Climate change impacts and adaptation in Canada: Is the forest sector prepared?

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The United Nations-sponsored Intergovernmental Panel on Climate Change has determined that global average surface temperature during the 21st Century is very likely to rise at a rate without precedent during the last 10 000 years. Countries such as Canada will be especially affected, particularly in more northern and interior locations.

Climate change has the potential to greatly influence the future health of Canada's forest ecosystems by changing not only forest fire, insect and disease disturbance regimes, but also the overall distribution of forest types, and the productivity of forest resources. These changes will have important implications to the many social and economic values Canadians associate with the forest. Many forest resource policies and practices, that have been established prior to our current understanding of climate change impacts, will require reconsideration and revision. Overall, the concept of "sustainable forest management" as practised in Canada will be fundamentally flawed if it does not incorporate the reality of climate change.

To date in forestry, the major research focus and budget expenditures (related to climate change) have been to support studies on carbon inventories and the potential of forests to offset greenhouse gas emissions, with particular

regard to Canada's responsibilities under the Kyoto Protocol. Historically, the broader field of climate change impacts and adaptation has received less attention and funding. As a result, the field is characterized by significant knowledge gaps and a general lack of action. The development and implementation of methodologies to assess vulnerabilities and develop adaptive strategies is in its infancy and policy-makers, forest managers and forest community leaders have not as yet generally recognized and embraced the need for change.

As the distribution and features of Canada's forests evolve in response to climate change, resource use conflicts may increase. This has important implications for new forest policy development in Canada. First, Canada's ability to effectively adapt to climate change will depend on the institutional capacity and flexibility of management agencies, industry, academia, First Nations, individual communities and stakeholder groups. Second, Canada's ability to establish effective policies to respond and adapt to climate change will require a better understanding of current and future vulnerabilities in the forest sector. It will also require an understanding of critical thresholds for change, the ranges of possible impacts on commercial and non-commercial forest values, and a general strengthening of the linkages between science, policy and operational management of forest resources.

Significant enhancements of the scientific capacity within government and universities to conduct fundamental and applied research and provide extension services in both impacts and adaptation, and climate modeling (including downscaling) are required to move the climate change agenda forward. In addition, the needs of decision-makers who must deal with the realities of climate change on a day-to-day basis should play an increasing role in guiding research priorities. Adaptation options for climate change should be developed to fit within the context of existing forest land-use planning systems and multiple resource objectives, rather than being viewed as a new and separate process. The adoption of a "vulnerability approach" to climate change impacts and adaptation in the forest sector provides opportunities for forest managers to integrate climate change into current forest management decision-making, concurrent with the management of other social, economic and bio-physical risks.

As recognized by the Standing Senate Committee on Agriculture and Forestry in its 2003 report "Climate Change: We Are At Risk," forest sector policy-making in

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Canada demands federal and provincial coordination, a sense of shared responsibility, and a commitment to pursue programs that enable, rather than constrain, adaptation. It also requires an identified and adequately resourced lead agency or champion with the necessary institutional framework and standing with the forest sector community to generate needed scientific knowledge, to lead the development of strategic policy frameworks, and to coordinate the development and implementation of adaptive responses. The Committee specifically called for the Government of Canada to "assume a leadership role and coordinate climate change impacts and adaptation efforts in Canada to ensure that all stakeholders remain engaged in the ongoing process of adaptation to climate change." In our view the Canadian Council of Forest Ministers (CCFM) also has a clear responsibility in this area, particularly as the debate moves from the relatively straightforward discussion of climate change impacts and vulnerabilities towards the more complex issues associated with the implementation of adaptive responses.

Canadians rely on the forest for many of their environmental, social, economic, cultural and spiritual needs. We think Canada's preoccupation with implementing Kyoto must be balanced by an equally strong commitment to deal with the effects of climate change on Canada's social, economic and environmental systems. Most recently, the Gleneagles Summit of the G8 Nations recognized the need for such a balanced approach, and pointed out the funda-

mental importance of the need for nations to manage the impact of climate change through the development of the "scientific capacity that will allow their governments to integrate climate, environmental, health, economic and social factors into development planning and resilience strategies."

It is our intent that this special issue of *The Forestry Chronicle* may provide an added impetus and sense of urgency towards finding solutions to the many complex issues that climate change poses. The concept for an issue dedicated to climate change impacts and adaptation originated at a session of the Canadian Institute of Forestry/Society of American Foresters joint Annual General Meeting held in Edmonton in October, 2004. The session was coordinated and moderated by the Canadian Climate Impacts and Adaptation Research Network — Forest Sector (<http://www.forest.c-ciarn.ca>), as part of its mandate to help bridge the gap between climate change science and long-term sustainable forest management in Canada. Many of the speakers at the Edmonton session have contributed articles to this issue, and we wish to thank them and their fellow authors for the valuable insights they have provided.

Adaptation has, at its core, the very sustainability of Canada's social, economic and environmental systems over the coming decades. Forests are vulnerable, and we in the forest sector have a responsibility to act collectively to minimize the risks and realize any benefits.