Controlling Water in the Great Lakes and St. Lawrence River Basin

Olga Bonfiglio
College of Arts and Sciences Staff Writer

Since 1900, engineers in the Great Lakes and St. Lawrence River Basin have attempted to control these vast waters with huge navigation and hydro-electric power projects. These efforts have meant that moving water in one lake can impact the others—even if the change is only a few inches.

Daniel Macfarlane, assistant professor of environmental and sustainability studies, illustrated this point at the Lee Honors College Lyceum series, “Our Blue Marble,” which takes place every Wednesday at noon.

Although there were some water diversions in the nineteenth century like the Erie and Welland Canals, the twentieth century has seen massive works of water management. The first major diversion of the century was the Chicago Sanitary and Ship Canal, which reversed the natural flow of the Chicago River from Lake Michigan eventually into the Mississippi River for the city's sewage disposal.

"Water levels on the Great Lakes decreased by only a few inches, but the diversion cost states billions of dollars because of the impact on navigation, harbor and the hydro-electric industries," said Macfarlane.

As a result, Canada and the United States drew up and signed the Boundary Waters Treaty in 1909 to jointly manage their border water resources.

"This treaty was significant in that it pioneered anti-pollution obligations, provided a public-input mechanism whenever a change was proposed, and established the International Joint Commission to oversee these matters, which it still does to this very day," said Macfarlane.

The treaty became the model for cooperatively handling environmental issues on borders and proposals of other projects like when two dams were built at the international boundary of the St. Mary’s River near Sault Ste. Marie to regulate the flow of the river and Lake Superior.

The Niagara Falls water diversions were planned around aesthetic appeal and tourism dollars. Water was controlled upstream by turning it “on and off” at different times of the day in order to please tourists while in the 1950s the Horseshoe Falls were reshaped for better distribution of flow and an unbroken crestline. In 1969, the American Falls were "shut off” so that the removal of talus could be studied. This feat is scheduled to be repeated in the next couple years.

The Ogoki and Long Lac diversions in the 1940s took water from the James Bay watershed and put it into Lake Superior to offset the Chicago diversion and to send more water to Lake Ontario, which produced more power at Niagara Falls.

The “big daddy” of all the water diversion projects, however, was the construction of the St. Lawrence Seaway in the 1950s. It included three dams plus a gravity power dam, the second

largest in North America at the time. This project required massive manipulation of the river and its environs—210 million cubic yards of earth and rock—that inundated 20,000 acres of Canadian land and 18,000 acres of American land.

As a result of this project, Canada suffered the loss of 225 farms, seven villages and three hamlets, 18 cemeteries and 1000 cottages while over 100 kilometers of the main east-west highway and main line railway were relocated. A number of American channels had to be dredged to accommodate the larger ships that traveled through the Seaway. The most important dredging took place in the Detroit River, Lake St. Clair, St. Clair River and St. Mary's River. (Dredging has likely had the greatest anthropogenic impact of all these projects in terms of lowering water levels in the Great Lakes due to the "bathtub effect" due to increasing the volume of the basin with the same amount of water.)

The water abundance in the basin has provoked envy from those outside the region who would like to divert this "liquid gold." To prevent these diversions from happening, the Great Lakes-St. Lawrence River Basin Water Resources Compact was signed by the eight states of the region in December 2005 and put into effect in 2008. One key provision of the Compact is that each state has veto power over any request for diversion. The Compact is now facing its first test because a town outside the basin – Waukesha, in southeastern Wisconsin – wants to divert water from Lake Michigan. Time will soon reveal the strength of the Compact. If the Waukesha request is fulfilled, some people worry that other requests will emerge from areas like the arid Southwestern states and those in the Great Plains who rely on water from the diminishing Ogallala Aquifer. However, no diversions to these areas are currently planned.

In 1985 the IJC reported on consumptive uses and effects of existing diversions into and out of the Great Lakes system. It showed that irrigation had a greater impact on water supply than engineering diversions. The study also concluded that climate and weather changes as well as precipitation, ice cover, evaporation, and glacial rebound affect levels of the lakes far more than existing man-made diversions on the region's supply of water.

The water diversions of the twentieth century have only slightly lowered the water line of the Great Lakes by a few feet, said Macfarlane. However, he cautioned about future diversions because there really isn't any surplus water. Instead, he suggested sticking to the Compact, which seems to be a good safeguard of any large-scale diversions, and to be vigilant about the unforeseen effects of climate change.

"History has shown that there are always unintended consequences that are often as bad or worse than the original problem they are trying to solve," said Macfarlane. "In some important ways we are only still learning how large systems like the Great lakes operate."

Last November, Macfarlane received the 2015 Floyd S. Chalmers Award for his book, ***Negotiating a River: Canada, the U.S., and the Creation of the St. Lawrence Seaway.*** *Macfarlane is currently at work two another book on related topics: a history of engineering Niagara Falls, and a volume (co-edited with ENVS and History Professor Lynne Heasley) on the history of US-Canadian-American border waters.*