

**IMPACTS OF CLIMATE CHANGE ON TRANSPORTATION IN CANADA**  
**JANUARY 30-31<sup>ST</sup>, 2003**  
**CANMORE, ALBERTA**  
**PRELIMINARY REPORT – WORKSHOP HIGHLIGHTS**

## **1. INTRODUCTION**

On January 30-31, 2003, Transport Canada held a 2-day workshop on the impacts of climate change on transportation in Canada. The objective of the workshop was to bring together transportation professionals, experts in climate change, and stakeholders to identify current and potential impacts of climate change on transportation infrastructure and operations in Canada, and provide advice to government and industry on preliminary steps towards adaptation planning, including research needs.

The workshop was also supported by the Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP) and the Government of Canada's Climate Change Impacts and Adaptation Program. Marbek Resource Consultants was engaged to assist with the planning, facilitation and reporting.

This preliminary report documents the main highlights of the presentations and discussion. A more complete record of workshop results will be distributed in March 2003.

Workshop organizers and sponsors would like to thank all of the participants who made this event, the first of its kind, a success. Participants are urged to reflect on the results and engage in further bilateral and multilateral discussions to determine the next steps.

## **2. TRANSPORTATION AND CLIMATE CHANGE IMPACTS**

Some of the key general themes that emerged from the presentations and discussion include:

***The climate is changing and the impacts are real...***

- Temperature is rising and the characteristics of weather are changing (e.g., more frequent drought and extreme events).
- There is a growing list of well-documented impacts (e.g., sea-level rises, landslides, lower water levels in lakes and rivers, melting permafrost, etc.).
- Despite efforts to mitigate climate change (reduce greenhouse gas emissions), some degree of climate change is inevitable.
- Significant climate impacts on transportation are already apparent, for example, warmer air temperatures and changes in permafrost are affecting winter and all-season roads in the three territories and northern parts of the provinces. These areas have been identified as having the least capacity to adapt. Western regions are dealing with an apparent increase in landslide impacts on road and rail networks, while coastal areas are dealing with threats to infrastructure from changing water levels and storm surges.

***Transportation is vital to Canadian society and economy...***

- Transportation in Canada is changing and is continually adapting to the socio-economic environment as well as the physical environment (climate change is one aspect among many factors). In recent years, there has been very strong growth in certain modes, such as road and air (although air travel on some routes has declined in the past two years).
- Transportation is both an important industry on its own and a key factor in the trade of goods and services.
- The impacts of climate change on transportation infrastructure and services in Canada have not been explored in great depth to date.

***More impacts on transportation are likely in the future...***

- Although there are still uncertainties, especially in predicting local effects, there is enough information to begin identifying sensitivities and vulnerabilities.
- More probabilistic threshold-based approaches can be used to assess regional impacts.
- There are a wide range of impacts, which span the geographic regions and modes, including threats and opportunities.
- Social and economic adjustments to climate change will cause indirect changes in transportation demand.
- Research on many issues presented is preliminary in scope, and some is just getting underway.

***Adaptation will occur... consequences will depend on the nature and timing of decisions***

- Adaptive capacity involves many facets – technology, management practices, attitudes, and financing mechanisms.
- Approaches to adaptation are either reactive or proactive and include: preventing the loss (by reducing vulnerability); tolerating the loss (by doing nothing and absorbing it); spreading or sharing the loss; changing the activity; or changing the location.
- It is likely that the transportation system can adapt (the industry has a long history of dealing with extremes of weather), however climate change is not yet a significant factor in industry planning activities and major investments in adaptation are very difficult to justify.
- Information sharing should be a priority among industry and government in order to make the business case for industry investments in adaptability.
- Canada may benefit from technologies or approaches used in other countries.

**Potential Impacts of Climate Change in the Transportation Sector**

- Sea ice melting and deglaciation/opening of northwest passage
- Sea level rises may impact on coastal infrastructure
- Increased frequency and severity of weather, storm surges, flooding, precipitation events affecting transportation operations and public safety (particularly in cities)
- Increased frequency of freeze/thaw cycles resulting in premature degradation of infrastructure
- Changes to lakes levels or debris flows in rivers reducing maritime freight capacity
- Degradation of permafrost/shortening of viable northern ice road season in winter
- Droughts/extreme heat resulting in direct and indirect impacts (e.g. rutting of roads and increased use of automobiles for the air conditioning)
- Warmer winters – reducing need to de-ice and clear snow from roads and runways
- Avalanches (interruption to rail and road services)

### **3. PRIORITY ISSUES, APPROACHES, RESEARCH NEEDS AND INITIAL STEPS**

Key observations include:

- Priorities depend on the region and local vulnerabilities. Consequences are varied and include minor impacts, such as service interruptions or delay, as well as major impacts such as threats to public safety and infrastructure damage. There are social, economic, environmental and political implications to most consequences.
- Adaptation strategies should consider non-climate factors as well, since infrastructure was designed for specific purposes (i.e., high-traffic roads designed differently than regional roads), which affects vulnerability.
- Because of the level of uncertainty, adaptation strategies need to be flexible and adaptable.

#### ***Potential Approaches***

- In the short-term, it will be important to raise awareness and improve the information base to support the business case for increased investments in adaptation planning.
- The capacity for weather monitoring will be very important in the future (need to maintain and/or re-institute stations).
- The use of different engineering designs is likely to be necessary for all modes.
- Other possible strategies that will be important include: relocation of some infrastructure, better forecasting, improved warning and response systems, and modal shifts.
- There may be significant opportunities for adaptation through increased intermodal connections and systems.

#### ***Possible Next Steps - Governments***

- Integrate climate change adaptation into routine government planning.
- Develop an analytical framework to guide priorities and activities (e.g. similar to the framework provided by the Transportation Table – for GHG mitigation).
- Adopt the raising of awareness as an important initial objective.
- Implement an effective mechanism for inter-jurisdictional coordination.
- Involve industry in establishing research priorities.
- Research priorities should focus on the highest risk areas. Initial research should help establish the main risk areas (e.g. through mapping of permafrost and other areas and features at risk).
- Disseminate research results widely.

#### ***Possible Next Steps - Industry***

- Monitor research results closely.
- In the short term, retain as much flexibility in physical infrastructure planning as possible, while raising awareness.
- In the medium term, use research results to explore the business case for more proactive adaptation strategies.