



Public Health in a Changing Climate: Leveraging Connections and Knowledge for Action

Lydia Ma

October 4, 2017

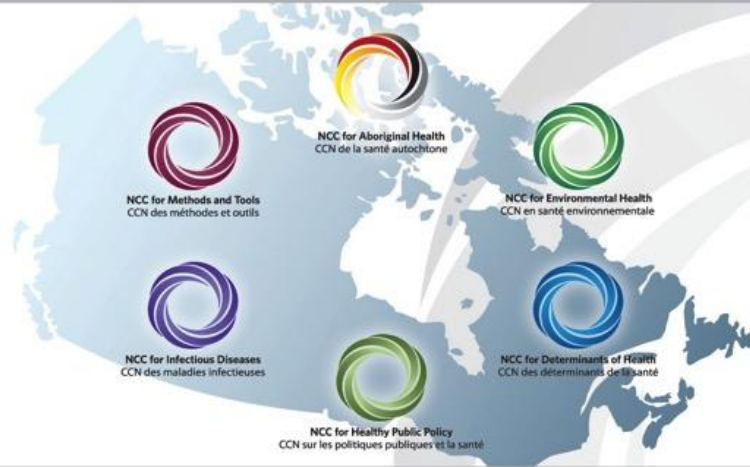
Brampton, ON

CIPHI Ontario 78th Annual Educational Conference



National Collaborating Centres
for Public Health

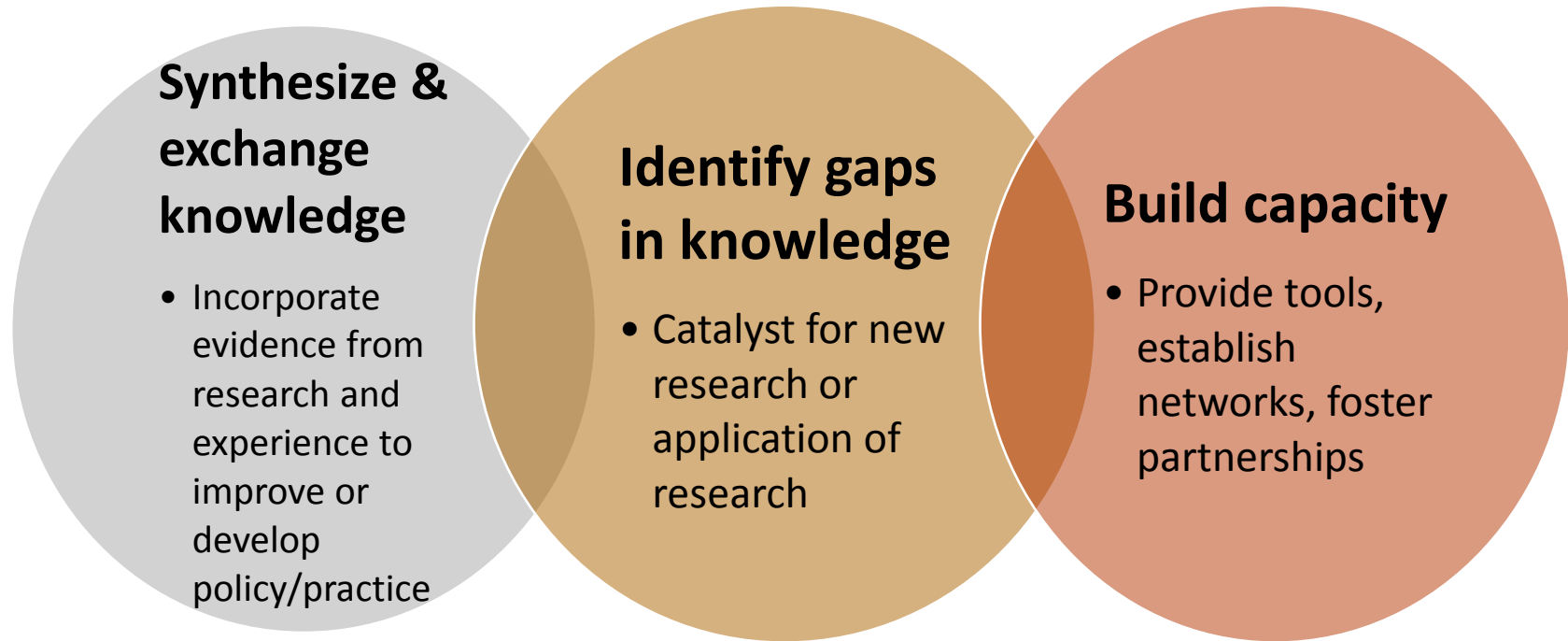
Centres de collaboration nationale
en santé publique



STRENGTHENING PUBLIC HEALTH ACROSS CANADA | APPUYER LA SANTÉ PUBLIQUE AU CANADA

Established by the Public Health Agency of Canada in 2005 to promote the use of knowledge and evidence by public health practitioners and policy-makers in Canada.

The NCCEH Mandate: Knowledge Translation



TARGET AUDIENCE: Medical health officers, environmental health officers and other public health practitioners and policy-makers.



There is no plan(et) B.

“Blue Marble” image of the Earth taken on January 4, 2012 aboard NASA’s earth-observing satellite, Suomi NPP.

Image Credit: NASA/NOAA/GSFC/Suomi NPP/VIIIRS/Norman Kuring





NEWS

August 2017: Second warmest on record

August 2017 was the second warmest August in 137 years of modern record-keeping, according to a monthly analysis of global temperatures by NASA scientists.

[FULL STORY](#)

Source: <https://climate.nasa.gov>

[CLICK TO EXPAND](#)

CARBON DIOXIDE

↑ 406.69 parts per million

GLOBAL TEMPERATURE

↑ 1.7 °F since 1880

ARCTIC ICE MINIMUM

↓ 13.3 percent per decade

LAND ICE

Satellite data show that Earth's polar ice sheets are losing mass

Paths and possibilities

Mitigation

Reduce and stabilize levels of heat-trapping greenhouse gases in the atmosphere:

- Reduce sources of GHGs – burning of fossil fuels
- Enhance “sinks” that remove/store these gases - oceans, forests, soil

Adaptation

Reduce our vulnerability to effects of climate change:

- sea-level encroachment; intense, extreme weather events; food insecurity

Capture potential beneficial opportunities associated with climate change

- longer growing seasons, increased crop yields in certain regions; less cold-related mortality



Photo credit: cogal /Getty Images

Delicate balance between human, ecosystem adaptability, and pace/ intensity of climate changes!

Source: <https://climate.nasa.gov/solutions/adaptation-mitigation/>

Pan-Canadian Framework on Clean Growth & Climate Change

- Developed with provinces and territories, in consultation with Indigenous peoples
- To meet Canada's emissions reduction target; economic growth
- Provincial and territorial key actions and collaborations opportunities with the Government of Canada

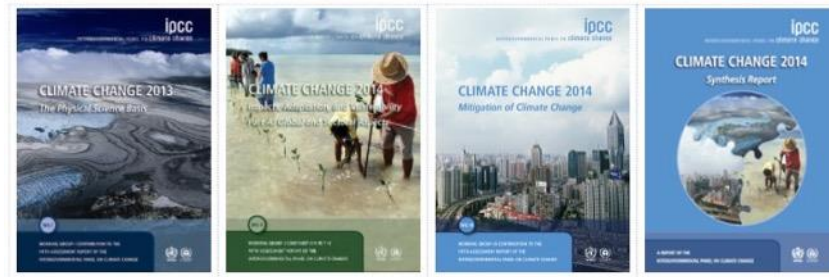


Source:

<https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html>

Government of Canada

- Hosted 46th session of the Intergovernmental Panel on Climate Change in Montreal, Sept 6-10, 2017; 195 countries
- Climate change impacts, future risks, adaptation & mitigation measures
- 6th Assessment Report (2015-2022) – Paris Agreement and Canada's Pan-Canadian Framework on Clean Growth and Climate Change



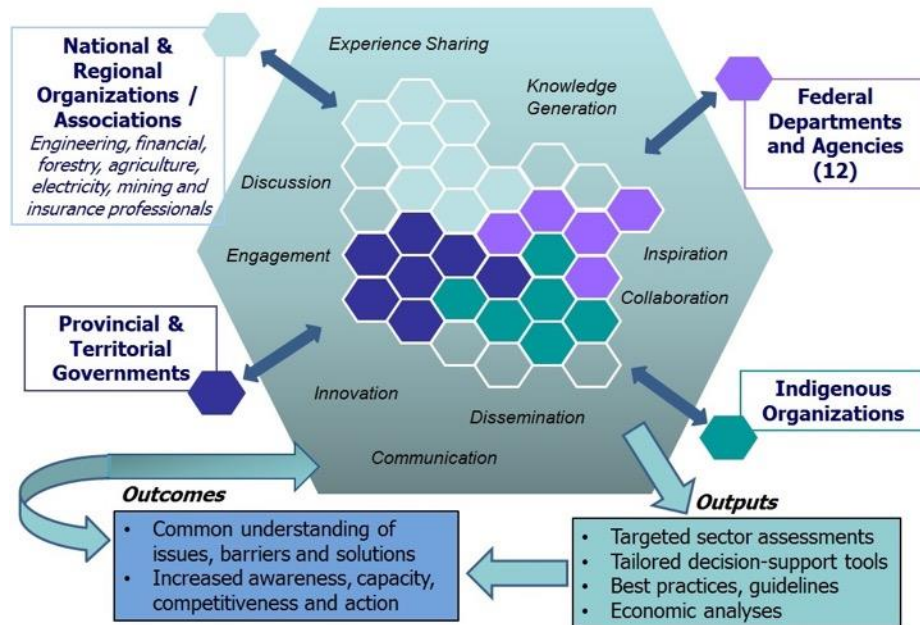
Canada's Climate Change, Impacts and Adaptation Programs

Climate Change Adaptation Platform (2012)

Natural Resources Canada

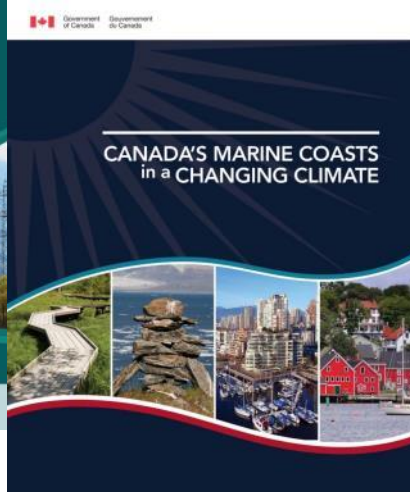
- National forum – reps from federal, provincial, territorial governments, industry, communities, academics, Indigenous, professional and not-for-profit organizations
- Collaborate on climate change adaptation priorities
- Working Groups: *agriculture, coastal management, economics, energy, forestry, infrastructure and buildings, measuring progress, mining, Northern, RAC & tools, science assessment, water and climate information, enhancing uptake*
- **Health?**

Canada's Climate Change Adaptation Platform



Climate Risks & Adaptation Practices

For the Canadian Transportation Sector 2016



Canada

Natural Resources Canada

Canada

Energy Mining/Materials Forests Earth Sciences Hazards Explosives The North Climate Change

Home → Climate Change → Climate Change Resources → Climate Change Data

Climate Change Data

Retrieve data related to:

- [Climate Change and Coasts](#)
- [Coastal Erosion](#)
- [Distribution of Glaciers](#)
- [Glaciers](#)
- [Icefields](#)
- [Permafrost](#)
- [Permafrost Distribution](#)
- [Sea-Level Rise](#)
- [Temperature Profiles](#)

You can search [entire collection](#) of geospatial data, topographic and geoscience maps, images and scientific publications.

Date Modified: 2017-05-16

Available at
<http://www.nrcan.gc.ca/environment/resources/publications/10766>

ADAPTING TO OUR CHANGING CLIMATE IN CANADA

We have the knowledge
to adapt now!

Canada's climate is already changing! Canada as a whole is warming at about twice the global average; the North even faster. There are more really hot days, sea ice is declining, glaciers are shrinking and sea level is rising in many areas. These changes are increasingly affecting our natural environment, economy and health.

Further climate changes are inevitable. We must reduce greenhouse gas (GHG) emissions to limit the amount of change. However, even the most ambitious mitigation actions cannot stop our climate from changing. Therefore, adaptation is also critical.

Adaptation reduces the risks of climate change and increases our resilience. Protecting coastal communities from flooding, creating wildlife corridors to help species migrate, and redesigning cities to make them more comfortable and safe during heat waves, are all examples of adaptation.

While annual national temperatures fluctuate year to year, the long-term trend is that Canada warmed by 1.6°C between 1948 and 2015.

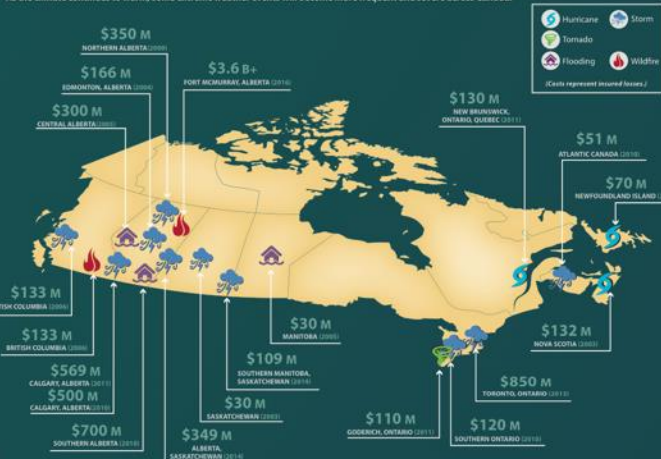


Annual precipitation is also increasing, with Canada as a whole becoming wetter since 1948.



EXTREME WEATHER EVENTS IN CANADA

As the climate continues to warm, some extreme weather events will become more frequent and severe across Canada.



(Costs represent insured losses.)

HOW IS CANADA ADAPTING?



Adapting to increased risk of forest fire Climate change leads to longer growing seasons for trees, but may also increase the risk of fire, drought and insect infestations in Canada's forests. To help adapt to these risks, researchers study seedling growth for the effects of higher temperatures on the development of tree species.



Monitoring the effects of climate change on species As temperatures warm, the Pika is expected to move to higher elevations, where the temperatures are cooler. The next time you're in Banff, Jasper, Yoho or Kootenay national parks, be an amateur scientist – listen for the Pika's PEEEP and share where you heard it with the Bow Valley Naturalists (BENL5 Project) bowvallynaturalists.org.



Building a Canadian home to stand up to hurricanes The way we make our homes can reduce damage from extreme winds, as shown by the weatherproof "demonstration home," designed and built by the Institute for Catastrophic Loss Reduction and The Co-operators General Insurance.



Promoting safe travel in the North Changing sea-ice conditions pose safety risks for resource industries and marine shipping, as well as for the Inuit who rely on sea ice for travel. SmartICE (Sea-Ice Monitoring And Real-Time Information for Coastal Environments) is a pilot project for safer northern coastal communities.



Adapting to sea-level rise on Canada's coasts Sea-level rise is an important issue for many coastal communities across the country, presenting risks to property, transportation and health. To help reduce these risks, governments, industry, universities, planners, engineers and non-governmental organizations collaborated to develop a national Sea Level Rise Primer.



Protecting Canadian health from extreme heat With climate change, the number of extreme weather events, like heat waves, is expected to increase. Many Canadian communities are already experiencing a greater number of hot days. Extreme heat can impact health, causing illness and even death. Across the country, there are actions underway to reduce these risks by developing community heat warning systems and promoting health protection measures.

DID YOU KNOW?



Climate change impacts on animal migration, range and reproduction effect access to, and reliability of, traditional foods that are essential to the health and culture of Canada's Indigenous peoples.



The frozen ground, called permafrost, in Canada's north is warming, which can cause the land to sink, damaging buildings, roads and other infrastructure.



Recent storm surges, coastal erosion and rising sea level are threatening important archaeological sites in Atlantic Canada.



Conservation partners in southern Ontario are working to restore forests and the "corridors" between them by planting over 4.5 million trees.



Faced with a surplus of blue-stained wood from the Mountain Pine Beetle outbreak, the forest industry in British Columbia is making unique wood furniture to adapt.



Climate change poses health risks from poor air quality linked with natural disasters like wildfires and extreme heat waves. The Air Quality Index is a daily, public info tool to help protect Canadians' health.



What are climate change impacts and adaptation?

Climate change refers to any change in climate over time. Impacts are the effects of climate change on natural and human systems. Adaptation is about adjusting our thinking, decisions and actions because of observed or expected changes in climate or their impacts, to reduce harm or take advantage of new opportunities.



What is the difference between climate change and changing weather?

Weather is the state of the atmosphere at a given time, and it changes with the passing of hours, days and seasons. Climate, on the other hand, can be thought of as the average weather conditions over a long period of time (decades and longer).



Adapting – There's a lot we can do!

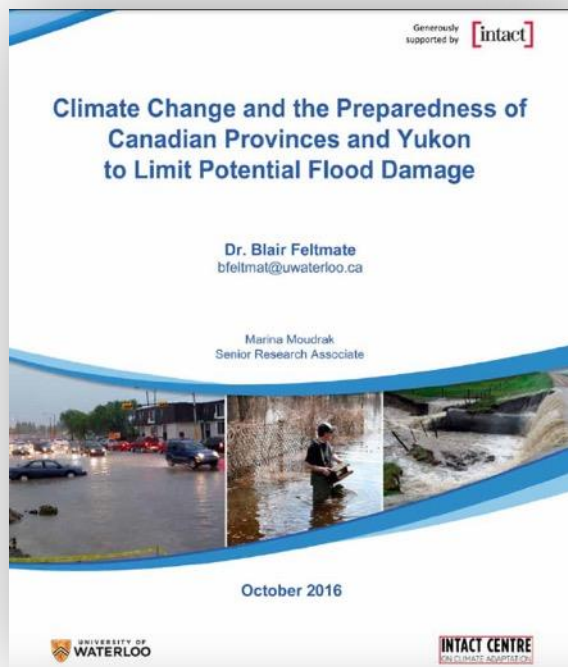
There are many things that you can do to reduce your risks from a changing climate, such as listening for heat alerts and storm warnings and being prepared for extreme events by creating an emergency kit. Teachers: Check out Climate Change Lessons at ontarioecoschools.org and cobwebsim.com.

For more information, go to

adaptation.nrcan.gc.ca

Fight climate change by reducing GHG's emitted in your daily activities (mitigation). Learn how you can lighten your "carbon footprint." (See Top 10 Things You Can Do To Help at climatechange.gc.ca.)

Lots of resources



Toronto's Heat Health Alert System

Proactive adaptation can help save lives now and prepare for climate change



The City of Toronto has developed and implemented two extreme weather Extreme-Cold Weather Alerts (in 1996), and Heat Health Alerts (in 2001). The designed to protect the city's most vulnerable populations – the elderly, child at-risk persons, and the homeless – from extremes of heat and cold. The Heat System was developed proactively, in part as a response to the disastrous heat wave in Chicago (1995) and Philadelphia (1993), both of which killed hundreds of people.

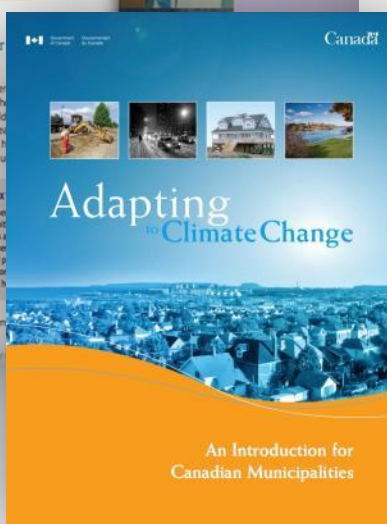
Environment Canada projects that by the latter part of this century, Toronto will average 65 days per year where the temperature exceeds 30°C, more than four times the historic average between 1961 and 1990. This represents a critical concern that will disproportionately impact the health and wellbeing of the city's more vulnerable populations.

Toronto has had a heat warning system since 1999. The first heat warning system used a threshold of a one-day forecast of humidex over 40°C. Since 2001, Toronto Public Health has adopted the Heat Health Alert System as the basis for declaring alerts. This system is based on a synoptic approach that assesses the historical relationship between mortality levels and weather conditions.

POPULATIONS AT RISK FROM EX
The health risks increase substantially when experience prolonged exposure to heat without cooling intervals. Socially isolated seniors, a risk of heat-related illness and death. Other include children, people with chronic and pre-existing conditions, people with mental illness, low-income and adults who are marginally housed or homeless.

the likelihood of excess weather-related mortality is 90 percent.

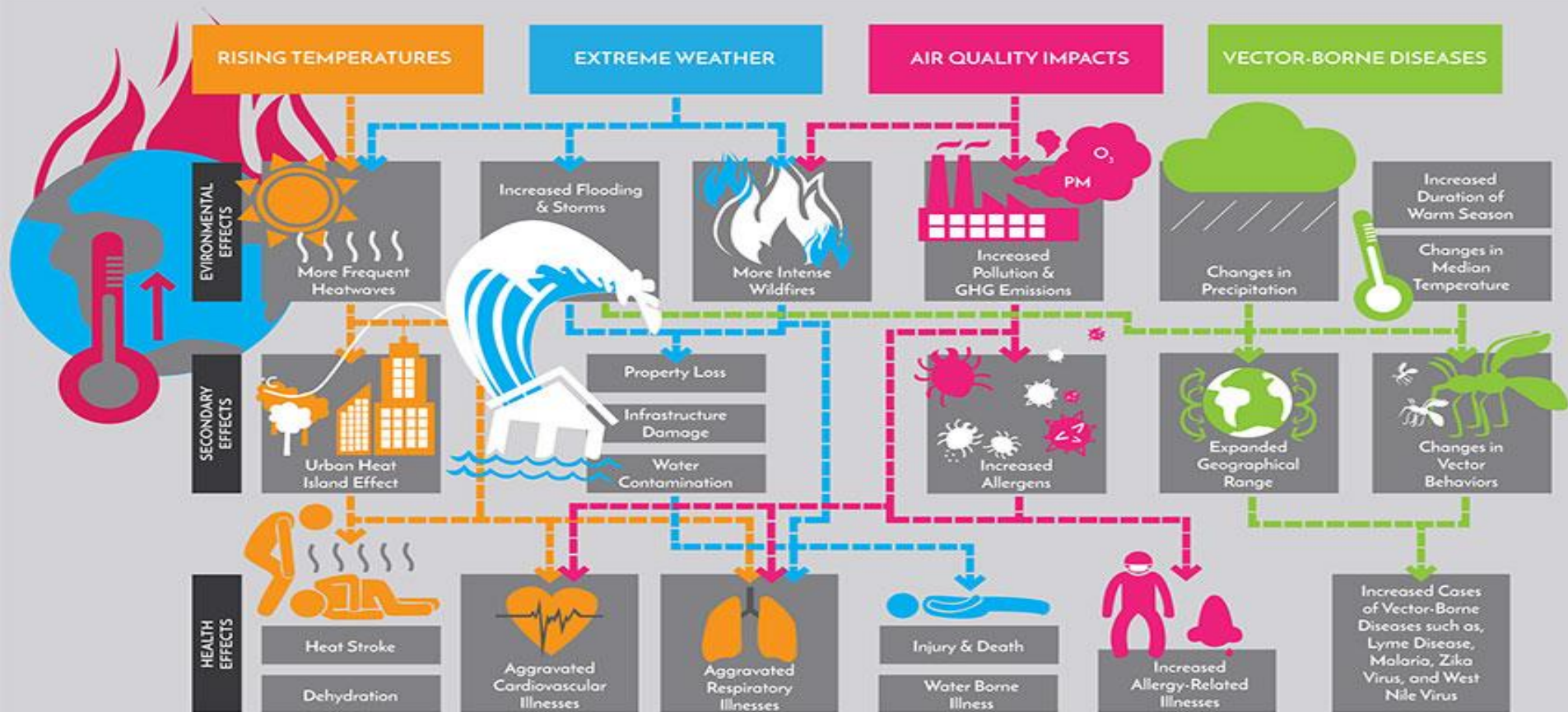
At the beginning of the summer, the City

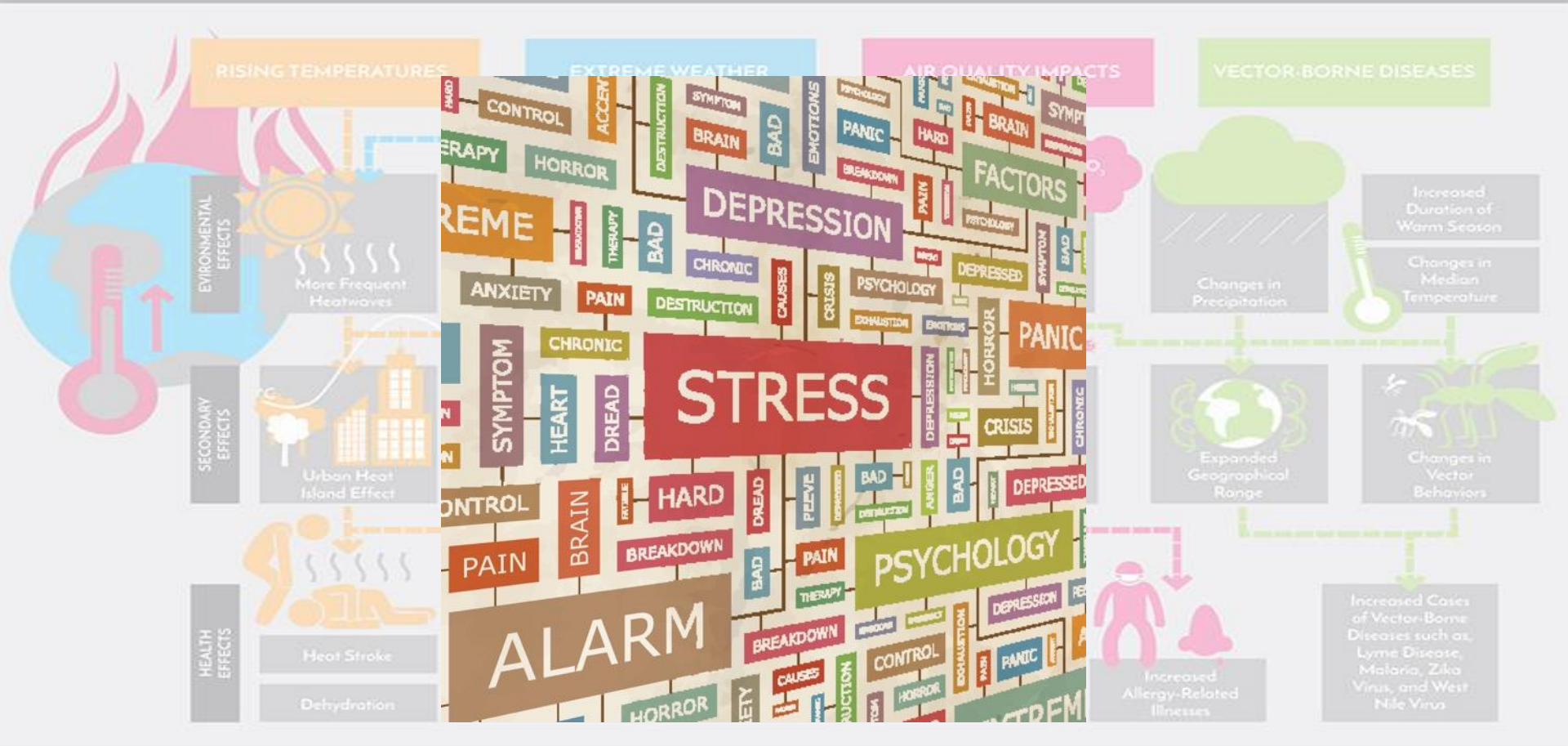


Climate Change: Global issues - local challenges

- Cities and local communities have to determine and implement local adaptation measures; various frameworks for action
- Examples:
 - build flood defenses
 - plan for heatwaves and high temps
 - considerations for urban vs rural vs coastal vs Northern Canada
 - emergency preparedness and evacuation protocols
- A need for multi- and cross-agency and cross-ministry collaboration, and to coordinate, share information and implement strategies bearing in mind regional-local adaptive capacities.

HOW CLIMATE CHANGE AFFECTS YOUR HEALTH





2017: A wild, wild summer ... and it continues



Kamloops experiencing worst air quality in its recorded history

The Air Quality Health Index measures risk from 1 to 10. Kamloops is at 49
By Anton McEoy CBC News Posted: Aug 03, 2017 4:10 PM PT | Last Updated: Aug 03, 2017 5:02 PM PT

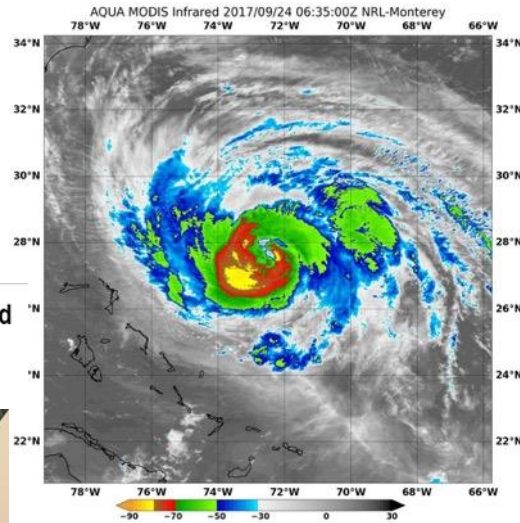


Photo credits: shaun/Getty Images (top left);
CBC.ca/news (bottom left); NASA/NRL (middle);
rotdadana/Getty Images (top right); Paul
Chiasson/The Canadian Press (bottom right)



Fires, Floods, and Bugs:

How Climate Change Impacts Drinking Water Source Quality

Dr. Angela Eykelbosh, NCCEH

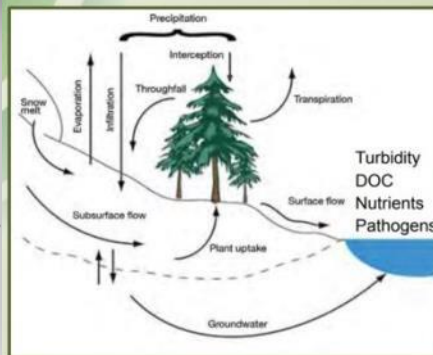
In collaboration with:

Dr. Monica Emelko, University of Waterloo; Dr. Uldis Silins, University of Alberta; Dr. Mike Stone, University of Waterloo

September 28, 2016 | Edmonton, AB



Trees in the Watershed

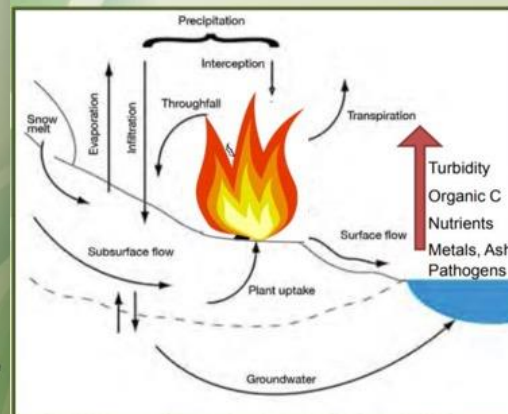


- Heavy rain
- Heat & Drought
- Pine beetle
- **Fires**

NRCAN, 2008. Towards Adaptation: Case Studies in British Columbia. In: From Impacts to Adaptation: Canada in a Changing Climate. FIGURE 11: Forest hydrological cycle (adapted from Helle et al., 2005).

NCCEH presentation in collaboration with
University of Waterloo & University of Alberta
2016 CIPHI National AEC, Edmonton, AB

Wildfires and Water Quality



- **Canopy gone, roots present**
- During a storm, more rain hits the ground.
- Soil is warmer and now water repellent – more water runs off
- More runoff, more erosion, more sediment & surface contaminants (ash, metals, pathogens)
- No water being transpired, so more GW, more DOC, more N+P, metals???
- Higher yields and peak flows increase.
- Snow melts faster; streamflow peaks earlier

NRCAN, 2008. Towards Adaptation: Case Studies in British Columbia. In: From Impacts to Adaptation: Canada in a Changing Climate. FIGURE 11: Forest hydrological cycle (adapted from Helle et al., 2005).

http://www.ncceh.ca/sites/default/files/CIPHI_National_2016_Climate_change_impacts_drinking_water-Eykelbosh.pdf

NCCEH: what we do

- Synthesize knowledge on climate change and health that is relevant to public health practice
- Translate, disseminate knowledge – useful, accessible
- Identify critical knowledge gaps and stimulate research in what we don't know about climate change & health on practice and decision making
- Link researchers and public health practitioners, building networks

NCCEH collaborations with researchers

forWater: NSERC Network for Forested Water Source Protection Technologies (2017-2022)

- Research on impacts of different forest management strategies on drinking water source quality and treatability to assess suitability as source water protection technologies across major ecological/forest regions of Canada
- Principal Investigators: Dr. Monica Emelko, University of Waterloo; Dr. Uldis Silins, University of Alberta
- Team members (n>75): multidisciplinary institutes and organizations – universities, industry, government; Canadian Water Network; NCCEH

NCCEH collaborations with researchers

CIHR Team Grant: Environments and Health

A SHARED Future: Achieving Strength, Health, and Autonomy through Renewable Energy Development for the Future (2017-2022)

- Research on fostering Indigenous leadership in renewable energy development has the potential to deliver positive community benefits and reach potential for reconciliation (Indigenous and settler communities, and with the environment.)
- Team Lead: Dr. Heather Castleden, Queen's University
- Team members (n>60): universities, governments, industry, communities, non-governmental organizations from across Canada including NCCEH, international advisory committee

NCCEH/BCCDC collaboration:

Building Greater Public Health Capacity to Address Forest Fire Smoke in Theory and Practice

- Funded by Health Canada
 - Focus is on public health (PH) response to wildfires
 - Consult with PH practitioners across Canada re: perceptions, challenges with role during wildfire events
 - Conduct in-depth needs assessment involving multiple PH jurisdictions in Canada to assess decision-making and implementation by PH practitioners.
- Synthesis of findings from literature review, document reviews of recent wildfire events and interviews

NCCEH collaborations in “CanDR2”

- CanDR2 (**Disaster Research Response** [DR2] Program)
- Gaps recognized during Feb 2016 *Best Brains Exchange* meeting - Canadian Institute of Health Research (CIHR), Health Canada, US National Institute of Environmental Health Science (NIEHS)
- Discussed integration of research and expertise in public health management of chemical emergencies/disasters in Canada
- Steering Committee Co-chaired by NCCEH Scientific Director and Health Canada Director General, Environmental and Radiation Health Science Directorate; Members include representatives of:
 - US NIEHS, NCCEH/BCCDC, Public Health England, Alberta Health, Public Health Ontario, Public Health Agency of Canada, Dept. of National Defense Centre for Security Sciences, Santé et Services Sociaux Québec, Lifeline Group

Public Health: Points for Action

Research

- Ground policy and actions in evidence-based research on climate change health impacts
- Identify the most vulnerable populations; consider and account for social determinants of health in adaptive actions
- Determine interaction of climate-change related hazards and other factors that impact health
- Investigate effectiveness of controls (protocols)

Public Health: Points for Action

Surveillance and Monitoring

- Determine health risks by subpopulations, location, and changes over time
- Enhance environmental monitoring
- Assess existing surveillance systems
- Utilize surveillance data to develop prevention programs and/or adaptation plans and strategies

Public Health: Points for Action

Risk Assessment

- Collect and track crucial information (need data)
- “Risk multiplier”
- A challenge and involves other disciplines
 - Can be simple or can be very complex

Risk Management

- Improve baseline health status
- Cross-sectoral partnerships; put health on “table”
- Enhance risk communication and public education/awareness
- Assure environmental health services and workforce are prepared
- Enhance capabilities to prepare for and respond to threats

CRISIS

危机

Danger

Opportunity



Acknowledgements

Drs. Angela Eykelbosh, Helen Ward, Michele Wiens, NCCEH

www.ncceh.ca || www.ccnse.ca

Production of this presentation has been made possible through a financial contribution from the **Public Health Agency of Canada**.