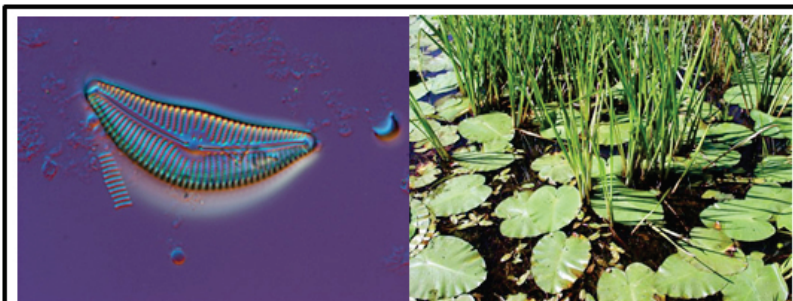


Canada's freshwater ecosystems: Using the past to predict the future

Human-induced changes to freshwater ecosystems is a global problem, leading to loss of aquatic biodiversity at rates equal to or greater than in some tropical forests. Freshwater is one of Canada's greatest resources; therefore Canadian researchers are trying to understand how freshwater ecosystems and associated aquatic biodiversity will respond to drastic environmental change. One of the ways in which they are doing this is through the use of paleolimnological techniques and long term data sets to understand past responses of aquatic ecosystems to infer how present-day systems might respond to environmental change. Paleolimnology is the study of the ecological history of a lake. Generally, researchers obtain a core sample from the sediments at the bottom of a lake. From the sediment layers preserved in these cores they are able to extract information about the past chemical composition of the lake, as well as the species of plants and animals that inhabited the lake throughout its history. Each layer represents a different historical time period, with the most recent sediments being on top, and the older sediments deeper in the core.



Professor John Smol, Queen's University, is one of Canada's leading paleolimnologists and heads the Paleoeological Environmental Assessment and Research Laboratory. This lab is largely funded by NSERC and performs research integral to understanding the effects of environmental stressors on freshwater ecosystems. For example, the work of Dr. Smol and his colleagues was instrumental in showing the effects of acidification in lakes near Sudbury, Ontario in the early 1990s. By comparing the diatom microfossils in surface sediments (recent) with those of deeper sediments (older) they were able to infer recent increases in pH in lakes closest to the source of pollution. In another example, Dr. Irene Gregory-Eaves' lab at McGill University has used similar



a) Diatoms are small, unicellular algae found in the water column. b) Macrophytes are plants that grow in and around water. Both are used as indicators of water quality. (photos: http://services.landes.org/ressources_eau/fr_vivre_eau_cours_accueil.htm)

techniques to show that diatoms can be used to estimate macrophyte cover. This is important because macrophyte cover in lakes tends to increase with nutrient inputs, for example from agricultural fertilizer. By modelling variation in diatom assemblages from core sediments and current samples they can estimate how macrophyte cover has changed in recent years, and relate this directly to changes in the chemistry of the lake imposed by pollution. The applications of paleolimnological research are vast, and

continued work in this field will help us to better understand how climate change is affecting freshwaters in Canada and globally.

To learn more, visit the homepages of these NSERC funded Canadian researchers:

Dr. John Smol and PEARL - <http://post.queensu.ca/~pearl/index.htm>

Dr. Irene Gregory-Eaves - http://biology.mcgill.ca/faculty/gregory_eaves/