

Northeastern Section (39th Annual) and Southeastern Section (53rd Annual) Joint Meeting (March 25–27, 2004)

**Paper No. 23-5**

**Presentation Time:** 2:20 PM-2:40 PM

**REMOTE SENSING BASED INVESTIGATION OF VARIABILITY IN  
NITRATE CONCENTRATION IN URBAN AND FORESTED WATERSHED  
STREAMS**

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Enoree River basin represents one of the rapidly developing areas in the Upstate of South Carolina. Landuse changes in the form of urbanization has many impacts on watersheds including increase in impervious cover, reduction in forest cover, changes in water chemistry, and disturbances to the natural hydrologic cycle. Streams in urban watersheds have been found to have higher concentration and variability of nitrate values, which has been a concern since high nitrate values can cause algal bloom in the stream, water quality impairment, and pose health hazard to humans. Understanding the relationship between landuse and nitrate concentration could provide a way to plan future developments in such a way that reduces negative impacts. A remote sensing based approach was used in combination with GIS to gain spatial understanding of landuse and water chemistry. Multispectral Landsat ETM+ satellite image acquired in June 2000 was processed digitally to produce classified landuse data, and vegetation density (normalized difference vegetation index) data, which were then used in GIS environment to correlate with nitrate concentration of stream water collected for the same period in 2000. Two sub-watersheds from within the Enoree River basin, Brushy Creek and Kings Creek, were studied for this purpose. Brushy Creek is nearly 70% developed, and drains about 35 km<sup>2</sup> area and Kings Creek is nearly 80% forested and drains about 53 km<sup>2</sup>. Variations in nitrate concentration within these two watersheds correlate well with satellite based landuse/land cover conditions. Results of our study shows that: a) nitrate concentrations have an inverse relationship with the size of the drainage basin; except for watersheds that are very small (smaller than 6 km<sup>2</sup>, located in the headwater regions) in which case there is a considerable variation in nitrate levels; b) vegetative land cover and amount of developed land use in the watershed have a strong correlation with nitrate concentration. The higher the amount of vegetation, lower the nitrate; and the higher the percentage of development, higher the nitrate, and c) spatial distribution of land use and land cover around the stream within the watershed has a significant impact on the water quality.

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[General Information for this Meeting](#)

Session No. 23

[From the Mountains to the Sea: Fluvial Processes in the Eastern United States II](#)

Hilton McLean Tysons Corner: Gunston A

1:00 PM-5:00 PM, Thursday, March 25, 2004

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