Field trip: The Experimental Lakes Area

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Introduction

The Experimental Lakes Area (ELA) began as a Government of Canada research station in 1968 tasked with investigating the causes of and controls on nutrient pollution in lakes. It was established largely in response to growing public awareness of nuisance algal blooms in lakes located close to cities. Throughout the 1960s, the algal blooms and fish kills in lakes such as Lake Erie became a major indicator of human influence on lake ecosystems (Schindler 2009). These changes are evidence of a process called eutrophication, whereby excess nutrients boost the productivity of plants and algae in lakes, but ultimately consume dissolved oxygen, leading to poor water quality and fish death. In order to understand this problem, federal scientists in the late 1960s sought out a remote site where lakes could be purposefully manipulated to assess their responses to environmental stressors. The ELA is located on the Precambrian shield of northwestern Ontario, 35 km southeast of Kenora, Ontario. It encompasses 58 lakes designated solely for research and monitoring (Blanchfield et al. 2009). This remote setting was chosen such that the lakes and their watersheds are distant from human-induced environmental pressures, including air pollution...
and impacts from industrial or urban development (Johnson and Vallentyne 1971). While there are several long-term research stations scattered across Canada, ELA is perhaps the best known for two reasons. First, its mandate to perform whole-ecosystem manipulation experiments to investigate the response of lakes and watersheds to stressors has produced striking results. These field test results have often stood in direct opposition to lab-based or smaller scale studies. Most notably, the experimental fertilization of Lake 227 in the 1970s demonstrated that algae in these systems are limited by phosphorus. This suggested that controlling phosphorus pollution to lakes would help them recover from eutrophication (Schindler 1974). These scientific results, accompanied by aerial photographs of emerald green, eutrophic lakes clearly altered by the addition of phosphorus, led to widespread policy changes that included banning phosphates in detergents (Schindler 2006). Research conducted at the ELA still informs efforts to control algal blooms in water bodies across Canada today (Lake Winnipeg Stewardship Board 2006).

The second reason that ELA is well-known is that in 2012, the federal government announced they intended to cut all funding to the research station, prompting an outcry from scientists across North America (Orihel et al. 2013). A campaign to save the ELA was launched, consisting of petitions, newspaper ads and rallies putting the research station and its long track record of policy-relevant science in the public eye. Responsibility for the operations of ELA was transferred to the International Institute for Sustainable Development, and the station became known formally as IISD-ELA (Xenopolous and Frost 2015).

This photo essay provides an overview of a tour of the IISD-ELA camp and surrounding area given by current staff to attendees of the 38th annual meeting of the Prairie Division of the Canadian Association of Geographers (PCAG). The meeting and field trip were held in Kenora, Ontario in September, 2015. Participants boarded a bus in Kenora and headed east on the TransCanada Highway, taking a southward turnoff to follow a long, bumpy road to the main IISD-ELA facilities.

**Figure 1**
The group gathers for a briefing by IISD-ELA staff at the dining hall before heading out on the tour. Although the camp was empty on the Saturday we visited, it can accommodate more than 50 people at a time. Much of the activity and interactions between researchers, students and staff is focused around meals, eaten communally in this building. (Photo credit: N. Casson, 2015)

**Figure 2**
Figures 2 and 3 show scenes inside the lab facilities. Long-term monitoring of physical, chemical and biological parameters of several lakes and streams has been ongoing since the early 1970s. These records set the context for many of the manipulative experiments which are carried out by researchers. They are also valuable for detecting the effects of drivers like climate change, which act over years or decades. (Photo credit: Figure 2, N. Casson, 2015; Figure 3, A. Ducharme, 2015)
Figures 4, 5 and 6 show views of the meteorological station located near the camp. The equipment here is operated by both IISE-ELA and Environment Canada and used to measure parameters including precipitation, temperature, windspeed and chemical deposition. As one of only a few stations in the region measuring airborne pollutants such as mercury, sulphur and nitrogen deposition, the data from this station provide an important measure of these chemicals which can be carried thousands of kilometres from their sources. (Photo credit: Figure 4, K. Thomson, 2015; Figure 5, N. Casson, 2015; Figure 6, J. Piwowar, 2015)

Figures 7 and 8 show views of the landscape at ELA. The boreal forest at this site is mostly dominated by jack pine (Pinus banksiana) and black spruce (Picea mariana), with thin and discontinuous soils (<1m in depth), underlain by granite-dominated Precambrian Shield geology (Schindler et al. 1996). (Photo credit: Figure 7, G. Vandeberg, 2015; Figure 8, N. Wilson, 2015)
Figure 9
Lake 240 located near the camp. This lake was originally considered for eutrophication experiments, but it was decided to leave it for recreation and study by researchers, students and staff staying at the camp (Schindler 2009). (Photo credit: M. Burke, 2015)

Figure 10
A flume capturing the outflow of Lake 239 into Lake 240. The inflows and outflows of several lakes are gauged and water level is measured continuously by dataloggers. Water chemistry samples are taken weekly. These records are more than 40 years long and allow researchers to calculate water and chemical budgets for the lakes. (Photo credit: B. McGregor, 2015)

Figure 11
Plate 11, 12 and 13 show field trip participants deploying a seine net. This vertical net with floats on the top and weights on the bottom is spooled out from a boat in a semicircle and dragged onto shore. (Photo credit: Figure 11, B. McGregor, 2015; Figure 12, J. Paterson, 2015; Figure 13, B. McGregor, 2015)
Conclusion

This field trip provided students and geographers a glimpse into how field research is carried out at one of the most important long-term ecological research sites in Canada. For some, the sunny afternoon trip inspired ideas of future research questions around ecosystem processes or ways in which science informs national and international environmental policy. The participants are grateful to the IISD-ELA staff and scientists, who facilitated the visit, led the tour and participated in lively discussions.

References


