IMPACT OF WASTEWATER TREATMENT EFFLUENT ON THE CHEMICAL COMPOSITION OF DURBIN CREEK AND THE ENOREE RIVER IN THE ENOREE RIVER BASIN, SC

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Anthropogenic input from point sources can alter the chemical composition of rivers and streams. In the Enoree River Basin of South Carolina, the major point sources are sewage treatment plants. Durbin Creek is a tributary watershed in the Enoree River basin with a sewage treatment plant that discharges 1.4 mgd into Middle Durbin Creek. Two sewage treatment plants that discharge over 5 mgd are located on the Enoree River. Sixteen localities in the Durbin Creek watershed and twenty-four localities on the Enoree River were sampled weekly for seven weeks in order to assess the impact of the sewage treatment plant on the chemical composition of Durbin Creek stream waters. Mixing diagrams using Na-normalized molar ratios in the dissolved phase of the 60 largest rivers were compared to data collected in this study. Unlike absolute concentrations, the ratios of calcium to sodium, bicarbonate to sodium, and magnesium to sodium are intensive parameters that permit the comparison of rivers with variable discharge. Upstream sites and other unaffected sites in the Durbin Creek watershed and the Enoree River have molar ratios and the low TDS characteristic of rivers draining silicate rocks. Ratios downstream of sewage treatment plants have chemical compositions similar to rivers draining evaporites, though relatively low TDS compared to rivers draining evaporites. Rivers in the Enoree River Basin are very sensitive to sewage treatment effluent because of the low TDS characteristic of rivers draining silicate rocks. The sewage treatment effluent, which has high TDS and comprises 20-50% of the total discharge, shifts the river composition into the evaporite field. The shift in chemical composition is likely a result of table salt consumption by humans and use of household products such as bleach and shampoo.

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