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# ECOSAN: TOILETS IN A BARREL

LOW COST CONTAINER COMPOST TOILETS FOR  
HOUSEHOLDS IN CAMPS AND SETTLEMENTS





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## PART 1

# DESIGNING AND BUILDING ECOSAN TOILETS

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- 5 Introduction to Ecosan toilets
- 6 Who can use Ecosans?
- 7 Seeking approval where appropriate
- 8 Mapping the needs of the household
- 9 Designing and selecting materials
- 11 Design for households who use anal wash water
- 12 Things to remember

## PART 2

# USING ECOSAN TOILETS

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- 14 Using and cleaning the toilets
- 15 Storing and using urine
- 17 Making and using compost
- 18 When is the compost ready?
- 19 Applying the compost

# DESIGNING AND BUILDING ECOSAN TOILETS



# Ecosan Toilets

This is a guide to building low cost, easy to maintain compost toilets in camps and settlements that:

- Give people a safe and clean toilet that costs nothing to empty and uses no water.
- Make fertilisers and soil improvers to grow healthy crops and enrich the environment.
- Do not pollute the ground or smell bad
- Can be built close to where people live
- Holds wastes in flood-resistant containers
- Can be built where it's difficult to dig in the ground or build permanent structures.





## Who can use these toilets?

- ✓ Family or household scale
- ✓ People who use toilet paper
- ✓ People who use water to clean themselves (with added soakaway design)
- ✓ Have close links to agriculture
- ✓ Have an outside space to place the toilet

## This design should not be used:

- ✗ If there is no opportunity to use compost
- ✗ If there is no outside space
- ✗ As communal latrines (unless there is a clear plan for cleaning and maintaining the latrines and for using the compost and urine)



## Do you need approval?



Ask about government policy and standards and get approvals if needed.

You could ask Camp Management or your local WASH cluster. If there are any nearby projects that have built toilets you could ask them what permissions they needed.



# Understand the needs and behaviours of the household

Talk with the people who will use the toilet and find out their needs, hopes and habits. You'll need to know:



- How many people will use the toilet?
- Will the toilet be used by people who wipe with toilet paper or use anal cleansing water?
- What special needs do people have that might stop them from being able to use the toilet?
- What are the cultural and religious rules for using toilets?
- The toilets need a constant supply of wood ash, or other carbon cover material. Will people be able to get this?
- Do they want a compost toilet, and will the compost be useful to them?
- Are they able to empty the containers in an appropriate place?
- Are they willing to use the compost and urine on their land for enriching soils and fertilising crops?



Everyone in the household must know how to use and maintain the toilets. You can use Section 2 of this booklet: 'Using Ecosan Toilets' to teach this and to find out if the household can manage it.



# Draw your design and select your materials



## ARE THERE ANY SPECIAL NEEDS?

The design may need adapting for people with disabilities. See the resources section at the back for help.

If anal cleansing water is used, follow the design on page 11 with added soak away.



## URINE DIVERSION SQUAT PLATE

This can be purchased or made.

You can also get seated urine diversion toilets. For 'wipers', a squat plate with just two holes is needed. For 'washers', a third hole is needed for wash water which should be directed via a pipe to a soak-away

## STEPS WITH HANDRAIL

Timber, mud brick, lime-stabilised soil bricks, or concrete



## WATERPROOF ROOFING SHEET

Corrugated steel or thatch panels, felted timber sheet or UPVC



## COVER FOR FAECES HOLE ON SQUAT PLATE

Timber semi-circle with handle

## STRONG FLOORBOARDS AND JOISTS

Usually timber

## DOOR, HINGES & LOCK

To give privacy and for durability



# Draw your design and select your materials

## POSTS AND BEAMS

Timber at least 75 x 75 mm, or a metal frame

## CLADDING MATERIAL

Timber, thatch panels, woven grass panels, or plastic. This should be durable, lightweight and give privacy



## LARGE PLASTIC CONTAINERS WITH SEALABLE LID

A 200+ litre drum to contain the faeces. The top of the barrel must be wider than the hole in the squat plate. For families of 4-7 people, you will need 2 barrels. For larger families, 3 barrels are needed.



## BLACK PLASTIC

To wrap the inside of the collection chamber to increase internal temperatures

## PVC PIPING

For urine collection into the jerry cans

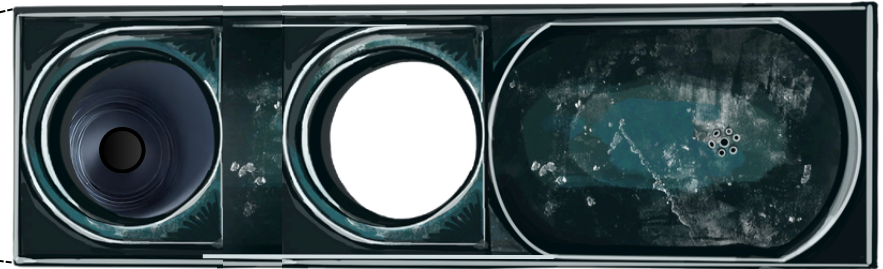
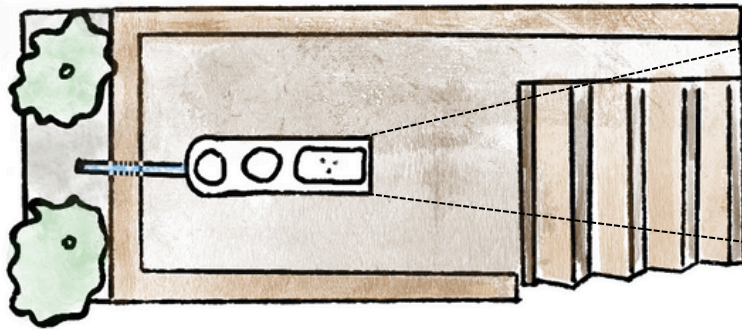


## 20 LITRE PLASTIC JERRY CANS

Two or three cans for collecting urine

# Design for households who use anal cleansing water

If cleansing water is used, an extra basin is needed behind the large squat hole to collect the anal cleansing water.



### CLEANSING BASIN

To collect the anal cleansing water, connected to a pipe that takes this water to an underground soakaway.

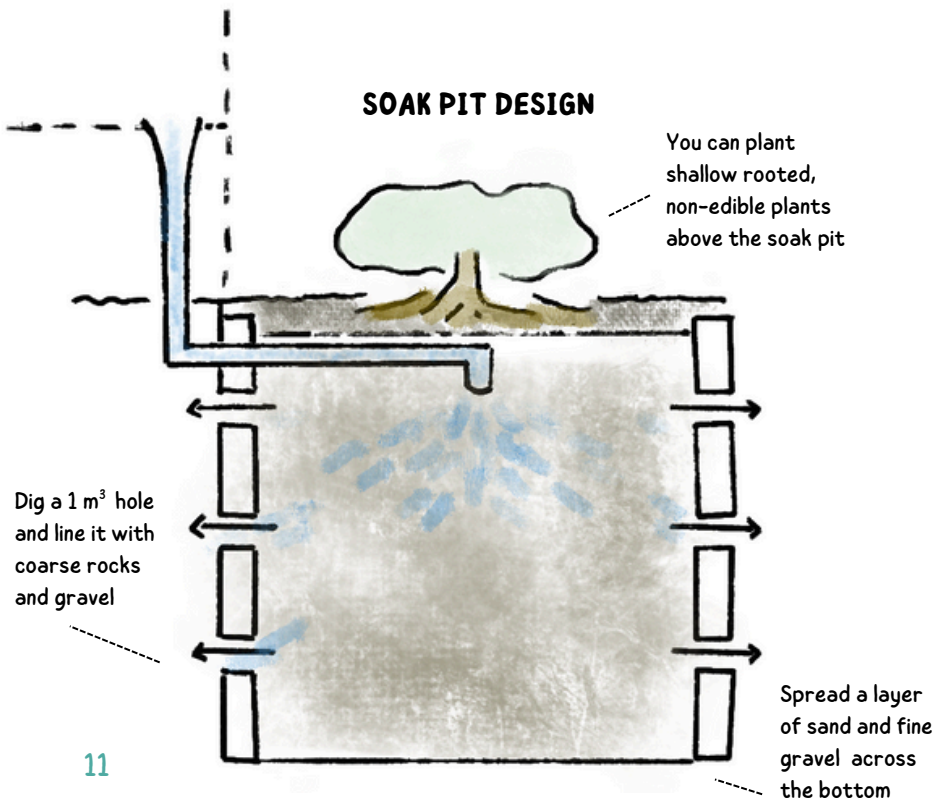
### LARGE SQUAT HOLE

The compost under the large squat hole must be kept dry so do not pour cleansing water in here.

### URINE BASIN

Only urine can go here, not washing water.

### SOAK PIT DESIGN



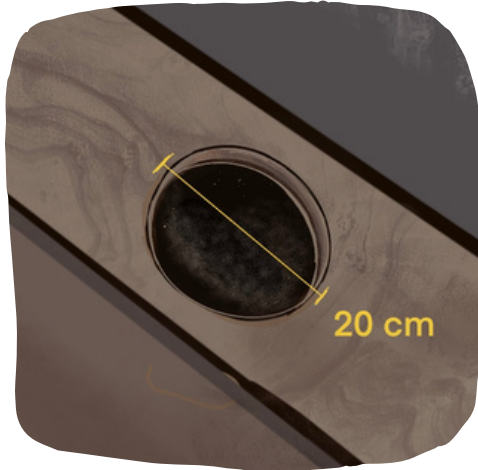
The anal cleansing water can be piped outside the toilet to a soak pit. If this is not possible, the water can be collected in a jerry can and emptied into a pit latrine or foul water drain if the household are willing to manage this.

- ❌ Do not put a soak away in areas with a high water table. The water table must be at least 1.5 metres below the pit.
- ❌ Do not put a soak away near drinking water source. Pits should 30 metres or more from a drinking water source.
- ❌ Do not place a soak pit in areas that flood.
- ❌ Do not dig a soak pit in soil that does not drain water.
- ❌ Do not walk or sit on top of the soak away.

## ! Remember



Protect timber from termites using engine oil or Neem, or use a metal frame. Wrap the bottom of the posts in plastic to prevent termites entering.



Do not make the hole in the squat plate larger than 20cm wide, or children could fall in.



Water and soap are needed for handwashing. A tipitap could be built outside the toilet.



Make sure the collection chamber is well sealed from flies and lockable so children cannot enter.



Engine oil is toxic so do not get it on people, animals or plants or in the soil.

# USING ECOSAN TOILETS

## Using the toilets

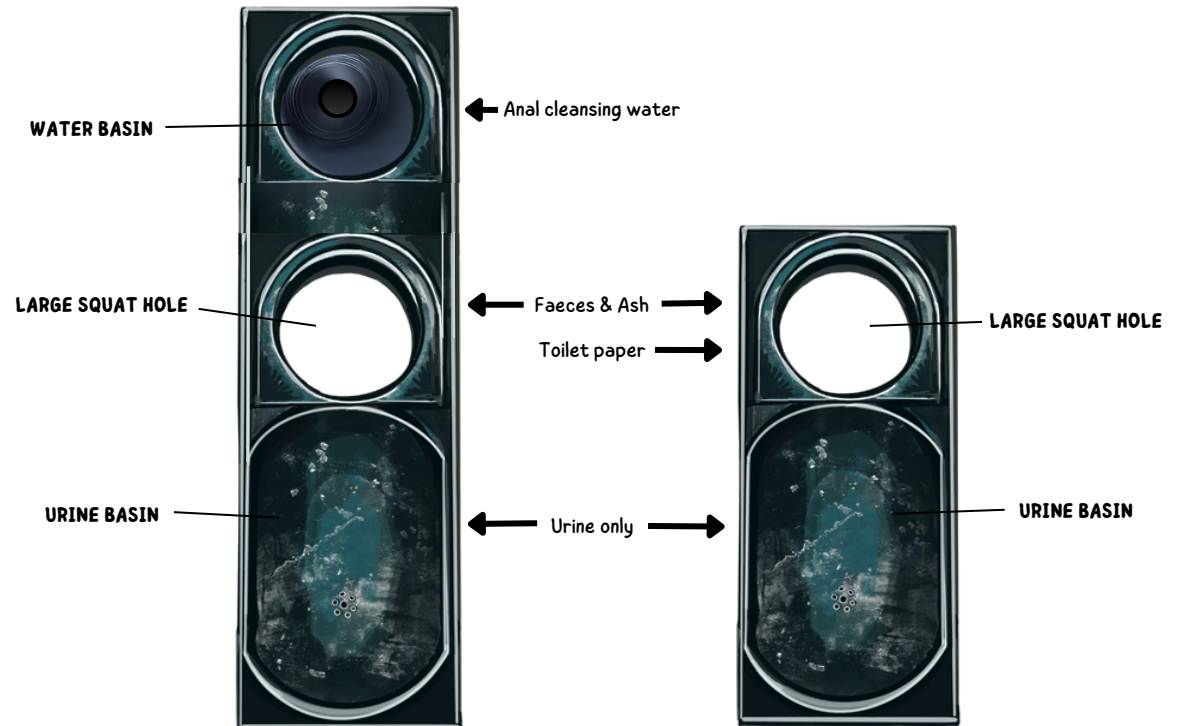
- ✓ Urinate in the front basin
- ✓ Faeces goes in the large squat hole
- ✓ Put wiping paper in large squat hole
- ✓ Add one cup of ash (or other carbon based cover material) to large squat hole after every use
- ✓ For Washers, shuffle back and make sure all anal cleansing water goes in the anal cleansing basin
- ✓ Replace the cover when finished

## To clean the toilets

- ✓ When needed, pour a small amount of hot water and vinegar into the urine and cleansing holes to clean the pipes.
- ✓ When needed, use a small amount of water and vinegar to clean the squat plate.



- ✗ Do not urinate in large squat hole because it will smell bad and make the compost too wet
- ✗ Do not add ash to the urine basin or it will block
- ✗ Do not pour water down the large squat hole because the compost must be kept dry
- ✗ Do not put rubbish into the toilets (no nappies, sanitary pads, condoms, cigarettes, plastics)
- ✗ Do not clean the toilet with chemicals - you will kill the compost
- ✗ Do not put anal cleansing water in the urine basin because it has germs in it





## Storing the Urine

Urine is full of nutrients and is a great fertiliser. After it is stored for 1 month, dangerous germs will be killed. The urine will still smell bad, so do not spill it on clothes and wash your hands after touching it.

- Check the urine jerry can often. When it is nearly full, swap the urine pipe to an empty jerry can.
- Put a lid on the full jerry can.
- Store the urine for 1 month with the lid on.

Jerrycans

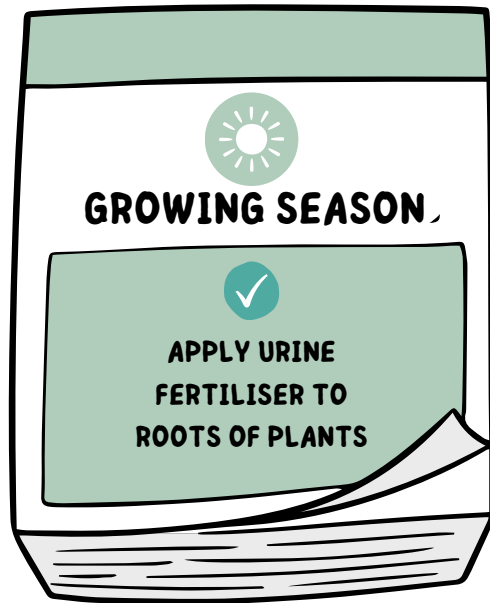


## Using the urine as plant fertiliser

- After 1 month mix the urine with water. It is good to have 5 times more water than urine.
- If a plant has too much urine it can make it sick. If the leaves turn brown, grey, or yellow it shows the plant could have had too much urine fertiliser.
- Young seedlings can be killed if you do not mix urine with enough water.
- You can use urine to deter pests on a plant. Apply it neat or with water where the pests are.

1:5 Urine to Water





- ✓ Apply urine-water to the roots of crops
- ✓ Stop applying urine 1 month before harvesting
- ✓ Apply during plant growth phase, when leaves are growing or fruit is forming.
- ✓ Use for crops that will be cooked or fruiting crops like tomatoes

- ✗ Do not apply urine-water one month or less before harvesting
- ✗ For fertilising do not apply urine-water to the leaves, fruit and stem of the plant
- ✗ Do not use for salad and leaf crops, like lettuce, that will be eaten raw

## Making and using the compost



Always wear waterproof gloves and boots when dealing with compost. When the barrel is almost full, add plenty of ash and some soil to cover the top of the contents of the barrel.



Open the chamber under the toilet and put on the lid of the barrel.

Move the barrel to the side and write the date on the barrel with pen. Leave to compost in the compost chamber.



Put an empty barrel under the squat hole. Put a mixture of dry soil and ash into the barrel to cover the bottom.

Every 3 months, roll the full barrel on its side to mix up the compost.

# When is the compost ready?

Complete composting kills germs in the barrels including viruses, bacteria and helminths. You should also store the compost before it is used to complete the treatment.



## Temperature

Rises above 50° C then cools



## Colour

Changes to dark brown



## Smells

Like wood and soil



## Texture

The feeling is crumbly and soft

Keeping the barrel in the chamber makes quicker compost, as this happens faster when it is hot and slower when it is cold.

**!** Always wear waterproof gloves when handling the compost.






## Storage Time

Compost should be stored, with no new material added, before it is used.

In hotter climates with ambient temperatures of 20 - 35° C store the compost in the barrel, or in sealed sacks, for **over one year before use.**

In cooler climates with ambient temperatures of 2-20° C store the compost in the barrel, or in sealed sacks for **18 - 24 months** before use.

## Not ready if...

-  Smells bad
-  Wet and sticky
-  It hasn't been stored for the correct time (see above)



# Applying the compost to the soil

- ✓ Use to grow above-ground crops
- ✓ Wait at least one month after adding the compost before you harvest any crops.
- ✓ Use for crops that will be cooked
- ✓ Use for fruit and nut crops
- ✓ Apply in a hole or trench and cover it with soil or mulch

## When harvesting

- ✓ Cut the crop, do not dig it up
- ✓ If you have clean water, wash the produce
- ✓ Always cook before eating unless the food is from a tree

- ✗ Do not use for leafy crops eaten raw, like lettuce
- ✗ Do not use for root vegetables
- ✗ Do not apply the compost during harvest season
- ✗ Do not apply the compost in places where children play
- ✗ Do not apply the compost by streams or rivers







## RESOURCES

### **FOR GUIDANCE ON ACCESSIBLE DESIGNS FOR PEOPLE WITH DISABILITIES:**

Compendium of accessible WASH technologies  
Jones & Wilbur (2014), Wateraid, Share & WEDC

### **FOR GUIDANCE ON THE SAFETY AND USE OF THIS AND OTHER TOILET SYSTEMS:**

Compendium of Sanitation Systems and Technologies 2nd Edition, Tilley et al, Eawag & IWA

### **FOR SAFETY RECOMMENDATIONS ON USING COMPOST FROM EXCRETA TO GROW FOOD:**

Guidelines for the safe use of wastewater, excreta and greywater - Volume 4 Excreta and greywater use in agriculture, World Health Organisation





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