Letter sent to ACRES USA in October, 2007.

Letter to the Editor of ACRES,

In response to the two articles on recycling Bio-Solids in the October 2007 issue, I would like to emphasize the importance of recycling nutrients in sustainable agriculture and make a case for using human manure. The quantity of minerals and nitrogen in the body of a fully grown adult is fairly constant. This means that the amount of these nutrients consumed is equal to the amount expelled as human manure. If a fruit or vegetable is ingested, the quantity of nutrients contained in that food will be the same as those present in the human waste. Complete recycling of these nutrients could provide all the needed inputs to re-grow the crop. There would be no need for additional fertilizer.

In engineering terms this method of analysis would be called continuity—what goes in equals what goes out plus what is collected. For animals grown for meat or dairy, what is collected (turned into edible animal protein) is typically about 10% of what goes in. In other words, 90% of the minerals and nitrogen in feed consumed by animals ends up in the manure.

In the US we obtain roughly 2/3 of our protein from animal sources. Assuming a 10% conversion efficiency of vegetable to animal protein, the continuity equation tells us that the quantity of animal manure produced will be 6 times greater then the production of human manure. In the US only a very small percentage of animal manure is recycled. Separating livestock from feed production by many miles limits the possibility of recycling. Much of this manure then ends up as a pollutant. The fact that the amount of nitrogen flowing down the Mississippi River from various sources is equal to the quantity of nitrogen contained in the manure of the entire US population is a measure of how inefficiently we use these nutrients. It is as if we're all using the Mississippi as a toilet.

A question often asked is there enough manure to grow the countries crops with out chemical fertilizers. Using this type of analysis it is easy to see if all the manure, animal and human were recycled with 100% efficiency there would be enough manure to grow our crops. Minerals can be recycled with near 100% efficiency however it is more difficult to recycle nitrogen efficiently. This is an area which deserves more study.

Although human manure is only about 16% of the total manure production, recycling is still important for conserving resources and managing pollution. If sludge is recycled during sewage treatment it contains only the solid portion of human waste. The liquid component, urine, contains 85% of the nitrogen, 90% of the potassium, and 60% of the phosphorus. Recycling only the solids retains a small percent of these nutrients.

It would be much simpler and safer to recycle the liquid and solid component of human waste if it were not combined with gray water, industrial waste, and street runoff as is typical. The nutrients in human waste often turn into pollutants. In 2006 there were 25,000 beach closings and health advisory days because these nutrients were not properly processed and recycled. Most spills occur in storms when sewage plants are overwhelmed and raw sewage must be released into waterways.

An alternative to recycling at the sewage treatment plant is the composting toilet. A composting toilet will recycle almost all mineral nutrients with nearly 100% efficiency. There will, however, be some loss of nitrogen. The quantity lost will depend on how the manure is composted. If done properly, pathogens can be effectively controlled. We have been building composting toilets for a number of years. Repeated tests have found the compost to be safe for use as a fertilizer. As an extra measure of safety, the compost could be used on plants that are not consumed raw and that are not grown at ground level. As a first step in initiating this recycling process, a CSA could provide food scrap compostors and composting toilets for the customers' homes. The composted material could then be returned to the CSA, closing the loop. The returned compost could be added to a larger compost pile where pasteurization temperature is attained. Hygiene considerations and transportation costs make it much safer and more efficient to transport composted rather than raw materials. We put together the accompanying diagram to illustrate the relative sense and senselessness of using composting toilets and conventional sewage treatment.

Recycling nutrients is an important aspect of sustainable agriculture that has been overlooked. We are gradually using up our pristine sources of mineral nutrients. In the future these nutrients will contain more heavy metals as the purer supplies are consumed.

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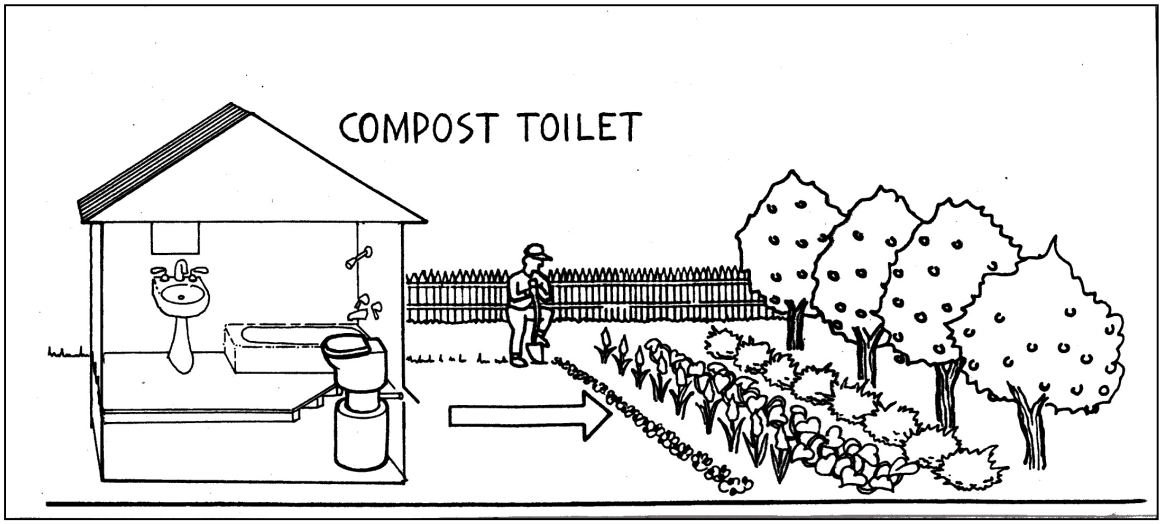
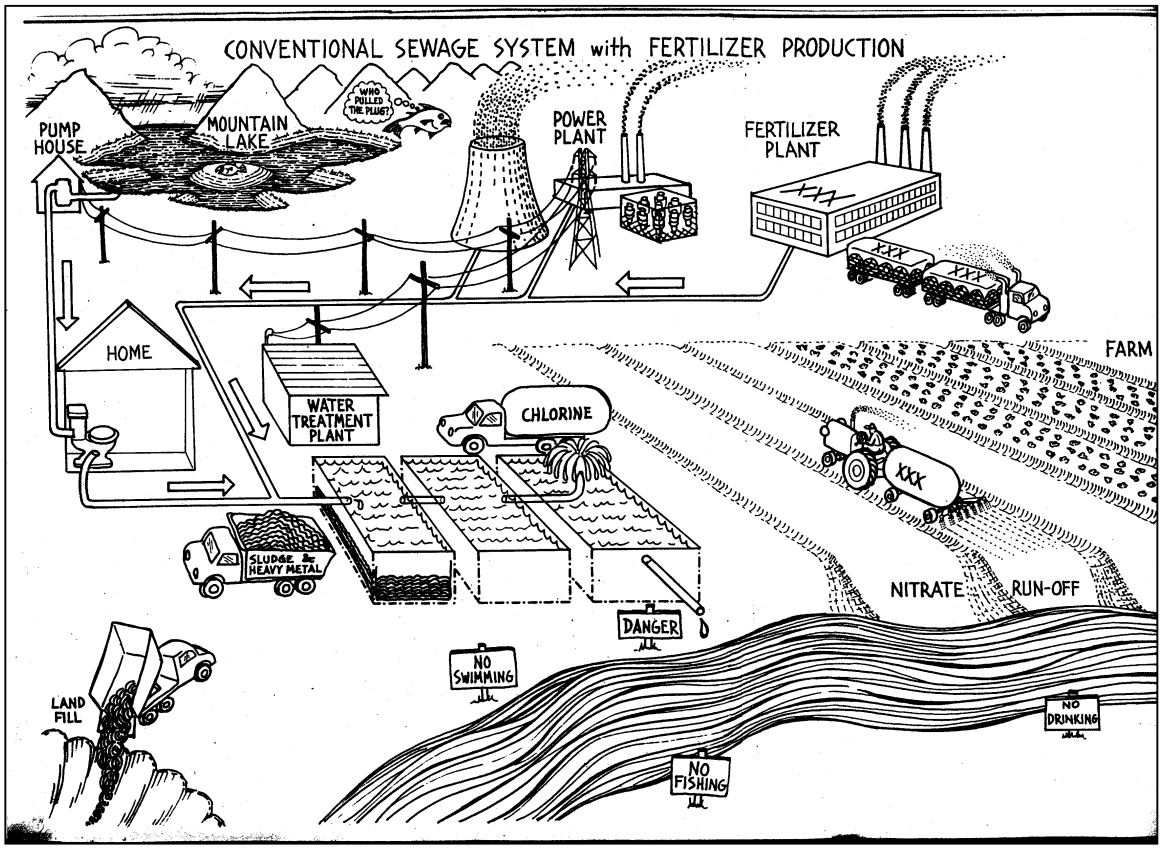

COMPOST TOILET


CONVENTIONAL SEWAGE SYSTEM with FERTILIZER PRODUCTION
PUMP HOUSE
MOUNTAIN LAKE
WHO PULLED THE PLUG?
POWER PLANT
FERTILIZER PLANT
XXX
HOME
WATER TREATMENT PLANT
CHLORINE
FARM
XXX
SLUDGE & HEAVY METAL
NITRATE RUN-OFF
DANGER
NO SWIMMING
LAND FILL
NO DRINKING
NO FISHING