

# Research: A way of life in peril as inland lakes and rivers fail to freeze

December 18 2019

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Credit: Lesley Knoll. Ice anglers take part in the 2019 Park Rapids American Legion Fishing Derby.

Melting glaciers and rising sea levels are common examples of the effects of climate change. However, there has been far less research on

how a warmer world affects people who need freshwater ice on lakes and rivers. What is known is that ice cover for freshwaters in the Northern Hemisphere has steadily declined for the last 150 years, putting people's cultural and spiritual practices at risk—and potentially their livelihoods.

In a recent study published in *Limnology and Oceanography Letters*, University of Minnesota researcher Lesley Knoll and colleagues report on the cultural impacts of ice loss on inland lakes and rivers. With warmer winters, events of socioeconomic and cultural importance—such as ice fishing tournaments, cross-country skiing and ice-skating races—are increasingly being canceled.

Like many Midwestern states, Minnesota has a long history of ice fishing and is home to dozens of ice fishing tournaments each year that draw participants and tourism dollars to [local communities](#). Examining the relationship between temperature and ice fishing tournaments, researchers found a higher number of tournament cancelations in the central part of the state when average winter air temperatures reached 24.8 degrees Fahrenheit or warmer. Researchers did not see this same relationship in the northern part of the state where it tends to be cooler during the winter.

"Reduced ice fishing during warmer winters has the potential to influence the economy and social network of northern communities. There is often a very social aspect to ice fishing," said Knoll, station biologist at the College of Biological Sciences' Itasca Biological Station and Laboratories. "In addition, lakes in Minnesota with long-term ice records show similar declining [ice cover](#) trends to those documented worldwide."

"The loss of ice currently affects 14,800 lakes and impacts cultural ecosystem services—such as food subsistence, transportation, religious

ceremonies and recreational opportunities—in surrounding communities," said Sapna Sharma, an associate professor at York University and study co-author. "Cultural ecosystem services are an underappreciated resource directly affected by climate change and that is impacting communities that rely on freshwater ice now."

For example, ice roads serve 49 remote First Nations communities in northern Ontario and Manitoba, often connecting communities in the north to those in the south. These winter ice roads are crucial for social, mental health and financial reasons. However, across Canada, the opening of ice roads has been delayed, at times, by as much as three weeks.

A lack of ice also affects centuries long traditions. In Germany, Catholic priests have carried a statue of John the Apostle across a frozen Lake Constance to a church in Switzerland since the 15th century as a sign of friendship. Lake Constance last froze in 1963, marking the last procession between the two countries.

"While each of these issues may seem like only a local concern, for the millions of people living in places where winter ice is in retreat it adds up to a major shift in their relationship to [winter](#)," Sharma said. "It's time that freshwater ice loss is included in the list of major climate change impacts."

**More information:** Lesley B. Knoll et al. Consequences of lake and river ice loss on cultural ecosystem services, *Limnology and Oceanography Letters* (2019). [DOI: 10.1002/lol2.10116](https://doi.org/10.1002/lol2.10116)

Provided by University of Minnesota

Citation: Research: A way of life in peril as inland lakes and rivers fail to freeze (2019, December 18) retrieved 25 April 2024 from <https://phys.org/news/2019-12-life-peril-inland-lakes-rivers.html>

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