

FACT SHEET

Climate Change and Floods

April 2026

In August 2024, the remnants of Hurricane Debby brought record-breaking floods to Quebec, inundating 55 communities. Just a month before, nearly 10 centimetres of rain fell in Toronto in three hours, overwhelming the city's infrastructure and flooding many homes and businesses. In November 2021, an atmospheric river unleashed record-breaking rain in British Columbia, triggering landslides and floods that caused extensive damage, cutting off main access routes to several areas of the province, severely impairing the economy.

As climate change worsens, Canadians will experience a significant increase in the frequency and intensity of these kinds of flood events. Warmer air, caused by increasing concentrations of heat-trapping gases in the atmosphere, holds more moisture, leading to heavier rainfall and more intense storms. This, combined with melting snow packs, rising sea levels, and changing weather patterns, has created the conditions for more severe and unpredictable flooding. These floods are devastating for communities, economies, and livelihoods.

Climate change is driving increasingly severe and frequent floods

- Because of climate change, most regions in the country will experience [increased rainfall](#), higher extreme rainfall, and increased [severity in coastal storms](#) (Vasseur et al. 2017; Zhang et al. 2019).
- Research shows that climate change [intensifies many contributing factors](#) that combine to elevate flood risk, including heavier rainfall and [storm surges](#) amplified by sea level rise (Denchak 2023; Greenan et al. 2019).
- Climate heating means that [warmer air can hold more water](#) than cooler air, increasing the risk of heavier and more extreme rainfall events. More rain is likely to fall in [short, intense bursts](#) rather than being spread out over a longer period (Westra et al. 2014).
- Increasingly frequent and severe short-duration rainfall events increase the [likelihood of flash floods](#), especially in urban areas, by [overwhelming storm sewers](#) and [drainage systems](#) (Brown et al. 2021; Sandink 2015; Westra et al. 2014).

- Parts of southern British Columbia, Ontario, Quebec, and the Atlantic provinces have seen [an increase of two to three heavy rainfall days](#) per year on average (Vincent et al. 2018; Zhang et al. 2019).
- Climate models project that by the end of the century, an [extreme rainfall event](#) that now occurs once every 20 years in Canada could happen every five years, and the amount of 24-hour extreme precipitation that occurs once in 20 years, on average, is projected to increase by 12 per cent (Zhang et al. 2019).

Floods can severely damage homes and infrastructure, costing billions of dollars

- Flooding is the most common and costly disaster in Canada. In the past decade, floods have averaged nearly [\\$800 million in insured losses annually](#) (Insurance Bureau of Canada 2024).
- Insurers estimate that for every dollar in insured losses from flooding, there are two dollars in [uninsured damage](#) that are borne directly by households and taxpayers (Honegger and Oehy 2016).
- Over [1.5 million homes](#) across the country are located in areas of high flood risk (Ness and Florez Bossio 2024). Eighty per cent of Canadian [cities are built, in whole or in part, on floodplains](#) (Public Safety Canada 2022).
- As extreme rainfall and coastal flooding increase, the annual costs of flood damage to homes and buildings in Canada could grow three to five times by mid-century—amounting to over \$5.5 billion—and reach [as high as \\$13.6 billion](#) by the end of the century (Ness et al. 2021).
- On July 16, 2024, in Toronto, nearly 10 centimetres of rain fell in three hours, leading to massive flooding across the city. The costs of this flooding reached nearly \$900 million [in insurable losses](#), with the total costs likely several times higher (Pereira 2024; Musselwhite 2025).
- Between August 8 and 10, 2024, the remnants of Hurricane Debby brought widespread flooding to southern Quebec and eastern Ontario. Insured losses from this event are roughly \$2.8 billion, making it the costliest extreme weather event in Quebec’s history (CatIQ 2025).
- Canada has experienced five billion-dollar-plus flood events since 2011 (Insurance Bureau of Canada 2023; Manitoba Flood Review Task Force 2013; Insurance Bureau of Canada 2024; Public Safety Canada 2023).
- Many Canadian homeowners believe they have insurance that will pay for repairs and rebuilding after overland flooding, but only about [10 to 15 per cent of households are actually covered](#) (Posadzki 2017).
- The households facing the highest flood risk in Canada either [can’t get flood insurance or can’t afford it](#) because the rates are so high (Public Safety Canada 2022).

More frequent and intense floods put people and communities at risk

- Heavy rainfall events can overwhelm small drinking water treatment systems, [degrading water quality](#) and increasing the risk of waterborne disease outbreaks (Wang et al. 2018).
- Over half of the [waterborne disease](#) outbreaks in the past 50 years in the United States occurred after episodes of extreme rainfall (Charron et al. 2011).
- [Floods can be fatal](#), as people drown while wading or driving through flood waters or are trapped in flooded buildings (Government of Canada 2021).
- [Injuries are common](#) during and after floods due to swiftly moving heavy objects, damaged electrical wiring and appliances, and the risk of hypothermia from cold floodwater (Government of Canada 2021).
- The [psychosocial impacts](#) of flooding are significant, increasing family conflicts, financial stress, and feelings of isolation. In some cases, flooding can trigger or exacerbate mental health conditions such as depression and post-traumatic stress disorder (Glenn and Myre 2022).
- A few months after the Quebec floods of 2019, 44 per cent of those affected had moderate to high symptoms of [post-traumatic stress](#), 21 per cent had symptoms of anxiety disorders, and 20 per cent had developed mood disorders (Institut national de santé publique du Québec 2024).
- Flooded buildings are quickly colonized by mold, fungi, and bacteria, which can cause or [aggravate skin, allergy, eye, respiratory, and gastrointestinal problems](#) such as asthma, conjunctivitis, and otitis (Institut national de santé publique du Québec 2024).

Governments can act to protect communities from worsening flood risk

- Flooding will only get worse as the concentration of heat-trapping gases in the atmosphere continues to increase. Government action to manage this growing risk and limit further emissions is essential.
- Because the impacts of climate change on flooding are already here and getting worse from the emissions that have already occurred, communities and governments must work together to adapt and prepare for increased risk of floods today and into the future.
- Some of the key adaptation actions governments can take to reduce flood risk and protect communities include:
 - **Shifting development away from high-risk flood zones:** To prevent placing more homes in harm's way, provincial and municipal governments could restrict building in areas with high flood risk. Research from the Canadian Climate Institute shows that steering development away from high-hazard areas in the next decade can prevent between \$340 million and \$2 billion per year in new flood losses without limiting housing growth (Ness et. al 2025).

- **Enhancing flood protection infrastructure at the community level:** Investing in new and improved flood protection infrastructure, such as levees, floodwalls, and nature-based solutions, can [cost-effectively safeguard communities at risk](#) of flooding (Ness et al. 2021).
- **Support proactive relocation from high-risk areas:** In a few areas where flood risk is too high to provide adequate protection, governments should engage with homeowners and communities to consider [proactive relocation](#), offering appropriate assistance and incentives for moving to safer areas ([Public Safety Canada 2022](#)).

References and resources

- [Three things governments need to do to protect homeowners and renters from the insurance industry's perfect storm](#) (Bourque 2022)
- [Reporting Extreme Weather and Climate Change: A Guide for Journalists](#) (Clark and Otto 2024)
- [Under Water: The Costs of Climate Change for Canada's Infrastructure](#) (Ness et al. 2021)

Experts available for comment and background information on this topic:

- **Ryan Ness** is Director of Adaptation Research at the Canadian Climate Institute and the lead researcher on the Institute's [Costs of Climate Change series](#) (Eastern Time, English and French).
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References

Bourque, Julien. 2021. "Three things governments need to do to protect homeowners and renters from the insurance industry's perfect storm." December 13. Canadian Climate Institute. <https://climateinstitute.ca/three-things-governments-need-to-do/>

Brown, Craig, Ewa Jackson, Deborah Harford, and David Bristow. 2021. "Cities and Towns" Chapter 2. In *Canada in a Changing Climate: National Issues Report*, F.J. Warren and N. Lulham (Eds). Government of Canada. p. 26

Catastrophic Indices and Quantification Inc.. 2025. "CAD 2.806 B – CatIQ Discloses Updated Industry Loss for the Flooding from the Remnants of Hurricane Debby in August 2024" CatIQ. <https://public.catiq.com/2025/08/12/cad-2-806-b-catiq-discloses-updated-industry-loss-for-the-flooding-from-the-remnants-of-hurricane-debby-in-august-2024/>

Charron, Dominique F., M. Kathleen Thomas, David Waltner-Toews, Jeffery J. Aramini, Tom Edge, Robert A. Kent, Abdel R. Maarouf, and Jeff Wilson. 2004. "Vulnerability of waterborne diseases to climate change in Canada: A review." *Journal of Toxicology and Environmental Health, Part A* 67(20–22): 1667–1677. <https://www.tandfonline.com/doi/10.1080/15287390490492313>

Clarke, Ben, and Friederike Otto. 2024. "Reporting extreme weather and climate change: A guide of journalists." World Weather Attribution. <https://www.worldweatherattribution.org/reporting-extreme-weather-and-climate-change-a-guide-for-journalists/>

Denchak, Melissa. 2023. "Flooding and Climate Change: Everything You Need to Know." *Natural Resources Defense Council*, November 3. <https://www.nrdc.org/stories/flooding-and-climate-change-everything-you-need-know#facts>

Glenn, Nicole, and Maxine Myre. 2022. "Post-Flooding Community-Level Psychosocial Impacts and Priorities in Canada: A Preliminary Report." *National Collaborating Centre for Environmental Health*, November 22. <https://ncceh.ca/resources/evidence-reviews/post-flooding-community-level-psychosocial-impacts-and-priorities-canada>

Government of Canada. 2021. "Climate Change and Public Health Factsheets." *Public Health Agency of Canada*, February 1. <https://www.canada.ca/en/public-health/services/health-promotion/environmental-public-health-climate-change/climate-change-public-health-factsheets-floods.html>

Greenan, Blair J. W., Thomas S. James, John W. Loder, Pierre Pepin, Kumiko Azetsu-Scott, Debby Ianson, Roberta C. Hamme, Denis Gilbert, Jean-Éric Tremblay, Xiaolan L. Wang, and Will Perrie. 2019. "Changes in oceans surrounding Canada"; Chapter 7 in E. Bush and D. S.

Lemmen (Eds.) *Canada's Changing Climate Report*. Government of Canada. p. 343-423.
<https://changingclimate.ca/CCCR2019/chapter/7-0/>

Honegger, Caspar, and Christoph Oehy. 2016. *The road to flood resilience in Canada*. Swiss Re.
https://www.preventionweb.net/files/49295_theroadtofloodresilienceincanada.pdf

Institut national de santé publique du Québec. 2024. "Inondations." *Institut national de santé publique du Québec*, April 3.
<https://www.inspq.qc.ca/changements-climatiques/menaces/inondations>

Insurance Bureau of Canada. 2024. "Severe Weather in 2023 Caused Over \$3.1 Billion in Insured Damage". January 8.
<https://www.ibc.ca/news-insights/news/severe-weather-in-2023-caused-over-3-1-billion-in-insured-damage>

Musselwhite, Beth. 2025. "CatIQ reduces 2024 Ontario flash flooding loss estimate by 9% to CAD 899m" *Reinsurance news*, July 16.
<https://www.reinsurancene.ws/catiq-reduces-2024-ontario-flash-flooding-loss-estimate-by-9-to-cad-899m/>

Ness, Ryan, Dylan G. Clark, Julien Bourque, Dena Coffman, and Dale Beugin. 2021. *Under Water: The Cost of Climate Change for Canada's Infrastructure*. Canadian Climate Institute, September.
<https://climatechoices.ca/wp-content/uploads/2021/09/Infrastructure-English-FINAL-jan17-2022.pdf>

Ness, Ryan, and Camila Florez Bossio. 2024. "High and dry: The rising tide of flood risks and the insurance dilemma." Canadian Climate Institute. March 18.
<https://climateinstitute.ca/flood-insurance-risks-canada/>

Ness, Ryan, Sarah Miller, Camila Flórez Bossio, Ricardo Pelai and Zacharie Carriere. 2025. *Close to Home: How to build more housing in a changing climate*. Canadian Climate Institute.
<https://climateinstitute.ca/reports/close-to-home/>

Pereira, Ana. 2024. "Toronto's 'After' Math: Total Damage from Flash Flood Could Surpass \$1 Billion. Here's How Much Floods Cost Homeowners Every Year." *Toronto Star*, July 17.
https://www.thestar.com/business/toronto-s-after-math-total-damage-from-flash-flood-could-surpass-1-billion-here-s/article_091766d4-4447-11ef-a1ea-eb24413392a4.html

Posadzki, Alexandra. 2017. "Majority of Canadian homeowners not insured for flooding: experts." *The Globe and Mail*, May 8.
<https://www.theglobeandmail.com/news/national/majority-of-canadian-homeowners-not-insured-for-flooding-experts/article34925679/>

Public Safety Canada. 2022. *Adapting to Rising Flood Risk: An Analysis of Insurance Solutions for Canada*. Public Safety Canada, November 10.

<https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/dptng-rsng-flt-rsk-2022/index-en.aspx#s3.2>

Sandink, Dan. 2015. "Urban Flooding and Ground-related Homes in Canada: An Overview." *Journal of Flood Risk Management* 9(3): 208–23.

<https://onlinelibrary.wiley.com/doi/epdf/10.1111/jfr3.12168>

Vasseur, Liette, Mary Thornbush, and Steve Plante. 2017. "Climatic and Environmental Changes Affecting Communities in Atlantic Canada." *Sustainability* 9(8): 1293.

<https://www.mdpi.com/2071-1050/9/8/1293>

Vincent, L.A. X. Zhang, É. Mekis, H Wan, and E.J. Bush. 2018. "Changes in Canada's Climate: Trends in Indices Based on Daily Temperature and Precipitation Data." *Atmosphere-Ocean* 56(5): 332–49. <https://www.tandfonline.com/doi/full/10.1080/07055900.2018.1514579#abstract>

Wang, Yi, Edward McBean, and Bahram Gharabaghi. 2018. "Increased Risks of Waterborne Disease Outbreaks in Northern Ontario Due to Climate Change." *Journal of Water Management Modeling*. <https://doi.org/10.14796/jwmm.c436>

Westra, Seth., H.J. Fowler, J. P. Evans, L.V. Alexander, P. Berg, F. Johnson, E. J. Kendon, G. Lenderink, and N. M. Roberts. 2014. "Future Changes to the Intensity and Frequency of Short-Duration Extreme Rainfall." *Reviews of Geophysics* 52: 522–555.

doi:10.1002/2014RG000464.

<https://agupubs.onlinelibrary.wiley.com/doi/10.1002/2014RG000464>

World Weather Attribution. 2023. "Climate change more than doubled the likelihood of extreme fire weather conditions in Eastern Canada." August 22.

<https://www.worldweatherattribution.org/climate-change-more-than-doubled-the-likelihood-of-extreme-fire-weather-conditions-in-eastern-canada/>

Zhang, Xuebin, Greg Flato, Megan Kirchmeier-Young, Lucie Vincent, Hui Wan, Xiaolan L. Wang, Robin Rong, John Fyfe, Guilong Li, and Viatcheslav V. Kharin. 2019. "Changes in Temperature and Precipitation Across Canada". Chapter 4. in E. Bush, and D. S. Lemmen (Eds.) *Canada's Changing Climate Report*. Government of Canada. pp 112-193.

<https://changingclimate.ca/CCCR2019/chapter/4-0/>