Application of Multilevel Modeling in Study the Effects of Urbanization in Stream Ecosystems

Song S. Qian[1,2], Kenneth H. Reckhow[2], Thomas F. Cuffney[3], Gerald McMahon[3], Roxolana Kashuba[2], Ibrahim Alameddine[2], Yoon Kyung Cha[2], Bok Nam Lee[2]

1. Corresponding author and moderator, phone 919 613-8105, email: song@duke.edu
2. Nicholas School of the Environment, Duke University Durham, NC, USA
3. U.S. Geological Survey, 3916 Sunset Ridge Road, Raleigh, NC 27607

The US Geological Survey conducted a study on the effect of urbanization on stream ecosystems (EUSE) in nine different metropolitan areas of the country, using a gradient approach. The aim of the study was to understand the relation among distal (e.g., watershed and riparian scale) and proximal (stream segment and reach above the sampling point) stressors on stream biota (fish, invertebrates, and algae). The proposed session focuses on the data analysis work, particularly the use of multilevel models, to examine these relations.

The session consists of four presentations discussing the use of modeling to study the coupled human-stream ecosystems. The first presentation introduces the EUSE project and its role in the USGS' NAWQA program. The second presentation introduces the multilevel models and their application in ecological studies. The third talk presents the responses of selected macroinvertebrate metrics to increased urbanization. The fourth talk compares the responses of fish and algae communities to development.

Presentations:

1. Introduction to EUSE
   Presenter: Thomas F. Cuffney, US Geological Survey
2. The application of multilevel regression in ecological data analysis
   Presenter: Song S. Qian, Duke University
3. Macroinvertebrate community responses to urbanization
   Presenters: Roxolana Kashuba and Yoon Kyung Cha, Duke University
4. A comparison of fish and algae community response to urbanization
   Presenters: Ibrahim Alameddine and Bok Nam Lee, Duke University