Southeastern Section - 54th Annual Meeting (March 17–18, 2005)

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Presentation Time: 8:00 AM-12:00 PM

RELATIONSHIPS BETWEEN URBAN LAND COVER AND NITROGEN BIOGEOCHEMISTRY IN STREAMS OF THE SOUTH CAROLINA PIEDMONT, PART I: THE MOUNTAIN CREEK WATERSHED

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Urbanization affects the chemistry of streams and rivers, presumably because of factors such as increased run-off from impervious surfaces, decreased nutrient uptake by vegetation, and acid rain, fertilizer, and septic system inputs. The result can be significant changes in the biogeochemistry of nutrients. This study examines how land cover influenced stream nitrogen concentrations in the Mountain Creek watershed of the Piedmont Province in northwestern South Carolina.

The 30 km^2 Mountain Creek watershed has two main branches that join 3.2 km upstream of the confluence with the Enoree River. The drainage area of the northern branch is mostly forested and only 6% urbanized. In contrast, the southern branch's drainage area is 43% urbanized (primarily residential development). From June to August 2004, we collected stream grab samples between one and six times at 27 sites in the watershed. Chemical analyses of samples included major anions and cations, total dissolved nitrogen (TDN), and ammonium. In the northern branch, mean nitrate concentrations increased downstream as the land cover changed from forested to urbanized (0.60-1.34 mg/L). Mean nitrate concentrations were as high as 2.45 mg/L in the most urbanized areas of the southern branch, but were similar to the northern branch in headwater regions where there is a more vegetative cover.. Nitrate concentrations were more variable spatially in the southern branch but were low below dams in both branches. In general, TDN concentrations followed the same spatial trends as nitrate concentrations. Typically, ammonium concentrations were less than 0.19 mg/L, although some seeps had higher concentrations (0.64-1.63 mg/L). The nitrate concentrations in those seeps were lower than the concentrations in the stream.

Because the molar Cl:NO3 ratio increased below dams, we hypothesize that denitrification, not dilution, accounts for the decline in nitrate concentration. Increases in ammonium concentrations downstream of dams suggested that dissimilatory nitrate reduction also occurred. Thus, urbanization tends to increase the amount of nitrogen in the streams because of acid rain, fertilizer, and septic system inputs, but ponds function to remove some of that nitrogen from the watershed.

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General Information for this Meeting

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Undergraduate Research (Posters)
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8:00 AM-12:00 PM, Friday, March 18, 2005

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