

Report for 2005MD85B: Fingerprinting Sediment to Determine Sources in an Urban Watershed

Publications

- Conference Proceedings:
 - Devereux, O.H., B.A. Needelman, A.C. Gellis, K.L. Prestegaard, and J.C. Ritchie. 2005. Determining sediment source in the Anacostia River through fingerprinting and GIS data analysis. In Annual Meetings Abstracts [CD-ROM]. SSSA, Madison, WI.
 - Devereux, O.H., B.A. Needelman, K.L. Prestegaard, A.C. Gellis, and J.C. Ritchie. 2005. Determining sediment sources in the Anacostia River watershed. American Geophysical Union Fall Meeting. December 5-9, San Francisco, CA.

Report Follows

Fingerprinting Sediment to Determine Sources in an Urban Watershed
MWRRRC Project #2005MD85B
Interim Project Report

Due to the nature of this study, we will not be completed until approximately December, 2006. Therefore please consider this an update report. We will submit a final report by Dec. 31, 2006.

The goal of the project is to test a methodology for determining the source of sediment in urban watersheds using the North East Branch, which drains to the Anacostia and the Chesapeake Bay. To recap, the objectives included:

1. Identify and quantify the source types and locations of suspended sediments,
2. Apply a composite sediment fingerprinting model for an urban watershed, and
3. Perform a soil survey of the subwatershed.

In year one (3/1/05 to 2/28/06), we had committed to obtaining soil samples of streambanks and upland areas. All source area samples have been collected and analyzed.

An additional objective for the first year was to perform morphological descriptions of soils and a topographical analysis. This objective has been fully completed. By providing a pedological context, we have actual data about the soil-landscape to guide our analysis, rather than expectations guiding data collection and analysis. This methodology is innovative and has already identified fingerprint components that have not commonly been used in other sediment fingerprinting studies. The soil survey indicated that banks are the primary source of erosive material in this urban watershed.

The third objective for the first year of the grant was to determine a composite fingerprint for each source type and area. Source areas have been determined based on those tracers that provide differentiation between sites, and similarities within source areas. The significant tracers were determined using the Kruskal Wallis test. The source areas were determined using multivariate discriminate function analysis.

While it had been anticipated that the physiographic boundary would provide definition between source areas, the subwatershed boundary showed a more significant difference between source sediments. The well-timed 10-year storm that occurred in January 2005 provided a good representative of suspended sediment and allowed us to test the mixing model to differentiate the source areas. In addition, sediment from five storm events has been collected since July 2006. Suspended sediment from will continue to be collected through June 2006. Laboratory analyses are underway with those samples already collected. Street residue was also collected to determine how much sediment washes off impermeable surfaces and from where.

Headwater erosion and sedimentation of waterways continues to be an important topic. Indeed, the "Urbanization: Stresses on Maryland's Water Resources" conference repeatedly referenced the importance of determining sources of sediment for establishing

sediment TMDLs. It is our hope that this research will validate a method that is effective in urban watersheds.

Should you have any questions or concerns, please feel free to contact me at 301-405-8227 (Needelman) or 301-405-1309 (Devereux). Once again, thank you for supporting this project.

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