


## Adapting to Climate Change: Science and Municipal Issues



100 Years Ago

There were only 8,000 cars in the U.S., and only 144 miles of paved roads.

The maximum speed limit in most cities was 10 mph.

Don C. MacIver



**Canada**

## ENVIRONMENT CANADA

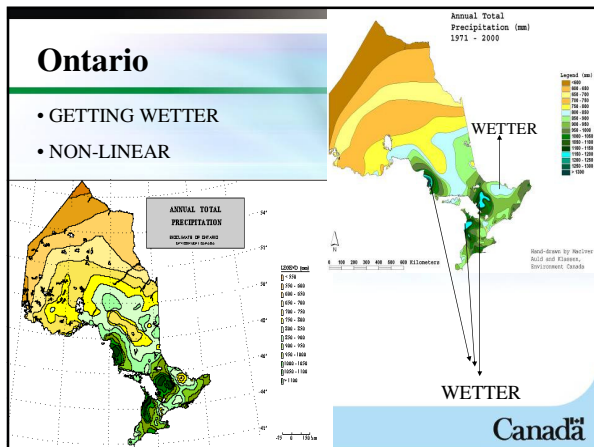
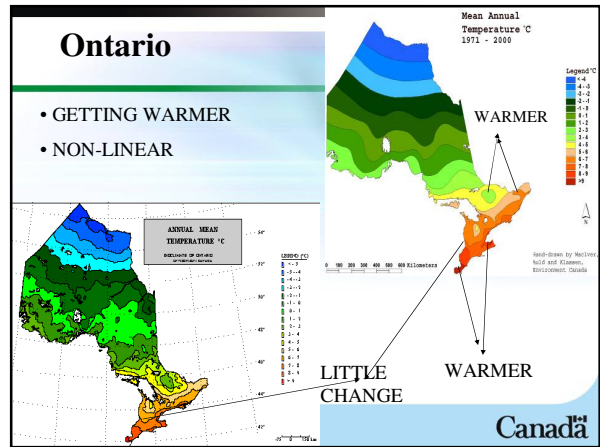
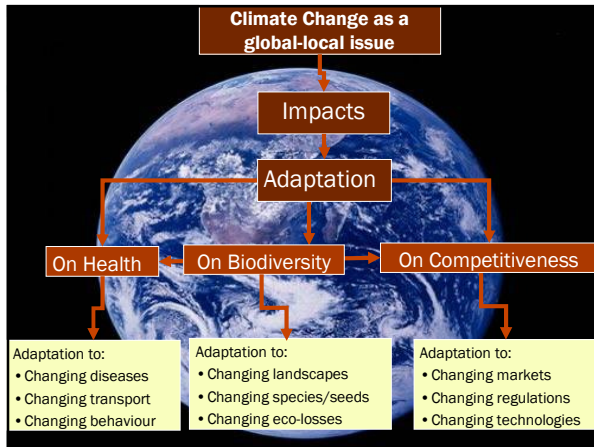
Adaptation and Impacts Research Division (AIRD)



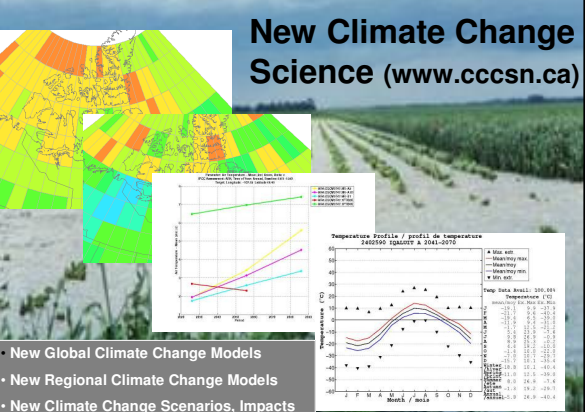
### Canadians understand the impacts of atmospheric change and adapt to its effects






**Canada**

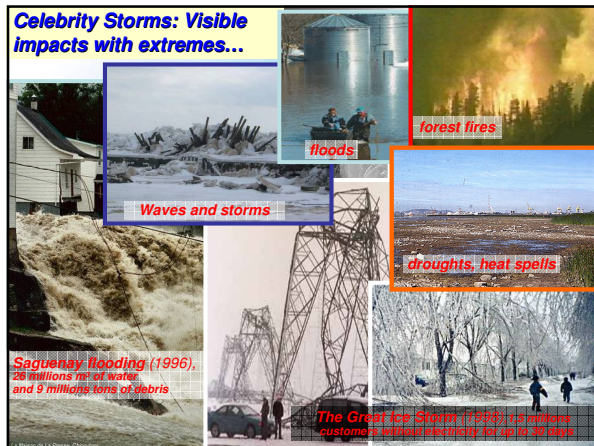


## New Climate Change Science (www.cccsn.ca)



- New Global Climate Change Models
- New Regional Climate Change Models
- New Climate Change Scenarios, Impacts and Adaptation



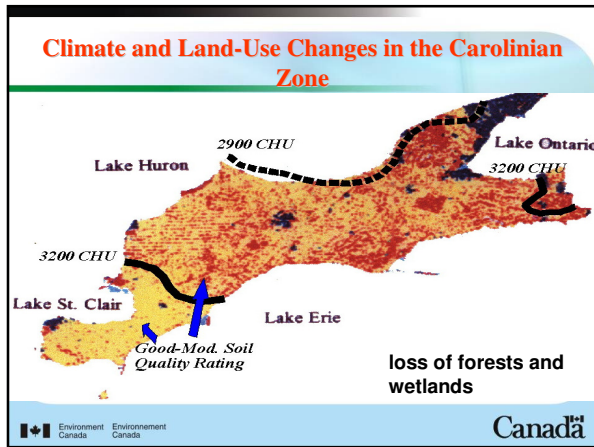
**New Hazards Website: <http://www.hazards.ca>**

Environment Canada / Environnement Canada  
 Meteorological Service of Canada / Service météorologique du Canada

Emergency Management Ontario / Gestion des Urgences Ontario

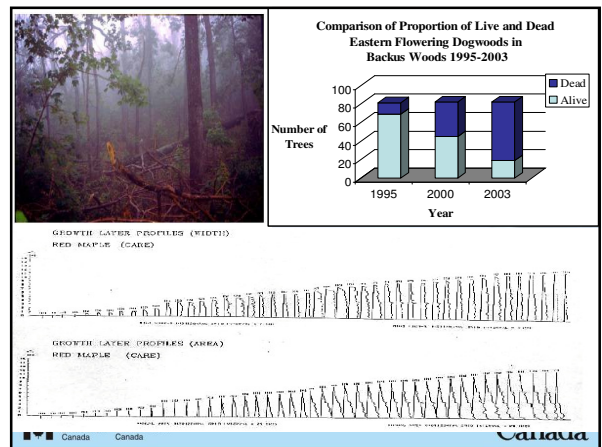
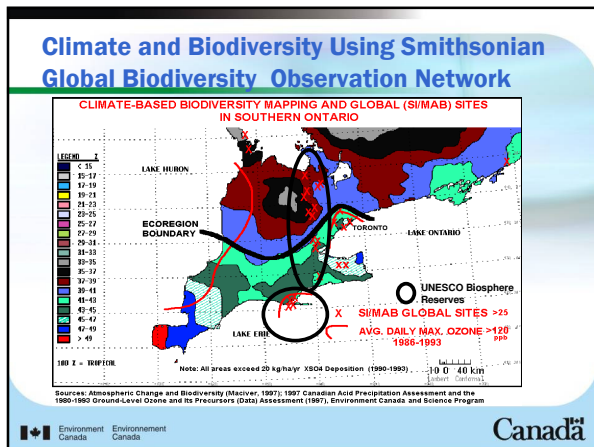
**Atmospheric Hazards / Dangers Atmosphérique Ontario**

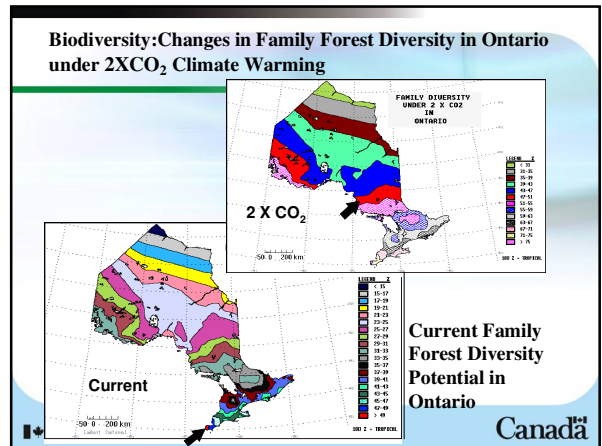
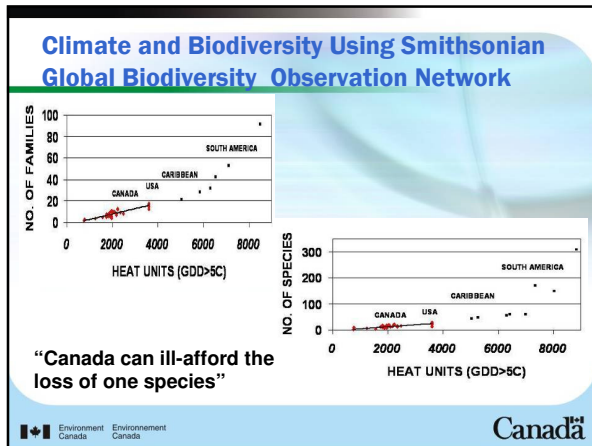
English / Français



**Linking Climate and Biodiversity: Conservation & Invasive Species**

- Climate and biodiversity are closely linked
- Heat is a powerful trigger in Ontario's ecosystems
- Biodiversity is responsive to 1-2C change in Canada





### HUMAN AND ANIMAL HEALTH: Climate Change and Diseases

Increased risk of spread of vector-borne diseases

Surveillance and prediction systems underway... for health care response

**West Nile Virus**

**Lyme Disease**

Environment Canada / Environnement Canada

### BUILDING SOLUTIONS – PATH FORWARD

#### Adaptation is scale dependent

Who	Scale	Adaptation Pillars	Outcomes
Scientists	Site	Scientific	Human Health and Safety
Citizens	Local	Technological	Competitiveness
Communities	Regional	Behavioral	Biodiversity Conservation
Governments	National	Institutional	
Private Industry	International	Economic	
Big Business		Regulatory	
Small Business		Education/Outreach	
		Expert Advice	

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### NEW SCIENCE INTO BEHAVIORAL ACTIONS: Heat Alert and Hot Weather Response System - Adapting to Extreme Heat

- 2003 European heat wave ... > 35,000 deaths
- 1995 Chicago heat wave ... > 600 deaths

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### WINTER MAINTENANCE in a Changing Climate

Climate Change Science: Analysis, Adaptation and Advice for Decision-Makers

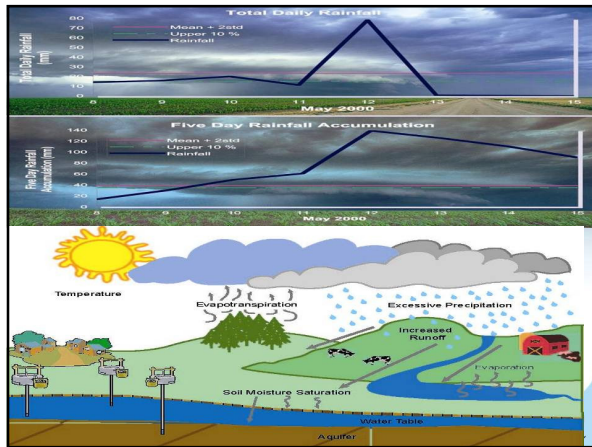
City of Ottawa By-Law ... Winter Road and Sidewalk Maintenance

### Infrastructure - Bldgs, Roads, Bridges

Bear the loss (eg. liability)  
Prevent the effects (eg. ice removal)  
Modify the events (eg. salt/sand)  
Change Behaviour (eg. warnings)  
Research – (eg. science & technology)  
Education & outreach

### Adaptation using Infrastructure Lifecycle Timeframes

Structures	Expected Lifecycle
Houses/Buildings	Retrofit/alterations 15-20 yrs Demolition 50-100 yrs Green Infrastructure
Sewer	Major upgrade 50 yr
Dams/Water Supply	Refurbishment 20-30 yrs Reconstruction 50 yrs
Bridges	Maintenance annually Resurface concrete 20-25 yrs Reconstruction 50-100 yrs



### ADAPTATION, MITIGATION AND SUSTAINABLE DEVELOPMENT (AMSD): Rapid Adaptation Assessment of Climate Change WITH Halton Region, Ontario

**Goals**

1. Links climate models to policy and decision making
2. Provides a rapid assessment of the risks of climate change to various economic sectors and the natural environment
3. Identifies priorities for climate change adaptation

**Why Halton?**

1. Urban and Rural
2. Largest population and industrialization growth rates for Canada between 2001 and 2006
3. Niagara Escarpment

**The Approach**

1. Past Climate Analysis
2. Future Climate Scenarios
3. Linking to Economic Sectors and the Natural Environment
4. Identifying Risks and Building Adaptation/Mitigation Plans

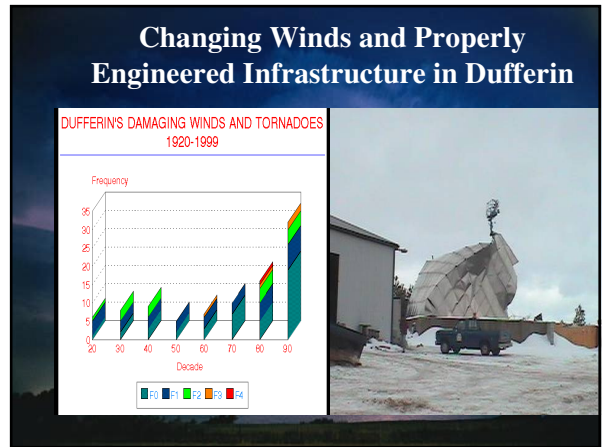
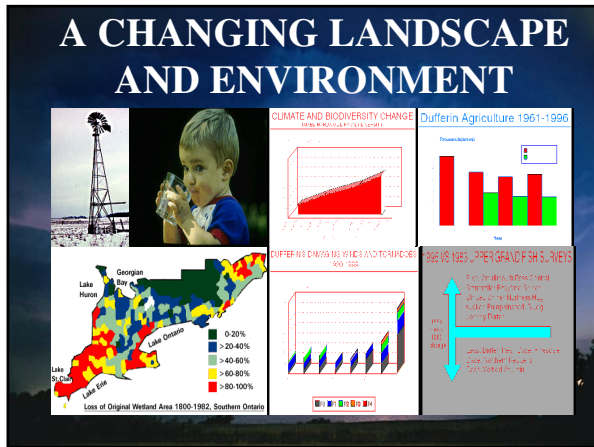
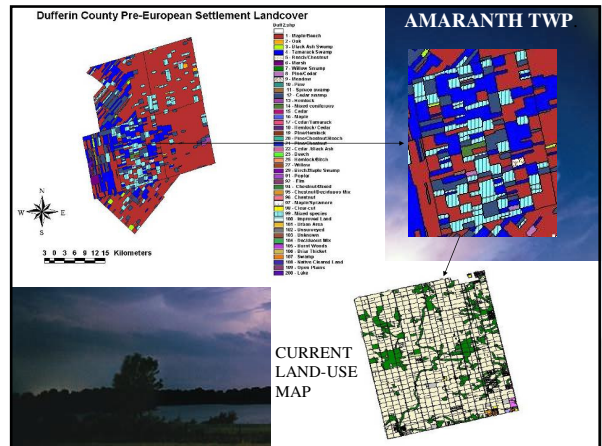
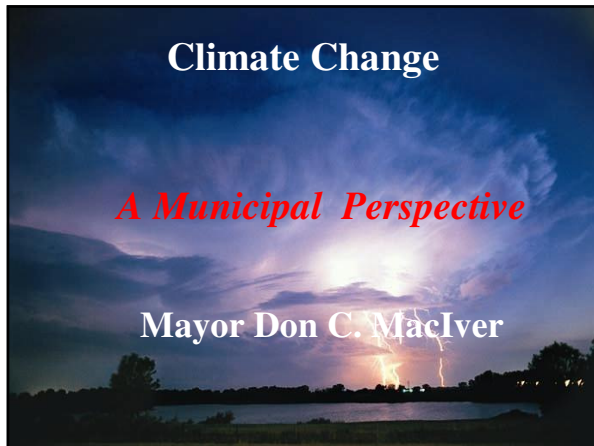
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### The Adaptation Challenge

“Cost-effective decision-making tools and best practices for using climate change adaptation science to increase safety, health, biodiversity & competitiveness”

Eg. Carolinian Product Branding and Labelling defined by environmentally sound standards to improve market share, nationally and internationally.

Environment Canada, Environment Canada



### IMPACTS OF INDIVIDUAL VEHICLE WASTE DISPOSAL VERSUS SINGLE TRUCK COLLECTION SYSTEM

COMMUNITY OF 4000/1200 HOUSEHOLDS

DIRECT BENEFIT			
Energy (GJ)	54,703	to 2,348	Tonnes/year Electricity for 1200 homes/year
Equiv. CO2	5,750	to 1,246	Tonnes/year Emissions from 1260cars/year
CO-BENEFITS			
NOx	33.5	to 1.4	Tonnes/year Emissions from 1500 cars/year
SOx	8.4	to .35	Tonnes/year Electricity for 1043 homes/year
PM	6.2	to .4	Tonnes/year Electricity for 1117 homes/year
VOCs	15.1	to .9	Tonnes/year Emissions from 446 cars/year
Cd (air)	.04	to 0	Kg/year Electricity for 2425 homes/year
ANCILLARY BENEFITS			

- Impact equivalents for Net Life Cycle Management are significantly higher for heavy metals
- Significant savings in road maintenance (26,000 cars per year versus one truck)
- Significant savings in individual vehicle repairs (combination of salt/gravel/mud exposures)
- Improved cost-efficiencies, control of the energy and waste stream, source separation, compaction and reduced volumes/ shipping, and improved wildlife conservation.



**COMPREHENSIVE WATER STRATEGY**


*SYNCHRONIZE PLANS*

- High Impact Weather Alerts
- Source Water Protection
- Nutrient Management Plans
- Groundwater Plans
- Official Plans
- Environmental Farm Plans

*WATER QUANTITY AND QUALITY*

**ADAPTING TO CLIMATE CHANGE**

**WALK THE TALK**



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