

Internship Report

The Sewanee Utility District was first opened in the late 1980s as the primary domestic wastewater treatment facility for the town of Sewanee, Tennessee. The Sewanee Utility District office and main treatment site are located on Highway 56 (Sherwood Road). On the site there are three large settling lagoons or ponds, a laboratory, and an expanse of forest upon which chlorinated waste water is applied as the final step in the treatment process. Currently the SUD sprays hundreds of thousands of gallons of water onto the forest each week. As the population of Sewanee grows along with the expanding student body of the University of the South, there is an increased need for efficient and sustainable methods of treating the town's waste water, which includes refuse from our toilets, sinks, washers, drains, labs, and so on.

The project I was involved in this summer addressed aspects of this case from the point of view of the forest, asking the questions: is our method of wastewater treatment sustainable for a larger population? How do the communities of flora and fauna in the treated forests respond to application of treated effluent? How can we better manage our impact on the soils and waters we share with the humans and other organisms inhabiting our region? I was responsible for designing and carrying out field research pertaining to the forest irrigated by treated effluent. With the help of Yeatman, my research partner, I

gathered samples of soil, water, leaf litter, foliage, herbaceous plants, and forest floor invertebrates. We used the state of the art instrument known as the LiCOR6400 to measure soil respiration and compare the health of the treated forest with surrounding, untreated forests. We gathered information about the tree species growing on the site, including their size and overall biomass.

Since Nitrogen, an essential element and plant nutrient, typically limits the growth of plants and the metabolic actions of soil microbes, we expected that the forest irrigated by effluent containing excess nitrogen would have a faster overall growth and decay rate. The forest experiences no shortages of nutrients or water, therefore the ecosystem processes such as growth, death, and decay, which usually move slowly, are sped up. In general, this is an accepted and seemingly sustainable way to get rid of our wastewater without discharging it directly into streams or lakes. However, as we saw in this brief study, there are limits to how much water the forest can take. For example, when heavy summer rains saturate the forest soils, a few days are needed for the soil to completely drain. Yet, at the spray fields in the Sewanee Utility District, there is not enough time to let soils drain before they begin to be irrigated again, since the need to discharge water from the treatment system is constant (in accordance with citizens constant need to flush toilets, wash clothes, et cetera). This causes a multitude of concerns, one being the “overland flow” of nitrate-rich water into streams, which then experience elevated algal growth rates and negative effects on aquatic animals. Another

concern is that trees cannot adequately root into mucky soil, and if the mature trees fall down then many years will be needed to replace them.

My internship with the Sewanee Utility District made a difference in my life. Now, wherever I choose to live in the future, I will refuse to remain uneducated about the fate of my wastewater and its impact on the earth. So many citizens in Sewanee are unaware of the integral role of the forest in maintaining safe and clean water in our streams, lakes, and ultimately in our own bodies. I am now aware of the many complexities of wastewater management; for example, the worryingly long residence time in the water and soil of chemicals like caffeine and hormones from birth control. The greatest lesson that I learned, one that I hope to be able to share with others, is to never take the flush of a toilet for granted.

After completing this internship, my career goals have not changed. I was lucky to be able to enhance my research skills this summer, especially with regard to soil and water sampling. These skills will no doubt be applicable in the future as I pursue graduate research in the field of ecology.