



A CANADIAN INITIATIVE

CLIMATE PROSPERITY

DEGREES OF CHANGE: CLIMATE WARMING AND THE STAKES FOR CANADA

// REPORT 02



National Round Table
on the Environment
and the Economy

Table ronde nationale
sur l'environnement
et l'économie

Canada



**THIS IS NOT
JUST ABOUT
COPING WITH
CLIMATE CHANGE,
BUT PROSPERING
THROUGH IT.**



A CANADIAN INITIATIVE

MESSAGE FROM THE CHAIR

No greater environmental and economic challenge faces Canada and Canadians than climate change. From melting sea ice in the Arctic to the pine beetle infestation in British Columbia to more extreme weather events, a warming globe from increased greenhouse gas emissions is making its effects known right here at home. Global temperatures have already increased by 0.78 degrees Celsius from pre-industrial times. Temperatures in Canada, meanwhile, have increased by 1.3 degrees Celsius since 1948. Canada and Canadians need to know what this could mean for us. And we need to think now about how best to adapt to it.

The NRTEE's new report, *Degrees of Change: Climate Warming and the Stakes for Canada*, illustrates and explains in a uniquely Canadian way what climate change could mean for our country. As a large country spanning five time zones and sheltered by three coasts, we can expect different effects in different places. Understanding how this will occur can help Canadians plan and adapt to the consequences of a climate change.

We need to mitigate the speed and magnitude of climate change by reducing the amount of greenhouse gases Canada and the world pumps into the atmosphere. But we must also adapt to the inevitable forecasted effects of climate change stemming from the carbon pollution and greenhouse gas concentrations already there. Years, even decades, of warming lie ahead because of this. We can expect more change and escalating levels of impacts going forward.

It is clear that there are real risks to both Canada's environment and economy from the impacts of climate change. But we also know there can be opportunities for Canada to gain and prosper through it economically and socially if we plan for what's ahead. We gain the business opportunities from being a technical leader in adaptation.

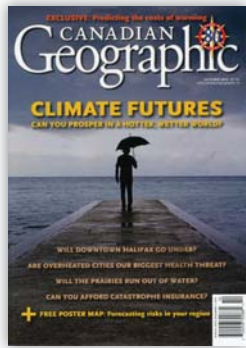
The NRTEE hopes this report will help Canadians learn more about what we can expect from climate change and what we can do about it. We present it in recognition of the attention already paid to the importance of climate change adaptation by the federal government. It builds on work already produced and ideas being considered by government departments and agencies in partnership with provinces, territories and municipalities. We believe our report will assist governments, businesses, communities, and others to begin the necessary planning and actions to adapt and prosper in a climate changing world.



A handwritten signature in black ink, which appears to read "Bob Page". The signature is written in a cursive, flowing style.

BOB PAGE
NRTEE Chair

MESSAGE FROM THE PRESIDENT AND CEO



Degrees of Change: Climate Warming and the Stakes for Canada is about Canada in a climate changing world. The earth is warming and Canada is already experiencing this change at an even faster rate than other nations. Climate change promises to be both pervasive and pernicious. What will it mean to Canada? How will it impact us? What can we expect?

These are the questions the NRTEE explores with our second report in our *Climate Prosperity* series on the risks and opportunities of climate change to Canada.

Its centre-piece is our unique *Degrees of Change* diagram. This diagram illustrates the likely impacts of climate change on our country from today's levels of warming to over 5 degrees Celsius. You can now see in one place, how and where Canada and Canadians could be affected by warming temperatures and changing precipitation across a number of impact areas, ranging from ecosystems to human health to water resources and more. While climate change is global, its impacts are local and we need a Canadian map to show a Canadian story.

We need to understand what this will mean and how we can adapt and prosper through the stresses and uncertainties of climate change. Our new report helps frame this issue for Canadians by making visible what could lie ahead. It sets the stage for a national conversation on how best to adapt to a changing climate and a warming globe.

The NRTEE began this conversation with the Royal Canadian Geographical Society which published our *Degrees of Change* diagram as part of dedicating its October issues of *Canadian Geographic* and *Géographica* to the Round Table's *Climate Prosperity* research. This report provides the full details, scientific background, and policy context for climate change impacts on Canada and what we can start to do about it.



A handwritten signature in black ink that reads 'David McLaughlin'.

DAVID McLAUGHLIN
NRTEE President and CEO

ABOUT US

Emerging from the famous Brundtland Report, *Our Common Future*, the National Round Table on the Environment and the Economy (NRTEE or Round Table) has become a model for convening diverse and competing interests around one table to create consensus ideas and viable suggestions for sustainable development. The NRTEE focuses on sustaining Canada's prosperity without borrowing resources from future generations or compromising their ability to live securely.

The NRTEE is in the unique position of being an independent policy advisory agency that advises the federal government on sustainable development solutions. We raise awareness among Canadians and their governments about the challenges of sustainable development. We advocate for positive change. We strive to promote credible and impartial policy solutions that are in the best interest of all Canadians.

We accomplish that mission by fostering sound, well-researched reports on priority issues and by offering advice to governments on how best to reconcile and integrate the often divergent challenges of economic prosperity and environmental conservation.

The NRTEE brings together a group of distinguished sustainability leaders active in businesses, universities, environmentalism, labour, public policy, and community life from across Canada. Our members are appointed by the federal government for a mandate of up to three years. They meet in a round table format that offers a safe haven for discussion and encourages the unfettered exchange of ideas leading to consensus.

We also reach out to expert organizations, industries, and individuals to assist us in conducting our work on behalf of Canadians.

The *NRTEE Act* underlines the independent nature of the Round Table and its work. The NRTEE reports, at this time, to the Government of Canada and Parliament through the Minister of the Environment. The NRTEE maintains a secretariat, which commissions and analyzes the research required by its members in their work.

NRTEE MEMBERS

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Plasco Energy Group
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Mark Parent

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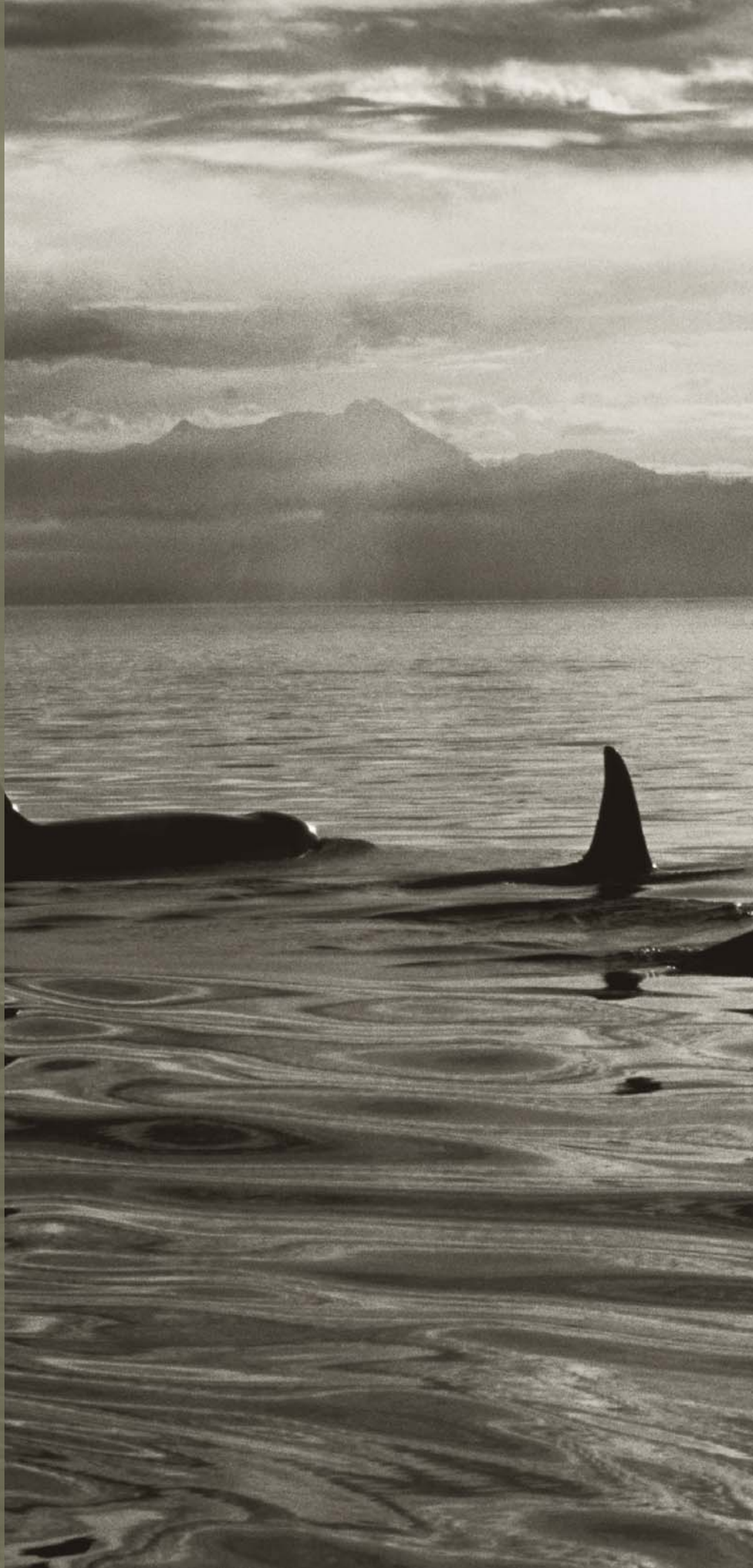
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NRTEE PRESIDENT AND CEO

David McLaughlin

EXECUTIVE SUMMARY





0.0 EXECUTIVE SUMMARY

Degrees of Change explains the implications of a changing climate for Canada and Canadians. It is the second report in the *Climate Prosperity* series by the National Round Table on the Environment and the Economy (NRTEE) on the economic risks and opportunities to Canada of climate change.

Examining what the impacts of climate change will mean to our environment and what a global low-carbon transition will mean to our economy, *Climate Prosperity* offers new insights and analysis into shaping Canada's public policy responses to this most extraordinary challenge.

This *Degrees of Change* report illustrates the expected impacts of a changing climate for Canada and how adapting to these impacts now will be necessary to secure our prosperity in an uncertain climate future. In Canada and across the globe, we are already seeing the effects of warming temperatures and changing climate conditions. As climate change persists, we can expect, for example, further melting of glaciers and sea ice, rising sea levels, earlier springs, shifts in the distribution of animals and plants, and increasingly volatile weather. No region and no aspect of our geography will be immune; but impacts will vary in time and intensity.

That is why the NRTEE has developed a uniquely Canadian diagram to illustrate the effects of climate change across eight areas of importance to our country and Canadians. Based on a vast array of published scientific literature, it maps scientifically accepted climate-related impacts, current and projected, to a global temperature scale. It puts global political commitments of keeping world temperatures below 2 degrees Celsius (°C) into perspective by showing what different levels of warming could mean to Canada. From ecosystems to human health to water resources to communities and infrastructure and more, *Degrees of Change* demonstrates just how pervasive and pernicious climate change could be. Both risks and potential opportunities — as we currently know them — are presented.

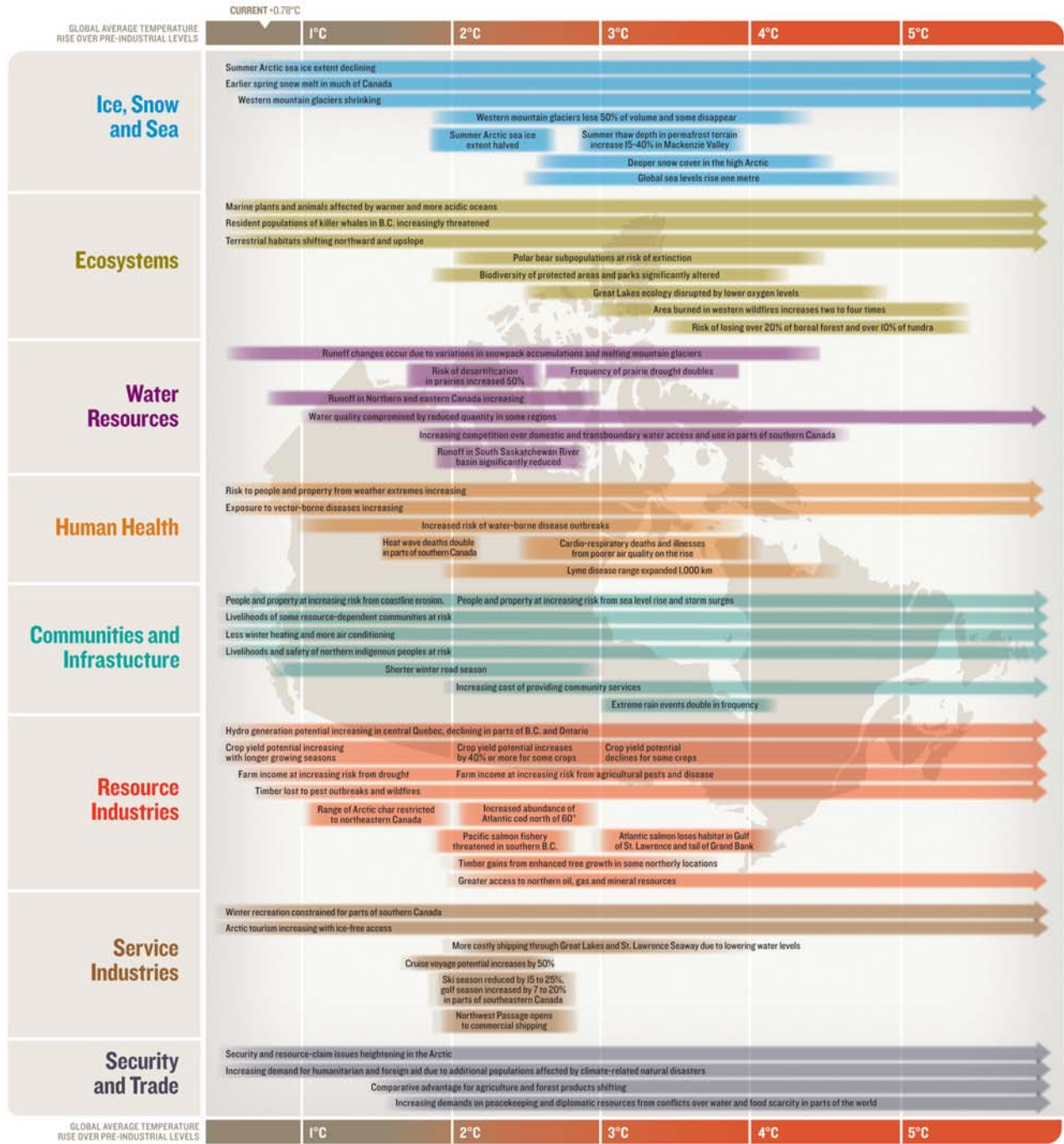
Canada — our people, places, and prosperity — will be affected by climate change. Changes in forest growth, pest outbreaks, and wildfires will impact resource-dependent communities and the livelihoods of workers and families. Tourism operators relying on seasonal patterns for snow and sun may have to plan for different outcomes. Farmers may face more varied drought and rain effects causing new economic impacts on their crop values and farming operations. These are but a few examples of what's at stake and how climate change impacts Canadians where we live and work.

Knowing what climate change could mean allows us to consider how and when to adapt to it. Adapting, so we can prosper through climate change, is essential for Canada's economic and environmental security. Levels of warming in Canada are already higher than the global average. Arresting the growth of greenhouse gas (GHG) emissions — necessary to limit the extent and speed of climate change — does nothing to change the impacts expected from GHG concentrations already in the atmosphere. Inevitably, we must think about how to adapt to the effects already taking place and those sure to come.

With risk comes uncertainty. And climate change offers both. This report helps reinforce the need to improve our understanding of how climate change could affect us and assess the risk of what this means. To date, we as a country have only just begun to consider the implications of future climate change impacts and see that they become factored in major planning decisions by governments, businesses, and communities on a more consistent and coordinated basis. Whether it's reinforcing infrastructure degraded by thawing permafrost in Nunavut or building new seawalls as protection from storm surge flooding in New Brunswick, we need to think differently about the value of taking action to adapt to current and future impacts of climate change. A changing climate makes the very concept of status quo irrelevant. Taking action to adapt now is an opportunity to shape possibilities and secure our prosperity for the future.

DEGREES OF CHANGE: CLIMATE WARMING AND THE STAKES FOR CANADA

A Summary of the Impacts of Climate Change Expected in Canada Over the 21st Century



▬ FORECAST WITHIN INDICATED RANGE
➔ TREND LIKELY TO CONTINUE, POTENTIALLY INTENSIFYING

The NRTEE's *Degrees of Change* diagram (ABOVE) is a summary of the impacts of climate change expected in Canada over the 21st century. It shows both risks and opportunities for Canada from different levels of global warming above pre-industrial levels. Each category in the diagram is an important part of our country's environment and economy, and only contains climate change impacts that we are confident could occur, as documented in scientific literature. Not all expected impacts of climate change are shown here. Nor is the diagram a prediction. It does not account for time lags between global temperature change and the response of our physical environment. Even if actions limit global temperature increases to 2°C by 2050, climate change impacts will continue to build up for decades at a minimum due to the slow response of Earth systems. Adapting to these impacts to reduce or avoid harm would lessen their effect, but this is not shown on the diagram.