce compost that is an asset to any farm or garden. The mixture is odourless, as long as it is not too wet. Eco-san latrines are permanent, cheap and easy to build, and over time generate an easy-to-handle, rich compost.

### **3 Types of eco-san latrines**

---

Three types of eco-sans have been built at Embangweni. These are called the Arborloo, the Fossa Alterna and the Skyloo. They work as follows:

#### **The Arborloo**

This is the simplest type of latrine and the one that involves the least amount of behaviour change from the conventional pit latrine. Anybody who has ever planted a tree in a full latrine pit can be said to be practising eco-sanitation!

A shallow pit (1.2 m recommended) is dug and a slab and easily movable superstructure placed on top of it. The family uses the latrine, adding a mixture of soil and ash after each use, until it is three quarters full (usually between four and nine months). After this the slab and the superstructure are moved to another pit. A layer of soil is added to the full pit and a sapling placed into the soil. The tree grows and utilises the compost to produce large, succulent fruit. After a few years of latrine movement the result is an orchard that is producing fruit with a real economic value.

#### **Fossa Alterna**

This is similar to an Arborloo except two shallow pits are dug and used like a twin pit latrine ie one is being filled while the other is maturing, and when the second is full, the first is emptied and used again. If a thin layer of soil is placed on the maturing pit, it becomes ideal for growing tomato or pepper plants. Watering of the plants helps the composting process. When the second pit is full, the contents of the first pit are placed on to the garden or farm and the fertility of the land is increased.

#### **Skyloo**

A skyloo latrine is constructed by building two brick and rendered vaults above ground level, placing latrine squatting slabs on top of the vaults and completed by building a superstructure on top of the slab. The faeces drop through a squat hole into the vaults and are left to mature. The vaults are rotated in a similar manner to the Fossa Alterna. After a suitable retention time, the contents of the vaults are placed on to the garden or farm.

All the latrine designs use an 80cm diameter domed slab as the basic building unit. This design has been chosen because it means that the only raw material that needs to be bought and brought into the project area is cement. The slabs do not contain any iron reinforcement bars which are expensive and only available in the major cities within Malawi. The weight and size of the slab make it relatively easy to transport using low cost technology transport ie hand carts.

## 4 What happened at Embangweni

---

### 4.1 Gaining acceptance

Eco-san has sometimes been regarded as a revolutionary new approach to latrine building. However, during the initial phase of the Embangweni project, the baseline survey showed that to some extent eco-san was already being practiced. Forty seven percent of households said they planted banana trees on their old latrine pits.

***Eco-san is therefore only revolutionary in the eyes of the development professionals and not perhaps to the communities who have been practicing it for generations.***

When the composting process was explained to householders in a little more detail, it was found that 38% of those interviewed accepted the concept of eco-san without reservation, 30% with some reservations about smell and the thought of handling faeces, while 32% said they would not use eco-sanitation.



The project initially worked with members of the community who were enthusiastic and willing to try the new approach to sanitation. When they saw the “power” of the human waste as a fertilizer they quickly made the economic linkage to increased crop production and the economic benefits that this would bring. Word quickly spread within the project area; one of the early innovators was so proud of his latrine and told so many people about it, that he was given the nickname “Mr Skyloo”.

After eighteen months of implementing the project, any resistance and doubt has disappeared. Communities have gained first hand experience of emptying human manure from the latrine pits, and know from this experience that the pit contents are neither obnoxious nor unpleasant to handle. Any initial resistance has in fact changed to unreserved enthusiasm.

### 4.2 Demand is Stimulated

The level of enthusiasm for eco-san has been surprising. Some households have even dug out their old traditional latrine pits and spread the contents on to their land prior to planting their annual crop of maize. One farmer who recognised the power of urine as a fertilizer at an early stage, completely unprompted by the project, adopted the practice of urinating into a container and tipping it into small holes dug near the roots of his maize. He then compared the growth of this crop with one fertilized by an artificial fertilizer and proudly announced that the yield of the urine fertilized crop was just as good. Farmers such as this have

become wonderful advocates for eco-sanitation, which has now become self promoting within the area.

### **4.3 Resulting in decreased subsidies**

As a result of the self promotion of eco-sanitation at Embangweni, demand grew to such an extent that the project found that it lacked the capacity to meet the demand. One of the positive effects was that it enabled the project to charge increased amounts of money for the concrete latrine slab (which is in effect a reduction of the subsidy). At the beginning of the project the subsidy was a relatively low \$2.10 per slab and the increased demand meant that it has been possible to further reduce the subsidy such that it now stands at \$1.40.

---

#### Comparing levels of subsidy – a word of caution

The arguments surrounding the use and need of subsidies can be complex and confusing. Some programmes claim to build zero subsidy latrines on the basis that the householders pay for every part of the latrine construction cost. This is a laudable claim, however it often disregards the costs of promoting the process and mobilising the householders. These costs can be significant whilst the rate at which latrines are constructed using this approach can be slow. Another approach is to factor in household labour costs e.g. for digging the pit, which in most projects is carried out for no financial remuneration by the householder. Factoring in these costs has the effect of over emphasising the household contribution and make the external agencies contribution appear appealingly low.

Making comparison of project performance using the level of subsidy as an indicator is often a difficult and flawed process. The figures quoted in this report are based purely on the value of the materials given to the householders by the project. They do not include transport, mobilisation or organisational support costs.

## **5. Why are eco-sans proving so popular?**

The related questions to this are: “Why is demand so high?” and “What added dimension is eco-sanitation giving toward the search for that ‘holy grail’ - a truly sustainable sanitation project?”

One of the biggest factors as to why eco-sanitation is proving to be so popular is without a doubt, the ever decreasing fertility of the soil in Malawi. Soil fertility in Malawi is 60% of what it was ten years ago. People in rural communities are expert farmers and are well aware of this problem. They complain that all their crops now need fertilizer if they are to produce a worthwhile yield. When walking through fields in the maize growing season, it does not take long for even an untrained eye to tell the difference between the pale, thin, yellow leaves of an unfertilized maize crop and the tall, green heavy plants produced when fertiliser is added. The cost of fertilizer has rocketed and last season was around \$14 for a 50 kg bag. This may not seem too high, but in a country where 60% of the population live on less than a dollar a day, it is a huge proportion of the household budget. Any system which reduces this burden, and is free and is in their control has got to be regarded as valuable. In Malawi 80% of Malawians are subsistence farmers and if this project continues to show the promise it has shown in its early stages, the impact of ecological sanitation on rural livelihoods will be considerable.

No doubt if the fertility of the soil was naturally better, or if artificial fertilizer was cheaper, the demand for eco-san would not be as great.

Another driving force behind demand could be the desire to own fruit trees. The income generating possibilities of selling the fruit is often quoted as the main motivation behind choosing the Arborloo, but it is also thought that owning a fruit tree may be a kind of status symbol. One householder described owning a fruit tree as ‘completing the house’.



## **6. Further observations**

---

The project has had some interesting knock-on effects:

### **6.1 Children's latrines and improved health**

At one point the project ran a 'two for the price of one' offer and gave a free children's latrine slab (60cms diameter dome slab) for every full size adult slab (80cms diameter dome slab) purchased. The take up of the offer was good and an evaluation on the use of children's latrines highlighted three interesting issues-

- Not only the women, but the men were telling their children to use the latrine. While the men may have been more interested in the fertiliser than the hygiene aspects of latrine use, the end result is the same, a huge reduction in children's faeces around the house compound.
- The women said that at night using their own latrine was a frightening experience, as snakes and insects could hide in the dark recesses of the superstructure. With the children's latrine, which has no superstructure as privacy during defecation is not an issue for children, there is nowhere for the snakes and insects to hide and the women could use it with greater confidence. The dark of the night maintained their privacy.
- The women were grateful that they no longer had to suffer the drudgery of picking up their children's faeces to place into the latrine. As hand washing is not easy for the average rural poor household, the fact that the practice of handling children's faeces has been eliminated, must have had a beneficial effect on the health of the whole family.

These factors have the combined effect of reducing the amount of faeces, and therefore levels of pathogens, in the area around the house. This has a positive impact on the levels of oral-faecal transmitted diarrhoea diseases within the family.

### **6.2 Gender roles and eco-san**

Eco-san has had an interesting effect on the gender roles associated with latrine construction. During the baseline survey the men and women were asked separately why they did not have a latrine. The men tended to give technical reasons such as a lack of wood, or no tools or sandy soils causing pit collapse. The women were more direct and thought it was more to do with the laziness and drunkenness of their husbands. The project has now found out that it has always been the man's role to dig the 3m deep latrine pit and with the husbands refusing to do this, the women and the family have - in effect, been denied access to any form of sanitation. With eco-san latrines, it is only necessary to dig a 1. 2m latrine pit and the women in Embangweni have recognised that this is

not a difficult task. Many of them have now dug their own pits, built their own latrines and provided safe sanitation for their family for the first time.

In some cases there has also been further effect, in that when the men have seen the 'power' of the faeces as a fertilizer they have been convinced of the need for a latrine and have 'reclaimed' their role as latrine builder.

## **7. Steps towards a sustainable latrine building programme**

---

WaterAid in Malawi believe that it is crucial that latrine construction can continue after external funding has been withdrawn. The problem the project is trying to overcome is the same as the one faced by all rural sanitation programmes in developing countries; when the supply of free cement ends, the production of latrines also ends. Programmes may provide sustainable latrines, but they are not in fact providing a sustainable latrine building programme.

From the outset, a major consideration in the design of the Embangweni programme has been the question, “But what will happen when funding ends?” Although still in the embryo stage of its development, the project has identified a number of obstacles to achieving a sustainable latrine building programme. The following is list of the obstacles together with steps taken by the project to try and overcome them.

### **7.1 Subsidy dependence**

The policy at Embangweni has been that the householder should always make a financial contribution towards the cost of a latrine slab, even though in some cases this may be only relatively small. The programme feels that only rarely would a bought slab result in an incomplete or unused latrine and that the more the slab is perceived to have a high value the more likely it is to be looked after and utilised.

Financial contribution towards latrine construction has been found to be what actually matters most to the householder (over and above construction time and other materials). This was summed up by one community member who said, “If I have MK100 in my pocket, I have 100 ways of spending it”.

The project has designed a mechanism which allows the subsidy to be adjusted without the end user being aware of the change. The price of the slab has been MK260 to the customer for over a year, the masons who built the slabs initially received cement at a subsidised rate of MK125 per bag (a subsidy of MK600 per bag of cement or MK150 per slab). This made it financially worthwhile for the masons to actively promote latrine production in order to maximise their profits. It was a good deal for them and linked effort to income. After nine months of running the project, demand for the latrines had increased and the project could lower the subsidy by increasing the cost of the cement to the masons to MK250. The price to the final consumer remained the same and the drop in the masons’ unit profit was off-set by the increase in turnover. The next stage in the process is to encourage an inflational increase in the slab price the final consumer has to pay, possibly to MK280, and to increase the price the masons pay for cement to MK350 per bag (one bag currently costs MK750). Over time it should be possible to reduce the subsidy even further, but this will always depend on demand, which in turn depends on the perceived value of the faeces as a fertilizer.

## 7.2 Transport dependencies

One of the biggest hidden dependencies in sanitation programmes is that of transport costs. This can be an expensive budget item, particularly if inefficient systems are used. That is, where one or two bags of cement are delivered in large pick-ups to remote rural villages. The communities and masons become used to having cement delivered to them and when this stops (because the project ends), they are reluctant and/or unused to sourcing their own supplies.

This project, partly through necessity and partly through design, has never delivered cement to communities and instead has developed a system whereby the masons come and collect and sign for their supplies from a central CCAP store. To date the project areas have not been too far away from the CCAP store, but even so this has meant that masons have been making 14 km round trips on their own bicycles to collect half a bag of cement (enough for two slabs). The initial concern was that this would prevent latrines being built as the incentives were not great enough to warrant such effort, however this has not proved to be the case and latrine building does not seem to have been impeded.

## 7.3 Lack of access to skills and advice

One of the first people to build a latrine with materials supplied by the project was Mrs Sankhepo Mvula, a relatively well off (in rural Malawian terms) woman who paid MK150 for a slab produced as part of the mason training process.

On a visit to her house it was found that she had paid the following prices to have her latrine built -

Item	Cost (MK)	Percentage of total
Labour for digging pit (3m)	300	25%
Walls and roof	300	25%
Latrine Slab	150	13%
Half bag of cement for floor	350	29%
Window blocks (decorative)	90	8%
Total	MK1190	

MK1190 is a significant amount of money for a person to pay for a latrine, particularly when her source of income is subsistence agriculture (and the harvest that year was poor).

When Mrs Mvula was asked why she had not built a latrine before, she replied that she had always wanted one but didn't know where to buy a latrine slab.

This prompted the question, how many more Mrs Mvula's are there in Embangweni? How many more are there in Malawi? Are people willing to build their own latrines without subsidy and simply lack access to a supplier of good quality materials and the necessary advice?

In designing the project it was thought to be important to train and use only masons from the communities who would remain and be available to give advice after the project had ended. Mrs Mvula actually bought her slab from Mrs Phili, somebody who has developed into one of the best small scale private sector builders on the project. It is the role of Mrs Phili and masons like her, not only to advise on latrine building and supply the concrete slabs, but also to actively promote latrine building in the area where they live. The reward she gets for doing this is the profit she makes from selling latrine slabs and other associated materials.

The interesting question from a sustainability aspect is whether the masons can sell slabs at a high enough price to make it worth their while to continue to produce and promote latrines after the project has ended. This is very much linked to gradually reducing subsidy levels and increasing prices during the project implementation period.



*Mrs Mvula and her eco-san latrine*

## 8 Conclusions

---

Eco-san latrines and their ability to produce much needed fertiliser have added a new dimension to the process of developing a sustainable latrine building programme. Rather than viewing excreta as a waste product, the communities in Embangweni now very firmly link it to fertilizer and income generation. This has added a much needed, direct and easily recognised benefit to building and using a latrine and has allowed the social marketing of latrines, using small scale private sector organisations as providers and promoters, to flourish. Although improved health was the primary objective for WaterAid and CCAP when initiating the project, health improvement there been found to be at best a secondary objective for the users.

Any organisation wanting to develop latrine building programmes in countries where soil fertility is decreasing and fertiliser prices are increasing should seriously consider the wealth of benefits offered by ecological sanitation. They should not let preconceived, and probably un-tested, ideas about cultural obstacles to handling faeces deter them.

# APPENDIX

## BRIEF OVERVIEW OF THE PROJECT FROM A SOCIAL MARKETING PERSPECTIVE

An analysis of the current project position with regard to the four P's of social marketing (product, price, promotion and place) provides a useful insight into where the project is now and where it needs to go in order to achieve a better chance of becoming a sustainable sanitation programme.

### A.1 Product

Eco sanitation latrines seem to be the right product at the right time. The demand for these latrines can be said to be fuelled by:

- Falling land fertility
- Increased cost of artificial fertilizer and related poverty
- High population of subsistence farmers in the project area.

With regard to the latrine design, there are different superstructure arrangements for the Fossa Alterna and Arborloo, most of which have been innovated by the community, but the Skyloo is causing problems with regard to its cost and the volume of the vaults. There is scope for further development in this area in order to make it more affordable.

### A.2 Price

WaterAid in Malawi regard subsidy as a promotional tool, and not a crutch. As a promotional tool it has to ensure that the rate at which latrines are built remains acceptably high whilst at the same time ensuring that the level of subsidy is not so high that the product provided is devalued. Achieving the right balance is difficult and should be regarded as being more of an art than a science. Perhaps the most important consideration with regard to subsidies should be the understanding that the process of setting them is dynamic and project managers should be constantly striving to reduce the subsidy to zero. Whilst it has to be accepted that this will not always be possible, it should not detract from the aim. At Embangweni the rate at which it has been possible to reduce the subsidy to a relatively low level is surprising, and this has to be attributed to the high demand for eco-sanitation and the resulting fertiliser.

The actual cost of a slab (and therefore the latrine) to a householder at the moment is K260, plus between MK50 and MK 100 for transport, depending on the location of their house. A slab is currently subsidized by the method described section 5.1 at MK125 per slab. The true ex-factory cost of a slab should therefore be MK385, if the masons were to maintain their current profit margins.

At the moment the price of MK260 does not seem to be affecting demand and the price of MK385 is thought to be achievable with time. The subject of slab

price elasticity is often pondered over and interestingly the masons are very non committal in this area as they know that if they gave any indication that people would be willing to pay more, the project would reduce the level of subsidy by charging the masons more for the cement.

One of the disadvantages of the system where a householder has to make a financial contribution is that the poorest members of the community may be inadvertently excluded and fail to gain access to the benefits improved sanitation can bring. If the poor are being excluded, one possible solution would be to target additional subsidy at the most vulnerable households, i.e. widows and the sick with the help of the medical staff at the CCAP mission hospital.

There are areas for potential improvement and experimentation which could have an impact on mason profit margins. The first of these is to diversify the range of products offered and for example, produce different diameter slabs giving the customer more choice. The second is to reduce the cost of the slab by improving production techniques, this is thought to be possible by using re-useable fibreglass moulds.

### **A.3 Promotion**

Like all well targeted interventions, eco-sans have been found to be self promoting and word has spread quickly throughout Embangweni about the 'fertiliser latrines'. CCAP is being pressurised by community leaders and other project staff members to start in other areas.

In the early stages of its introduction there was a lot of scepticism about eco-sanitation and the claims made regarding the quality of the resulting fertiliser. With CCAP's in-depth knowledge of the area and the trust that the people had in them, a few enthusiastic innovators were found who were willing to try out the new latrines. This was helped by the fact that the concept was not entirely new. These innovators soon discovered the fertilizer production quality of the latrines and talked to other members of the community enthusiastically about their findings. From these early innovators came more people willing to try the new latrines and from this the demand began to grow.

One of the most exciting aspects about a visit to Embangweni in the wet season is to be shown around some of the community's experimental plots. There is a large combination of maize crops growing with or without ash, manure, urine, and/or artificial fertiliser. What is interesting to see is the number of farmers actually experimenting on their own initiative and the enthusiasm and pride with which they explain their findings. The ownership and development of eco-sanitation in areas in Embangweni is no longer the domain of CCAP and WaterAid but has become driven by the communities themselves. This leads to excellent internal promotion and allows for natural organic growth between communities.

There are naturally still doubters, but it has been found that once they have seen how well a Papaw sapling grows in an Arborloo latrine pit, they are soon converted and become advocates for eco-sanitation themselves. One such household visited by the WaterAid Country Representative had a four month old



Papaw tree that was over six feet tall and already beginning to produce small fruits. The rate of grow was spectacular.

With such good internal promotion and a product that speaks for itself, the need for more structured advertising campaigns with radio jingles and posters has not been necessary.

#### **A.4 Place**

'Place' in this context refers to the products availability in the places where the consumers live. It does not refer to Embangweni or Mzimba.

Two systems are currently used to get the slabs to the customer, both with inherent weaknesses. The first is centralised slab production in a small workshop which results in high quality slabs, but high slab transport costs with a limited range. The second method is the roving mason who takes the cement with them and produce slabs at the household. This tends to result in poorer quality slabs, but lower transportation cost and larger ranges. Although the range of the second approach is larger, it is limited by the distance the masons are willing to transport the cement.

What has been found to work in Embangweni is to be flexible and not to dictate to the masons how they should operate. However, if the project is to scale up, solutions need to be found for

- increasing the range of the centralised production workshop
- improving the quality of slab production of roving masons
- shortening the distances masons have to travel to collect cement

The project is in the process of providing bicycle-trailers to some of the masons operating from a central workshop and monitoring the effect this has on their working range.

Shortening the distances masons have to travel to collect cement is a more difficult problem to solve and is linked to the whole process of 'scaling up'. The method currently under discussion is by using schools as distribution, promotion and educational centres. The aim is to develop the schools so that they will become cement stores and distribution centres. They will sell the cement at subsidised prices to the masons and make a small amount of profit on the sale. They will be responsible for stock keeping, transport and re-ordering cement. The expectation is that by using the schools in this way the distance the masons will have to travel to collect cement will reduce and their effective range will increase. It is thought that this system will have the advantage of:

- providing separate girls, boys and teachers eco- sanitation latrines at the schools which currently face sanitation problems.
- developing an educational programme within the schools around the eco sanitation latrines and the effect of fertilizer on plant growth. As most of the children at the schools are likely to become subsistence farmers, these will be lessons which they are likely to remember and apply in later life.

- As part of the educational process it is thought that the children will become advocates for the process and apply pressure on their parents to build and use an eco-sanitation latrine. In other projects, this has been shown to be a powerful promotion tool.
  
- The schools will become the focus for mason training and monitoring. Parents who have decided to build a latrine will be able to visit the school and gain advice from a specified teacher on the advantages, disadvantages and use of each latrine. As the masons buy their cement from the school, parents can also be put in contact with a mason who works in their area and find out where to purchase a slab.