

# Biologic Design

## Wetland Ecosystem Treatment

Integrated wastewater purification, resource production & habitat creation

### The Treebog

#### A Waterless Composting Earth Closet

The Treebog is a simple method of composting wastes, and since its introduction by Biologic Design in 1995 at least 1,500 Treebogs have been built in Britain. They have been a welcome addition in woodlands as well as on sites ranging from fruit farms and pick-your-own enterprises, campsites and an angling lake to annual festival sites, remote/low impact dwellings and holiday cottages.

A Treebog can even be created if you are on the mains but wish to lower the environmental impact and energy used in sending your wastewater to the sewage works.

The Treebog has attracted the attention of NGOs and aid workers who hope to develop its potential for use in shanty towns or refugee camps - anywhere that water is scarce and the population pressure on resources is high. Most regions have vigorous and useful plants which can be used if willow, comfrey and other 'heavy feeders' are not available (e.g. in the subtropics the nitrogen fixing *Gliricidia sepium* otherwise known as Glory Cedar or 'Quickstick').

A Treebog is simply a controlled compost heap whose function has been enhanced by conscious management and the judicious use of moisture/nutrient-hungry trees. Treebogs use no water, purify waste as they create willow as a biomass resource, and also contain the organic waste, thus preventing the spread of disease - all whilst creating soil.

A seating platform/cubicle is mounted at least 1m over an aerobic compost heap. The area beneath the seating platform should be enclosed around its edges as well as over the ground by a double-layer of chicken wire - this acts as an effective rodent/small animal and childproof barrier, but allows air to circulate through the compost heap. The edges of the chicken wire can also be dug into the ground to prevent burrowing animals gaining access to the compost heap underneath the structure.

The space between the wire mesh should be loosely filled with straw which helps to sop up excess urine and prevents the likelihood of odour problems due to incomplete biological absorption and breakdown of the urea or the potentially odorous nitrogen compounds from the urine, and also acts as a visual screen for the first year's use.

The structure is then surrounded by two closely planted rows of biomass type or osier willow cuttings; this living wall of willow can then be woven into a hurdle-like structure and its annual growth can be harvested by coppicing. The planted species could be any wetland tree or even fruit trees and soft fruit bushes such as Blackcurrants.

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Treebogs can also be sited on the edge of existing stands of trees, woodlands or hedges: the mature tree roots will soon find the additional source of nutrients. In this case, planting willow may be unnecessary - or indeed impossible if it is located in the middle of a mature woodland due to the shading by existing mature trees.

The Treebog combines resource production and waste purification. The Treebog functions by transforming faeces and urine into growing trees and organic soil. The roots of the trees are host to soil micro-organisms which decompose and mineralise the materials in the compost heap, making the nutrients available to the tree roots. Thus the willow are able to grow more vigourously as these added nutrients become available.

### Inputs/Costs:

Initial construction/planting (materials & time).  
Wood chips, small quantities of untreated wood only or shredded newspaper (once a week under heavy usage), or straw/leaves.  
Leaf mould (annual layer).  
Half a cup of dried soil and/or wood ash to help prevent odour (daily).  
Occasional leveling of heap with a pole.

### Outputs/Benefits:

Purification of waste without using water. Sawdust/Soil is both generated & regenerated.  
Earthworms proliferate in the compost.  
Leaf mould from willow leaves.  
Comfrey bed on leach field for nitrate/phosphate absorption.  
Leaf matter and twigs for stock fodder.  
No odour or fly problems.  
Willow wands: baskets, fuel or structural use.

The Treebog is a simple and effective means of taking responsibility for wastes produced in your own day to day existence. It involves no secondary handling (shoveling or bucketing) of either liquids or solid materials. Management is minimal, being an optional annual winter coppice cutting and weaving of the willow. The wands can be used as polewood, for basket or hurdle making, or chipped for use for, mulching, animal bedding or cut and bundled as faggots to use as fuelwood - especially useful in Rocket Stoves.

To create a Treebog with adequate volumetric capacity for domestic, year round use it is best to allow a minimum of at least  $0.75\text{m}^3/\text{person}/\text{year}$ . For annual events the minimum number of Treebogs required should be at least one Treebog/200 people/week: the overall volume of the Treebogs should be based on 350g per person per day. (Assume 1 tonne of faeces has a volume of  $1\text{m}^3$ .) Do not site your Treebog closer than 10 metres to a watercourse or spring and always provide handwashing facilities close by.

If you do not know what the soil/subsoil profile is in the area where the Treebog is to be situated, speak to people who are familiar with it, or dig a trial pit and if possible do a percolation test by filling this pit with water and seeing how long it takes for this to drain (percolate) away.

The type of structure that can be built to house the Treebog is limited only by imagination. As a DIY project or the result of a professional carpenter's labour a Treebog can have a canvas covering - like a tent or it could be a bender on stilts, a shed, gazebo or fanciful folly. Rainwater from the Treebog's roof can be collected in a water butt for handwashing.

It can be created over a number of years to include a living, growing willow framework and surrounded with a range of fragrant flowers (e.g. sweet rocket) and herbs (e.g. mint and lemon balm).

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Current interest in living willow sculpture is inspiring the use of woven willow wands to create a living hurdle around the platform, which can also be covered with climbers (e.g. honey-suckle) to create a dense screen of foliage.

For the best establishment of the willow surrounding the Treebog any existing vegetation, such as grasses, whose roots would compete with the willow sets should be cut back and thoroughly mulched - either with black polyethylene sheet (silotop) or preferably multiple layers of newspaper covered with straw. This will ensure rapid rooting of the willow sets in the first growing season which will both be of benefit to the composting processes as well as giving maximum growth which will act as an effective visual screen for the platform.

Recent experience of using woodchip as a 6" deep mulch all the way around the Treebog has proved very successful in establishing the willow sets and as the woodchip - acting as a carbon source for the microbes as they absorb the nitrogen from the pee breaks down - it soon becomes a low soil bank which prevents urine leaving the Treebog area.

Guidelines based on the most frequently asked questions for building a Treebog:

### Structure

A seating platform/cubicle is mounted at least 1m over an aerobic compost heap... the rest is up to you. We deliberately do not describe exactly how the structure should be built; there is no one method; the chosen structure is often dependent on the materials and budget available; each builder is free to interpret the basic Treebog principles in their own way. For example, a summer camp Treebog will differ from an all year round domestic version.

### Siting

The Treebog must be sited where the surrounding willow and other planted species will have plenty of sunlight otherwise photosynthesis will be limited and the plants will not thrive. To adhere to the Environment Agency regulations Treebogs should always be situated more than 10m from any water courses or springs.

Treebogs should not be located where the site is liable to flooding, and if placed close to a known badger sett the Treebog must be badger proof or the contents will be snaffled away by these inquisitive creatures! Fencing may also be required if livestock are present - to prevent stock from eating the willows and other planted species.

### Willow planting

Although not a requirement for an effective Treebog we would recommend that, ideally, the willow wands be planted at least one growing season prior to the Treebog being used for the first time. This is so that the willow roots are mature and the wands have grown up to a reasonable height before the platform is constructed - as the shadow of the platform can hinder the growth of the planted willow sets on the shade side.

The best time to plant out the willow for a Treebog is from October to March, as then the willow has a chance to get established before the onset of summer.

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However it is possible to construct and use a Treebog at any time and then plant it out at the appropriate time of year. The straw mentioned in the information sheet will act as the visual screen for the compost pile until the willow is in place and growing.

Unrooted willow sets/cuttings should be of a vigorous variety, and if they are planted out after the middle of April they should be well mulched and watered every day for the first month or they will not take (i.e. the roots will not develop and they will wither away).

We prefer to use named osier rather than biomass types since these will grow vigorously and can tolerate the annual coppicing as well as being suited for use in basketry and hurdle making. If you are gathering local wild osier or other willow to plant your Treebog, use willow that has been coppiced or pollarded recently, because young wood makes the best cuttings.

### Willow management

The willow can be coppiced annually or left to grow for more than one year, though you will find it grows quite large. Cut the willow between November and early March and don't be afraid to cut it right down to the ground or to the top of your living woven willow hurdle - as long as it is not smothered with weeds and has sufficient sunlight it will re-grow vigorously, using the nutrients and moisture within the Treebog.

### Inputs

Sawdust - in very small quantities - is useful to aid the correct carbon-nitrogen ratio, but beware - some scatophobic campers have been known to fill an entire Treebog with sawdust, or straw, in just a few days - bucketing the stuff in to cover every trace of the latest deposit!

Use untreated sawdust or woodchip only, in small quantities, or add a daily or weekly layer to the compost pile.

Wood ash is helpful in keeping the compost pile sweet, but make sure all the embers have gone out and the ash is cold or you may end up with a Treebog bonfire.

In normal use the liquid input drains away from the compost pile by gravity and soaks into the soil/straw/woodchip where it is rapidly broken down, but if large quantities of urine are entering your Treebog (perhaps because it is next to the beer tent at a festival!) you could consider separating the inputs - composting liquids and solids separately - e.g. a separate Treebog or simple straw pissoir, for liquids only.

The 'gravity powered' separation of solids and liquids prevents the smells caused by the compost pile going anaerobic. The through-flow of air below the platform is also important - a boxed-in pile with no ventilation may well go anaerobic and start to smell.

### Ventilation of the Treebog

A black plastic drainpipe (guttering downpipe or similar) can be used as a vent - connecting the compost pile beneath the platform, running through the cubicle, and then emerging like a 'chimney' through the roof or sidewall.

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It will act as a channel creating a 'through-draft' (as the pipe warms up on sunny days). This will draw air from around the compost pile, enhancing the flow of air around it and help to prevent any odours which may build up within the cubicle

### Official Requirements

Planning - if your Treebog is a temporary structure and has no permanent foundations, planning regulations do not usually apply - the trees of course do not need planning permission.

Council Environmental Health Officers have no objections to people using Treebogs as long as access to the compost pile is restricted from children and pets (chicken wire or similar barrier) and hand washing facilities are available nearby.

The full gamut of Environmental Health regulations for composting toilets come into force only with regard to the secondary handling of the waste - the compost pile; thus a Treebog is exempt from these regulations.

We know this from our negotiations with the Environment Agency and local Council Environmental Health Departments when approval for for Treebogs has been sought at many different sites - including Council operated allotments.

If the creation of your Treebog does become an 'issue' with the Environment Agency, the Environmental Health Department or the Planners we know of a Senior Pollution Control Officer at the Environment Agency who is happy to vouch for the efficacy and acceptability within the rules of a properly built and maintained Treebog, of which he now has 13 years continuous experience - please contact us for his telephone number if needed.

We are always pleased to discuss your specific requirements and have a construction team available who are able to create a custom designed Treebog for your particular site, to your requirements and specification - get in touch if we can help in creating a simple domestic Treebog or Treebogs for your annual gathering or woodland projects.

Should you require willow for your own Treebog project we have a range of 55 types of willow available as cuttings; many are very old, named basket-making varieties as well as some biomass types, all of which can be ordered over the 'phone and delivered by parcel post between December and March.

It is always great to receive a photograph of the completed Treebog for our "Treebog Gallery" and the forthcoming Treebog Book which will - when we have the time to put it together - be published by Permanent Publications who produce the Permaculture Magazine.

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