How global warming is reshaping winter life in Canada

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As we begin to emerge out of yet another mild winter, Canadians are once again being reminded of just how acutely global warming has changed Canada's winter climate.

The impacts of this mild winter were felt across the country and touched all aspects of winter culture. From melting ice castles at Québec's winter carnival, to a dismal lack of snow at many Western Canada ski resorts, seemingly no part of Canada was unaffected. But the change that will likely be felt most keenly by many Canadians is the loss of a reliable outdoor skating season.

For the second year running, Ottawa's Rideau Canal Skateway was closed for what should be the peak of the skating season. In 2022-2023, the Skateway did not open at all for the first time ever. This winter, a portion of the Skateway opened briefly in January, but continuing mild temperatures forced a closure again after only four days of skating. In Montréal, fewer than 40 percent of the city's outdoor rinks were open in the middle of February.

There is no obvious upside to this story. Outdoor skating in Canada is fast becoming the latest casualty of our failure to confront the reality of the climate crisis.

On thin ice

More than a decade ago, our research group published our first analysis of how outdoor skating was being affected by warming winter temperatures in Canada. We showed that even as of 2005, there was already evidence of later start dates, and shorter skating seasons across most of the country.

These conclusions were echoed by subsequent publications from the RinkWatch project, which has reported consistent declines in skating season length and quality in many Canadian cities.

Meanwhile in Ottawa, skating days on the Rideau Canal Skateway have been trending downwards over the last 20 years. In this time, the typical

skating season has decreased by almost 40 percent, a trend that is clearly correlated with increasing winter temperatures over the same period.

Moving in the wrong direction

Climate mitigation progress continues to be far too slow.

Global CO_2 emissions reached their highest level ever recorded in 2023, and average global temperatures have now reached 1.3 C above pre-industrial temperatures. If these trends continue, we are on track to reach 1.5 C—the lower threshold of the Paris Agreement temperature target—in less than seven years.

In our 2012 paper, we estimated that suitable rink flooding days could disappear across most of southern Canada by mid-century. In a more recent analysis of Montréal's outdoor rinks, we estimated that the number of viable skating days in Montréal could decrease to zero by as early as 2070.

In hindsight, these and other similar projections may have been far too optimistic. In a study of Rideau canal skating days published in 2015, the authors projected declining but sustained skating conditions throughout this century, even in a high future emissions scenario. The reality of the past two seasons shows that skating conditions have deteriorated far more quickly than predicted.

Global temperatures in 2023 were the highest ever recorded, as were winter temperatures in December 2023 and January 2024. Since 1950, winter temperatures in Canada have increased by more than 3 C, which is about three times the rate of global warming over this same period.

Outdoor rinks require at least three consecutive very cold days to establish a foundation of ice, followed by enough cold days to maintain a

good ice surface. Temperatures above freezing are poorly tolerated by outdoor rinks, and rain is often disastrous.

A few degrees of warming in January and February temperatures can be the difference between a rink that is skatable and one that is not. As winters continue to warm, the case for building and maintaining outdoor municipal rinks will become harder to justify.

A stark and still changing new reality

As years go by without any real progress on climate mitigation, it is becoming increasingly difficult to imagine a future in which outdoor rinks will be widely available without artificial refrigeration. Other winter activities will also be affected by changing snow conditions, but outdoor skating will likely be hit first in direct response to warming winter temperatures.

Wayne Gretzky famously learned to skate and play hockey in Branford, Ont. in the 1960s on an outdoor rink built by his father. Reliable winter skating conditions in southern Ontario are already mostly a thing of the past, and are becoming more and more scarce as global warming progresses. It is increasingly unlikely that current and future generations will be able to follow Gretzky's path.

This reality is both a tragic injustice for many young Canadians and an existential threat to a core aspect of the Canadian winter identity.

Preserving what remains of Canada's winter skating culture will require that we rapidly step up our efforts to drive down CO_2 emissions and stabilize global temperatures. Otherwise, Joni Mitchell's "river I could skate away on" will become an increasingly wishful dream that soon will exist only in the lyrics of old songs.

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