

# The great thaw: Canada must lead climate change battle in a time of disappearing ice and snow

Opinion | BY JOHN POMEROY | December 4, 2024

As a scientist at COP29, I was deeply dismayed to see yet another failure of negotiations to restrict emissions of greenhouse gases to a level that would save our winters and what is collectively called “the cryosphere”—snowpacks, glaciers, lake and river ice, permafrost, sea ice—from destruction this century. Negotiations for what are essentially reparations to economically disadvantaged countries from the countries that became rich by burning fossil fuels have resulted in wholly inadequate support to adapt to the impacts of global heating and transition from dirty fuels like coal and oil. New post-factual regimes are not stepping up to address these concerns and so Canada must offer leadership where we can have impact.

Canadians have become wealthy because we have one-fifth of the stores of surface freshwater on the planet, but this storage is largely because of our long winters, deep snowpacks, massive glaciers and frozen lakes and rivers. Our “frozen water” has acted like millions of small dams, holding back water until the snow melts in spring or the glaciers melt in summer—right when we need it. We have used this to become a continental energy superpower through hydroelectricity. Clean meltwater replenishes our lakes and rivers, supporting wondrous fish populations. It recharges our groundwater and wetlands, and it supplies water for our crops and for the rivers that supply our vast irrigation districts and agricultural exports. It has supplied reliable water to most of the country, except where we have contaminated it through mismanagement.

All of this is now at risk as global heating of more than 1.5 C results in snow droughts in the West, record glacier retreat, record low sea and lake ice cover, the absence of a “real winter” in southern Ontario, algal blooms on our lakes, and record fast permafrost thaw and landscape collapse in the North. Record wildfires destroy our forests and communities whilst poisoning our air and sending yet more carbon to the atmosphere. And temperatures will keep rising due to the persistent failures at 29 COPs to achieve a meaningful reduction in greenhouse gases.

It is now time for Canadians to prepare for “cryospheric destruction” and it is going to be a distressing experience. We must prepare for earlier, smaller, and less reliable snowmelt

and, hence, less reliable river flows and lake levels that supply drinking water, irrigation water, hydropower, and cold-loving fish such as trout and salmon. We must prepare for the end of our beautiful mountain glaciers. We must prepare for minimal sea ice in the Arctic Ocean in the summer and sea level rise on all coasts as glacier melt raises sea levels. We must prepare for ecological devastation in the Great Lakes as they lose their ice cover and winter storms load them with sediment and excessive nutrients leading to harmful algal blooms. We must prepare for permafrost thaw, forest collapse and wildfires burning our boreal and sub-Arctic forests from east to west. And we must prepare for food insecurity as the snowmelt that recharges soil moisture and supplies irrigation in the West dwindles and arrives earlier, if at all.

How can we prepare? First, we must increase the technology measuring these changes so that we can understand them better to find solutions. Expanded snow, permafrost, glacier and water surveys, and new satellites for river levels, ice and snowpacks will provide invaluable intelligence on how fast our cryosphere is being destroyed and early warning on what freshwater is still available. Second, we must better predict these changes to forecast how fast they are, so that we can respond and allocate water resources with forethought and strategy. Third, we must build the capacity and strategies to adapt so that our industries, agriculture, communities and ecosystems can find ways to function without the benefits that the cryosphere has always provided to us, for free. We will have to integrate our approach across national and provincial boundaries, with Indigenous communities and from city to countryside to do this, as well as re-engineer water infrastructure, increase water storage in groundwater, wetlands and lakes, and allocate water more efficiently, equitably, and effectively over our drainage basins. Some adaptations will profoundly change our communities and lives, but will help us avoid abandoning parts of the country that become too dry.

I believe Canada can meet this extraordinary challenge and can lead the way for the world in adapting to this post-cryosphere future—but we must start now with monitoring, science, prediction, and implementation of new resilient water management solutions. The cost of inaction far exceeds that of preparing intelligently, vigorously, and immediately.

*Professor John W. Pomeroy is a snow and ice hydrologist at the University of Saskatchewan (USask) where he is a distinguished professor, UNESCO Chair in Mountain Water Sustainability, director of the Global Water Futures program, and director of the Centre for Hydrology. He co-chairs the United Nations Advisory Board on the International Year of Glaciers Preservation—2025.*

***The Hill Times***