



Results from the National Municipal Adaptation Survey

Since the Intergovernmental Panel on Climate Change (IPCC) issued its consensus reports on climate change, the global science and policy discussion has come to include a stronger recognition that we must now also plan for impacts.

Across Canada the effects of climate change will differ greatly by region and community.

Adaptation must include local efforts. As the IPCC notes, the impacts of change on infrastructure, communities, industry and economies will be substantial and global.

Local planning must be at the forefront of helping to decide on the best adaptation and resiliency strategies.

Gradual change and sudden events are especially troubling for municipal governments. Few are prepared to deal with inconceivable consequence, in part because they have expected, and indeed hoped, that senior governments are preparing for such problems, but this may not be happening.

Climate change will stress local resources, impose new challenges on local governments, and will require innovation, flexibility and a new vision of planning and growth.

Adaptation is the actions that help reduce the negative impacts of climate change, or even take advantage of potential new opportunities.

Adaptation measures can increase the resilience of communities. Resiliency means supporting governance and infrastructure that are strategic and adaptive to environmental change, flexible in application, durable in change contexts, and responsive to regional economic social and environmental challenges.

There is an urgent need for new planning and infrastructure approaches that can respond to the reality of climate change.

Many communities are beginning to understand that planning for the 100-year event may no longer be enough—instead local systems have to adapt to the possibility of 20 or even 5-year severe weather events, and anticipate interactions between existing planning and land use practices and future impacts. The severe events that at one time were infrequent may become our new normal.

Environmental change is certain; we are only unsure about what it will look like. Adaptation planning requires new information, innovation and investment to protect Canadian communities.

The National Municipal Adaptation Project (NMAP) is a university-based research group that works to assess the state of planning for adaptation and resiliency in Canadian local governments, develop case studies, and generate applied knowledge that can help advance adaptation planning.

NMAP is helping to fill a knowledge gap by completing a survey of Canadian municipal governments that provides a broad image of the state of municipal adaptation planning in Canada. This basic information is an important part of identifying local government needs and policy opportunities.

This report provides a summary of survey results for BC. For more results please visit the NMAP website at localadaptation.ca where you will find other provincial and regional reports.

Un sommaire de ce rapport est disponible en français.

Response Rates

Table 1. Responses by Province	
Province	Number of responses (% Rounded)
British Columbia	69 (14)
Yukon	3 (0.1)
Alberta	54 (11)
Northwest Territories	3 (0.1)
Nunavut	2 (0.04)
Saskatchewan	55 (11)
Manitoba	40 (8)
Ontario	104 (22)
Quebec	98 (21)
New Brunswick	23 (5)
Nova Scotia	9 (2)
Prince Edward Island	7 (1.5)
Newfoundland and Labrador	14 (3)
All of Canada	481

Table 2. British Columbia responses by community size	
Population	Responses (% of 69)
Less than 5000	17 (24.6)
5000+ to 10 000	17 (24.6)
10 000+ to 50 000	20 (29)
50 000+ to 100 000	6 (8.7)
100 000+ to 500 000	7 (10.1)
500 000+ to 1 million	2 (2.9)
1 million+	0

The Survey Approach

The NMAP survey contacted each local government in Canada.

Our national mailing list of 3566 local governments was developed from the public information available from provincial governments. In 2012 we sent participation requests to 198 local governments in BC.

From across Canada we received 481 responses (a 14% response rate, 95% confidence level). Over half of respondents were small communities. Small towns account for well over half of local governments in Canada. Each of Canada's large cities participated, and there is a good overall representation from midsize cities and towns.

Ontario, Quebec and British Columbia provided the most responses. From BC there were 69 responses, a 35% response rate for that province and the third largest number of responses nationally.

Participation requests were sent to a mayor's office, except in those instances where we were able to identify a local government office or employee that was dealing with climate change issues, adaptation planning, or related environmental or infrastructure planning. In those cases the email request was sent to that office or individual.

The survey was provided in English and French. Three reminder emails were sent, one from NMAP and 2 from the Federation of Canadian Municipalities.

A website was used to collect responses to the survey. A digital survey form was also available and could be returned by email or printed and sent by post.

All respondents were able to respond to the first six questions. In question 6, if a respondent indicated that their local government did not have an adaptation plan or strategy in place and was not considering adaptation planning at this time then the survey ended. Only those engaged in adaptation planning, even if such action was formative, were asked the questions that followed.

Weather experiences and expectations

Table 3. Has your community experienced any of the following weather or weather-related events within the last 10 years?

<i>56 answered this question. Questions are edited here for space. Respondents could choose more than one.</i>	Number of responses (% of 69)
Flood requiring significant or uncommon protection measures or causing significant damage to public and/or private property	28 (40.6)
Significant or uncommon storm-water discharges	16 (23.2)
High rainfall causing damages	30 (42.5)
High snowfall causing damages or entailing unusually high snow removal costs	26 (37.7)
Drought requiring significant or uncommon water restrictions	13 (18.8)
Forest fire that resulted in evacuations or an evacuation alert	17 (24.6)
High temperatures for a prolonged period of time, with temperatures well above the annual normal	10 (14.5)
Severe cold periods, for a prolonged period of time, with temperatures well below the annual normal	4 (5.8)
Unusual changes in local flora and fauna	7 (10.1)
Other events	11 (15.9)

Table 4. With respect to climate change, are there specific weather events that your local government expects will become more problematic in your community over the next 10 years?

<i>54 answered this question. Questions are edited here for space. Respondents could choose more than one.</i>	Number of responses (% of 69)
Drought	24 (34.8)
Higher than average rain or snowfall	30 (43.5)
Forest fires	32 (46.4)
High loss of vegetation (for example loss of trees)	10 (14.5)
Biodiversity change (changes to composition of vegetation and/or fauna)	17 (24.6)
Flooding	29 (42)
Other	9 (13)

The state of adaptation planning

Knowledge areas supported by the survey

Table 5. Where is climate change adaptation being discussed in your community?	
64 answered this question. Questions are edited here for space. Respondents could choose more than one.	Number of responses (% of 69)
City/town council	26 (37.7)
By local government staff	48 (69.6)
Community organisations	27 (39.1)
Business organisations	6 (8.7)
By community leaders	14 (20.3)
There is no notable community discussion about climate change adaption	14 (20.3)
Other	11 (15.9)

Weather events. What are the experiences to date with severe weather?

Planning activities. What are local governments doing and how are they thinking about adaptation?

Program support. What programs have been used or developed to augment adaptation planning and what types of programs might be needed in the future?

Data and information needs. What types of information do municipal governments now use and need in the future to support adaptation planning?

What are the funding needs of municipalities and how might the federal and provincial governments develop programs to support these?

Table 6. Which of the statements below best describes your local government's situation?	
64 answered this question. Categories are edited here for space. Respondents could choose only one.	Number of responses (% of 69)
We have an adaption plan/strategy in place.	6 (8.7)
We are now in the process of developing an adaptation plan/strategy.	9 (13)
We do not have an individual adaptation plan/strategy, but we have incorporated adaptation into an existing plan or plans.	7 (10.1)
We are now in the process of incorporating adaptation into an existing plan.	4 (5.8)
We are beginning to discuss adaptation, but are not at the stage of developing a plan or strategy, or incorporating adaptation into an existing plan.	15 (21.7)
We do not have an adaptation plan/strategy and are not considering adaptation planning at this time.*	17 (24.6)
Other	6 (8.7)

*The survey ended for respondents who chose this option or if they did not respond to the question; 47 respondents went on to the following questions.

Local resources and responsibility*

Table 7. Has your local government assigned a staff position(s) to adaptation planning?

<i>25 answered this question. Only one option could be chosen. Categories are edited here for space.</i>	Number of responses (% of 69)(% of 47)**
One individual, adaptation planning accounts for more than half of their time.	1 (1.5)(2.1)
One individual, adaptation planning accounts for less than half of their time.	7 (10.1)(14.9)
Two or more individuals work on adaptation planning; it accounts for more than half of their work time.	2 (2.9)(4.3)
Adaptation planning is not the responsibility of any one person or department, but it is shared amongst departments and staff. Overall it accounts for less half of their work time.	7 (10.1)(14.9)
We have an office that is dedicated to adaptation planning; this office has a staff of more than 2 people who work full time on adaptation planning.	0
There is no staff member responsible; adaptation planning is done on-an-as-needed basis by an external consultant(s).	8 (11.6)(17)
Other	7 (10.1)(14.9)

Table 8. Which department in your local government is primarily responsible for adaptation planning?

<i>19 answered this question. Respondents could only choose one.</i>	Number of responses (% of 69)(% of 47)
Planning	13 (18.8)(27.7)
Environment	1 (1.5)(2.1)
Engineering	2 (2.9)(4.3)
Transportation	0
Fire and public safety	2 (2.9)(4.3)
Recreation/parks	0
Disaster management	1 (1.5)(2.1)
Other	12 (17.4)(25.5)

*For Questions 7 to 17 a response was not required in order to proceed. If the respondent did not consider the question or categories relevant to their context and if they did not choose to enter information in the 'other' category, then they could leave the question blank and proceed to the next one. **Two percentages are provided for Tables 7 to 17. The first is the percentage of all respondents (69) and the second is the percentage of those communities engaged in some form of adaptation planning (47).

Adaptation activities

Table 9. What does adaptation planning in your local government include?

25 answered this question. Respondents could choose more than one.	Number of responses (% of 69)(% of 47)
A campaign to provide public information and improve public knowledge about adaptation	7 (10.1)(14.9)
Community engagement planning processes	9 (13)(19.2)
Seeking new internal revenue sources for adaptation	5 (1.5)(10.6)
Seeking new external revenue sources for adaptation	8 (11.6)(17)
Planning for new public infrastructure	9 (13)(19.2)
Improving existing public infrastructure	14 (20.3)(29.8)
Land use zoning changes	16 (23.2)(34)
Bylaws aimed at changing public behaviour (for example, water use restrictions)	5 (1.5)(10.6)
Risk management/risk assessment	16 (23.2)(34)
Examining insurance costs and other potential liabilities	6 (8.7)(12.8)
Other	7 (10.1)(14.9)

More than a quarter of survey communities in BC had experienced one or more severe event such as flooding, storm-water damage, high rainfall or high snowfall event causing damages, or a forest fire emergency.

About one quarter of communities in this region have *no adaptation plan* and are not considering one.

For those communities that are engaged in an adaptation discussion, three quarters indicated that *adaptation leadership comes from local government staff*.

Infrastructure improvements, land use zoning and risk management and assessment are *key adaptation planning activities* in BC.

Table 10. With respect to infrastructure, has your local government taken any actions to ensure that any of the systems/services noted below are able to cope with more frequent extreme weather events?

<i>35 answered this question. Categories are edited here for space. Respondents could choose more than one.</i>	Number of responses (% of 69)(% of 47)
Electrical services	4 (5.8)(8.5)
Freshwater works	8 (11.6)(17)
Public housing	0
Services for the elderly (including housing designated for the elderly)	2 (2.9)(4.3)
Wastewater works	8 (11.6)(17)
Storm water systems	21 (30.4)(44.7)
Solid waste management	10 (14.5)(21.3)
Public transit	2 (2.9)(4.3)
Roads	12 (17.4)(25.5)
Health services	5 (1.5)(10.6)
Police services	4 (5.8)(8.5)
Fire protection	14 (20.3)(29.8)
Other emergency services/management	18 (26.1)(38.3)
Parks and recreation	7 (10.1)(14.9)
Urban forestry	8 (11.6)(17)
Other	12 (17.4)(25.5)

Storm water systems, fire protection and other emergency services rank high as infrastructure areas that BC communities are thinking about when it comes to extreme weather events. But other important and vulnerable services areas, such as electrical infrastructure, housing and transportation, will need more attention.

Planning support

Table 11. Has your local government accessed services from any of the following to help in adaptation planning?

<i>33 answered this question. Respondents could choose more than one.</i>	Number of responses (% of 69)(% of 47)
Engineering consultants	21 (30.4)(44.7)
Planning consultants	15 (21.7)(31.9)
Economic consultants	0
Canadian Institute of Planners or its provincial affiliates	1 (1.5)(2.1)
Your provincial municipal association	5 (1.5)(10.6)
Other non-government organisation such as environmental or city advocacy organisations(s)	12 (17.4)(25.5)
University researchers	11 (15.9)(23.4)
Other	6 (8.7)(12.8)

Funding support

Table 12. In the last 5 years has your local government received external funding for adaptation related physical infrastructure from any of sources noted below?

<i>22 answered this question. More than one option could be chosen. Categories are edited for presentation here.</i>	Number of responses (% of 69)(% of 47)
The provincial government	14 (20.3)(29.8)
Federal stimulus funding (Canada's Economic Action Plan)	5 (1.5)(10.6)
Federal Excise Gasoline Tax Refund Program	5 (1.5)(10.6)
Other federal sources	3 (4.3)(6.4)
Federation of Canadian Municipalities Green Municipal fund	2 (2.9)(4.3)
Private sector	1 (1.5)(2.1)
Other	2 (2.9)(4.3)

Table 13. In the last 5 years has your local government received external funding for adaptation related research or planning from any of sources noted below?

<i>12 answered this question. Respondents could choose more than one.</i>	Number of responses (% of 69)(% of 47)
The provincial government	8 (11.6)(17)
The federal government	5 (1.5)(10.6)
Federation of Canadian Municipalities Green Municipal Fund	1 (1.5)(2.1)
Private sector contributions	2 (2.9)(4.3)
Other	6 (8.7)(12.8)

Local and provincial funding are key sources for adaptation planning activities.

Table 14. What funding sources for adaptation planning actions are presently being used by your local government?

<i>24 answered this question. Respondents could choose more than one.</i>	Number of responses (% of 69)(% of 47)
Local government funds	20 (29)(42.6)
Provincial transfers	6 (8.7)(12.8)
Federal stimulus funding (Canada's Economic Action Plan)	4 (5.8)(7.7)
Other federal sources	1 (1.5)(2.1)
Federation of Canadian Municipalities Green Municipal Fund	2 (2.9)(4.3)
Private sector contributions	2 (2.9)(4.3)
Other	1 (1.5)(2.1)

Information needs

Table 15. What types of information has your local government sought out to help in adaptation planning?

<i>31 answered this question. Respondents could choose more than one.</i>	Number of responses (% of 69)(% of 47)
Predictive data that indicates the types of change we are most likely to face (such as changes to rainfall, snowfall, temperatures or water levels)	25 (36.2)(53.2)
Examples of adaptation planning in other Canadian local governments	17 (24.6)(36.2)
Examples of adaptation planning in local governments outside Canada	10 (14.5)(21.3)
Technology and design alternatives for infrastructure	13 (18.8)(27.7)
Information about funding for infrastructure	7 (10.1)(14.9)
Scientific academic research	13 (18.8)(27.7)
Social and/or economic academic research	7 (10.1)(14.9)
Other	3 (4.3)(6.4)

Table 16. Has your local government consulted any of the resources noted below?

<i>23 answered this question. Respondents could choose more than one.</i>	Number of responses (% of 69)(% of 47)
Federation of Canadian Municipalities: Partners for Climate Protection information and case examples (a website)	17 (24.6)(36)
ICLEI and Natural Resources Canada: Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation (an online publication)	12 (17.4)(25.5)
ICLEI: Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments (an online publication)	10 (14.5)(21.3)
ICLEI: Local Government Climate Change Adaptation Toolkit (an online publication)	9 (13)(19.1)
Natural Resources Canada: Case studies and adaptation planning examples (a website)	8 (11.6)(17)
Natural Resources Canada: Adapting to Climate Change: An Introduction for Canadian Municipalities (a booklet)	9 (13)(19.1)
Other guidebooks or templates	10 (14.5)(21.3)

Information sources

Table 17. Has your local government sought adaptation information from any of the seven sources noted below?

<i>27 answered this question. Respondents could choose more than one.</i>	Number of responses (% of 69)(% of 47)
Environment Canada	21 (30.4)(44.7)
Natural Resources Canada	8 (11.6)(17)
A provincial government	17 (24.6)(36)
A university research group	13 (18.8)(27.7)
Environmental group	5 (1.5)(10.6)
Business/industry group	4 (5.8)(8.5)
Private foundation	1 (1.5)(2.1)

Environment Canada and provincial agencies are key sources of information about what climate change will mean for communities. In BC, university researchers are also seen as important knowledge resources for information about planning for adaptation.

National Overview

- We received 481 responses from local governments across Canada.
- The highest numbers of responses were from Ontario, Quebec and British Columbia.
- Over half of the communities that participated in the survey have a population of less than 5000 people.
- All of Canada's major cities participated.
- 75% of the Canadian communities participating in the NMAP survey have experienced severe weather events in the last 10 years.
- The most commonly cited severe weather events experienced by communities in the last decade were related to water (floods, drought, high snowfall and high rainfall).
- 10% had experienced a forest fire emergency.
- Adaptation planning is variable in Canada. The extent to which communities are engaged in adaptation thinking may reflect the strength of provincial policies.
- Provincial and local governments are emerging as the main sources of funding support for adaptation actions, whilst the federal government mostly serves an information function.
- Support and leadership from planners and other municipal staff and local politicians can be important factors in advancing adaptation planning.
- Nationally, Environment Canada was the federal agency most commonly mentioned as a source of adaptation information.
- Despite experience with severe weather, too many Canadian communities are not planning for adaptation. But many are either beginning to discuss adaptation, are developing plans or have plans in place.
- Smaller communities seem less likely to be planning for adaptation; but they may be the most vulnerable.

Contact Us

You may contact the project leader by email at Canada.adaptation@ubc.ca.

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