

Adaptation, Linking Research and Practice: An Ontario Perspective

The State of Adaptation in Canada

Climate change adaptation involves making adjustments in decisions, activities, and ways of thinking in response to observed or expected changes in climate, with the goal of reducing harm and taking advantage of potential opportunities (see Figure 1) (IPCC, 2013). Globally, adaptation has evolved as a concept since it first emerged as a potential response to climate change in the 1990s. Attitudes about the role of adaptation as an essential response to climate change have shifted; awareness of the need to adapt is more widespread relative to just five years ago, and many organizations are currently planning for climate change (Eyzaguirre and Warren, 2014). In Canada, engagement on adaptation (both in research and application) has increased. Ongoing research has helped frame adaptation through a variety of different lenses, including economic, social, environmental and psychological in order to increase understanding and action. Increasing focus is being placed on adaptation options that result in co-benefits or result in benefits regardless of the level of climate change (i.e. win-win solutions) (Eyzaguirre and Warren, 2014).

Adaptation is also becoming more entrenched in Canadian society (see Table 1). The development of climate change adaptation plans has become more common at all levels of government (municipal, regional, provincial and federal); industry is beginning to consider climate change impacts through planning processes including risk, vulnerability, economic and environmental assessments; and the NGO community is working to develop resources and tools to support adaptation in the public and private sector (Eyzaguirre and Warren, 2014).

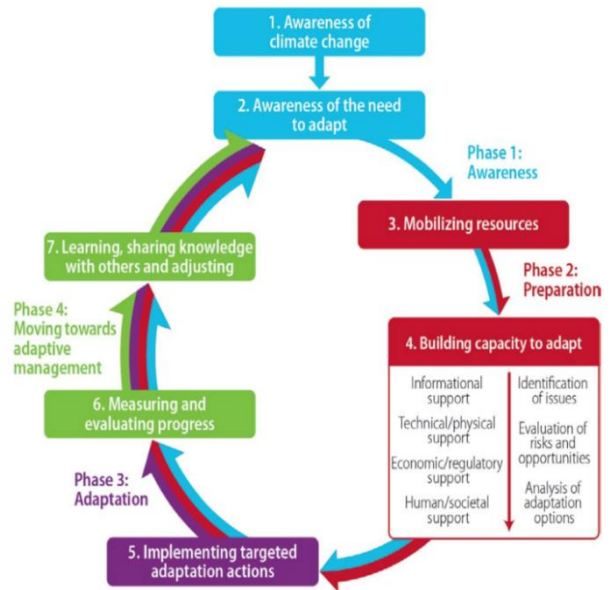


Figure 1: Stages and steps in the adaptation process. Although presented as a linear process, organizations may take different pathways as they transition and iterate through these phases and steps (Eyzaguirre and Warren, 2014).

Table 1: Examples of adaptation in Ontario government, industry and NGO's (Eyzaguirre and Warren, 2014)

Government	
Provincial	Climate Ready: Adaptation Strategy and Action Plan (MOECC, 2011)
	Ontario Regional Adaptation Collaborative – federally funded but provincially focused adaptation program (OCCIAR, 2015b)
	Assisted migration trial in Claremont (NRCan, 2015)
Municipal	City of Toronto Hot Weather Response Plan
	York Region's extreme cold de-icing techniques (CAP, 2012)
	Syndromic surveillance system to address heat-related illness in Kingston, Ontario (CAP, 2012)
	Cambridge/Milton assessing economic impacts of climate change on design of drainage infrastructure in flood-prone areas (Scheckenberger, 2009)
	Richmond Hill's retrofit of stormwater management infrastructure (retention pond)
	Windsor's use of heat-health vulnerability assessments to update their heat alert and response system
Watershed	Lake Simcoe climate change adaptation strategy (OCCIAR, 2015c)
Inter-Governmental	
CCFM	Canadian Council of Forest Ministers (CCFM) <i>Adapting Sustainable Forest Management to Climate Change: Preparing for the Future</i> (CCFM, 2015)
Industry	
Mining	Glencore's climate change risk assessment and adaptation plan (FBC and MIRARCO, 2014)
Tourism	Blue Mountain's business diversification strategy and underground pipeline to extend snowmaking capability (CAP, 2011)
NGO	
OCCIAR	Adaptation planning with Georgina Island First Nation (OCCIAR, 2015a)
ICLEI	Building Adaptive and Resilient Communities (BARC) program assisting communities with adaptation planning (ICLEI Canada, 2015)

Although adaptation is becoming more visible in public and private decision-making, there are currently few documented examples of specific adaptation actions that were implemented in order to manage future climate risk. Barriers to such action can include: 1) the availability, complexity and use of climate information; 2) lack of economic, human and technological resources; 3) challenges relating to governance, such as the competing priorities of invested governing agencies; and 4) psychological challenges, including the perceived importance of climate change or uncertainty in climate projections (Eyzaguirre and Warren, 2014).

Building Adaptive Capacity in Ontario

Increasing the level of adaptation within Canada relies on: 1) creating the will to adapt among key stakeholders, and 2) overcoming current barriers to climate change decision-making. The former has received little attention in current literature and research. The latter, however, is currently being addressed through efforts to build adaptive capacity in Canada's municipalities and industrial sectors. In Ontario, many activities and programs are underway to facilitate adaptation action in at-risk or vulnerable sectors (see Table 2) (Eyzaguirre and Warren, 2014).

Table 2: Examples of ongoing activities/programs/research to build adaptive capacity in Ontario (Eyzaguirre and Warren, 2014).

Type of activity, program, research	Audience	Description
Addressing information needs	Private/Public	OURANOS developed a guidebook on how to use climate scenarios to guide adaptation
	Private/Public	Environment Canada developed the Canadian Climate Data and Scenarios to house climate data
	Government, Industry, Private/Public	OCCIAR's National Climate Change Adaptation Community of Practice transfers information, knowledge and understanding on adaptation
	Government, Industry	Clean Air Partnership (CAP) and ICLEI developed adaptation indicators to assess the effectiveness of adaptation
Developing and disseminating adaptation tools	Industry	OCCIAR developed a Climate Change Cost Benefit Analysis Tool to assist mining stakeholders in assessing the economic impacts of climate change on a mine, and the costs/benefits of adaptation measures
	Municipality	Mississauga, in collaboration with Green Analytics and OCCIAR, assessed the economic impacts of climate hazards on municipal infrastructure and services in the absence of adaptation
Addressing economic resource constraints	Landowners	The Ontario government is offering the Managed Forest Tax Incentive Program, Conservation Land Tax Incentive Program, and Environmental Farm Plan to promote restoring and conserving wetlands, tree planting, riparian buffer strip planting, and developing alternative water sources for cattle
Creating the will to adapt	Municipal Staff	CAP developed a municipal adaptation training program
Creating an enabling environment	Forestry	CCFM developed vulnerability assessment tools and techniques and adaptation indicators and assessments in order to promote consistent approaches across the sector, supporting benchmarking and leveling the playing field

References

- CAP [Clean Air Partnership] (2011): Climate Change Adaptation Strategies at Blue Mountain Resort. Video <www.cleanairpartnership.org/cai_videos>.
- CAP [Clean Air Partnership] (2012): Accelerating Adaptation in Canadian Communities: Case Studies. <www.cleanairpartnership.org/accelerating_climate_change_adaptation_case_studies>
- CCFM [Canadian Council of Forest Ministers] (2015): Climate Change. <www.ccfm.org/english/coreproducts-cc.asp>.
- Eyzaguirre, J. and Warren, F.J. (2014): Adaptation: Linking Research and Practice; in Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation, edited by F.J. Warren and D.S. Lemmen; Government of Canada, Ottawa, ON, p. 253-286.
- FBC and MIRARCO (2014): Climate Change Planning at Glencore in Sudbury, Ontario. Case Study by Fraser Basin Council and MIRARCO <www.retooling.ca/_Library/Mining_Essentials/mining_case_study_glencore.pdf>.
- ICLEI Canada (2015): Building Adaptive, Resilient Communities. <www.icleicanada.org/programs/adaptation/barc>.
- IPCC [Intergovernmental Panel on Climate Change] (2013): *Summary for Policymakers*. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- MOE [Ministry of the Environment] (2011): Climate ready: Ontario's Adaptation Strategy and Action Plan 2011-2014; Ministry of the Environment, <www.ontario.ca/document/climate-ready-adaptation-strategy-and-action-plan-2011-2014>.
- NRCAN [Natural Resources Canada] (2015): Assisted Migration. Natural Resources Canada <www.nrcan.gc.ca/forests/climate-change/13121>.
- OCCIAR [Ontario Centre for Climate Impacts and Adaptation Resources] (2015a): Climate Change Adaptation Planning with the Georgina Island First Nation. <www.climateontario.ca/p_CCAPwGIFN.php>.
- OCCIAR [Ontario Centre for Climate Impacts and Adaptation Resources] (2015b): Ontario Regional Adaptation Collaborative Products. <www.climateontario.ca/ORAC_Products.php>.
- OCCIAR [Ontario Centre for Climate Impacts and Adaptation Resources] (2015c): Project: Lake Simcoe. <www.climateontario.ca/p_ls.php>.
- Scheckenberger, R.B., Farrell, A.C., and Senior, M. (2009): Economic Assessment of Climate Change Scenarios on Drainage Infrastructure Design; Transportation Association of Canada Annual Meeting, Vancouver.

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The information presented is based on Chapter 9 of NRCAN's 2014 National Climate Assessment titled **Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation** with additional Ontario-specific information. For more information on the National Assessment, please visit: www.nrcan.gc.ca/environment/resources/publications/10766