Geophysical Research Abstracts, Vol. 7, 05635, 2005
SRef-ID: 1607-7962/gra/EGU05-A-05635

The Influence of Runoff Generation on N:P Ratios in Headwater Lotic Ecosystems: A Midwestern North America Paired Watershed Study

M.B. Green (1), J.L. Nieber (2), G. Johnson (3), J. Magner (3), B. Schaefer (1)

1. Graduate Program in Water Resources Science, University of Minnesota
2. Department of Biosystems and Agricultural Engineering, University of Minnesota
3. Minnesota Pollution Control Agency

The relative abundance of N and P (N:P ratios) can impact community composition, trophic interactions, and retention of nutrients during transport in lotic ecosystems. Stream water N:P ratios vary spatially within and between watersheds, but little is known about what causes the spatial variability. We hypothesize that a watershed's tendency to generate overland runoff will influence the stream water N:P ratios within the watershed. Thus, we expect high runoff watersheds would have lower N:P ratios than watersheds with relatively low runoff. Preliminary data from a paired watershed study in southeastern Minnesota, USA, shows that watershed tendency to generate runoff can impact stream water N:P ratios. The paired watersheds (East and West Finley watersheds) have similar land use (mixed row crop and pasture in both), size (24 ha in East Finley and 10 ha in West Finley), and shape, but different watershed hydrology. The East Finley watershed experiences high intensity peak flows with short durations while the West Finley watershed experiences lower intensity flows that have a longer duration. During storm events, the East Finley watershed generally experiences a peak of total suspended solids (TSS) and total phosphorus (TP) concentrations, and a trough of NO_3^- concentrations during storm flows. The West Finley watershed generally experiences a different dynamic, with relatively constant TSS, TP, and NO_3^- concentrations during storm flows. While N:P ratios between the East and West Finley watersheds deviate during stormflows, N:P ratios are similar during baseflow conditions. It remains unknown whether the pulses of P (and changes of stream water N:P ratios) alter the periphyton cellular N:P ratios in the East Finley watershed. Future

work in the Finley watersheds will measure the N:P ratio of event and pre-event water, identifying the impact of water flow path on stream water N:P ratio. Surface and subsurface runoff and solute transport modeling will also be incorporated in the future work to help assess the importance of runoff generation on stream water N:P ratios in other watersheds within different geographic regions. Showing a relationship between runoff generation and stream water N:P ratios will provide understanding of spatial variations of stream water N:P ratios.