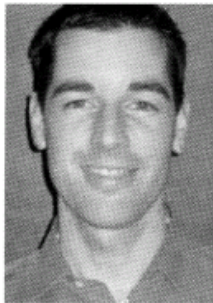


CANADA'S CLIMATE IS CHANGING

David Noble and Bano Mehdi



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This is the first in a series of approximately eight articles on climate change impacts and adaptation that will be published in Municipal World over the next year. The articles will cover observed and projected climate changes, the changing risk environment, strategies for understanding and managing climate change risks and opportunities, tools and other resources to support municipalities' efforts to adapt, and the political realities that influence the response to climate change. The aim is to raise readers' awareness and understanding of critical climate change issues and strategies for adapting to climate change.

Over the last century, the mean global temperature increased by about 0.6°C. Canada's climate warmed by about 1°C over the same period. Over the past 100 years, the climate was warmer than any time over the last 1000 years, and the 10 warmest years on record have occurred since 1991. New research reported in January of this year suggested that 2005 was the warmest year yet!

The climate will almost certainly continue to warm. Canada's climate is projected to increase by 2° to 4°C by the 2050s. In the Arctic, temperatures could rise by as much as 8° to 10°C. These are not small changes – by comparison, the earth's mean temperature was only 4° to 5°C cooler during the last ice age.

Some of us will welcome warmer temperatures throughout much of the

year, lower heating bills, longer growing seasons for crop production, and perhaps more nice days for outdoor recreation. These are some of the potential benefits from a warmer climate. However, for all the upsides, there are likely many more and much greater downsides.

Climate change is likely to result in more extreme weather events such as major storms, intense rainfall events, floods, heat waves and droughts. It is also likely to result in less winter snowfall (especially at higher altitudes and in the north), increased smog, greater insect/pest problems, and other ecosystem changes that will affect our neighbourhoods and communities.

These changes may impact community life in familiar ways. For example, storms can damage buildings and other infrastructure, disrupt transportation and communication networks, impact local economies and human health; droughts can stress municipal water supplies; and insect pests can wreak havoc on urban forests. The

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potential outcomes: infrastructure challenges persist, insurance premiums rise, businesses fail, tree cover retreats, residents suffer, sustainability is threatened, and quality of life declines.

Implications for Municipalities

Municipalities have responsibilities with respect to many of these issues, just as they have had for many years. They have managed these responsibilities, in part, by adapting to their local climates. For example, they have:

- ▶ developed policies and plans that reflect a range of historical weather conditions (eg. Ontario municipalities recently completed a hazard identification and risk assessment, which included an assessment of weather-related hazards and risks based on recent historical conditions; these assessments will form the basis for emergency preparedness plans that must be developed by 2008);
- ▶ built infrastructure according to certain design criteria (eg. drainage systems are designed to a design-

ated storm, such as a 1-in-5 year storm);

- ▶ allocated resources commensurate with needs (eg. most municipalities have an annual budget for snow removal and related expenses; the City of Victoria, though does not).

However, the climate to which municipalities have adapted has traditionally been considered as fixed. Climate encompasses "normal" weather conditions, including a "normal" frequency and severity of extreme weather ("normal" based on the long-term average weather and extreme weather conditions). Policies, plans, infrastructure, resource allocations and other adaptations are designed to yield appropriate outcomes (eg. levels of service, cost/benefit, etc.) under these "normal" climate conditions.

As the climate changes, these adaptations may become less and less well suited to prevailing climate conditions. In many cases, the results include:

- ▶ sub-par levels of service (eg. summer water shortages);
- ▶ unacceptable levels of risk (eg.

health risks from poor air quality); and

- ▶ potential catastrophes (eg. Hurricane Katrina's impacts on New Orleans).

Where there are responsibilities, there are potential liabilities. As climate change impacts increase, municipalities will create policies and plans to manage the associated risks. Municipalities could be liable for negligently carrying out their operational responsibilities where they have a duty of care to their citizens (eg. in managing sewage and water services so that the systems protect human health and the natural environment.)¹ Municipalities could also be subject

¹ See *Just v. British Columbia* [1989] 2 SCR 1228, an operational decision involves the carrying-out of a municipal program or policy or the implementing of a by-law or plan.

² In *Pearson v. Inco Ltd.*; 2005 Ontario Court of Appeal; November 18, 2005, a class action was certified for damages to *devaluation of real property* arising from the alleged contamination of soil by Inco. A related certification was not allowed relating to the *health effects* of the alleged contamination of soil: *Pearson v. Inco Ltd.*, 183 O.A.C. 168, 2004, 44 C.P.C. (5th) 276, [2004] O.J. No. 317, 6 C.E.L.R. (3d) 117.



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to class proceedings litigation for negligence resulting in property damage² from flooding and sewage system overload as a result of increased rain intensities associated with climate change. In Stratford, Ontario, a class proceeding was recently certified for the property damage associated with such a flood event.

Adaptation to Climate Change

Adaptation to climate change is emerging as a critical dimension of existing municipal responsibilities. The World Mayors and Municipal Leaders Declaration on Climate Change (Article 2.7) reads "... More severe and extreme weather events necessitate urgent action to ensure adequate mitigation and adaptation measures be taken to protect public health, strengthen infrastructure, apply appropriate urban and regional development plans, and advance economic development." Climate change is thus a new variable to be considered in the context of ordinary municipal business.

Adaptation refers to a wide range

of activities that will reduce the negative impacts or exploit opportunities related to climate change. In practice, adaptation can take many forms, including:

- ▶ revised floodplain policies to reduce flooding risks;
- ▶ enhanced water conservation to reduce water shortage problems; and
- ▶ planting new species of trees that will thrive under changed climate conditions.

Some adaptations are "no regrets" – responses that are beneficial irrespective of future climate change. For example:

- ▶ Annapolis Royal, Nova Scotia identified two important adaptations – to raise its protective dykes and to relocate the fire department (which could be cut off from the town by storm surge floodwaters). The town is already vulnerable to storm surge flooding, and these measures will be valuable irrespective of the extent of future (climate change-related) sea-level rise and coastal flooding;
- ▶ The City of Guelph, Ontario developed an outdoor water-use pro-

gram to manage peak water demand in response to recurring summer low-water conditions. Climate change was not an impetus for the program, but the program will certainly strengthen the city's capacity to cope with similar conditions that may worsen in a warmed climate.

Every municipality is unique in terms of its exposure to climate change-related risks, capacity for managing risks and risk tolerance. Thus, there are no one-size-fits-all solutions to the climate change problem. Individual municipalities, or groups of municipalities, are well advised to carefully examine their own circumstances and initiate appropriate adaptation responses. MW

We request your feedback on how we could improve these articles so that they meet your learning objectives. Please send comments or questions to David Noble at (519) 341-1720 or <noble@2degreesC.com>. For more information on adaptation to climate change for municipalities, see the recent publication "Adapting to Climate Change: An introduction for Canadian municipalities" available at <www.c-ciam.ca>.




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