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Nancy Langston,
Sustaining Lake Superior: An Extraordinary Lake in a Changing World
New Haven and London: Yale University Press, 2017
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Deep, cold and remote, Lake Superior is often called 'pristine' or 'unspoiled', as if it were somehow immune from the environmental problems of industrial North America. But as Nancy Langston demonstrates in this fine new study, Lake Superior is, in many ways, at the epicentre of a vexing new reality of climate change and pervasive toxic contaminants.

From the fur trade to forest-cutting, mining and papermaking, the Lake Superior basin has a long history of environmental disruption. Langston's book is a scientific and political history of the ways in which these threats have been recognised, studied and remedied. The news here is not all bad. Langston, who teaches at Michigan Technological University on the Keweenaw Peninsula, celebrates the resurgence of species such as the lake trout, 'one of conservation's great success stories' (p. vii). Certainly the last half-century has seen major reductions in the sort of pollution that can be seen, smelled or tasted. In addition, science is working to reduce or at least contain the health hazards posed by now-banned substances including DDT, toxaphene and PCBs.

All of these gains have been hard-won, however, and Langston demonstrates repeatedly that the lag time between initial concern and decisive action may run to several decades.

A case in point is the battle over taconite mining after World War II. Taconite, or low-grade iron ore, was seen as a solution to dwindling reserves of high-grade ore in northern Minnesota. In addition to its obvious benefits to the regional economy, taconite mining was posited as an essential part of U.S. national security at the dawn of the Cold War.

Examining thousands of pages of documents only recently made public, Langston concludes that regulators and local communities took the pollution threat seriously when Reserve Mining Company was granted permission to dump mine tailings into the lake. But the philosophy of 'cooperative pragmatism' employed by conservationists would be steamrolled by the economic and political inertia of the project once it was launched, even when harm to fish (and potentially, people) became apparent.

Such 'pragmatism' meant containing pollution with technology and forging voluntary partnerships with industry. From a regulatory standpoint, however, voluntarism shifted the burden of proof, forcing regulators to demonstrate harm rather than requiring mining executives to prove safety.

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Eventually, a U.S. federal judge stood up to what he termed the company's 'economic blackmail' and ordered it to dispose of its tailings on land, rather than in the lake. An appeals court reversed that decision on the grounds that regulators had not proved conclusively that Reserve's pollution would kill anyone. One environmental official complained that the government could prove such a case only by 'counting dead bodies through an after-the-fact epidemiological study' (p. 136).

Court decisions in the 1970s gave regulation more teeth, and the tradition of 'cooperative pragmatism' gave way to what one scholar calls a 'legalistic, adversarial approach' (p. 137). Langston notes, however, that environmental groups still are forced to play a continuous game of catch-up because regulators in the United States and Canada tend to assess pollutants' danger only after the fact, when harm to ecosystems becomes clear.

The science of toxic pollutants, meanwhile, seems to highlight new threats each day. Researchers have long known how toxics bioaccumulate in fish, but they are just beginning to understand how these substances can travel thousands of miles from their point of origin, often in multiple leaps between land, water bodies and the atmosphere – a phenomenon known as the 'grasshopper effect'. Toxaphene, for example, was banned in the United States and Canada in 1990, but it is still used as a pesticide in Africa. Its biggest use in North America was on cotton fields a thousand miles south of Lake Superior. Yet the contaminant is found in Lake Superior trout, and Canadian researchers have discovered it in the Arctic, in the fat of polar bears, seals and fish.

Lake Superior's enduring environmental challenge lies in its remarkable ability to distort time and space in manifesting damage caused by humans. 'Legacy contaminants' such as PCBs are still in evidence, buried in lake silt long after the production of these chemicals ceased. Contaminants from afar are concentrating in the lake, because once they fall into the cold water they are unlikely to escape. 'Emerging contaminants' such as flame retardants are still being produced and promoted, even as researchers raise alarms about their resistance to breakdown and their effects on human health.

The questions are not merely scientific. Because boreal lakes become sinks for contaminants produced far away, pollution often invokes issues of social and environmental justice. Indigenous communities along Lake Superior depend heavily on lake trout as a source of protein, for example. Of what use to these communities are the many fish consumption advisories aimed at the broader population, which has far more alternatives in its diet?

And then there is global warming. Langston is careful with her predictions on climate change, but she ventures that a warmer Lake Superior (for which there is much evidence already) may see a greater threat from invasive species and algal blooms, in effect prematurely ageing this

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oligotrophic lake. Farther north, toxic pollutants long stored away in Arctic ice may be remobilised. Perhaps most alarming, the boreal forest's role in carbon sequestration may decline as the soil warms, 'meaning that one of the key carbon sinks of the world might tip into a carbon source instead' (p. 223).

It seems a gloomy prospect, but Langston manages to strike a tone of measured optimism in her conclusion. The challenges facing Lake Superior are essentially humanistic, she argues, and 'the quality of water determines the quality of life' (p. 235). Human communities must embrace an ethos of science, stewardship and humility in the face of complexity as they work to mitigate their effects on the region while living within it.

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