Chapter 1

Landscapes of Science

Stephen Bocking

Figure 1. Salmon Coast Field Station, Broughton Archipelago, British Columbia. Photo: Stephen Bocking.

ON CANADA'S WEST COAST an archipelago of islands and straits sits between northern Vancouver Island and the mainland. In the north, the Mackenzie River meets the Beaufort Sea in a delta landscape of channels, wetlands and lakes. Down east, the woods, fields, and hills of the Oak Ridges Moraine arc across Toronto's suburban sprawl. These are very different landscapes, with distinctive historical patterns of human activity: forestry, fisheries, and salmon farming; fur trapping and oil exploration;

and urban development. But they all share a history of scientific activity. Like many other places in Canada, they are landscapes of science.

These landscapes remind us that although science is often associated with laboratories, there's an extensive history of scientific work outside, in a variety of environments, taking place for a multitude of reasons. Scientific activity has proliferated in industrial, resource, and urban landscapes, and in places where human activities are less dominant. The questions that scientists ask and the methods they apply in these places have been shaped by their training, disciplinary affiliations, and funding, among other factors. Political and managerial imperatives are also important, such as surveying and asserting national territory, justifying and guiding resource exploitation and management, and tracking the impacts of human activities.

These places also show us how science has been central to key episodes in the environmental history of Canada. Over the last decade, as the Broughton Archipelago became a controversial site for salmon farming, it also attracted intensive research activity. The results of this research, including insights into the implications of sea lice and viruses for farmed and wild salmon, have contributed much to ongoing debates about this industry.[1] The Mackenzie Delta has been amply studied over the last several decades, partly because of interest in and concerns about oil and gas development. Ever since the Mackenzie Valley Pipeline Inquiry in the 1970s, scientific research and Indigenous knowledge have together shaped attitudes regarding resource exploitation in this region.[2] And in controversies concerning development of the Oak Ridges Moraine, research, particularly on groundwater, has played a leading role. The environmental history of southern Ontario—including ongoing tensions between development, farming, and the protection of natural areas, now

Figure 2. Suburban development on the Oak Ridges Moraine, near Toronto. Photo: Stephen Bocking.

framed in terms of protecting the Greenbelt that encircles the Greater Toronto Area—continues to reflect these controversies.[3]

Much has been written about the history of science in the Canadian environment. I'm thinking, for example, of Matt Farish's work on military science in the Arctic, Stéphane Castonguay's study of agricultural, forest and entomological science, Caroline Desbiens' analysis of environmental science and the James Bay hydroelectric project, and Richard Rajala's study of forestry.[4] All of this work combines in different but interesting ways the history of science and environmental history. It shows how science has been linked to historical themes such as Cold War strategic imperatives, the extension of colonial authority, and resource management. But much remains unexamined. What topics and themes deserve more attention in the environmental history of Canadian science? Here are five ideas.

Figure 3. The Mackenzie River on a calm day. Photo: Anson Chappell.

1) The political and economic contexts of science. Discussion of science and politics in Canada was, until recently, dominated by criticism (amply justified) of the Harper government's manipulation and ignorance of science. Today, attention has shifted to the Trump administration's apparently similar, if more extreme, strategy south of the border.[5] But debates about science policy should be placed in their historical context. This means following the money: paying attention not just to how government funds science, but also to the implications of private funding for environmental research, by industry, foundations, and even wealthy individuals. Although it's likely accelerated in recent years, privatization has in fact been a factor in Canadian environmental science since at least the early 1970s. At that time, the first Trudeau government began shifting research activity from its own agencies to the private sector in an effort to

build an environmental consulting industry. The nature and implications of this creeping privatization of environmental knowledge for government, public spaces, and civic life remain largely unexamined by historians. Studies of the political economy of environmental knowledge could draw on recent work on the role of corporate science in agricultural and health industries, which has explored the consequences of rearranging everything from genes to ecosystems for profit.[6]

2) Scientists' practices and material cultures. Studying the environmental history of science includes examining what scientists actually do, and with what—how they interact with the environment, designing surveys, conducting experiments (especially in the field), and using models of various kinds to make sense of their data and identify patterns in nature. Scientists' choices about their methods and how they use these to assert their own credibility helps determine what gets to count as knowledge. In my own study of salmon farming science, for example, I found it interesting how scientists developed research techniques that used the unique environmental conditions available at particular field sites to derive conclusions that could also be valid elsewhere.[7]

3) The environmental contexts of scientific activity. Scientists work in many environments: both controlled field sites, and unpredictable landscapes, including those transformed beyond recognition, such as the tar sands or hydroelectric dam sites. Developing reliable results in such places can pose real challenges, particularly when these results are controversial. When the stakes are high, it is always possible for those opposed to their implications to cast doubt on new knowledge. Attention to where science is done can help in understanding how knowledge is affected when the environment being studied is itself transformed, as well as how constructing scientific practices and facts is inseparable from constructing the identity of a place. Arctic science exemplifies these ties

Figure 4. Cleveland Dam, Capilano River, North Vancouver. Photo: Stephen Bocking.

between knowledge and place. In recent decades scientists and Inuit have reframed how we see this region: once forbiddingly cold, now dangerously warm.

4) The historical geography of science. Scientific activity has ebbed and flowed across the Canadian landscape, responding to government and industrial patronage and scientists' priorities. This geography raises many interesting questions, such as the relation between the postwar expansion of science in northern Canada and efforts to administer and exploit the region, the influence of global scientific activities (such as climate change studies) on knowledge of our own environment, and the relation between local knowledge and technical expertise imported from elsewhere. Knowledge can itself be mobile, alongside commodities, people, and power.

It can even draw power, in fact, from demonstrating the capacity to move, or by asserting ties to a specific place.

5) Indigenous knowledge and its relation to science. Once dismissed by scientists as anecdote and superstition, Indigenous knowledge has more recently been recognized as a source of guidance, of insight into memory and meaning, and as an important basis for asserting territorial and political rights.[8] But there's also a history of scientists drawing on Indigenous knowledge for their own purposes, often without acknowledging their sources, and of regulatory systems viewing it as merely a source of data.[9] These and other relations between knowledge systems in Canada deserve more study.

So there's much to pursue in the study of the environmental history of landscapes of science. In the Anthropocene, thinking about environmental knowledge raises essential issues of power, identity, interests, and even human survival. As Christophe Bonneuil and Jean-Baptiste Fressoz have argued recently, knowledge should be at the centre of our understanding of the history of the Anthropocene, because we created this new era fully aware of what we were doing—and we did it anyway.[10] Understanding how and why knowledge both enabled and warned of planetary transformation represents a pressing agenda for environmental historians ready to engage with the biggest questions of our future.

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[1] Nathan Young and Ralph Matthews, *The Aquaculture Controversy in Canada: Activism, Policy, and Contested Science* (Vancouver: UBC Press, 2010).

[2] Andrew Stuhl, *Unfreezing the Arctic: Science, Colonialism, and the Transformation of Inuit Lands* (Chicago: University of Chicago Press, 2016) https://doi.org/10.7208/chicago/9780226416786.001.0001.

[3] L. Anders Sandberg, Gerda R. Wekerle and Liette Gilbert, *The Oak Ridges Moraine Battles: Development, Sprawl, and Nature Conservation in the Toronto Region* (Toronto: University of Toronto Press, 2013).

[4] Matthew Farish, "Frontier Engineering: From the Globe to the Body in the Cold War Arctic," *The Canadian Geographer* 50, no. 2 (2006): 177–96, https://doi.org/10.1111/j.0008-3658.2006.00134.x (and subsequent papers by Farish); Stéphane Castonguay, *Protection des Cultures, Construction de la Nature: Agriculture, Foresterie et Entomologie au Canada, 1884–1959* (Montreal: Septentrion, 2004); Caroline Desbiens, *Power from the North: Territory, Identity, and the Culture of Hydroelectricity in Quebec* (Vancouver: UBC Press, 2013); Richard Rajala, *Clearcutting the Pacific Rain Forest: Production, Science, and Regulation* (Vancouver: UBC Press, 1999).

[5] Christopher Sellers et al., *The EPA Under Siege: Trump's Assault in History and Testimony* (N.p.: Environmental Data & Governance Initiative, 2017), https://100days.envirodatagov.org/epa-under-siege/.

[6] See, for example, Paula Stephan, *How Economics Shapes Science* (Cambridge, MA: Harvard University Press, 2012).

[7] Stephen Bocking, "Science, Salmon, and Sea Lice: Constructing Practice and Place in an Environmental Controversy," *Journal of the History of Biology* 45, no. 4 (2012): 681–716, https://doi.org/10.1007/s10739-011-9299-z

[8] Emilie Cameron, *Far Off Metal River: Inuit Lands, Settler Stories, and the Making of the Contemporary Arctic* (Vancouver: UBC Press, 2015).

[9] Paul Nadasdy, *Hunters and Bureaucrats: Power, Knowledge, and Aboriginal-State Relations in the Southwest Yukon* (Vancouver: UBC Press, 2003).

[10] Christophe Bonneuil and Jean-Baptiste Fressoz, *The Shock of the Anthropocene: The Earth, History and Us* (London: Verso, 2016).