Abstract #63

Evaluation of the Long-Term Impacts of Urbanization on a Piedmont Headwater Stream: A Comparison of Physical, Biological, and Chemical Indicators of Response

Robert L. Bourne[1] and Ted Mikalsen[2]

[1]Environmental Compliance Supervisor, Cobb County Water System, Central Laboratory,
622 South Cobb Drive, Marietta, GA 30060
[2]TMDL Implementation Coordinator, Georgia Environmental Protection Division,
4220 International Parkway, Suite 101, Atlanta, GA 30340

Biographical Sketches of Authors

Robert Bourne has a B.S. in Environmental Science from the University of Georgia. He has worked for Cobb County for almost 18 years. He presently holds the position of Environmental Compliance Supervisor and has also held positions as a Laboratory Analyst and Stream Monitoring Coordinator.

Ted Mikalsen is the Total Maximum Daily Load (TMDL) Implementation Coordinator for the Georgia Environmental Protection Division where he has been involved in river basin planning and management, nonpoint source pollution assessment and management, and nonpoint source grant and contract management. He received his Master of Urban and Regional Planning and engaged in further study of the effects of urban storm water on water quality at Florida State University.

Abstract

A long-term field study was initiated in 1996 to evaluate the response of a 100 m reach of a tributary of Proctor Creek, a 3.1 km^2 watershed in the Atlanta metropolitan area, to the impact of rapid urbanization in the watershed over time and in comparison to a reach of a physically comparable but almost fully developed urban watershed. The objectives of the study are to measure, evaluate, and compare long-term changes in channel cross-sections, bank and channel scouring, streambed composition, longitudinal reach profiles, plan-form dimensions, biological habitats and communities, water chemistry, and land cover to determine the timing and response of the stream to urbanization within the watershed and in comparison to the almost fully developed urban watershed. Since the onset of physical observations in 1996, when increased sedimentation deposition was the most evident indication of increased upstream development in the study reach, there has been an 18 to 25% increase in impervious cover from 1995 to 1999, a decline in macroinvertebrate taxa richness and disappearance of sensitive species since 1995, increased sinuosity, increased mean cross-sectional area, extensive bank undercutting and cantilever failure in the lower portion of the reach, scouring and undercutting of an outside bank and downstream migration of a cobble deposit in the middle section, scouring of root-armored banks in the upper portion of the reach, and extensive silt and sediment deposition over the entire reach. Since 1990, a composite index of water quality measurements has decreased; measures of conductivity, total suspended solids, and turbidity have increased, and oxidized nitrogen and dissolved oxygen saturation have decreased. The presentation will more fully describe and evaluate those changes and compare them to one another and measurements for the developed watershed.