



Brief to the House of Commons Standing Committee on Finance

September 5, 2006

Summary

Weather, air quality, climate and marine conditions have a major impact on Canada's economy, its sovereignty and security, and the health of its citizens. While the impacts of these factors are increasing, they are also accompanied by new opportunities. An integrated approach is required to ensure that Canadians and their governments have the necessary information on weather and climate to protect themselves and their property, enhance economic efficiency, act on new opportunities and establish strategic international partnerships. This approach will permit evidence-based policy and management decisions as well as strategic business development.

The Canadian Foundation for Climate and Atmospheric Sciences recommends a substantial increase in the federal investment for research on smog/atmospheric chemistry, the extreme weather that causes natural disasters, climate trends and marine prediction, in order to support federal environmental measures. The Government's 'made in Canada' approach to clean air and climate requires a) new knowledge; b) innovative policies; c) an adaptation strategy; and d) skilled people. The Foundation is an effective and efficient mechanism for generating relevant new knowledge and skilled human resources. It ensures that its programs respect federal needs through senior federal representatives on its Board of Trustees; it also promotes the sharing and transfer of research findings through collaborative, intersectoral initiatives and firm directives on data management.

This Brief proposes measures to reinforce research on Canada's weather and climate, to generate and promote use of new knowledge, to adapt to changing environmental conditions and to train the people we need now and for the future. We propose that the Government:

1. Boost its financial support for research in universities and federal laboratories as part of a 'made in Canada' approach to environmental challenges and adaptation strategies addressing changing weather, water resources, air quality and climate conditions.

We recommend a financial investment of \$250 million over 10 years to address the socio-economic and health impacts of environmental change and to reinforce the federal government's commitment to scientific knowledge and training in Canada's universities. We further recommend that this investment in universities be administered through CFCAS with a broadened mandate, to include economic impacts and adaptation.

2. Support measures for continuous monitoring, archiving and use of scientific and research data on the environment, including the North and adjacent oceans.

3. Enhance financial support for Canadian involvement in major bilateral and international science and research initiatives related to weather, air quality, climate, marine conditions and water resources.

Introduction

The number of weather-related disasters in Canada has continued to increase, from 30 in the decade of the 1950's to 130 in decade of the 1990's. The Saguenay flood of 1996, the Red River flood of 1997 and the 1998 Eastern Canada ice storm all caused major loss of life and great economic hardship. The ice storm was responsible for at least 28 deaths, over 900 injuries and economic costs near \$7 billion. The Canadian droughts of 2001 and 2002 brought devastating impacts to many sectors of the economy, posed considerable adaptation challenges, and made history. Agricultural production dropped an estimated \$3.6 billion and the GDP fell about \$5.8 billion during these two years.

On July 14, 2000 a tornado struck Pine Lake, Alberta resulting in 12 deaths, 140 injuries, and \$15 million in economic losses to a small community. When Hurricane Juan hit Nova Scotia on 29 September 2003, it generated maximum sustained wind speed of 160 km/h and gusts up to 230 km/h causing waves in excess of 20 metres and widespread damage: at least 8 lives lost and more than 300,000 people were without power for up to a week and a half. In 2004 heavy rains resulted in over \$400M in insured losses in the Peterborough area. The summer of 2006 has seen tornadoes in Ontario and across the Prairies.

In 2005, air pollution resulted in over 5,800 premature deaths in Ontario and had an economic impact of approximately \$3.4 billion in health and environmental costs¹. The Ontario Medical Association has estimated a total economic impact of \$7.8 billion; it states that the health burden is cardiovascular as well as respiratory and increases with age.²

In the Arctic, there has been a loss of about 2,000,000 km² of sea ice since 1979 – an area roughly twice the size of Ontario - and an overall decrease of around 32 percent in the volume of ice in the northern hemisphere. A seasonally ice-free Arctic is projected as early as 2050, though some estimates suggest global warming could open the Northwest Passage to summertime commercial traffic within a couple of decades. This reinforces the need for Canada to monitor, control and service the use of its Arctic waters and to resolve certain jurisdictional and sovereignty challenges.

Weather, air quality, marine and hydrological conditions matter to Canadians; every day we and our governments make decisions based on weather conditions. These decisions affect our economic efficiency, our overall health, our property and sometimes even our lives. Some decisions are dependent on weather today and tomorrow; others will be impacted by the conditions a decade or more from now – by what we call climate.

Science provides the basic information Canadians need for these decisions: continued investments in scientific research and science infrastructure are needed to meet these needs. The investments must be balanced across government laboratories and the universities. At present, federal laboratories are struggling to adjust to reduced funding, deteriorating infrastructure and shifting priorities; and CFCAS resources are now fully committed. These factors have compromised Canada's ability to retain leadership in key fields, generate the knowledge needed

¹ Lauren Broten, Ontario Minister of Environment, Keynote luncheon summary, ECO Canada Conference. Toronto, January 26, 2006.

² The Illness Costs of Air Pollution, Ontario Medical Association: 2005-2026 Health & Economic Damage Estimates, June 2005. *Note:* estimate of economic damages based on lost productivity, healthcare costs, pain and suffering, and loss of life.

to meet its own needs and its international environmental commitments, and to seize new opportunities.

The Canadian Foundation for Climate and Atmospheric Sciences

CFCAS is the main funding body for relevant university-based research in Canada. It has invested over \$109 million in research since 2000; partner support has generated an additional \$130 million in cash and services from federal, provincial, industrial and academic sources, more than doubling the impact of CFCAS's investment. Around \$54 million has been employed in training students and other research personnel and they have gone on to subsequent employment in the public and private sectors, in research agencies, universities and other educational institutions.

CFCAS is structured to support research targeted to federal needs. Its Board of Trustees includes three senior public servants, appointed on the recommendation of the Minister of the Environment, in addition to academics and members from the private sector. This distinguishes it from federal granting councils. With a core staff of six, it is an efficient, cost-effective mechanism for targeted research funding in areas of national priority.

CFCAS-sponsored research is sustaining and advancing Canadian leadership in areas such as the identification and tracking of air pollutants, climate modelling, prediction of severe weather, greenhouse gas generation and absorption by natural systems, and offshore conditions that affect coastal industries. CFCAS-funded drought research is identifying what triggers a Prairie drought and why it persists; better short term forecasting is helping Environment Canada provide weather warnings to municipal authorities and airports, so they can take measures to keep highways and airports operational in bad weather. One-third of CFCAS grant funds support work on Arctic air pollution, storms and climate trends, as well as work on the glaciers and snow pack that are so critical to our water supply – for hydro power, farming, municipal water supply, forest health and tourism. CFCAS-funded research is helping track air pollutants back to their sources; determining how particles in the air become smog and showing how polluted air moves around the globe.

Recommendations

Adapting to change

In speaking to the UNFCCC³ Workshop on the 'Adaptation Fund', Minister Ambrose stated that we must “*find new ways to work together that can stimulate sustainable development, effectively address the issue of adaptation, realize the full potential of technology, and fully utilize all of the policy tools available to us*” (underlining added). Atmospheric and environmental changes are happening in Canada and around the world as human activities change the landscape and alter the chemistry of the atmosphere, rivers, lakes and oceans. We need to know more about how these changes are taking place, about feedback mechanisms and about how ecosystems function, and respond to such changes. An adaptation strategy is critical to Canada's economic productivity, security, and the health and well being of its citizens. The strategy must be grounded in science and provide a realistic structure for industrial innovation, private sector planning, legislative decision-making, strategic partnerships, training/retention of highly qualified personnel, and quality of life.

³ United Nations Framework Convention on Climate Change (UNFCCC) Workshop, Edmonton, May 5 2006.

As noted in the Canadian statement to the UNFCCC talks in Bonn (May 16, 2006) : *“In Canada’s Arctic region, the changes noted by the Inuit community – such as melting permafrost, changes in sea ice and the arrival of new migratory animal species – has raised the need to address adaptation measures.”* Weather, climate and ecosystems are changing more rapidly than anticipated and the impacts are most evident in the North. CFCAS has already invested \$28 million in research on ice and snow and the Arctic; it remains an excellent vehicle for support of targeted research on Canada’s North.

Substantial benefit is derived from complementary or joint scientific initiatives; these foster optimal use of facilities and technical resources, concentrated scientific effort, intellectual exchange, knowledge transfer and training. Consortia are often international in scope and require administrative structures, major research facilities or platforms that constitute ‘big science’. Research alliances reinforce Canada’s research and innovation capacity and the uptake and use of new knowledge; however the deterioration of federal facilities and research capacity has diminished federal ability to engage in partnerships within Canada and around the world.

Scientific initiatives provide the means to improve:

- weather and air quality information, assessments, forecasting and warning
- water resource management through better understanding of the water cycle.
- assessment, prediction, mitigation and adaptation to climate variability and change.
- management and protection of terrestrial, coastal and marine ecosystems

Recommendation #1: that the federal Government reinforce its financial support for research in universities and federal laboratories as part of a ‘made in Canada’ approach to environmental challenges and adaptation strategies addressing changing weather, water resources, air quality and climate conditions

The Canadian Foundation for Climate and Atmospheric Sciences is well placed to channel that support to high quality university-based climate research, targeted to federal needs.

Monitoring and data management

Weather, air quality, marine and climate science depend on information from many sources. Data is the vital raw material which is processed into forecasts, information and decision support tools for end users. Data is now flowing at an unprecedented rate from satellites, ocean floats, automated stations and international consortia; long-term monitoring is providing an essential base of information; but data must be preserved and accessible. There is diminished federal ability to sustain long-term environmental monitoring.

The generation of research data requires observation, costly fieldwork, archiving and access. Comprehensive, sustained and coordinated observations are essential for data which can be transformed into vital information for society. Comprehensive, systematic observation allows us to analyze what has happened in the past, and is our key to understanding and predicting what will happen in the future.

The federal government's support for northern logistics under the Polar Continental Shelf Project is insufficient; yet we are a polar nation and will have a leading research role during International Polar Year (2007-08). We suggest the Government revisit its support for northern research and establish a mechanism for adequate, coordinated logistical support for research in northern and remote locations.

Recommendation #2: Support measures for continuous monitoring, archiving and use of environmental data across Canada, including the North and our adjacent oceans.

Canada's role on the world stage

Global competition is fundamental to the Canadian economy; research underpins innovation and contributes to the training of skilled human resources. Participation in bilateral and international research generates science that feeds into ensemble forecasting for medium and long term forecasts, that permits a coordinated approach to cross border pollution, natural hazards and other such initiatives. It also gives Canada's scientific leaders access to expertise, facilities, results and analyses, and international comparators. Participation in international initiatives enables Canadian scientists to influence the direction of major programs and to showcase Canada's intellectual and technological strengths, thereby reinforcing Canada's importance as a partner nation. Incentives are required to enable public and private sectors in Canada to recognize and seize business opportunities presented by international agreements and arising from changing climatic conditions.

Canadian scientists are already highly involved in international research programs such as those of the World Climate Research Program. CFCAS supports the International Project Office for SPARC (Stratospheric Processes and their Role in Climate); the SPARC Secretariat moved from France to Canada (Toronto) in 2004, but Canadian support for the international Secretariat is available for only five years.

International Polar Year (2007-08) provides a superb opportunity to advance Canada's interests and sovereignty over its vast and vital northern region. During IPY the world's circumpolar nations will coordinate their research to understand the impact of the poles on Earth's climate, environments and ecosystems. Among its polar initiatives, CFCAS is funding the science at a unique facility located near the North Pole, at Eureka on Ellesmere Island: the Polar Environment Atmospheric Research Laboratory (PEARL). Work at PEARL will provide vital information on air quality and other atmospheric conditions in the most sensitive region of Canada – its Arctic. Canadian scientists are already working with U.S. and other international polar scientists at Eureka as well as on the Amundsen polar research vessel and elsewhere in Canada's north.

We recommend that the Government reinforce its support for Canadian leadership in bilateral and international research initiatives and a limited number of International Project Offices consistent with Canada's interests. We further recommend sustained (minimum 10 year) funding commitments for participation in major international research initiatives or the hosting of international research offices.

Recommendation #3: Enhance financial support for Canadian involvement in major bilateral and international science and research initiatives related to weather, air quality, climate, marine conditions and water resources.

Conclusion

The Foundation recognizes that:

- Canadian climate researchers are highly respected by their international peers and are world leaders in key areas of climate and environmental research. This status facilitates strategic partnerships with access to knowledge, data and facilities.
- The deterioration of federal research laboratories has compromised Canada's scientific infrastructure and monitoring capacity and this must be addressed.
- A 'made in Canada' strategy for adaptation to changing environmental conditions must include: research on regional conditions such as drought or flood; on natural processes that produce hazards or opportunities; provision for critical policy decisions; and incentives for innovation.
- Cooperation among research and development performing sectors remains essential.

Canada's '*made in Canada*' climate strategy must be based on integrated scientific studies of the environment, including climate systems and their interactions with other natural systems and with humans. It also requires a strategy to adapt to the relentless warming of the planet. CFCAS is a cost effective conduit of support to the academic community: for research on clean air and climate, for training of human resources and for generation of the knowledge needed to meet the Government's international environmental commitments.

We propose that CFCAS be continued as cost-effective way of providing federal support for university-based science, research and training in these areas. We thus recommend a financial investment of \$250 million over 10 years to address the socio-economic and health impacts of environmental change and to reinforce the federal government's commitment to scientific knowledge and training in Canada's universities. We further recommend that this investment in universities be administered through CFCAS with a broadened mandate, to include economic impacts and adaptation.