Abstract Title:
Influence of stream channel morphology, hydrology, and landuse conditions on the nitrate concentration in urban stream system

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Abstract:
Urbanized watersheds typically have higher nutrient concentrations than forested watersheds and they also exhibit greater variability within the watershed. Our objective is to determine how land cover, surface impoundments, and stream geomorphology interact to cause variations in the concentration of nitrate. In particular, stream gradient, bank steepness, and depth to water table can affect the discharge of groundwater into a stream. The variation in land cover in Mountain Creek watershed, located northeast of Greenville, SC, provides an excellent opportunity to test how these variables interact. The northern tributary watershed is mostly forested and has nearly pristine nitrate concentrations. In contrast, the southern tributary watershed grades from high density residential to commercial land cover in the headwater region and has nitrate concentrations three times or higher than the forested watershed. Also, in both urbanized and forested stream reaches, nitrate concentrations decrease immediately downstream of surface impoundments, then gradually rise further downstream. The decrease in nitrate is likely cause by a combination of denitrification and dissimilatory nitrate reduction. We hypothesize that the increase is caused by groundwater discharge. To test this hypothesis, longitudinal and cross-sectional profiles of selected stream reaches were developed and we are collecting surface water and hyporheic water samples across the stream and along the stream. Analysis of this data is expected to show if there is a relationship between bank steepness, longitudinal slope of the stream, landuse, and vegetation index, and if they have a combined effect on nutrient levels in the stream water.

Keywords:

Urbanization, Nitrate, Greenville - South Carolina, hydrology, stream geomorphology