Southeastern Section - 57th Annual Meeting (10–11 April 2008)

Paper No. 31-14

Presentation Time: 1:30 PM-5:30 PM

BIOGEOCHEMISTRY OF AN ARTIFICIAL IMPOUNDMENT IN THE UPPER PIEDMONT OF SOUTH CAROLINA

TRIERWEILER, Annette[1], MOORE, Cameron[1], LEWIS, Gregory P.[2], ANDERSEN, C. Brannon[1], and DRIPPS, Weston R.[1], (1) Earth and Environmental Sciences, Furman University, 3300 Poinsett Highway, Greenville, SC 29613, annette.trierweiler@furman.edu, (2) Department of Biology, Furman University, 3300 Poinsett Highway, Greenville, SC 29613

Small artificial ponds and lakes are a ubiquitous feature in river basins throughout the United States. Small impoundments increase the residence time of water, thereby increasing the potential for retention of nutrients through biological and physical processes. We examined the biogeochemistry of Furman Lake, a small (0.11 km^2) impoundment within the Reedy River basin in the upper piedmont of South Carolina. Previous measurements of solute concentrations in the lake's inlet and outlet streams suggested that the lake acts as a sink for nitrate, sulfate, dissolved silicon, but a source of dissolved carbon. The objective of our study was to establish a biogeochemical budget for Furman Lake and elucidate the biogeochemical processes controlling nutrient concentrations. We measured stream discharges and solute concentration from June to November 2007. Water samples were collected from the inlet and outlet streams, from the lake itself, and from six groundwater wells installed along the lake's periphery. Based on mixing models of the two inlet streams, concentrations of chloride, sodium, and magnesium were within 30% of predicted lake concentrations, whereas concentrations of nitrate, sulfate, and silicon were at least 75% less than predicted lake concentrations. In contrast, TDC of the lake was 40% greater than predicted by the mixing model. Analysis of carbon speciation shows that inlet streams were supersaturated whereas the lake was undersaturated with respect to carbon dioxide. Dissolved organic carbon and bicarbonate in the lake increased significantly relative to the inlet streams. The results of mixing models and carbon speciation suggest that photosynthesis, respiration, sulfate reduction, and denitrification played significant roles in the biogeochemical transformations of nutrients in the lake. Preliminary biogeochemical budget analyses were complicated by substantial losses of lake water to the groundwater system during drought conditions.

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General Information for this Meeting

Session No. 31--Booth# 25
Undergraduate Research Session (Posters) II
Hilton Charlotte University Place: University Lake Ballroom Suites A, B, C
1:30 PM-5:30 PM, Friday, 11 April 2008

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