



Use and Maintenance of Urine Diversion Dry Toilets (UDDTs) and Composting Toilets

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Ecological Sanitation Technology – Urine Diversion Dry Toilet (UDDT)

There are many ways and technologies to practise ecological sanitation. The most common types of toilets are urine diversion dry toilets (UDDT's) and composting toilets.

Urine diversion dry toilet (UDDT)

UDDT consists of eight basic functional elements:

1. A urine diversion toilet seat or squatting pan
2. One or two vaults, usually above ground, or one shallow pit for faeces collection and storage
3. Piping to lead urine from the user interface to an infiltration or collection system
4. A ventilation pipe to exhaust moisture and odours from the vault or pit
5. If required, an anal cleansing area for the separate collection and drainage of anal wash water
6. A toilet superstructure, unless the toilet is installed inside an existing house
7. A bucket with dry cover material (e.g. dry grass, sawdust, dry leaves)
8. A hand washing facility with soap and water.

The advantages of urine separation:

- reduces odour (a mix of urine and faeces causes substantial odour)
- enables fast drying of faeces which makes handling of faeces more simple and hygienic
- reduces environmental impacts
- source-separated urine can be used as a fertilizer on plants or crops.

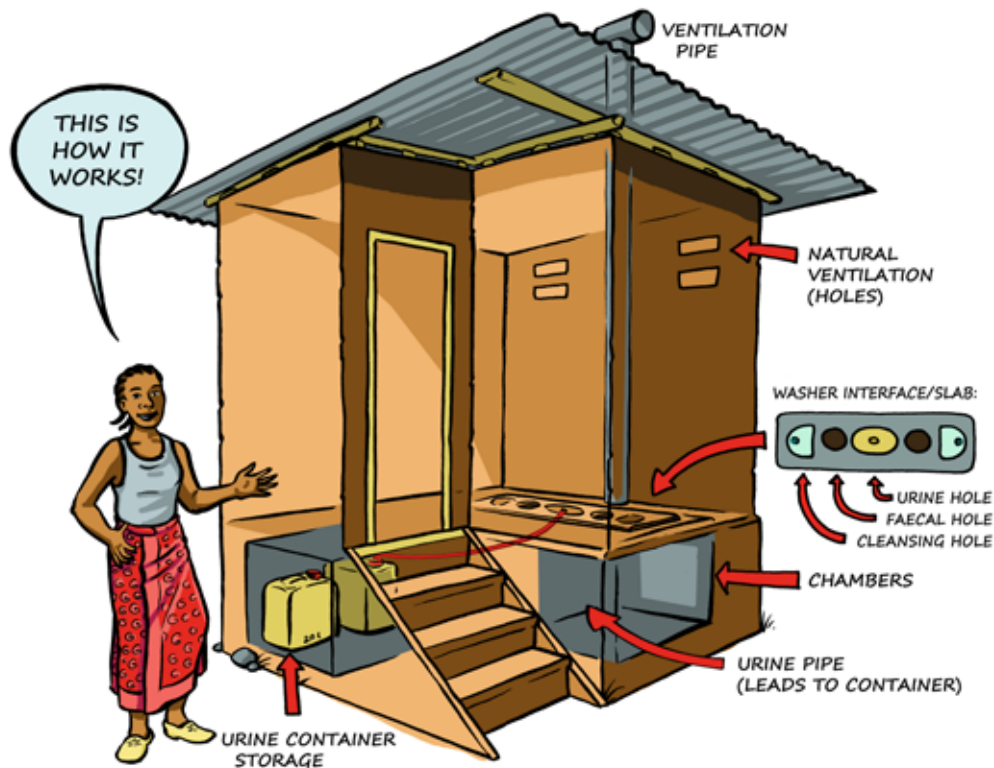


Figure 1.
The principle of urine diversion dry toilet (UDDT).

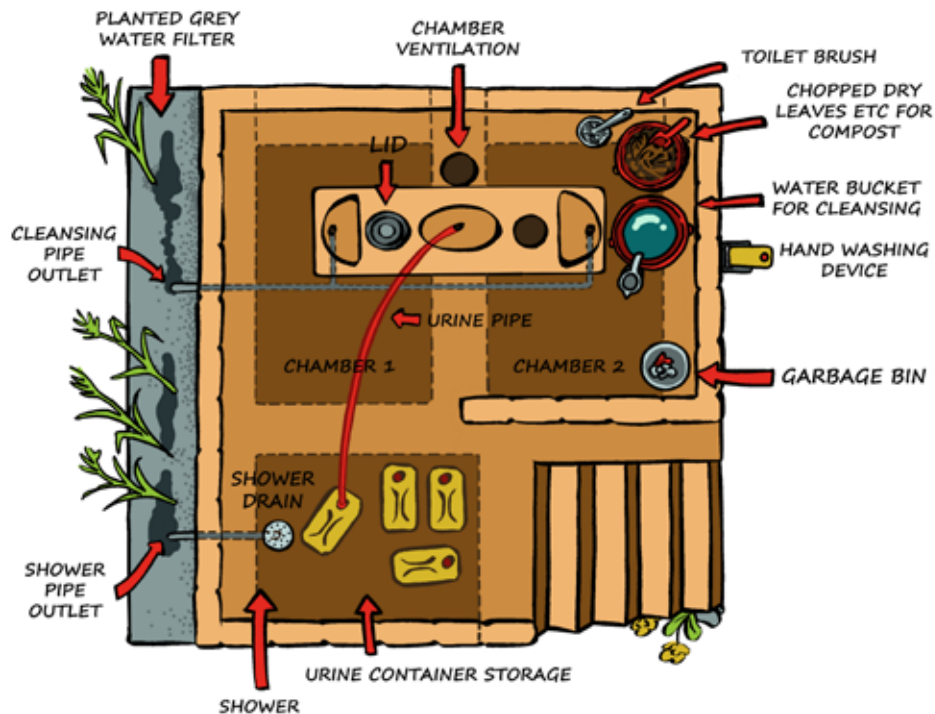


Figure 2. Layout of urine diversion dry toilet (UDDT).

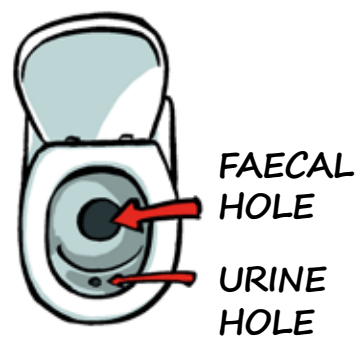


Figure 3.
Urine diversion toilet seat.

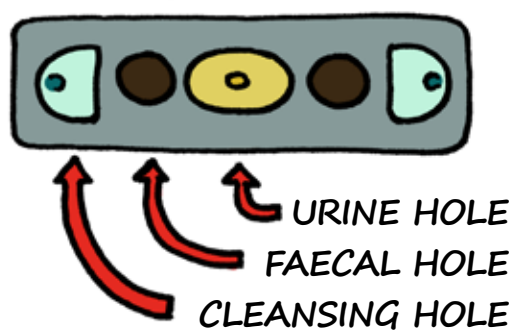


Figure 4.
Urine diversion squatting pan.

How the Urine Diversion Dry Toilet (UDDT) Works?

Urine-diverting dry toilets (UDDTs) allow for the source separation of urine and faeces through the use of a specially designed toilet seat or squatting pan, as shown in Figures 3 and 4. Urine is diverted via small hole through a urine pipe to a urine container. Faecal material goes through a bigger hole to a chamber below. There may be a third hole for washing.

The faeces drop into a pit, vault or container. There can be either single or double vault collection systems, as shown in Figure 9 on page 21. In single vault systems, interchangeable containers can be used or the container can be emptied and compost stored and treated elsewhere. In the double vault toilet, the material is stored in the vault. When the first vault is full, it is closed and left to rest, while the other vault is used. When the second vault is full, the first vault is emptied with a shovel through an access door located at the rear of the vault. The second full vault is then sealed and left to rest while the first vault refills. Properly designed faecal vaults will fill in 6 to 12 months and then rest for an equal period of time. During the storage, the moisture in the faeces slowly evaporates and is released through the vault's ventilation system, or is absorbed by the dry cover material. This process is called dehydration. The resulting dry and odourless material can be used as an agricultural soil conditioner.

Urine diversion serves a number of important functions including reducing odour and simplifying the excreta management process. Dry or 'waterless' operation indicates that no water is used for flushing faecal material, though water must be present for hand washing and other hygiene practices following defecation and urination.

Before Starting to Use the UDDT's

Before starting to use urine diversion dry toilets (UTTDs) make sure that:

- Ventilation pipe from faecal chamber is straight and there is a fly screen at the end of the ventilation pipe
- Urine pipes are joined to urine containers properly
- Doors of the faecal chamber are closed properly
- Only one faecal chamber is used at a time; lock the other side or seal the hole if possible
- Add approximately 10 centimetre layer of bulking material, preferably saw dust in the bottom of the faecal chamber, which is going to be in use
- You have enough urine containers depending of the usage
- Urine containers should be fitted with lids because nitrogen evaporates easily to the air
- There is a closed bucket/container with cover material
- There is a water container or toilet paper for cleansing/wiping
- There is a small water container/bottle in the latrine to be used for cleaning the urine separation hole
- There is water and soap for hand washing
- Users know the toilet's proper use, and especially know the urine diversion and faeces section of the squatting pan. Drawings and instructions on the wall are a good way to introduce the proper use. "How to use and maintain private dry toilet" -poster can be used for this purpose.



Figure 5.

Before starting to use the toilet, add approximately 10 centimetre layer of bulking material, preferably saw dust in the bottom of the faecal chamber, which is going to be in use.



Figure 6.

Make sure that you have enough urine containers depending of the usage. Urine containers should be fitted with lids because nitrogen evaporates easily to the air.



Figure 7.

Urine Diversion Dry Toilet (UDDT) needs to have user instructions inside the toilet. "How to use and maintain private dry toilet" -poster can be used for this purpose.

NOTICE: PUT ONLY FAECES, WIPING PAPER AND BULKING MATERIAL IN DRY TOILET!

✓

✗ Diapers, sanitary pads...
Chemicals...
Plastic...
Cigarettes...
Et cetera...

MAKE SURE THAT YOU USE THE TOILET CORRECTLY:
NO WATER OR URINE INTO THE FAECAL HOLE!

SLAB (WASHER INTERFACE)

URINE HOLE
FAECAL HOLE
CLEANSING HOLE

ADD ONE CUP OF BULKING MATERIAL AFTER EVERY USE.

YOU CAN USE FOR EXAMPLE:
SAW DUST,
CHOPPED GRASS, DRY LEAVES,
SMALL BRANCHES...

TAKE CARE THAT THE TOILET IS **CLEAN** AFTER YOUR VISIT!

CLEAN WITH BRUSH WHEN NECESSARY.

Urine hole
Faecal hole

WASH URINE HOLE WITH WATER WHEN NECESSARY, AND WITH VINEGAR ONCE A MONTH.

NEVER USE **CHEMICALS** FOR CLEANING!

WATER
VINEGAR
CHEMICALS

CLEAN THE TOILET REGULARLY!

IF THE PILE BUILDS UP TOO HIGH...

...USE A STICK OR MANURE FORK TO PUSH IT BACK DOWN.

MAKE SURE THAT EVERYTHING FUNCTIONS.

CHECK: URINE PIPE, VENTILATION PIPE AND FLY SCREEN.

AND LAST: DON'T FORGET TO WASH YOUR HANDS!

How to Use the UDDT's?

- Put ONLY FAECES, toilet paper or cover material into the faecal container. Do not put any garbage into the holes (e.g. diapers, sanitary pads or other plastics, condoms, cigarettes, chemicals)
- Add one cup of cover material after each use. Cover material ensures that the pile is not too tight and composting works well. It also helps to prevent smells and flies
- Cover material can be for example: saw dust, chopped grass, maize or banana leaves, small wood brunch, coconut choir etc.
- Make sure no water gets into the toilet chamber (hole for faeces). If the content of the toilet gets wet, add more cover material
- Make sure toilet is clean after your use
- Always close the lid after use. It prevents flies from entering the hole. In some cases lid can be closed by foot
- Always wash your hands with soap after using or maintenance of the toilet.

Figure 8.

Always close the lid after use. It prevents flies from entering the hole. In some cases lid can be closed by foot.



How to Maintain the UDDT's?

Clean the latrine regularly and make sure that everything functions properly. Frequency of cleaning should be enough to provide a nice/enjoyable and hygienic toilet that will encourage the co-operation of the users. The toilet should be cleaned with soap and water (not with disinfectant, which could harm the composting process).



- Sweep the toilet cubicle with a mop or rag
- Clean the faecal hole with a brush if necessary. **DON'T USE THAT BRUSH FOR ANYTHING ELSE!** Use a small amount of water if necessary
- Clean the urine hole with water, except once a month clean with a cup of vinegar to dissolve accumulating salts. Salts might block the urine pipe in the long run if not dissolved
- Use a small brush to clean up the urine hole
- The seat and the outside of the toilet can be cleaned/wiped with some biodegradable cleaner applied to a damp cloth
- The inside of the toilet bowl is easily cleaned with a small quantity of water and biodegradable cleaner, using a soft toilet brush. **Chlorine based cleaners, bleaches and disinfectants must not be used as these will kill the compost bacteria and stop the composting process**
- Check the level of urine in the collection container and empty/change when necessary
- Check the volume of faeces in the vaults and level the pile when necessary. Use a stick or manure fork to push it back down
- Check the urine pipes, fly screen and ventilation pipe from time to time. Remove blockages from the urine pipes such as bulking materials, faeces, dirt or precipitates that may accumulate over the period of the toilet's use
- Do the minor repairs such as cracks in the wall, floor, door, hinges etc.
- Keep the chamber doors intact in order to protect the vault contents from rainwater and animals. This may include replacing door locks and hinges/hooks, and resealing the door panels.



What to Do if There Are Problems?

If the toilet smells bad:

- Add more dry material into the faecal hole, it can also be added straight to the chamber
- Make sure the vent pipe is clean and unblocked
- Clean the urine hole with a small brush and some water or vinegar to dissolve any blockages
- Check urine pipes and container, disconnect urine pipes and clean them with water if needed
- Clean the faecal hole with a brush and small amount of water
- Don't put any chemicals in the faecal- and urine holes.

If flies enter the latrine:

- Add more dry material into the faecal hole, it can also be added straight to the chamber
- Clean the toilet regularly, clean toilet does not attract flies
- Prevent flies' breeding in dry material bucket; put the lid to the bucket and make sure it's closed. Clean the bucket with hot water from time to time
- Check fly screen on the top of the vent pipe
- Make sure that the lid for faecal hole is always closed when not in use
- Sky blue paint inside the toilet prevents flies from entering inside
- Don't put any chemical insecticide into the faecal- and urine-holes.





Composting Toilet

There is no source separation of urine and faeces in the composting toilets. Instead, urine and faeces are led to the same collecting or composting container and composted together in the container or in a separate container elsewhere. Composting is a biological process where micro-organisms decompose organic materials to fertile soil. To be efficient, compost pile should be humid and aerobic, containing enough air.

The main elements of composting toilets:

1. A place to sit or squat and a collecting or composting container
2. A ventilation system that allows good aeration of the composting container, removal of excess moisture and reduction of odour
3. Dry material like dry grass, leaves or sawdust which keeps the compost relatively dry and aerobic
4. Adequate composting time in a composting toilet container or in a separate (closed) composting container
5. Safe use of the compost.

There are four main types of composting toilets:

- Single vault composting toilets
- Multiple vault composting toilets
- Mobile bucket or bin toilets followed by composting of the excreta
- Composting toilets with mechanical devices.

Most of the composting toilet systems are easy to use and maintain, so composting toilets can be used in most parts of the world. They can be self-built or manufactured products. It is important to instruct the users on proper maintenance of the toilet and use of the compost. A strong commitment from the users or operators is needed.

When using the composting toilet, a handful of dry material is added to the container after each use. When the container is full it is either left to compost in the composting container or emptied to a separate (closed) composting container or a separate composting area. The emptying frequency of the composting container depends on the capacity of the container, the number of users and the composting conditions (e.g. heat, humidity and amount of nutrients). Remember that fresh excreta should not be mixed with the compost. Approximately after 12 months of composting the compost can be applied to the land as a fertilizer and soil conditioner. When handling the compost, make sure you use safety measures such as gloves and boots and wash your hands with soap afterwards.

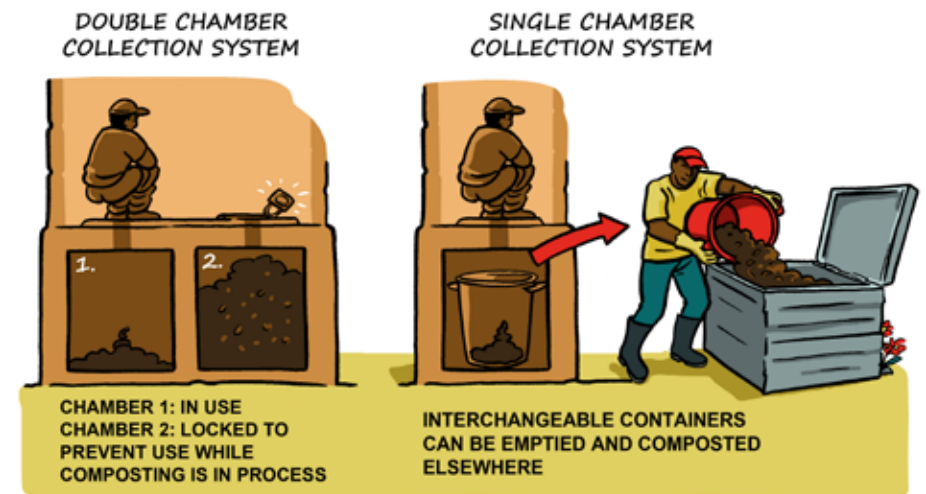


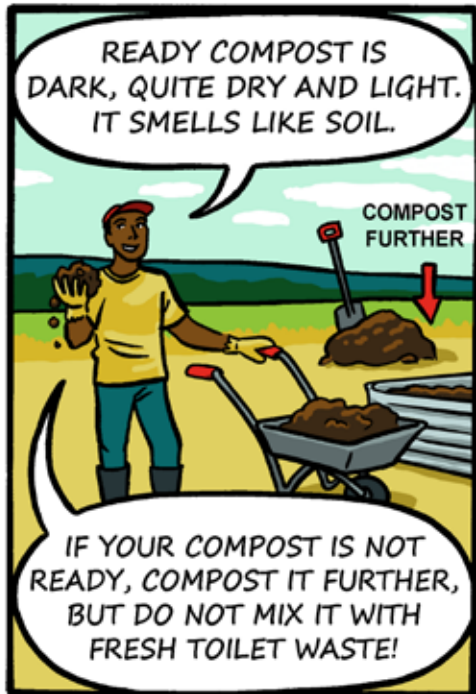
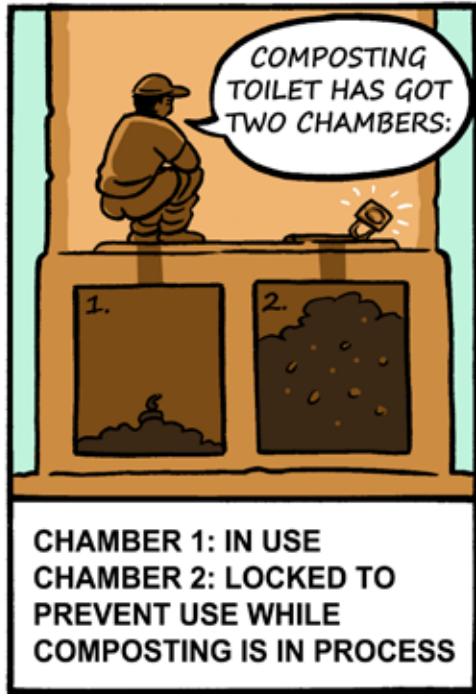
Figure 9. Single and double chamber collection systems.

How to Use and Maintain the Composting Toilets?

- A handful of a mixture of cover material like dry grass, leaves or sawdust is added to the chamber after each use. This helps to keep the chamber contents relatively dry and aerobic
- The emptying frequency of the composting container depends on the capacity of the container, the number of users and the composting conditions (e.g. heat, humidity and amount of nutrients)
- After 12 months of composting the resulting product can be applied to the land as a fertilizer and soil conditioner
- Regular maintenance of composting toilets in private or public use is critical to ensure that the facility operates well. This involves proper cleaning and control of technical components of the facilities (air vent and excreta vault). To ensure a safe end product, the composting process should be monitored.

To Keep in Mind

- Add dry material after each use. Make sure no water gets in the toilet chamber. If the contents of the toilet get wet, add more dry material
- Add more dry material and make sure the vent pipe is clear if the toilet smells bad or flies enter the latrine
- Do not put garbage to the faeces chamber (e.g. diapers, sanitary pads or other plastics)
- Use a stick or a manure fork to push the pile back if it builds up too high
- Clean the latrine on a regular basis and make sure that everything functions well
- Clean urine and faecal holes with water when dirty
- Remember to use gloves and shoes and wash your hands with soap when cleaning the toilet or handling latrine waste
- Replace the urine container with a new one when full, and close the full one for storage
- Keep instructions for use of latrine for everyone to see e.g. on the latrine wall or door
- Close the faeces chamber after a year or when the chamber is $\frac{3}{4}$ full and let it compost. Use the second chamber
- Leave the faeces to decompose for a full year before emptying the chamber. Check the level of decomposition and compost further when needed
- Provide a place for washing hands.



Hand Washing Facilities

To prevent diseases from spreading, it is very important to wash your hands after using and maintaining the toilets and handling compost and/or urine. All toilets should have a hand washing facility with soap nearby. If water connection is available, piped hand wash stations are advisable. If not, then hand washing devices can be made from e.g. cans, plastic bottles or containers. A tippy-tap is a simple hand washing device where a jug is hung by a rope to pour a small amount of water over the hands. There can be a foot operated lever.



Build a Tippy-Tap



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