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Rapid Geomorphic Assessment and Sediment Source Tracking - North Fork Broad River, Georgia

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Abstract:

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 are using the North Fork Broad River, a sediment-impaired watershed in Georgia, as a case study for the new approach. Our hypothesis is that the North Fork Broad River is in an unstable stage and that bank erosion of legacy sediment is a major source of the current, high sediment load. Rapid Geomorphic Assessment (RGA) of the stream channel was used to determine if the stream is stable or unstable. Sediment fingerprinting (Cs-137 and Be-7, heavy metals, base cations, C, N, S and P) and mixing models were used to identify the primary sources of erosion. Our results on the condition of the stream channels and the primary source of suspended sediment in this watershed will be discussed.

Impact Statement:

We expect that our results will show that the North Fork Broad River is an unstable stream and that the current approach for setting and implementing a TMDL is unrealistic. We will develop a new approach based on a four-tier process that includes sediment fingerprinting, geomorphic assessment, and modeling of channel evolution. This approach is obviously very expensive and can't be applied to the large number of Piedmont streams scheduled for sediment TMDLs. However, we have every reason to believe that the North Fork Broad River is a typical rural stream for the region and that the results from our project can guide TMDL establishment and implementation plans for other streams of the region.

Our target audiences includes the stake holder group within the North Fork Broad River watershed formed as part of Section 319 grant in which we participate, extension specialists and agents, state environmental agency staff, and nonprofit environmental staff working on sediment TMDLs in the southern Piedmont region and undergraduate and graduate students.

Category: Watershed Assessment and Restoration

Type of Presentation: Oral Presentation