IMPACT OF SEWAGE TREATMENT PLANT EFFLUENT ON THE BIOGEOCHEMISTRY OF THE ENOREE RIVER NEAR GREENVILLE, SOUTH CAROLINA

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Studies of fluvial biogeochemistry are beginning to focus on quantifying the impact of humans on water quality. First-order control over the chemical composition of river water is determined by the weathering of the underlying rock type in the river basin. This is modified by input from agricultural runoff, precipitation during rain events, and communal effluent. In urban areas, communal input from industry and sewage treatment plants can substantially modify the chemical composition of river water. Most importantly, sewage treatment plants can discharge nutrients that stimulate biological activity, further modifying the chemical composition of river water.

Along the 167 km length of the Enoree River, water samples have been collected at 28 sites over the past two years. Samples were analyzed for anions, major cations, dissolved organic carbon, total coliforms, *E. coli*, total heterotropic bacteria, turbidity, alkalinity, and the common in situ measurements of dissolved oxygen, conductivity, pH, and temperature.

As a result of the drought conditions experienced in the Upstate the past two years, as much as forty percent of the flow in a major portion of the Enoree River is from the discharge of sewage treatment effluent. This is associated with increases in the dissolved organic carbon, nitrate, and phosphate concentrations and a corresponding increase in the numbers of coliforms, *E. coli*, and heterotrophic bacteria. Also observed is a decrease in silica concentration, which we interpret to represent diatom production as a result of nutrient loading. These results suggest that sewage treatment effluent has a major biogeochemical impact on river water, including an indirect effect on bacterial concentrations.

Contributions from tributary streams were negligible compared to the effect of the known point sources. Thus, the general attenuation of nutrients seen downstream from known point sources is probably due to dilution by tributaries that are draining areas of lower industrialization and possibly uptake by benthic algae and planktic microorganims.