

Aquatic ecosystem responses to changing nutrients, climate and flows

Dr. Helen M. Baulch, Assistant Professor, University of Saskatchewan,
www.usask.ca/water/; <http://homepage.usask.ca/~hmb925/>

Global biogeochemical cycles have undergone unprecedented changes, leading to changes in elemental fluxes to aquatic ecosystems. Overlain on these changes are the impacts of climate change and impoundments, affecting flows, temperature, and ecology of aquatic ecosystems.

My research program focuses on applied limnology – understanding human effects on aquatic ecosystems, and informing management to help maintain ecosystem services. There are four major research themes. The first focuses on climate change, specifically assessing how declining periods of ice cover associated with climate change will affect aquatic biogeochemistry and ecology. The second theme focuses on agricultural land management. In this work, we are developing improved modelling tools to quantify nutrient transport in cold prairie landscapes, and performing a detailed assessment of the role of beneficial management practices and instream processes in nutrient retention, as well as flood mitigation. The third theme assesses how altered flow management regimes may be used to increase biological productivity of impounded ecosystems. Finally, we are starting a new project, partnered with a regional water treatment plant aimed at using improved knowledge of ecosystem productivity and harmful algal blooms to optimize water treatment processes, help anticipate algal blooms, and understand how long-term changes in water chemistry have affected bloom dynamics and lake productivity. These research programs rely upon varied tools including in situ sensors, process-based mathematical modelling, stable isotopes, and paleolimnology.