

Politics

Hudson Bay Lowlands show recent effects of global warming

Ecosystem had escaped effects of climate change until about 15 years ago

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An aerial view shows the landscape typical of the Hudson Bay Lowlands in Ontario. A new study of lake sediment core samples by Queen's University researchers shows the area has warmed rapidly in the last 15 years. (Kathleen Ruehland/Queen's University)

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A bastion of pre-industrial Arctic ecology is finally — and rapidly — succumbing to the effects of climate change, according to a new report released in the Proceedings of the Royal Society B.

The Hudson Bay Lowlands, a vast area of lakes, rivers, peat bogs and polar bears on the western shore of Hudson Bay and James Bay, began warming in the mid-1990s — unlike other parts of the Arctic and sub-Arctic, which started heating up decades before.

"This would have been predicted. It was going to happen. It has happened," said John Smol, a Queen's University biologist and co-author of the report titled Global Warming Triggers the Loss of a Key Arctic Refugium.

What is a refugium?

The Hudson Bay Lowlands were protected from the effects of climate change by the bottleneck of ice in the bay that kept the surrounding region cold, Smol explained. The area reached a tipping point about 15 years ago and has warmed on average by about three degrees.

An area of relatively unaltered climate that is inhabited by plants and animals during a period of continental climatic change.

— Merriam-Webster

Smol and his team were able to draw these conclusions by taking core samples of sediments from the bottom of four lakes that drain into the Sutton River in northern Ontario. Some of the cores went back as far as 200 years, near the beginning of the Industrial Revolution.

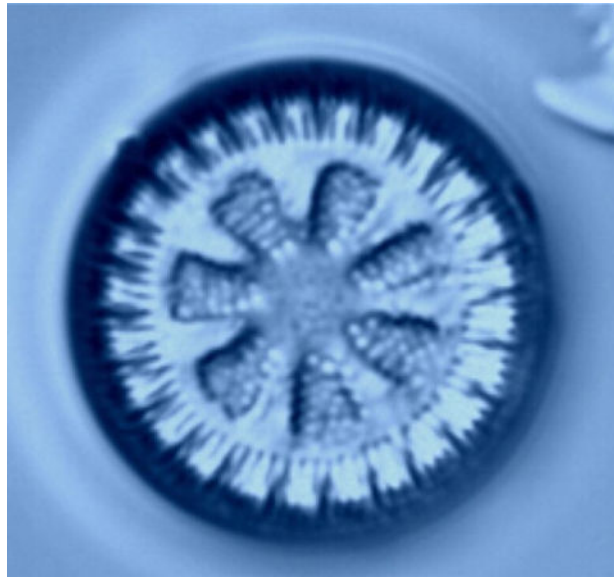
"Every time you see a lake, it's a history book of what happened, not just in the lake, but in the catchment and the area around it. It's constantly capturing historical information if you know how to tease it apart," he explained.

Smol knows just how to do that. He studied changes in algae deposited over decades at the bottom of the lake.

What he found was "not a good news story."

Feedback loops

"We're entering a regime shift because it's really quite a different change in the lake," Smol told the CBC. There is much less ice cover, warmer water and temperatures in the lake are stratifying. The Sutton River has also seen mass die-offs of brook char — a sport fish — because of the rising temperatures.



Photomicrograph of a planktonic diatom: *Cyclotella antiqua*. This is a building block of a type of algae found in the lakes in the Hudson Bay Lowlands. (Kathleen Ruehland/Queen's University)

Smol believes that the warming will create positive feedback loops. He saw these effects in studies he conducted in the High Arctic.

"You have whole changes in water chemistry, that changes the food web. Some ponds will totally disappear. Some of the wetlands will dry up. You will start getting this whole chain reaction of events," he explained.

Smol and his co-authors dedicated their study to Dr. Klaus Hochheim, a University of Manitoba climate scientist who died in a helicopter crash [in the Northwest Passage](#)

[last month](#). He was leading a research group on the Canadian Coast Guard icebreaker Amundsen. Hochheim died along with the pilot, Daniel Dubé, and the Amundsen's captain, Marc Thibault.

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