



REPORT

Canada in a Changing Climate

National Issues

Chapter 7: Sector Impacts and Adaptation



Government
of Canada

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du Canada

Canada

Outline

1. Introduction to the chapter
2. Key messages
3. Emerging issues and knowledge gaps
4. Final thoughts
5. Q&A
6. What's next in the National Issues Report Winter Webinar Series



Introduction to the chapter

- The chapter examines recent advances related to seven sectors of Canada's economy – forestry, agriculture, fisheries, energy, mining, transportation and tourism – as well as corporate adaptation more broadly.
- The chapter complements information contained in Chapter 6 (Costs and Benefits of Climate Change Impacts and Adaptation) and Chapter 8 (Climate Disclosure, Litigation and Finance).

It is increasingly evident that climate change is impacting Canada's economy as a whole, and that these impacts will increase in future.

Canadian Council of Academies (2019)

Proactive adaptation enables innovation and growth, and can enhance economic competitiveness.

Kovacs and Thistlethwaite (2014)

Key Message #1



Climate change affects almost every economic sector in Canada

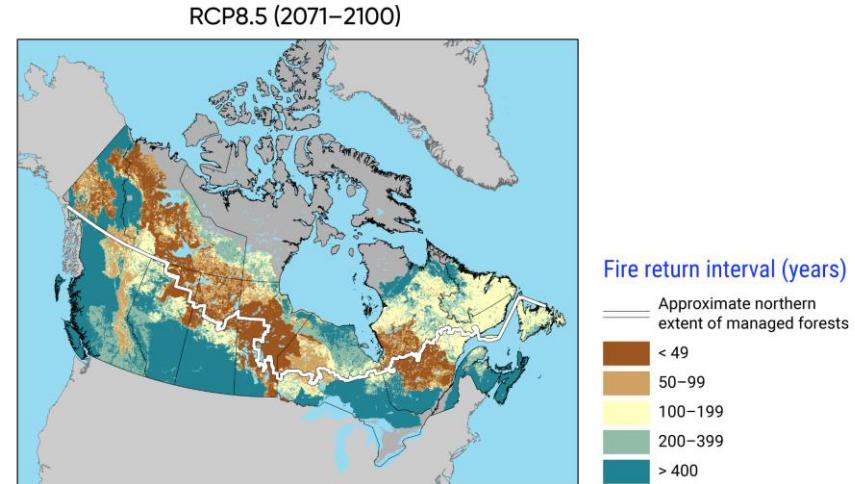
- In some sectors, climate change directly affects primary production (e.g., agriculture, fisheries, forestry, hydroelectricity production).
- Virtually all economic sectors are affected by climate-related disruptions to infrastructure and supply chains (e.g., ability of resources and workers to reach the job site), as well as cascading impacts from other sectors.
- Economic sectors are also affected by climate change-related changes in consumer demand (e.g., heating energy demand, tourism, real estate) and societal priorities (e.g., investment).

Key Message #2

Sustainable forest management is challenged by wildfires and pest outbreaks



- The impacts of recent extreme climate events highlight the need for actions that build more resilient forests and communities, and that contribute to climate change mitigation.
- Actions to address current and near-term risks must be made in the context of long-term climate change impacts on tree species composition, stand structure, productivity and health.



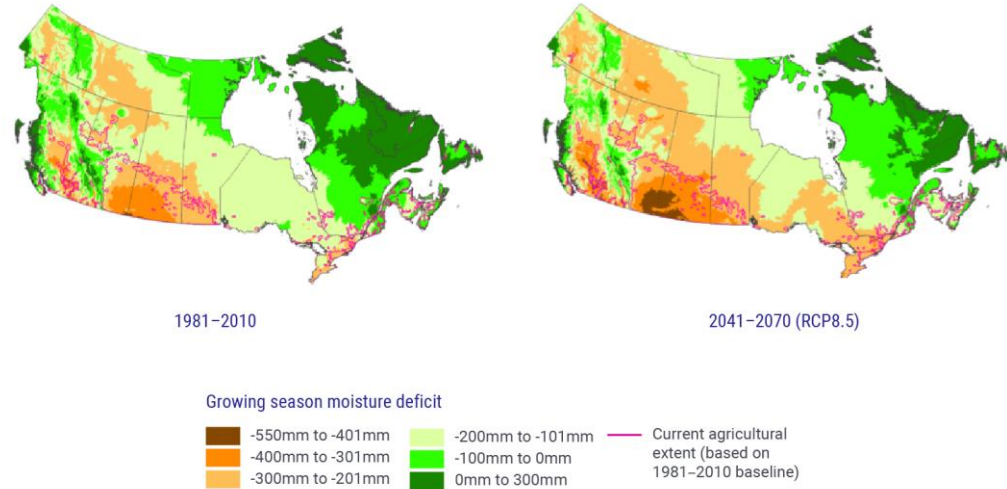
Historic fire risk in Canada. Long return intervals represent a low fire risk.



Key Message #4

Climate change brings benefits and threats to the agriculture sector

- Longer, warmer growing seasons and the potential to grow crops farther north may benefit agriculture, while changes in water availability, extreme weather events and pests and diseases will present challenges.
- Adaptation actions that enhance climate resilience and consider the linkages between agriculture and interconnected sectors (such as water management and transportation) will benefit both local sustainability and global food security.



Historic and projected growing season moisture balance (precipitation minus potential evapotranspiration) in Canada.

Key Message #3



Changes to ocean health are affecting fisheries and associated livelihoods

- Climate change is significantly altering the world's oceans, with changes in temperature, dissolved oxygen and acidification responsible for most of the direct impacts on fisheries and aquaculture in Canada.
- Impacts include changes in the distribution, productivity, reproduction and timing of seasonal events (e.g., spawning and hatching) for many aquatic species.
- Adaptation measures must account for the complex interactions between various climate, as well as non-climate, stressors.



Healthy and deformed lobster larva, the latter reared at pH 7.75.



Key Message #9

Increased private sector involvement will accelerate adaptation across sectors

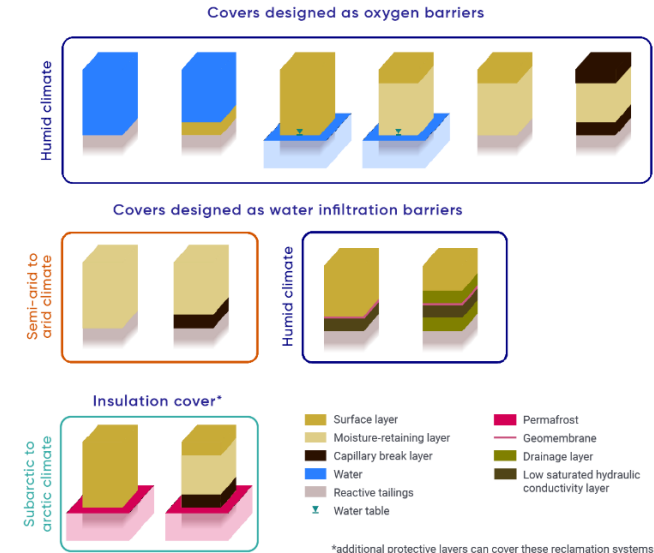
- Despite growing awareness of climate change impacts, there is no widespread evidence of corporate adaptation in Canada.
- When adaptation does occur, it tends to focus on short-term actions to address physical risks, such as disruptions in construction and interruptions in supply-chains.
- Drivers for corporate adaptation include strategic incentives associated with physical risks, growing awareness among stakeholders of the need to adapt, and government regulation.
- Barriers to corporate adaptation relate to capacity and the short-term time horizons of most business operations.

Key Message #5

Climate change brings new environmental challenges mining



- Climate change can affect every phase of a mine's life cycle.
- While impacts on daily operations and disruption of critical supply chains require adaptive actions, impacts on tailings containment and reclamation structures represent key vulnerabilities for the Canadian mining industry.
- Current engineering designs take into account average and extreme historical conditions, but these do not capture the full range of likely future conditions.



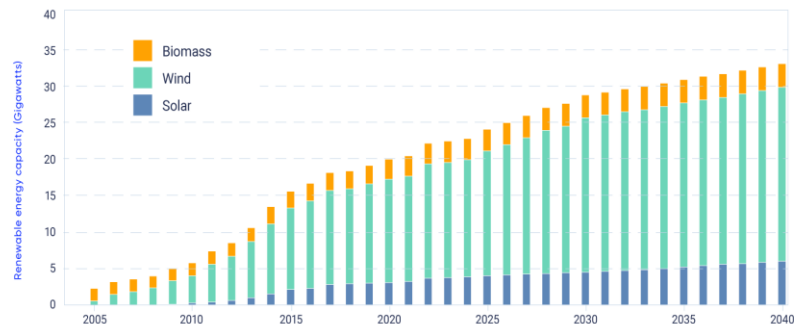
Primary reclamation methods used in Canada.



Key Message #6

Each link of the energy value chain can be vulnerable to climate change

- Climate change affects energy exploration and production, right through to transmission and distribution.
- Impacts on energy supply relate to changes in permafrost, ice cover, sea level, wave regimes, precipitation patterns, river flows and extreme weather events (such as hurricanes and ice storms).
- Impacts on energy demand include increased demand for cooling in summer and decreased demand for heating in winter.
- As we transform to low-carbon energy systems, it will be important to ensure that climate resilience is considered in infrastructure design.



Observed and projected changes in non-hydro renewable energy capacity in Canada. Source: Adapted from National Energy Board, 2018.



Key Message #7

Extreme weather events impact transportation, disrupting supply chains

- Major disruptions to road, rail, marine and air transportation in Canada have significant economic and social impacts.
- Assessment of climate change impacts, including from slow-onset change, must consider potential cascading risks arising from linkages between transportation systems, and between transportation modes and a wide range of other economic sectors.
- Coordinating adaptation responses across jurisdictions and sectors will benefit transportation asset owners, operators and those dependent on vulnerable supply chains and corridors.



Canada's national transportation systems.



Key Message #8

Climate change is leading to transformational changes in tourism

- Tourism is Canada's largest service sector.
- All tourism destinations need to adapt to climate change impacts on tourism assets and altered competitiveness.
- Overall, Canadian tourism competitiveness is expected to increase under climate change, but the market and regional specific implications are poorly understood.
- Winter and northern tourism and recreation, including ski, snowmobile and arctic cruise tourism, are particularly sensitive to climate variability.



Cruise ship Hanseatic arriving in Pond Inlet, Nunavut.

Emerging issues and knowledge gaps

- 1. State of adaptation in the private sector:** Very little information is available on adaptation actions undertaken by small and medium-sized businesses, even though many are highly exposed to climate risks.
- 2. Transnational climate impacts:** Climate impacts that occur in one country affect the adaptation measures taken within other countries. These could relate to impacts on global supply chains, international competitiveness, financial flows and trade.
- 3. Interdependencies:** Most research in Canada has focused on individual sectors. Without analysis that considers the interdependencies between sectors, there is potential to significantly underestimate the risks associated with climate change.
- 4. Strengthened economic analysis:** While examples of detailed economic analysis (including cost-benefit, cost-effectiveness and multi-criteria analyses) exist, there is limited application of these techniques in Canada.

Final thoughts

- Climate change affects almost every economic sector in Canada.
- Understanding the interconnections within and between multiple sectors is critical.
- Adaptation is occurring within all sectors, but needs to be accelerated.
- There is an **urgent need** to accelerate both adaptation and mitigation action:
 - Urgency for adaptation measures is most clear where current climate risks are not adequately managed, and where investment decisions made today have implications extending out many decades.
 - Rapid, near-term reduction of GHG emissions is essential to avoid the most severe impacts of climate change, and hence the most severe impacts on Canadian sectors. The range of viable adaptation options decreases under higher rates of climate change, and limits to adaptation can be exceeded.

Question & Answer Period

Climate change affects almost every economic sector in Canada



Sustainable forest management is challenged by wildfires and pest outbreaks

Climate change brings new environmental challenges for mining



Changes to ocean health are affecting fisheries and associated livelihoods



Climate change brings benefits and threats to the agriculture sector

Each link of the energy value chain can be vulnerable to climate change



Extreme weather events impact transportation, disrupting supply chains



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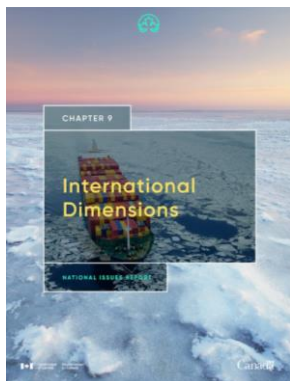
Increased private sector involvement will accelerate adaptation across sectors



Upcoming National Issues Report Webinars

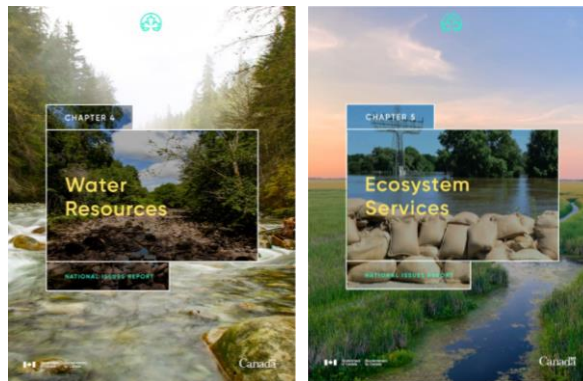
International Dimensions

Friday, February 4, 2022
12:00 – 1:00 pm (EST)



Water Resources and Ecosystem Services

Friday, February 11, 2022
12:00 – 1:30 pm (EST)



Costs and Benefits of Climate Change Impacts and Adaptation

Friday, February 18, 2022
12:00 – 1:00 pm (EST)

