



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003IA35B

Title: Tracing Sediment Sources in Eastern Iowa by Using Stable Carbon and Nitrogen Isotopes: An Exploratory Research

Project Type: Research

Focus Categories: Non Point Pollution, Sediments, Hydrology

Keywords: Rivers, Watershed Management, Contaminant Transport, Soil Erosion, Stream Sedimentation, Isotopes, Heavy Metals, Benthic Populations, Agriculture, Fluid Flow, Hydrogeology

Start Date: 03/01/2003

End Date: 02/28/2005

Federal Funds Requested: \$4,000

Non-Federal Matching Funds Requested: \$9,096

Congressional District: IA 4

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Abstract

Sediment fingerprinting via stable isotopes relies upon the premise that the physical and chemical properties of sediment will reflect its provenance. Sediments from different sources in most cases have different organic content (and in some cases different mineralogy) and as a result may exhibit different degree of impact in the receiving waters.

The hypothesis in this exploratory research is that stable carbon and nitrogen isotope compositions coupled with measurements of carbon/nitrogen (C/N) ratios can be used to distinguish and quantify sources of sediments when all the factors affecting isotope spatial and temporal variability are considered. The sediment isotope fingerprinting method can be implemented successfully only if two conditions are met:(1) variation between sources must be greater than the variation within, and (2) any modification of the fingerprint due to anthropogenic and in-stream biogenic processes must be accounted for.

The objectives of this research are to: (1) distinguish sediment sources by using isotopic ratios of $^{13}\text{C}/^{12}\text{C}$ or $^{15}\text{N}/^{14}\text{N}$ and atomic ratios of C/N in the Lower Cedar River Watershed; (2) evaluate the spatial and seasonal changes in the sources of sediments; and (3) explore the nature of the chemical and hydrological controls on the sources and composition of sediments.