Nitrogen and Phosphorus in the Cedar River Watershed

Issue: Nutrients in agricultural runoff are unintended exports that, along with erodible soils, get washed into lakes, ponds and rivers during large storm events or high floods. Nitrogen (N) and phosphorus (P) are the primary causes of eutrophication of surface water bodies. The Iowa Nutrient Reduction Strategy called for additional research on direct measurements of N and P loss, plus modeling to help determine ways to reduce losses.

Objective: This comprehensive study of nutrient distribution, transport and biogeochemical transformations in the Cedar River watershed will lead to modeling of land-water relationships. There are three objectives.

First, geo-hydrologic mapping of the Cedar River watershed will identify the probable "hot spots" of soil runoff N and P. Second, avenues of nutrient and sediment transport in the watershed caused by high intensity rain events and flooding will be determined. Third, biogeochemical transformation pathways of N and P will be studied and routes through which nutrients escape from the field identified.

Approach: The project will involve extensive fieldwork in the Cedar River watershed, followed by lab analysis of water and soil samples. Samples will be collected from 12 to 14 sites in the watershed every two weeks. Additional samples will be collected immediately after intense rain events. Soils from the surrounding agricultural fields also will be sampled. Based on the distribution of N and P in the watershed, nutrient mass balance will be calculated at the sub-watershed levels. Eventually, the high flux areas will be compared to the land use practices in nearby farm fields.

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