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# **Climate Change Adaptation in Ontario**

**Climate Change Adaptation Workshop - Hamilton**

**Ministry of the Environment**

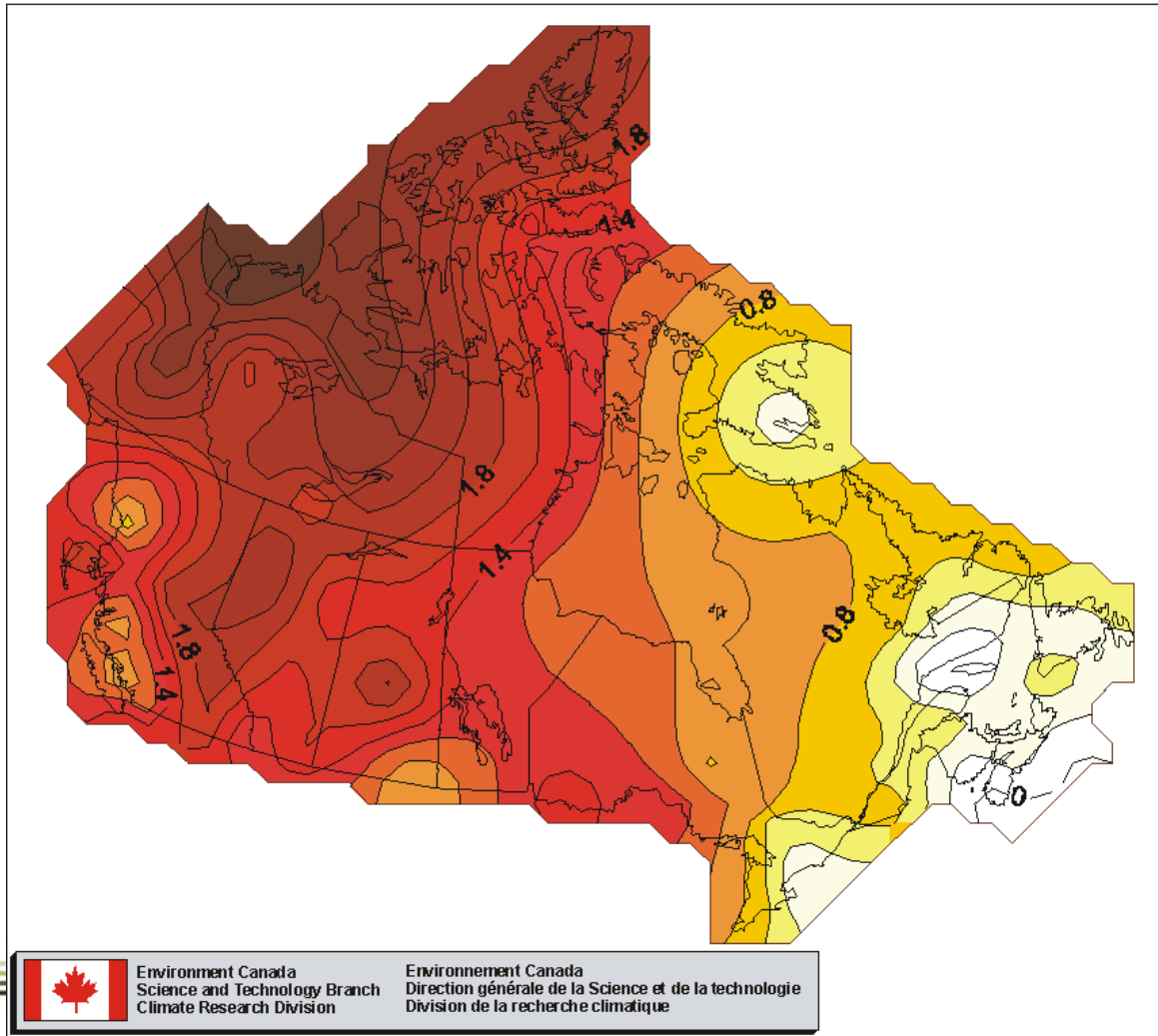
**March 9, 2011**

# Outline

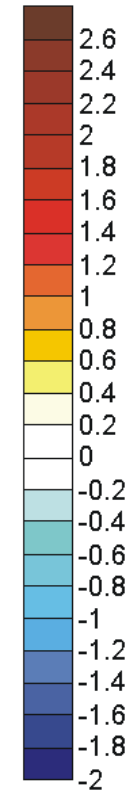
- Context
- Expert Panel on Climate Change Adaptation
  - The Panel Process
- Overview of Panel Report and Recommendations
- Actions on Climate Modelling and IDF Curves
- Other Current Adaptation Actions
- Regional Adaptation Collaborative
- Community Adaptation Initiative

# Context – Ontario's Changing Climate

Annual Temperature Trend, 1948-2008



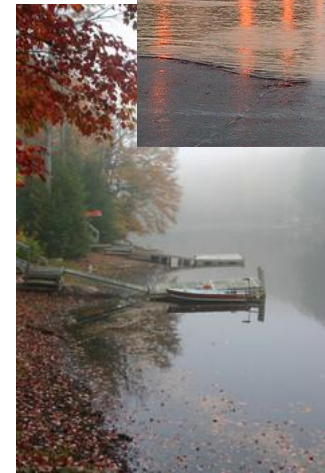
degrees C



There has been an increase of up to 1.4° C in average temperatures in Ontario since 1948.

# Context – Ontario's Changing Climate

- We know that such temperature increases, though small at first glance, go along with huge changes in the patterns of wind and precipitation.
- Many of these changes are impacting our lives in a number of ways:
  - 2010 has been estimated as the hottest year on record, causing more heat alerts and health concerns;
  - According to the Insurance Bureau of Canada, flooding damages account for the highest number of household insurance claims in Ontario; and
  - Lower water levels in the Great Lakes-St. Lawrence River Basin mean potential impacts to fish spawning patterns, water availability for drinking and for power generation and pollution levels.





# Context – Climate Impacts

Finch Avenue Washout in Toronto in 2005 resulted in ~\$500M in insurance claims.

Flooding resulting in infrastructure failure, backed up storm sewers, property damage.



# Context – Climate Impacts

Severe Winter Storm in Eastern Ontario, Québec and the Maritime Provinces in 1998 (\$1.5B insurance claims in Canada).



# Context – Climate Impacts

Low water levels in the Great Lakes – Georgian Bay “Dry Docks.”



# Context – Climate Impacts

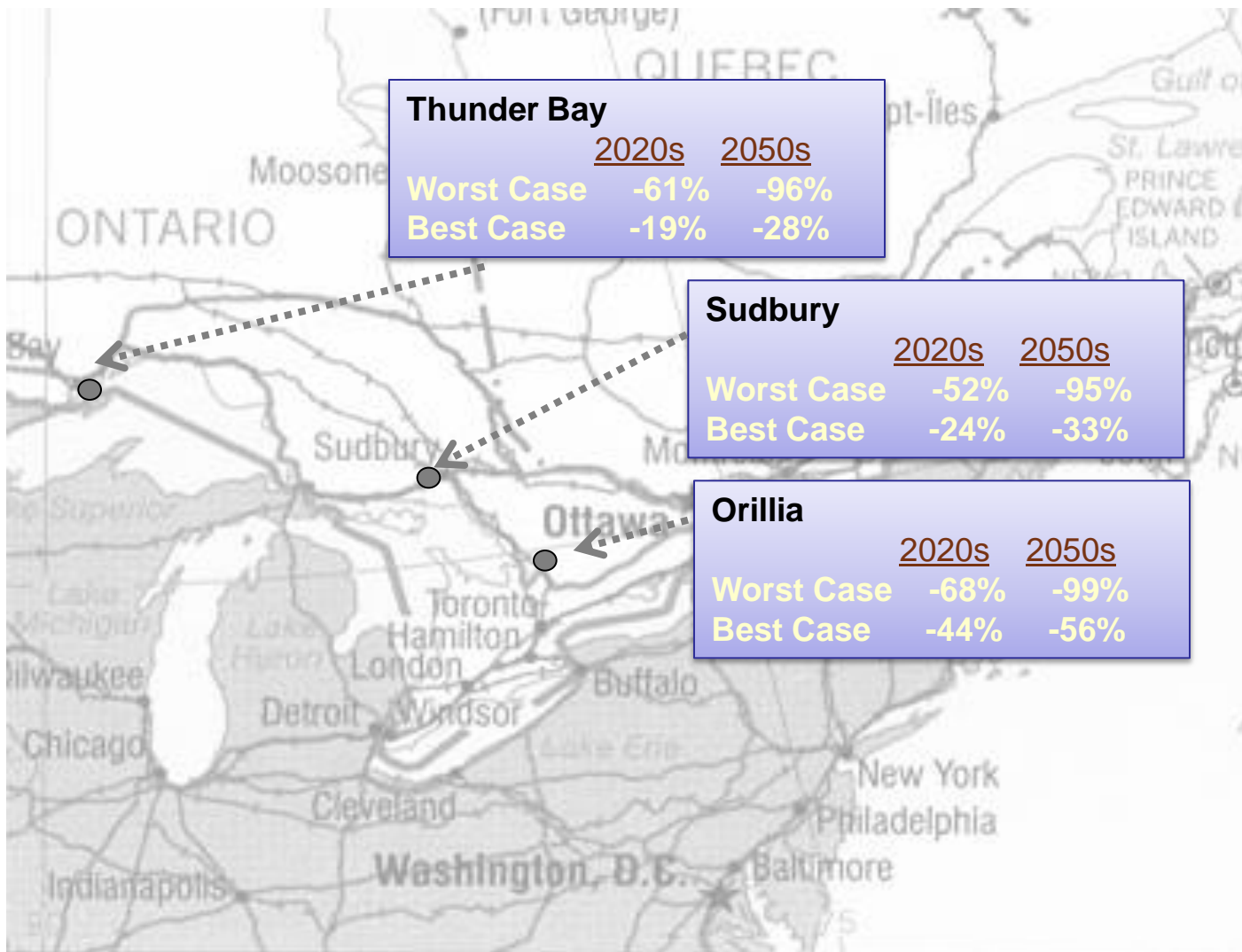
Vaughan and Grey County tornadoes in 2009 resulted in \$76M in insurance claims.

Wind damage resulting in personal injury, infrastructure and property damage, and power failures.



# Context – Climate Impacts

Economic losses in the snowmobiling industry as a result of shortened season are projected to be significant.



# Context – Economic Impacts

## Cost of adaptation increases when action delayed

- Cost of extreme weather may increase by **0.5 to 1% of world GDP** by mid-century (Derived from Stern, 2006 and Garnaut, 2008).
- This means that if Ontario isn't prepared for the impacts of a changing climate, the costs to our economy could be as much as **~\$5.19B**, or 1% of our GDP (Ministry of Finance 2009 GDP).

## Value of early action and targeted investment

- Well-targeted, early investment to improve climate resilience is likely to be cheaper and more effective than complex disaster relief efforts after the event.
- 2005 storm/flood that washed out Finch Avenue resulted in **\$500M in damages**; costs could have been **reduced through adaptation measures** such as larger road culverts, better protection for electrical and communication cabling, and back-flow valves in homes in surrounding area.

## Economic Opportunities

- Adaptation measures can spark innovation (e.g. new drip irrigation **technologies** in Leamington).
- Longer growing seasons have enabled a **vineyard** to be established on Manitoulin Island.

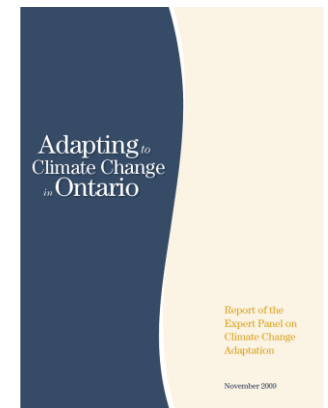
# Expert Panel on Climate Change Adaptation

The Panel, appointed in December 2007, consisted of two co-chairs:

- Dr. David Pearson, Professor of Earth Sciences at Laurentian University
- Dr. Ian Burton, Emeritus Professor at the University of Toronto and Lead Author for the IPCC 4th Assessment Report.

Nine additional members from a diverse variety of backgrounds and expertise:

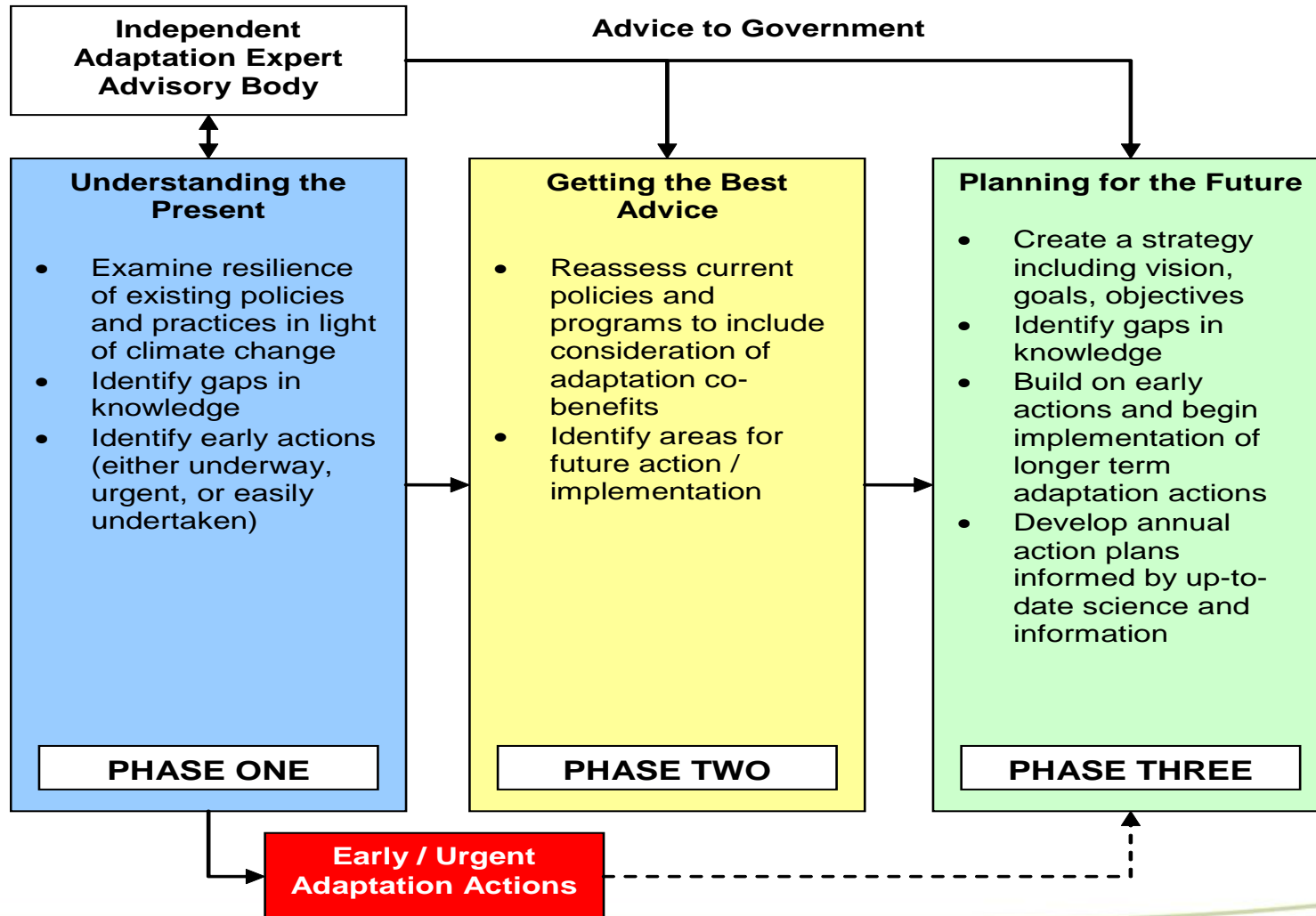
- Dr. John Beaucage (former Grand Council Chief of Anishinabek Nation)
- Dr. Barry Smit (University of Guelph)
- Dr. Judith Guernsey (Dalhousie University)
- Dr. Quentin Chiotti (Pollution Probe)
- Eva Ligeti (Clean Air Partnership)
- David Lapp (Canadian Council of Professional Engineers)
- Dr. Gordon McBean (University of Western Ontario)
- Alain Bourque (Impacts and Adaptation, Ouranos, Quebec)
- Jo-Ellen Parry (International Institute for Sustainable Development)



The Panel developed recommendations culminating in the Panel's Report, "Adapting to Climate Change in Ontario", to the Minister of the Environment (submitted November 2009).

[http://www.ene.gov.on.ca/environment/en/category/climate\\_change/STDPROD\\_078898.html](http://www.ene.gov.on.ca/environment/en/category/climate_change/STDPROD_078898.html)

# The Panel Process



# Stakeholder Engagement

- Stakeholder engagement began with the Panel looking internally to Ministries, and once report released, shifted focus to engage externally.
- Using the Expert Panel's report as a platform for engagement, MOE met with several stakeholders/sectors over spring 2010 to help inform a provincial policy framework (TBD) for adaptation.
- Stakeholders included representatives from the Environmental Commissioner's office, energy sector, municipalities, building sector, conservation authorities, the insurance industry, agriculture, health, and others leaders in the field.
- Feedback included need for:
  - Provincial adaptation strategy;
  - Clear, central accountability structure;
  - Dedicated funding;
  - Updated floodplain mapping, modelling, Intensity Duration Frequency curves;
  - Outreach and education to build capacity at community level; and
  - Clear and consistent risk assessments to prioritize decisions, given limited resources.

# Key Panel Recommendations

The government is currently considering the panel's recommendations. Some specific examples include:

## Infrastructure

### Rec #14 – Update stormwater management guidance

- MOE should complete a review of stormwater management throughout province by end of 2011, which would assess effectiveness of stormwater approval process and stormwater management master plans, and update the Stormwater Management Design manual to encourage innovation in municipal stormwater management practices.

## Water

### Rec #30 – Water conservation

- MOE should accelerate its work to develop strong and comprehensive water conservation strategies across the province, including reduction targets for large discretionary uses like municipal water use, introducing requirements in the Building Code for water conservation amenities, and conservation incentives.

# Key Panel Recommendations

## Water (cont'd)

### Rec #32 – Review Ontario Low Water Response program

- MNR should undertake a comprehensive review of the Ontario Low Water Response Program to adjust for projected drought conditions in areas determined to be vulnerable to extended dry periods, and should link this review to water use reporting and water conservation in the context of integrated watershed management.

### Rec #33 – Great Lakes agreements should be reviewed

- Regulations, policies and programs to implement the intra-basin transfer regulation and conservation commitments of the Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement prepared by MOE and MNR should be reviewed by adaptation experts to ensure the impacts of climate change are taken into account and appropriate adaptive solutions included.

### Rec #34 – Use Lake Simcoe strategy as a pilot

- The climate change adaptation strategy called for in the Lake Simcoe Protection Plan should be considered as a pilot project with potential application to strategies for increasing the climate resilience of other watersheds.

# Key Panel Recommendations

## Science, Monitoring and Modelling

### Rec #4 – Enhance climate change science and modelling capacity

- MOE should participate in Canadian Climate Change Scenarios Network's national science and modelling program, provide advice across government and analyze/review and communicate climate change science to government users.

### Rec #15 – Update IDF curves and review flood plain mapping

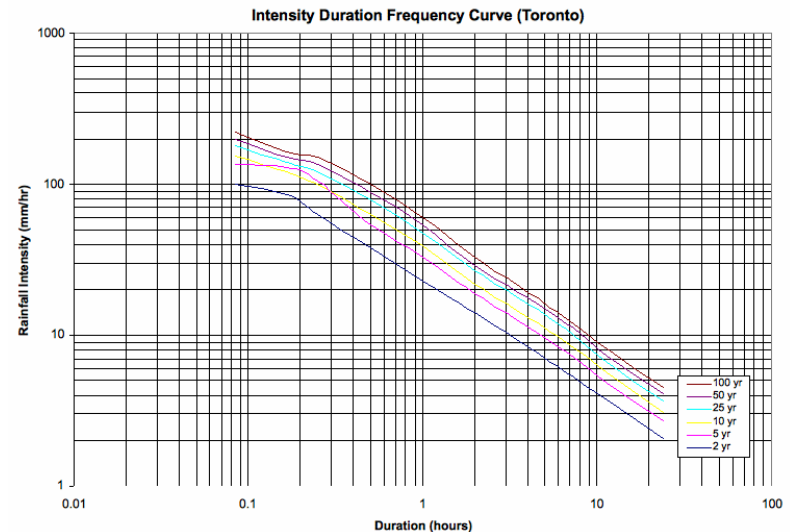
- MNR with Conservation Authorities should review existing flood plain mapping and coordinate completion where gaps exist; and update and develop local and regional Intensity, Duration and Frequency Curves to ensure best available data and projections are accessible to local decision-makers.

# Current Actions on Climate Modelling

- MOE is currently collaborating with a number of partners on climate modelling.
- Early findings from OURANOS and the University of Regina, using two different climate models (CRCM & PRECIS) indicate that Ontario will experience:
  - Increases in temperature;
  - Increases in precipitation in spring, fall and winter (large variability in summer); and
  - Decrease in length of snow period.
- Several additional grant agreements are underway with University of Toronto (St. George), University of Toronto (Scarborough), University of Regina, and York University.
  - These projects will further refine climate projections to higher resolution (up to 10km x 10km). Results from these projects are expected to be available by April 2011.
- Anticipated project results could inform the development of socio-economic adaptation strategies. For example,
  - Temperature and precipitation indicators could link with water modelling currently underway by MNR and MOE;
  - Intensity, duration and frequency of precipitation and wind gust analyses could inform infrastructure investment and insurance sector policies; and
  - Heat-wave analyses could be useful for public health authorities.

# Current Actions on IDF Curves

- In related work, MTO has developed a web based tool for rainfall Intensity, Duration and Frequency (IDF) curves
  - Collaborated with University of Waterloo using Environment Canada data
  - Provides IDF curves electronically for any location in the Province
  - Ensures future highway drainage infrastructure designs are based on more precise representation of recent weather patterns; can be reflective of climate change trends in the historic data
  - Easily updated when new rainfall data becomes available



<http://www.mto.gov.on.ca/english/engineering/drainage/index.shtml>

# Other Current Adaptation Actions

- **Lake Simcoe Protection Plan**
  - Requires the development of climate change adaptation strategy for watershed.
  - MOE currently undertaking vulnerability assessments to inform the strategy.
- **Sourcewater Protection Planning**
  - MOE undertaking assessment of emerging science needs to consider climate change impacts within the planning process.
- **Capital Planning Instructions**
  - MEI modified their Capital Planning Instructions requiring ministries to consider impacts of climate change on infrastructure when seeking funding for five year plans (e.g. highways, dams and buildings).
- **Growth Plan for Northern Ontario**
  - Climate change impacts were considered in the development of the draft plan, released for public comment in Fall 2009.

# Other Current Adaptation Actions

- **Provincial Policy Statement**
  - MMAH is currently undertaking a 5-year review of the PPS.
  - Opportunity to integrate adaptation policies (e.g. related to development in floodplains, sustainable water use, stormwater management, protecting natural heritage).
- **Ontario Building Code**
  - MMAH is currently undertaking a 5-year review of the Building Code.
  - Opportunity to integrate adaptation policies that would increase resilience of buildings (e.g. hurricane straps, backflow valves).
- **Far North Land Use Strategy**
  - MNR is working with Far North First Nations to ensure that their land use planning considers the impacts of climate change.
  - Working to ensure community-based land use planning will assess the potential effects of climate change and enhance community resilience.

# Ontario Regional Adaptation Collaborative

- Initiative with Natural Resources Canada to advance community level adaptation planning and actions to reduce vulnerability to climate change impacts.
- Program value is up to \$6.8M from December 2009 – March 2012.
- MOE's RAC partners include:
  - The Ministry of Natural Resources;
  - The Ministry of Municipal Affairs and Housing;
  - Ontario Centre for Climate Impacts and Adaptation Resources (OCCIAR);
  - Toronto Public Health;
  - York University;
  - Toronto and Region Conservation Authority;
  - Institute for Catastrophic Loss Reduction;
  - Clean Air Partnership; and
  - Association for Canadian Educational Resources.
- Potential opportunity for local engagement (e.g. Conservation Authorities) and participation in components of the RAC (e.g., workshops and risk management tools).

# Ontario Regional Adaptation Collaborative (RAC)

## Urban Component

Build capacity through outreach and training with large urban communities (e.g. municipalities, public health units) across Ontario.

Partners: CAP.

## Rural/Northern Component

Build capacity through outreach and training with small, rural, agricultural, resource-based and Northern communities across Ontario.

Partners: OCCIAR.

## Outreach & Capacity Building

## Ontario RAC

## Water Resources

## Risk Management

## Weather and Water Information Gateway:

Create a web-based integrated Provincial weather and water information discovery and access service to facilitate decision-making the community level.

Partners: MNR, ACER.

## Public Health Tools

Develop heat vulnerability assessment tool to enable public health units to deliver scarce resources during a heat event.

Partner: Toronto Public Health.

## Municipal Risk Assessment Tools

Expand and update municipal guide to assist municipalities to create risk-based vulnerability assessments.

Partner: MMAH.

## 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/CO, York University.

## Resilient Buildings

Document and make available best practices to retrofit existing homes to improve resilience to climate extremes. Information could be used to update provincial building code, municipal bylaws, current constructions practices, etc.

Partner: Institute for Catastrophic Loss Reduction.

# Community Adaptation Initiative

- MOE grant program that aims to improve the climate-resilience of the province by funding the **promotion and delivery of resources, outreach and capacity building** related to impacts and adaptation across the province.
  - Examples include: vulnerability assessment tools, brochures, workshops, and research.
  - CAI is expected to reach a wide range of community types with particular focus on vulnerable communities (e.g., rural, northern, First Nations).
  - CAI will include 1-2 **citizens conferences** this year.
    - intensive events spread over several days for groups of selected members of the public usually aimed at gathering opinions and recommendations about potential government actions and policy options.
    - also a way of stimulating debate and engaging the public in discussion of important issues involving their values, beliefs, and perceptions of risk.

# Thank you for your time!



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