

CONSERVATION AND CLIMATE CHANGE

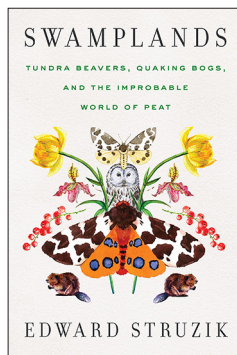
Swamplands: Tundra Beavers, Quaking Bogs, and the Improbable World of Peat

By Edward Struzik. 2021. Island Press. 312 pages, 39.95 CAD, Hardcover, 33.95 CAD, Paper, 29.99 CAD, E-book.

Swamplands focusses on the preservation and restoration of peatlands (swamps, bogs, and fens) in Canada and the United States. Throughout the book, Struzik relies on current research and interviews with active researchers to emphasize that peatlands are globally the most important ecosystem for storing carbon and controlling the effects of climate change. The book will be appreciated by all those readers looking for a comprehensive introduction to these essential and diverse ecosystems.

Each *Swamplands* chapter begins with a short story about an individual researcher followed by the ecological history and current state of preservation or restoration taking place at a particular location. Struzik's conversational writing style effectively brings uninitiated readers into the story. Each chapter stands alone, summarizing the subject with enough depth to leave the reader informed but not overwhelmed, and providing a set of Notes at the back of the book for those wishing to explore topics in more detail. However, reading the book in sequence leads to an improved understanding of the context and challenges facing peatland reclamation and preservation.

The first two chapters set the historical context by contrasting two views of North American swamplands that began with early European settlers and persist today. One perspective views peatland as not only worthless but also a danger to public health. The other, more closely aligned with those of Indigenous people who adapted to peatlands rather than subdued them, is exemplified by Henry David Thoreau—"without wetland the world would fall apart" (p. 60)—and the ironically named George Perkins Marsh, who supported considerations of peatland preservation and restoration during development in the latter half of the



19th century and urged all to become a "co-worker with nature" (p. 60).

Struzik devotes four chapters to the American perspective on species restoration. He looks at North Carolina's swamplands, the preservation of Hawaii's tropical peatlands, peaty wetlands formed around ponds in Mojave Desert oases, and western Alaskan tundra peatlands. Canadian perspectives on preservation issues are described in five chapters, which include discussions of the small Wagner Fen in Alberta, Ontario's Georgian Bay peatlands, Alberta's Crowsnest Pass peatlands, the Hudson Bay Lowlands, and ending in High Arctic peatlands.

Each chapter explores the following points about peatland ecological value, preservation, and restoration:

1. Peatlands are evolutionary petri dishes and often contain endemic species and rich species assemblages (e.g., over 2000 arthropods and 16 of the 26 orchid species native to Alberta are in Wagner Fen, Alberta).
2. They have unique habitats that are critical to individual species. Larval development of rare Aweme Borer (a small brown moth) depends on Buckbean, which only grows in peatland sedge mats. Rattlesnakes use peat for overwintering in Georgian Bay. The Hudson Bay Lowlands serve as breeding grounds for migratory birds (e.g., Hudsonian Godwit), and peaty hillsides provide dens for Polar Bears. As an aside, each of these species has been recently assessed by The Committee on the Status of Endangered Wildlife in Canada (COSEWIC; Government of Canada 2022).
3. Restoration and preservation projects depend on the efforts of dedicated individuals within governments, citizen scientists, local volunteer groups, and non-governmental organizations (NGOs) like The Nature Conservancy, which has made preservation purchases of several peatland sites in Canada and the United States.
4. Restoration and preservation projects commonly

encounter conflicting objectives among user groups, such as deer hunters fearing that Red Wolf restoration will threaten local deer populations in North Carolina's Albemarle-Pamlico Peninsula wetlands.

The final two chapters of *Swamplands* focus on whole ecosystem restoration of peatlands extracted for resource use and the increasingly precarious areas of warming permafrost that are poised to release large amounts of stored carbon and encourage, rather than mitigate, climate change effects.

Line Rochefort, a scientist at Université Laval, has worked on the restoration of more than 100 peatlands, including work with a company that extracts peat for horticultural products in Saint-Fabien, Quebec. Rochefort's restoration technique depends on the presence of an intact foundation that can be conditioned so that reintroduced sphagnum and brown mosses will promote peat growth. Thus far, restoration of early succession plants has been successful, but restoring the later successional plants requires additional time and work.

The area affected by Alberta's oil sand peatland extraction is much larger than the Saint-Fabien peatland and the production process has not left an intact reclamation foundation. Efforts to restore oil sand peatland have been unsuccessful.

Struzik also provides a comprehensive review of projects directed at reversing or stalling the destruction of peatland from warming permafrost. The mixture of approaches and the intense debates over unintended consequences are summed up by Rebecca Rooney, an aquatic ecologist at the University of Waterloo:

if this continues without a clear wetland reclamation policy, we will have more than 65 percent less peatland and very little of the plant and animal life that existed there in the past. (p. 246)

Struzik describes the wide variety of environments in which peatlands exist and the large number of diverse projects proposed for their preservation, reclamation, and use. *Swamplands* closes by emphasizing the importance of developing an objective and consistent framework for evaluating the relative costs and benefits of pursuing one peatland restoration project over another. Large-scale comparative experiments, like Spruce and Peatland Responses Under Changing Environments (SPRUCE) managed by the U.S. Forest Service in Minnesota, will be essential for quantifying the costs of restoration, the value of ecosystem functions (e.g., storing carbon, filtering water, mitigating floods, and creating animal refuges), and the economic benefits of resource extraction over a range of environmental conditions.

Swamplands reminds us that each new energy source—peat, coal, and oil—was promoted as essential in its time. The book documents the environmental scars and cumulative effects that remain while we search for new energy sources. Most importantly, *Swamplands* contributes to discussions on how to create a sustainable future and avoid repeating past errors. Whether at home or the library, this book belongs on an accessible shelf next to Aldo Leopold's *A Sand County Almanac* (Oxford University Press, 1949) and Rachel Carson's *Silent Spring* (Houghton Mifflin, 1962). You will be referring to all three soon.

Literature Cited

Government of Canada. 2022. Species at risk public registry. Government of Canada, Ottawa, Ontario, Canada. Accessed 19 October 2022. <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>.

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