"SEWERAGE"
It doesn't have to be a problem!

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INTRODUCTION

According to Greenpeace about three quaters of all pollutants entering the world's oceans are from land based sources (usually sewerage outfalls). What we need to understand is that ocean outfalls are turning our oceans into a giant toxic waste dump. If we understand this and realise that nearly all of our fresh drinking water has its origin from the ocean then what we are doing is polluting our own fresh water supply. At the same time we are destroying life forms at the bottom of the food chain, which has the potential to eventually affect us all. By our actions, search for convenience, lack of understanding and care for our environment we are irrefutably changing our evolutionary path.

Every year the billions of litres of sewerage that flows into the world's oceans create a greater and greater imbalance in the natural cycle. It causes a rise in the number of oxygen-consuming micro-organisms which leads to other animals such as fish and coral suffocating due to lack of oxygen. Toxic chemicals coming from the outflows are often bio-accumulative (they build up in the body and gradually progress up the food chain). A build up of these chemicals can lead to reduced fertility, suppression of the immune system and development problems.

A very real scenario for the future is that eventually everyone will have to be accountable for their own waste. Or at least for the type of disposal system that they use. At long last this will make people think seriously about what happens when they go to the toilet, or rather, what happens when they have finished in the toilet! When people have to take responsibility for their system and maintain it, we wonder what will eventually be chosen?

AEROBIC DECOMPOSITION

At the onset, it should be pointed out that the key to successful environmental treatment of domestic wastes is to provide adequate oxygen. This will allow the nutrients to degrade using aerobic bacteria rather than anaerobic bacteria which are much slower in action. Conventional centralised sewerage treatment systems use this principle: after primary sedimentation, the sewerage is normally aerated by equipment such as trickling filters, activated sludge beds or Pasveer channels.
This forced aeration at the sewerage treatment plant is necessary, because the human and domestic wastes are deposited into water at the residence, thereby immediately cutting off access for oxygen. Until 150 years ago, most human wastes were deposited in a manner which allowed the urine and faeces to be decomposed with aerobic bacteria to a greater extent. With the advent of the water closet, this natural method of treatment was no longer available, and costly technical processes had to be developed.
An on-site system using a composting toilet and properly designed greywater treatment system, by contrast, is designed to allow access by oxygen to the material in a natural manner, without requiring costly energy to force it in. The material in the composting toilet is kept undisturbed for at least 12 months, so that it has time to be decomposed by aerobic (and

anaerobic) bacteria and other decomposers. This decomposition process is largely complete within 3 months, but the material is kept away from contact with people or the environment for at least a year as an extra precaution. By that time, most disease organisms will be dead. Ecoli, an indicator for the presence of faecal matter, has regularly been found not to exist in the humus from the Rota-Loo. The only pathogenic organism that can be found after 12 months have been the eggs from Ascaris (threadworm), which are not a problem in developed countries. The hazard from handling compost should be no greater than that from digging in the garden.

The Rota-Loo greywater treatment system is also designed to encourage aerobic bacteria. Greywater which passes through such facilities is designed to be aerated naturally using evapotranspiration by the roots of plants and by capillary action through the soil.

THE ROTA-LOO COMPOSTING TOILET

This patented system takes its name from the sturdy internal turntable which rotates on a ball and socket joint. Sitting on the turntable are a number of wedge shaped removable composting bins, each with a handle for easy manoeuvring. In the bottom of each bin are a series of channels & drainage holes for liquid to seep through into the outer tank where it is evaporated, whilst warm air flows around & through the bin so that the aerobic bacteria can quickly decompose the organic matter.

When the first bin is full the turntable is simply rotated and the next bin receives the waste. The contents of the first bin can now compost without any fresh material being added. When it eventually moves back to the first position, after all the bins have been filled, its contents will have fully composted and be ready for returning into the soil. To empty, you open the front cover, take the bin out & turn it upside down into a shallow hole (requirements for the final disposal of humus are different in each state, to be sure consult your local health inspector), replace a few woodchips, put the bin back in and you're ready to start again....it's that simple!

THE GREYWATER TREATMENT SYSTEM

Greywater is the effluent from a household or building other than what comes from the toilet (ie. Kitchen, showers, laundry etc.). It has fewer disease organisms and a lower concentration of nitrogen compounds than combined wastewater. Consequently, it is easier to treat on-site.

The normal design passes the effluent through a greywater pre-treatment tank and then into capillary absorption trenches. On difficult or very sensitive sites, the effluent can pass from the tank first into a reed bed or rock-plant filter, before discharging to the absorption trenches.

The reed beds consist of large stones on which a biofilm grows. This biofilm takes up the nutrients. As well, reeds are planted to grow in these rocks, and they also take up nutrients into their roots, thereby providing aeration.

The capillary absorption trenches are also designed to keep the effluent aerated. An impermeable layer is put at the base and the effluent collecting there is encouraged to seep upwards by capillary action. In this process, the water develops a large surface area and this allows air to be taken up at a greater rate than usual, thus enabling aeration to proceed without the need for costly equipment.

To improve the operation of the trenches still further, native shrubs are planted on top, so that their roots can grow down into the trenches and take up the effluent. This uptake helps keep the trenches aerated, encouraging the aerobic bacterial which are ten times faster in treating the effluent than anaerobic bacteria. In this way, the trenches are much less likely to

become clogged.

NUTRIENTS INTO WATERWAYS

Once the material is removed from the composting toilet, it can be used as low-grade fertiliser, reducing the need to purchase it, and keeping down the rate at which excess nutrients are introduced to the catchment. This compost also has the capacity to take up other potential pollutants such as phosphorus and heavy metals, such as chromium and copper through electrochemical bonding, and this should reduce the rate of release of pollutants into the catchment.

The nutrients in the Rota-Loo greywater treatment system are designed to be taken up by plants as described above. As well, they will be absorbed onto or absorbed into the humus and clay particles in the soil.

In the age of information superhighways it is hard to believe that we humans are still pumping sewerage into the oceans using technology and ideas that were developed in the 1800's Along with human sewerage also go industrial wastes, oil, animal faeces, plastics pesticides and fertilisers from urban and rural run-off. Industry uses the infrastructure of the sewerage system to pump their toxic wastes. Sewerage treatment processes don't remove the toxins poured into them, and the whole waste stream contains unknown chemicals caused by combining different chemical wastes in a giant underground "laboratory" which is the sewerage system.

ECONOMIC RATIONALISM

Costs for materials and resources are different in each state and territory in Australia, however, the figures used here will be relative across the board.

In October 1994, a proposal was put forward to construct a new housing development in the western suburbs of Melbourne for 20,000 people. The first phase of the development was to build 1,000 homes by the year 2,000. The estimated cost for the infrastructure required to supply mains sewerage facilities to each of these houses, and for the construction of a primary treatment facility to cope with that amount of sewerage was in the vicinity of $80 million. This capital outlay did not take into account any additional costs, such as the infrastructure that would be required for water catchment and storage to facilitate such a scheme, nor did it relate to the costs required for future expansion of the system as the development grew, nor were the costs of ongoing maintenance and repair taken into account.

In comparison, if each of these houses were to install a Rota-Loo composting toilet and Greywater system on-site, the net expense would be around $20 million, a saving of $60 million.

Secondly, the Government would be receiving the sales tax, which would amount to approximately $275,000. An additional savings here is to the home owners who would be saving on the cost of approximately 13 million litres of fresh drinking water each year that doesn't have to be flushed through an "S" bend. The government would also benefit by slowing down the need for expensive capital works to provide this water.

In real terms then, if the Government was to develop the project using an environmentally beneficial Rota-Loo system they would not only be saving an estimated $80 million but they would receive revenue to the sum of $275,000, as well as protecting the local environment from harmful sewerage pollutants, saving on ongoing costs associated with maintenance to a sewerage system and at the same time lowering the cost of housing for many people.

SUMMARY

Rota-Loo composting toilets with Rota-Loo greywater treatment systems are superior to centralised sewerage insofar as:-

- there are far fewer disease organisms in the final product
- they promote aerobic decomposition in a manner which uses little energy
- they do not put nutrients and pollutants into waterways
- they are cheaper to install
- there are no hydraulic overloads
- they conserve and recycle water

This indicates that a Rota-Loo system is safer and environmentally superior to a centralised system.