

## 2015.1 NMSEA Santa Fe blog

### Save Water, Save the World...with a sawdust toilet?

Our standard sewer systems use a tremendous amount of water and energy. We'd all like to cut our water and carbon footprints, but how many of us are ready to give up the flush toilet? To help you ponder that question, this blog will explore some problems with the current system, and mention a low-cost, zero-water option that you could choose tomorrow- the sawdust toilet.

#### The Problem, 1: Outputs

Let's start with a thought experiment. What would happen, if you proposed to the average American, that we take their drinking water, mix in sewage, and then add the resulting mixture back to the drinking water supply? Would they think you were crazy? Dangerous? A terrorist? Well, not only is this standard procedure all across the country, but in many places, it is the only legal option. Of course, we need to add two quick footnotes. Communities seldom dump their sewage back into their own water supply. They usually pollute the water of the communities downstream. And almost all cities have some sort of sewage treatment system. But that footnote needs its own pair of footnotes. Billions of gallons of untreated sewage are released into our water supplies each year, due to errors, leaks, breakdowns, floods, faulty or outdated equipment, and abnormal events. Meanwhile, trillions of gallons of treated sewage are returned to the water supply, without fully removing many harmful components, such as pharmaceuticals that our bodies do not completely process, some of the chemicals that are added to the water during the treatment process, and residues from fertilizers and pesticides, which are added to the sewage stream by the mix-everything-together philosophy of our water-intensive waste disposal system.

#### The Problem, 2: Inputs

Our current sewage system consumes a tremendous amount of water and energy. Water used in flushing toilets ranges from 20% to 40% of all the water consumed in the home. That water has first been pumped, purified, and pushed to our individual houses via a significant amount of electricity and an expensive distribution infrastructure. After passing through our toilets, the water is again pumped and purified, using more electricity, chemicals, and often, additional water, in the sewage infrastructure. All of this is very expensive. In a desert region like ours, water is a scarce resource that can't be replaced, only diverted from better uses, such as drinking, habitat, and growing food.

#### Waste is a Terrible Thing to Waste

We are sufficiently uncomfortable with our bodily excretions, that we don't like to talk about them, think about them, or deal with them intelligently. We are afraid of our wastes, which we consider dangerous. Ironically, our current system takes the few ounces of waste that we produce each day, and mixes it with gallons and gallons of water. We then pipe the mixture back to our waterways, increasing the volume of waste, and some of the consequent risks, by thousands of percent. Meanwhile, we spend millions of dollars on synthetic fertilizers, consuming energy and petroleum, all of which increase the pollution of our water supplies. We need to stop wasting our waste. If we could accept a safe and inexpensive way to return our human manure, or humanure, to the growing of plants, it would eliminate waste, by utilizing it as

the valuable resource that it can be. It's time to close the nutrient cycle. While municipal sewer systems sometimes do produce fertilizer products, for the most part, they are not pleasant or attractive to gardeners, or nor to citizens using the parks on which they have been spread. There is room for improvement.

### Conventional Alternatives

The best-known alternative to flush toilets are outhouses. The common alternative to a sewer system is a septic system. While each of these are better than nothing, they have problems. Outhouses, which I run into most often at campsites and picnic grounds, are unpleasant during much of the year, and usually have fly problems, which can be a disease vector. Septic systems use almost as much water and energy as toilets connected to a sewage system. Neither alternative returns the nutrients to the environment in a safe, effective way, and both have the potential to cause ground water pollution.

Commercial composting toilets attempt to address some of these problems, with variable success. Many are shockingly expensive to purchase, and they often require significant, expensive square footage on two levels of the house. Designs are improving every year, but odors are sometimes a problem. Maintenance may be more frequent and less pleasant than anticipated, and emptying the collection tank is something most home owners want to avoid. In addition, many of them don't compost very well.

### Composting is Key

Various societies, groups, and individuals have used humanure directly on crops, at different points in history, but this is not a prudent approach. The result is unpleasant, there is some disease risk, and the plants aren't that enthusiastic, either. All three of these problems can be solved by proper composting. As is documented in *The Humanure Handbook, 3rd Edition*, (linked at the end of this article), composting can eliminate pathogens, odors, and make the nutrients far more available to plants. Effective composting is the way to turn a waste problem into a valuable resource, for an individual, family, small group, or city. Proper composting is easy, but it does require consistency and attention to few details, such as the carbon/nitrogen balance. The good news: You DON'T have to turn the compost pile!

Humanure, other manures, food scraps, and some freshly cut plant materials tend to be good sources of nitrogen. Composting is optimum with a carbon to nitrogen ratio of about 30 to 1. Therefore, humanure must be combined with a source of carbon. Your junk mail and other paper, older plant materials such as brush, leaves, wood chips, and sawdust are possible sources of carbon for your compost pile.

### Collecting and Processing: This plan is in the toilet

Composting works best when diverse materials are collected, mixed, and then left to sit for several months, while the biological magic happens, courtesy of manifold microorganisms. Composting toilets face a difficult dilemma. People who spend thousands of dollars on a composting toilet want the easy and "ignore it" simplicity of a conventional flush toilet. They don't want to be emptying things frequently, so they have large collection tanks, often on a lower story of the house. However, large collection tanks make it hard to promote consistent and effective composting. It is hard to maintain a thriving biological community in your compost,

when new material is constantly added, and the liquid, carbon, and nitrogen levels are constantly changing. The challenge is, if you can't compost where you collect, how will the materials be moved to the processing site for microbiological composting? And how often?

Commercial composting toilets have to address these questions in ways that will satisfy the ambivalent customer, who wants to do something ecologically responsible, but also not be bothered with system maintenance. That's a tall order, but manufacturers are doing their best. They generally try to collect a fairly large amount of material in the house. Some try to mix the collection and composting functions in the collection bins, while others look to more frequent emptying cycles. We may see a time in the near future, when commercial enterprises will be emptying composting toilets, and completing the composting phase in remote locations, in a higher tech/more biologically intensive reprise of systems used in some places a hundred years ago.

A number of New Mexican families have installed pumice wick systems, some of which are fully permitted. The brainchild of a local engineer, these systems connect conventional flush toilets with infiltrators that process humanure and water aerobically in the biologically active top 24" of soil, connected to the root systems of plants, rather than the utilizing the anaerobic biology and deeper level infiltration of a septic system.

The most widely used composting toilet system is the sawdust toilet. Like other composting toilets, the sawdust toilet collects the material indoors, in the bathroom. However, it uses smaller batches, and moves them frequently to larger outdoor processing bins (or trenches), for proper composting. The materials can be left to the microbes for months or years of excellent compost production, with little need for human attention.

#### Sawdust, a Safe, Powdery Solution

There are many thousands of sawdust toilets in use around the world, most of them using the ubiquitous five gallon plastic bucket as the collection container. Sawdust makes an excellent composting companion for humanure, since it is high in carbon and has a tremendous amount of surface area. Spreading a layer of sawdust over each humanure deposit practically eradicates odors, absorbs liquids, covers that which we prefer not to look at, and provides a primary barrier to discourage flies. When the collection bucket contains between three and four gallons of sawdust/humanure mixture, it is still light enough to be carried comfortably. Every two-to-four days, the collection bucket is emptied outside into the composting bins or trenches, along with food scraps and a bit more sawdust, for microbial processing and aging.

#### You Can Eliminate Your Toilet Water Use

Obviously, using a sawdust toilet will not appeal to most people. But if you are looking for ways to reduce your water and carbon footprints, it offers an effective way to reduce to ZERO the water used by the largest water consumer in your house, the toilet.

Vastly more detail about the process, biochemistry, and safety of this method, including hundreds of footnotes, can be found in *The Humanure Handbook, Third Edition*. This book is available in paper or electronic editions for as little as \$10, or each chapter be read

online/downloaded for free.

[http://humanurehandbook.com/downloads/Humanure\\_Handbook\\_all.pdf](http://humanurehandbook.com/downloads/Humanure_Handbook_all.pdf)

A quick, tongue-in-cheek “summary” can be seen in Frank Meyer’s comedic three-minute music video *Poop in a Bucket*. <https://www.youtube.com/watch?v=HoiJvWoOcBg>

And don’t miss Frank’s number 1 song, *I Like to Pee Outside*.

<https://www.youtube.com/watch?v=GrnJvPMwww>

If there is interest, in a future blog, I will offer more details on the construction and use of a sawdust toilet.