

JULY 24 2025

# CAPACITY BUILDING TOOLS AND RESOURCES FOR CLIMATE ADAPTATION IN CANADIAN MUNICIPALITIES

Dr. Michèle Martin, Climate Training Program Specialist



UNIVERSITY OF  
**WATERLOO**



WATERLOO  
**Climate Institute**

**13** CLIMATE  
ACTION



# PRESENTATION OVERVIEW

- Intro to the Waterloo Climate Institute, our members
- Climate Institute research, data and projects
- Climate adaptation education and training initiatives
- Overview of useful strategies, tools and resources for climate adaptation capacity building in municipalities



# THE WATERLOO CLIMATE INSTITUTE

Established in 2008, we are an Interdisciplinary hub of Waterloo faculty researchers from all six Faculties, hundreds of students, and scientists from partner institutions and government agencies.

- **Research** – Strategic research development and management across priority areas
- **Training and Capacity Building** – Supporting climate action through targeted life-long learning and integration of climate education in academic programs
- **Knowledge Mobilization** – Informing decision makers in policy, practice and innovation through tailored reports, briefs, workshops, data visualization, roundtables, media engagement, and partnerships



# A LEADER IN CANADA

**LARGEST**

**UNIVERSITY-BASED  
CLIMATE RESEARCH  
INSTITUTE IN  
CANADA**



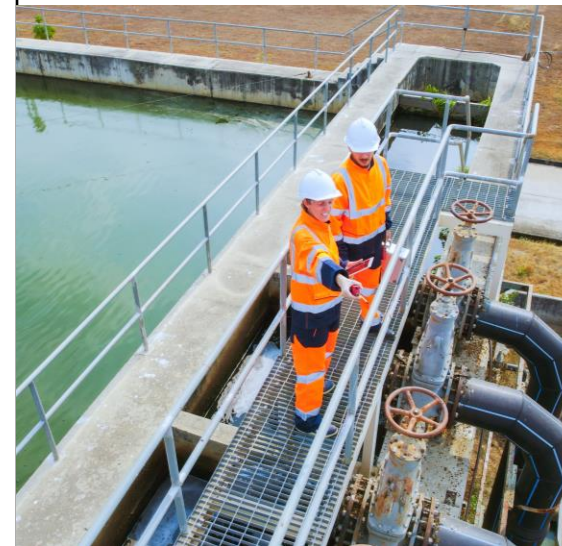
**140+**

**FACULTY MEMBERS  
FROM ALL SIX  
FACULTIES**



**19**

**RESEARCH CHAIRS  
INVOLVED IN  
CLIMATE CHANGE-  
RELATED RESEARCH**



**100's**

**OF STUDENTS  
ENGAGED IN CLIMATE  
CHANGE RESEARCH  
AND EDUCATION**

**ipcc**

**HOME TO HIGHEST  
NUMBER OF  
CANADIAN IPCC  
AUTHORS (AR6)**

# RESEARCH AND DATA



# UWaterloo Research: Municipal Net-Zero Action Research Partnership (N-ZAP)



- Supporting Canadian municipalities to monitor, measure and achieve their greenhouse gas (GHG) mitigation goals.
- Ensuring emissions reduction projects, policies and programs are aligned with Canada's national emissions reduction commitments.
- Advancing quantification of GHG emissions and application of methods

## Waterloo Climate Institute Contributors:

- Amelia Clarke
- Jeffrey Wilson



<https://uwaterloo.ca/implementing-sustainable-community-plans/municipal-net-zero-action-research-partnership-n-zap>

This project was undertaken with the financial support of the Government of Canada.

Ce projet a été réalisé avec l'appui financier du gouvernement du Canada.

**Canada** 

**UNIVERSITY OF WATERLOO**

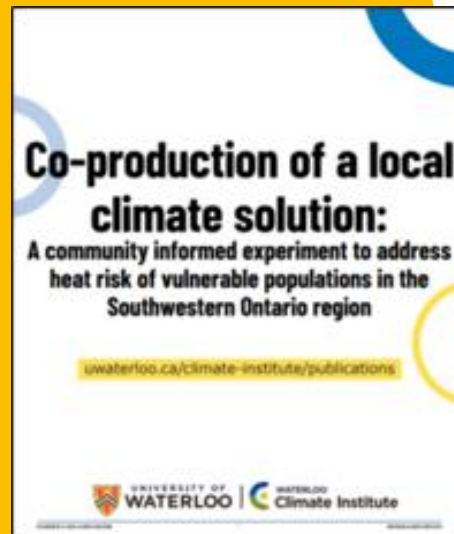
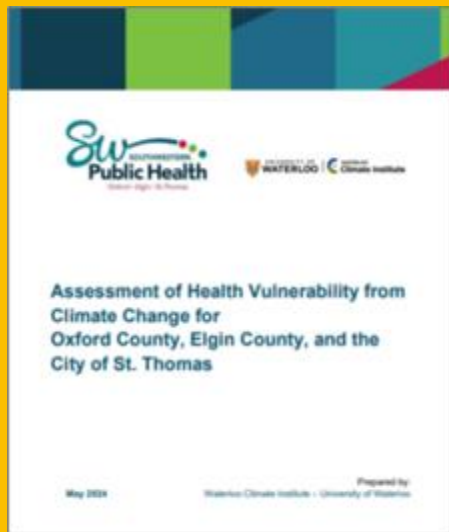
# UWaterloo Research: Health & Climate Vulnerability

## Waterloo Climate Institute Contributors:

- Peter Crank
- Susan Elliot
- Jose Di Bella

## Climate Institute research collaboration with Southwestern Public Health (Ontario) to:

1. Undertake a health & climate vulnerability assessment and create an action plan
2. Pilot project to test adaptation strategies for addressing extreme heat in urban settings
3. Researching health risks and extreme heat



<https://uwaterloo.ca/climate-institute/sites/default/files/uploads/documents/phase-2-final-report.pdf>

<https://uwaterloo.ca/climate-institute/sites/default/files/uploads/documents/final-swph-vulnerability-assessment-report-may-2024.pdf>

# UWaterloo Research: Mitigation of methane emission hotspots from municipal landfills

## Waterloo Climate Institute Contributors:

- Laura Hug
- Maria Strack
- Kyle Daun
- Fereidoun Rezanezhad

This project was undertaken with the financial support of the Government of Canada.

Ce projet a été réalisé avec l'appui financier du gouvernement du Canada.

**Canada**



- Aims to improve methane emission monitoring at landfills by combining soil measurements with hyperspectral infrared imaging.
- Working towards reducing emissions using methane-consuming microbes from landfill cover soils.
- Targeting the large, poorly quantified emissions from Canadian landfills and provides information, tools, and methods for practical solutions.



<https://uwaterloo.ca/mitigation-methane-hotspots/u>



# UWaterloo Research: the Can-Peat Project

## Waterloo Climate Institute Contributors:

- Maria Strack
- Kelsey Leonard
- Richard Petrone
- Fereidoun Rezanezhad
- Philippe Van Cappellen



- Peatlands cover over 12% of Canada's land and could be used as a mitigation tool to reduce ~10 Mt Co<sub>2</sub>e in the year 2030
- Bringing together other experts to reduce uncertainty in this field and evaluate policy supporting implementation
- Using an open access database of peatland distribution, vulnerability, disturbance response, and climate friendly management tools
- Funded by ECCC's Climate Action and Awareness Fund (CAAF)



<https://uwaterloo.ca/can-peat/>

This project was undertaken with the financial support of the Government of Canada.

Ce projet a été réalisé avec l'appui financier du gouvernement du Canada.

**Canada**

# UWaterloo Research: The Climate Risk Research Group



Climate Risk  
Research Group

## Areas of expertise include:

- climate change adaptation;
- climate finance and economic impacts of climate change;
- flood risk policy and governance;
- flood risk analysis and mapping (GIS);
- public engagement and knowledge exchange.



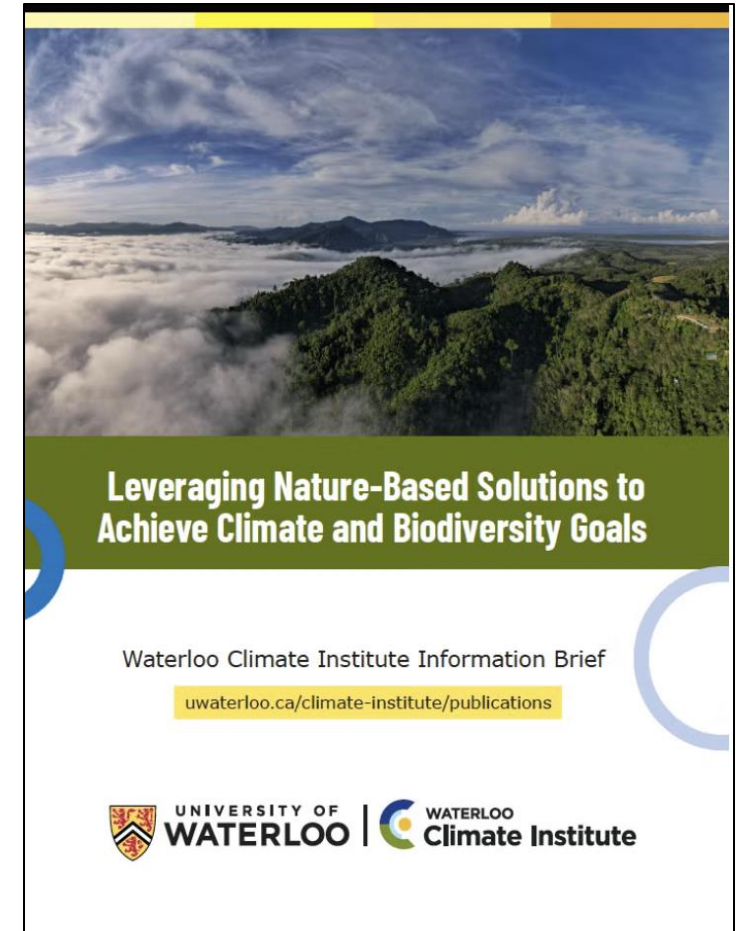
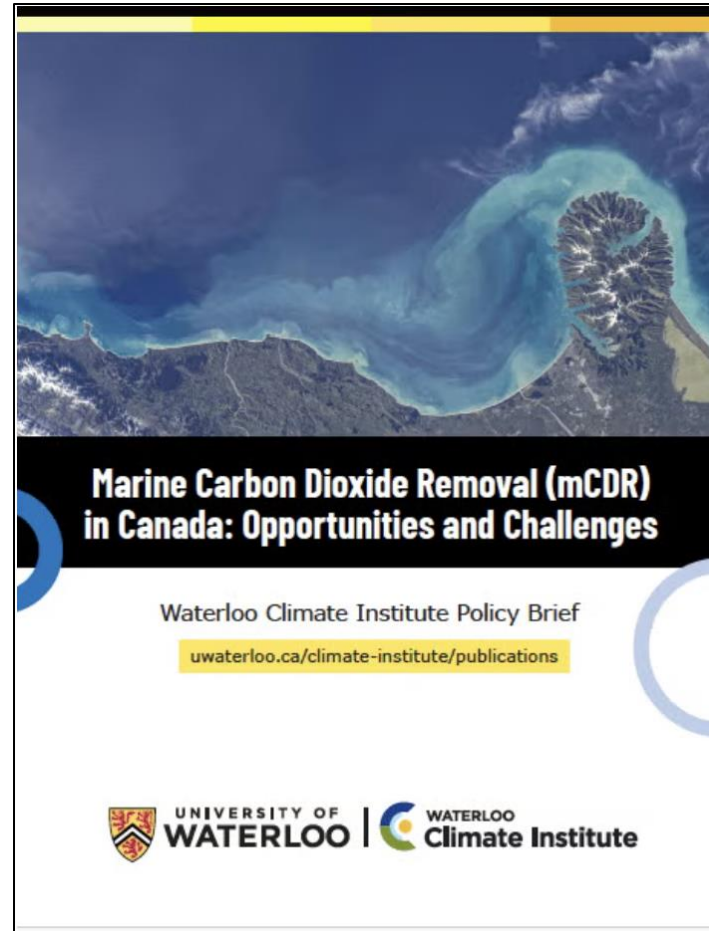
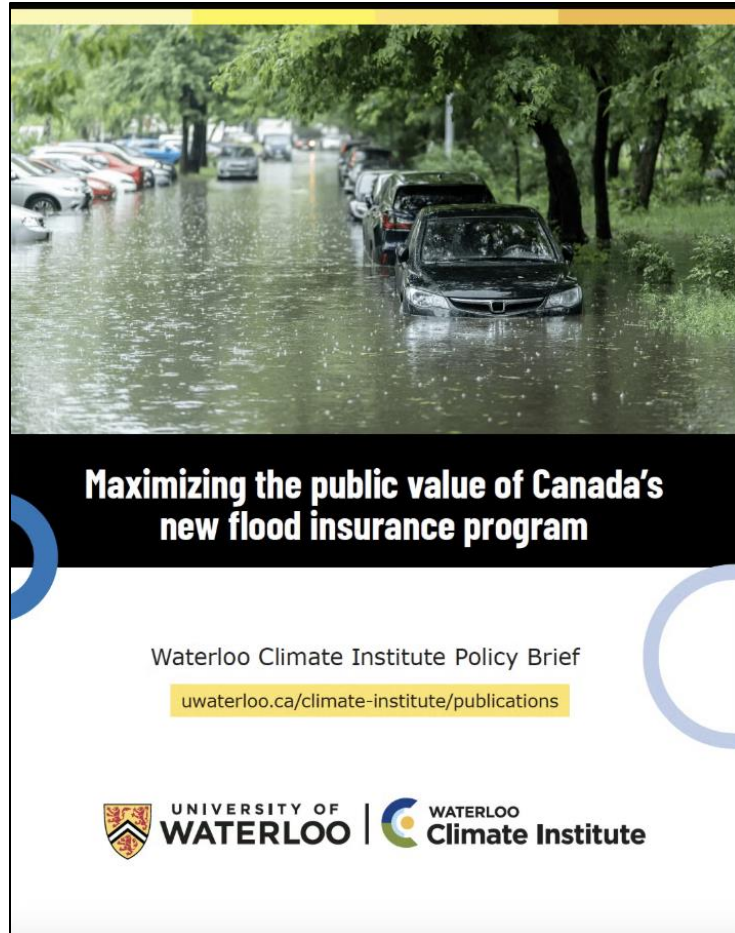
<https://uwaterloo.ca/climate-risk-research-group/>

CRRG is interdisciplinary team at UWaterloo working to support climate change adaptation by providing **evidence-based policy advice**. They partner with practitioners in the public and private sectors and with non-profit organizations to find **practical solutions to climate-related challenges**.

## Waterloo Climate Institute Contributors:

- Daniel Henstra
- Jason Thistlewaite

# CLIMATE INSTITUTE POLICY BRIEFS



<https://uwaterloo.ca/climate-institute/waterloo-climate-institute-briefs>





<https://floodsmartcanada.ca/>

# POLAR DATA CATALOGUE (PDC)

- Managed by the Waterloo Climate Institute
- Repository of metadata and data that describes and provides access to diverse data sets generated by Arctic and Antarctic researchers.
- Records cover a wide range of disciplines from natural sciences and policy, to health and social sciences.
- Available to the public and researchers
- Allows you to search for data using a mapping interface and other parameters.



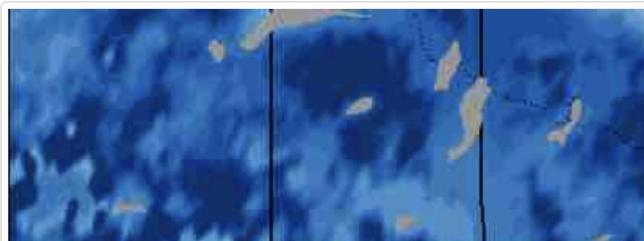
<https://www.polardata.ca/>



## Snow Water Equivalent

The SWE tool shows the depth of water (in mm) that would be produced if the snow melted. The coloured contours show variations in SWE derived from passive microwave satellite data.

[View](#)



## Historical SWE

Interactive map of SWE data for the Canadian Prairies, presented in pentads (5-day periods) for years 1978-2007 and in weeks (7-day periods) for years 2010-2012. The coloured contours show variations in SWE derived from passive microwave satellite data.

[View](#)



## Sea Ice Thickness

This tool can animate and graph ice thickness data after selecting the year and stations to be displayed. The data used has been collected under the Ice Thickness Program Collection from Environment and Climate Change Canada.

[View](#)



## Lake Ice Cover

The interactive Lake Ice tool below shows freeze and thaw dates for a large selection of Canadian and US lakes from 2004 to the present.

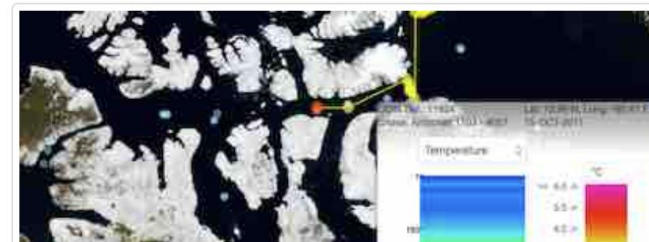
[View](#)



## Historical Lake Ice Cover

This tool shows freeze-up, break-up, ice thickness, and ice-on duration for a network of Canadian lake ice sites (red dots), 1822-1995.

[View](#)



## Map Viewer Application

The Map Viewer visualization tool displays GIS, CTD and Mooring data available in the Polar Data Catalogue, on an interactive map where data points can be clicked to view data at that specific location.

[View](#)



# CLIMATE EDUCATION & TRAINING

# University of Waterloo's ACE Project

*Accelerating Climate Education (ACE) for the Next Generation of Professionals*



## Project Objective:

To accelerate the integration of climate change adaptation (CCA) knowledge and skills Accounting, Architecture, Engineering (Civil, Environmental, Systems Design) and Planning professional degree programs across Canada.

**Timeline:** April 2024 to December 2026

## Funder and partners:



Natural Resources  
Canada

Ressources naturelles  
Canada

Canada



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# Project Activities

For more information contact:  
Dr. Michèle Martin, Waterloo Climate Institute  
[michelep.martin@uwaterloo.ca](mailto:michelep.martin@uwaterloo.ca)

## A) National Needs Assessment - Completed in April, 2025

- National report available [online](#)
- Findings indicate that all programs have somewhat begun to address climate change but much of this is in elective courses. Some programs (architecture and planning) are more advanced than others (engineering and accounting)

## B) University of Waterloo Curriculum Revisions

- Target departments have completed an audit of existing climate/sustainability content and potential entry points for climate learning/action in each program
- Professors, assisted by graduate students, are working on curriculum revisions, aiming for at least 3 new/updated courses per program by end of project
- Climate Action Competency Framework (CACFv2) provides guidance for new learning outcomes

## C) National Community of Practice

- First national forum held in April 2025 - 185 attendees from across Canada
- Series of activities planned to stimulate more dialogue and collaboration among post-secondary instructors and institutions.
- Discussions include program accreditation bodies and how to integrate climate adaptation into provincial and national standards and competencies.





# UNIVERSITY OF WATERLOO MUNICIPAL CLIMATE ADAPTATION CERTIFICATE

Starting January 2026!

This 12-week leading-edge certificate delivered by climate experts will empower participants with specialized knowledge and skills to integrate equity-informed climate adaptation strategies into their work.

Designed for professionals across roles, like accounting, planning, governance, engineering, and community development, the certificate will be delivered in an affordable, flexible, and accessible online format.



GREEN  
MUNICIPAL  
FUND

FONDS  
MUNICIPAL  
VERT

*A program of  
Un programme de la*



*Funded by  
Financé par*



UNIVERSITY OF  
**WATERLOO**



WATERLOO  
**Climate Institute**

### **3 Courses Total**

- Foundations of Climate Risk and Adaptation – 4 weeks
- Specialization – 4 weeks
- Mini-Capstone – 5 weeks

**\$350 per course\***

### **Specialization Courses (choose one):**

- Climate-related Health
- Engineering
- Finance and Accounting
- Governance
- Nature-Based Solutions
- Planning

### **Options for Mini-Capstone**

- 3 days in-person at University of Waterloo
- 5 weeks online

*\* \$200 bursary per course provided for Indigenous community staff, municipal staff, and non-profit organizations*

Don't miss out on this unique professional development opportunity!

Strengthen your climate literacy, learn how to apply a climate lens to your work, and collaborate with like-minded professionals to build climate resilience in communities across Canada.

For more information contact:  
[jenni.hayman@uwaterloo.ca](mailto:jenni.hayman@uwaterloo.ca)

# UWaterloo Graduate Programs in Climate Change



Masters in Climate Change  
(1 year, full time)

Graduate Diploma in Climate  
Risk Management  
(part time, for professionals  
from any background)



## WATERLOO CLIMATE INSTITUTE

[About](#) ▾ [Climate data](#) [Research and resources](#) ▾ [Educational programs](#) ▾ [News](#) [Events](#) [Opportunities](#)

## Illuminate: Climate change simulation game



## Can you solve climate change?

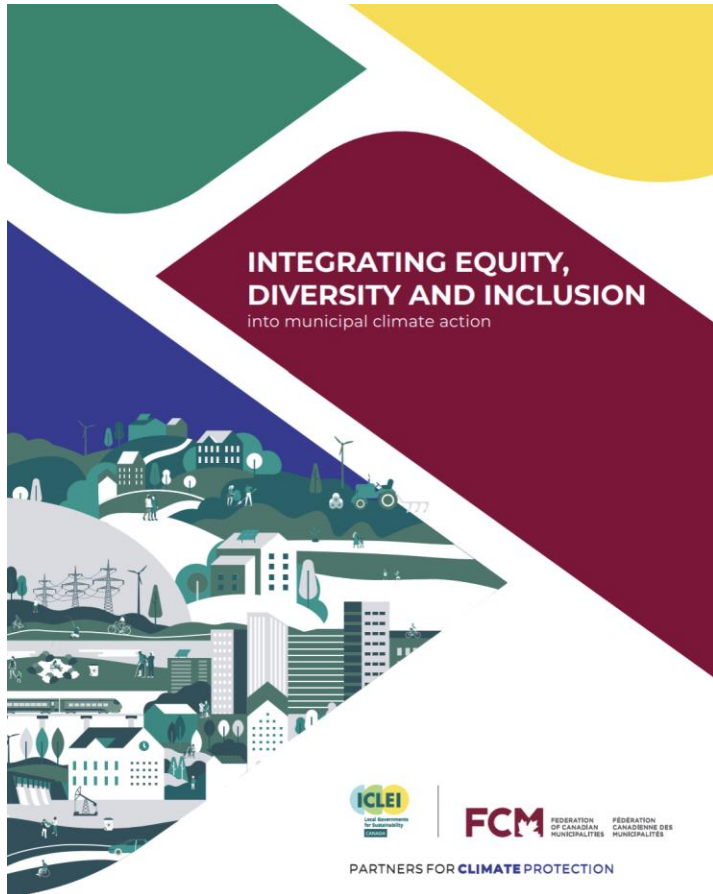
Give it a try in Illuminate — an educational simulation game that aims to teach players about the impacts of climate change, explore ways to reduce greenhouse gas emissions (GHG) and respond to climate risks.

TEST AND DEVELOP YOUR KNOWLEDGE OF CLIMATE SOLUTIONS

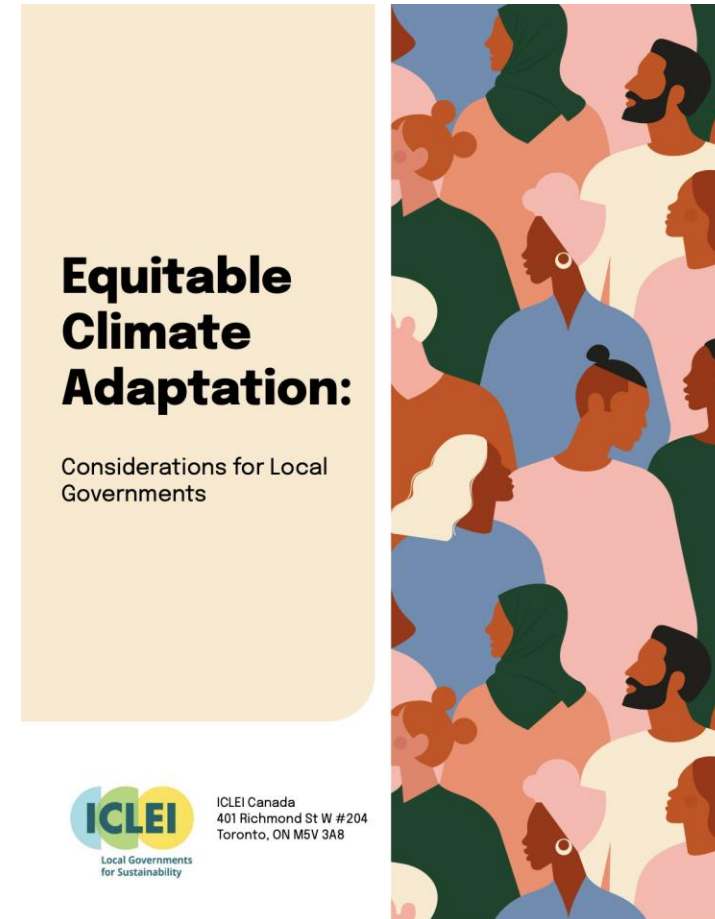
**PLAY THE GAME**<https://uwaterloo.ca/climate-institute/educational-programs/illuminate-climate-change-simulation-game>

# **OTHER USEFUL RESOURCES FOR CLIMATE CHANGE ADAPTATION CAPACITY BUILDING**

# EQUITY AND CLIMATE ADAPTATION



<https://www.pcp-ppc.ca/resources/edi>



<https://icleicanada.org/wp-content/uploads/2022/11/2022-11-08-ICLEI-Equitable-Climate-Adaptation-Considerations-for-Local-Governments.pdf>





# Climate Insight

Helping communities  
build low carbon, resilient  
infrastructure

<https://climateinsight.ca/>

## BUILDING FOR TOMORROW RESOURCES FOR CLIMATE-READY HOUSING AND INFRASTRUCTURE

What would you like to do?



**FIND  
SPECIFIC  
INFORMATION**

Visit the library



**GET  
GUIDED  
ASSISTANCE  
ON A PROJECT**

Start here →



**EXPLORE  
MAPS**

Get geospatial information

# CLIMATE DATA AND INFORMATION



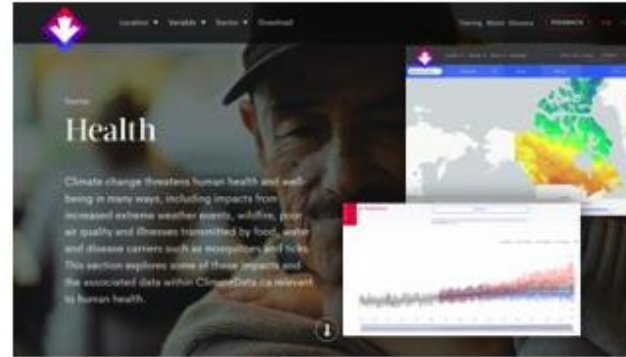
# CLIMAtlantic



## Climate Atlas of Canada

The *Climate Atlas of Canada* combines climate science, mapping, and storytelling to bring the global issue of climate change closer to home for Canadians. It is designed to inspire local, regional, and national action that will let us move from risk to resilience.

This interactive tool is for citizens, researchers, businesses, and community and political leaders to learn about climate change in Canada.



## ClimateData.ca

ClimateData.ca provides high-resolution climate data to help decision makers build a more resilient Canada. Start exploring case studies and downloading location-based climate data by variable or sector.

This platform is supported by the [Canadian Centre for Climate Services \(CCCS\)](#) of Environment and Climate Change Canada as part of its efforts to provide Canadians with easy access to climate related data and to help increase their resilience to climate change.



## Power Analytics and Visualization for Climate Science (PAVICS)

PAVICS is a virtual laboratory facilitating the analysis of climate data. It provides access to several data collections ranging from observations, climate projections and reanalyses. It also provides a Python programming environment to analyze this data without the need to download it. This working environment is constantly updated with the most efficient libraries for climate data analysis, in addition to ensuring quality control on the provided data and associated metadata.

<https://climatlantic.ca/data/climate-data-information/>





# Thank you!

For more information contact:  
**Michele Martin**  
[michelep.martin@uwaterloo.ca](mailto:michelep.martin@uwaterloo.ca)



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