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<https://www.ubcpres.ca/fixing-niagara-falls>

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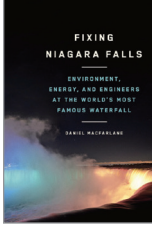
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Hydropower plays an important role in Canadian energy history. Canada is a leader in hydroelectric power providing the country's largest share of electricity generation since the late nineteenth century. This historical and unique reliance on what has been termed "white coal" may now turn into a stroke of luck in a world that needs to decarbonize and in which governments introduce net zero CO₂ emission goals.

Daniel Macfarlane's *Fixing Niagara Falls* brings us back to one of the earliest sites of hydropower engineering in North America. Often considered the "cradle of hydroelectricity" (37), Niagara Falls' claim to being the global "birthplace of hydropower" may have been "exaggerated" (4), but its history is important and emblematic of many of the issues surrounding the history of hydroelectric power in Canada and North America. It is also unique in its public recognition and high profile, which began in the 19th century when it was one of the most widely known and depicted American images. As Macfarlane explains, the waterfalls were an iconic landscape and tourist attraction before they became a site of technological innovation and industrial sublime in the wake of the second industrial revolution and the onset of electrification toward

the end of the 19th century. Niagara Falls was both a spectacle of nature and of technology. Addressing this constant negotiation between beauty and power (6) and understanding the various attempts at beautifying and harnessing energetic power from the Niagara Falls since the late 19th century lies at the heart of Macfarlane's historical narrative.

Using an envirotech approach, which brings together environmental and technological history, Macfarlane "foregrounds" Niagara Falls and its "microgeography" arguing that it is "a tangled blend of nature and culture" (5) exhibiting a "manufactured naturalness" (27). Not only does he acknowledge that the falls are simultaneously natural and artificial, or what Richard White called an "organic machine," but Macfarlane also attributes historical agency to the falls (8-9). This approach is not new to historians of science and technology who may be slightly disappointed by the decision of Macfarlane to title his chapters along the various ways that humans have done something to Niagara Falls rendering the waterfalls passive again. *Fixing Niagara Falls* provides a chronological story of the various ways that the waterfalls were harnessed (chapter 1), saved (chapter 2), negotiated (chapter 3), empowered (chapter 4), disguised (chapter 5), preserved (chapter 6) and fabricated (conclusion). Every chapter begins with a personal vignette which is closely linked to the natural and material landscape which is brought into direct conversation with the present. While this makes the narrative immediately relatable and accessible, the dense and highly detailed discussions that ensue subsequently can sometimes be a bit tedious and more difficult to follow, at least for a non-expert, general audience including students. At the same time,

each chapter features an extremely useful conclusion.

Historians of science and technology will benefit from Macfarlane's discussion of how politics, environment and energy systems impacted engineering decisions. The chapters on early hydropower development (chapter 1), on alterations made between the 1890s and 1920s to address erosion (chapter 2), on the mid-century construction of large power stations and diversion of water on grand scales (chapter 4) and the remedial works or engineering interventions of the 1950s and 1960s (chapter 5) will be of particular interest. Unfortunately, the intriguing stories of engineering and research activities which are mentioned throughout the book, including scientific studies of ice formation, hydraulic engineering models or telecolorimeter studies, are not discussed in a more focused way in a separate chapter. It would have been interesting to learn in more detail how Canadian and U.S. engineers, scientists and their organisations competed over knowledge production and expertise leading at times to "national engineering chauvinism" (78), how different cultural assumptions about aesthetics and science created different preferences, for example for a white or greenish-blue shade of the water (67), and how a North American hydraulic epistemic community (62) emerged and developed. Macfarlane provides fascinating findings on all these topics, but his decision to structure his book chronologically leaves them slightly disconnected.

Because Niagara Falls is located at the international border, its history is further embedded in what Macfarlane describes as "hydro diplomacy" between jurisdictions

on the local, state, provincial and federal levels, as well as in the competition between private and public approaches to harnessing hydropower in Canada and the United States and during different time periods. While *Fixing Niagara Falls* helps us understand Canadian energy history, it cannot be told as a national story. Based on extensive archival material from both the United States and Canada, Macfarlane provides a transnational history reminding us of the importance of transcending national confines when studying our energetic pasts. The book further benefits from a wide range of more than fifty captivating images, photos, tables and graphics.

Macfarlane's book is a valuable contribution to North American energy history but also to its water history. There probably is no better person to provide such a history than Macfarlane who has published extensively on both. Those who are more familiar with his work may recognize some of the findings from previously published journal articles on Niagara Falls. This is not meant to downgrade his achievement in any way. *Fixing Niagara Falls* is a well-written and thoroughly researched history of a group of waterfalls, which have been adored for their natural beauty and engineered for their energetic power. Cognizant of the extractive mentality underlying hydropower and referring to the increasing terraforming of our planet, Macfarlane also uses his story to remind us that hydroelectricity may not be such a stroke of luck after all as it "is not nearly as environmentally benign as many claim." (204).

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