Collingwood Climate Adaptation Plan

Workshop #1

December 16, 2025

AMETHYST INFRASTRUCTURE MANAGEMENT

aspire CONSULTING

redbrick COMMUNICATIONS

Agenda

- ✓ Introductions
- ✓ Climate Change & Adaptation Primer
- ✓ Collingwood Climate Adaptation Project
- ✓ First Look at Climate Impacts & Action
- ✓ Introduction to Systems Thinking
- ✓ Climate Profile: Town of Collingwood
- ✓ Climate Impact Statements
- ✓ Next Steps

Land Acknowledgement

For more than 15,000 years the First Nations walked upon, and cared for, the lands we now call home: Anishinaabek, Haudenosaunee, Ojibwe, and many others who cared for their families and communities, the way we now seek to care for ours.

The Town of Collingwood acknowledges the Lake Simcoe-Nottawasaga Treaty of 1818 and respects all of the Nation-to-Nation agreements that have formed relationships with the original inhabitants of Turtle Island; the reality of our shared history; the current contributions of Indigenous people within our community and seeks to continue empowering expressions of pride amongst all of the diverse stakeholders in this area.

We seek to do better, to continue to recognize, learn, and grow, in friendship and community, Nation-to-Nation.

Climate Change & Adaptation Primer

Climate Change

Global & Canadian Perspectives

Human influence has unequivocally warmed the atmosphere, ocean, and land

(IPCC, 2023)

Global surface temperature has **increased by approximately 1.1°C** above pre-industrial levels

(IPCC, 2023)

Canada is warming at roughly twice the global average, and northern regions at nearly three times that rate

(Government of Canada, 2023)

Climate Change

Global Impacts & Losses Observed

Water Availability & Food Production

- Water availability
- Agriculture/crop production
- Animal and livestock health and productivity
- Fisheries yields and aquiculture production

Cities, Settlements & Infrastructure

- Inland flooding and associated damages
- Flood/storm induced damages in coastal areas
- Damages to infrastructure
- Damages to key economic sectors

Health & Well-Being

- Infectious diseases
- Heat, malnutrition and harm from wildfire
- Mental health
- Displacement

Biodiversity & Ecosystems

- Terrestrial ecosystems
- Freshwater ecosystems
- Ocean ecosystems

Source: IPCC, 2023

Climate Change

A Local Issue

Weather events once considered rare are happening more often

Source: collingwoodtoday.ca

Heat waves and wildfires are creating health and safety emergencies

Source: ctvnews.ca

Source: globalnews.ca

Infrastructure built for past conditions is failing under today's extremes

Source: snnewswatch.com

Communities are bearing rising costs of repairs and insurance

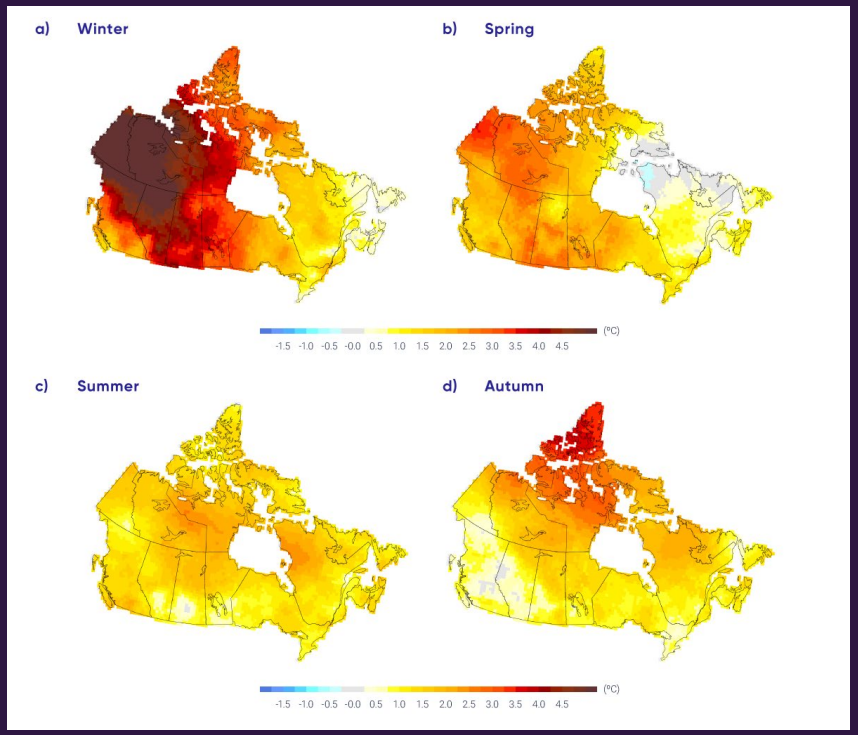
Key Concepts

Weather

Short-term conditions
(hours to days)

Climate

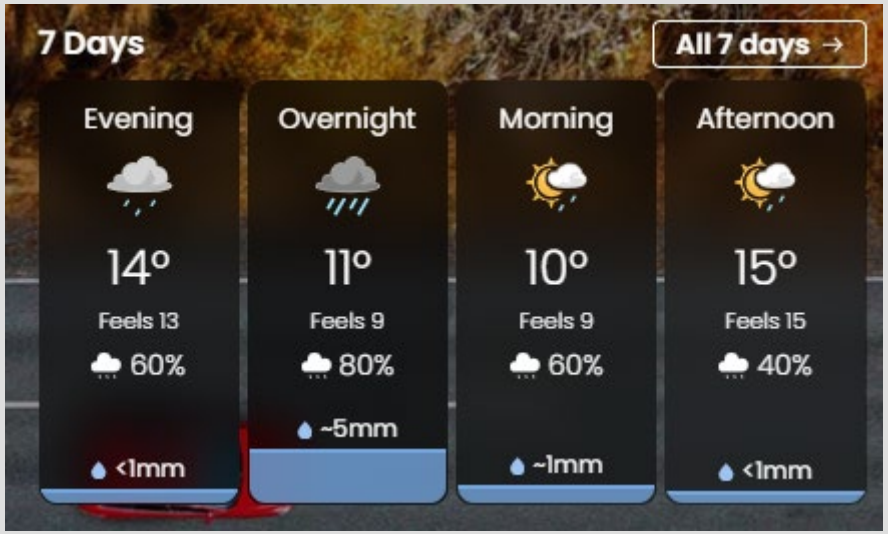
Long-term patterns and averages



Key Concepts

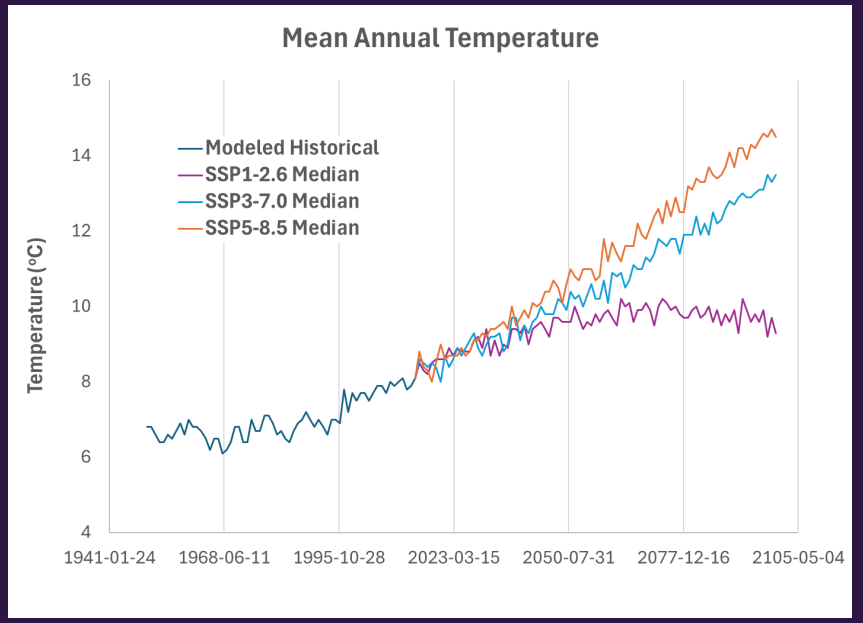
Forecast

Predict short term events
(e.g. storms)



Projection

Model long-term trends



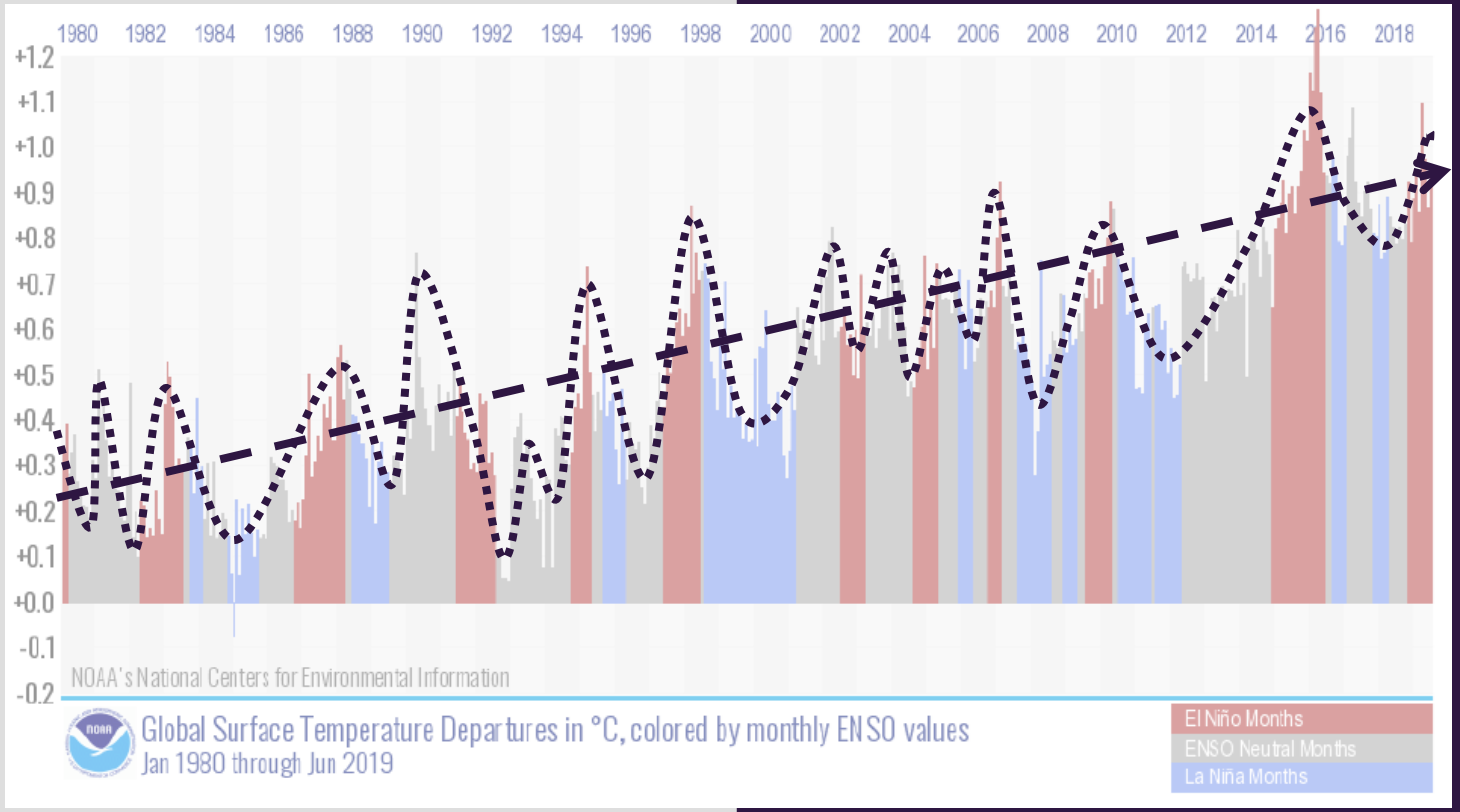
Key Concepts

Climate Variability

Climate naturally varies year-to-year (e.g. El Niño, cold winters)

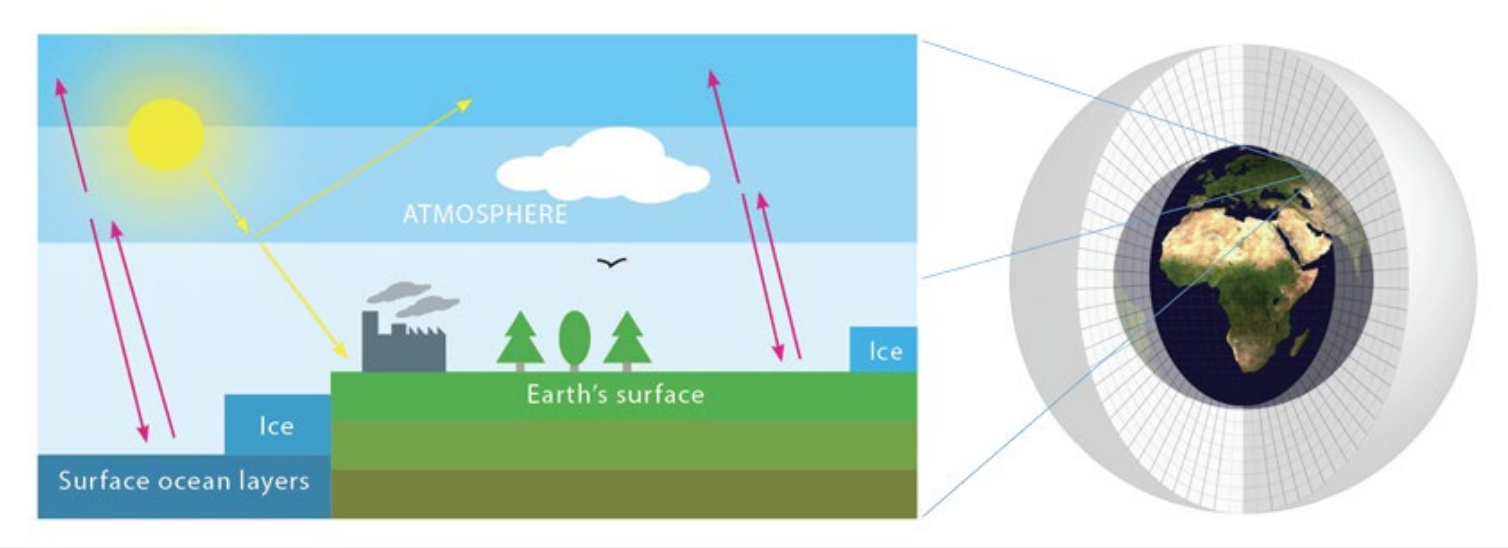
Climate Change

Persistent, long-term shifts caused mainly by human activity



Key Concepts

Climate Models



Source: Ouranos (2016)

- Mathematical representation of global climate systems
- Numerous calibrated climate models have been developed globally
- An ensemble of models are used to determine a range of projected conditions

GCM – Global Climate Model

RCM – Regional Climate Model

Key Concepts

Greenhouse Gases (GHGs)

Carbon Dioxide (CO_2)

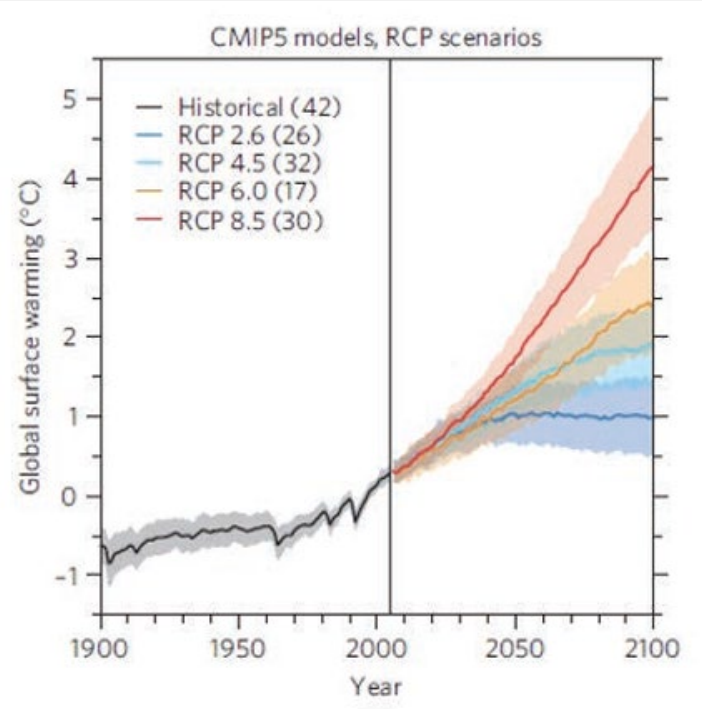
Methane (CH_4)

Nitrous Oxide (N_2O)

Fluorinated Gases

Key Concepts

Emission Scenarios

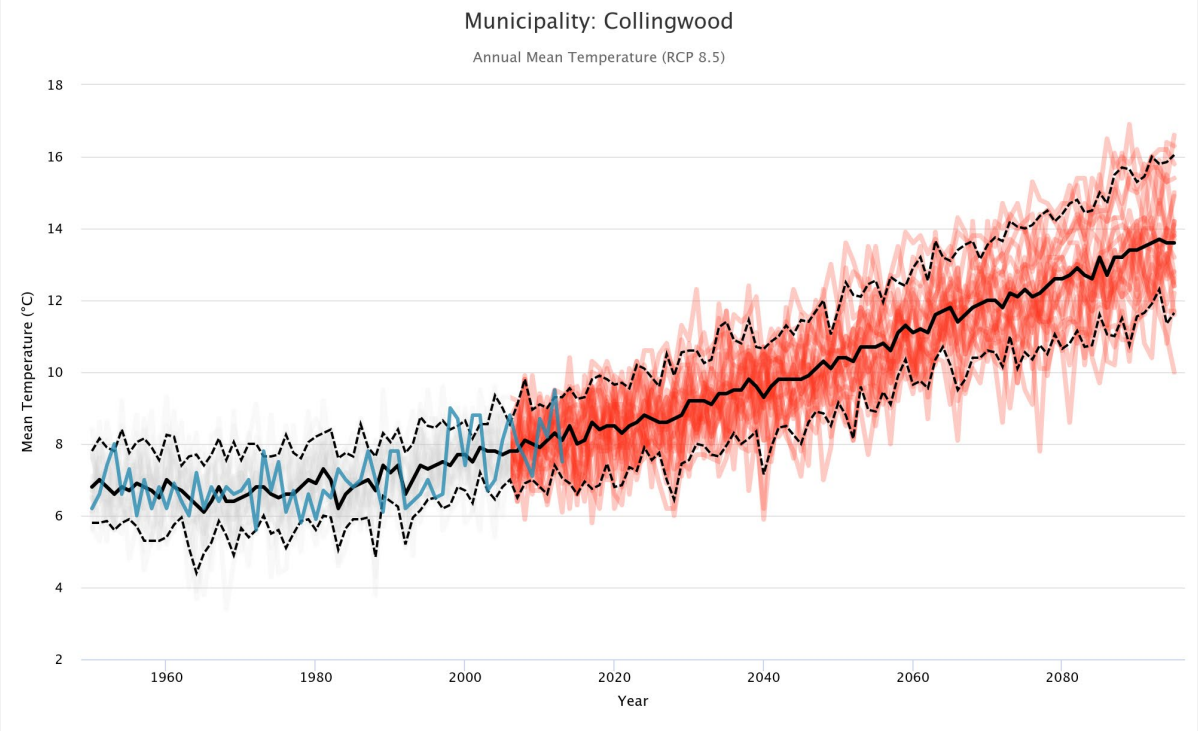


Source: Ouranos (2016)

- Alternative visions of the future emission concentrations
- Incorporates assumptions around changes in technology, demographics, growth, and their interactions
- Considers how mitigation policies will regulate anthropogenic emissions
- Representative Concentration Pathways (**RCPs**) are the emission scenarios from the Fifth Assessment Report (AR5) published by the Intergovernmental Panel on Climate Change (IPCC)

Key Concepts

Emissions Scenarios



Individual model data

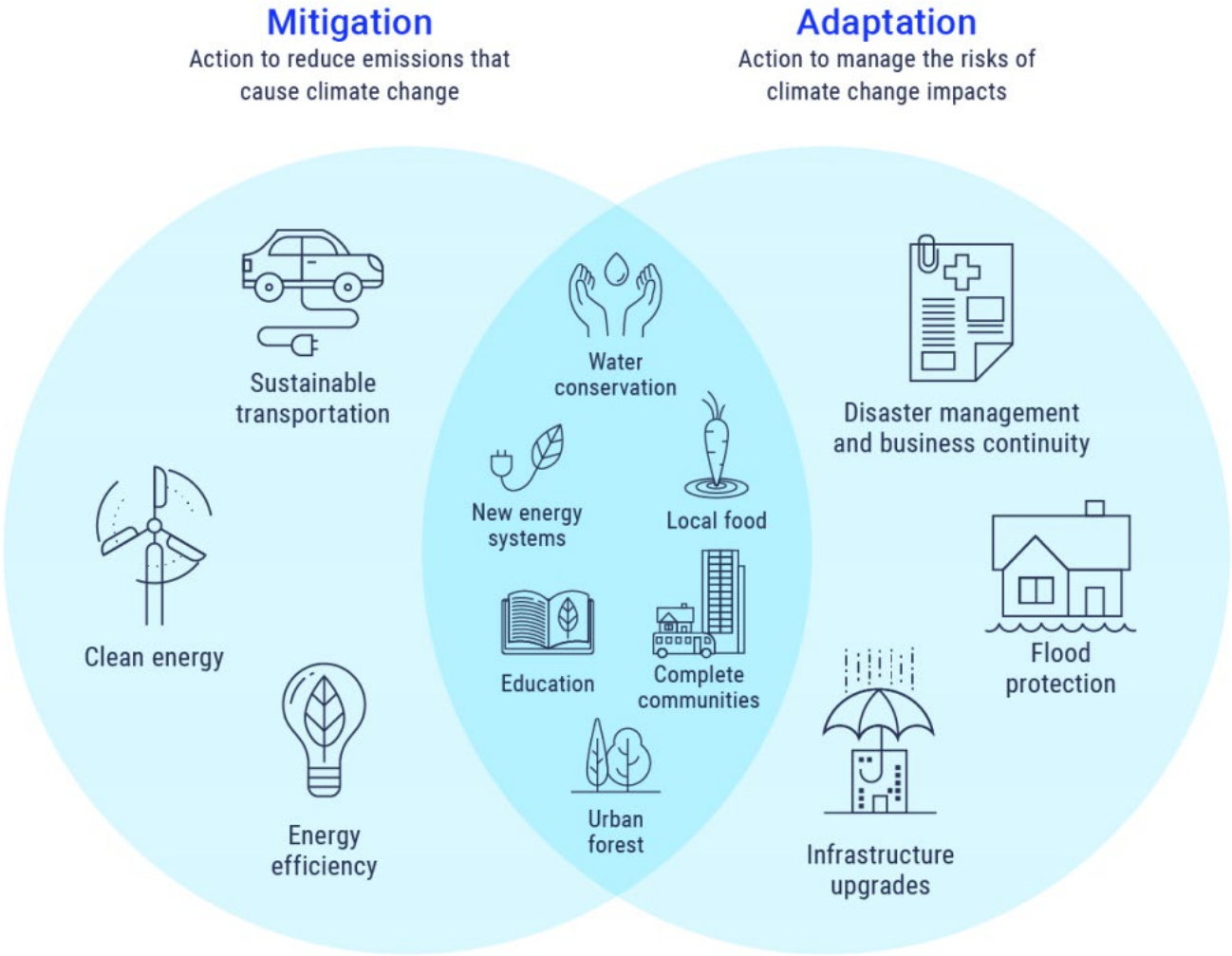
- MIROC-ESM-CHEM
- IPSL-CM5A-MR
- NorESM1-M
- MIROC-ESM
- CESM1-CAM5
- NorESM1-ME
- MRI-CGCM3
- BNU-ESM
- bcc-csm1-1
- bcc-csm1-1-m
- HadGEM2-ES
- HadGEM2-AO
- GFDL-ESM2G
- CNRM-CM5
- IPSL-CM5A-LR
- FGOALS-g2
- CSIRO-Mk3-6-0
- MIROC5
- CCSM4
- MPI-ESM-MR
- GFDL-ESM2M
- MPI-ESM-LR
- GFDL-CM3
- CanESM2

Summary data

- Ensemble mean
- Historical Values
- 10th percentile
- 90th percentile

Key Concepts

Mitigation vs. Adaptation



Source: Government of Canada (2022)

What is Climate Adaptation

Infrastructure Upgrades and Design Standards

Policy, Planning and Regulatory Updates

Emergency Planning and Response Enhancement

Education, Capacity Building, and Partnerships

Maximizing Economic and Ecological Opportunities

Why Climate Adaptation is Important

Protect public health & safety

Enhance social & environmental resilience

Safeguard local economies

Promote equity & inclusion

Role of Local Governments

Local governments are on the front line of climate impacts and play a pivotal role in planning, action, and community leadership

Integrate adaptation into planning documents

Undertake climate risk assessments

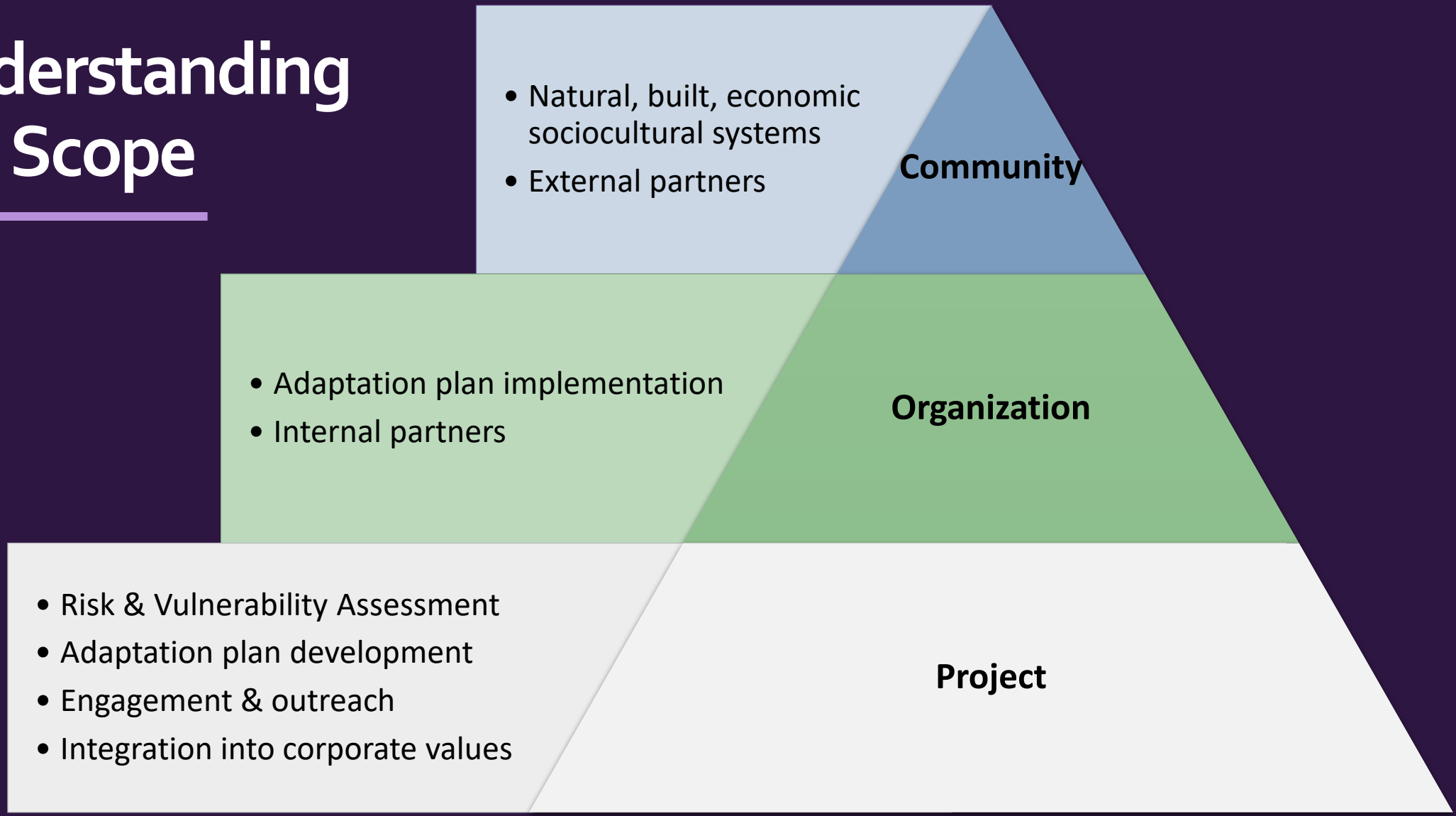
Develop and implement adaptation actions

Foster community engagement and inclusion

Collingwood Climate Adaptation Plan

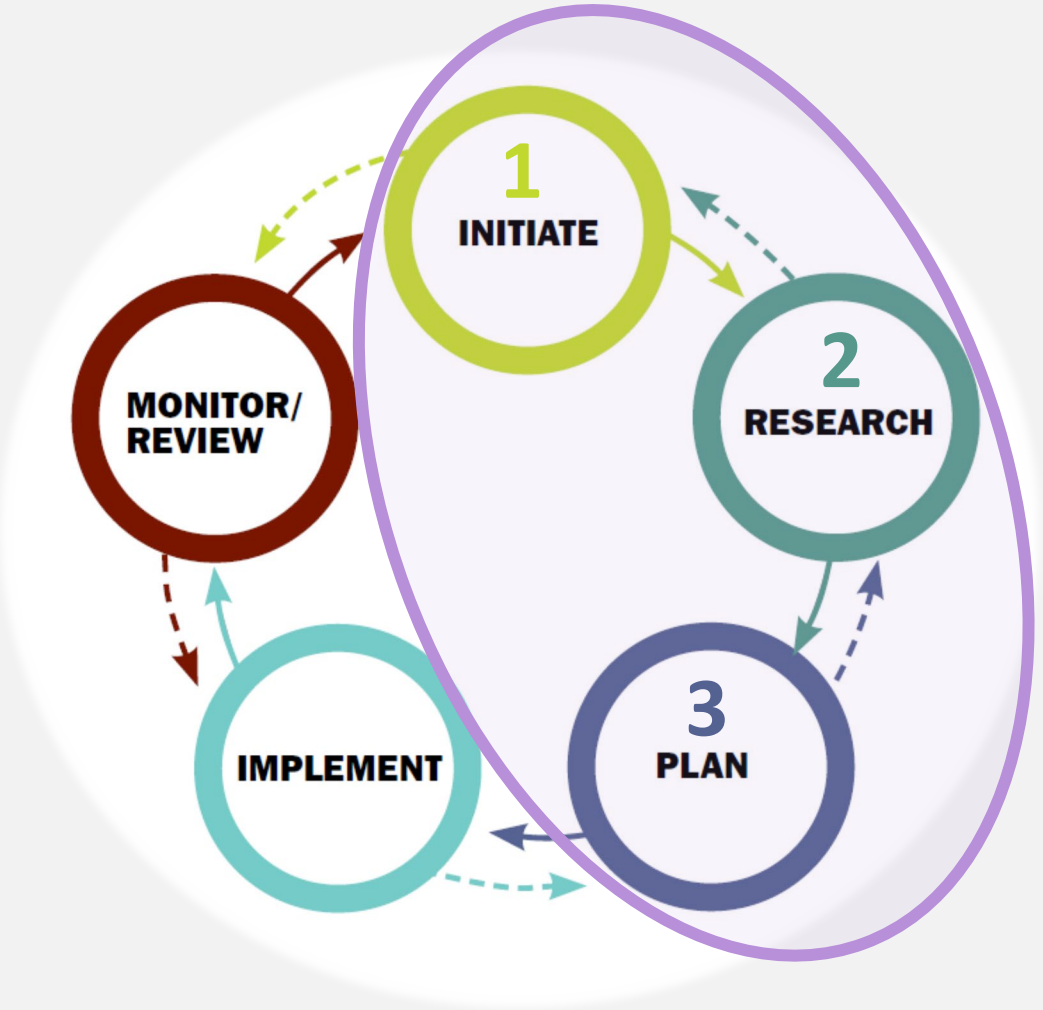
Why develop a climate adaptation plan for Collingwood?

Understanding the Scope



Building Adaptive & Resilient Communities (BARC)

Five milestone framework developed by the International Council for Local Environmental Initiatives (ICLEI) Canada



Source: ICLEI Canada

Resilient Collingwood Task Force

Purpose

1. Guide Collingwood through ICLEI's Building Adaptive and Resilient Communities (BARC) milestones

2. Provide strategic oversight, ensuring that climate risk and resilience are integrated across municipal services, infrastructure, and policies

3. Build internal capacity and alignment among departments to sustain adaptation planning and implementation beyond the project

Resilient Collingwood Task Force

Primary Functions

Collaborate	Advise	Champion
Bring together stakeholders to share knowledge and coordinate actions	Review climate risk and vulnerability assessment findings and help identify adaptation priorities and feasible actions	Promote integration of climate resilience into decision-making, budgets, and operations

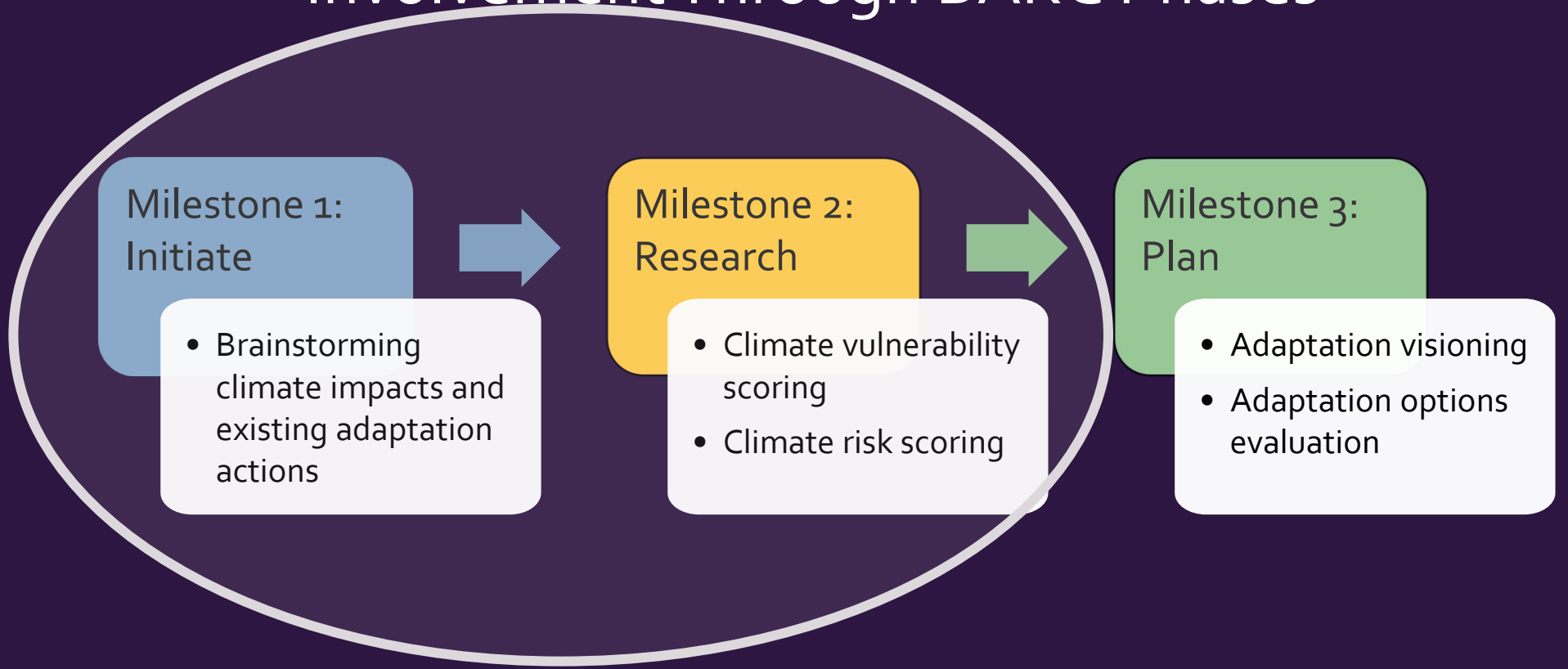
Resilient Collingwood Task Force

Team Structure

- Team Leader
- Core Team
- Other internal and external partners will be involved as the project advances

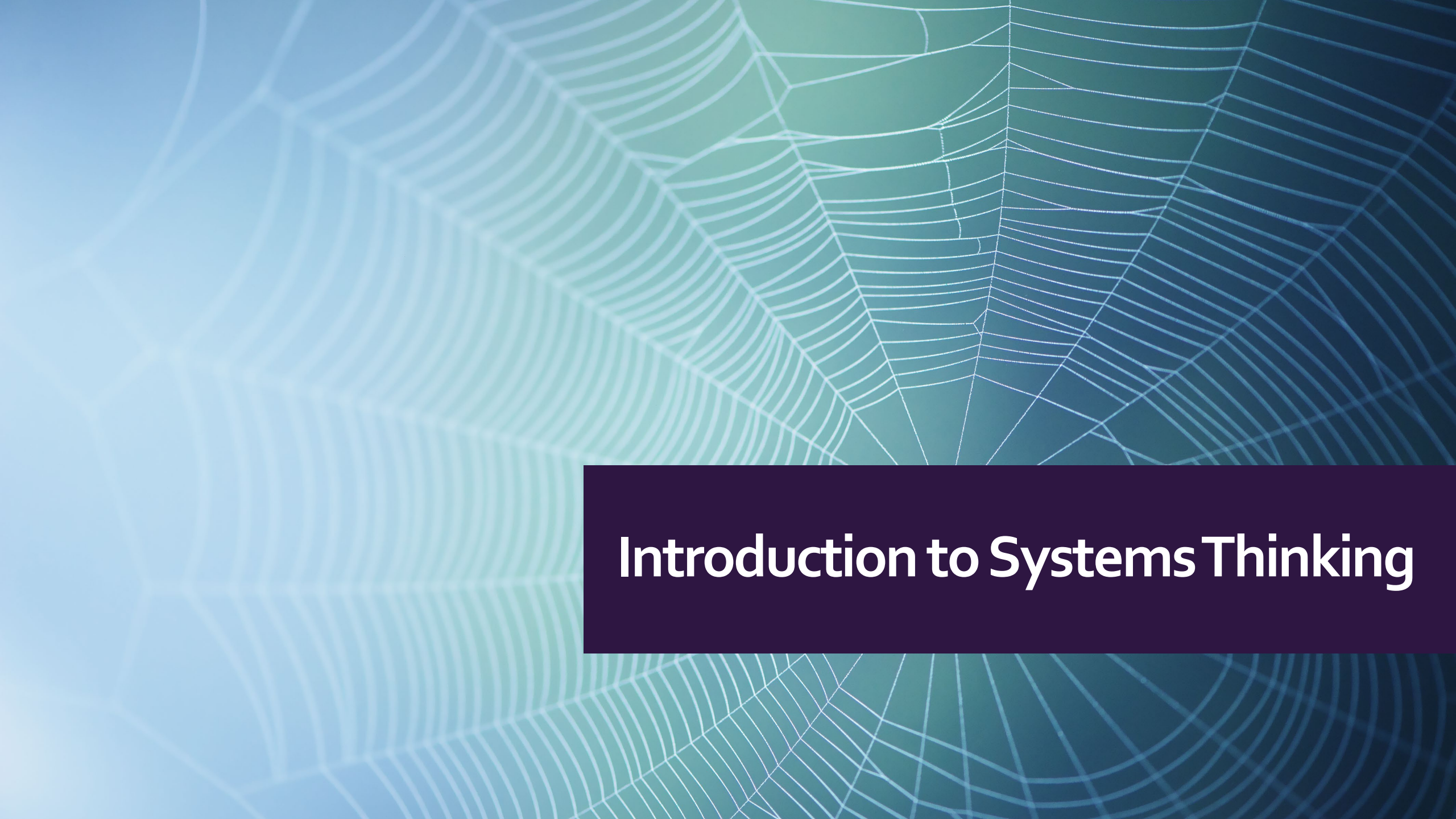
Resilient Collingwood Task Force

Involvement Through BARC Phases



Group Activity:
First Look at Climate Impacts and Action

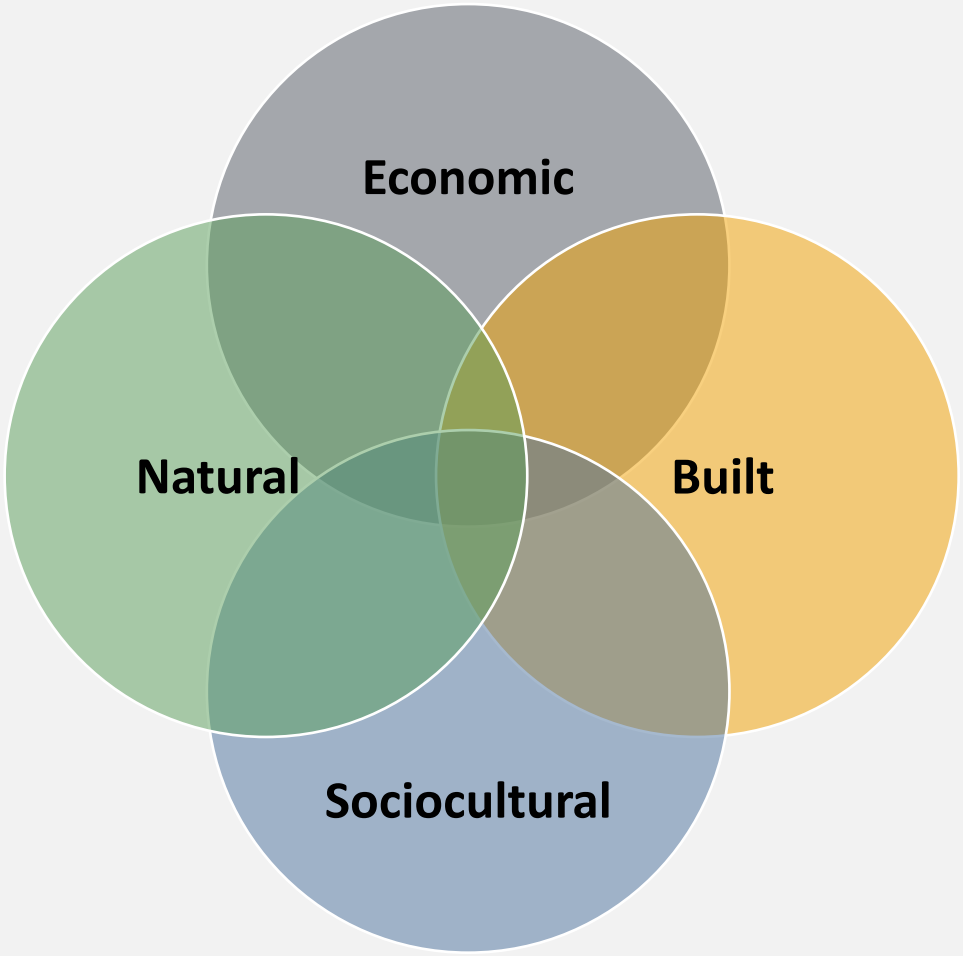
Scan the QR code to open the Mentimeter survey



Introduction to Systems Thinking

What is Systems Thinking?

- Everything is connected
- Climate impacts ripple across systems
- Siloed actions can create new risks
- Integrated solutions build resilience



Built Systems

The backbone of the community

What's Included:

- Roads, bridges, buildings, sewers, water treatment plants, and energy infrastructure

Climate Impacts/Vulnerabilities:

- Not designed to withstand current or future climate extremes
- Increasing maintenance costs, repair costs, and service interruptions

Sociocultural Systems

How people live, connect and find meaning

What's Included:

- Formal institutions of health care, education and social services
- Informal networks of care and community life
- Culturally significant places and customs

Climate Impacts/Vulnerabilities:

- Disproportionate impacts on equity-denied and vulnerable populations
- Stress on social supports, emergency services, and community well-being

Economic Systems

Drivers of prosperity

What's Included:

- Local businesses, workers, tourism, supply chains, and financial services

Climate Impacts/Vulnerabilities:

- Business disruptions, lost income, infrastructure downtime, recovery costs
- Impacts to tourism, waterfront activities, agriculture, labour productivity

Natural Systems

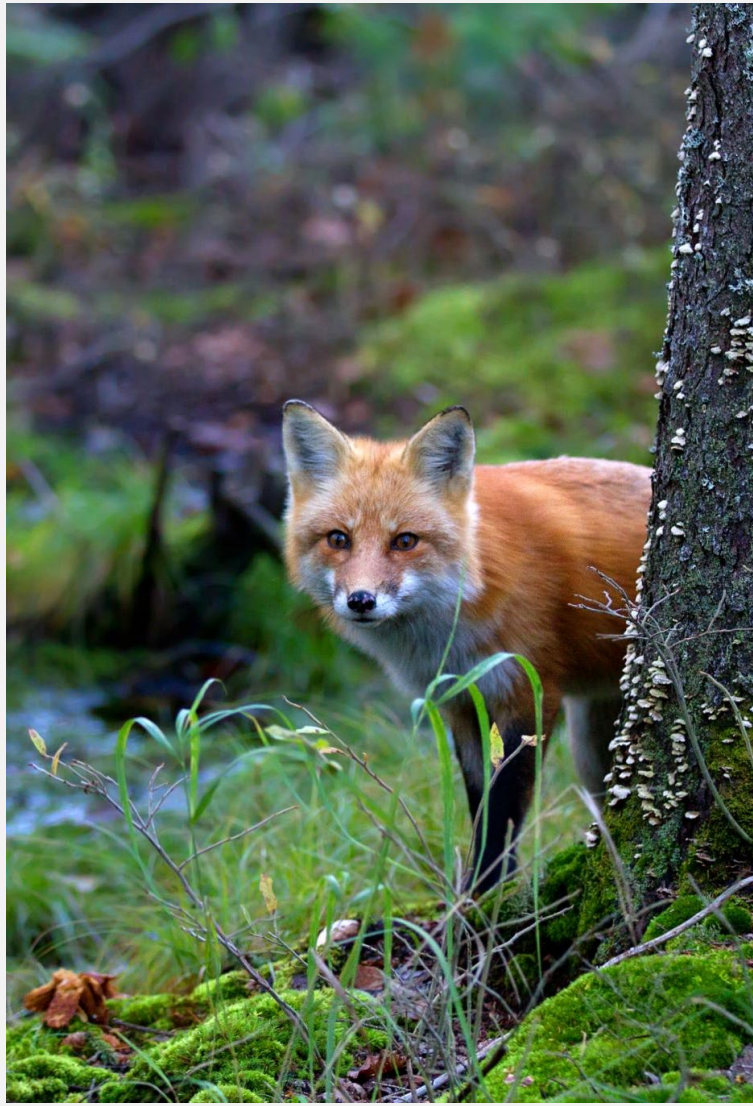
Ecosystems supporting life and services

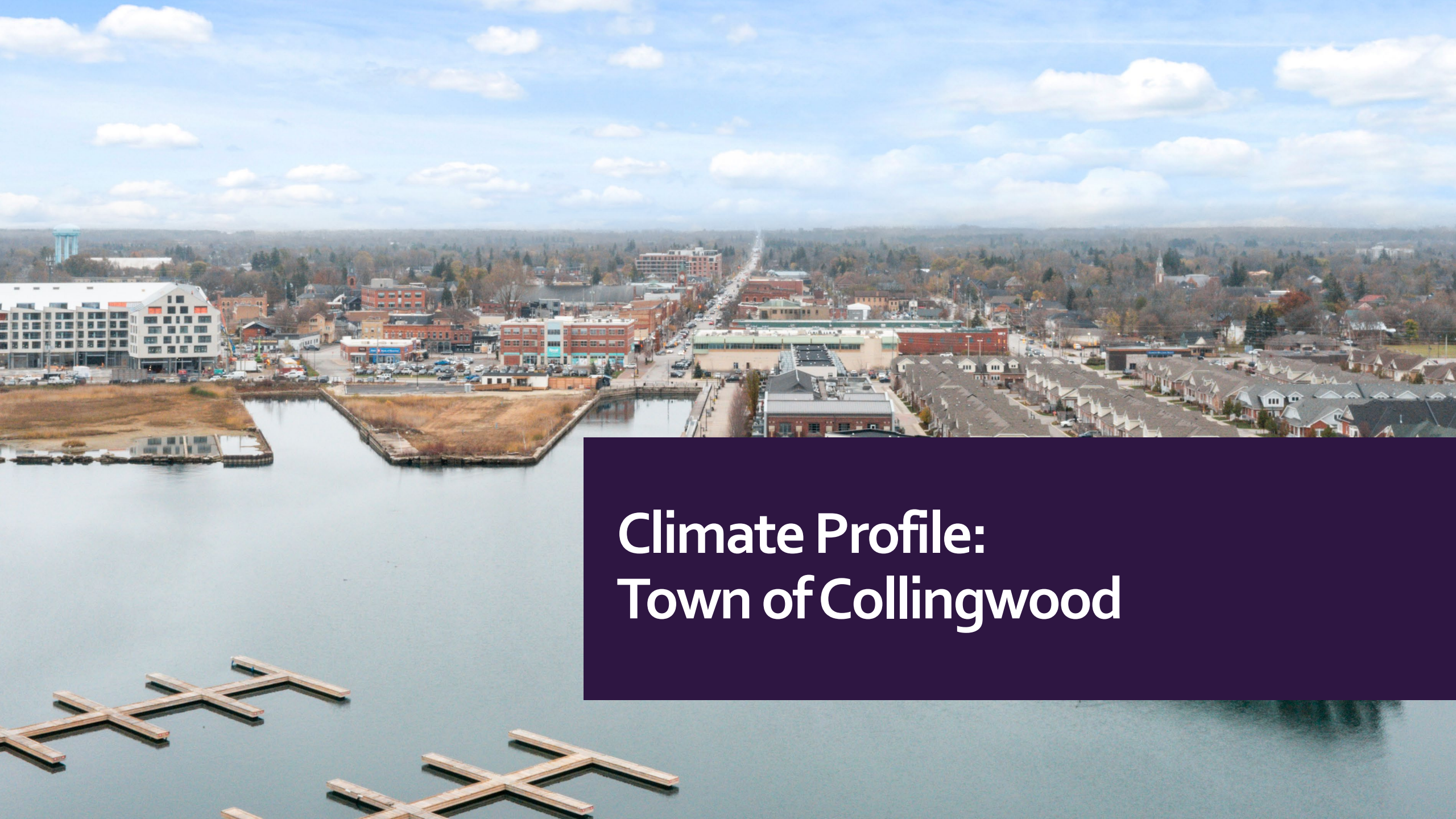
What's Included:

- Forests, wetlands, waterways, shorelines, soils, biodiversity, and nature-based systems

Climate Impacts/Vulnerabilities:

- Stress from heat, drought, invasive species, erosion, flooding, and changes to water quality/quantity
- Loss of ecosystem services (cooling, flood mitigation, water filtration) if natural assets are degraded





Climate Profile: Town of Collingwood

Data Sources & Methodology

Data Sources

- Publicly available climate models
- Regional climate studies

Emissions Scenarios

- Low Carbon Scenario (RCP4.5)
- High Carbon Scenario (RCP8.5)

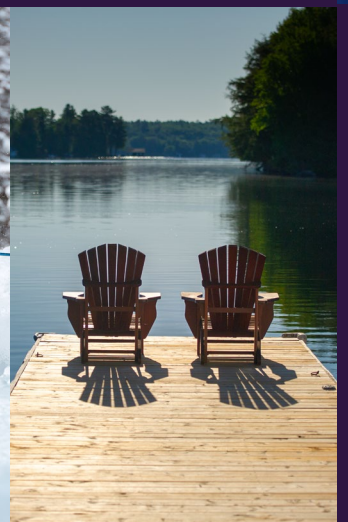
Time Horizons

- Baseline (1976-2005)
- Near term (2021-2050)
- Long term (2051-2080)

Historical Climate

Cold winters and mild summers

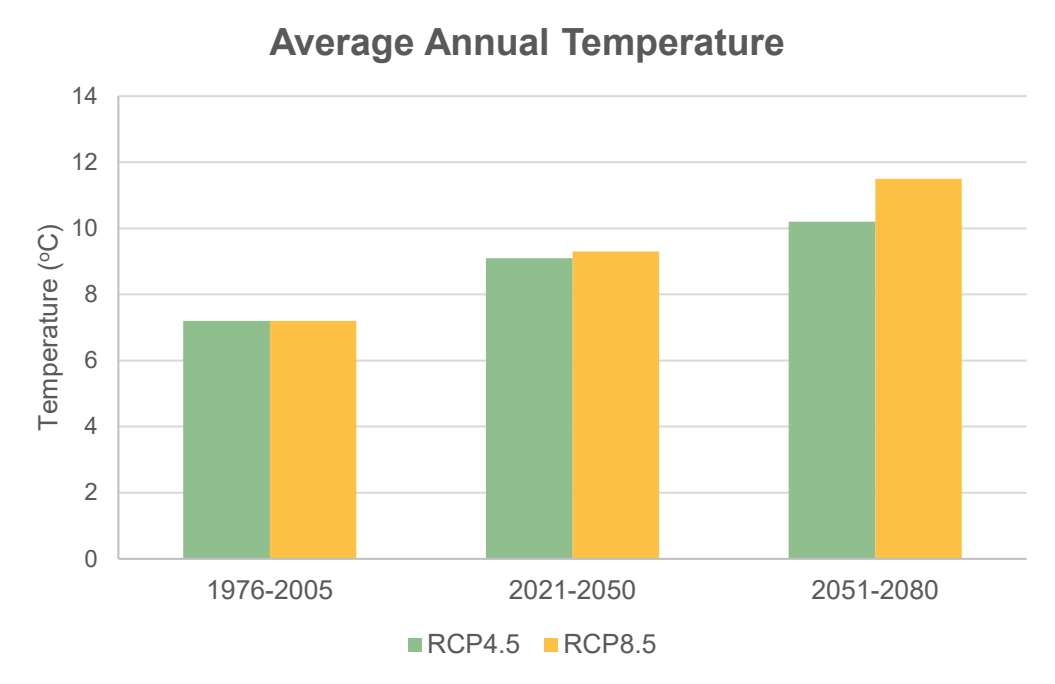
Moderate annual precipitation with seasonal variability



Frequent freeze-thaw cycles

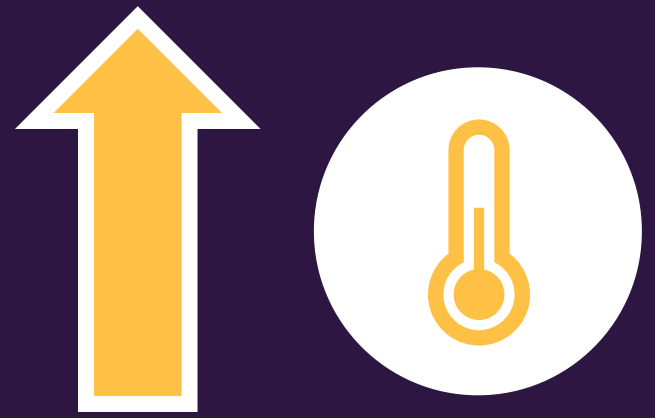
Limited heat extremes

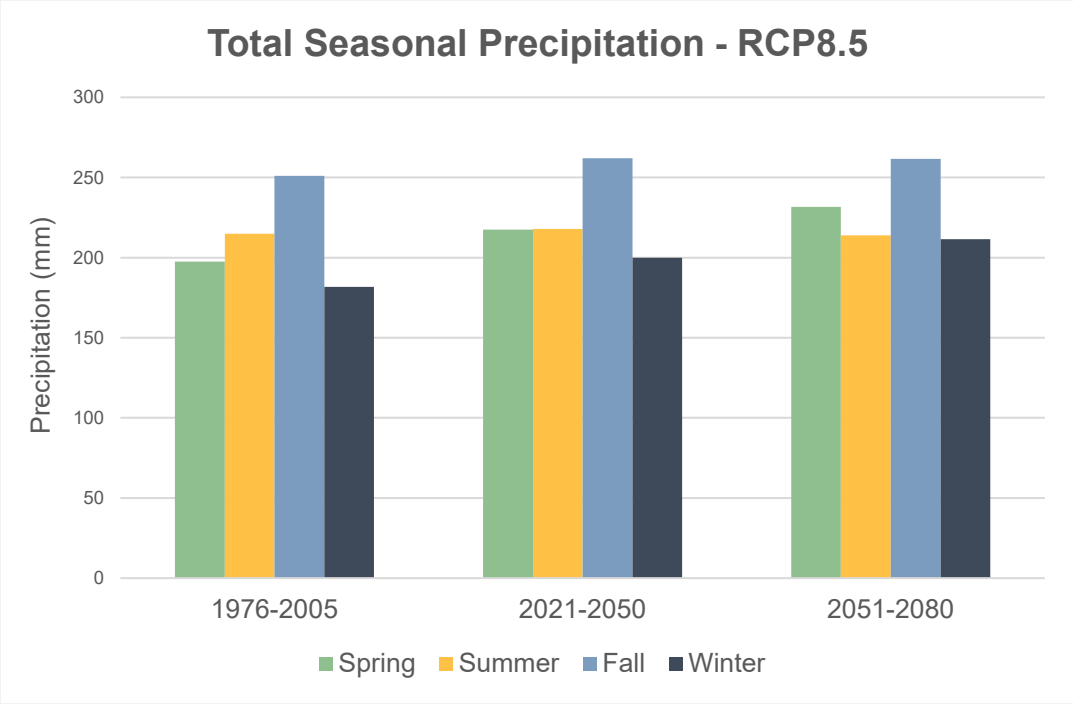
- Average temperature increasing by 1.9°C by 2050, and by 3.0°C by 2080
- Greater warming trend in winter, with fewer days with temperatures less than 0°C and fewer very cold days
- Decreasing number of freeze-thaw cycles annually
- Longer frost-free and growing season



Climate Projection: Temperature

Warmer year-round conditions, fewer cold extremes, and more frequent heat events

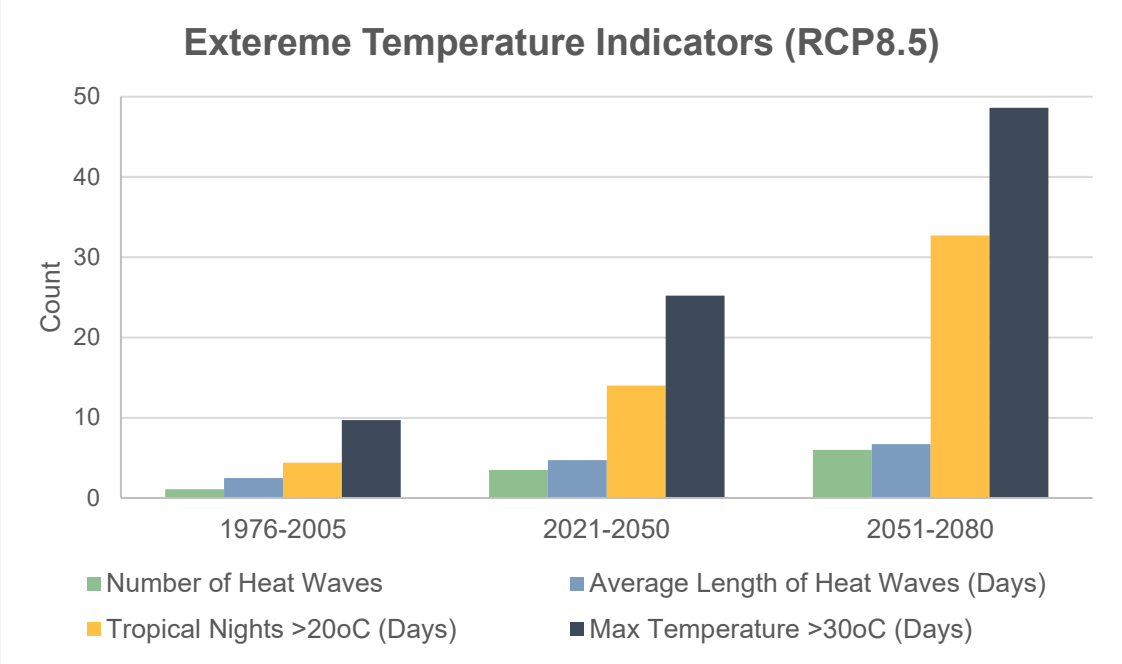




- Total annual precipitation will increase by at least 5% by 2050, and by 8%-10% by 2080
- Total winter precipitation will increase by 9% by 2050 and by 12%-19% by 2080

Climate Projection: Precipitation

Increasing total annual precipitation and increasing winter and spring precipitation



- Maximum single day precipitation will increase by 15-18% by 2080
- More heavy rainfall events (>20 mm)
- Increasing frequency and duration of heat waves
- Increasing number days with maximum temperature greater than >30°C and more tropical nights
- More intense storms events with high winds and lightning

Climate Projection: Extreme Weather

Increasing frequency and severity of extreme weather events with hotter days and more intense precipitation

Group Activity:
Identifying & Defining Local Climate Impacts

Identifying & Defining Local Climate Impacts

How might projected climatic changes intersect with the unique characteristics of Collingwood?

- Infrastructure conditions
- Land use patterns
- Economic drivers
- Social dynamics
- Natural environment

Climate impacts are often complex and multidimensional

- Direct or indirect
- Occurring immediately or over time
- Interacting with other hazards in cascading, compounding, or cumulative ways

Climate Impact Statements

*Describes **how a climate event affects the community**, its infrastructure, people, economy, and natural systems*

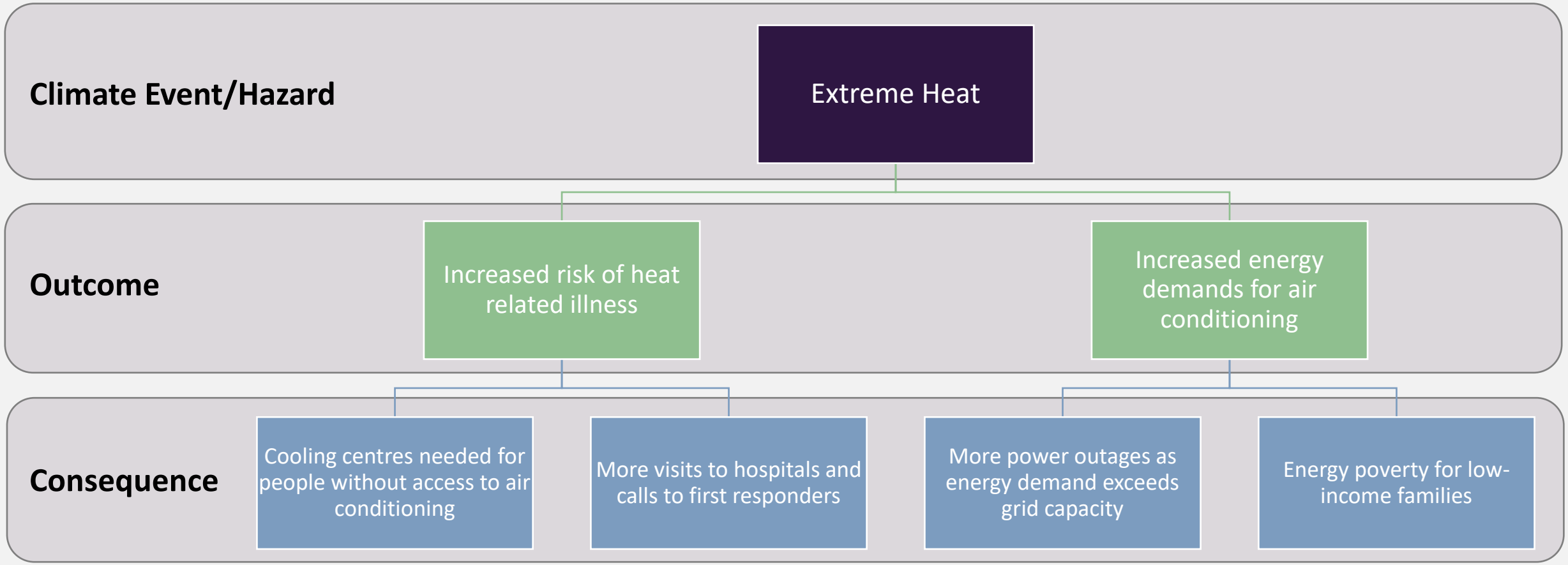
If… **Climate Event/Hazard** *(e.g. significant precipitation)*

Then… **Outcome** *(e.g. flooding)*

So… **Consequences** *(e.g. damage to buildings from water, displacing occupants)*

“Increasing frequency of significant precipitation events that flood buildings, resulting in damage to structures and displacing occupants”

Climate Impact Statements



Climate Impact Statements

How might projected climatic changes affect vulnerable populations?

- Impacts are not felt equally
- Consider those at higher risk
    - Older adults, children, low-income households, those without AC, people with mobility limitations, renters, outdoor workers
- Think about how consequences may compound existing vulnerabilities

Climate Impact Statements

Phase 1: Identifying Outcomes

1. Review flip chart sheets with identified climate events/hazards on your table
2. Consider the outcomes that may be associated with each climate event

   If …. Then…

3. As a group, write at least three outcomes for each climate event using the sticky notes provided
4. As a group, move to the other tables and add at least one more outcome for each of the other climate events

Climate Impact Statements

Phase 2: Identifying Consequences

1. Review flip chart sheets with identified climate events/hazards and outcomes on your table
2. Consider the consequences that may be associated with each climate event

   If …. Then… So…

3. As a group, document the outcomes and at least two consequences for each of the outcomes on the worksheets provided
4. Note the systems affected by the climate impact statement
5. As a group, move to the other tables and add one additional consequence for each of the outcomes identified and note the systems affected

Next Steps

1. Compile climate impact statements from today's workshop
2. Generate other climate statements based on research
3. Circulate comprehensive list of climate impact statements to RCTF in advance of vulnerability assessment workshop
4. Workshop #2: Vulnerability Assessment on Wednesday January 14