



Title: Manipulation of Experimental Watersheds through BMPs: Fluxes, Fate and Transport

Name: Joseph Makarewicz

Email: jmakarew@brockport.edu

Organization: State University of New York at Brockport

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Theme: Watershed Management

Situation: Mitigation of soil and nutrient loss from watersheds in agriculture in the Finger Lakes Region of New York State and, in general, within the country continues to be a major issue. Because of a sense of stewardship, the demonstrated loss of nutrients and soil from their land and the effects this may have on downstream environments, the local agricultural agencies, with cooperation and participation of local farmers, formed the "Conesus Lake Watershed Group" (CLWG) to focus attention on watershed issues important to farmers and to coordinate and foster collaboration between academic researchers, governing bodies, and the agricultural community. This multi-dimensional project represents an integrated approach of academics, extension and farming interests to conduct hypothesis-based research at the watershed level that will test the ecosystem impact of Best Management Practices on mitigation of non-point sources of nutrient and soil loss.

Objectives: The goal of the proposed project is to demonstrate, through the experimental watershed approach, that implementation of BMPs in agriculturally dominated watersheds will preserve soil and reduce nutrient loss from a series of sub-watersheds. A second goal is to evaluate the impact of instituted BMPs by considering the impacts on the downstream lake community on the watershed scale. A third goal is to evaluate fate and transport of nutrients over space and time. Specifically, we hypothesize not only reductions in nutrient and soil concentrations and loading but also a resultant decrease in metaphyton and coliform bacteria populations at stream mouths and, with time, a reduction in macrophyte communities. We intend to demonstrate with the Finger Lakes farming community, the utility and effectiveness of the implemented BMPs allowing regional policy makers and managers to develop optimal strategies for improving land usage in watersheds while significantly improving water quality and decreasing abundance of nuisance plant species in downstream ecosystems. As such, this proposal is a logical step in the implementation of the Conesus Lake Watershed Management Plan and a mechanism for the farming community to be proactive in watershed issues through education, implementation of BMPs, and by its traditional stewardship of the land it farms. Ultimately, the proposed research expands our basic understanding of the effects of practices to control non-point source pollution while contributing toward the goal of improving water quality of downstream systems. The diverse nature (academics, agriculture agencies, extension, planners) of the Conesus Lake Watershed Group allows for dissemination of information to a wide audience at the local, regional and national level through a WEB page, a seminar series, Cornell Cooperative Extension, and the scientific literature.

Methods: Small experimental sub watersheds (33 to 325 ha) were chosen for manipulation because they are predominantly in agriculture (over 70%) and are farmed by only one or two landowners. These circumstances ensure that any effects on downstream systems (stream, stream mouths and nearshore of the lake) will be a result of implemented BMPs; that is, results will not be confounded by other land use practices often observed in large watershed approaches.

Partnerships: The local agricultural agencies (Cornell Cooperative Extension, Livingston County Soil and Water District, Farm Service Agency, and the Natural resources Conservation Service) with cooperation and participation of local farmers (Grey, Barber, McClellan, Meyer and Maxwell farms) formed the "Conesus Lake Watershed Group" (CLWG) to focus attention on watershed issues important to farmers and to coordinate and foster collaboration between academic researchers (SUNY Brockport, SUNY Geneseo, Rochester Institute of Technology), governing bodies (Livingston County Planning Department, Livingston County Department of Health, Conesus Lake Watershed Management Planning Committee and the Conesus Lake Compact of Towns), and the agricultural community. This multi-dimensional project represents an integrated approach of academics, extension and farming interests to conduct hypothesis-based research at the watershed level that will test the ecosystem impact of Best Management Practices on mitigation of non-point sources of nutrient and soil loss.

Resources: Matching funds were provided through release time of academic faculty during the academic year.

Results: The project is nearing completion of its first full year. Pre-manipulation data are available on the relationship between nutrient loss from sub-watersheds on lake/stream metaphyton and macrophyte populations. There is a direct relation between phosphorus loss from a sub-watershed and macrophyte bed size and bed biomass. Experimentally results also demonstrate that metaphyton population growth is enhanced by stream water from sub-watersheds in agriculture.



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