

This country profile was compiled by the OECD Secretariat and reflects information available as of June 2013. Further information and analysis can be found in the publication: OECD (2013) *Water and Climate Change Adaptation: Policies to Navigate Uncharted Waters*, OECD Studies on Water, OECD Publishing. <http://dx.doi.org/10.1787/9789264200449-en>. Country profiles for all OECD member countries are available for download at: [www.oecd.org/env/resources/waterandclimatechange.htm](http://www.oecd.org/env/resources/waterandclimatechange.htm). These profiles will be regularly updated and it is planned to expand coverage over time to include key partner countries.

## Canada

### Climate change impacts on water systems

Observed changes and trends	<ul style="list-style-type: none"> <li>Climate change impacts on water resources in Canada vary regionally including shortages (droughts), excesses (floods) and associated water quality issues, depending on the season.</li> <li>Since 1948, snowfall has increased in the North, and decreased in South-Western Canada.</li> <li>Glacial retreat is widespread since the late 1800s in Western Canada and since the 1920s in the Arctic.</li> <li>Decline in summer and fall runoff in the Prairies provinces, leading to seasonally lower lake and river levels.</li> <li>Northward or upslope shifts in terrestrial ecosystems, shifts towards warmer thermal regimes in freshwater ecosystems.</li> <li>On average, Great Lakes water levels are currently about 1 metre below the long-term average.</li> </ul>				
Projected impacts	<ul style="list-style-type: none"> <li>Increase in annual total precipitation across the country during the current century. However, throughout most of southern Canada, precipitation increases are projected to be low (0% to 10% by 2050s) during the summer and fall months. In some regions, especially in the south-central Prairies and southwestern British Columbia, precipitation is expected to decline in the summer.</li> <li>Increase in the frequency of water shortages in Ontario, British Columbia, and in the Prairie provinces.</li> <li>Increase in surface water temperatures, decrease in the duration of ice cover, and lower water levels due to warmer conditions. These changes lead to higher pollutant concentrations. Increased flooding will also contribute to water quality degradation.</li> <li>Water supply issues to become a greater concern in the Great Lake Basin due to lower lake levels, which may reduce hydroelectricity production, harm tourism and recreation, and force vessels to decrease cargo capacity.</li> <li>Increase in the frequency, intensity or duration of extreme weather/climate events in most regions.</li> <li>Increase in the risk of flooding in many regions in winter due to less ice cover, more precipitation events, and more frequent winter thaw. An increase in extreme daily precipitation is expected.</li> <li>More frequent and sustained drought in British Columbia.</li> <li>Adverse effects on ecosystems in Québec, Ontario, and in the Prairie provinces. In particular, changes in winter snowfall will have an adverse impact on Prairie wetlands.</li> </ul>				
Primary concerns	Water quantity	Water quality	Water supply and sanitation	Extreme weather events	Ecosystems
	✓ (Seasonal and regional basis)	✓ (Seasonal and regional basis)		✓	
Key vulnerabilities	<ul style="list-style-type: none"> <li>Canada's Arctic is particularly vulnerable to climate change. Infrastructure in the Arctic regions has already been exposed to significant impacts that require urgent changes to engineering practices, climatic design information, codes and standards from melting permafrost, warming temperatures, changing snow loads and other extreme precipitation.</li> <li>Water-stressed areas will expand due to decreased runoff in many areas, while reduced water quality and quantity will be experienced on a seasonal basis in every region of Canada.</li> </ul>				

Sources: Environment Canada (2012), *Climate Information to Inform New Codes and Standards*, [www.ec.gc.ca/sc-cs/default.asp?lang=En&n=20CD1ADB-1](http://www.ec.gc.ca/sc-cs/default.asp?lang=En&n=20CD1ADB-1) (accessed 2 October 2012); Environment Canada (2004), *Threats to Water Availability in Canada*, National Water Research Institute, Burlington, Ontario, NWRI Scientific Assessment Report Series No. 3 and ACSD Science Assessment Series No. 1, [www.ec.gc.ca/inre-nwri/default.asp?lang=En&n=0CD66675-1&offset=1&toc=show](http://www.ec.gc.ca/inre-nwri/default.asp?lang=En&n=0CD66675-1&offset=1&toc=show) (accessed 20 November 2012); Government of Canada (2010), *Fifth National Communication on Climate Change*, [http://unfccc.int/national\\_reports/annex\\_i\\_natcom/submitted\\_natcom/items/4903.php](http://unfccc.int/national_reports/annex_i_natcom/submitted_natcom/items/4903.php) (accessed 20 June 2012); Government of Canada (2007), *From Impacts to Adaptation: Canada in a Changing Climate*, D.S. Lemmen et al. (eds.), Natural Resources Canada, Environment Canada, Ottawa, Ontario; Government of Canada (2004), *Climate Change Impacts and Adaptation: A Canadian Perspective*, D.S. Lemmen and F.J. Warren (eds.), Natural Resources Canada, Ottawa, Ontario.

## Key policy documents

Document	Reference to water?	Type	Year	Responsible institution
Federal Adaptation Policy Framework	N	Federal adaptation framework	2011	Government of Canada
Canada Country Study: Climate Impacts and Adaptation	Y	National impact assessment	2000	Environment Canada
From Impacts to Adaptation: Canada in a Changing Climate	Y	National risk assessment	2008	Natural Resources Canada
Strategic Directions for Water: Three Year Action Plan <sup>1</sup>	Y	Water strategy document	2010	Canadian Council of Ministers of the Environment
Climate Ready: Ontario's Adaptation Strategy and Action Plan	Y	Sub-national responses	2011	Government of Ontario
The Water Opportunities Act	Y	Sub-national responses	2010	Government of Ontario
Preparing for Climate Change: British Columbia's Adaptation Strategy	Y	Sub-national responses	2010	Government of British Columbia
Living Water Smart	Y	Sub-national responses		Government of British Columbia
Water for Life: Nova Scotia's Water Resource	Y	Sub-national responses	2010	Government of Nova Scotia
Manitoba Water Strategy	Y	Sub-national responses	2003	Government of Manitoba
Northwest Territories Water Stewardship Strategy	Y	Sub-national responses	2010	Government of the Northwest Territories
Water for Life	Y	Sub-national responses	2008	Government of Alberta
Water for Life: Action Plan	Y	Sub-national responses	2009	Government of Alberta
Climate Change Action Plan	Y	Sub-national responses	2008	Government of Québec
Quebec Water Policy	Y	Sub-national responses	2002	Government of Québec
Saskatchewan Energy and Climate Change Plan	Y	Sub-national responses	2007	Government of Saskatchewan
Pan-Territorial Adaptation Strategy: Moving Forward on Adaptation in Canada's North	Y	Sub-national responses	2011	The Governments of Nunavut, the Northwest Territories and Yukon
Climate Change Adaptation Strategy for Atlantic Canada	Y	Sub-national responses	2008	Governments of New Brunswick, Prince Edward Island, Nova Scotia, and Newfoundland and Labrador
Climate Change Action Plan	Y	Sub-national responses	2007	Government of New Brunswick
Prince Edward Island and Climate Change: A Strategy for Reducing the Impacts of Global Warming	Y	Sub-national responses	2008	Government of Prince Edward Island
Climate Change Action Plan	Y	Sub-national responses	2005	Government of Newfoundland and Labrador

1. One of the goals is to reduce climate change impacts on water through adaptive strategies.

## Policy instruments<sup>1</sup>

Areas	Policy mix	Regulatory instruments <sup>2</sup>	Economic instruments	Information and other instruments
Water quantity		<b>Ontario:</b> The Low Water Response Programme: Aims to reduce the impacts of drought on water supplies. It was developed in response to the increased occurrence of low water levels due to changing weather patterns, such as a severe drought in 1998-99.		<ul style="list-style-type: none"> <li>Innovative risk management tools for adaptation: Guidelines and tools to address risks from climate change, e.g. "Adapting to Climate Change: A Risk Based Guide for Local Governments", "Infrastructure Climate Risk Protocol", <a href="http://www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/295">www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/295</a>.</li> <li>Adaptation planning tools: Guide users from risk assessment to the identification and implementation of adaptation responses, e.g. "Changing Climate, Changing Communities: Guide for Municipal Climate Adaptation" and "Canadian Communities' Guidebook for Adaptation to Climate Change", <a href="http://www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/295">www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/295</a>.</li> </ul>
Water quality				<ul style="list-style-type: none"> <li>Water and Climate Compendium: A website providing access to information, knowledge products, and training on water resource adaptation to climate change, <a href="http://waterandclimate.ca/WP">http://waterandclimate.ca/WP</a>.</li> <li>Early warning system: Environment Canada's Meteorological Service has the unique mandate and capacity to warn Canadians of impending high impact weather events that can affect their lives and property.</li> <li>A Canada-wide Framework for Water Quality Monitoring (2006): A guide for jurisdictions in the planning and implementation of water quality monitoring programs, <a href="http://www.ccme.ca/assets/pdf/wqm_framework_1.0_e_web.pdf">www.ccme.ca/assets/pdf/wqm_framework_1.0_e_web.pdf</a>.</li> </ul>
Water supply and sanitation		<b>Ontario:</b> The Water Opportunities and Water Conservation Act (2010): Enables the province to develop regulations that will require new and innovative ways to reduce demands on existing water resources and also address impacts from a changing climate. The Act requires municipalities to create a Municipal Water Sustainability Plan that includes conservation plans, a risk assessment and risk management plan which address the challenges of climate change and impacts on water resources.		
Extreme weather events		<b>Ontario:</b> <ul style="list-style-type: none"> <li>The Building Code is an important policy tool in responding to the direct and indirect effects of climate change. Work is underway by the Ministry of Municipal Affairs and Housing (MMAH) on the development of the next edition of the Building Code to make new buildings in Ontario resilient to climate change impacts and to enhance their ability to conserve water and energy.</li> </ul>		
Ecosystems				

1. Water management issues are primarily the responsibility of provincial and territorial governments in Canada. Major provincial and territorial initiatives relating to climate change adaptation and water are listed in Section 2. For more information on principal measures to address climate change adaptation for water systems at sub-national level, please see provincial and territorial government websites for further information.
2. This section provides some examples of regulatory instruments from the Government of Ontario.

## Main research programmes

- Environment Canada undertakes a broad range of climate research including process studies, data analysis, greenhouse gas monitoring and global and regional climate modeling, [www.ec.gc.ca/sc-cs/default.asp?lang=En&n=1F788646-1](http://www.ec.gc.ca/sc-cs/default.asp?lang=En&n=1F788646-1).
- Environment Canada also conducts national scale research on climate change impacts and water availability, [www.ec.gc.ca/sc-cs/default.asp?lang=En&n=9AF9494E-1](http://www.ec.gc.ca/sc-cs/default.asp?lang=En&n=9AF9494E-1). Research programmes focussed on climate change and water are undertaken by several departments.
- The Natural Sciences and Engineering Research Council of Canada announced in 2012 a program called "Climate Change and Atmospheric Research" (CCAR) to fund new climate change research in Canada and foster improved collaboration between government and university researchers, [www.nserc-crsng.gc.ca/Professors-Professeurs/Grants-Subs/CCAR-RCCA\\_eng.asp](http://www.nserc-crsng.gc.ca/Professors-Professeurs/Grants-Subs/CCAR-RCCA_eng.asp).

## Principal financing mechanisms and investment programmes

- The Government of Canada invested CAN 85.9 million over the period 2007-11 to help Canadians increase their capacity to adapt to a changing climate. These initiatives enhanced the scientific knowledge and tools needed to take further action against climate change and reduce the risks to Canadians, [www.ec.gc.ca/default.asp?lang=En&xml=91E1F38E-C53C-404B-9512-22EA69C08787](http://www.ec.gc.ca/default.asp?lang=En&xml=91E1F38E-C53C-404B-9512-22EA69C08787).
- In November 2011, the Government announced CAN 148.8 million over five years for projects to improve the understanding of climate change impacts focusing on science to inform adaptation decision making, health, the North and Aboriginal communities, and economic competitiveness, [www.climatechange.gc.ca/default.asp?lang=En&n=2B2A953E-1](http://www.climatechange.gc.ca/default.asp?lang=En&n=2B2A953E-1) (note that not all of these programs focus on water issues).
- Funding for new climate change research in Canada will be provided by the Natural Sciences and Engineering Research Council of Canada under the new program "Climate Change and Atmospheric Research" (CCAR), [www.nserc-crsng.gc.ca/Professors-Professeurs/Grants-Subs/CCAR-RCCA\\_eng.asp](http://www.nserc-crsng.gc.ca/Professors-Professeurs/Grants-Subs/CCAR-RCCA_eng.asp).

## Highlights and innovative initiatives

- The **Regional Adaptation Collaboratives (RACs) Climate Change Program** was a three year, CAN 30 million, cost-shared federal program to help Canadians reduce the risks and maximise the opportunities posed by climate change. This Program helped communities prepare for and adapt to local impacts posed by our changing climate, such as decreasing fresh water supplies, increasing droughts, floods, and coastal erosion.
  - The British Columbia RAC, Preparing for Climate Change: Securing B.C.'s Water Future, focused on enhancing resilience to a changing climate and the anticipated, related impacts on water and aquatic ecosystems, [www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/regional-collaborative/636](http://www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/regional-collaborative/636).
  - The Prairies RAC focused on a series of projects to advance decision making in the areas of water supply and demand, drought and flood planning, and, forest and grassland ecosystems, [www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/regional-collaborative/175](http://www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/regional-collaborative/175).
  - To address targeted climate change vulnerabilities, the Ontario RAC conducted a series of projects to advance decision making in the areas of extreme weather risk management, water management and community development planning, [www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/regional-collaborative/189](http://www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/regional-collaborative/189).
  - Water management was a focus of the Quebec RAC, which aimed to initiate adaptation on targeted issues by providing specialised information and tools to government water managers and watershed groups, [www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/regional-collaborative/768#water](http://www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/regional-collaborative/768#water).
  - The Atlantic Climate Adaptation Solutions Project worked collaboratively with a broad range of government and non-government partners to enhance Atlantic Canada's resilience to a changing climate. A series of projects were undertaken to address vulnerabilities in this region, [www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/regional-collaborative/204#enhance](http://www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/regional-collaborative/204#enhance).
- The **Northern Voices, Northern Waters** – Northwest Territory Water Stewardship Strategy: Released in May 2010, the Strategy aims to ensure the maintenance of the quantity and quality of water resources in the Northwest Territory, secure water supply, and the resilience of freshwater ecosystems. An action plan for the period of 2011-15 has been developed, [www.enr.gov.nt.ca/\\_live/pages/wpPages/water.aspx](http://www.enr.gov.nt.ca/_live/pages/wpPages/water.aspx).