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Sediment Fingerprinting in a Southern Piedmont Watershed - Preliminary Results

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Abstract Text:

Many of the streams in the Piedmont region of Georgia and other southeastern states are impaired because of high levels of sediment. For these streams, it is not clear if the reason for the high levels of sediment is due to current upland erosion sources (such as agricultural fields, roads ditches, construction sites, etc.) or bank erosion of historic sediment (deposited in the flood plains during the period of intensive cotton farming from about 1830 to 1930). This is an important distinction because TMDL implementation plans must address the sources of erosion. Sediment fingerprinting can identify sediment sources, provided there is sufficient difference in the chemical and physical properties at the different potential sources and the number of potential sediment sources is limited. This is a promising approach for determining the relative contribution of the different sources to the current sediment load in Piedmont rivers. Identifying the primary sediment source and their relative contributions can help in tailoring site specific sediment management practices. Environmental radionuclides like 137Cs, 210Pb along with other naturally occurring tracers in the soil environment can show distinct signatures on the different sources of sediment and sediment in stream. A mixing model can estimate the relative contribution of sediment from the different potential sources. This poster describes how the fingerprinting approach works based on the preliminary results of a study conducted on a sub-basin of the North Fork Broad River Watershed. The results show that most of the stream sediment is being contributed by the bank. However more sampling, chemical analysis and statistical analysis is required from a larger area before arriving at a reliable conclusion.

Impact Statement:

Many streams in the southern Piedmont region are impaired because of high concentrations of suspended sediment and scheduled for development of Total Maximum Daily Load (TMDL) implementation plans. For these waters, it's not clear if the source is upland erosion from agricultural sources or bank erosion of historic sediment deposited in the flood plains during the 19th and 20th century when cotton farming was extensive. If the TMDL implementation plan addresses the wrong source, stakeholders will become disillusioned with the TMDL process. A new approach is needed to determine if bank erosion of legacy sediment is a significant source and how to implement sediment TMDLs in streams that are in an unstable stage of channel evolution. We propose using the North Fork Broad River, a sediment-impaired watershed in Georgia, as a case study for the new approach.