



# CLIMATE CHANGE ADAPTATION

WHAT IS IT?

WHY DOES IT MATTER?



## CLIMATE CHANGE LEADS TO

1. Warmer air, soil and water temperatures
2. Longer summers, growing seasons; Later falls; Increased variability within seasons
3. Changes in precipitation patterns, including increases in more intense events
4. Increased weather variability & extreme events
5. Increased evaporation from surface waters; Potential for lower Great Lakes levels
6. Coastal sea level rise and stronger storm surges;
7. Reduced average snow packs – but, potential for more extreme snow storms
8. **WARMER, WETTER, WILDER...**

## HEALTH IMPACTS

### HEAT RISKS

- Heat-related illness & deaths
- Increased smog and related illness and deaths (unless emissions reduced)
- More food-borne illness
- Increase in vector-borne diseases such as West Nile & Lyme disease, new diseases

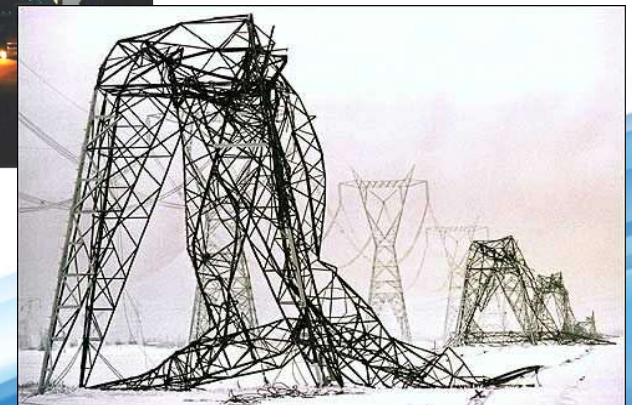
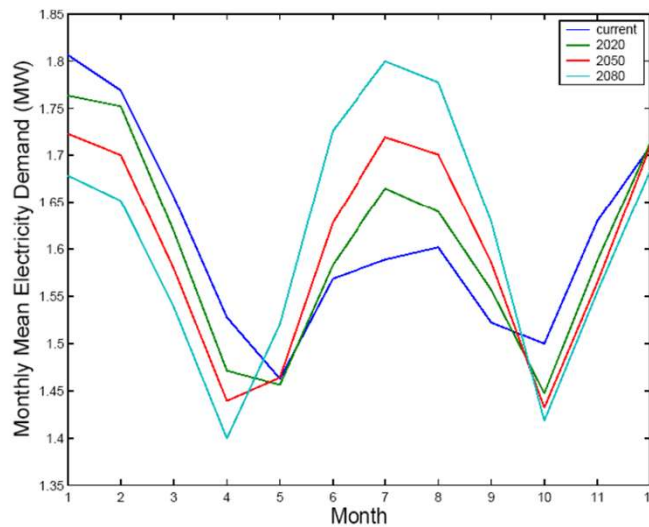


### PRECIPITATION RISKS

- Increased waterborne disease potential
- Injuries and deaths from flooding & winter storms (e.g. ice storms)
- More lake effect snowstorms
- Increase in basement mould from flooding incidents
- Mental health

## ENERGY IMPACTS

- Rise in average & peak summer demand
- Stress on electricity generation, transmission & distribution
- Damage to transmission & distribution capacity from storms, wind
- Decreased hydro power from declining water levels



## TRANSPORTATION IMPACTS



- Damage to roads, bridges, culverts
- Disruptions due to blackouts, storms, floods, freezing rain
- Reduced Great Lakes shipping
- More frequent disruption of air traffic



## WATER IMPACTS

- More frequent flooding from intense rainfall events; changed seasonality to flooding risks
- Water quality impacts from stormwater runoff, warmer water in lakes and streams and lower lake levels, algal blooms
- More frequent heat waves and droughts (increasing water demand and potentially leading to water shortages)



## BUILDING IMPACTS



- Basement flooding
- Damage from high winds, severe thunderstorms & tornados
- Roof damage from ice dams created by frequent freeze-thaw cycles, rain on snow
- Increased thermal discomfort in buildings without a/c
- New building codes and standards; retrofits & repairs to existing buildings

## URBAN ECOSYSTEM IMPACTS

- Stress on vegetation from heat & drought
- Damage to parks & trees from floods & windstorms
- More pests & disease
- Loss of native biodiversity
- Loss of wetlands & shorebirds
- More invasive species established





## VULNERABLE POPULATIONS



- Homeless
- Low-income people
  - Housing conditions
  - Limited mobility
  - Lack of insurance, savings
- People in poor health
- Isolated seniors
- Infants & small children



## GOVERNMENT FINANCE IMPACTS

- Direct costs of repairing weather-related damage to municipal infrastructure, facilities & parks
- Costs for premature replacement of infrastructure, increased maintenance
- Expenditures during & after weather emergencies
- Subsidies for uninsured residents & businesses affected by climate-related events
- Increased insurance costs
- Loss of taxes, incomes due to business disruption
- Lawsuits



# Financial Implications – 2018

- January: Winter storm damage in Toronto, London & southwestern Ontario of nearly \$10m
- February: Water and winter storm damage in southern Ontario of over \$40m
- Early April: Wind and rain storm damage in southern Ontario topping \$79m
- Mid-April: Winter storm and ice storm in Toronto and southwestern Ontario of over \$187m
- May: Wind and rain storm in Hamilton & the GTA of over \$500m
- August: Extensive flooding due to rain storm in Toronto of over \$80m
- September: Tornado in Ottawa-Gatineau Area \$300m in insured damage.





# Financial Implications

- In 2016 Windsor's flooding caused \$108m in insured losses and Windsor's 2017 flooding caused \$124m in insured losses.
- Only 45% of residents had insurance cover losses.
- Estimated insurance cost of the 2014 flood in Burlington was close to \$90m.
- The 2013 Ice Storm resulted in \$65m in direct costs to the City of Toronto and \$940m in insured losses.
- The 2013 Flood in Toronto resulted in \$103m in direct costs to the City of Toronto and almost \$1bn in insured losses.



## ADAPTATION Vs MITIGATION

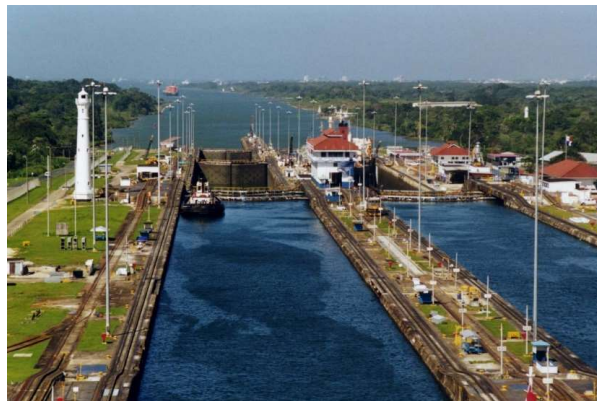
- Mitigate reduce greenhouse gas emissions

*“Avoid the unmanageable”*

- Adapt take action to reduce vulnerability

*“Manage the unavoidable”*

# ADAPTING OUR ENVIRONMENT





## CLIMATE ADAPTATION IS NOT NEW

- Following Hurricane Hazel, Ontario developed regulations that restricted developments on flood plains
- Following the August 2005 storm, the City of Toronto developed new overflow protection for Black Creek
- Following heat waves in the 1980's and 1990's, many municipalities developed heat alert and response systems



# Resident Relocations



- 260 Wellesley Street
- Burst Water Pipe
- Flooding in Equipment Room
- 1,000 residents without water or power
- Residents needed to be relocated for 3 days
- Aging Building Stock



## THE FUDAI FLOODGATE



- 12 years to build ('72-'84)
- ¥3.56 billion (\$33m)
- 205m span
- 15.5m high
- 10m is standard height for a Japanese floodgate
- Ugly as hell, cost more than required height
- Fukushima estimated to cost 20 trillion yen (\$180 billion US \$)



# Thank You

Gabriella Kalapos

Clean Air Partnership

[gkalapos@cleanairpartnership.org](mailto:gkalapos@cleanairpartnership.org)



## Durham Region Natural Environment Climate Change Summit

Brought to you by: the Natural Environment  
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*thank you*

*thank you*