Adaptation in Ontario

Presentation to the Clean Air Council

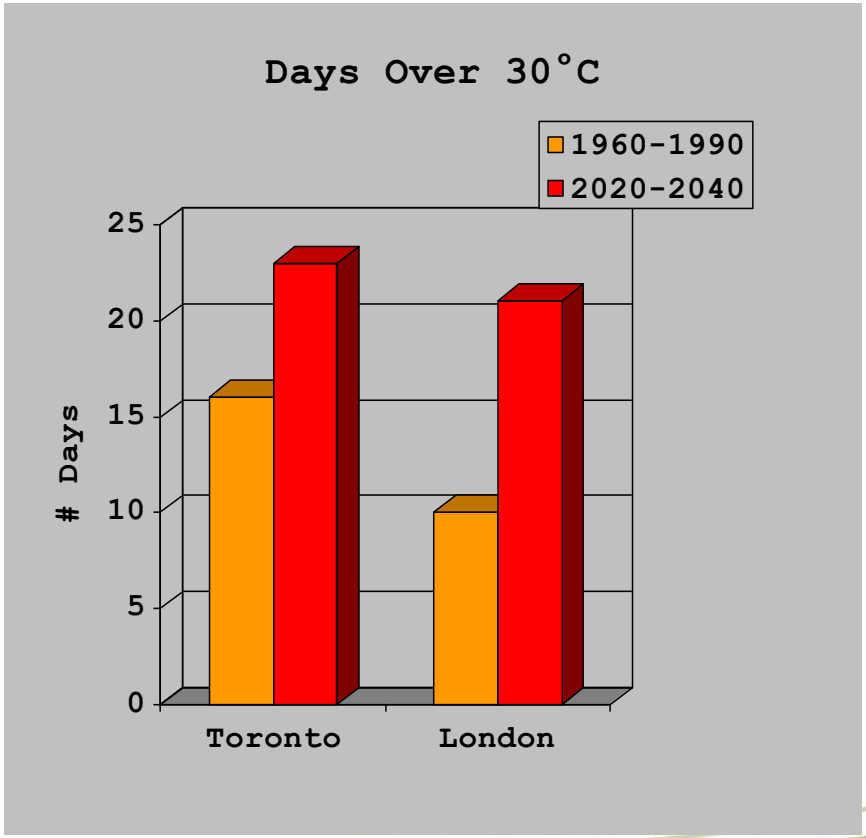
Ministry of the Environment and Climate Change

January 27, 2017

Changing Climate

- The variability of weather has increased dramatically; it is becoming increasingly difficult to predict weather patterns year to year.
- This shift in localized weather patterns has made the traditional reliance on historical data (e.g., Intensity Duration Frequency Curves) insufficient in ensuring our economy is protected from the adverse effects of a changing climate.
- Globally the 10 warmest years on record have all been recorded since 1998. Warming temperatures are:
    - Increasing the unpredictability, severity of extreme weather events (e.g., floods, high winds, drought)
    - Changing how much energy we consume, as well as our ability to produce electricity and deliver it reliably (i.e. cooling demand).

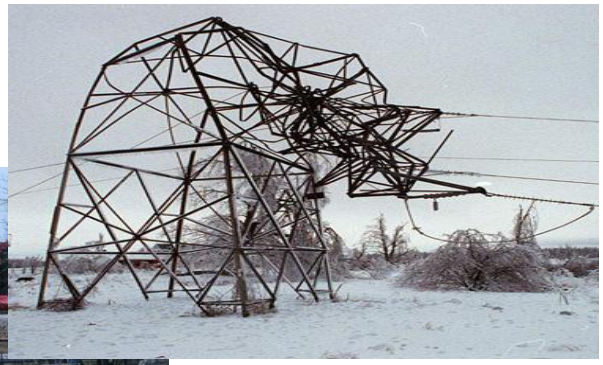
The number of 30-degree days is projected to increase significantly over the next several decades.

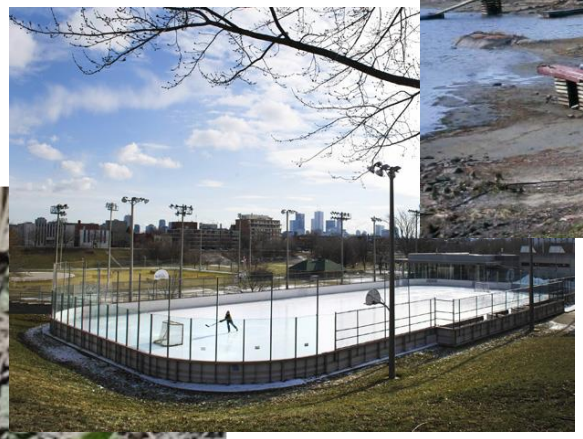


Ontario

Changing Climate – Impacts

Rising average temperatures lead to more widespread extreme weather events, like severe storms, flooding, droughts, and heat waves.





Impacts vary on a regional scale and are already affecting every economic sector (human health, energy, transportation, tourism, recreation etc.)

Ontario has already experienced decreased winter tourism (availability of snow) and increased summer tourism.

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Flooding Events

In May 2013, heavy rains and subsequent flooding caused Thunder Bay to declare a state of emergency after homes and infrastructure were flooded and sewer systems overloaded as parts of the city got more than 100mm of rain. Pump failures at Thunder Bay's sewage treatment plant also resulted in the flooding of hundreds of basements.

July 8, 2013 the Greater Toronto area experienced flooding conditions after a record breaking 126mm of rain in a few hours. The previous single-day record was 122mm set in 1954 during Hurricane Hazel.

The storm resulted in stranded cars, flooded basements and widespread power outages across the city. The Insurance Bureau of Canada has indicated that a preliminary estimate of insured property damage is already more than $850 million.

Flooding of a Hydro One transmission station in South Etobicoke, one of two in the city that were flooded, causing 500,000 power outages at the storm's peak.

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Severe Storms

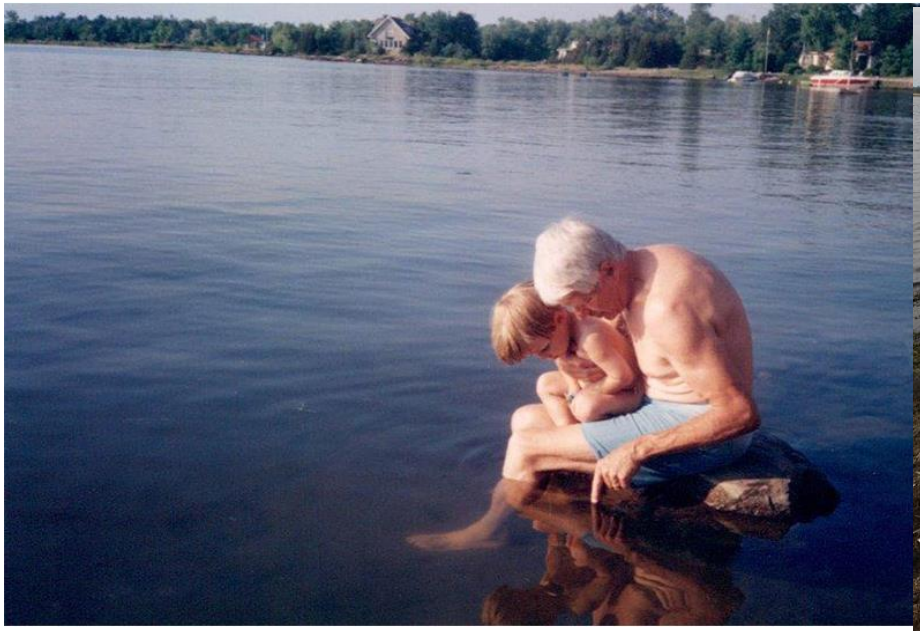
There have been a number of catastrophic events in recent years that can be attributed to increasingly variable and volatile weather patterns:

- In 2009, Vaughan and Grey County tornadoes resulted in $76M in insurance claims.
- In June 2010, a wind and thunderstorm event in Leamington resulted in $120M in insurance claims.
- An August 2011 tornado in Goderich resulted in heavy damage to the city's downtown core and disruptions in electricity and natural gas utilities.
- In October 2012, Hurricane Sandy devastated portions of the Caribbean and the Mid-Atlantic and the Northeastern United States, including impacts in Southeastern Canada and the US mid-west. Economic impacts from losses due to damage and business interruption are currently being estimated between $30 and $50 billion.

Photo: Tornado damage in Vaughan, 2009

Low Water Levels (Georgian Bay)

BEFORE (1994)



AFTER (2013)

Low water levels in the Great Lakes, can cause impacts on ecosystem health (e.g. fish and wildlife habitat), shipping industry (e.g. reduced cargo capacity and dredging), private property (e.g. access to existing docks for recreation, changes to property lines), as well as on energy generation (e.g. hydro power capacity).

Photo Caption - the family of 21-year-old Lauren Patchett has owned a cottage in Honey Harbour, Georgian Bay for decades. The submerged rock where her grandfather, Richard McPhail, sits in this 1994 picture with water to his knees while holding 2-year-old Lauren on his lap is now well back from the water's edge.

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Climate Variability

An increase in variability is proving challenging for the agricultural sector (e.g. wine industry and types of grapes grown; asparagus may be ready for harvest sooner, or prone to late frost damage).

Increased climate variability (e.g. extreme heat/drought) make crops more vulnerable to pest infestations (Corn earworm, *Helicoverpa zea pictured below)*.

A warm March and a severe frost in April 2012 saw over 80% of Ontario's apple crop lost to frost damage

Hail damage to vineyard

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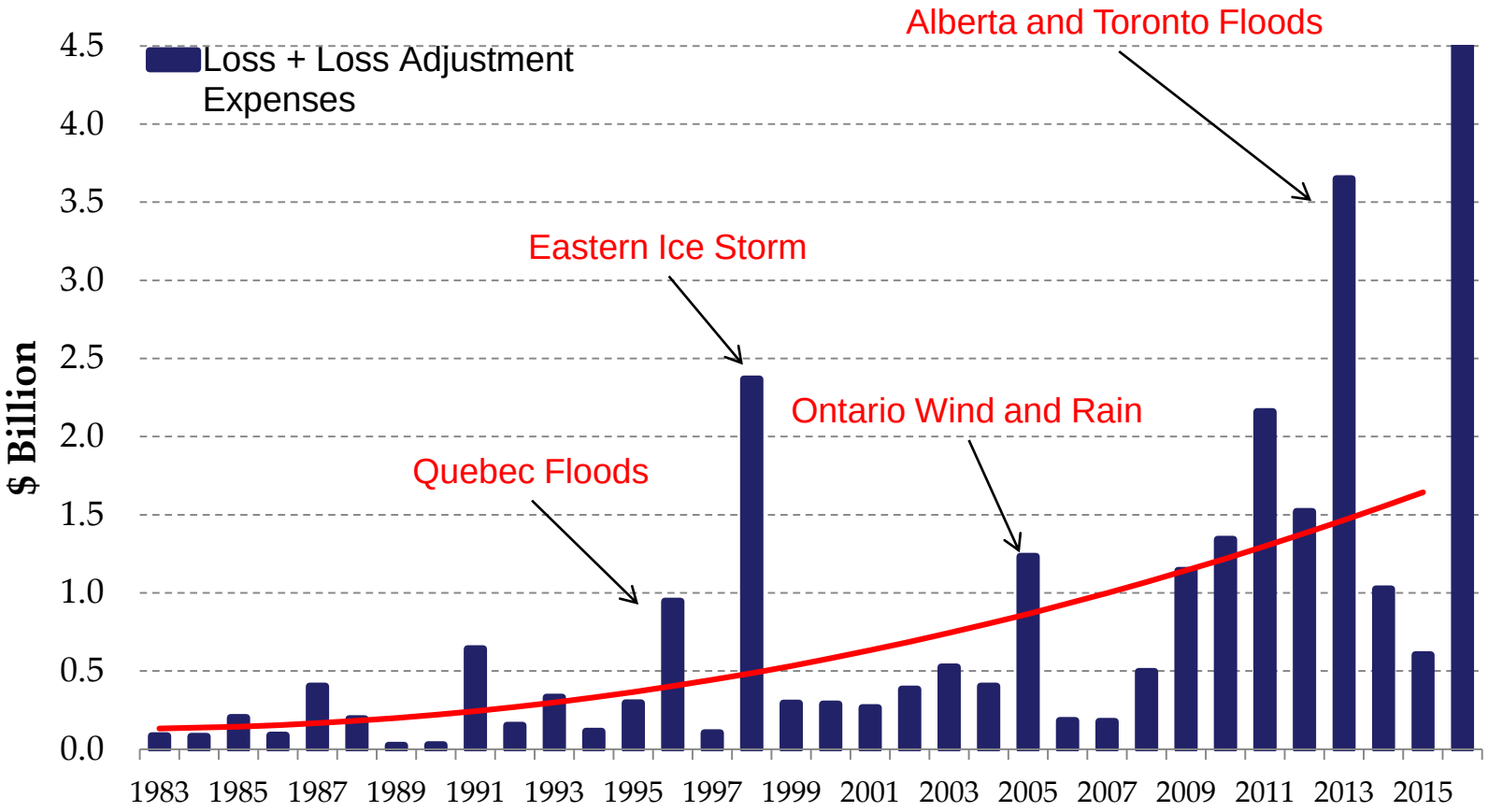
The Business Case

Ontario is experiencing the impacts of climate change across all sectors.



Note: not all extreme weather is climate-change induced

Source: IBC Facts Book, PCS, CatIQ, Swiss Re, Munich Re & Deloitte
Values in 2015 $ CAN

The Business Case

- The financial services sector is one area of Ontario's economy feeling the impacts.

- The Environmental Commissioner and Mark Carney, Chair of the G20's Financial Stability Board have all called for stronger action related to climate risk disclosure. (e.g., investors, creditors, Credit Rating Agencies and regulators).

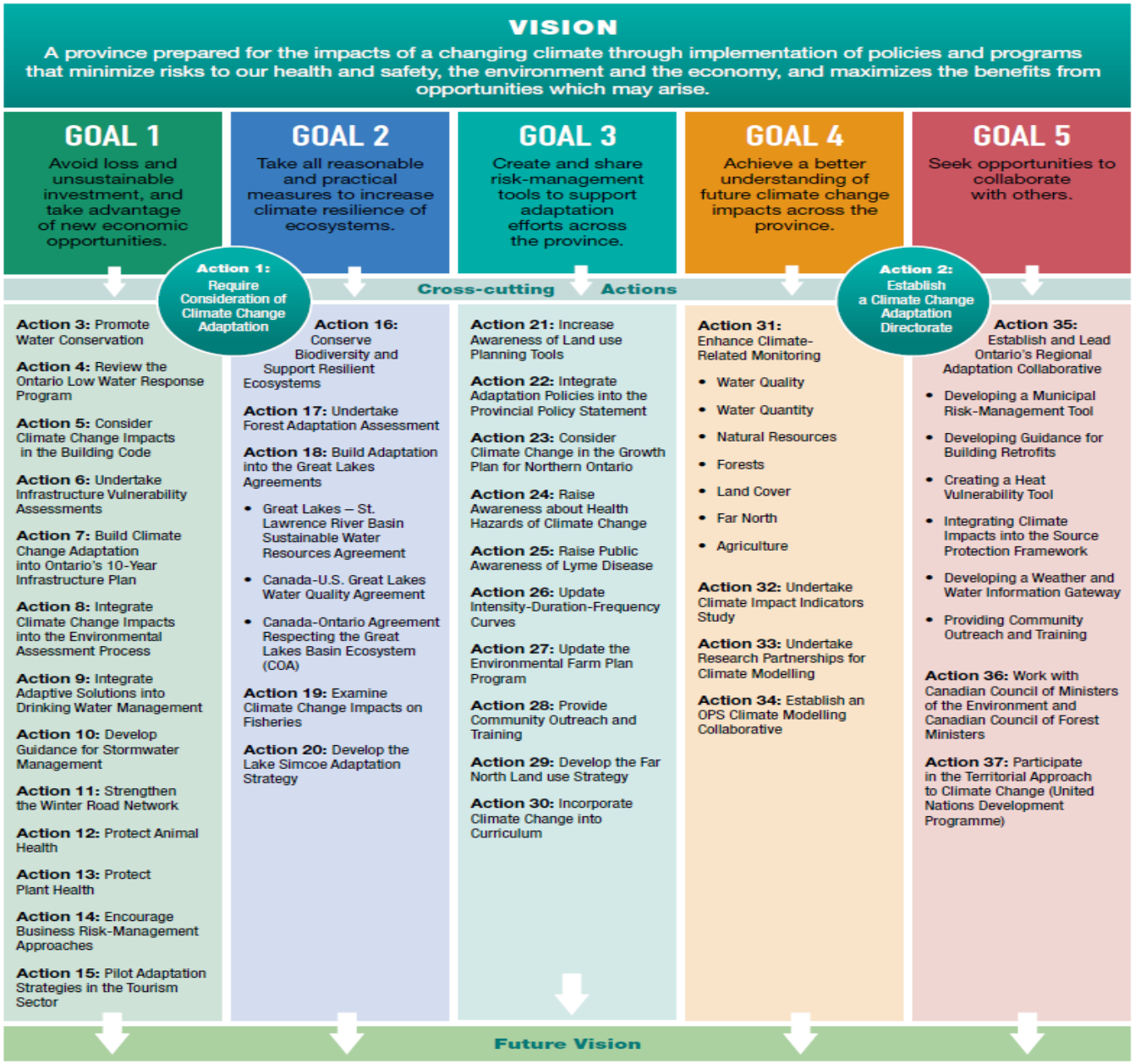
- Asset and business owners have stated that they do not have the information and expertise to disclose the material risks of climate change (e.g., CIBC Global Asset Management Inc.; RBC Capital Markets Inc.; Manulife Financial Corporation).

- Our communities, and the sectors operating within them, are all grappling with how to manage climate risk without the tools, information or capacity required.

Climate Ready: Ontario's Adaptation Strategy and Action Plan

- Building on the momentum created by the Expert Panel, the province released *Climate Ready: Ontario's Adaptation Strategy and Action Plan* in 2011.
- Climate Ready outlined a total of 37 actions to be taken by 10 ministries (MOECC, MNRF, MEDG, MOI, MTO, Education, Tourism, MNDM, MMAH, OMAFRA), over the course of four years, 2011 to 2014.
- The 37 actions in the plan capitalized on existing activities and investments across government.
- One key program that kick-started partnerships and networks across the province was the Ontario Regional Adaptation Collaborative (2009-2012)
  - Jointly funded with Natural Resources Canada to advance community level adaptation planning and actions to reduce vulnerability to climate change impacts. Projects included:
    - **Public Health Tools** - Developed heat vulnerability assessment tool to enable public health units to deliver scarce resources during a heat event. **Partner: Toronto Public Health**.
    - **Source Protection** - Ensure assessment reports and source protection plans for vulnerable communities in Ontario include climate change adaptation (e.g. potential water shortages) policies and data. **Partners: MOE, TRCA, York University**.

Climate Ready – Vision & Goals



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Progress under Climate Ready

Adaptation Policies in the Provincial Policy Statement (PPS):

- The Provincial Policy Statement (2014) contains enhanced policies for both climate change adaptation and mitigation.
  - Promoting efficient and resilient development and land use patterns that consider the impacts of a changing climate, minimize land consumption and servicing costs, reduce GHG emissions, improve air quality, conserve biodiversity, and support energy efficiency and conservation;
  - Requiring infrastructure to be provided in a coordinated, efficient and cost-effective manner that considers the impacts from climate change;
  - Encouraging green infrastructure and strengthening stormwater management requirements as important components of broader infrastructure planning;
  - Requiring the identification of natural heritage systems in southern Ontario and recognizing the conservation of biodiversity as a planning consideration; and
  - Requiring consideration of climate change impacts that may increase the risk associated with natural hazards.

Progress Under Climate Ready

Infrastructure Risk Assessments:

- Ministry of Infrastructure has completed vulnerability assessments on three public buildings (roads and bridges have not been assessed to date, even though the action commits to assessment of all classes).
- MOE has also completed a Risk Assessment of a Water Supply System in Leamington, the assessment has identified risks from potential future climate impacts (e.g. flooding) and measures to limit those risks.

Build Climate Change Adaptation into Ontario's 10-Year Infrastructure Plan:

- A key part of the province's long-term infrastructure plan is the requirement that asset management plans prepared by the province or transfer payment partners will have to show how climate change adaptation was considered in the project design.

EA Guidance:

- In September 2016, the MOECC posted a draft guidance document for comment on the Environmental Registry to assist proponents to incorporate climate change mitigation and adaptation considerations into Environmental Assessments. Posting closed Oct. 27, 2016 (Environmental Registry # 012-5806)

Building Code:

- MMA is currently consulting on the next version of the Building Code (Phase 1 closed Dec. 20, 2016 – Phase 2 timing TBC)
- Phase 1 consultation included discussion questions on a number of government priorities including climate change adaptation (e.g. back flow prevention, hurricane straps, etc.)

Current Government Commitment

- In the September 2016 mandate letter, the Minister of the Environment and Climate Change has been tasked with:
  - *"Working with partner ministers, stakeholders and Indigenous partners, develop a Climate Change Adaptation Plan for Ontario that sets out priorities and actions Ontario will take to adapt to the effects of Climate Change."*

- In the November 2015 Climate Change Strategy, the province committed to:
  - *"Establish a **climate change modelling collaborative** for climate data. Our strategy will establish a one-window source for climate data. This will ensure open access to standardized and wide-ranging climate information. It will help both public and private sectors make informed and evidence-based decisions regarding adapting to climate change and increasing resilience."*
  - *"Integrate climate change adaptation considerations in infrastructure decision-making."*

- Ontario's Climate Change Action Plan further strengthens government's commitment to release a **new Climate Change Adaptation Plan** in 2017, which will include details of the Climate Modelling Collaborative.

Ontario Climate Change Adaptation Activities

- **New Adaptation Plan for Ontario**
  - An update to Climate Ready: Ontario's Adaptation Strategy and Action Plan that would build on previous commitments and identify NEW actions
- **Climate Modelling Consortium**
  - Signature action within the new Plan
  - One window access to climate science and information
  - Climate services that enhance understanding of risks and opportunities to enable effective adaptation action and decision-making at the community level.

Proposed Outcomes for a new Adaptation Action Plan

- Consideration of adaptation is directly relevant to the mandate of various ministries, and cannot be considered a purely environmental issue (it is a land-use planning issue, a health issue, and a risk and emergency management issue, etc.).
- While there has been success in integrating future climate considerations in a number of programs and policies, there is still a strong need for guidance and capacity building in this area.
- Municipalities play a critical role in land use planning, infrastructure planning and design, emergency management, and other areas that are priorities for a new plan.
- A new province-wide Climate Change Adaptation Action Plan would aim to:
  - **Build knowledge and adaptive capacity:** provide access to information on climate change impacts in an effort to enable/promote local action by decision-makers (e.g. Climate Modelling Consortium).
  - **Promote Public Education and Outreach:** increase awareness of climate impacts and adaptation in order to change behaviour, ensure a cultural shift, and encourage the public to take responsibility for adaptation action

Increasing Requirements to Consider Climate Change

- Since Climate Ready was released, there are a growing number policies and programs requiring the consideration of climate impacts, but no tools or standards are available on how to deliver on these requirements. For example:
  - Land-use Planning **– 2014 Provincial Policy Statement** requires consideration of climate impacts in Official Plans
    - Municipalities require locally-relevant information and capacity in order to apply consideration of climate impacts in official plans
  - Climate impact consideration is appearing in various other policies and programs (e.g., **Infrastructure Jobs and Prosperity Act, 2015**)

Provincial Need – Climate Modelling Consortium

- The impacts of a changing climate (increased risk of flooding, extreme heat, new disease vectors) are changing the dynamics of responsible decision-making – there is a need to consider uncertain changes in climate to ensure good value for money/risk management.

- A common understanding, supported by standardized, forward looking climate data and climate services would better enable decision-makers to take into account climate impacts for a wide range of decisions:
  - Infrastructure (e.g., size of culverts in roadways)
  - Health-care (e.g. new disease vectors - ticks and Lyme disease)
  - Municipal planning (e.g., emergency management - power outages)

- That is why the province is developing a framework for a **climate modelling consortium** which could support to the broader public sector, municipalities, Indigenous Communities and the private sector in the development of risk assessments and adaptive strategies.

Climate Services Market

- The market place is complex and being served by various providers, offering a range of services to support a variety of sectors.
- The quality of the data being used across the market place varies, and should be standardized and validated.
- There is unequal access to expertise and climate services.
- Stakeholders are looking for government endorsed climate information.

Climate Modelling Information (Ontario)

- In the absence of a modelling collaborative, the province has been investing in climate information:
  - Modelling and Risk Assessments: MOECC has invested $255,000 a year over the past 8 years:
    - Develop Ontario-specific high resolution regional climate projections (e.g, distribution of trends of major climate indicators across Ontario - 10km x 10km grids), and
    - Undertake risk assessments under potential climate changes (Assessing Climate Change Impacts on Droughts and Food Security over Ontario).
  - Ontario Climate Change Data Portals: On-line external portals with high-resolution Ontario climate data projections (raw data/outputs, requires technical expertise) (http://ontarioccdp.ca/ and http://occp.lamps.yorku.ca/).
- Other jurisdictions have made significant investments in modelling agencies and institutions (e.g., Québec, B.C.)

Climate Modelling in Other Jurisdictions

Within Canada

- Québec's Ouranos consortium – established after 1998 ice storm; focus on climate modelling and impact assessments.
  - Ouranos' mission is to provide the decision makers with climate knowledge/scenarios at regional scale, assessment of impacts/ vulnerabilities and support for various types of adaptation decisions by practitioners, managers, and decision makers
- BC's $90M endowment fund – established to meet need for adaptation to sea level rise and pine beetle damage; focus on impact assessment, user-friendly products and outreach.
- Federal Government – has been making significant investments in both climate science and adaptation planning; current focus is sector-based (e.g., mining, forestry); however, does not provide regionally specific information.
  - Has committed, through the Pan Canadian Framework, to work with provinces to accelerate and enhance access to climate information in Canada.
  - This commitment aligns with Ontario's potential Climate Modelling Consortium

Users

Municipalities / Indigenous Communities	Agricultural Sector	Resource Sector	Private Sector (e.g., Insurance, Financial Services)

Understanding Impacts – variables to determine future conditions

Air temperature; Rainfall (mean / heavy); TEK	Air temperature; relative humidity; Rainfall (mean / heavy)	Rainfall (mean / heavy); Solar Radiation; wind speed	Rainfall (mean / heavy); Wind speed; Relative humidity

Promoting Local Adaptive Solutions

➢ Integrating impacts in official plans ➢ Planning Cooling centres for heat waves ➢ Infrastructure Risk assessment ➢ Case Studies	➢ Crop planning (e.g., pear or grape species to plant) ➢ Pest management ➢ Case Studies	➢ Mine closure plans ➢ Species planning for replanting ➢ Forest Fire Planning ➢ Case Studies	➢ Insurance sector policies/rates ➢ Long-term investment planning for tourism ➢ Case Studies

Discussion

1. What are the most significant impacts you are currently experiencing within your municipality?
2. Are you currently incorporating future climate into your infrastructure decision-making?
3. What information/services are you currently accessing to support your infrastructure decisions?
4. What are the biggest gaps in terms of support for climate-smart decisions at the municipal level?
5. What kind of services would you like to see offered by the climate modelling collaborative?