Ontario Provincial Climate Change Impact Assessment

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Clean Air Council

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About CRI

Training and Credentialling

Vulnerability and Risk Assessments

Adaptation Planning

Policy Evaluation

Education and Outreach

CLIMATE RISK INSTITUTE

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# Large Scale Risk Assessments

Provincial Climate Change Impact Assessment (PCCIA) - Objectives

- Provide a risk baseline

- Support decision-making that protects investments, livelihoods and public health

- Improve our understanding to inform future decisions that build more resilience to climate impacts

- Scalable and replicable methods for local and future assessments

- **Inform adaptation** by governments, businesses and communities – CRITICAL!!!
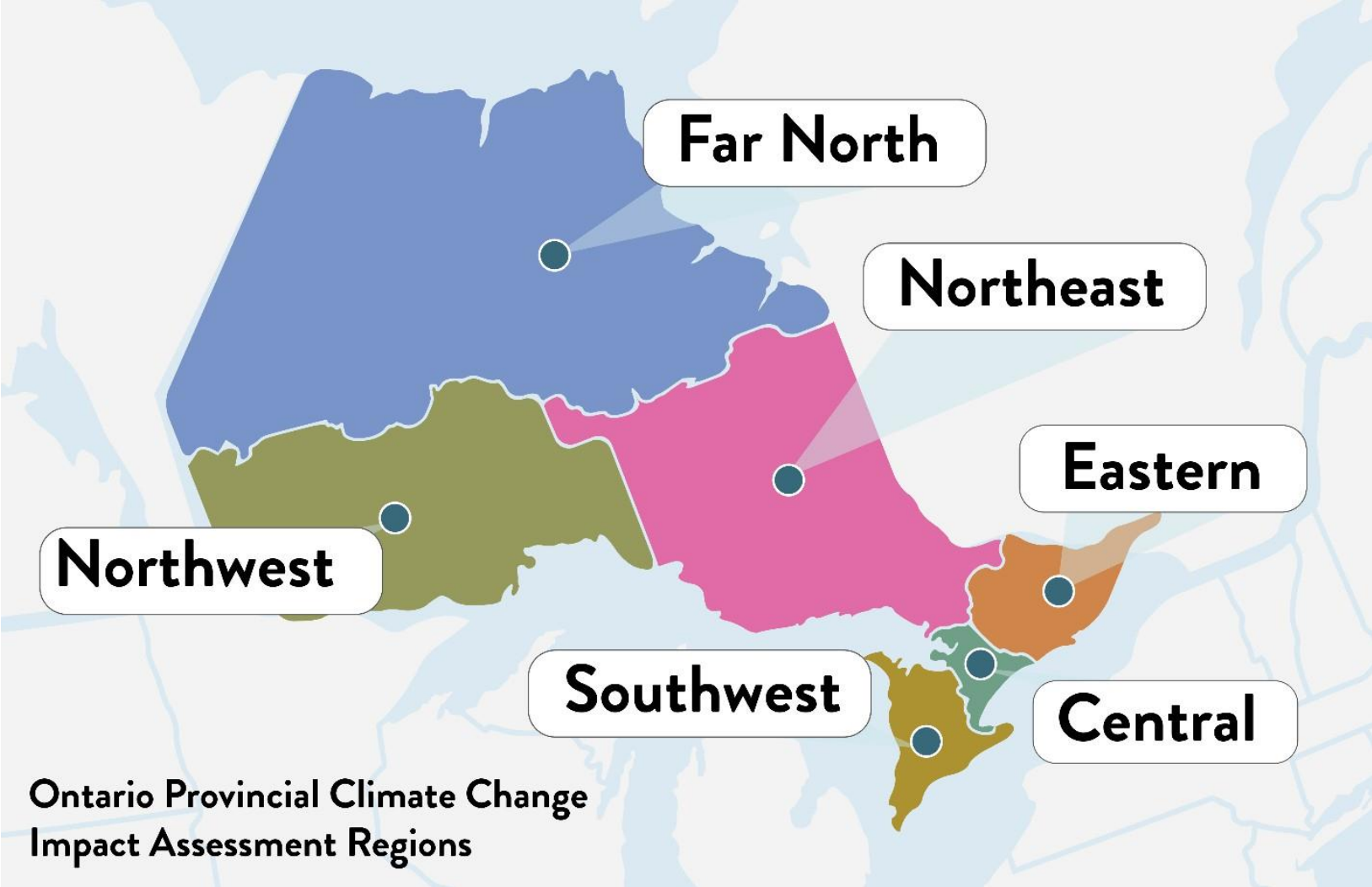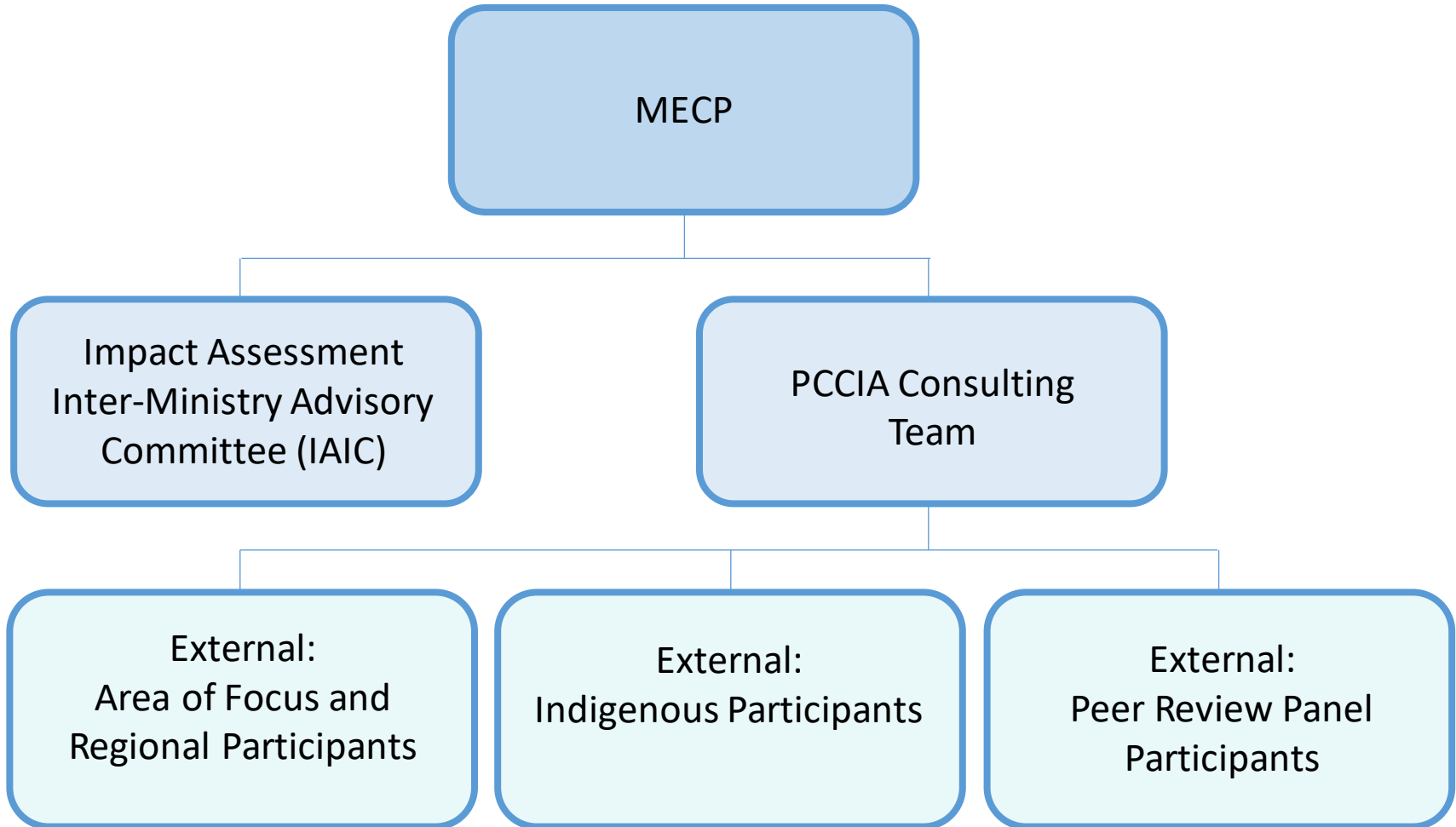
Overview
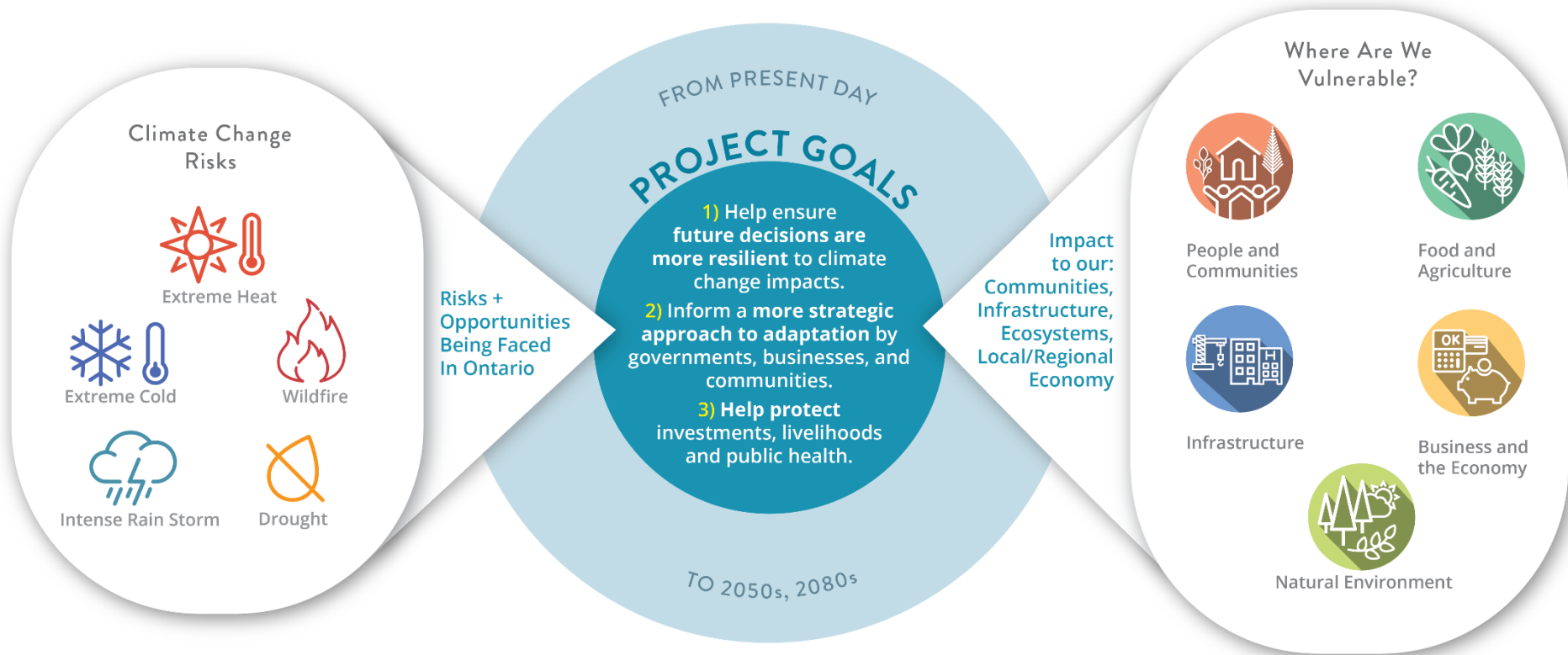
- Multi-sectoral climate change impact assessment
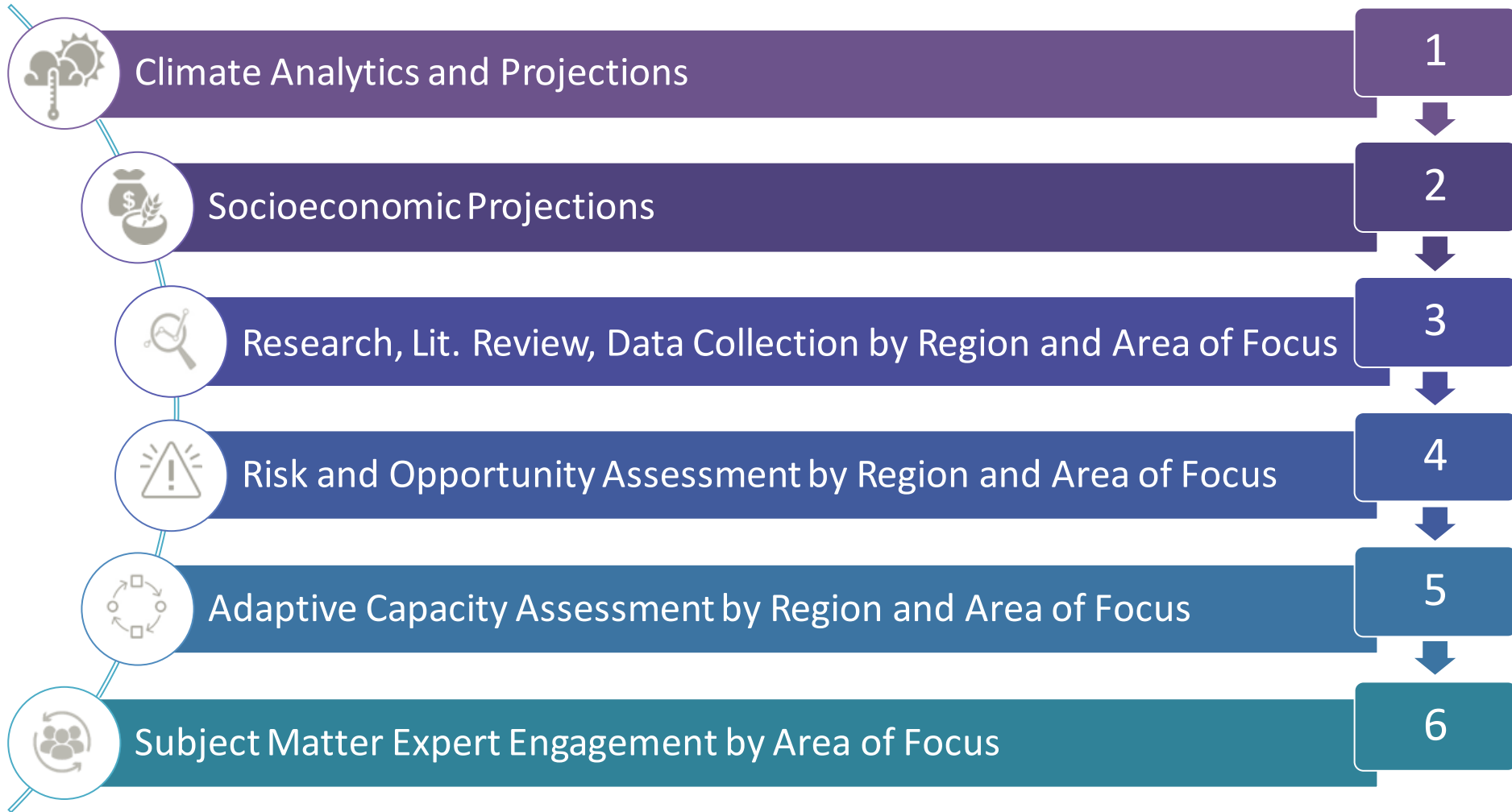- 5 Areas of Focus (AoF)
- 6 Regions

Geographic Regions

Ontario Provincial Climate Change
Impact Assessment Regions

Oversight and Participants

Key Project Elements

1. Climate Analytics and Projections
2. Socioeconomic Projections
3. Research, Lit. Review, Data Collection by Region and Area of Focus
4. Risk and Opportunity Assessment by Region and Area of Focus
5. Adaptive Capacity Assessment by Region and Area of Focus
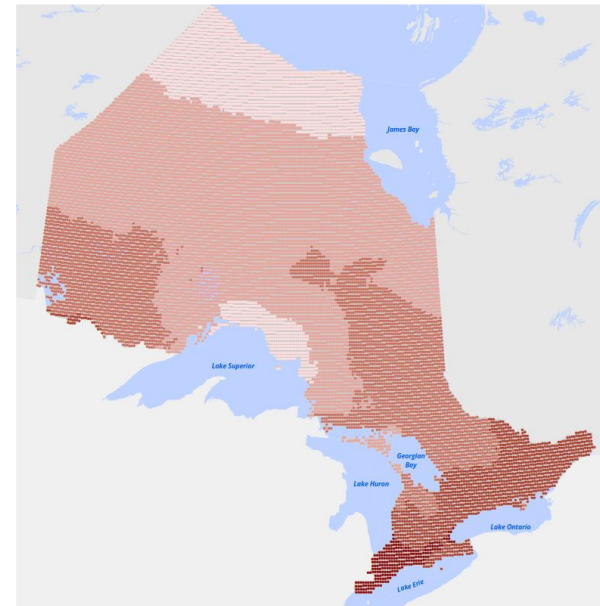6. Subject Matter Expert Engagement by Area of Focus

Climate Analytics

1

2

3
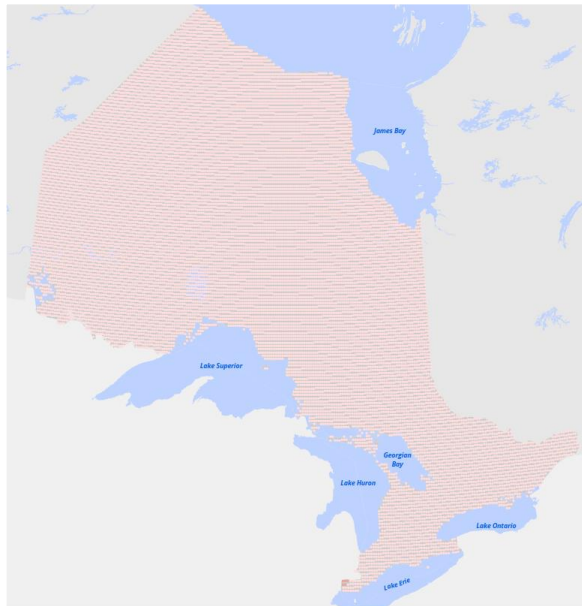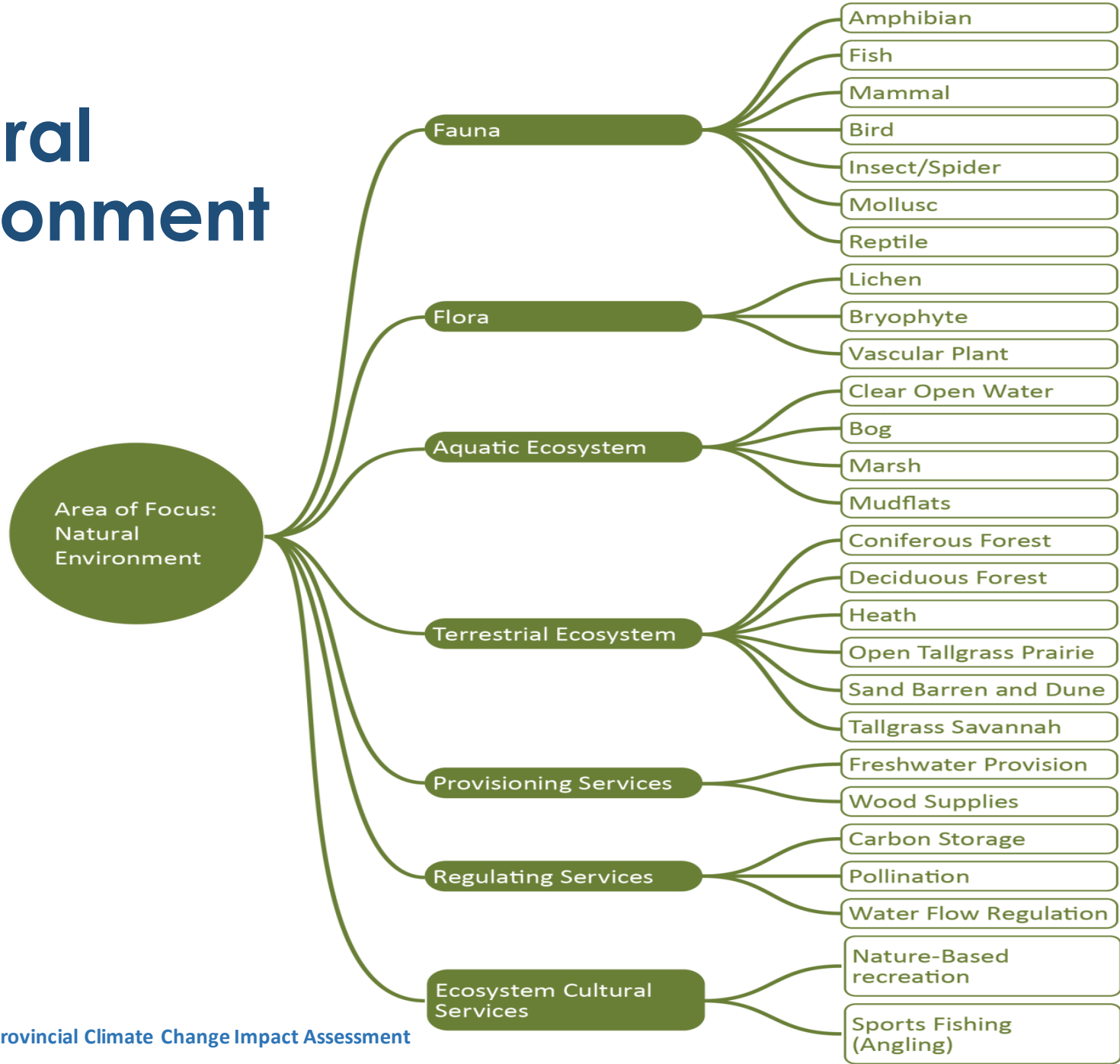
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6

- 15 Climate Hazards
- Representative Concentration Pathways 4.5 and 8.5 (RCP)
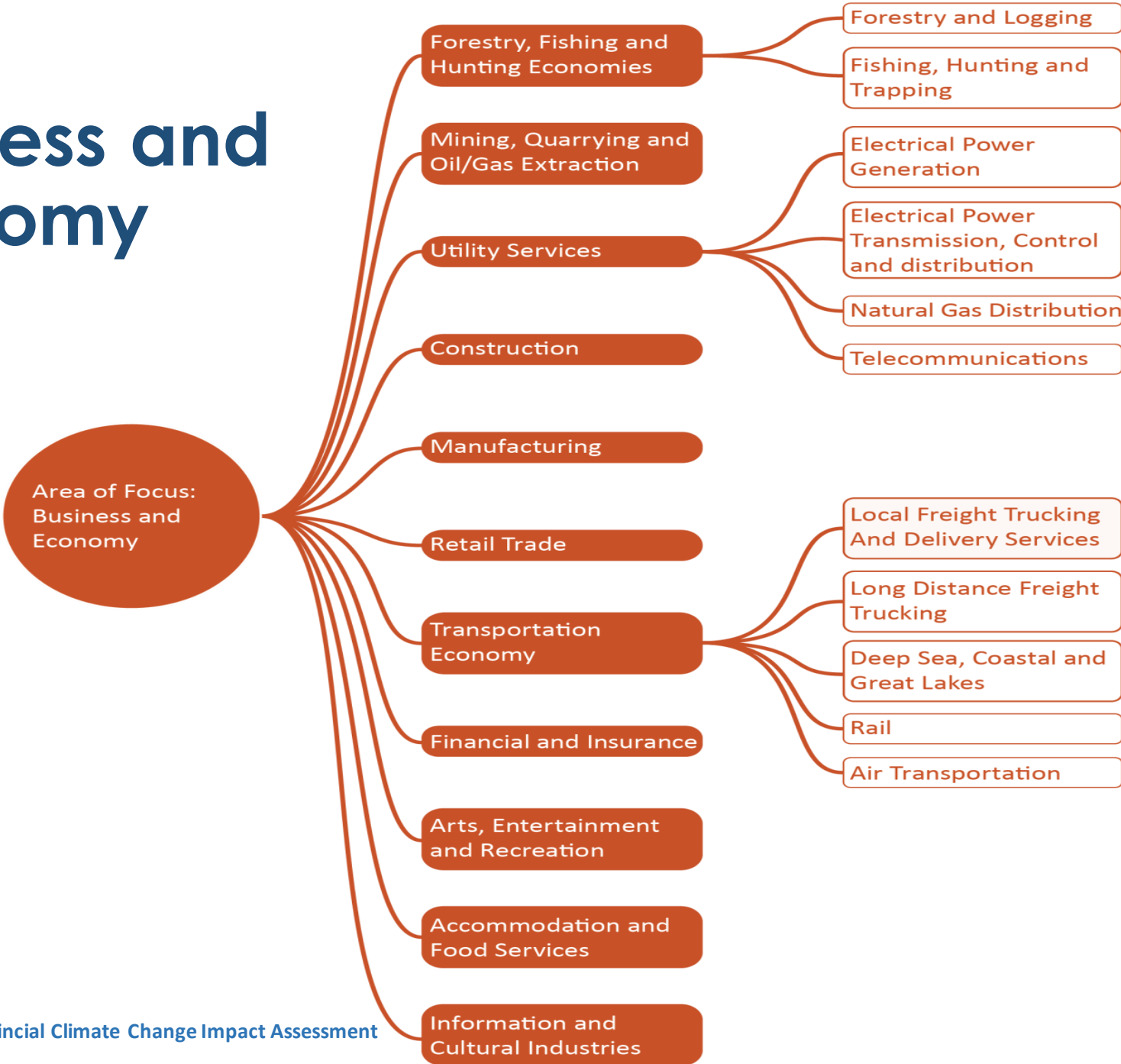- Current and Future (2050s, 2080s)

Area of Focus Delineation

Natural Environment

Area of Focus: Natural Environment

- **Fauna**
  - Amphibian
  - Fish
  - Mammal
  - Bird
  - Insect/Spider
  - Mollusc
  - Reptile
- **Flora**
  - Lichen
  - Bryophyte
  - Vascular Plant
- **Aquatic Ecosystem**
  - Clear Open Water
  - Bog
  - Marsh
  - Mudflats
- **Terrestrial Ecosystem**
  - Coniferous Forest
  - Deciduous Forest
  - Heath
  - Open Tallgrass Prairie
  - Sand Barren and Dune
  - Tallgrass Savannah
- **Provisioning Services**
  - Freshwater Provision
  - Wood Supplies
- **Regulating Services**
  - Carbon Storage
  - Pollination
  - Water Flow Regulation
- **Ecosystem Cultural Services**
  - Nature-Based recreation
  - Sports Fishing (Angling)

Business and Economy

Area of Focus: Business and Economy

- Forestry, Fishing and Hunting Economies
  - Forestry and Logging
  - Fishing, Hunting and Trapping
- Mining, Quarrying and Oil/Gas Extraction
- Utility Services
  - Electrical Power Generation
  - Electrical Power Transmission, Control and distribution
  - Natural Gas Distribution
  - Telecommunications
- Construction
- Manufacturing
- Retail Trade
- Transportation Economy
  - Local Freight Trucking And Delivery Services
  - Long Distance Freight Trucking
  - Deep Sea, Coastal and Great Lakes
  - Rail
  - Air Transportation
- Financial and Insurance
- Arts, Entertainment and Recreation
- Accommodation and Food Services
- Information and Cultural Industries

Risk Registry

Details of the interactions and risk scenarios through formulas

Risk Roll-Up Approach
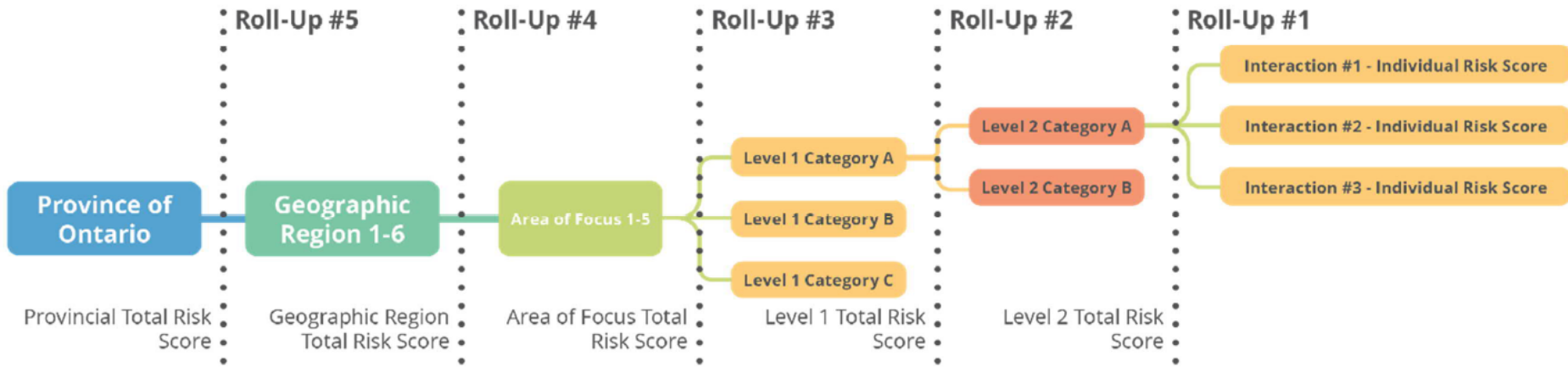
Adaptive Capacity

"**the ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences**"

1. Technology

2. Resource Availability

3. Equity

4. Governance

5. Complexity

Sample-Natural Environment

Climate change is already a threat to Ontario's natural environment and is expected to continue to **intensify risks to species, habitats, and ecosystems into the future**. In tandem with significant human development pressures, risk profiles across almost all natural systems that were assessed are rising to 'high' by mid-century. By the end of the century, one quarter of climate risks to the natural environment are expected to be 'very high'.
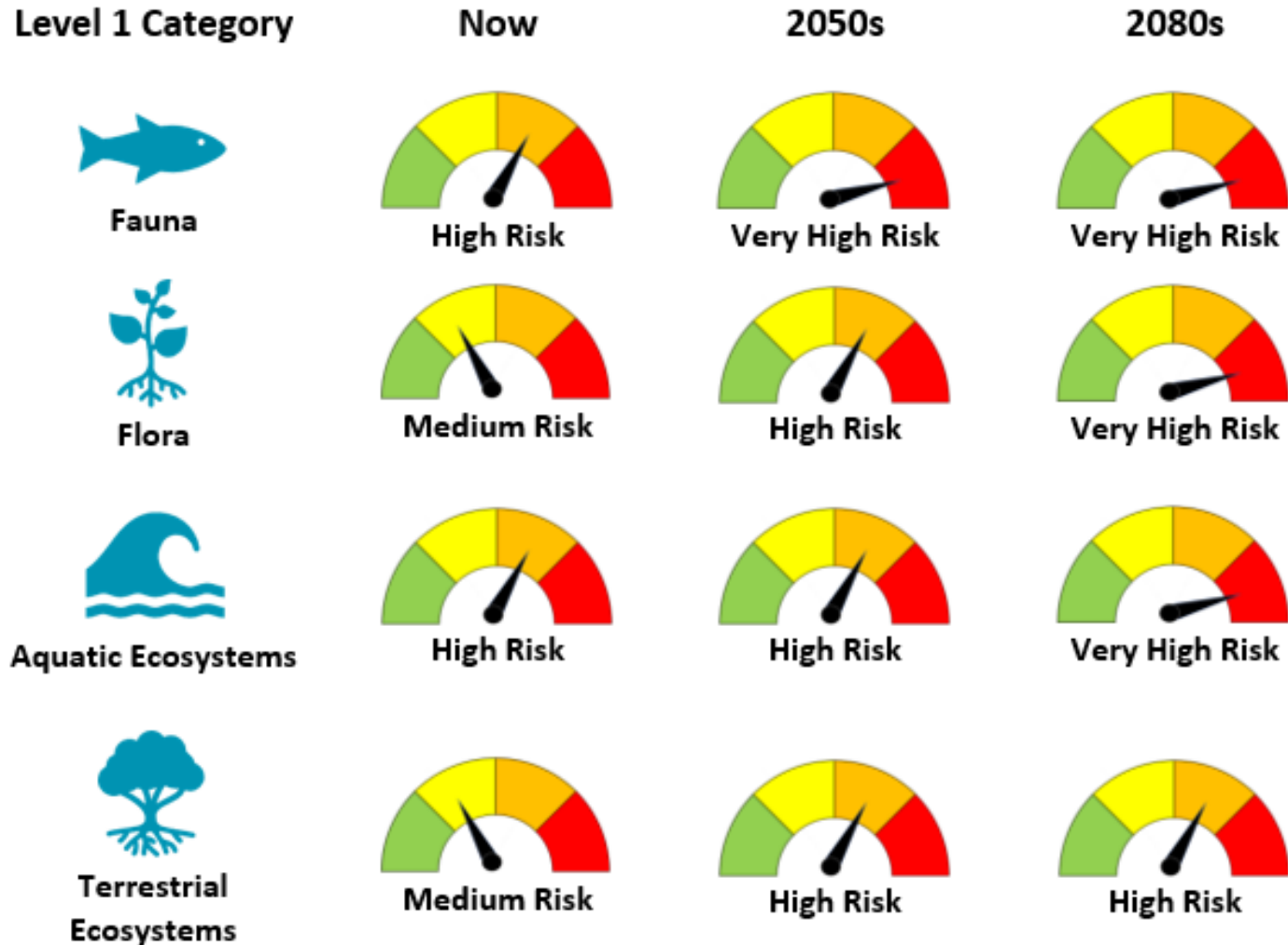
Species and habitats are irreplaceable, and ecosystem services and functions that benefit society are difficult and costly to replicate via engineered technical substitutes. **A healthy and resilient natural environment in Ontario is the essential foundation to adapting to a changing climate.**

Natural Environment

Level 1 Category	Now	2050s	2080s
Fauna	High Risk	Very High Risk	Very High Risk
Flora	Medium Risk	High Risk	Very High Risk
Aquatic Ecosystems	High Risk	High Risk	Very High Risk
Terrestrial Ecosystems	Medium Risk	High Risk	High Risk

Natural Environment

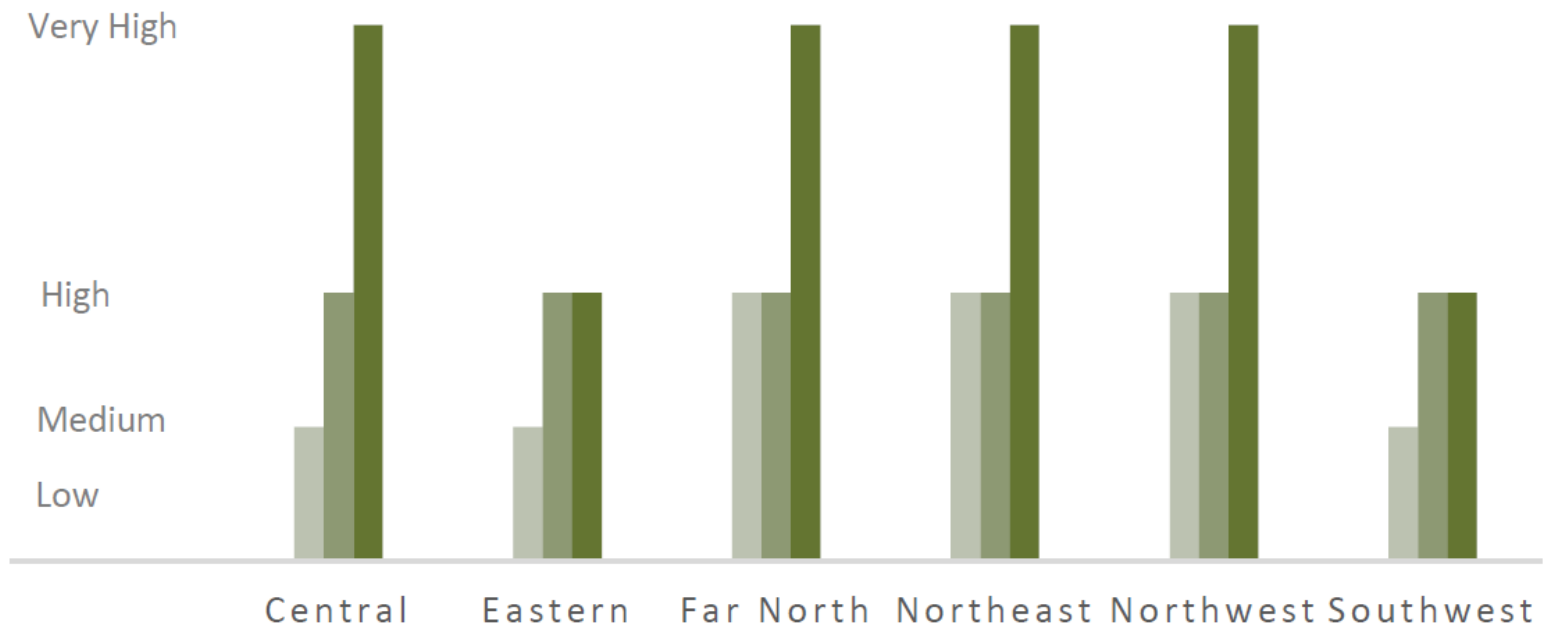| Level 1 Category	Now	2050s	2080s
Regulating Services	High Risk	Very High Risk	Very High Risk
Provisioning Services	Medium Risk	High Risk	Very High Risk
Ecosystem Cultural Services	Medium Risk	High Risk	Very High Risk

Natural Environment – Regional Risk Profiles
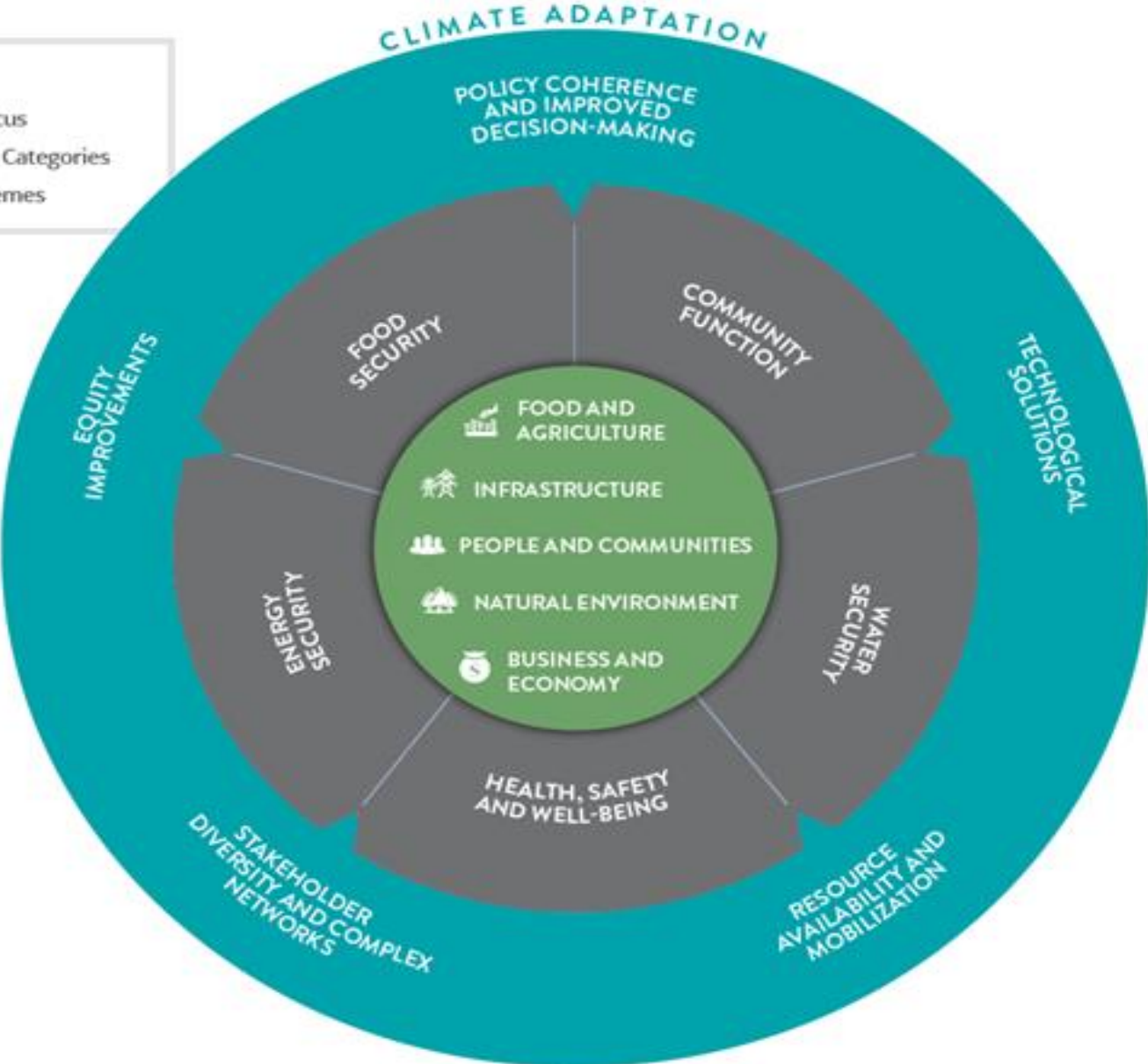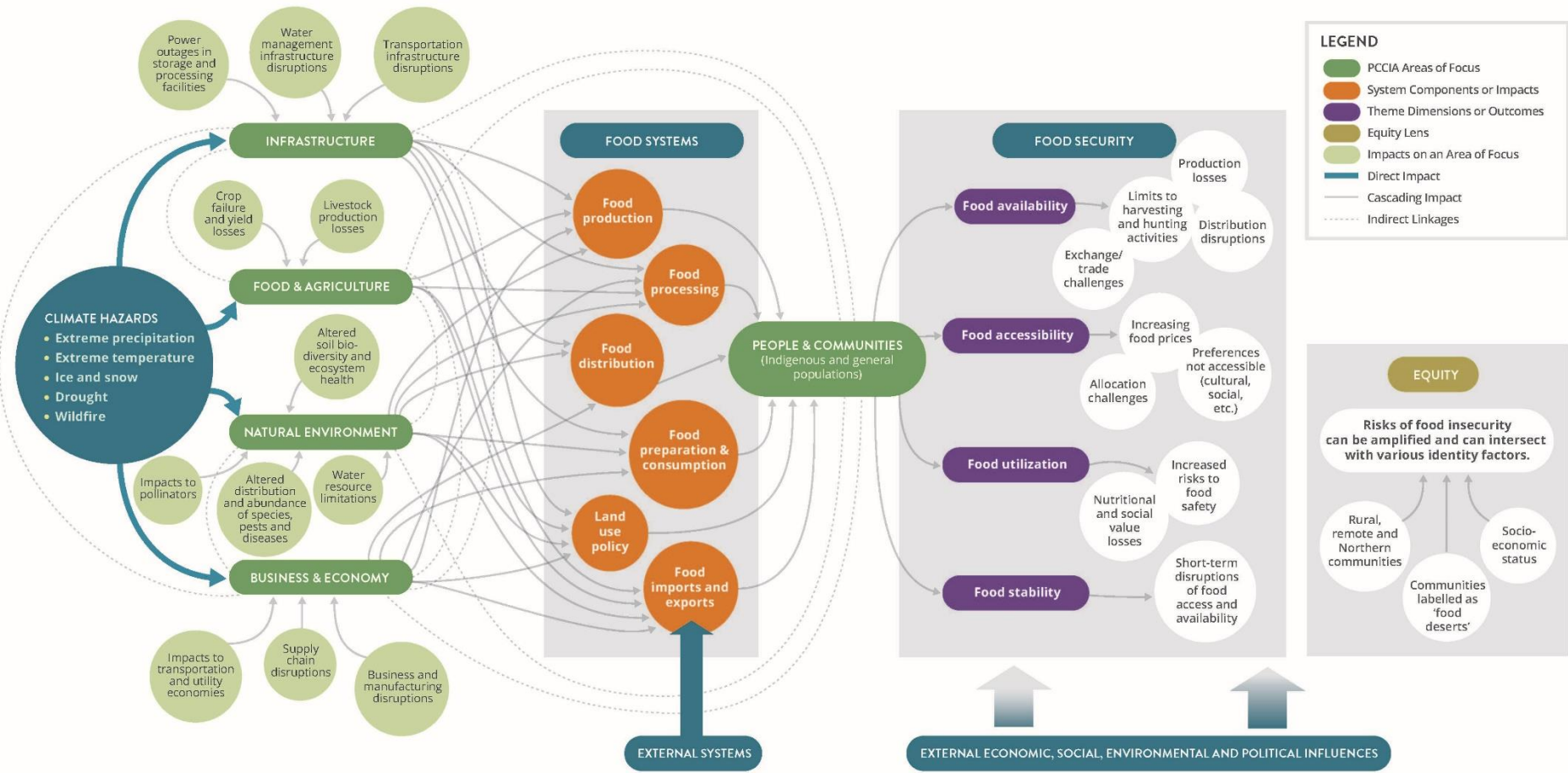

Aquatic Ecosystem

Cross-Sectoral Themes

LEGEND
- PCCIA Areas of Focus
- Adaptive Capacity Categories
- Cross-Sectoral Themes

CLIMATE ADAPTATION

POLICY COHERENCE AND IMPROVED DECISION-MAKING

COMMUNITY FUNCTION

TECHNOLOGICAL SOLUTIONS

FOOD SECURITY

EQUITY IMPROVEMENTS

ENERGY SECURITY

WATER SECURITY

STAKEHOLDER DIVERSITY AND COMPLEX NETWORKS

HEALTH, SAFETY AND WELL-BEING

RESOURCE AVAILABILITY AND MOBILIZATION

FOOD AND AGRICULTURE

INFRASTRUCTURE

PEOPLE AND COMMUNITIES

NATURAL ENVIRONMENT

BUSINESS AND ECONOMY

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Food Security

Adaptation and Resilience Best Practices (ARBP or ABP)

ARBP Reporting Process

1. Engagement with subject matter experts and provincial government reps;

2. Research and literature review. Practices that have been implemented, and/or have been researched and peer-reviewed, and

3. Inclusion of low-risk, high-reward practices identified by subject matter experts for each Area of Focus.

Peer reviewed for utility and gaps.

ARBP Audiences

1. Policy-makers

2. Decision-makers

3. Practitioners (technical)

4. Transfer agents

5. Others (eg. homeowners, academia, institutions, etc)

Over-arching Principles for Adaptation

- Ensure resilient foundations through rapid and inclusive development.

- Facilitate the adaptation of businesses and people.

- Adapt land use patterns and protect critical public assets and services.

- Increase people's capacity to cope with and recover from shocks.

- Anticipate and manage macroeconomic and fiscal risks.

- Ensure effective implementation through prioritization and continuous monitoring.

Cautions for Mal-Adaptation

- Focusing on technological fixes versus holistic approaches;

- Difficulty of distinguishing the difference between adaptation and development;

- Difficult in quantifying unquantifiable metrics and thus using inaccurate indicators to measure success; and

- Competing challenges that lead to adaptation not being prioritized.

Type of Adaptation Best Practice	Description of Adaptation Best Practice	Implementation Timeline	Implementation Responsibility and Partners	Reference
Policy and Regulation **Investment and Incentives** **Research and Development** **Projects or Programs**	Description, including information for report user review and consideration. Hyperlinks to resources and references.	Timeline for implementation: • Short (Less than 5 years) • Medium (5-10 years) • Long Term (More than 10 years). Based on urgency of action needed, as well as high level feasibility of implementation.	**Provincial Government** includes ministries and departments within the government. **Agencies** includes Conservation Authorities, other Provincial bodies, Canadian Federal agencies, and other government entities **Municipalities and/or Indigenous Communities** refers to municipal governments and Indigenous Peoples. **Associations and Non-government** includes non-ministerial regulatory and governing bodies, professional associations, and service providers **Private Sector** or Individual includes companies and individual citizens.	Additional references. While all actions incorporate refinements from Subject Matter Experts, the notation [SME] where used in the full ABP Report indicates an action specifically recommended by a Subject Matter Expert as part of the PCCIA project process.

Overarching Adaptation

| Adaptation Category	Examples of Adaptation Measures
Projects or Programs	- Facilitate access to relevant climate and hydrological data - Review and implement flood risk strategies in high-risk areas **Adopt Nature Based Solutions** - Develop a suite of decision-support tools for climate change adaptation
Research and Development	- Integrate monitoring and evaluation of adaptation planning - Leverage larger city-based resiliency networks in Canada and internationally
Investment and Incentives	- Develop programs and enhance policies that support **Nature-Based Solutions** and increase protection of green spaces and green infrastructure
Policy and Regulation	- Apply a climate lens to government decision-making - Embed climate risk in land use planning and policy - Apply an equity lens to all climate change adaptation planning - Apply an Indigenous lens to all climate change adaptation planning

Adaptation Practice per AoF

Adaptation Category	Examples of Adaptation Measures
Projects or Programs	• Strengthen monitoring and surveillance programs for pest and disease management. • Expand decision support tools for on-farm water, soil and nutrient management. • Enable demand-driven knowledge transformation and transfer through collaboration between researchers and farmers.
Research and Development	• Support and advance research on agricultural expansion opportunities under a changing climate. • Undertake research and development efforts into new and climate-resilient varieties/species. • Fund a knowledge transfer and sharing program for practical adaptation and best management practice sharing with Indigenous knowledge at its core.
Investment and Incentives	• Support and advance research on agricultural expansion opportunities under a changing climate. • Support technological research and advancements on precision agriculture, advance drainage and irrigation systems.
Policy and Regulation	• Apply a climate lens to government decision-making, and ensure integration of Indigenous perspectives. • Invest and strengthen coordination and integration of water management

Key Messages

- **The climate has changed.** Between 1948 and 2016, average temperatures have risen 1.3°C and total annual precipitation has increased by 9.7% in Ontario.

- **Ontario has already experienced significant climate impacts** from flooding, wildfires, heat waves, ice storms and many other events.

- **The climate will continue to change.** In fact, we are locked into climate impacts over the next half century, with impacts expected to become more frequent and more extreme.

- **There is an urgent need to act, to prepare and to invest.** The impacts associated with a changing climate have become more apparent in daily life, increasing risks to social, economic, cultural and ecological systems.
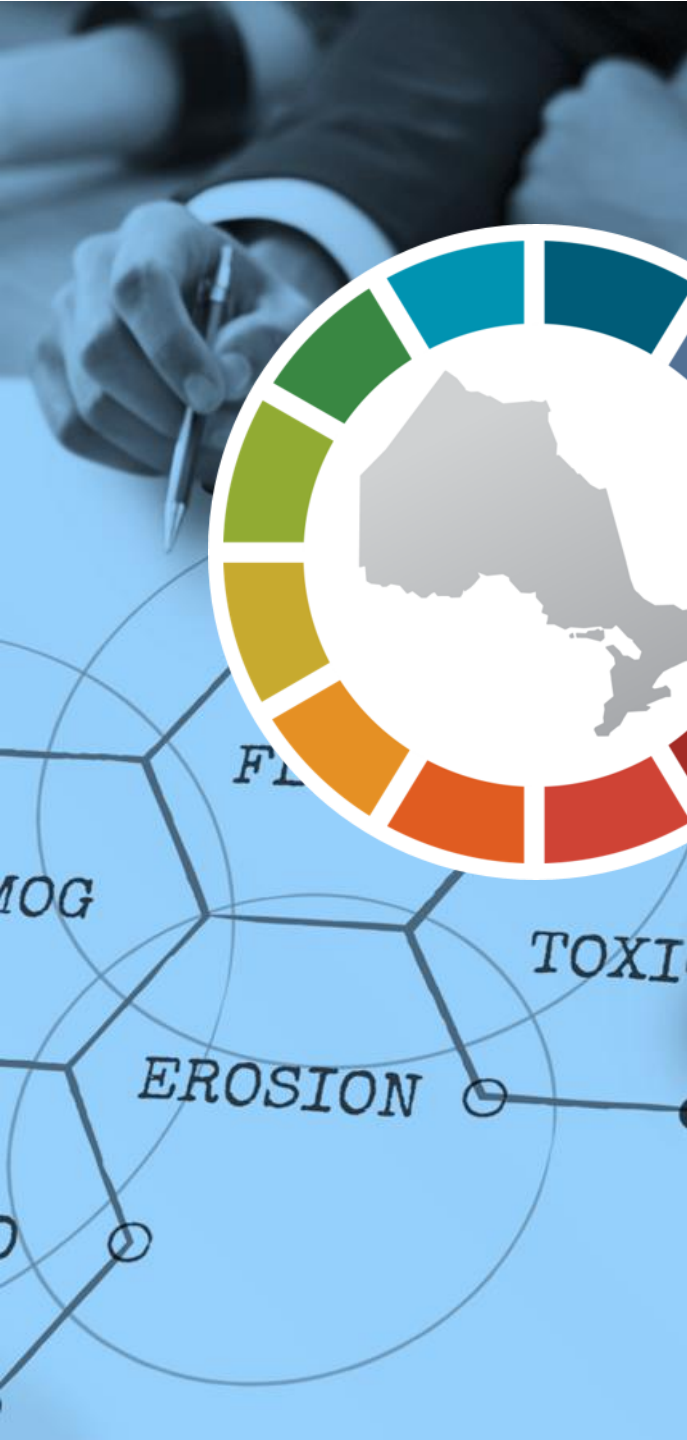
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Thank You