



Natural Wastewater Treatment: Spray Irrigation

Nature's food chain, where one species' cast-offs are another's means of survival, is a blue ribbon recycler. At the low end of the chain are countless billions of small and microscopic organisms who consume nutrient laden wastes discarded by higher level beings. Living in soils, water, and on other animal and plant species, these unobtrusive organisms are a giant living filter of organic matter. The role they play in creating soil and fueling the cycle of life is inestimable, as is the role played by earth's vegetative root system, which draws nutrients and minerals from soil and water for conversion into vital food.

Human technologies for treating wastewater, however sophisticated, fall very short of Nature's 100% recycling rate. But the most efficient systems are those that use earth's living filter to deliver back to the food chain the fundamental elements of life contained in waste. A time-tested system devised for using the living filter to cleanse human wastewater is spray irrigation, which uses a combination of soil and vegetation to cleanse the wastewater and recycle nutrients.

Spray irrigation is favored for flat and sloping surfaces. After pretreatment the wastewater is applied to crops, pastures, forest land, parks, golf courses and other recreational areas, thus providing an added bonus to the community. Nutrients and other organic compounds are removed by bacteria and plants as the water slowly percolates through the soil.

This process can remove up to 99% of the biochemical oxygen demand and suspended solids, between 80 - 95% of nitrogen, and 90 - 99% of phosphate found in the waste water. These results are equal to or better than the results achieved by conventional advanced treatment systems, which are far more costly to build and operate.

Using wastewater nutrients for fertilizer eliminates the need for synthetic fertilizer and avoids discharging them to waterways, where they can stress aquatic ecosystems. Spray irrigation also helps to protect local groundwater levels. Thirty percent or more of wastewater used for irrigation slowly filters down to the aquifer, where it can contribute to the base flow of local streams or to drinking water supplies. Sewage treatment plants that discharge water send it downstream, where it is permanently lost to the watershed of its origin.

Delaware Riverkeeper Network

300 Pond Street, Second Floor
Bristol, PA 19007

tel: (215) 369-1188

fax: (215) 369-1181

drkn@delawariverkeeper.org

www.delawariverkeeper.org

Irrigation Factors

When considering spray irrigation, a number of site specific factors must be taken into account:

- Soil type, permeability, and depth
- Underground geological formation
- Soil surface topography
- Climate
- Public access and use

Once a suitable site has been selected, the amount of water that can be sprayed depends upon soil drainage, type of crop, topography and climate. The proper rate of application is vital to the operation of the system over the long term. Too much water can cause soil erosion, crop damage and rot, and nitrogen may pass through the soil and enter the groundwater before it can be absorbed by the vegetation.

Pretreatment -- usually a settling process that takes place in ponds or lagoons -- is necessary to avoid clogging equipment and overloading the soil with solids. Properly constructed treatment lagoons can deliver pathogen-free wastewater for spray irrigation. Nevertheless, sites used by the public and/or state effluent requirements may necessitate chlorinating the water before it is applied to the land. Lagoons also provide for storage, an important factor when regulating the rate of application. Storage is needed in winter climates, when biological processes slow or stop completely. Economic Considerations In addition to the high level of water quality produced by natural wastewater systems, a major advantage is the fact that they are less sensitive to economies of scale than conventional systems. This means that you can build in smaller scale and still be cost-effective. Natural systems generally cost less to operate as well, and there is the potential for income through the sale of crops, or the wastewater itself, which can help offset operating expenses.

As with most treatment systems, capital investment is the biggest part of the cost. Cost factors can include setting aside public land, purchasing land, modifying an existing treatment facility, creating treatment ponds, and construction of the irrigation system. Operating costs, vastly lower than conventional sewage treatment plants, include labor, energy and system maintenance.

Conclusion

When operated properly, a spray irrigation system built today can run well into the next century. Examples of long lived systems include ones in Wyoming and California, in operation since 1881 and 1891 respectively. Treatment systems have been used in big and small applications across the country, demonstrating their versatility. When compared to the cost of traditional systems and considering the final effluent quality, this type of system is hard to beat both in terms of price and result. If a suitable site can be found, it is an economical choice for any community.

For fact sheets on other natural waste water systems call (215) 369 - 1188

For information on grants for innovative waste water treatment systems call the National Small Flows Clearinghouse at 1(800) 624- 8301.