

Natural Assets and their Role in a Climate Resilient Community

October 4, 2023

Navigating the Road to Resilience – LAS IPE Risk Management Symposium

Anabela Bonada, Ph.D.
Manager and Research Associate
Intact Centre on Climate Adaptation
abonada@uwaterloo.ca

Joanna Eyquem PGeo. ENV SP. CWEM. CEnv.
Managing Director, Climate Resilient Infrastructure
Intact Centre on Climate Adaptation
joanna.eyquem@uwaterloo.ca

INTACT CENTRE
ON CLIMATE ADAPTATION

Generously
supported by:



UNIVERSITY OF
WATERLOO

Agenda

- ◆ Introduction to the Intact Centre
- ◆ Climate Change in Canada and Impacts in Ontario
- ◆ What does Extreme Weather cost?
- ◆ Canada's Main Perils: Flooding, Wildfire and Extreme Heat
- ◆ Climate Adaptation Tools at the Watershed and Community Level
- ◆ Climate Adaptation Tools at the Individual Level
- ◆ Key Messages

Intact Centre on Climate Adaptation

- ◆ **Applied research** centre with national focus.
- ◆ Develop **easy to follow, actionable guidelines** to mitigate extreme weather risk (flooding, wildfire and extreme heat).
- ◆ Work with **homeowners, communities, governments, NGO's and businesses.**
- ◆ Shift the national conversation about climate change to address **climate adaptation.**
- ◆ Large media presence – **knowledge mobilization.**

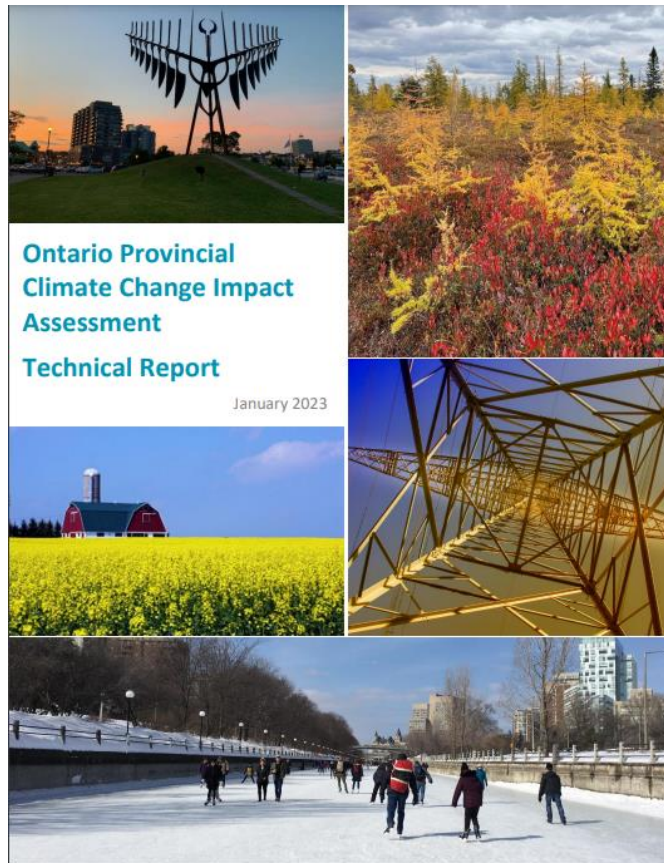


Climate Change in Canada



- ◇ Canada's climate **has warmed and will continue to warm** in the future – driven by human influence.
- ◇ Past and future warming is on average **double** the magnitude of global warming – and **triple** over northern Canada.
- ◇ Warming is effectively **irreversible**, even if we reduce emissions.

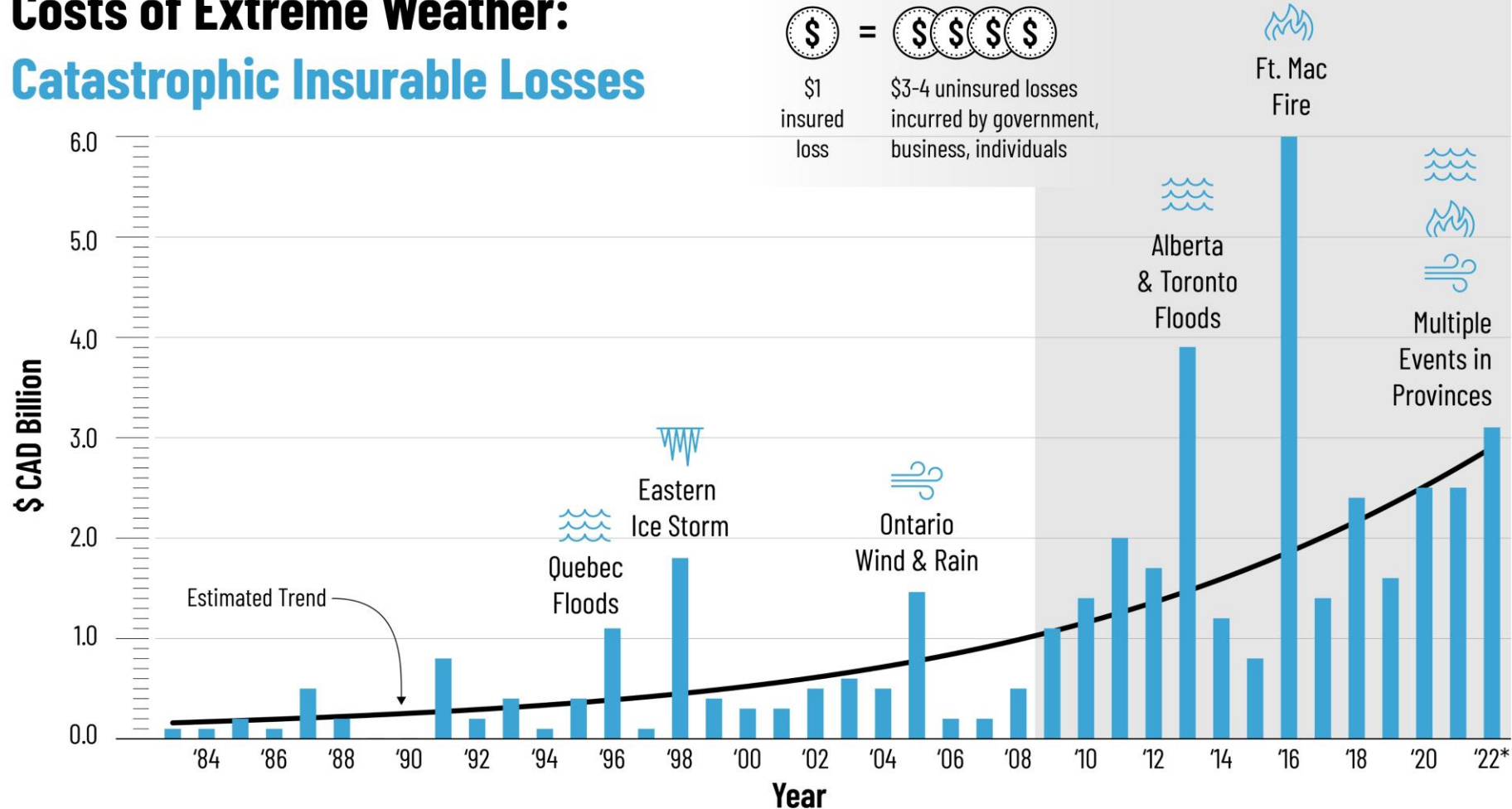
Climate Change Impacts in Ontario



- ◇ Overall, extreme heat, extreme precipitation and seasonal temperature-related impacts are the drivers of highest risks.
- ◇ For some areas, wildfire, drought conditions and seasonal precipitation pose a high risk.
- ◇ If conditions continue as they are now, Ontario's infrastructure, food and agriculture, natural environment, people and communities, business and economy will experience some level of impact (low to very high).

Cost of Extreme Weather

Costs of Extreme Weather: Catastrophic Insurable Losses



Source: IBC Facts Book, PCS, CatIQ, Swiss Re, Munich Re & Deloitte

*2022 preliminary values in 2022\$ CAN, corrected for inflation and per capita wealth accumulation.

Extreme Weather Events



FLOODING



EXTREME HEAT



WILDFIRE

A photograph showing two trees with green and yellow leaves standing in a flooded field. The water is calm and reflects the trees and the clear blue sky above. The scene is peaceful and illustrates the concept of flooding.

Flooding

Flooding

Most **widespread and costliest** peril – residential flooding (\$43,000).

About **9% (3.3 million)** and **11% (3.9 million)** of the Canadian population reside in 1-in-100 and 1-in-200-year floodplains, respectively.

Outside floodplains, **high intensity precipitation events**, make historically safe communities vulnerable to flooding.



Essex County flood on Thursday, Aug. 24, 2023.
Source: TJ Dhir/CBC

Flooding: Residential Real Estate

The cover features a photograph of a flooded residential street with a blue trash bin in the foreground. A callout box in the top right corner shows a house icon and the text 'Flooding Impact on House Price -8.2%'. The title 'TREADING WATER: IMPACT OF CATASTROPHIC FLOODING ON CANADA'S HOUSING MARKET' is prominently displayed in white text. Logos for the University of Waterloo and the Intact Centre are in the top left. A list of topics is in the bottom left, and logos for Intact, CMHC, and GRI are in the bottom left. The authors' names are in the bottom right, and the date 'February 2022' is at the very bottom.

UNIVERSITY OF WATERLOO
INTACT CENTRE ON CLIMATE ADAPTATION

Flooding Impact on House Price
-8.2%

TREADING WATER: IMPACT OF CATASTROPHIC FLOODING ON CANADA'S HOUSING MARKET

- Sold Price
- Days on Market
- Houses on Market
- Mortgage Arrears & Deferrals

Supported by:
intact CMHC SCHI GRI GLOBAL RISK INSTITUTE

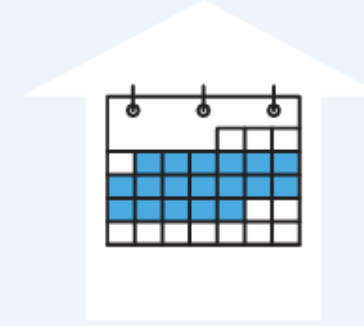
Kathryn Bakos
Dr. Blair Feltmate
Chris Chopik
Cheryl Evans

February 2022

8.2% reduction
in average sold price
of house



19.8% increase
in average days on
market to sell a house



44.3% reduction
in average houses listed
for sale



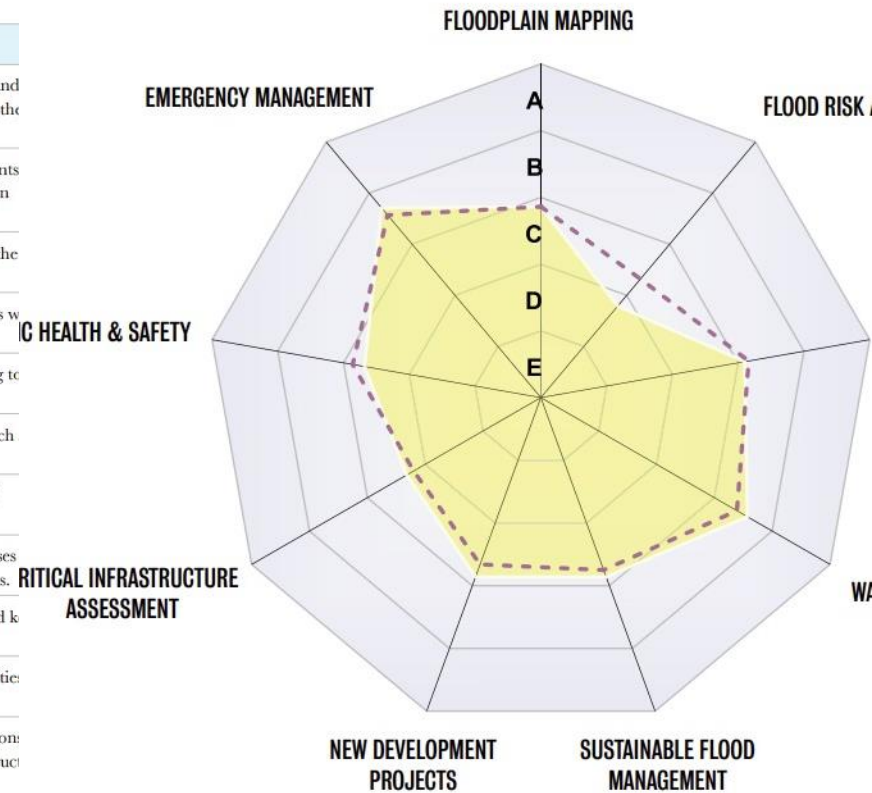


CLIMATE CHANGE

AND THE PREPAREDNESS OF CANADIAN PROVINCES AND TERRITORIES TO **LIMIT FLOOD RISK**

Table 1: Description of criteria utilized to assess the flood preparedness of Canadian provinces and territories.

| CRITERIA | DESCRIPTION |
|---|--|
| Floodplain Mapping | Floodplain maps delineate areas expected to flood, which can provide a basis for land planning. The creation and regular update of floodplain maps is vital for reducing the impact of flooding. |
| Hazard Mapping | Hazard maps, used by the territories, delineate areas predisposed to hazardous events including permafrost degradation. Maps are used primarily for land-use planning in Northern Canada. |
| Flood Risk Assessment | Flood risk assessments define the probability that floods occur in a given area and the consequences of flooding for people, properties, and infrastructure. |
| Hazard Risk Assessment | Hazard risk assessments define the probability that hazards occur in a given area as well as the consequences of such events for people, properties, and infrastructure. |
| Land Use Planning | Land use planning manages development activities to minimize the risk of flooding to property, and infrastructure. |
| Waterway Management | Waterway management regulates actions to ensure that waterway modifications such as widening, deepening, realigning or clearing rivers do not increase risk of flooding. |
| Sustainable Flood Management | Sustainable flood management focuses on the protection of the natural features of floodplains, which may include residential relocation. |
| New Development Projects | The assessment of new development projects, with multi-decade service lives, focuses on changing of climatic conditions and the sensitivity of these projects to such changes. |
| Critical Infrastructure (CI) Assessment | CI assessments focus on the vulnerability of existing critical systems to flooding and measures and actions to enhance their flood resilience. |
| Public Health and Safety | Public Health and Safety assessments focus on flood risks affecting healthcare facilities, dams, flood protection infrastructure and abandoned contaminated sites. |
| Emergency Management | Emergency management assessments focus on flood risks affecting emergency response and recovery operations including contingency planning for businesses and infrastructure owners/operators. |



How prepared is Ontario for flood?



Extreme Heat

Extreme Heat

Extreme temperatures and heat waves already occur across Canada and will become more extreme in the future.

Impacts

Extremely hot temperatures and heat waves can be deadly and have a severe impact on:



Infrastructure and Services

- Electrical distribution problems
- Disrupted digital and telecommunications services
- Damage to transportation infrastructure - rail, roads, bridges
- Reduced water availability
- Increased demand for health and social services



Health

- Increase in physical health issues and heat-related deaths
- Adverse effects on mental health and wellbeing
- Increased challenges for populations at risk e.g. older adults, low income families, homeless people



Natural Environment

- Water-stressed plants
- Reduced insect populations
- Changes in bird communities
- Reduced water quality



Economy

- Reduced economic productivity
- Increased costs of loss of life and reduced quality of life



Heat-related deaths

619 in British Columbia 2021 86 in Quebec 2018

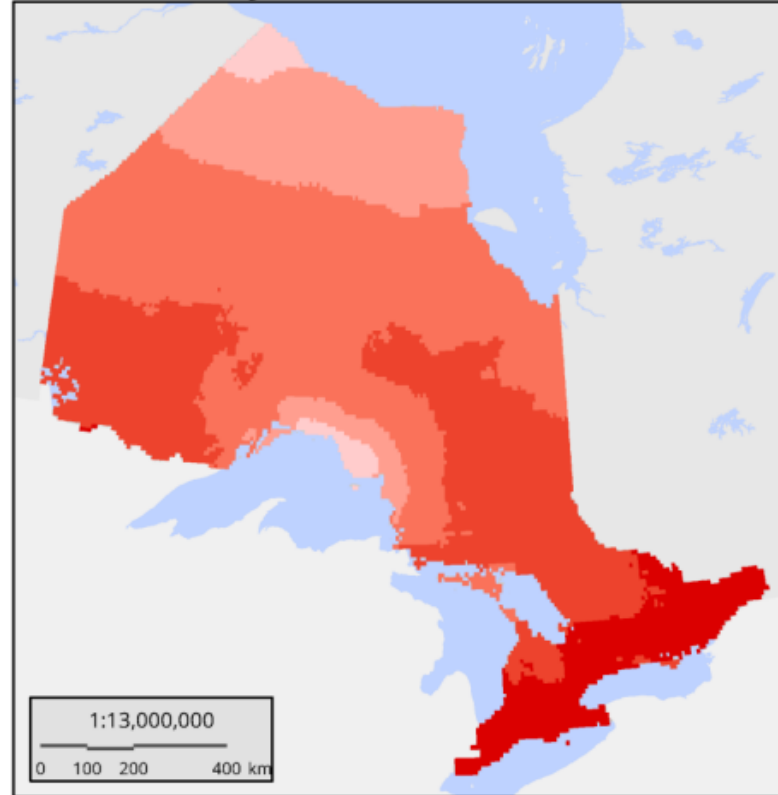
Who are the most vulnerable?

| Risk Factors | Populations at Risk |
|--|--|
| Increased exposure to extreme heat | <ul style="list-style-type: none"> • People living in urban-heat-island areas with limited vegetation and natural habitat • People living outdoors • People living in housing that is poorly adapted to extreme heat (higher floors of apartment buildings; prisons; housing without access to air conditioning or without ventilation) • People with mobility issues • People who are socially isolated (living alone, do not leave home) • People who work in the heat (outdoors and indoors) • People who exercise in the heat |
| Increased sensitivity to extreme heat | <ul style="list-style-type: none"> • Older adults • Infants and young children • Pregnant women • People with chronic illnesses such as breathing difficulties, heart conditions, obesity or diabetes • People living with mental illness • People who are malnourished or dehydrated • People taking certain medications • People taking certain drugs or alcohol |
| Limited access to resources and/or information | <ul style="list-style-type: none"> • People with low incomes • People experiencing homelessness • People living in underserved communities • People who neither speak nor understand English or French |

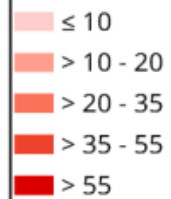
Extreme Hot Days - Baseline



Extreme Hot Days - 2080s (RCP8.5)



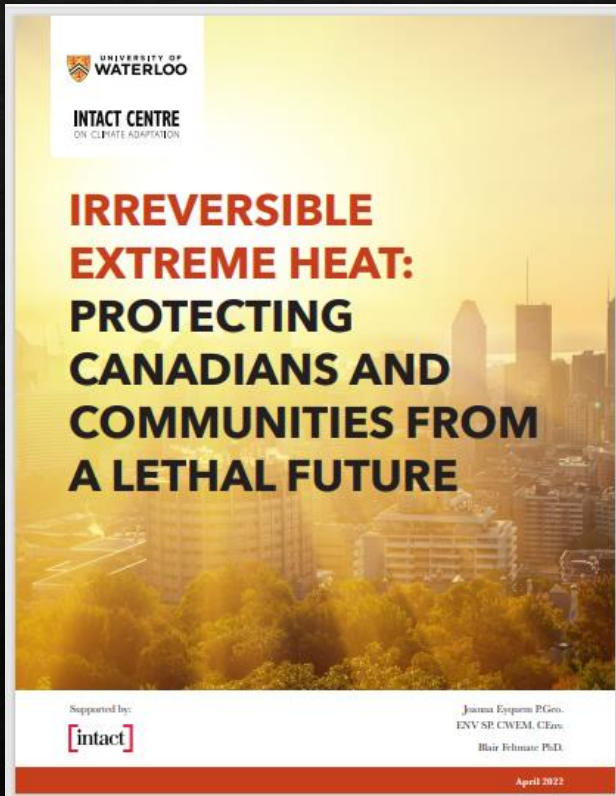
Extreme Hot Days Average Annual Count



Average Annual Number of Extreme Hot Days (>30°C).
Left illustrates current conditions, right shows 2080s
conditions under RCP8.5.

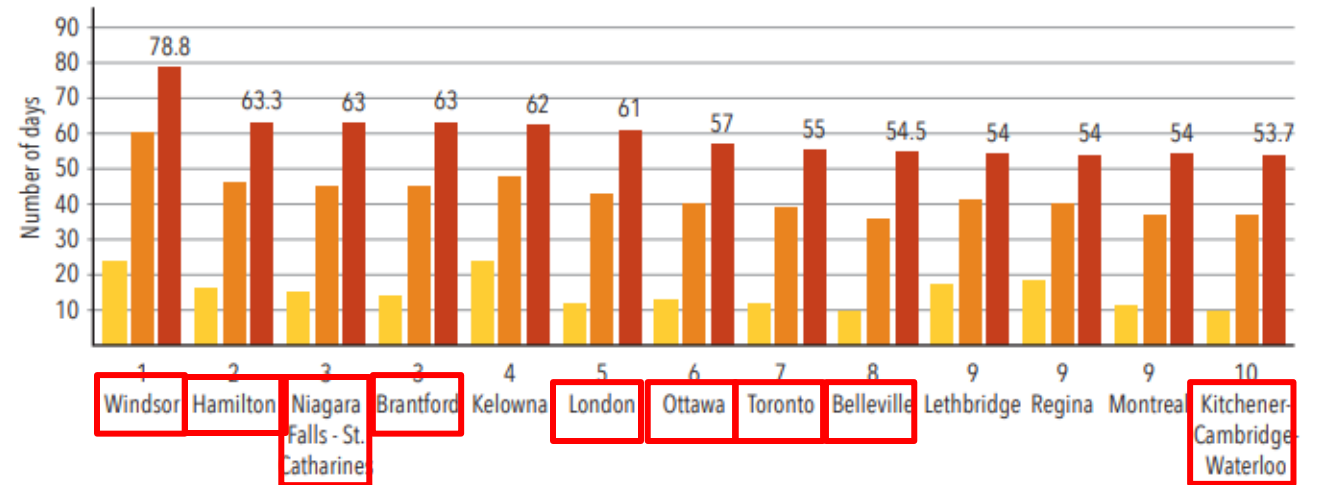
Source: Ontario Provincial Climate Change Impact Assessment
– Technical Report (2023).

Irreversible Extreme Heat



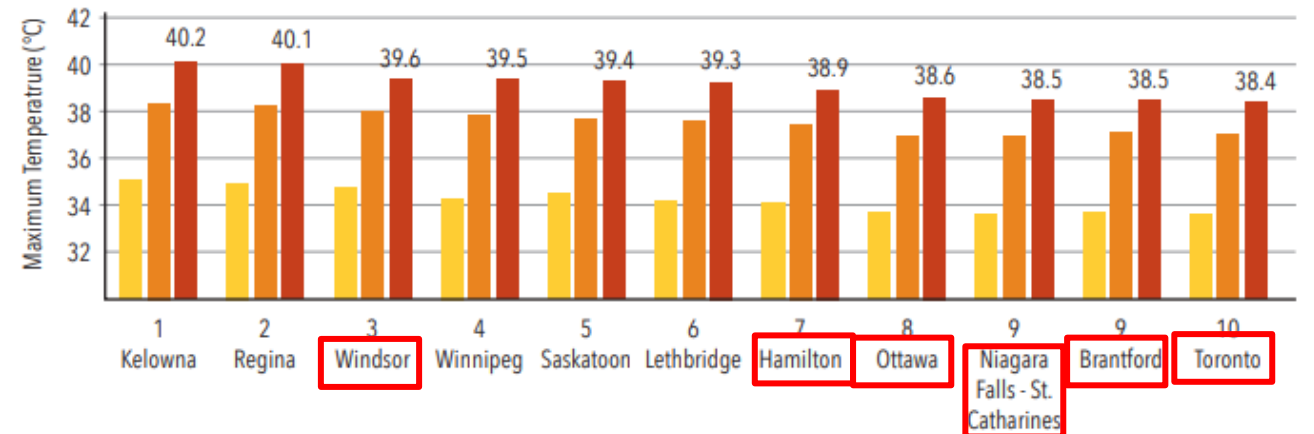
Number of very hot days +30°C

Recent history (1976-2005) 2051-2080 Low Carbon 2051-2080 High Carbon



Warmest Maximum Temperature

Recent history (1976-2005) 2051-2080 Low Carbon 2051-2080 High Carbon



An aerial photograph capturing a wildfire as it spreads through a dense forest. The fire is visible as a bright orange and yellow line, winding across the landscape. The forest is a mix of green trees and charred, blackened remains. Plumes of white smoke rise from the fire, partially obscuring the sky. The word "Wildfire" is written in a white, serif font across the center of the image.

Wildfire

Wildfire

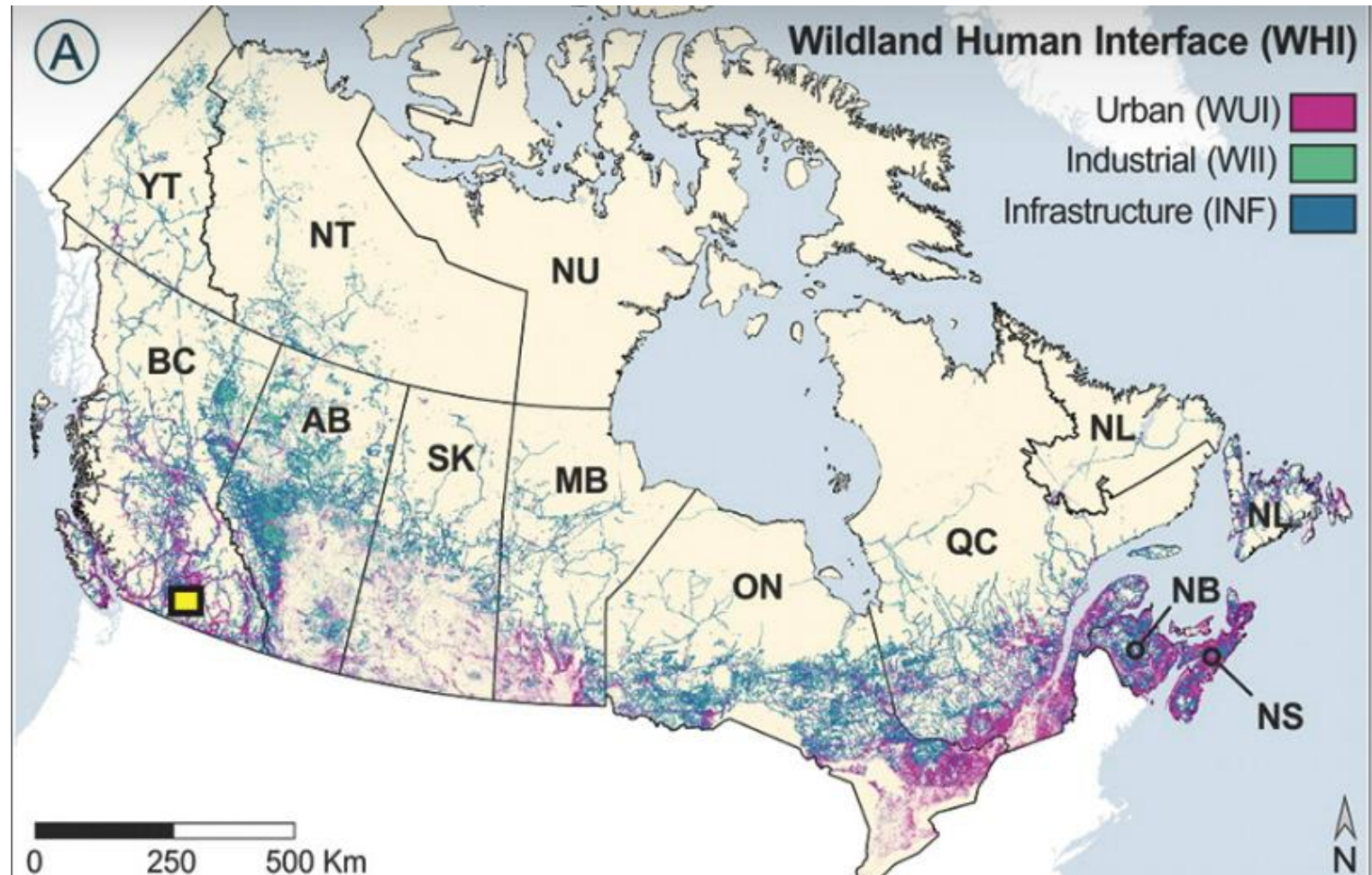
- ◆ Wildfire is a **natural process** – maintains boreal forest ecosystem health.
- ◆ When wildfires **shift** from consuming wildland fuels to human structures their impact on communities can be catastrophic.
- ◆ Impacts vary across the country and shift from year to year.



2018 Perry Sound wildfire.
Source: Canadian Press

Wildland-urban Interface (WUI)

- **Wildland-urban interface:** the area where human settlement meets and intermingles with the natural environment.
- **96%** of communities have at least some WUI and **60%** have more than 500 hectares of WUI.
- About **12.3%** of the population live in the WUI, of which **32.1%** are on-reserve First Nations.



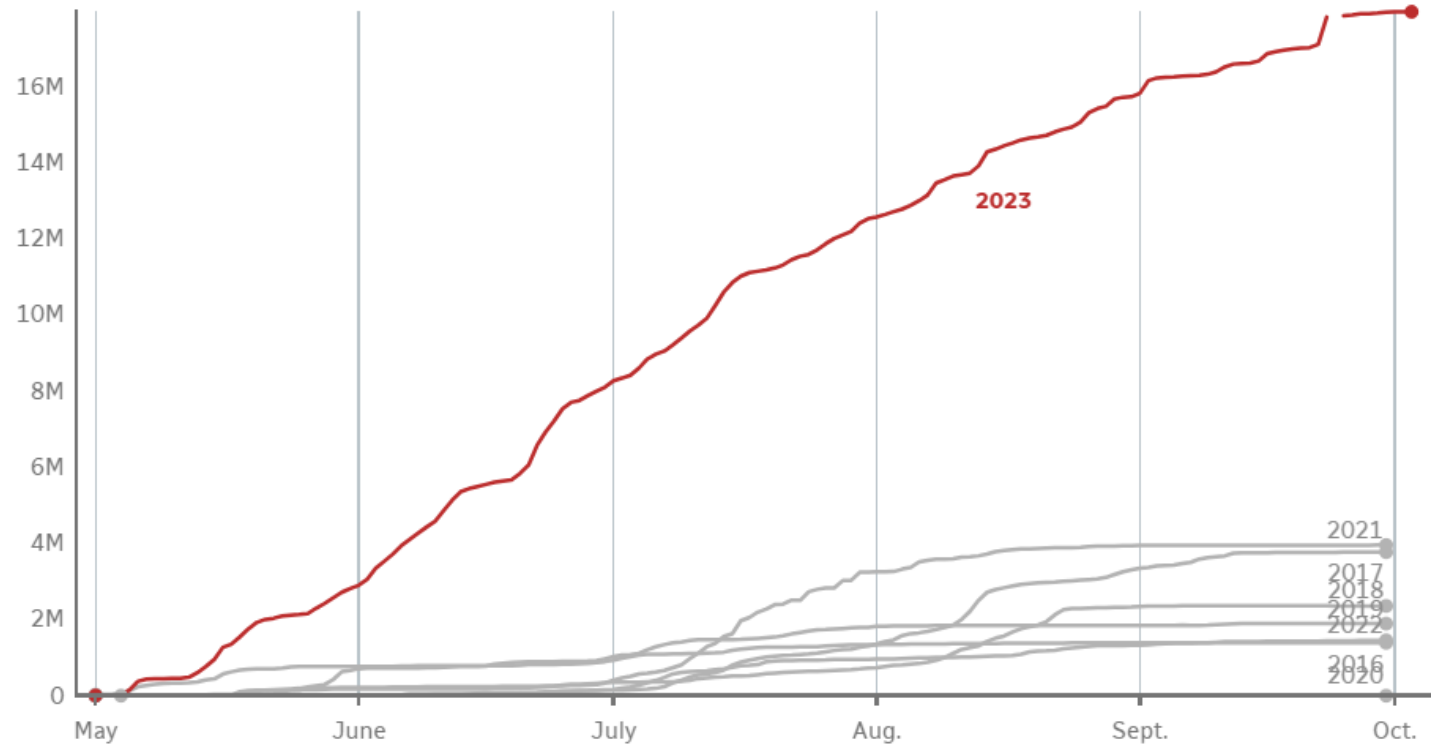
Source: Erni et al. (2021). Exposure of the Canadian wildland–human interface and population to wildland fire, under current and future climate conditions. *Canadian Journal of Forest Research*. 51(9): 1357-1367.

Wildfire and Climate Change

- ◆ **Wildfire risk** is increasing across Canada
- ◆ **Fire season** starts earlier and ends later
- ◆ **Jet Steam** changes allow heat domes to build
- ◆ Wildfires will **increase in intensity and duration**

How much has burned so far this year in Canada

Estimated cumulative hectares burned in wildfires from satellite-detected hotspots



Updated on October 3, 2023 at 2:15pm EDT

Source: Canadian Wildland Fire Information System (Graeme Bruce/CBC)

Forest fire smoke envelops Toronto, bringing poor air quality, pollution



Special weather statement for Toronto continues Wednesday

CBC News · Posted: Jun 07, 2023 6:34 AM EDT | Last Updated: June 7



Toxic smoke from Canadian wildfires could impact health of millions in the US

Tiny particles from the smoke can be inhaled and damage the lungs, experts said.


By [Mary Kekatos](#)
July 17, 2023, 9:40 AM



CLIMATE

New York City tops world's worst air pollution list from Canada wildfire smoke

PUBLISHED WED, JUN 7 2023-12:22 PM EDT | UPDATED WED, JUN 7 2023-8:47 PM EDT

 Emma Newburger
@EMMA_NEWBURGER

SHARE    

KEY POINTS

- New York City's air pollution ranked the worst of any city in the world on Wednesday as wildfire smoke from Canada continued to drift over the area, creating a second day of orange haze over the city and prompting some residents to wear face masks outdoors.
- As of Wednesday afternoon, the city reached an AQI of 342, a level considered "hazardous" for all residents.

 **Power Lunch** [WATCH LIVE](#) 
UP NEXT | [Closing Bell](#) 03:00 pm ET [Listen](#)

Wildfire

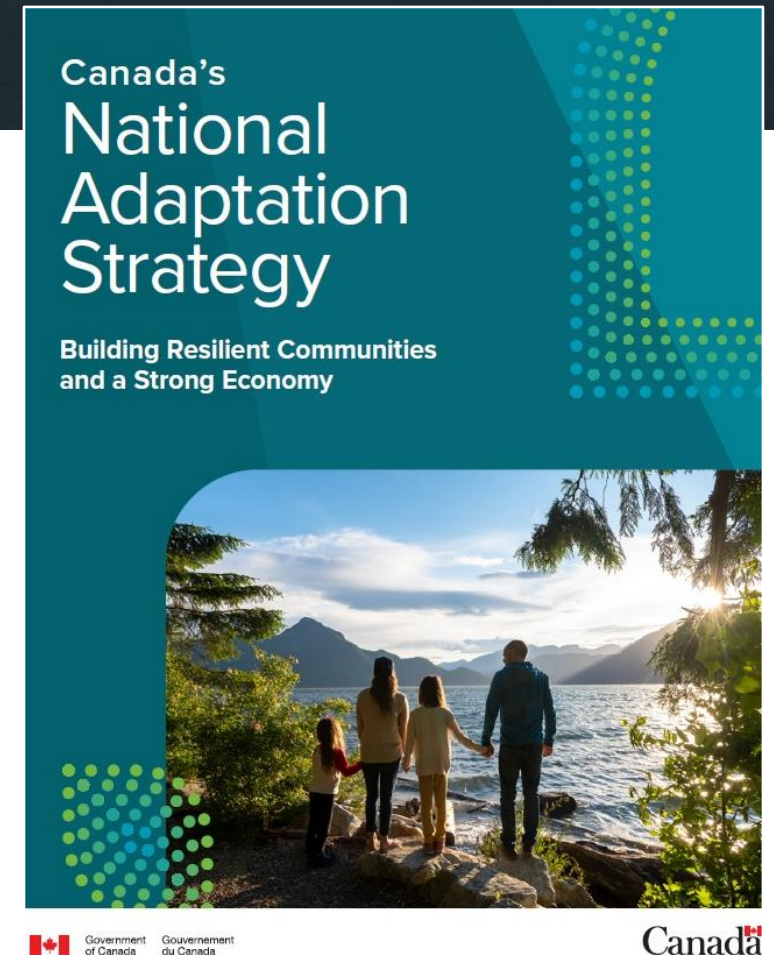
A stack of newspapers is shown in a grayscale, slightly desaturated style. The papers are piled up, with some pages visible at the edges. A pen is resting horizontally across the top of the stack. The text is overlaid in the center of the image.

That was the bad news, now
for the **good** news

National Adaptation Strategy

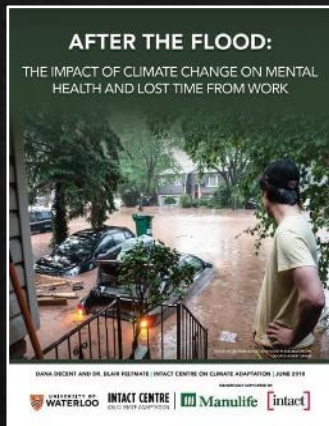
The National Adaptation Strategy outlines a shared path to a more **climate-resilient Canada**. Targets include:

- **Risk Awareness** – By 2025, 60% of Canadians, including northerners and Indigenous Peoples, are aware of the disaster risks facing their household
- **Preventative Action** – By 2025, 50% of Canadians have taken concrete actions to better prepare for and respond to climate change risks facing their household.
- **Community Protection Plans** – Communities, including northern and Indigenous communities, in zones of high risk, as identified by provinces and territories, develop wildfire community prevention and mitigation plans by 2030, with up to 15% implemented by 2028.

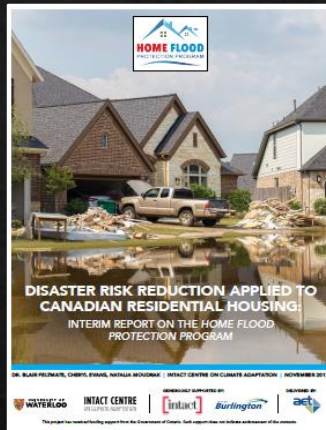


Tools Available to Reduce Risk

Residents



Homes



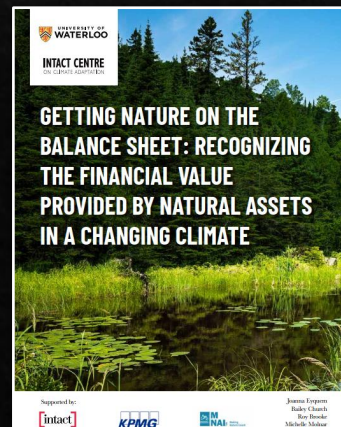
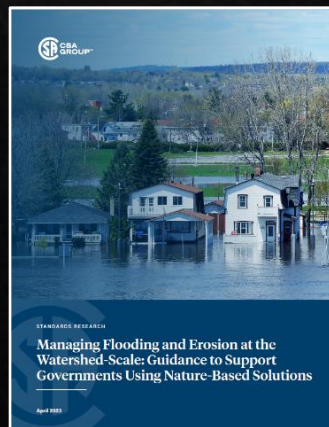
Commercial Real-Estate



Communities



Role of Natural Infrastructure



Wildfires



Extreme Heat

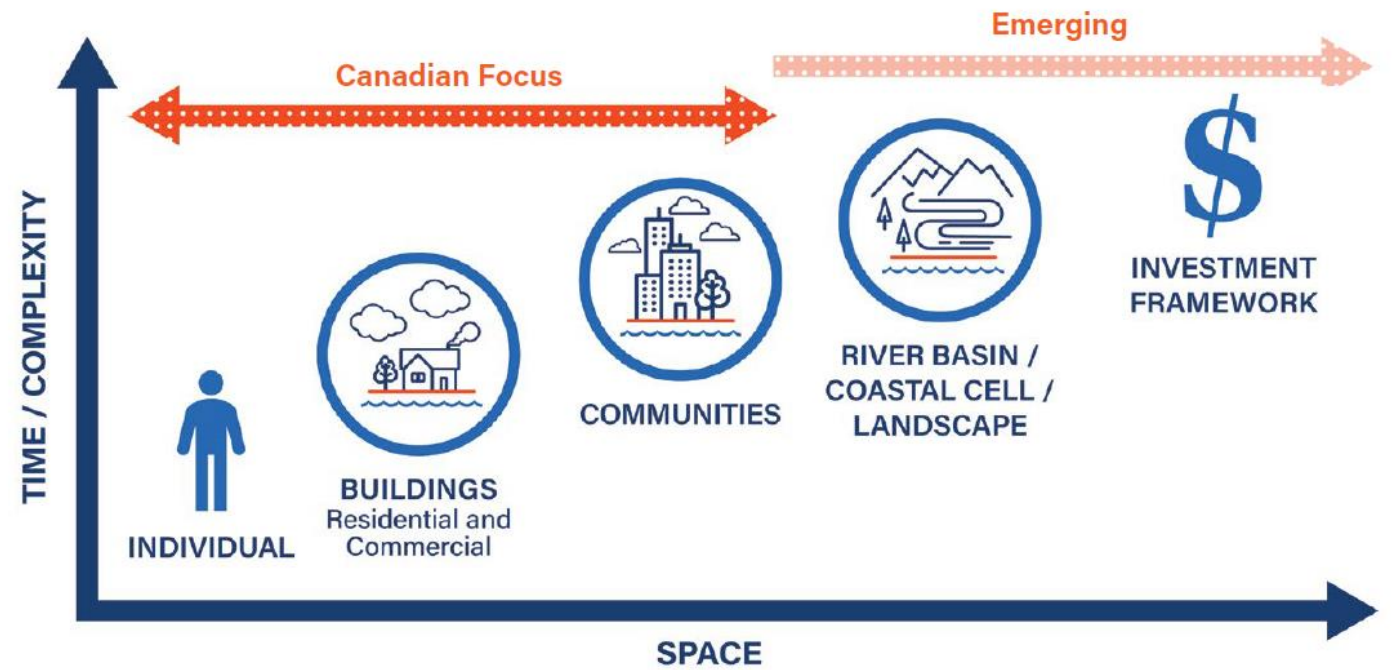


Capital Markets



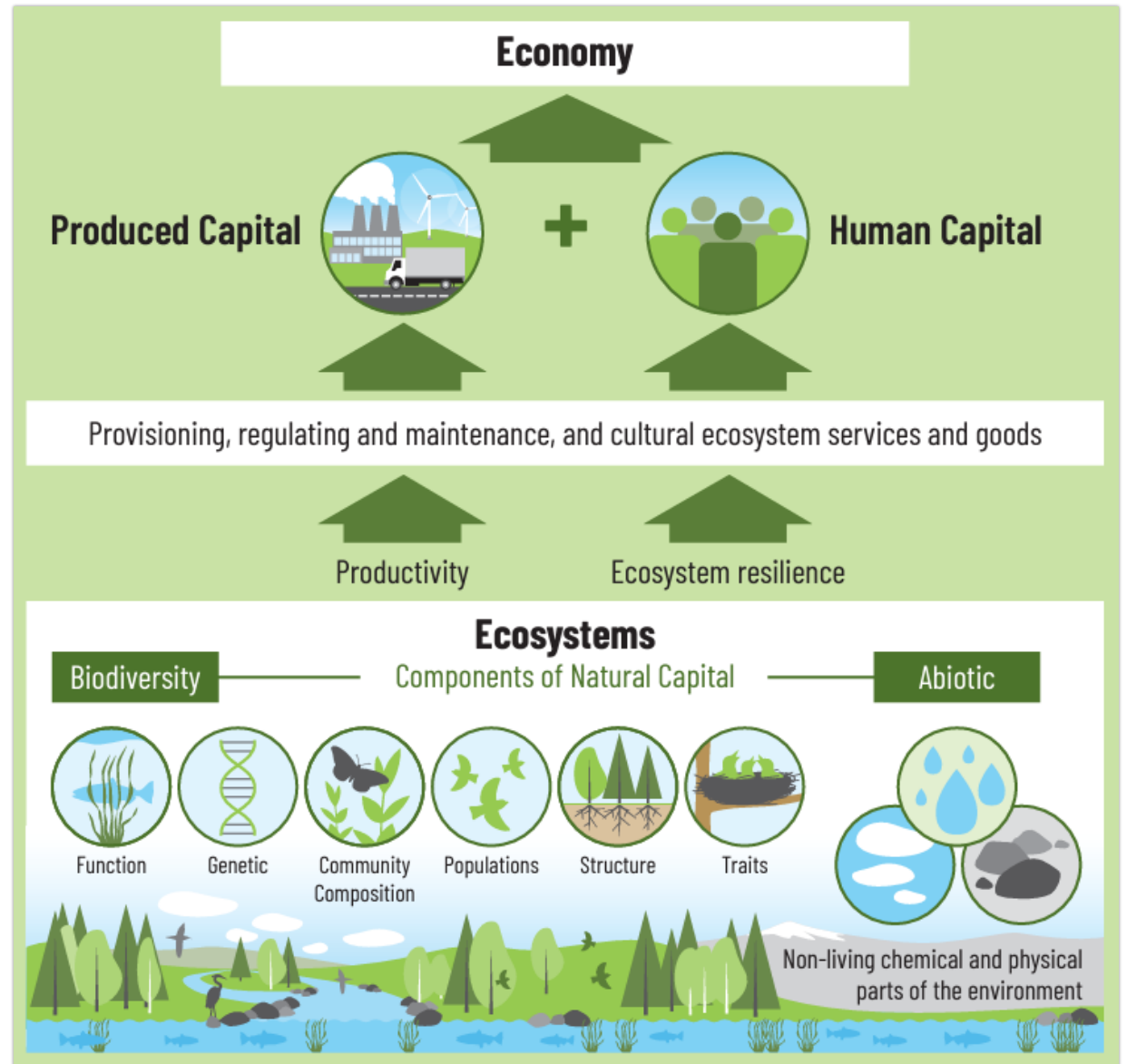
Adaptation is
required at
different
scales

Focus of Flood Resilience Guidance and Standards in Canada



Role of Natural Assets in Climate Adaptation

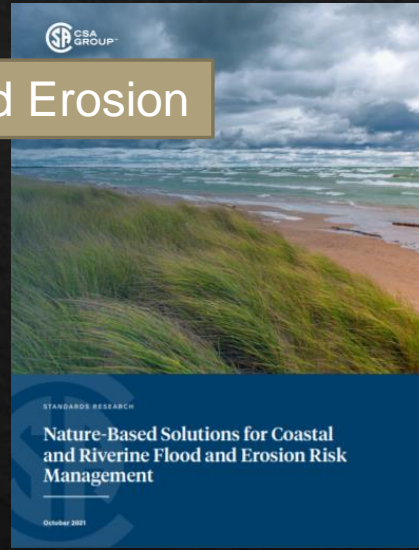
- ◆ Nature-based Solutions (NbS) provide *ecosystem goods and services*.
- ◆ **Provisioning:** food, water, timber, etc.
- ◆ **Regulating:** carbon sequestration, water purification, erosion and flood control, etc.
- ◆ **Cultural:** recreation, mental health, etc.
- ◆ **Supporting:** soil formation, photosynthesis and nutrient cycling, etc.



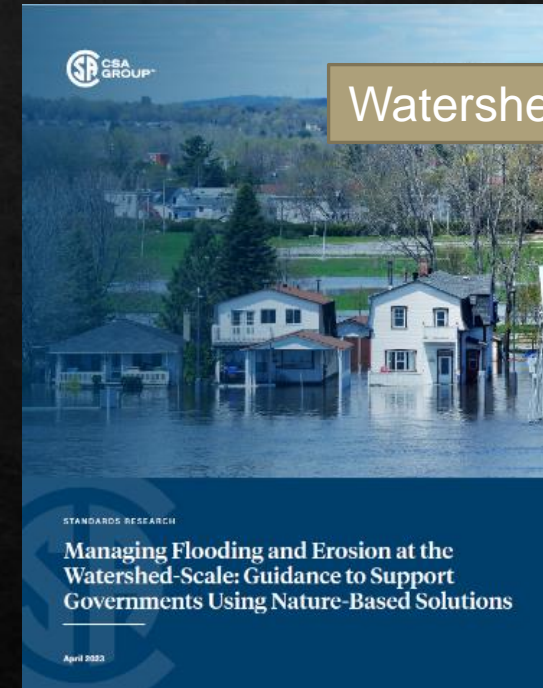
Guidance: Natural Infrastructure for Adaptation



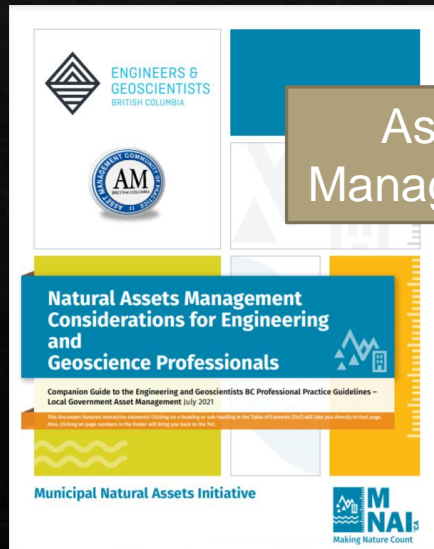
Flood and Erosion



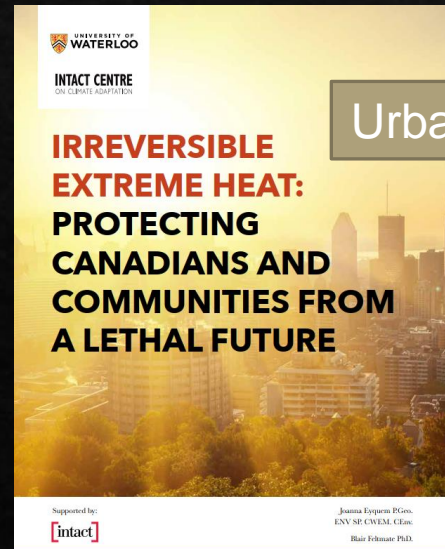
Coasts



Watersheds

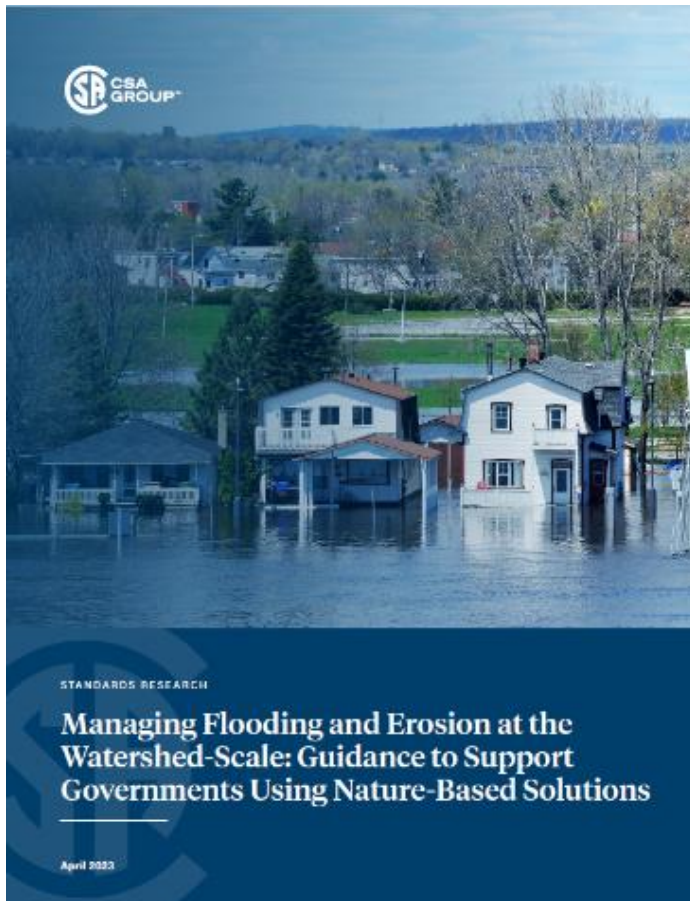


Asset Management



Urban Heat

Flooding and Erosion at the Watershed Scale



- ◆ Develop **consistent** provincial approaches to **integrated watershed management** (Ontario is doing this!)
- ◆ Direct funding for river flood management to **high-risk watersheds**.
- ◆ Routinely consider **nature-based solutions** for river flood and erosion management alongside built infrastructure.

Scaling up: Getting Nature on the Balance Sheet

Municipalities across Canada (27 in Ontario) are already managing and valuing natural assets.



Next phase: work on accounting systems to allow for reporting of financial value of services provided by nature.

The cover of a report features a photograph of a lush green landscape with a pond and lily pads. The text on the cover includes the University of Waterloo logo, the Intact Centre on Climate Adaptation logo, and the title: 'GETTING NATURE ON THE BALANCE SHEET: RECOGNIZING THE FINANCIAL VALUE PROVIDED BY NATURAL ASSETS IN A CHANGING CLIMATE'. At the bottom, it lists supporters: Intact, KPMG, and MNAI, along with the names of the authors: Joanna Expiem, Bailey Church, Ray Brooke, and Michelle Molnar.

Extreme Heat Mitigation at the Community Level




Actions by Communities

| Non-structural (planning and behavioural changes) | Green Infrastructure* (working with nature) | Grey Infrastructure (improving buildings and public infrastructure) |
|---|---|---|
| <p>COM-1 Assess and map vulnerability to extreme heat</p> <p>COM-2 Use education and outreach campaigns to encourage preventive action</p> <p>COM-3 Set up community support programs for vulnerable populations (e.g. underserved communities)</p> <p>COM-4 Require heat-sensitive urban planning, infrastructure design, and operation</p> <p>COM-5 Provide incentives to increase passive cooling and reduce "waste" heat (e.g. by subsidising tree planting or home retrofits)</p> <p>COM-6 Develop extreme-heat emergency plan</p> | <p>GI-1 Plant and maintain trees (including in urban forests, green corridors, and urban parks)</p> <p>GI-2 Expand vegetated areas and water bodies and absorb more water (forming a blue-green infrastructure network)</p> | <p>BI-11 Adapt community infrastructure to extreme heat (e.g. transport, utilities, water supply)</p> <p>BI-12 Reduce vehicular traffic</p> <p>BI-13 Install "cool" reflective or permeable pavements</p> <p>BI-14 Expand artificial shade (e.g. using canopies or shelters)</p> <p>BI-15 Install water-based cooling systems (e.g. ponds and sprinklers) and drinking fountains</p> |

* In places at risk of wildfire, particularly at the wildland-urban interface, the use of green infrastructure must be considered alongside FireSmart guidance.⁷⁰

** Denotes actions that may be most achievable by tenants and those with fewer resources

A photograph of a city street with red brick buildings, trees, and a street sign. The scene is captured from a low angle, looking down the street. On the left, a red brick building features a white portico with columns and a set of red steps with a black metal railing. A street sign for 'ANTHONY PL' is visible on the right. The street is lined with trees and parked cars, and the sky is clear and blue.

Resources for your Residents

Create a Climate-Ready Community

Resilience in Commercial Real Estate

UNIVERSITY OF WATERLOO
INTACT CENTRE
ON CLIMATE ADAPTATION

AHEAD OF THE STORM

Developing Flood-Resilience Guidance for Canada's Commercial Real Estate

SUPPORTED BY: **intact** REALPAC BOMA

Natalia Moudrak and Dr. Blair Helmcke
Intact Centre On Climate Adaptation

October 2019

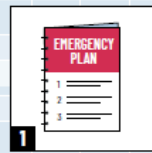
Key Flood-Resilience Measures for Commercial Real Estate in Canada

INTACT CENTRE
ON CLIMATE ADAPTATION



The commercial real estate industry can implement flood-resilience measures to reduce property damage, business disruptions and potential flood-related injury and loss of life stemming from extreme rainfall events.

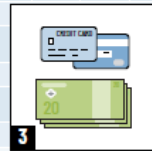
Plans and Procedures



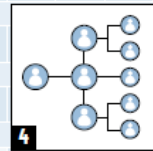
1 Emergency plans



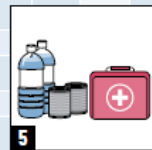
2 Practice drills



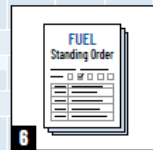
3 Emergency funds



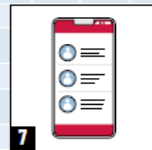
4 Tenant communication channels



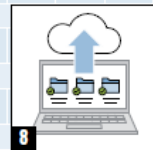
5 Emergency operations centres



6 Emergency response supply contracts

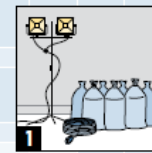


7 Emergency contact information

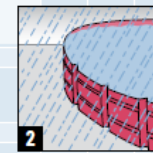


8 Insurance documentation

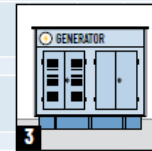
Equipment and Supplies



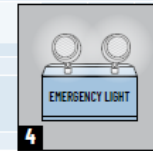
1 Critical equipment and supplies



2 Portable flood barriers and sandbags



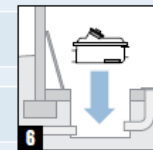
3 Back-up generation



4 Emergency lighting



5 Elevator water sensors

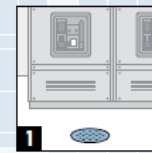


6 Backwater valves

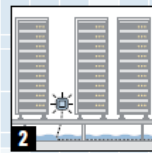


7 Hazardous materials storage

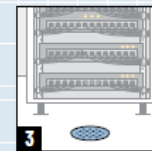
Major Retrofits*



1 Elevating and flood-proofing critical equipment



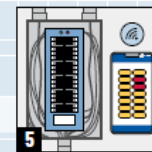
2 Protecting server rooms



3 Protecting high-voltage and telecommunication pull rooms



4 Isolating electrical circuits

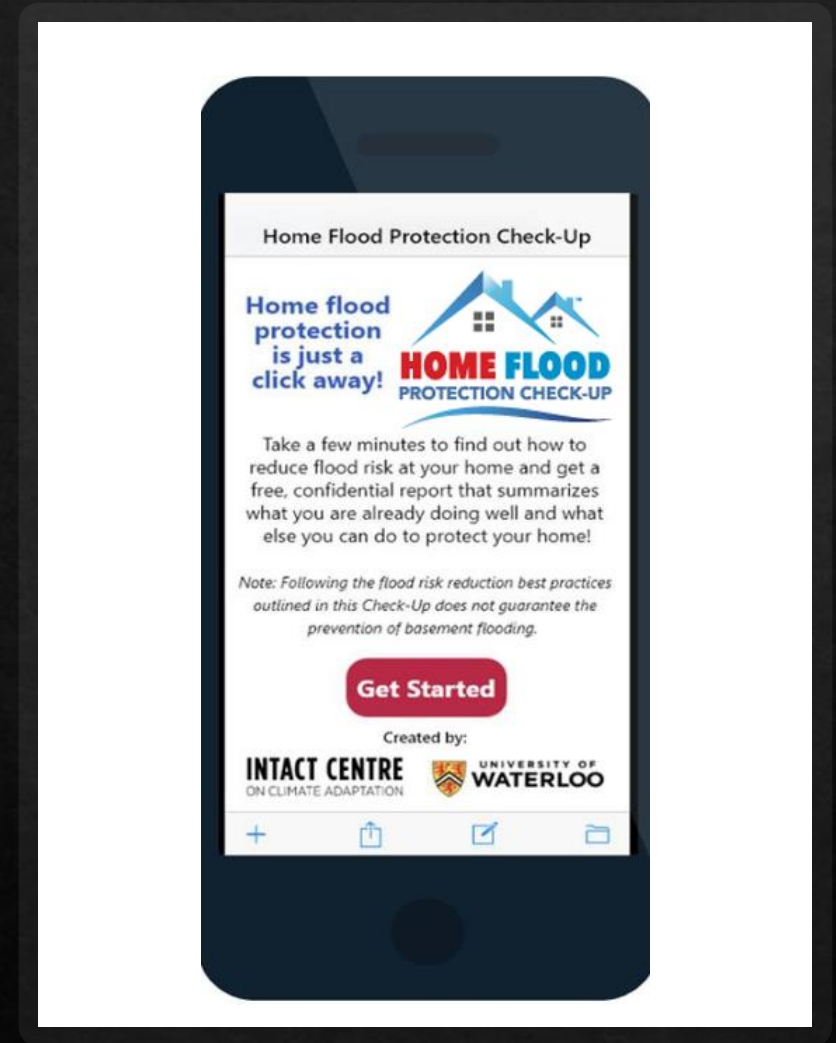


5 Electrical panel upgrades

* These retrofits may be cost-prohibitive to implement post-construction, but they may be warranted for critical sites.

Home Flood Protection Program

- ◆ Provide homeowners with **practical information** necessary to identify and limit their risk of basement flooding.
- ◆ **Free Online Resources:** Home flood protection fact sheets and video links found at www.homefloodprotect.ca.
- ◆ Home Flood Protection Assessment: A confidential, onsite, flood risk assessment service.
- ◆ Identified top actions that can be completed to significantly reduce flooded basements.

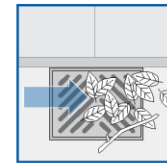


Three Steps to Cost-Effective Home Flood Protection

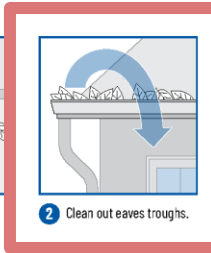
THREE STEPS TO COST-EFFECTIVE HOME FLOOD PROTECTION

Step 1: Maintain what you've got at least twice per year

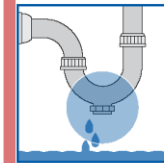
Do-it-yourself, \$0



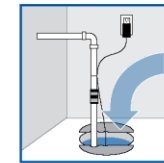
1 Remove debris from nearest storm drain or ditch and culvert.



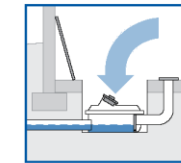
2 Clean out eaves troughs.



3 Check for leaks in plumbing, fixtures and appliances.



4 Test your sump pump.

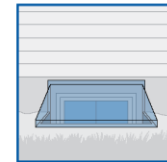


5 Clean out your backwater valve.

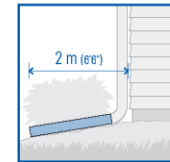


Step 2: Complete simple upgrades

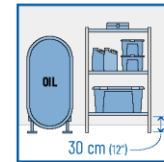
Do-it-yourself, for under \$250



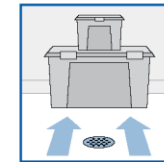
1 Install window well covers (where fire escape requirements permit).



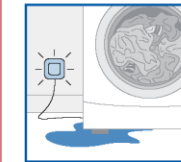
2 Extend downspouts and sump discharge pipes at least 2 m (6'6").



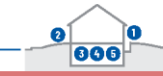
3 Store valuables and hazardous materials in watertight containers and secure fuel tanks.



4 Remove obstructions to floor drain.

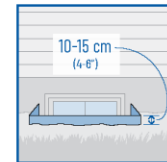


5 Install and maintain flood alarm.

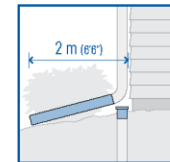


Step 3: Complete more complex upgrades

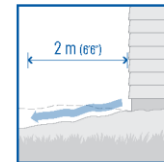
Work with a contractor, for over \$250



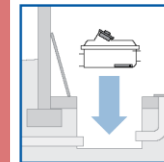
1 Install window wells that sit 10-15 cm above ground and upgrade to water resistant windows.



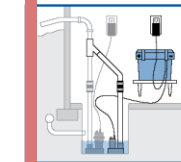
2 Disconnect downspouts, cap foundation drains and extend downspouts to direct water at least 2 m from foundation.



3 Correct grading to direct water at least 2 m away from foundation.



4 Install backwater valve.



5 Install backup sump pump and battery.



THREE STEPS TO COST-EFFECTIVE APARTMENT AND CONDO HEAT PROTECTION

Step 1: Plan ahead to keep cool

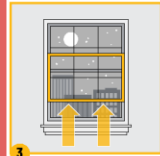
Do-it-yourself, \$0



1 Help vulnerable neighbours, family, friends prepare and arrange to check on them during heat events.



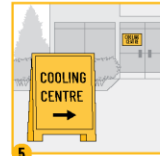
2 Sign up for heat alerts on your phone (e.g., WeatherCan).



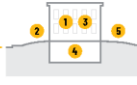
3 Learn how to best use windows and doors to naturally ventilate your unit, particularly at night.



4 Choose energy efficient lights and appliances that produce less "waste" heat.

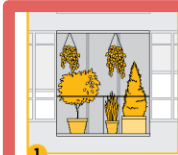


5 Arrange to work or sleep in a cooler place (e.g., shared cooling space).

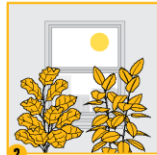


Step 2: Complete simple upgrades

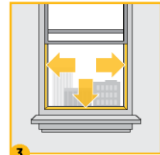
Do-it-yourself, for under \$250



1 Green your balcony or deck with potted, hanging and climbing plants.*



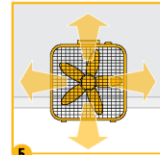
2 Place tall plants with large leaves near light-facing windows.



3 Improve unit insulation and air tightness (e.g., draft strips).



4 Install blinds, heat-resistant curtains, or films on windows.

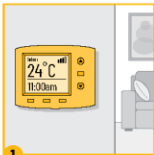


5 Use portable or ceiling fans that increase air circulation.



Step 3: Complete more complex upgrades

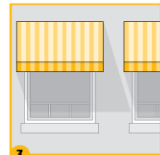
With building managers, for over \$250



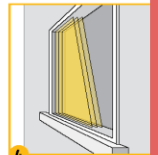
1 Install temperature and humidity monitors or controls.



2 Paint unit walls with white paint or light colours.



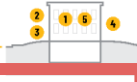
3 Shade windows with outdoor shutters and awnings.



4 Install windows and doors with low Solar Heat Gain Coefficient that let less heat in.



5 Install and maintain a heat pump or air conditioning unit.



* In places at risk of wildfire, the use of green infrastructure must be considered alongside FireSmart™ guidance.



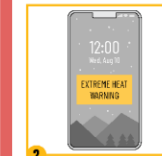
THREE STEPS TO COST-EFFECTIVE HOME HEAT PROTECTION

Step 1: Plan ahead to keep cool

Do-it-yourself, \$0



1 Help vulnerable neighbours, family, friends prepare and arrange to check on them during heat events.



2 Sign up for heat alerts on your phone (e.g., WeatherCan).



3 Learn how to best use windows and doors to naturally ventilate your home, particularly at night.



4 Choose energy efficient lights and appliances that produce less "waste" heat.



5 Temporarily arrange to work or sleep in cooler rooms (e.g. basement).



Step 2: Complete simple upgrades

Do-it-yourself, for under \$250



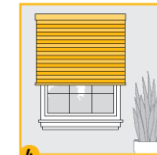
1 Plant and maintain shade trees, especially along south, east and west facing walls.*



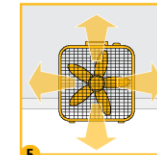
2 Grow plants climbing up your walls, and on decks and balconies.*



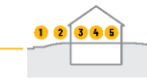
3 Improve home insulation and air tightness (e.g., draft strips).



4 Install blinds, heat-resistant curtains, or films on windows.



5 Use portable or ceiling fans that increase air circulation.



Step 3: Complete more complex upgrades

Work with a contractor, for over \$250



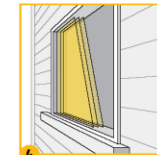
1 Convert saved areas to vegetation which absorbs less heat and more water.*



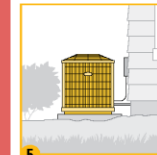
2 Install a green (vegetated) or reflective roof.*



3 Shade windows with outdoor shutters and awnings.



4 Install windows and doors that have a low Solar Heat Gain Coefficient (let less heat in).



5 Install and maintain a heat pump or air conditioning unit.



* Seek local advice on appropriate native species, and, in places at risk of wildfire, consider FireSmart™ guidance.



THREE STEPS TO A COST-EFFECTIVE FIRESMART™ HOME

Step 1: Maintain what you've got at least twice per year

Do-it-yourself, \$0 - \$300

- Remove needles, leaves and other debris from gutters, roof surfaces, decks and balconies. Regularly clean vents.
- Remove all combustible ground cover (mulch and plants) within 1.5 m of the house perimeter.
- Remove combustible materials (firewood and lumber) stored within 10 m of house perimeter and under decks.
- Mow the lawn to <10 cm and plant low-growing, well-spaced shrubs and other fire-resistant plants.
- Prune trees to create a 2 m clearance from the ground to the lowest tree branches.

Step 2: Complete simple upgrades

\$300 - \$3,000

- Replace worn or missing weather stripping on all doors including garage doors.
- Add a non-combustible 3 mm screen to all external vents, except dryer vents.
- Create a 15 cm ground-siding non-combustible clearance (e.g., install cement board or metal skirting).
- Install non-combustible fencing within 1.5 m of the house (cement fiber, metal, chain link or stone).
- Install non-combustible ground surfaces within 1.5 m of the house (mineral soil, rock, concrete or stone).

Step 3: Complete more complex upgrades

WORK WITH A CONTRACTOR 3,000 - \$30,000

- Install Class A fire-resistant roof covering (e.g., cement fibre, metal or asphalt shingles).
- Install non-combustible siding (stucco, metal, stone, cement fibre board).
- Install multi-pane or tempered glass windows and exterior fire rated doors.
- Retrofit all deck components to be fire-rated, with a continuous surface.
- Remove conifer trees that are within 10 m of the house.

FireSmart, Intelli-Ho and other associated marks are trademarks of the Canadian Interagency Forest Fire Centre



THREE FEATURES OF A WILDFIRE-READY COMMUNITY

Communities can integrate wildfire-ready features into their risk management plans to limit damage and disruption due to wildfire events and strengthen emergency preparedness. By working with Provincial/Territorial wildfire agencies, communities can access available tools, training, and resources to help them assess their unique risks, and create customized action plans.

Feature 1: Wildfire-Ready Structures & Infrastructure

- Complete regular maintenance of structures, infrastructure, and landscaping within 10 m to limit accumulation of flammable materials (e.g., leaves, brush piles, stored items, fuel tanks).
- Install/replace landscaping with fire resistant materials within 10 m of structures and infrastructure.
- Build/update structures and infrastructure using fire resistant building materials (e.g., Class A roofing/metal roofs, non-combustible siding, metal, or concrete hydro poles).
- Design/update structures and infrastructure to be ignition resistant (e.g., 5 m distance between vegetation and power lines, power supply lines below ground where feasible).

Feature 2: Wildfire-Ready Community Design

- Integrate minimum 30 m wide zones (fire breaks) featuring ignition resistant materials (e.g., mowed grasses, ponds, roads) into community design to limit the spread of fire. Increase minimum to 50 m on steep slopes.
- Provide greater spatial separation between structures in hazard areas to limit the spread of fire from one structure to another.
- Require minimum 10 m setback from the crest of a hill to limit spread of fire to structures.
- Restrict development in hazard areas where mitigation measures cannot meet minimum standards for health, safety, and environmental protection.

Feature 3: Wildfire-Ready Emergency Response

- Complete annual emergency planning and cross-training exercises that include multiple agencies (e.g., wildland and structural firefighters).
- Designate at least one emergency shelter per community.
- Ensure minimum water supply for firefighting.
- Provide two or more access and egress routes.

Note: The guidance in this document is voluntary. Completion of actions should not conflict with applicable building and fire codes. Wildfire-ready communities can reduce but not eliminate risk.



Three Ways to Reduce Climate Risk Working with Nature at Home

THREE WAYS TO REDUCE CLIMATE RISK WORKING WITH NATURE AT HOME

HEAT AND FLOOD PROTECTION For areas not at risk of wildfire

Complete simple upgrades

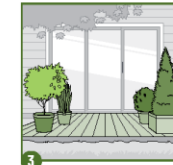
Do-it-yourself, for under \$250



1 Maintain existing shade trees.



2 Grow plants climbing up your walls.



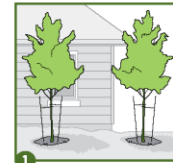
3 Green your balcony or deck with potted or hanging plants.



4 Join or start a community greening program.

Complete more complex upgrades

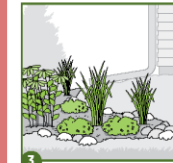
Work with a contractor, for over \$250



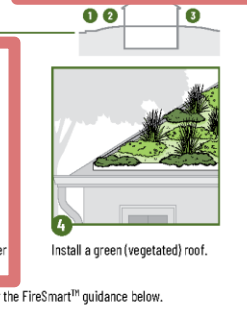
1 Plant new shade trees, along south, east, and west facing walls.



2 Convert paved areas to vegetation which absorbs less heat and more water.



3 Install a rain garden to collect stormwater (at least 5 m from the foundation).



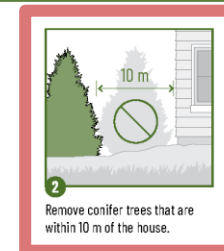
4 Install a green (vegetated) roof.

Note: Seek local advice on appropriate native species that will tolerate future climate conditions, and, in places at risk of wildfire, consider the FireSmart™ guidance below.

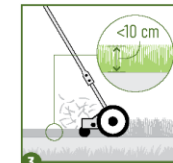
WILDFIRE PROTECTION For areas at risk of wildfire



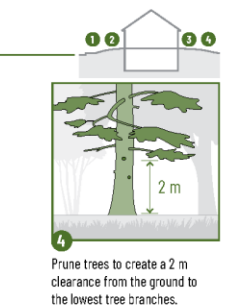
1 Remove all combustible ground cover (mulch and plants) within 1.5 m of the house perimeter.



2 Remove conifer trees that are within 10 m of the house.



3 Mow the lawn to <10 cm and plant low-growing, well-spaced shrubs and other fire-resistant plants.



4 Prune trees to create a 2 m clearance from the ground to the lowest tree branches.

Note: Not all actions will be applicable to each home. Completing these steps does not guarantee the prevention of fire.

INTACT CENTRE
ON CLIMATE ADAPTATION



Scan the code or click the link for additional resources at www.intactcentre.ca



Key Messages

Climate change is **irreversible** – extreme events are becoming **more frequent and intense**

We have the resources, we need to act **NOW**

Whole-of-society approach – residents, communities, businesses, NGO's, Indigenous Peoples, government



Thank you

Download and distribute our free resources from
IntactCentre.ca

Anabela Bonada, Ph.D.
Manager and Research Associate
Intact Centre on Climate Adaptation
abonada@uwaterloo.ca

Joanna Eyquem PGeo. ENV SP. CWEM. CEnv.
Managing Director, Climate Resilient Infrastructure
Intact Centre on Climate Adaptation
joanna.eyquem@uwaterloo.ca

INTACT CENTRE
ON CLIMATE ADAPTATION



UNIVERSITY OF
WATERLOO