



Pacific Institute  
for Climate Solutions  
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# **Climate Change Adaptation for Local Government**

## A Resource Guide

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# Table of Contents

## **INTRODUCTION: ABOUT THIS DOCUMENT**

### **SECTION A: ADAPTATION AND THE ADAPTATION PROCESS**

1. Introductory Resources
2. Guidebooks and Methodologies
  - a) Canada
  - b) International

### **SECTION B: RESOURCES THAT SUPPORT CLIMATE CHANGE ASSESSMENT**

3. Past and Future Climate Change and Its Impacts
4. Synthesized Assessment Products
  - a) British Columbia
  - b) North America

### **SECTION C: RESOURCES THAT SUPPORT ADAPTATION PLANNING**

5. Adaptation Best Practices
6. Evaluating and Selecting Adaptation Options
7. Monitoring and Measuring Adaptation Progress
8. Communications and Outreach

### **SECTION D: LOCAL GOVERNMENT ADAPTATION CASE STUDIES**

9. British Columbia Case Studies
10. Canadian Case Studies
11. International Case Studies

### **SECTION E: RESOURCES THAT BUILD ADAPTATION CAPACITY**

12. Community Adaptation Partners
13. Adaptation Training Programs
14. Resource Lists and Clearinghouse

## Introduction: About this Document

The number of resources for local government adaptation has increased substantially over the past several years. Local governments in British Columbia that wish to learn more about climate change impacts and adaptation, to embark upon their own internal risk and vulnerability assessment processes, or to identify their own adaptation options now have many resources to draw upon. They can find information about past and future climate, find a methodology that suits their needs and resources, learn more about the experience of other local governments, or access university-based research expertise. Climate change adaptation is still an emerging field, however, and there remain aspects of the adaptation process for which resources remain limited.

This document was produced for participants in the forum *Resilient Communities: Preparing for the Climate Challenge*, June 14-15, 2011 in Vancouver. It updates and adds to resources identified on the *ReTooling for Climate Change* website, funded by Natural Resources Canada and produced by the Fraser Basin Council. The BC Ministry of Environment, Climate Action Secretariat, provided guidance and expertise. The report was co-authored by Jenny Fraser, BC Ministry of Environment, and Matt Strand, who was supported through a Pacific Institute for Climate Solutions grant to Simon Fraser University's Adapting to Climate Change Team (ACT).

# A: Adaptation and the Adaptation Process

## 1. Introductory Resources

### Canada - Adapting to Climate Change: An Introduction for Canadian Municipalities

2010 - *Natural Resources Canada*

This resource provides a brief overview of climate change adaptation for municipal officials and staff. Readers will be familiarized with basic terms and components of climate change impacts, such as adaptive capacity, types of adaptation and vulnerability assessments. The document highlights several adaptation guides that communities can utilize, and provides examples of frameworks adopted and actions taken by local governments across Canada to integrate adaptation into their planning and decision making process.

**Go to Resource:** [http://adaptation.nrcan.gc.ca/mun/index\\_e.php](http://adaptation.nrcan.gc.ca/mun/index_e.php)

### United States - Ask the Climate Question - Adapting to Climate Change Impacts in Urban Regions

2009 - *Center for Clean Air Policy (CCAP)*

This resource describes the adaptation efforts of 10 cities participating in CCAP's Urban Leaders Adaptation Initiative, and the lessons they learned about the adaptation process. Participating cities were: Chicago, King County (Washington), Los Angeles, Miami-Dade County (Florida), Milwaukee, Nassau County (New York), New York City, Phoenix, San Francisco and Toronto. The resource also serves as an introduction to local government adaptation.

**Go to Resource:** [http://www.ccap.org/docs/resources/674/Urban\\_Climate\\_Adaptation-FINAL\\_CCAP%206-9-09.pdf](http://www.ccap.org/docs/resources/674/Urban_Climate_Adaptation-FINAL_CCAP%206-9-09.pdf)

## 2. Guidebooks and Methodologies

The first stage in local government adaptation is to assess how climate change will likely affect the community and identify priorities for action. Climate change and its impacts vary from one location to another, and communities vary in their exposure and ability to cope. Adaptation guidebooks typically present a multi-step process that includes an assessment – in which communities identify potential local impacts, risks, vulnerabilities, and priorities – and a planning component – in which communities explore adaptation options and develop adaptation plans.

Some processes can be completed within a short time period, and require limited resources. Others can last two years or longer. While the following list represents most of the best-known adaptation guidebooks produced for local governments and/or communities, it has likely overlooked other worthwhile resources; readers are encouraged to explore these other resources.

There has been relatively little evaluation of the strengths and weaknesses of existing adaptation guidebooks, and of their suitability for use by larger or smaller communities. The survey below may be the only example of such an evaluation, and is included in this resources list only for those interested in such questions.

### International - A Survey of Climate Change Adaptation Planning

2007 - *Heintz Center*

This report is an introductory survey that compares a number of guidebooks and adaptation efforts.

**Go to Resource:** [www.heinzctr.org/publications/.../Adaptation\\_Report\\_October\\_10\\_2007.pdf](http://www.heinzctr.org/publications/.../Adaptation_Report_October_10_2007.pdf)

## a) Canada

### Arctic and North - Managing the Risks of Climate Change: A Guide for Arctic and Northern Communities 2011 - Centre for Indigenous Environmental Resources (CIER) website

This webpage describes and provides links to a two-volume adaptation planning guide. It explains how to use a risk management process as a simple way to determine the best solutions for dealing with issues caused by climate change. The North has unique characteristics that make it more vulnerable to changes in the climate, particularly warming trends. The guide is intended to be a tool to help local governments and other organizations make sensible and practical decisions in northern communities.

**Go to Resource:** <http://ccrm.cier.ca/>

### Alberta - Climate Change Adaptation Framework

2010 – Alberta Sustainable Resource Development

This guide is designed to help large organizations evaluate climate-related risks and vulnerabilities. The manual follows a straightforward process including: identifying the scope of the assessment and communicating expectations to all team members involved; conducting activities to identify organizational vulnerabilities; prioritizing risks; and, identifying a suite of potential adaptation options.

**Go to**

**Resource:** <http://www.srd.alberta.ca/MapsFormsPublications/Publications/ClimateChangeAdaptationFramework.aspx>

### British Columbia - Adapting to Climate Change: A Risk-Based Guide for Local Governments in British Columbia

2010 - Robert A. Black, James P. Bruce and I.D. Mark Egener

Using the Canadian national standard framework for risk management, this guide helps local and regional governments (including health officials, emergency managers and businesses) identify and manage the risks related to climate change and projected impacts. The guide provides an overview of past and future climate in BC, and outlines the steps in the risk assessment and management process.

**Go to Resource:** [http://adaptation.nrcan.gc.ca/projdb/pdf/212\\_e.pdf](http://adaptation.nrcan.gc.ca/projdb/pdf/212_e.pdf)

### Canada - Canadian Communities' Guidebook for Adaptation to Climate Change

2009 - L. Bizikova, T. Neale and I. Burton. Environment Canada & University of British Columbia

This guidebook is for local governments that are looking for “win-win” solutions that both reduce greenhouse gas emissions and manage risks related to climate change (e.g. more frequent heat waves, water shortages, intense storms and sea-level rise). It is recommended only for local governments already engaged in both greenhouse gas reduction and adaptation, and familiar with climate change assessment and adaptation planning.

**Go to Resource:** <http://www.forestry.ubc.ca/Default.aspx?alias=www.forestry.ubc.ca/aird>

### Canada - Changing Climate, Changing Community: Guide and Workbook for Municipal Climate Adaptation

2010 – ICLEI Canada

This toolkit includes a 68-page comprehensive manual that describes a six-stage adaptation process, and a companion volume that presents and explains 14 tools geared for adaptation planning. The tools include a planning workshop template, stakeholder identification worksheet, barriers document, and risk assessment scenario worksheet.

**Go to Resource:** <http://www.iclei.org/index.php?id=11710>

### Canada - Climate Change Planning Tools for First Nations Guidebooks

2006 - Centre for Indigenous Environmental Resources (CIER)

Focusing on climate change effects, capacity and resilience, these six tools were developed to guide a First Nation community through the adaptation process. Topics include: getting started, climate change impacts in communities, vulnerability, sustainability, identifying solutions, taking adaptive action and monitoring progress and change.

**Go to Resource:** <http://www.cier.ca/information-and-resources/publications-and-products.aspx?id=412>

### Canada - Climate Change Adaptations for Land Use Planners

2007 – J. Parks, Birch Hill GeoSolutions

This report describes the implications of climate change for land use, the tools that can be used to evaluate climate related risks, and the adaptation actions that can be used to manage these risks. It identifies tools that land use planners, engineers and scientists can use who provide essential input to community land use planning processes. Although the content is based on the needs of rural communities in the Atlantic provinces, many of the tools would also apply to cities and to other regions.

**Go to Resource:** [http://adaptation.nrcan.gc.ca/projdb/pdf/178b\\_e.pdf](http://adaptation.nrcan.gc.ca/projdb/pdf/178b_e.pdf)

### Canada - PIEVC Engineering Protocol for Climate Change Infrastructure Vulnerability Assessment

2009 - D. Lapp, Canadian Council of Professional Engineers

This resource describes the five-step Public Infrastructure Engineering Vulnerability Committee (PIEVC) protocol designed to help users assess the impact of climate change on infrastructure with a particular focus on buildings; roads (including culverts and bridges); storm water and wastewater systems; and water management and control infrastructure. Application of the protocol should aid decisions regarding infrastructure planning, design, maintenance and operation. The PIEVC protocol itself must be obtained directly from Engineers Canada.

**Go to Resource:** [http://www.wfeo.net/cee/CLIMATE\\_CASE\\_STUDIES/PIEVC\\_Engineering\\_Protocol\\_-\\_Version\\_9\\_-\\_April\\_2009.pdf](http://www.wfeo.net/cee/CLIMATE_CASE_STUDIES/PIEVC_Engineering_Protocol_-_Version_9_-_April_2009.pdf)

### Nova Scotia - Climate Change: Developer's Risk Management Guide

2007 - Halifax Regional Municipality

This resource was created for developers of Halifax's coastal, low-lying, urban/forest fringe, and rural areas and serves as a model for developers in other regions. The guide includes an overview of climate change, describes the predicted climate impacts on Halifax relevant to development projects, provides a step-by-step approach to assessing the risk, and provides a checklist that can be used in the planning and evaluating of development proposals.

**Go to Resource:** <http://ccap.org/docs/resources/394/DevelopersGuidetoRiskManagment.pdf>

### Nova Scotia - Halifax Climate SMART (Sustainable Mitigation and Adaptation Risk Toolkits)

2011 - Halifax Climate SMART website

The Sustainable Mitigation and Adaptation Risk Toolkit (SMART) includes tools that enable the Halifax Regional Municipality to manage and assess related risks; identify and quantify vulnerability; evaluate the costs and benefits of adaptation measures; assess environmental impacts; and communicate with stakeholders. While SMART was designed for Halifax, elements of the toolkit would be useful for other coastal communities.

**Go to Resource:** <http://www.halifax.ca/climate/solution1.html>

## **b) International**

### Australia – Climate Change Impacts and Risk Management: A Guide for Business and Government

2006 – Australia Greenhouse Office

This resource guides Australian businesses and governments in integrating climate change impacts into risk management and other strategic planning activities in Australian public and private sector organisations. It is directed to elected officials, general managers, and specialist risk managers. The guide is consistent with the Australian and New Zealand Standard for Risk Management, AS/NZS 4360:2004, and describes how use of the Standard can be extended to include the risks generated by climate change impacts.

**Go to Resource:** <http://www.climatechange.gov.au/community/~media/publications/local-govt/risk-management.ashx>

### Australia – Local Government Climate Change Adaptation Toolkit

2008 – ICLEI Oceania

This toolkit – designed for use with the risk management guide (above) – helps local governments conduct a risk or adaptive management process through which they can identify aspects of their existing internal decision-making processes that need to be enhanced in order to prepare for climate changes. The process requires significant time and commitment from participating councils. Councils can select those tools and exercises they wish to pursue as they work through the process. The toolkit and the risk management guide (above) are compatible with *Climate Change Adaptation Actions for Local Government* (see “best practices” section).

**Go to Resource:** <http://www.iclei.org/index.php?id=adaptation-toolkit>

### New Zealand - Climate Change Effects and Impacts Assessment: A Guidance Manual for Local Government in New Zealand – Second Edition

2008 - New Zealand Climate Change Office, Ministry for the Environment

This guide is designed to help local governments identify and quantify climate change impacts. It includes information about public consultation, financial responsibility and legal liability, and the relevance of climate change to local government functions and services.

**Go to Resource:** <http://www.mfe.govt.nz/publications/climate/climate-change-effect-impacts-assessments-may08/index.html>

### United Kingdom - Local Climate Impacts Profile: How to do a Local Climate Impacts Profile

2006 – United Kingdom Climate Impacts Programme (UKCIP)

This resource describes how local governments can focus on the current weather and its impacts as an entry point for climate change adaptation. Approximately half the local governments in the UK have completed an LCIP. The process takes about three months, and many local governments in the UK have been able to complete an LCIP with the help of a student (usually graduate level). The resource is available for free from UKCIP, but users of the site must register to obtain access the document.

**Go to Resource:** <http://www.ukcip.org.uk/tools/>

### United Kingdom - Adaptation Wizard

2011 - United Kingdom Climate Impacts Programme (UKCIP)

The *Adaptation Wizard* guides users through an interactive online five-stage adaptation planning process designed for local governments, and in particular helps users understand their current vulnerability to weather and climate. The Wizard was designed for use within the UK but can be used effectively by organizations outside the UK if they substitute their own climate change scenarios in Step 3. BC users can use information from the Plan2Adapt website (<http://www.plan2adapt.ca/>) developed for British Columbia. The Wizard is available for free, but users must register with UKCIP to obtain access to it.

**Go to Resource:** <http://www.ukcip.org.uk/tools/>

### United States - Ask the Climate Question - Adapting to Climate Change Impacts in Urban Regions

2009 - Center for Clean Air Policy (CCAP)

This resource describes the adaptation efforts of 10 cities participating in CCAP’s Urban Leaders Adaptation Initiative, and the lessons they learned about the adaptation process. Participating cities were: Chicago, King County (Washington), Los Angeles, Miami-Dade County (Florida), Milwaukee, Nassau County (New York), New York City, Phoenix, San Francisco and Toronto. The resource also serves as an introduction to local government adaptation.

**Go to Resource:** [http://www.ccap.org/docs/resources/674/Urban\\_Climate\\_Adaptation-FINAL\\_CCAP%206-9-09.pdf](http://www.ccap.org/docs/resources/674/Urban_Climate_Adaptation-FINAL_CCAP%206-9-09.pdf)

United States - Chicago Area Climate Change Quick Guide: Adapting to the Physical Impacts of Climate Change – For Municipalities and Other Organizations

2008 - J. Parzen (Editor)

The adaptation quick guide includes a detailed risk assessment framework and describes how Chicago used it to determine adaptation priorities and actions. It outlines lessons learned including the need for adaptation solutions that also meet mitigation objectives. Adaptation priorities for the city include heat events and heat island effects, severe weather, infrastructure function and natural ecosystem function.

**Go to**

**Resource:** [http://www.chicagoclimateaction.org/filebin/pdf/Chicago\\_Quick\\_Guide\\_to\\_Climate\\_Change\\_Preparation\\_June\\_2008.pdf](http://www.chicagoclimateaction.org/filebin/pdf/Chicago_Quick_Guide_to_Climate_Change_Preparation_June_2008.pdf)

Washington State - Preparing for Climate Change: A Guidebook for Local, Regional and State Governments

2007 – Climate Impacts Group, Centre for Science in the Earth System

This guidebook was created by the University of Washington and King County in partnership with *ICLEI - Local Governments for Sustainability*. The document contains a glossary of key terms and a detailed overview of climate change. The guide includes a comprehensive framework to guide communities in developing adaptation plans.

**Go to Resource:** <http://cses.washington.edu/cig/fpt/guidebook.shtml>



## SECTION B: Resources that Support Climate Change Assessment

### 3. Past and Future Climate Change and Its Impacts

Most adaptation processes require the application of information about past and potential future climate change during the assessment portion of the process. Information about past climate can help frame current climate-related vulnerabilities. Information about future climate can help local governments identify potential hazards and their exposure. Future climate information is available to local governments in BC in a relatively simple to understand form through the Plan2Adapt website (below), though other resources may provide more detailed information.

#### Canada - Juan-de-Fuca Storm Surge Forecast

*Annually October to March - Fisheries and Oceans Canada*

An operational ocean model is used to predict storm surge activity along the British Columbia coastline. The model provides forecasts of total sea level during extreme high water events associated with winter storms, seasonal factors and tidal state up to 48 hours in advance, thereby assisting coastal authorities to prepare for potential inundation in low lying areas.

**Go to Resource:** [http://www.env.gov.bc.ca/cas/adaptation/storm\\_surges.html](http://www.env.gov.bc.ca/cas/adaptation/storm_surges.html)

#### Canadian Climate Change Scenarios Network

*2010 - Canadian Climate Change Scenarios Network*

Supported by Environment Canada, the *Canadian Climate Change Scenarios Network* (CCCSN) provides access to data and information on climate change scenarios in your area and shares information on adaptation research. The resource includes an introduction to climate change scenarios, concepts, definitions and background, as well as other information and resources. Users can generate their own climate change scenarios, gather raw data, visualize climate models and generate local variables.

**Go to Resource:** <http://cccsn.ca/>

#### Climate Trends and Variations Bulletin

*2010 - Environment Canada*

Environment Canada provides bulletins on a quarterly basis that summarize historic climate data. The information is displayed in maps and charts and is compiled nationally and broken down by region. This resource provides a regularly updated overview of climate change trends in Canada.

**Go to Resource:** <http://www.ec.gc.ca/adsc-cmda/default.asp?lang=En&n=8C03D32A-1>

#### Hazards Website for British Columbia and the Yukon

The *Canadian Atmospheric Hazards Network* was developed by Environment Canada to help individuals, municipalities and provincial/territorial governments identify and assess their risks to atmospheric hazards for planning and decision-making activities, including the development of community and provincial emergency management plans. The site provides information on the types of atmospheric hazards common to each of the 5 Canadian regions and the climatology of these hazardous events. The hazards information is available through a series of maps and graphics with supplementary hazards datasets and documentation.

**Go to Resource:** [www.hazards.ca](http://www.hazards.ca)

#### Plan2Adapt Tool

*2010 - Pacific Climate Impacts Consortium (PCIC)*

This online tool allows users to generate information (maps, graphs and data tables) to better understand how climate will change in their area, and how the region will be affected. It provides future information for temperature and precipitation changes, shifts in growing degree days and changes in frost-free days for different regions in BC for the 2020s, 2050s and 2080s. This web-based tool was designed to be easy to use for local governments and other decision-makers.

**Go to Resource:** <http://www.plan2adapt.ca>

### Regional Analysis Tool

2011 – *Pacific Climate Change Impacts Consortium (PCIC)*

The Regional Analysis Tool generates maps, plots and data that describe projected future climate conditions for the Pacific and Yukon regions. It is similar to PCIC's Plan2Adapt tool (above) and uses the same data to generate outputs. With a more complex user interface and greater number of configurable options the *Regional Analysis Tool* is primarily designed to serve the needs of researchers. Other users are advised to start with Plan2Adapt.

**Go to Resource:** <http://pacificclimate.org/tools-and-data/regional-analysis-tool>

## **4. Synthesized Assessment Products**

This category includes written reports, brochures, and other products that synthesize existing information about climate change and its ecological, social, and economic impacts. Most synthesized products are technical and developed for a specialized audience, and so may not be directly useful to decision makers. To date few such products have been translated into plain language for direct use by local governments in BC; the Columbia Basin resource *Starting the Dialogue* listed below is an exception. The value of such plain language products has been identified and similar materials may become more widespread.

### **a) British Columbia**

#### Chapter 8: British Columbia

2007 - *Natural Resources Canada, Climate Change Impacts & Adaptation Division*

This section of the larger report, *From Impacts to Adaptation: Canada in a Changing Climate 2007* (see below), synthesizes scientific knowledge about climate change and its impacts in British Columbia. It considers different regions and sectors of the province, and the information, while high level, may help local governments understand local adaptation options.

**Go to Resource:** [http://www.adaptation.nrcan.gc.ca/assess/2007/pdf/ch8\\_e.pdf](http://www.adaptation.nrcan.gc.ca/assess/2007/pdf/ch8_e.pdf)

#### Climate Change Effects on Watershed Processes in British Columbia

2010 – *Robin Pike et al*

This is a chapter from the substantial compendium of forest hydrology and geomorphology in British Columbia, which documents the history, scientific discoveries, and field expertise gained in watershed management in British Columbia. The chapter consolidates current scientific knowledge and operational experience and is designed to inform the management of water resources in forested environments.

**Go to Resource:** <http://www.forrex.org/program/water/compendium.asp>

#### Climate Change, Impacts and Adaptation Scenarios: Climate Change and Forest and Range Management in British Columbia

2008 – *DL Spittlehouse, Research Brand, Ministry of Forests, Mines and Lands*

This report explores the impacts of climate change on forest and range resources in British Columbia. It describes impacts such as reduced snowpack, increased frequency of extreme events and changes in water evaporation. Changes in temperature and precipitation will result in changes to species distribution, an increase in forest fires, potential pest outbreaks and a need to change forestry practices.

**Go to Resource:** <http://www.for.gov.bc.ca/hfd/pubs/Docs/Tr/Tr045.htm>

#### Climate Change in the Canadian Columbia Basin: Starting the Dialogue

2007 – *Columbia Basin Trust*

This plain language summary of a more comprehensive technical report available on the website of the Pacific Climate Impacts Consortium (PCIC) describes past and potential future climate change and its impacts on water, resources, and communities in the Basin.

**Go to Resource:** [http://www.cbt.org/uploads/pdf/Climate\\_Change\\_in\\_the\\_Canadian\\_Columbia\\_Basin\\_-\\_Starting\\_the\\_Dialogue.pdf](http://www.cbt.org/uploads/pdf/Climate_Change_in_the_Canadian_Columbia_Basin_-_Starting_the_Dialogue.pdf)

Climate Overview 2007: Hydro-climatology and Future Climate Impacts in British Columbia  
2007 – Pacific Climate Impacts Consortium

The first half of this 152-page report presents an analysis of BC's historical climate trends and variability. The second part applies projections of future climate and identifies potential future hydrologic impacts, such as changes in soil moisture, growing-degree-days and the Mountain Pine Beetle infestation. PCIC has also published reports on past and future climate and impacts on hydrology in many sub-regions of British Columbia, including Prince George, the Cariboo-Chilcotin, Metro Vancouver, and the Columbia Basin.

**Go to Resource:** <http://www.pcic.uvic.ca/resources/publications>

Columbia Basin - Climate Change Science 101

2010 - Columbia Basin Trust, Climate Change Initiative

This video is produced by the Columbia Basin Trust to provide a general introduction to climate change science as it relates to the Columbia Basin. The five minute video outlines the basics of climate change and variability and different impacts that residents in southeast BC are facing. The video is easy to understand and useful for both practitioners and those striving to learn more about climate change. It includes an introduction to the concepts of climate change, variability and impacts.

**Go to Resource:** <http://www.youtube.com/watch?v=ECJtF7CfyCA>

Mitigating and Adapting to Climate Change Through Conservation of Nature

2008 – Land Trust Alliance

This report communicates the current health and state of natural systems in BC, and the potential impacts of climate change on these systems. It describes the important services that natural ecosystems provide, including flood protection, water filtration, and fisheries, and how a healthy ecosystems contributes to climate resiliency. It also recommends conservation strategies.

**Go to Resource:** [http://landtrustalliance.bc.ca/docs/LTA\\_ClimateChangePrint.pdf](http://landtrustalliance.bc.ca/docs/LTA_ClimateChangePrint.pdf)

Projected Sea Level Changes for British Columbia in the 21<sup>st</sup> Century

2008 – Brian D. Bornhold

Projected Sea Level Changes for British Columbia in the 21st Century summarizes the factors affecting sea levels along the BC coast including global sea level change and local factors such as vertical land movement. It also presents projections for the year 2100 of relative sea level rise for points along the BC coast. The local sea level rise scenarios are an update to global projections presented in the Intergovernmental Panel on Climate Change's 4<sup>th</sup> Assessment. This report is a summary of the technical report titled An Examination of the Factors Affecting Relative and Absolute Sea Level in Coastal British Columbia.

**Go to Resource:** <http://www.dfo-mpo.gc.ca/Library/335209.pdf>

## **b) North America**

Climate Liability: municipal responsibilities in a changing climate

2011 – Federation of Canadian Municipalities

Climate change and extreme weather events are placing stressors on municipal services, infrastructure and codes/standards. This 2011 webinar describes the legal implications of climate change adaptation and the potential liabilities for municipalities. Speakers are David MacLeod, Senior Environmental Specialist with the City of Toronto, and Travis Allan, Environmental Lawyer with Zizzo Allan Climate Law LLP.

**Go to Resource:** <http://gmf.fcm.ca/Webinars/Past-Webinar-Series/PCP/March-3-2011.asp>

From Impacts to Adaptation: Canada in a Changing Climate 2007

2007 - *Climate Change Impacts & Adaptation Division, Natural Resources Canada*

Published by Natural Resources Canada (NRCan), this report discusses current and future risks and opportunities due to climate change in Canada. The report gives a detailed overview of the concepts and science behind adaptation, and assesses regional the risks and opportunities associated with climate change for different regions in Canada in separate chapters, including British Columbia (link above).

**Go to Resource:** [http://www.adaptation.nrcan.gc.ca/assess/2007/index\\_e.php](http://www.adaptation.nrcan.gc.ca/assess/2007/index_e.php)

Chapter 14: North America

2007 - *Intergovernmental Panel on Climate Change (IPCC)*

This chapter from the much larger IPCC *Fourth Assessment Report* provides a continent-wide overview of the best available knowledge about climate change and its impacts. The Intergovernmental Panel on Climate Change (IPCC) was established by the United Nations and the World Meteorological Association, and is the leading international body for the assessment of climate change. It is a scientific body that reviews and assesses existing research to produce relevant information on climate change.

**Go to Resource:** [http://www.ipcc.ch/publications\\_and\\_data/ar4/wg2/en/ch14.html](http://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch14.html)

The Washington Climate Change Impacts Assessment: Evaluating Washington's Future in a Changing Climate

2009 - *Climate Impacts Group, University of Washington*

This 414-page assessment provides detailed information for Washington state, and includes information about the Canadian portion of the Columbia River basin. Topics covered include: hydrology and water resources; energy; agriculture; salmon; forests; coasts; urban storm water and infrastructure; and human health. A shorter, plain language summary is also available from CIG.

**Go to Resource:** <http://www.cses.washington.edu/db/pdf/wacciareport681.pdf>

## SECTION C: Resources that Support Adaptation Planning

### 5. Adaptation Best Practices

This section includes resources that identify adaptation options – usually for a specific sector. The predominance of resources produced in the United Kingdom is the result of significant investments in supporting local government decision-makers, builders, and developers. Such options can be considered adaptation “best practices”. As communities vary in their vision, values, risk tolerance, priorities, resources, and other factors, even those facing similar risks and opportunities may make different adaptation choices from the longer list of adaptation best practices.

#### Australia – Climate Change Adaptation Actions for Local Government

2009 – SMEC Australia

This report identifies adaptation actions that are applicable to Australia's climatic conditions, address projected climate impacts, and can be implemented by local governments. It describes actions in six areas: infrastructure and property services; provision of recreation facilities; health services; planning and development approvals; natural resource management; and water and sewerage services. It emphasizes actions that provide a net economic, social or environmental benefit no matter what level of climate change occurs. The report is designed for use with *Climate Change Impacts & Risk Management – A Guide for Business and Government* (2006) and the *Local Government Climate Change Adaptation Toolkit* (2008) – see section 2.

**Go to Resource:** [http://www.climatechange.gov.au/what-you-can-do/community/~media/publications/local-govt/localadaption\\_localgovernment.ashx](http://www.climatechange.gov.au/what-you-can-do/community/~media/publications/local-govt/localadaption_localgovernment.ashx)

#### United Kingdom - Adapting to Climate Change: A checklist for development

2005 - London Climate Change Partnership, South East Climate Change Partnership, & East of England Sustainable Development Round Table

This checklist was created for use by developers and builders in the United Kingdom but would be applicable in other regions facing similar climate change impacts. The checklist is based on the premise that buildings should be designed with the understanding that they will need to be resilient to climate change impacts over their lifetime. The guidance covers water re-use and efficiency, reducing flood risk, avoiding overheating and minimizing damage from land subsidence and heaving.

**Go to Resource:** <http://www.london.gov.uk/lccp/publications/development.jsp>

#### United Kingdom - Adapting to Climate Change: A case study companion to the checklist for development

2007 - South East Climate Change Partnership, Sustainable Development Roundtable and London Climate Change Partnership

The companion guide applies the Checklist for Development's guidance and provides case studies of developments or buildings that incorporate adaptation in their design and construction. This guide provides replicable cases of buildings and developments that incorporated adaptation measures to increase resiliency to the changing climate. The case studies address climate change impacts, such as urban heat island effect and flooding, and they illustrate techniques relevant to key climate change adaptations issues, such as siting, site layout, ventilation, drainage, water, outdoor spaces and connectivity.

**Go to Resource:** <http://www.london.gov.uk/lccp/publications/docs/adapting-climate-change-case-study-ver2.pdf>

### United Kingdom - Beating the heat: Keeping UK buildings cool in a warming climate

2005 – J.N. Hacker, S.E. Belcher, & R.K. Connell for UKCIP

This report, written for a United Kingdom audience, examines climate change impacts by region, building type, form and fabric, and looks at how designers will need to adjust their understanding of building performance to provide thermal comfort in the future, considering both traditional 'passive' and mechanical cooling measures. The report is based on a longer technical report published by the Chartered Institution of Building Services Engineers, *Climate Change and the Indoor Environment: Impacts and Adaptation*.

**Go to Resource:** [http://www.ukcip.org.uk/wordpress/wp-content/PDFs/Beating\\_heat.pdf](http://www.ukcip.org.uk/wordpress/wp-content/PDFs/Beating_heat.pdf)

### United Kingdom - Climate Change Adaptation by Design: A Guide for Sustainable Communities

2007 – R. Shaw, M. Colley, and R. Connell, Commission for Architecture and the Built Environment

This guide describes how location and the scale of development influence adaptation options. It includes: an analysis of policy and legislative drivers for adaptation action; a proposed framework for adaptation action at the local level; and guidance on how to create local adaptation strategies. Particularly relevant to BC would be the menu of adaptation options, at a regional, community, and building level, for managing high temperatures, increased flood risks, water resources and water quality, and ground conditions with climate change in mind.

**Go to Resource:** <http://www.preventionweb.net/english/professional/publications/v.php?id=7780>

### United Kingdom – Identifying Adaptation Options

No date – Climate Impacts Programme (CIP)

This report provides guidance on the identification and selection of adaptation options that can be used to respond to climate risks. It is designed to build on information provided in the UKCIP *Risk, Uncertainty and Decision-making* framework (2003) and in *Measuring Progress* (2005). Its main value to local governments in BC, however, is in its description and examples of the many types of adaptation options.

**Go to Resource:** [http://www.ukcip.org.uk/wordpress/wp-content/PDFs/ID\\_Adapt\\_options.pdf](http://www.ukcip.org.uk/wordpress/wp-content/PDFs/ID_Adapt_options.pdf)

### United Kingdom - Identifying Adaptation Options (AdOpt)

2011 - Climate Impacts Programme (CIP)

AdOpt is a web-based tool – based on the report above – that explores the characteristics of adaptation in the context of climate risk, and provides further information about adaptation and examples of adaptation strategies and options. It also presents a simple adaptation checklist that identifies key principles that are synonymous with good adaptation decisions. AdOpt is available for free, but users must register with UK CIP to obtain access.

**Go to Resource:** <http://www.ukcip.org.uk/tools/>

### United Kingdom - Infrastructure, Engineering and Climate Adaptation

2011 – The Royal Academy of Engineering

The report examines vulnerabilities to the effects of climate change within four UK infrastructure sectors (energy, transport, water, and communications), and the modifications that would be needed to increase resilience. It considers the infrastructure system as a whole and vulnerabilities which arise as a result of interdependencies between different sectors.

**Go to Resource:**

[http://www.raeng.org.uk/news/publications/list/reports/Engineering\\_the\\_future\\_2011.pdf](http://www.raeng.org.uk/news/publications/list/reports/Engineering_the_future_2011.pdf)

### United Kingdom - Nottingham Declaration

2007 – Energy Savings Trust

This section of a larger site for local governments in the United Kingdom describes adaptation actions in the context of the business areas of local governments, including: Building Management, Community, Corporate Functions, Economy and Regeneration, Education and Learning, Emergency Planning, Environment, Fire and Rescue, Health, Housing and Energy Services, Leisure and Culture, Planning and Building Control, Police, Social Care, Transport, and Waste and Recycling.

**Go to Resource:** <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Local-Services>

## 6. Evaluating and Selecting Adaptation Options

Climate change and its impacts vary from one location to another, and communities vary in their exposure and ability to cope. In addition, communities facing similar risks and opportunities may make different adaptation choices. There are currently no simple, practical tools available to help decision-makers evaluate the costs and benefits of adaptation options and select those most suitable, although the resource listed below demonstrates the complexity of the exercise. In many cases, decision-makers address the complexity of adaptation decisions by selecting “win-win” adaptation actions that increase resilience and convey other benefits, and “no regrets” actions that address current as well as future impacts. Tools designed to let users explore management options – such as the two water conservation tools listed below – can be used to explore win-win and no-regrets options.

### Climate Decisions Org

#### *Climate Decision Making Center*

The climate-decisions.org project aims to assist those who making decisions for forestry, fisheries, and biodiversity preservation in the Pacific Northwest, given the impacts of climate change. It is part of the UBC component of the Climate Decision Making Center at Carnegie Mellon University. This website helps guide wise decision making about climate change adaptation, with a focus on natural resource contexts. The site contains useful concepts, strategies, case studies, and research findings related to structured decision making and climate change adaptation.

**Go to Resource:** <http://www.climate-decisions.org/index.htm>

### Water Balance Model

#### *2010 – B.C. Intergovernmental Partnership*

The *Water Balance Model* is an on-line decision support and scenario modeling tool for promoting rainwater management and stream health protection through implementation of “green” development practices. It enables users to evaluate the effectiveness of source controls – such as absorbent landscaping, infiltration facilities, green roofs, and rainwater harvesting – in achieving performance targets for rainwater volume capture and runoff rate control under various combinations of land use, soil and climate conditions – including potential future climate conditions.

**Go to Resource:** <http://bc.waterbalance.ca/index.asp>

### Water Conservation Calculator

#### *2010 - Government of British Columbia*

The *Water Conservation Calculator* is a decision support tool designed primarily for water managers in small to medium-sized communities in British Columbia. A user who has compiled the community water system data can test a variety of water conservation strategies. The outcomes can be measured, and reports and charts generated, to show how water conservation measures save both money and water. This tool can help communities identify measures that can increase resilience to water shortages and fulfill the requirements of some provincial capital grant programs.

**Go to Resource:** <http://www.waterconservationcalculator.com/>

## 7. Monitoring and Measuring Adaptation Progress

The adaptation process involves implementing plans, monitoring results, and updating plans and decisions to reflect new information, priorities, and resources. Because different communities face different climate change impacts, have different priorities, and implement different solutions, there is no standard measure of adaptation success. While the evaluation of adaptation success is an area of great interest, few resources exist. This list includes only two. One was developed for local governments and is available without charge; the other must be purchased.



### Adapting to Climate Change: Guidance notes for NI188

2008 - *The Local and Regional Partnership Board, United Kingdom*

National Indicator 188 (NI 188) was one of 198 indicators introduced in 2008 as part of the UK Local Government Performance Framework. NI 188 was designed to help local authorities assess and address the risks and opportunities presented by a changing climate, and to embed the management of climate risks and opportunities across all levels of services, plans and assets. Use of the indicator is now on a voluntary basis only. These draft guidance notes describe the five levels of adaptation identified in NI 188 and were designed to help local governments use the performance indicator to evaluate progress.

**Go to Resource:** <http://www.lga.gov.uk/lga/aio/1382855>

### PACT

*Alexander Ballard Ltd, UK*

PACT is a fee-based resource that provides a quick way to assess how well an organisation is addressing climate change issues, and identifies actions that will improve an organization's capacity to address climate impacts and regulatory and other pressures that will accompany them. PACT identifies nine performance pathways needed to improve climate change performance: awareness, agency, leadership, agents of change, working together, learning, managing operations, programme scope and coherence, and expertise and evidence. For each pathway it identifies six levels of increasing capacity: core business focused stakeholder responsive, management efficiency, breakthrough projects, strategic resilience, and champion organization.

**Go to Resource:** <http://www.pact.co/home>

## **8. Communications and Outreach**

There are thousands of resources related to climate change communications and outreach. This resource list includes two identified as current and particularly relevant to the adaptation context.

### Local Climate Change Visioning Guidance Manual

2010 - *Collaboration for Advanced Landscape Planning (CALP)*

Local climate change visioning integrates climate science with local planning, using participatory processes and "virtual reality" techniques based on digital mapping and scientific data to accelerate community awareness, help to build a constituency for change, and support decision-making on climate change options. This guidance manual describes how visioning has informed adaptation in BC communities. It provides guidance on how others with access to suitable technical expertise can do the same. See [www.calp.forestry.ubc.ca/wp-content/uploads/2010/02/CALP-Visioning-Guidance-Manual-Version-1.1\\_EXEC\\_SUMMARY1.pdf](http://www.calp.forestry.ubc.ca/wp-content/uploads/2010/02/CALP-Visioning-Guidance-Manual-Version-1.1_EXEC_SUMMARY1.pdf) for an illustrated summary of the manual.

**Go to Resource:** [www.calp.forestry.ubc.ca/wp-content/uploads/2010/02/CALP-Visioning-Guidance-Manual-Version-1.1.pdf](http://www.calp.forestry.ubc.ca/wp-content/uploads/2010/02/CALP-Visioning-Guidance-Manual-Version-1.1.pdf)

### Learned Lessons on Key Considerations for Communicating Climate Risk

2010 - *weADAPT*

This webpage summarizes lessons learned from developing and implementing climate risk communication strategies. The specific techniques explored are: two-way dialogue, knowing the local context, understanding the local know-how on climate risk, engagement in the process, combining strategies to target different stakeholders, strategic use of space, and innovative ways of communicating. Although based on case studies in Africa and Asia, the content is applicable elsewhere.

**Go to**

**Resource:** [http://wikiadapt.org/index.php?title=Learned\\_lessons\\_on\\_key\\_considerations\\_for\\_communicating\\_climate\\_risk](http://wikiadapt.org/index.php?title=Learned_lessons_on_key_considerations_for_communicating_climate_risk)



The Psychology of Climate Change Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public

2009 - *Center for Research on Environmental Decisions, Columbia University.*

The table of contents includes: introduction; know your audience; get your audience's attention; translate scientific data into concrete experience; beware the overuse of emotional appeals; address scientific and climate uncertainties; tap into social identities and affiliations; encourage group participation; make behaviour change easier; and conclusions.

**Go to Resource:** <http://cred.columbia.edu/guide/>

## SECTION D: Local Government Adaptation Case Studies

### 9. British Columbia Case Studies

#### Atlin Area - Managing Climate Change Risks

2007 - *Northern Climate ExChange* - Yukon College

Atlin was the first community to participate in the *Northern Climate ExChange's* community-based and participatory climate change adaptation planning program. Three separate groups looked at climate change from three different perspectives: land-based traditional; local economic; and infrastructure and planning. Each group identified local climate impacts, determined the vulnerability of the community to these impacts and explored local capacity to deal with these changes. There is a summary of the process, as well as links to the documents.

**Go to Resource:** <http://www.taiga.net/nce/initiatives/workshops/atlin2007/index.html>

#### Columbia Basin Community Adaptation Case Studies

2011 - *Columbia Basin Trust*

The Columbia Basin Trust has helped five communities in the Columbia Basin incorporate adaptation into their local government planning and decision-making processes. The *Communities Adapting to Climate Change* website includes descriptions of the adaptation processes undergone by Kimberly, Elkford, Rossland, Castlegar, and Kaslo in collaboration with Regional District of Central Kootenay Area D, and copies of reports and plans produced by these communities.

**Go to Resource:** [http://www.cbt.org/Initiatives/Climate\\_Change/?Adapting\\_to\\_Climate\\_Change](http://www.cbt.org/Initiatives/Climate_Change/?Adapting_to_Climate_Change)

#### Delta - Corporation of Delta Case Study: Sensitivity of the Roberts Bank Tidal Flats to Accelerated Sea Level Rise and Intensified Storminess

*Canadian Institute of Planners*

Natural Resources Canada (NRCan) researchers worked with the community of Delta, the Tsawwassen First Nation and other stakeholders to investigate the potential impacts of rising average sea level and extreme sea levels on Roberts Bank, a tidal flat that forms a boundary for the communities of Delta and Tsawwassen. The findings of the study directly inform these communities of their potential risks and impacts arising from climate change.

**Go to Resource:** <http://www.cip-icu.ca/web/la/en/pa/fdd921fc64cb4439a096528bfd59e779/template.asp>

#### Fraser Basin - Adapting to Climate Change

2008 - R. Searle, *Natural Resources Canada*

This video provides stunning visuals of the Fraser Basin, and discusses how communities in the basin will have to adapt to climate change. Local mayors from communities discuss the impacts they have experienced in their towns and cities, and the changes they expect to see in the future. Academic experts provide their opinions on what communities need to do to start proactively considering adaptation. Flooding, forests, water supply and infrastructure standards are discussed in the video, with a focus on water supply in Kamloops.

**Go to Resource:** <http://ekoscommunications.com/node/682>

#### Graham Island - Case Study of Impacts of Sea Level Rise

2004 - *Canadian Institute of Planners*

Graham Island is the largest island in the Haida Gwaii archipelago in British Columbia. This case study highlights the vulnerability of community infrastructure, cultural sites, tourism and ecological areas to sea level rise. This island is one of the most vulnerable areas in Canada to sea level rise.

**Go to Resource:** <http://www.cip-icu.ca/web/la/en/pa/FDD921FC64CB4439A096528BFD59E779/template.asp>

### Kamloops - Wildfire Protection Plan

2010 - *Natural Resources Canada, Climate Change Impacts and Adaptation Division*

In response to wildfires in 2003, the City of Kamloops, British Columbia developed a *Wildfire Protection Plan* to address an increased fire risk due to a dry and changing climate.

**Go to Resource:** [http://adaptation.nrcan.gc.ca/mun/kamloops\\_e.php](http://adaptation.nrcan.gc.ca/mun/kamloops_e.php)

### Lower Mainland - Adapting to Climate Change

2008 - *R. Searle, Natural Resources Canada*

This video provides an overview of how climate change and its impacts are affecting the BC Lower Mainland and concentrates on how sea level, storm surges and freshet flooding can impact the City of Vancouver and Lower Mainland. Several academics offer background to the issue, and prominent civic leaders share their experiences related to climate change and their concerns about future impacts.

**Go to Resource:** <http://ekoscommunications.com/node/683>

### Metro Vancouver – Summary

2011 - *Pacific Climate Impacts Consortium (PCIC) Plan2Adapt*

This high level overview includes a link to the more comprehensive case study produced by Natural Resources Canada (below).

**Go to Resource:** [http://www.retooling.ca/Library/Case\\_Studies/Greater\\_Vancouver\\_Regional\\_District\\_-\\_PCIC\\_Case\\_Study.pdf](http://www.retooling.ca/Library/Case_Studies/Greater_Vancouver_Regional_District_-_PCIC_Case_Study.pdf)

### Metro Vancouver's Stormwater Management Program

2010 - *Natural Resources Canada, Climate Change Impacts and Adaptation Division*

Since 2002, Metro Vancouver has integrated adaptation planning into regional wastewater processes. The recent Integrated Liquid Waste and Resource Management Plan addresses the impacts of climate change and climatic cycles on local water resources. This case study is from the longer report, *Adapting to Climate Change: An Introduction for Canadian Municipalities*.

**Go to Resource:** [http://adaptation.nrcan.gc.ca/mun/vancouver\\_e.php](http://adaptation.nrcan.gc.ca/mun/vancouver_e.php)

### Okanagan Basin - Participatory Integrated Assessment of Water Management & Climate Change

2009 – *Environment Canada AIRD & University of BC*

Researchers from Environment Canada and the University of British Columbia worked with stakeholders in the Okanagan area to investigate climate change and impacts on water supply and water demand in the area. The final report provides an overview of the issues and outlines possible adaptation solutions that could be implemented. Both agricultural and domestic water use trends and projections are examined and there is an explanation of a decision support model to help identify appropriate solutions.

**Go to Resource:** [http://www.forestry.ubc.ca/Portals/97/docs/OKPIA\\_2004-06\\_FinalReport\\_HiRes.pdf](http://www.forestry.ubc.ca/Portals/97/docs/OKPIA_2004-06_FinalReport_HiRes.pdf)

### Saanich - Adaptation Plan

2010 – *District of Saanich*

The District of Saanich in British Columbia is developing a Climate Adaptation Plan to address priority climate change impacts in the area. Saanich completed a risk and vulnerability assessment and drafted an adaptation plan with climate scientists, community advisory committees, local government leaders and community stakeholders.

**Go to Resource:** <http://www.saanich.ca/living/climate/ccap.html>

### Vanderhoof - Summary

2011 – *Pacific Climate Impacts Consortium*

The Canadian Forest Service (CFS) developed a framework for assessing the vulnerability to climate change of forest-based communities and applied it to the community of Vanderhoof. The resulting report focused on assessing the potential impacts of climate change on forest resources and the subsequent impact on communities they support.

**Go to Resource:** [http://www.retooling.ca/Library/Case\\_Studies/Vanderhoof\\_BC\\_-\\_PCIC\\_Case\\_Study.pdf](http://www.retooling.ca/Library/Case_Studies/Vanderhoof_BC_-_PCIC_Case_Study.pdf)

## 10. Canadian Case Studies

### Calgary – Municipal Water Supply

2008 - *Clean Air Partnership & City of Toronto*

Calgary is one of the fastest growing cities in Canada and relies solely on water supply from the Elbow and Bow Rivers. The amount of water the city is currently licensed to withdraw places a clear upper limit on the population base it can support. Current climate change models predict that river discharge will drop due to decreased precipitation and decreased glacial coverage in the headwaters of the basin. As the city would likely have to share water shortages with other major users (industry, agriculture), this places a high degree of uncertainty on the upper limit of population that can be supported solely by the river system.

**Go to Resource:** <http://www.cip-icu.ca/web/la/en/pa/FDD921FC64CB4439A096528BFD59E779/template.asp>

### Fredericton - Climate Change Adaptation Strategy

2008 – *Adaptation Fredericton & Environment and Sustainable Research Centre*

This document was completed for *Adaptation Fredericton* and contains climate scenarios for the region, stakeholder input, presentations and recommendations to guide decision-making in Fredericton. Climate change risks and potential adaptation measures for the built environment, housing, municipal services, transportation, recreation and parks, and business and the economy are discussed.

**Go to Resource:** [www.resourcesnorth.org/downloads/Fredericton-report.pdf](http://www.resourcesnorth.org/downloads/Fredericton-report.pdf)

### Infrastructure Case Studies

*Public Infrastructure Engineering Vulnerability Committee (PIEVC)*

PIEVC has completed a number of case studies as part of a Canada-wide assessment related to climate change impacts on buildings, roads and related structures, stormwater and wastewater systems, and water resources.

**Go to Resource:** [http://pievc.ca/e/doc\\_list.cfm?dsid=3](http://pievc.ca/e/doc_list.cfm?dsid=3)

### Northern Community Adaptation Projects

2011 - *Northern Climate ExChange*

The Yukon-based Community Climate Change Adaptation Project (CCCAP) is undertaking adaptation pilots in three communities: Dawson City, Whitehorse (underway), and Mayo (to be released shortly).

**Go to Resource:** <http://www.taiga.net/nce/adaptation/projects.html>

### Salluit– Impacts of Degrading Permafrost

2004 – *Natural Resources Canada*

Salluit, located in northern Quebec, has a rapidly expanding population that requires new housing and municipal development. Being located in the bottom of a valley along a fjord, on ice rich soils, there is little space for new expansion. The area has been affected by rapid climate warming since 1995. Permafrost temperature has gone up by about 1.5 °C, from -6.5 °C to -5.0 °C, and the active layer depth has increased by about 150%. The increase in temperature has a huge impact on the bearing capacity of the soils that limit the spatial expansion of the village.

**Go to Resource:** <http://www.cip-icu.ca/web/la/en/pa/FDD921FC64CB4439A096528BFD59E779/template.asp>

### Toronto - Ahead of the Storm: Preparing Toronto for Climate Change

2008 - *City of Toronto*

This report provides an overview of climate change and what impacts are expected in Toronto. The website directs readers to documents that identify where and how Toronto needs to act, steps the city is already taking (such as a heat alert and flood warning system) and short-term actions needed to improve Toronto's ability to cope with climate change.

**Go to Resource:** <http://www.toronto.ca/teo/adaptation.htm>

### Toronto - Climate Change Adaptation in the City of Toronto: Lessons for Great Lakes Communities

2008 - Clean Air Partnership & City of Toronto

This report examines the effects of climate change on Toronto, and identifies stormwater management, erosion, water pollution and flooding as key vulnerabilities. It describes the steps needed for local governments to gain political support, adopt a clear process for planning, create a specific team, build resources internally and use external resources to tackle the adaptation challenge.

#### **Go to**

**Resource:** [http://www.cleanairpartnership.org/files/Penney\\_%20J\\_2008\\_Climate%20Change%20Adaptation%20in%20the%20City%20of%20Toronto.pdf](http://www.cleanairpartnership.org/files/Penney_%20J_2008_Climate%20Change%20Adaptation%20in%20the%20City%20of%20Toronto.pdf)

## **11. International Case Studies**

### International - Cities Preparing for Climate Change

2007 – Clean Air Partnership

This report describes lessons learned about adaptation based on the experience of six municipalities – London, New York, Boston, Halifax, Vancouver and Seattle. It also outlines an adaptation process for municipalities and provides examples of municipal adaptation policies and specific adaptation measures from the cities studied.

**Go to Resource:** [http://www.cleanairpartnership.org/pdf/cities\\_climate\\_change.pdf](http://www.cleanairpartnership.org/pdf/cities_climate_change.pdf)

### United Kingdom - Community Adaptation Case Studies

2010 - United Kingdom Climate Impacts Programme (UKCIP)

The UKCIP website includes a searchable database that includes local government adaptation case studies, primarily from within the UK.

**Go to Resource:** <http://www.ukcip.org.uk/case-studies/>

### United Kingdom – London Climate Change Adaptation Strategy

2011 - Greater London Authority

The *Climate Change Adaptation Strategy* of the City of London, England identifies risks, analyzes climate change impacts related to flood, drought and heat waves, and identifies actions to manage these impacts. This draft strategy has also been assessed for its potential impacts on sustainability (environmental, economic and social effects) through a sustainability appraisal.

**Go to Resource:** <http://www.london.gov.uk/climatechange/>

### United States - Promising Practices in Adaptation and Resilience: A Resource Guide for Local Leaders

2010 – Climate Leadership Academy, Institute for Sustainable Communities & Centre for Clean Air Policy

This resource guide synthesizes the best available information about adaptation policies, programs and practices deployed by experts and practitioners across the United States. It showcases a number of case studies that describe how local government practitioners have made progress on climate adaptation planning, including risk assessment, integration of climate concerns in planning, attracting and keeping commitment to adaptation, and cross-jurisdictional collaboration.

**Go to Resource:** [http://www.iscvt.org/how\\_weve\\_helped/adaptation\\_cla/](http://www.iscvt.org/how_weve_helped/adaptation_cla/)

### United States - Chicago Climate Action Adaptation Plan

2008 - City of Chicago, Illinois

Chicago's Adaptation Plan includes strategies to manage heat, promote urban cooling, protect air quality, stormwater management, heat and flooding, impacts on urban vegetation, vulnerable populations, and business. Chicago will monitor and report on progress in implementing the plans.

**Go to Resource:** <http://www.chicagoclimateaction.org/pages/adaptation/11.php>

### United States - Homer, Alaska - Climate Adaptation Progress Despite Uncertainties

2010 - ICLEI USA and Homer, Alaska

The Homer Global Warming Task Force, created in 2006, was commissioned to make recommendations on reducing greenhouse gas emissions and the impacts of climate change on the community's environment, economy, infrastructure and future development. Different adaptation strategies and priorities are identified.

**Go to Resource:** [http://www.icleiusa.org/action-center/learn-from-others/ICLEI\\_case%20study\\_Homer\\_adaptation.pdf](http://www.icleiusa.org/action-center/learn-from-others/ICLEI_case%20study_Homer_adaptation.pdf)

### United States - Keene, New Hampshire – Leading on Climate Preparedness

2010 - ICLEI USA and Keene, New Hampshire

Adaptation efforts in Keene, New Hampshire began in 2000 with the “Cities for Climate Protection Campaign” of ICLEI, *Local Governments for Sustainability*. Devastated by severe flooding, one of Keene's first steps was to structure a formal adaptation and resiliency planning process that identified climate change impacts, community vulnerabilities and opportunities, and established goals related to adaptation planning. Formal adaptation efforts in Keene began in 2007, and in 2010 the city integrated climate adaptation and mitigation into its *Community Vision and Comprehensive Plan*.

**Go to Resource:** [http://www.icleiusa.org/action-center/learn-from-others/ICLEI\\_case%20study\\_Keene\\_adaptation.pdf](http://www.icleiusa.org/action-center/learn-from-others/ICLEI_case%20study_Keene_adaptation.pdf)

### United States - King County, Washington - Climate Plan

2007 - King County, Washington

The King County climate plan is an often referred-to adaptation related plan. The document is a comprehensive investigation of how this Washington State County could reduce emissions and adapt to climate impacts. The document contains an overview of climate change and a discussion on the state of the science, as well as a section outlining climate change impacts in the Pacific Northwest. The document describes how public health, water supply and quantity, property and infrastructure, government services, economic prosperity and biodiversity will be affected by climate change. The plan discusses how climate change will be incorporated into future decision-making.

**Go to Resource:** <http://your.kingcounty.gov/exec/news/2007/pdf/ClimatePlan.pdf>

### United States - Olympia – Planning For Sea Level Rise

2010 – City of Olympia, Washington and Climate Adaptation Knowledge Exchange

Olympia is prone to flooding due to sea level rise and the city has developed strategies to reduce the vulnerability of its downtown. Short-term and long-term adaptation strategies to enhance resilience to sea-level rise were developed by assessing climate change impacts on the community through modeling.

**Go to Resource:** <http://www.cakex.org/case-studies/683>

### United States - Swinomish Climate Adaptation Action Plan, Swinomish Climate Change Initiative

2010 – Swinomish Tribal Community, Office of Planning and Community Development

Adaptation planning efforts of the Washington region Swinomish Tribal Community include an assessment of climate change impacts in their area, as well as the development of an adaptation plan. This focus is on planning for coastal and upland resources, physical health, as well as community infrastructure and services. The *Climate Adaptation Action Plan* highlights the context of the community, summarizes potential climate change impacts, identifies adaptation goals, and outlines elements of a climate change adaptation framework.

**Go to Resource:** [http://www.swinomish-nsn.gov/climate\\_change/project/reports.html](http://www.swinomish-nsn.gov/climate_change/project/reports.html)

## SECTION E: Resources that Build Adaptation Capacity

### 12. Community Adaptation Partners

This section identifies organizations that support local government adaptation in British Columbia. Some provide resources and information, while others translate and provide of science information and may work directly with local governments, supporting them in the climate change assessment and adaptation planning process.

#### Environment Canada - Adaptation and Impacts Research Division (AIRD)

AIRD researchers are distributed to universities across Canada, including the University of British Columbia. The group does research on many topics related to climate change, including climate change scenarios, hazards and climate impacts, and researchers work with local governments on a number of projects.

**Go to Resource:** <http://www.forestry.ubc.ca/Default.aspx?alias=www.forestry.ubc.ca/aird>

#### B.C. Ministry of Environment - Climate Action Secretariat

The Climate Action Secretariat (CAS) leads British Columbia's leadership on climate change, including development and delivery of the provincial Adaptation Strategy. CAS advises and supports a number of adaptation initiatives in BC, working with partners including the Pacific Climate Impacts Consortium (PCIC), the Fraser Basin Council, and the Columbia Basin Trust. The BC government supported the establishment of PICS and PCIC through an \$85 million endowment.

**Go to Resource:** <http://www.env.gov.bc.ca/cas/adaptation/index.html>

#### Canadian Institute of Planners

The Canadian Institute of Planners (CIP) is the federation that accredits, represents and communicates with planners across the country. CIP has issued a climate adaptation policy communicating the urgency of the issue and has developed an adaptation website that includes case studies. CIP also offers courses on climate change adaptation for professional planners.

**Go to Resource:** [www.cip-icu.ca/](http://www.cip-icu.ca/)

#### Centre for Indigenous Environmental Resources (CIER)

The Centre for Indigenous Environmental Resources (CIER) is a non-profit organization dedicated to sustainable First Nations communities and environmental protection. One of their four areas of focus is "taking action on climate change." This group provides information and resources to help First Nations understand climate change and its impacts and identify solutions, and also to inform other communities of the effects of climate change on First Nations. CIER will work with First Nations to identify project funding.

**Go to Resource:** <http://www.cier.ca/taking-action-on-climate-change/Default.aspx?id=56&linkidentifier=id&itemid=56>

#### Climate Impacts Group – University of Washington

Based at the University of Washington in Seattle, the Climate Impacts Group (CIG) is an interdisciplinary research group studying the impacts of natural climate variability and global climate change. CIG works towards ecosystem and community resilience through a range of projects focused on the Pacific Northwest and other areas of the western United States, and the Columbia Basin.

**Go to Resource:** <http://cses.washington.edu/cig/>

#### Clean Air Partnership - Adaptation Strategies

The Clean Air Partnership's mission is to transform cities into sustainable, vibrant, resilient communities, where the air is clean to breathe and greenhouse gas emissions are minimized. This non-profit organization, based in Toronto, also works across Canada to help local governments prepare for climate change and its impacts.

**Go to Resource:** [http://www.cleanairpartnership.org/adaptation\\_strategies](http://www.cleanairpartnership.org/adaptation_strategies)



### Columbia Basin Trust

The Columbia Basin Trust – through its *Communities Adapting to Climate Change Initiative* – works with communities in the Columbia Basin to help them incorporate adaptation into their local government planning and decision-making processes. CBT offers many educational tools, guides and other resources to help communities and individuals in learning about climate change impacts and adaptation and in implementing adaptation actions. Five communities have undergone climate change adaptation planning processes including: City of Kimberly, District of Elkford, City of Rossland, City of Castlegar, and Village of Kaslo in collaboration with Regional District of Central Kootenay Area D.

**Go to Resource:** [http://www.cbt.org/Initiatives/Climate\\_Change/?Adapting\\_to\\_Climate\\_Change](http://www.cbt.org/Initiatives/Climate_Change/?Adapting_to_Climate_Change)

### Fraser Basin Council

The Fraser Basin Council (FBC) acts as a facilitator, coordinator and catalyst for action to help British Columbia communities adapt to climate change and its impacts. FBC currently manages the BC Regional Adaptation Collaborative. Funded by Natural Resources Canada, and co-managed by the BC Ministry of Environment, this initiative involves many partner organizations. It considers adaptation in: water allocation and use; forest and watershed management; flood protection and floodplain management; and community adaptation.

**Go to Resource:** <http://www.fraserbasin.bc.ca>

### ICLEI Canada

ICLEI - Local Governments for Sustainability is an international association of local governments and local government organizations that are committed to sustainable development. They provide a variety of services, including technical consulting, training and information services intended to build capacity and support local government through chapters worldwide. ICLEI Canada is working with 14 communities across Canada to develop adaptation plans based on the new resource *Changing Climate, Changing Community* (see Section 2).

**Go to Resource:** <http://www.iclei.org/> and <http://www.iclei.org/index.php?id=8708>

### Natural Resources Canada - Climate Change Impacts and Adaptation Division (CCIAD)

CCIAD facilitates the sharing of knowledge and tools to integrate adaptation into policy, plans and projects. Since 1998, CCIAD has supported more than 300 adaptation and impacts research projects. This group currently delivers two main programs: Regional Adaptation Collaboratives (RAC) designed to advance adaptation decision-making across Canada, and a program focused on developing tools to support climate change adaptation decision-making. NRCan supported development of many of the Canadian tools included in this resource list.

**Go to Resource:** [http://adaptation.nrcan.gc.ca/101/index\\_e.php](http://adaptation.nrcan.gc.ca/101/index_e.php)

### Pacific Climate Impacts Consortium (PCIC)

PCIC, based at the University of Victoria, collaborates with decision-makers and other research institutions to produce information about past and future climate for education, policy and decision-making in the Pacific Northwest. PCIC is able to provide some off-the-shelf information free of charge, and also provides custom work on a non-profit, fee-for-service basis. The PCIC website includes links to climate and impacts information, reports, technical publications, peer-reviewed papers and other publications.

**Go to Resource:** <http://www.pacificclimate.org>

### Pacific Institute for Climate Solutions (PICS)

PICS, hosted and led by the University of Victoria, is a knowledge network that integrates multi-disciplinary approaches to climate change. PICS' mandate is to develop innovative climate change solutions, seek new opportunities for positive adaptation, and lead the way to a vibrant low-carbon economy. Its objectives include understanding the magnitude and patterns of climate change and its impacts; evaluating the physical, economic and social implications; assessing options and developing policy and business solutions. PICS is supported by an endowment from the Government of British Columbia.

**Go to Resource:** <http://www.pics.uvic.ca/>



#### Public Infrastructure Engineering Vulnerability Committee (PIEVC)

PIEVC, co-founded by Engineers Canada and Natural Resources Canada, assesses the vulnerability of public infrastructure in Canada to climate change impacts. A range of pilot studies, case studies, and assessments have been conducted.

**Go to Resource:** <http://w-circ.uvic.ca/english/index.php>

#### Simon Fraser University – Adaptation to Climate Change Team

Based at *Simon Fraser University in British Columbia*, the *Adaptation to Climate Change Team (ACT)* includes experts from a variety of disciplines and around the world with industry, community and government decision-makers to explore risks related to climate change impacts and to generate recommendations for sustainable adaptation. ACT collaborates with many stakeholders including practitioners, industry, government, communities, NGOs, First Nations and researchers.

**Go to Resource:** <http://www.sfu.ca/act/>

### **13. Adaptation Training Programs**

There are currently few adaptation programs available for local government staff and decision-makers; of the three listed here, only one is available to all interested, and that program has an enrollment charge. Other programs are under development and may become available in the next year or two.

#### Adapting Your Infrastructure To Climate Change.

*2011 - Canadian Standards Association & Federation of Canadian Municipalities.*

This course provides a roadmap of available tools and techniques that support vulnerability assessment, risk evaluation and response planning related to climate change impacts on infrastructure within a given region. It is designed for municipal staff, elected officials and professional service providers responsible for infrastructure planning and maintenance

**Go to Resource:** <http://shop.csa.ca/en/canada/infrastructure-solutions/adapting-your-infrastructure-to-climate-change/invnt/2703207wt/>

#### Canadian Institute of Planners

CIP has a 2-day climate change training module, which can be altered to a shorter length of time, and altered depending on the audience. The module is designed for professional planners.

**Go to Resource:** [www.planningforclimatechange.ca](http://www.planningforclimatechange.ca)

#### Climate Leadership Academy

The Climate Leadership Academy offers training and technical assistance to community based climate solutions. Its purpose is to build the capacity of communities to take smarter, swifter, more effective actions to increase energy efficiency, reduce climate pollution and dependency on fossil fuels, create green businesses and jobs, and strengthen their resilience to the local impacts of climate disruption.

**Go to Resource:** [http://www.iscvt.org/what\\_we\\_do/climate/article/cla.php](http://www.iscvt.org/what_we_do/climate/article/cla.php)

## 14. Resource Lists and Information Clearinghouses

This section includes other resource compilations, available on-line or through published reports. Some of these compilations include resources already identified on this current list; others include additional resources.

### AdaptNet Bulletins

*Nautilus Institute for Security and Sustainability*

AdaptNet is RMIT University Global Cities Research Institute's Climate Change Adaptation Program focused on urban climate change adaptation. It is produced in partnership with Nautilus Institute. This decentralized network offers information, analysis, and methodology to undertake urban climate change adaptive policy research and analysis. Its weekly bulletins are a source of up to date information.

**Go to Resource:** <http://www.nautilus.org/GC/mailling-lists/adaptnet>

### Adaptation 101

*Natural Resources Canada – Climate Change Impacts and Adaptation Directorate*

This website includes introductory information about: Impacts (physical/biological); Impacts (Extreme Weather); What is Adaptation; Adaptive Capacity in Canada; Adaptation initiatives in Canada; Moving Forward on Adaptation to Climate Change; and Resources. The CCIAD website also includes examples of climate change assessments, tools for adaptation, case studies and information about adaptation initiatives and events across Canada.

**Go to Resource:** <http://adaptation.nrcan.gc.ca/>

### Climate Adaptation

*ICLEI USA*

The Climate Resilient Communities website includes background information and free case studies and fact sheets, (as well as resources that are available only to members).

**Go to Resource:** [http://www.icleiusa.org/programs/climate/Climate\\_Adaptation/adaptation](http://www.icleiusa.org/programs/climate/Climate_Adaptation/adaptation)

### Climate Adaptation Knowledge Network (CAKE)

*EcoAdapt & Island Press*

CAKE builds and shares knowledge to assist people and organizations in Canada to adapt to climate change impacts. The organization shares information, manages an online community, and facilitates a community of practitioners who share knowledge and experiences and identify tools.

**Go to Resource:** <http://www.cakex.org>

### Coastal Climate Adaption

*National Oceanic and Atmospheric Administration*

This site includes a wide range of resources on climate change impacts and adaptation, and includes adaptation plans, action plans, case studies, strategies, guidebooks, outreach material, risk and vulnerability assessments, stakeholder engagement guides, and training and workshop materials. While much of the content is designed for state-level coastal managers, content dealing with land use, coastal infrastructure, and stormwater runoff may be of value to local governments.

**Go to Resource:** <http://coastalmanagement.noaa.gov/climate/adaptation.html>

### Community Adaptation Resource Kit

*2008 - Columbia Basin Trust*

This website, produced as part of the Communities Adapting to Climate Change program, includes links to selected resources used in the Columbia Basin and recommended to communities there.

**Go to Resource:** <http://cbtadaptation.squarespace.com/>

### Changing Climate, Changing Communities: Information Annexes and Materials

2010 - ICLEI Canada

This extensive resource list complements the ICLEI Canada *Changing Climate, Changing Communities* guidebook and workbook (see Section 2). It includes resources under the following headings: Adaptation in Action; General Adaptation Information; Municipal Adaptation; Policy; Risk Based Approaches to Adaptation; Scientific Assessments; Social Implications of Climate Change.

#### **Go to**

**Resource:** [http://www.iclei.org/fileadmin/user\\_upload/documents/Canada/Changing\\_Climate/Info\\_Annexes\\_Merged.pdf](http://www.iclei.org/fileadmin/user_upload/documents/Canada/Changing_Climate/Info_Annexes_Merged.pdf)

### Municipal Resources for Adapting to Climate Change

2009 - Federation of Canadian Municipalities

This report provides an introduction to municipal adaptation, examples of adaptation, and additional resource lists.

**Go to Resource:** [http://fmv.fcm.ca/files/Capacity\\_Building\\_-\\_PCP/PCP\\_Resources/Mun-Re-\\_Adapting-Climate-Change-e.pdf](http://fmv.fcm.ca/files/Capacity_Building_-_PCP/PCP_Resources/Mun-Re-_Adapting-Climate-Change-e.pdf)

### Northern Climate ExChange

The *Northern Climate ExChange* provides independent information, develop shared understanding and promote action on climate change for Northern Canada. The website includes a section on impacts and adaptation, featuring northern communities, case studies, resources and assessments.

**Go to Resource:** <http://www.taiga.net/nce/adaptation/index.html>

### Promising Practices in Adaptation and Resilience: A Resource Guide for Local Leaders

2010 - Climate Leadership Academy, Institute for Sustainable Communities & Center for Clean Air Policy

This guide serves as a resource for governments undertaking adaptation initiatives highlighting case studies from around the world, illustrating models for adaptation planning, offering insight on how to secure commitment on climate adaptation, and how to champion cross-jurisdictional collaboration. The guide also refers to general adaptation resources, planning guidelines and tools, risk assessment guidelines and strategies in a number of focus areas.

**Go to Resource:** [http://www.iscvt.org/how\\_weve\\_helped/adaptation\\_cla/](http://www.iscvt.org/how_weve_helped/adaptation_cla/)

### ReTooling for Climate Change

Fraser Basin Council

This website is designed as a first stop for elected officials and staff of local governments, First Nations, and everyone else in British Columbia interested in learning about climate change adaptation. It includes information on climate change, local impacts, and adaptation planning from BC, Canada, and around the world.

**Go to Resource:** <http://www.retooling.ca/>