Rapid Assessment of the Impacts of Climate Change (RAICCC)

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Step 1
Build History of Climate Extremes
Observational Data

Step 2
Evaluate and Select Climate Model
Model Output

Step 3
Build Future of Climate Extremes

Step 4
Climate Change Environmental Predictions
10 eco-sectors

Step 5
Relative Risk Assessment
Impacts of Climate Change

- Fast
- Simple (Transferable)
- Builds on Existing Tools
- Linked to Scientific Literature on Impacts
- Presents a Relative Risk Assessment
Step 1
Building a History of Climate Extremes

Getting warmer
\[ \uparrow 1.54^\circ C \]

Getting dryer
\[ \downarrow 0.55 \text{ mm/day (20 cm/year)} \]
Past Extremes at Halton Region

- Raining/snowing less often ↓7% per year
- Raining/snowing less intensely ↓0.4 mm/episode (primarily the Summer as increases in Spring)
- More dog days of summer ↑ ~6.5 days per year
- Less brutal cold days ↓ ~8 days per year
- Growing season increased ↑ over 3 weeks
- Frost season decreased ↓ ~ 5 days
Step 2 – Selecting a Climate Model

Parameter: Air Temperature - Mean (2m) Anom, Units: °C
Target: Longitude: -79.29, Latitude: 43.67
Validating Models

Observed vs. Modelled
Halton Region 1980 to 1999

- Too warm
- Too cold
- Too wet
- Too dry

Perfect Model
Ensemble
INMCM3
CSIROMk3
CGCM3
Step 3 – Building a Future of Climate Extremes

- Will rain/snow more often \( \uparrow \) 5% by 2100
- Will rain/snow more intensely \( \uparrow \) 0.71 mm/event by 2100
- More dog days of summer \( \uparrow \) 32 days/year by 2100
- Less brutal cold days \( \downarrow \) 17 days/year by 2100
- Growing season \( \uparrow \) Almost a month longer
- Frost season \( \downarrow \) Almost a month shorter
Observed ↑ 10 days

Projected ↑ 18 days by 2100

“Oh, no! Golf-ball-sized hail!”

Past and Future
Potential Premium Golf Days Due to Climate Change
Halton Region 1980 to 2100
Observed ➤ 11 days

Projected ➤ 36 days by 2100
### Step 5
Relative Risk/Benefit Assessment of Climate Change

<table>
<thead>
<tr>
<th>Change (Δ) in Risk (−)/Benefit (+)</th>
<th>Measured as % change</th>
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</thead>
<tbody>
<tr>
<td>Very High Δ in Risk/Benefit (≥40)</td>
<td>Biodiversity (−)</td>
<td>Forests (−)</td>
<td>Energy (Cooling) (−)</td>
<td>Agriculture (+)</td>
<td>Built Environment (+)</td>
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<tr>
<td>High Δ in Risk/Benefit (30 to 40)</td>
<td>Energy (Heating) (−)</td>
<td>Human Health (−)</td>
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<tr>
<td>Medium Δ in Risk/Benefit (20 to 30)</td>
<td>Water Quality (−)</td>
<td>Fisheries (−)</td>
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<tr>
<td>Low Δ in Risk/Benefit (10 to 20)</td>
<td>Transportation (−)</td>
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</tr>
<tr>
<td>Very Low Δ in Risk/Benefit (0 to 10)</td>
<td>Very High Model Uncertainty (≥2.0)</td>
<td>High Model Uncertainty (1.51 to 2.0)</td>
<td>Medium Model Uncertainty (1.1 to 1.5)</td>
<td>Low Model Uncertainty (0.51 to 1.0)</td>
<td>Very Low Model Uncertainty (0 to 0.5)</td>
</tr>
</tbody>
</table>

**Model Uncertainty** measured by Confidence Index (CI)
Conclusions

For Halton Region
• climate change is an important issue to Halton, and its importance will increase over the 21\textsuperscript{st} century
• the built environment, agriculture and tourism are those eco-sectors at Halton Region identified for further study

For RAICCC
• Provides climate change information to local communities
• Next steps include identifying adaptation options and then the cost-effectiveness of each option
• Applying at Biosphere Reserves in Canada, and elsewhere