

Spatial and Temporal Variability in Phosphorus Sequestration in Mississippi River Sediment

During the fall and winter of 2010, sediment cores were collected from a backwater lake of the Mississippi River. The cores have been analyzed for organic matter and calcium carbonate content, and they are currently being dated using radiometric techniques. Dr. Gerrish, Biology Department, currently has students using the cores to study changes in the wetland's plankton community following European-American settlement and lock and dam closure. I am interested in knowing how rates of phosphorus sequestration have varied through time in the backwater and the degree of spatial variability found over a small area. Phosphorus is an important limiting nutrient in the upper Mississippi River backwaters and it contributes to excessive aquatic vegetation growth. Phosphorus sequestration in the sediment is also potentially important for reducing downstream nutrient transport. The interested student would use existing sediment samples and a spectrophotometer to determine phosphorus concentrations in the cores. The resulting data would be interpreted in conjunction with radiometric dates, biological community changes, and organic matter concentrations.

Spatial and Temporal Variability in Particle Size of Mississippi River Sediment

The Geography Department recently acquired a laser diffraction particle size analyzer. This high-tech equipment is becoming the industry standard grain size analysis of sediment and soil samples. Knowledge of particle size is valuable for reconstructing flood history at a site, influencing erosion of sediment and associated contaminants, and determining historical changes in a site's hydrology. The interested student would use the Mastersizer 2000 laser diffraction system to determine the grain size of sediment collected from backwaters of the Mississippi River. Grain size data would be interpreted in conjunction with radiometric dates, biological community changes, and nutrient concentrations found at the sites.

Spatial and Temporal Variability in Heavy Metal Sequestration in Mississippi River Sediment

Historical sediment deposited in the backwaters of the Mississippi River can potentially be associated with elevated concentrations of heavy metals such as lead. The Department of Geography and the Department of Physics acquired an X-ray fluorescence (XRF) detector for quantifying concentrations of heavy metals in sediment. The interested student would use XRF to determine heavy metal concentrations in sediments collected from backwaters of the Mississippi River. The elemental data would be interpreted in conjunction with radiometric dates, biological community changes, nutrient concentrations, and particle size data for each of the sites.

La Crosse River Marsh Gun Club Sediment Chemistry

During the summer of 2011 sediment cores were collected from the La Crosse River Marsh at the site of the former La Crosse Gun Club trap shooting range. The cores are in the process of being analyzed for heavy metals associated with the gun club via X-ray fluorescence. Lead mobility in the sediment can be affected by factors such as pH, and organic matter and phosphorus concentrations. The interested student would use a pH meter, muffle furnace, and spectrophotometer to characterize these sediment properties. This data would be interpreted in conjunction with radiometric dates, lead shot counts, and heavy metal concentrations found at the core sites.

La Crosse River Marsh Bathymetric Surveying

The Department of Geography recently acquired a survey-grade echosounder and differential GPS. The interested student would use the echosounder and dGPS on a boat to map lake depth and sediment stratigraphy in the La Crosse River Marsh in the vicinity of the former La Crosse Gun Club.

Mississippi River Backwater Bathymetric Surveying

The department's echosounder and dGPS would be used on a boat to map the backwater depth and volume of fine sediment in two backwater lakes of the Mississippi River. This data will be used as a baseline for annual re-surveys to determine spatial and temporal variability in sediment deposition. Sedimentation is considered by the Fish and Wildlife Service to be one of the greatest threats to the ecological health of the backwaters.