The construction and use of the Arborloo

Peter Morgan
2009
The Arborloo is one of the sanitation technologies now being considered for monitoring and evaluation by the Zimbabwe Government in pilot projects within the National Sanitation Program.

Whilst this sanitation system is widely used in several other African countries it is not well known in Zimbabwe, although the concept was first researched in Zimbabwe.
The name Arborloo means “tree toilet” (from the Latin word – Arbor – meaning tree).

The Arborloo is a simple shallow pit toilet which fills with a mix of excreta, soil and ash.

The regular addition of soil and ash to the pit contents reduces fly nuisance and odour and also hastens the conversion of excreta into compost.

This makes the pit, once full, an ideal place for planting trees.
The link between pit toilets and trees is nothing new.

Huge numbers of pit toilets when full are planted with trees in traditional practice in Africa. It is common practice in countries like Malawi and Mozambique. The trees grown on old pits are known to grow very large.
The link between pit toilets and trees is nothing new.

Nature also plants trees in disused toilet pits as this photo shows! Seeds from an indigenous tree in Kenya has fallen into the pit and the seed has germinated and the tree is starting to grow out of the old pit.
Abandoned backyard toilet pits which have filled are often filled with soil, compost or kitchen scraps (containing the seeds of paw paw or vegetables like tomato or pumpkin) which grow spontaneously. In Malawi Bananas are commonly planted in these abandoned pit and produce huge crops.
The Arborloo concept has streamlined this natural or traditional method by:

1. Accelerating the conversion of pit contents (by the regular addition of soil and ash during the pit filling stages)
2. Formalising and making acceptable the use of pit compost in the production of fruit

(formerly the origin of fruit grown on toilet pits was concealed. As people thought the fruit would be contaminated. This is not true.

The concept of the Arborloo is now well established in Africa. At least 8000 have been built in Malawi and over 40 000 in Ethiopia.
The Stages in the life of the Arborloo

STAGES IN LIFE of ARBORLOO

STAGE ONE
Make "ring beam" and dig pit inside ring beam down to one metre depth

Ring beams help to protect pits where the soil is moderately firm

STAGE TWO
Arborloo in use (Pit filling with excreta soil and ash)

STAGE THREE
When pit near full remove toilet. Fill up pit with good soil and plant a tree
The Arborloo

Advantages:

The cost is low and the toilets can be built quickly and easily by the homesteaders once they have learned how to make a slab and ring beam and how to build the toilet house (from traditional materials).
The Arborloo

- Advantages:

The pit is shallow and easily dug by the family itself in a few hours

It is safe to dig
The Arborloo

advantages:

The contents of the pit (excreta, soil and ash) turn into compost which can provide rich nutrients for tree growth. Trees can be a valuable resource.

Many species of tree will grow on an Arborloo pit!
Although the nutrients in the pit compost are recycled, the compost is never touched by human hand, making the system safe.

*The tree itself does the recycling*

The young tree is planted in a thick layer of soil (15cm deep) placed over the pit contents.
The Arborloo - disadvantages:

* The toilet **pit life is short**, perhaps up to a year if soil and ash are added regularly. That means the toilet must be moved regularly. This may seem like too much **hard work** for many people.

* The Arborloo **cannot be used as a washroom**, as too much water added to the unlined pit will stop the composting process and may lead to erosion of the unlined pit wall.

* If the Arborloo is used like a normal pit toilet (ie not adding soil and ash etc), fly breeding and smell will not be reduced.

* User education is required on the **special method** of using the Arborloo compared to the standard Blair or pit toilet.
In Zimbabwe, unlike other African countries, the Arborloo toilet slab is fabricated with a hole for a vent pipe as well as a squat hole. This means that the standard concrete slab can be used in an upgrading process which includes a ventilated version of the Arborloo and also a brick Blair VIP toilet. The Arborloo can thus be seen as an easily built “start off” toilet which can be upgraded later as the family gathers resources to upgrade it to a more permanent facility.
BUILDING THE ARBORLOO

1. Siting

The Arborloo should be sited at a convenient place for use on slightly raised ground if possible and at least 30m away from a well used for domestic purposes. The most ideal site is an area where the family can plan an orchard of fruit trees growing in the future.
2. Stages of construction

The *Arborloo* is made up of 4 parts

1. The pit (one metre deep)
2. The “ring beam” to protect the pit
3. The concrete slab which sits on the ring beam
4. The toilet house which provides privacy.
3. How to make a concrete slab

The *Arborloo* slab is made of concrete and is 1.1m in diameter. The mould for the *Arborloo* slab can be made from a ring of bricks or steel shuttering.
Sizes and mixes for concrete slab

A squat hole (30cm X 15cm) and vent pipe hole (110mm) are made in the slab. Mixture of Portland cement and river sand is 10 litres of Portland cement (1/4 bag) and 50 litres of clean river sand (5:1).

The mould is half filled with the concrete mix. Then pre-cut 3mm wire (or barbed wires) is used for reinforcing. About 10m of wire are required per slab (3 pieces 1.1m, 4 pieces 0.9m and 4 pieces of 0.6m.)

The wires are laid on the concrete when half has been added (see diagram). The remaining half of the concrete mix covers the wire. The concrete is levelled off and made smooth. The slab is left to harden overnight and is kept wet for a week to cure before moving.
Making the slab
The slab is made in a mould of bricks are steel shuttering.
THE “RING BEAM”

The ring beam helps to keep the top of the pit from falling in. It also supports the concrete slab, which is raised above the ground level. The ring beam also diverts rainwater away from the toilet site, which also helps avoid pit collapse.

The ring beam can be constructed with a circle of cement mortared bricks (or with traditional anthill mortar) but is best made in concrete at the site of the toilet. If the soil is very loose or sandy the ring beam concept cannot be used, but in most moderately stable soils it works well.
Making the concrete ring beam

The ring beam is made with a mix of 10 litres of cement and 60 litres of river sand. Two rings of 3mm wire are laid in the middle of the concrete mix.

Both steel and brick shuttering can be used to make the ring beam.
Making the concrete ring beam

Steel shuttering for ring beam is most convenient. Once the ring beam has been casted, the shuttering is removed and the concrete left to set. It is watered daily for several days to cure.
Digging pit inside brick ring beam.

Once the concrete or mortar has set hard the pit is dug down inside the ring beam. Ring beams are not added to pits that have already been dug. That may lead to collapse. The pit is dug down 1m (one metre). In firmer soils the pit can be dug down further, up to 1.5m,
Placing the concrete slab on the ring beam

A layer of weak cement mortar (16:1) is laid on top of the ring beam and the slab is set into this. This provides the slab with even support and makes an airtight seal between slab and pit. The slab must be level when laid and may need propping up with small stones to get the correct level. Cement mortar is used to support the slab all round.
**Building the toilet house (superstructure)**

Once the slab has been placed over the ring beam, construction of the toilet house can begin. There are many ways of making the superstructure from simple low-cost materials. It is best to make a roof to fit over the structure for shade and to keep the rain out. This also helps control flies.
The toilet house (superstructure)

Arborloo structures should be made in such a way that they can be moved easily or dismantled easily for movement from one location to the next.
The toilet house (superstructure)

There are many ways of making portable light weight structures
The toilet house (superstructure)

The structures are generally made of traditional materials.
Building the toilet house (superstructure)
Where wooden poles are used and penetrate the ground it is important to put some form of ant and termite protection in the holes around the wood. This can be in the form of wood ash or old engine oil.
The toilet house (superstructure)

There is an infinite variation in the design of the toilet house! Competitions can be organised to give prizes for the best and most original structures made from traditional or easily available materials.
How to use the Arborloo

When using the Arborloo, regularly add dry soil, wood ash and leaves to the pit as well as excreta. This helps to make good compost in the pit and also reduces odours and flies.

The more ash is added the greater the fly and odour control. Keep the toilet clean. Do not put rubbish down the pit like plastic and rags, as this makes the pit fill up more quickly.

Use the toilet until the pit is nearly full.
Moving Arborloo

When the Arborloo pit is nearly full (after about one year), the parts of the toilet (ring beam, slab, structure) are moved to another convenient place.

The ring beam is laid on level ground and a hole dug inside. The slab and house are then remounted.
Filling the used pit with soil (making ready for tree planting)

The old used pit is filled with soil in preparation for tree planting. It is best to use the best topsoil available and mix with compost if possible.
Planting trees

Most trees will grow on an Arborloo pit if well cared for, including fruit, ornamental, shade and indigenous trees. These include banana, guava, paw paw, mulberry, lemon, avocado, gum and many more. By using this simple principle, the nutrients in our excreta can be recycled into something valuable.
Filling the used pit with soil
Planting and protecting the tree

Young trees should be planted carefully and watered often. They should also be protected from animals like goats. It is often best to let the pit contents settle and add more soil. Tree planting is best undertaken at the beginning of the rainy season.
A photo gallery of trees growing on Arborloo pits
A photo gallery of trees growing on Arborloo pits

The list of possibilities is endless – here are mulberry, banana, avocado, passion fruit and citrus fruits
Upgrading the *Arborloo*

The *Arborloo* also has the potential to be upgraded.

The concrete slab can be used to make a more sophisticated Blair VIP toilet. Even the simple *Arborloo* can be fitted with a vent pipe. This will control odours and if the toilet house is made with a roof and designed so that it is semi dark inside, the vent will also control flies if the pipe is screened.

The *Arborloo* represents the first step up the sanitation ladder.
Summing up

The Arborloo, like many other toilet built with ecological principles can be a valuable resource as well as a disposal system. And the tree is one of the earth’s greatest treasures!