

- put a drainpipe in the bottom where treated water can run out
- tie some net around the inlet of the drainpipe
- fill the hole with small stones or shells and fill up with sand
- plant reedplants like vetiver, bamboo, papyrus or other marsh plants
- lay the pipe leading the water on top
- close the end and make many small holes to distribute the wastewater
- collect the treated water in a container.
- use the water for gardening until the plants are growing well
- later it can be used for general purposes but should be treated before drinking - boil or solar radiation



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THE GAIA-MOVEMENT

BOOKLET NO 6

HOW TO:

REUSE WASTEWATER FROM KITCHEN AND BATH IN A SAFE WAY



Vetiver and duckweed - two of Nature's water cleaners

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How to reuse wastewater safely

Idea

The idea is to make a system so wastewater from kitchen and baths (grey water) can be used safely for watering in the vegetable and flower garden and with extra treatment also for all purposes like bathing or washing.

Introduction

There is less and less clean water available for people around the World. This is because populations are increasing and at the same time more water is getting spoiled by salt or chemicals.

Besides collecting more of the rainwater one of the solutions is reusing water as much as possible.

Wastewater from baths and kitchen is in many places led directly into the ground. This water could instead be used to water vegetables or flowers. The nutrients in the wastewater will also fertilise the garden.

Wastewater is treated in developed countries to:

- avoid diseases spread by microorganisms
- reduce Nitrogen and Phosphate containing nutrients which create polluted waters

Microorganisms spreading diseases do not grow outside the body but can survive if they are inside faeces.



- tie net over the inlet of this pipe so duckweed do not flow out
- collect the water in a container
- use the water for gardening until the duckweed are growing well
- later it can be used for general purposes but should be treated before drinking - boil or solar radiation (see other booklet)
- harvest every one or two days removing half of the duckweed with a net
- the harvested duckweed is good food for chicken - up to one third of their food
- duckweed can also be dried in the sun and used later or sold as feed

How to make a simple reed bed system

- make a hole in the ground
- the size should be 1 square meter pr person
- cover the hole with a sheet of plastic



Reedbeds can be made of vetiver, bamboo or other reeds



How to make a duckweed pond

The size of the pond depends on how much water it has to treat. For every 1000 litres of water you use per day you need 2 x 1 meter of pond about 50 cm deep

Mosquito larvae can not survive if the duckweed layer is complete but if you are in an area with serious malaria it is probably better to make a reedbed system.

Before you start make sure that you can find duckweed in your area. They normally grow on any small pond.

- make a hole 50 cm deep in the ground
- make the pond narrow - not more than 2 meters wide - so it is easy to harvest
- cover the hole with a sheet of plastic
- fill with (waste)water
- make a system so water can run out of a pipe before flowing over the sides



Duckweed is found in most small ponds



This is why wastewater from toilets (black wastewater) should not be used untreated for irrigation.

Grey water does not normally contain these microorganisms and can be used safely in simple ways as described below.

Many developed countries have strict rules as to what is allowed. It has to be filtered through a sand or soil filter (this can be done decoratively as a flower bed). After this it is often only allowed to use for underground irrigation or flushing toilets.

Developing countries have less strict rules and it is possible to make safe systems where the grey wastewater is reused for irrigation. It can also be treated very simply so it can be used for general purposes like bathing, washing etc by:

- filtering through a simple sandfilter in a drum +
- sending through a shallow pond with duckweed
- or through a bed of reeds like vetiver



*We have to take care of the fresh water we have.
One way is to reuse as much as possible*



The filter is there to take out food wastes, hair etc. This can be done easily by letting the water through a drum or a tank filled with sand.

This will remove practically all organic material from the wastewater. The nutrients (Nitrogen and Phosphate) will still be there, but they are good for the plants. There is no need to remove them if the water is used in the garden.

The sand filter will eventually fill up with waste, and should then be changed. As the waste in the sand is all organic it can just be filled in a hole.

The duckweed pond or the reedbed can be used to clean the waste water so it can be reused for bathing, washing etc. The duckweed pond should be chosen if you have chicken or ducks as duckweed is a very good feed for them.

There is some work every day to remove some of the duckweeds.

The reedbed needs less attention. One or two times every year it is necessary to cut the grass. This can then be used for thatching or mulch in the garden.

If you are using vetiver grass new plants will be formed at the base - tillers. They can be taken and used to make hedges to prevent erosion.

The filter can be connected to the pond or reedbed with pipes if water can run down by itself. Or you can move the water with a bucket.



Instruction

How to make a sandfilter

- take a fuel drum or plastic barrel which has a top with an opening so you can connect a tube
- cut out the bottom
- hammer where you cut to avoid sharp edges
- connect the outlet of the drum to a hose - either with a fitting to the threaded hole in the drum or directly with a hose using tyre rubber to stop leaks
- turn the drum up side down and place on some stones so the outlet is free
- place/tie mosquito net over the drum outlet
- fill the drum with sand
- tie mosquito net like a bag around the hose bringing wastewater to the filter
- this bag should be emptied every day of the waste collected

Sand filter and duckweed pond

