



Grey water system

Urine diverting dry toilets (UDDT)

Description

The dimensions of a sewage system without faeces using urine diverting dry toilets are about 10 times smaller than a "wet toilet" system. This has considerable economic and ecological advantages. When a local treatment system needs to be considered, this type of toilet is an obvious choice. The most important advantage, however, is that because of the small dimensions, it becomes fairly easy to internally recycle the output of the water treatment system, and you are therefore (in principle) exonerated from any legal requirements concerning sewage. However, in order to prove that you have no leakage in the ground, it is necessary to construct a system that operates in a closed environment. This can be done by putting a pond liner under the whole system, and use the surplus water within this closed environment.

Functioning

This system is designed for 200 liters of urine and hand washing water per day. This capacity is enough for about 50 guests per day. One load of 200 liters waste water diluted with rainwater, is flushed in about 2 to 3 hours through a 12 meter long gravity fed helophyte filter. At the end it is pumped back to the beginning. This loop is repeated throughout the day. At the end of the day, the filtered water is

stored for irrigating the greenhouse where bamboo and young trees are grown. The compost from the toilets, is also produced in this space and applied after at least one year of maturation to the non-consumable vegetation system, and use the surplus water within this closed environment.

Fig 3.33, Urine diverting dry toilets (UDDT) integrated system
Illustration by Alessandro Rosa

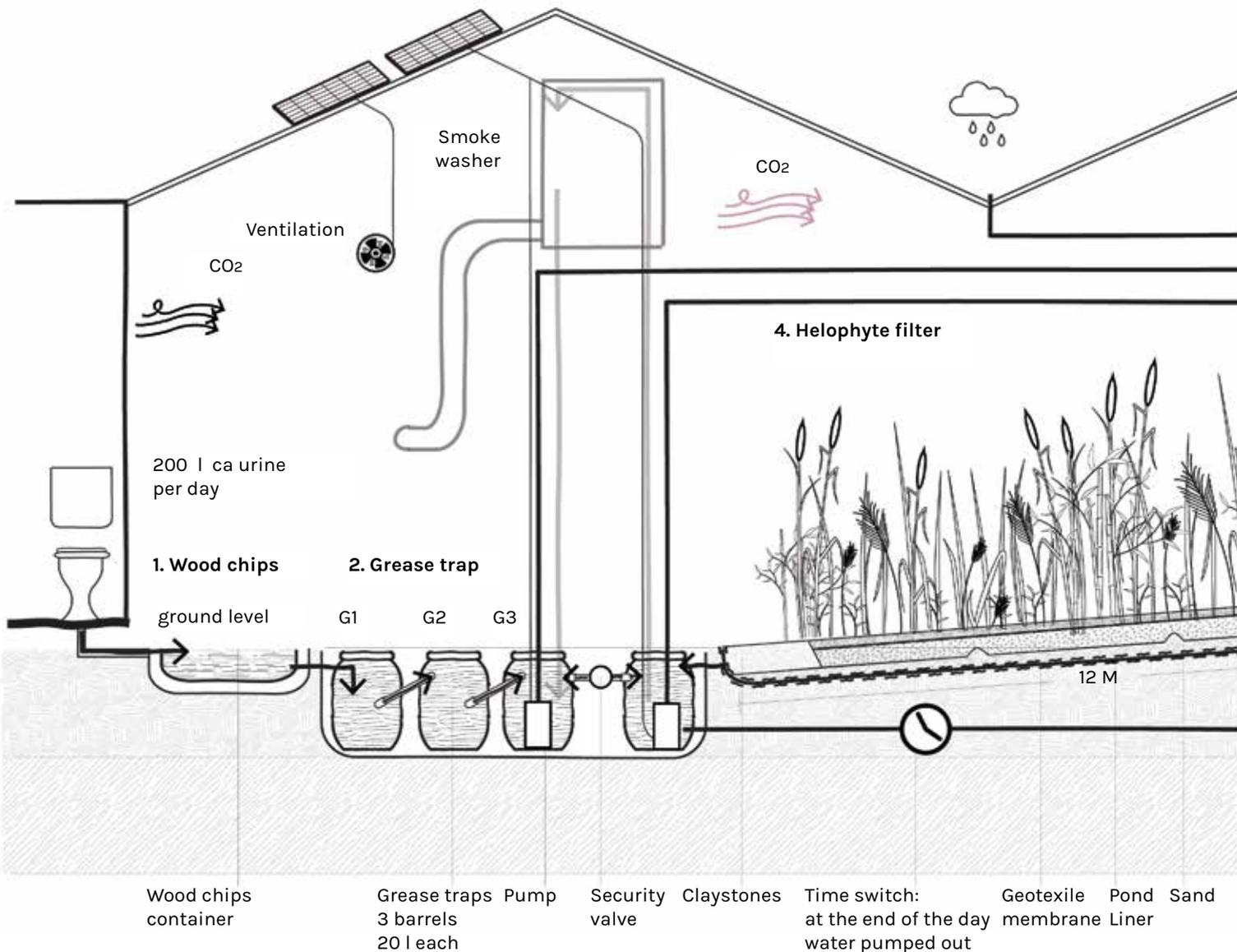
The treatment has 5 stages:

1. Pre-treatment.

This is a 1m²/ 50cm high container filled with wood chips in which the waste water arrives. This takes out the biggest particles.

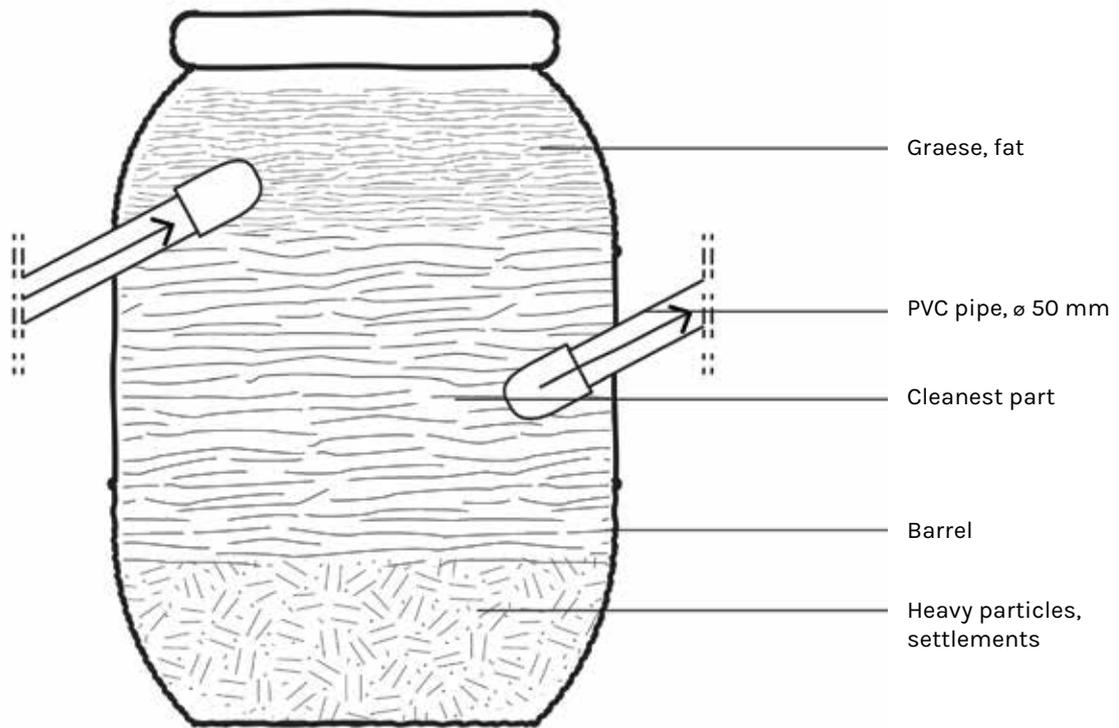
2. Grease trap.

This trap has three compartments (3 barrels) through which the waste water runs up and down in order to stimulate settlement.



Detail grease trap.

Fig 3.34, Detail grease trap with stratification of water
Illustration by Alessandro Rosa



Detail Mixing and Oxigenation

Fig 3.35, Detail mixing and oxygenation barrel with bell siphon
Illustration by Alessandro Rosa

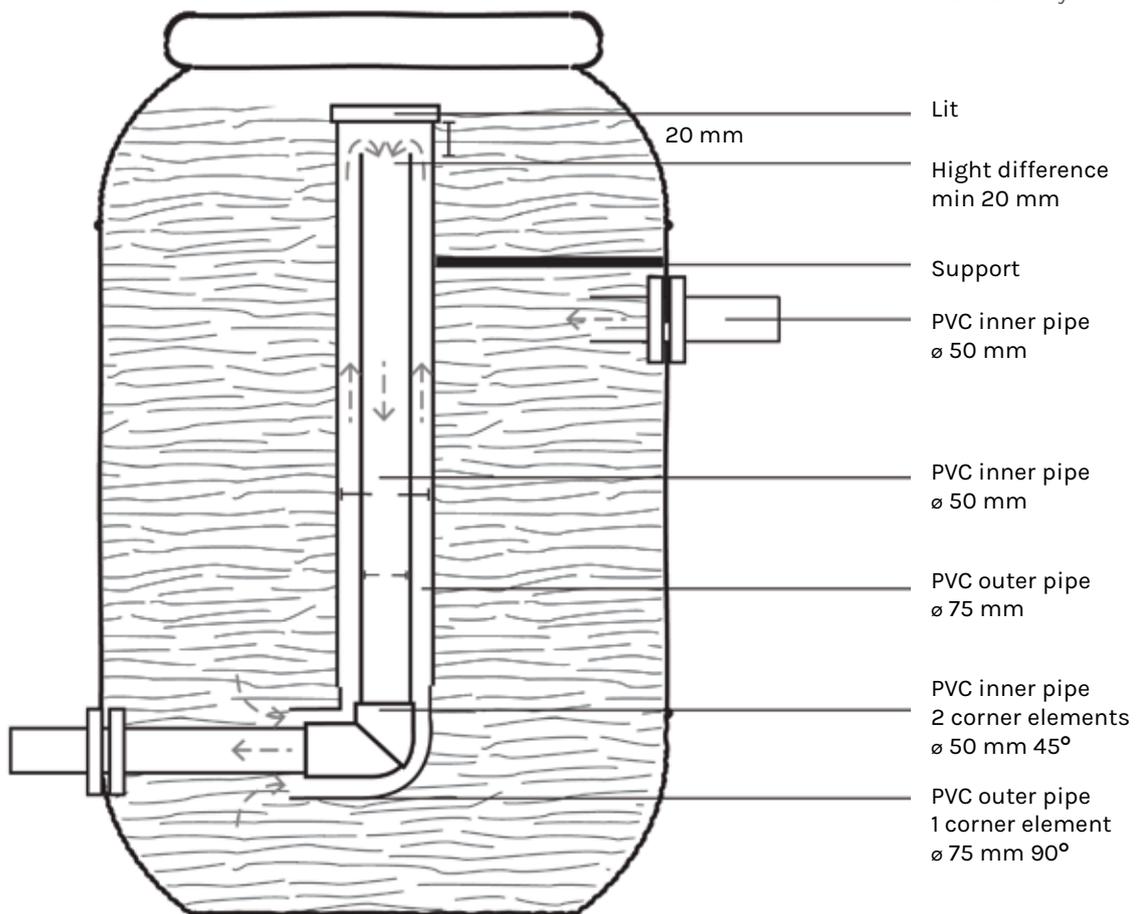
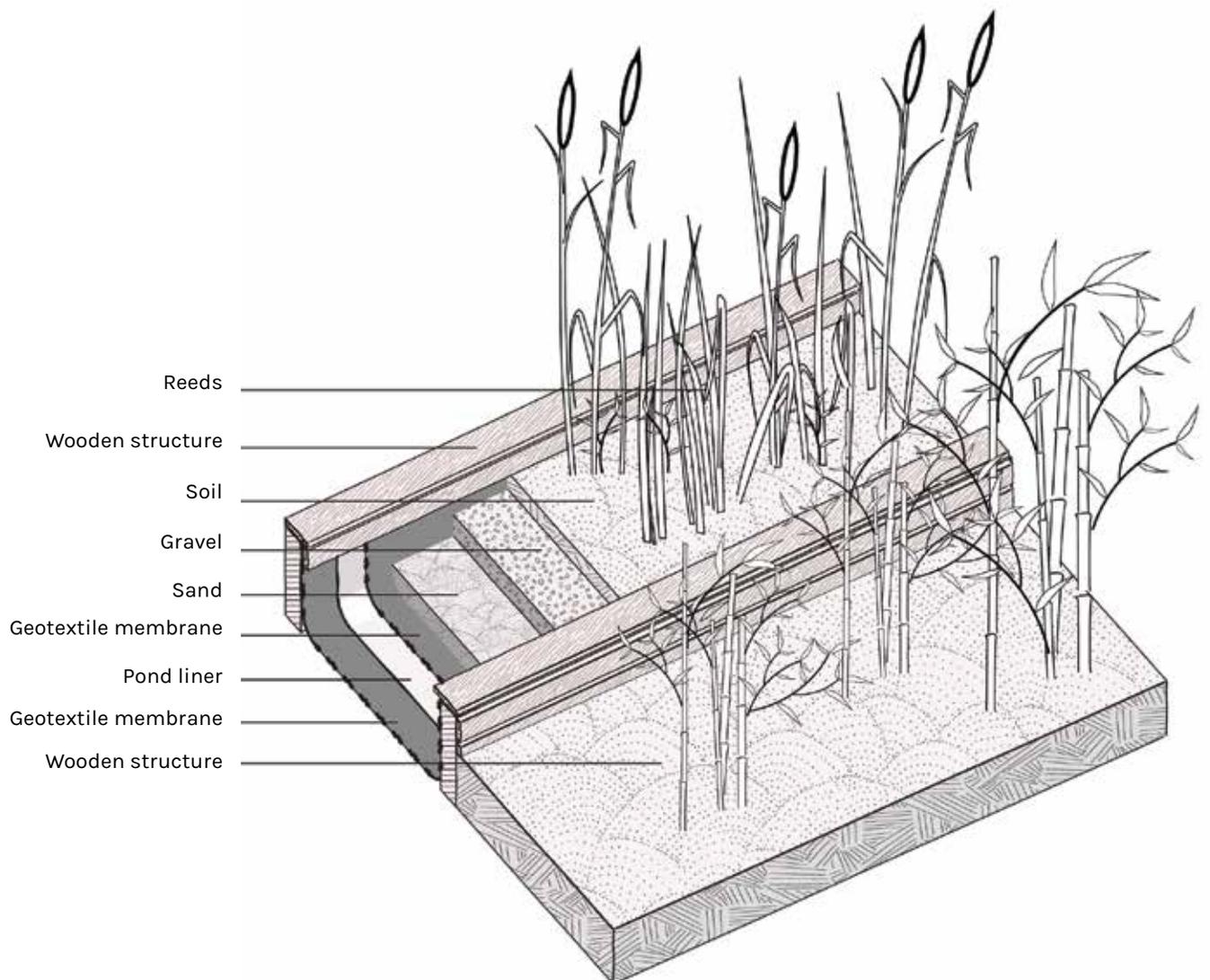


Fig 3.36, Detail Helophyte filter with stratification of layers and bamboo plantation
Illustration by Alessandro Rosa

Detail Helophyte and bamboo filters.



Materials and construction

Most of the material for this unit can be made of scrap or be bought second hand. In order to prove it is a closed environment though, it is advisable to buy a new pond liner and tank connectors.

- a large box in the ground, at least 2 m³
- the barrels are from a pickle factory
- the IBC's are bought second hand
- two bilge pumps

Construction

1. In a 5x12 meter greenhouse, a pond liner buried in the ground, 1,5 meter deep at its deepest point.
2. In the middle there is a buried box containing the grease trap and collection point of the helophyte filter.
3. The hole for the pond liner is dug out 1,5 meter , creating three terraces, in order for the soil to hold irrigation water. The pond liner is protected by a sandwich of fabric. In order to prevent dead zones, the first layer in filling up the hole, consists of a coarse, draining, material like rough sand with gravel.

From left to right
Fig 3.37 Overall Urine diverting dry toilets (UDDT) filter
Fig 3.38 Construction of the filter. The hole for the pond liner and the three terraces, with the buried box in the middle at its deepest point.

Fig 3.39, The buried box containing the grease trap and collection point of the helophyte filter.

Photos by Naiara Alava Aguirre



7. Greenhouse unit is described on page 37

8. Composting unit is described on page 91

4. In the middle, in the deepest point, the box for the grease trap is constructed.

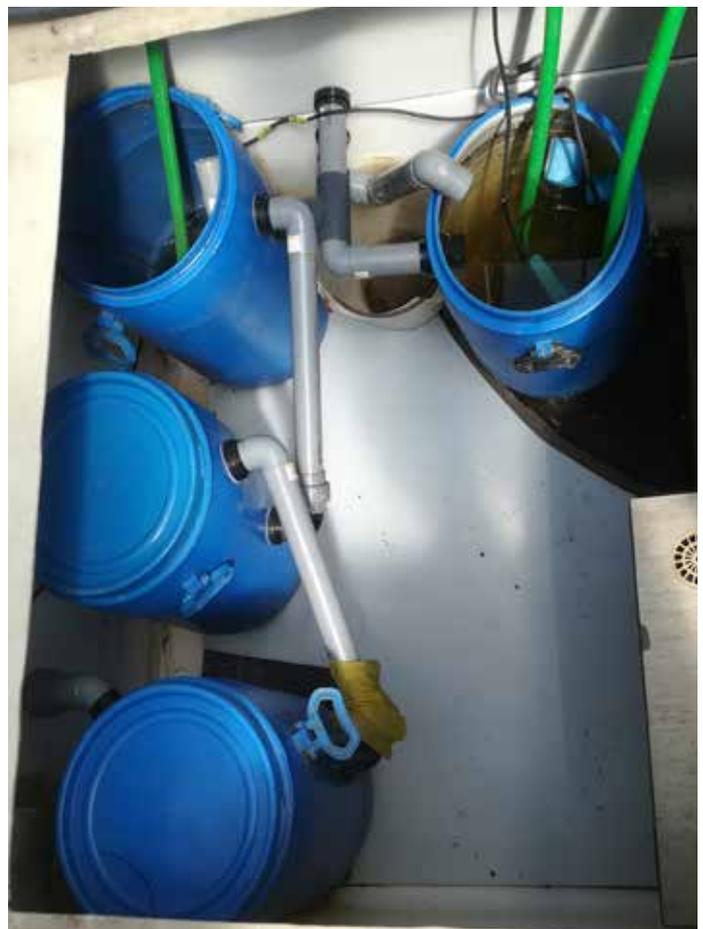
5. The filter is laid out, ending in the middle, at the deepest point. In this case, the filter has an inclination of 1 meter, over 12 meters length, following the three terraces down. Then the original dug out soil can be put back in.

6. A pump for pumping up the urine to the helophyte filter.

7. A pump for redirecting the water from the end of the filter to the beginning of the filter for its second or third loop. Because the last two barrels are interconnected, the two pumps also function as each others back-up pump in case of malfunction.

Maintenance

Wood chips and grease trap barrels should be emptied out every 6 months in the composting unit⁸.



Kitchen filter

Fig 3.40, Kitchen filter
Illustration by Alessandro Rosa

The main difference between the kitchen filter and the Urine filter is the last part of the process; At the end of the day, the water is pumped to an irrigation tank and is used to irrigate instead of bamboo and willow, tomatoes and other edibles plants in the vegetable garden.

The use of IBCs for the Helophyte filter is another possibility, best for projects with a duration lower than 6 years.

