CANADIAN NATIONAL SUMMARY REPORT IDNDR

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SECTION A: PROFILE

1. Composition of National Committee:

Ministries: Federal
- Canadian International Development Agency (CIDA) (Dr. Jan Loubser)
- Department of Foreign Affairs and International Trade (Hon. John Fraser, P.C., Q.C.)
- Department of National Defence (Vice-Admiral L.E. Murray)
- Environment Canada (Ms. Danielle Wetherup)
- Natural Resources Canada (Dr. Michael Berry) (5)

Ministries: Provincial
- Alberta Public Safety Services (Mr. Mark Egener)
- British Columbia Ministry of Forests (Mr. James Dunlop)
- Emergency Planning Ontario (Mr. Jim Ellard) (3)

Academic & Research Institutions
- Boundary Layer Wind Tunnel Laboratory, University of Western Ontario (Dr. Alan Davenport)
- Department of Civil Engineering, Queen's University (Dr. Edgar Watt)
- Department of Civil Engineering, University of Alberta (Dr. Norbert Morgenstern)
- Département d'Océanographie, Université du Québec à Rimouski (Dr. Mohammed El-Sabh)
- Disaster Research Unit, University of Manitoba (Dr. John Rogge) (5)

Private Sector
- Acres International Limited (Engineering) (Dr. Robin Charlwood) (1)

Non-Governmental Organizations

- Canadian Council for International Cooperation (CCIC) (Ms. Valerie Warmington)
- Canadian Red Cross Society (Mr. René DeGrâce) (2)

Insurance
- Insurance Bureau of Canada (Mr. Paul Kovacs)
- Munich Reinsurance Company of Canada (Mr. John Phelan) (2)

Others
- Canadian Academy of Engineering (ex officio) (Dr. Léopold Nadeau)
- Mr. James Bruce, Chair, Scientific and Technical Committee, IDNDR (ex officio) (2)

2. Internal organization of the National Committee:

The Canadian National Committee (CNC) for IDNDR, established under the auspices of the Royal Society of Canada and the Canadian Academy of Engineering, is composed of 20 representatives from federal and provincial government, industry, academia, the private sector and not-for-profit organizations. The committee provides the leadership, development and coordination of the Canadian program of action to mitigate the effects of natural disasters in Canada and abroad. To support the work of the Committee, the Canadian government will be providing $280,000 over five years. Federal agencies that will contribute include the Department of National Defence (Emergency Preparedness Canada), Environment Canada, Transport Canada, Department of Foreign Affairs and International Trade, Fisheries and Oceans Canada, Natural Resources Canada, and Public Works and Government Services Canada.

The Royal Society of Canada is providing office space and staff to support the work of the Canadian National Committee.

The Committee held its inaugural meeting on September 10, 1993.

3. Prevailing hazards

Prevailing hazards affecting Canada are described in detail in the Canadian National Report. Generally, they can be divided into four main groups:

Meterological Hazards
- wind storms and tornadoes
- hurricanes and tropical cyclones
- blizzards and ice storms
- hailstorms and lightning

Geological
- earthquakes
- landslides
- snow avalanches
- volcanic eruptions
- meteorite impacts

Hydrological
- floods
- sea and river ice
- tsunamis
- sea waves
- drought

Biological
- wildfire
- insect infestations

4. Recent natural disasters

Type/Location	*Affected Population/Losses*
Floods	
1993 Manitoba	$500 million damage
Wildfires	
1989 Northern Manitoba	$150 million damage, 2 million ha. razed
Tornadoes	
1987 Edmonton, Alberta	27 deaths, 600 injuries; $500 million damage
Landslides	
1993 Lemieux, Ontario	no deaths; $2.5 million damage (mitigation/clean up)
Earthquakes	
1988 Saguenay, Quebec	no deaths; $10+ million damage
Drought (crop losses)	
1988 Manitoba/Saskatchewan/Ontario	$1.8 million damage
1984-85 Alberta	$1.1 million damage
1979 Saskatchewan	$1.5 million damage
Hailstorms	
1991 Calgary, Alberta	$500+ million damage

5. National socio-economic conditions

- Population: 28,866 million (Statistics Canada, 1993 estimate)
- Gross-National Product (GNP): $686,044 million (Statistics Canada, 1993)
- Gross-Domestic Product (GDP): $710,723 million (Statistics Canada, 1993)
- Per-Capita Income:
  a) Personal Income: $22,015 (Statistics Canada, 1993)
  b) Disposable Income: $16,970 (Statistics Canada, 1993)

6. Availability of assistance to other countries in the field of natural disaster reduction.

Many government and non-government agencies provide assistance internationally for the four categories of natural hazards recognized in Canada (meteorological, hydrological, geological and biological).

The Canadian government's official assistance to developing countries is provided by the Canadian International Development Agency (CIDA). CIDA focuses primarily on multilateral efforts when responding to disasters. Other agencies providing assistance include Emergency Preparedness Canada, Geological Survey of Canada, Environment Canada, Canadian Council for International Cooperation, Canadian Red Cross Society, CARE Canada, and the Disaster Research Unit of the University of Manitoba.

SECTION B: STRATEGIES AND ACTIVITIES

1. Steps towards achieving the 3 main Decade targets

(a) Comprehensive national assessments of risks from natural hazards, with these assessments taken into account in development plans.

Canada is a geographically vast country exposed to a wide variety of natural hazards as severe as those found anywhere in the world. Earthquakes of magnitude 8 have been encountered on the west coast and moderate earthquakes (magnitude 6) in the St. Lawrence region, East coast and Arctic. Canada also experiences severe wind storms associated with rapidly intensifying depressions (on the East and West coasts), hurricanes (on the east coast), tornadoes (in the southern Great Lakes region and prairies), and severe blizzards with snow, ice and freezing rain can occur throughout the country. Severe flooding conditions can occur throughout the country accompanying heavy precipitation, snow melt, or wind seiches in the Great Lakes. Canada's extensive forests are subject to forest fires and insect infestations. Drought and soil erosion are problems in some prairie regions.

Comprehensive assessments of the risks (frequencies, recurrence intervals and intensities) are carried out regularly for variables affecting the most important hazards, such as wind, directions, snowfall, rain, ice and hail, earthquake ground motion and temperature. These are needed in construction, for the engineering design of structures, coastal defences, dams, power stations and in estimating flooding. The methodology in used for these purposes is generally "state of the art" and Canada has been a leader in research in these areas.

Gaps exist in providing adequate coverage of observations and data. A need also exists for the field calibration of certain data sources to define the influence of the local terrain and topography – on the wind speed, for example. There is also a need to create local zones to deal with special conditions not covered by larger scale risk maps. Local areas of high seismicity due to soft soil conditions is one example; areas prone to landslides is another.

Other applications of risk assessment can be employed by insurance, agriculture and emergency preparedness. These various users of risk estimation have not so far collaborated as closely as they might. Closer working relationships should allow imporvements not only in the methods used but also in the collection and quality control of data, the density of the network and the upgrading of the instrumentation. This could include, for example, Doppler Radar and satellite remote sensing techniques.

The development of closer links between the risk users is a high priority of the Canadian National Committee. A conference on this theme was sponsored by the Committee

(through the Institute for Risk Research) and a further conference will take place in 1995 between representatives from climatology, engineering, insurance and agriculture.

In the evaluation of risks, the implications of possible climate change are important factors. Both changes in the mean temperature and changes in the extremes should be monitored. Preparedness for natural hazards overlaps with strategies for dealing with climate change. There are clearly opportunities for close liaison with other countries on these issues.

(b) Mitigation plans at national and/or local levels, involving long-term prevention and preparedness and community awareness.

Several effective mitigation plans are in effect. These include the National Flood Damage Reduction Program. This program is an agreement under which national and provincial governments agree to the following:

1. They will not build, approve or finance flood-prone development in a designated flood risk area;
2. They will not provide flood disaster assistance for any development built after an area becomes designated (except for flood-proofed development in the flood fringe); and
3. The provinces will encourage local authorities to zone on the basis of flood risk.

Public support for this program was developed through the dissemination of high quality information maps with the involvement of the local community.

An important initiative of the Canadian National Committee is to seek ways to ensure quality in construction. It has often been observed that structures, although designed in accordance with adequate standards, are not hazard resistant due to inadequate quality in the construction process. A study has been proposed to investigate the factors which lead to quality construction. It should consider the influence of the parties involved in the building process in achieving quality, the management of the process and the bidding and other practices. This has significance in both developed and in developing countries.

The broad application of the National Building Code of Canada, with its up-to-date treatment of hazardous loads due to earthquakes and windstorms, to construction across the country represents another form of mitigation practice. The Building Code covers mainly the construction of new buildings.

There is also a need to ensure that existing construction is upgraded. This must be carried out through appropriate incentive schemes, and a priority of the Canadian National Committee is to seek out mechanisms for improving the hazard resistance of

existing building stock.

(c) Ready access to global, regional, national and local warning systems and broad dissemination of warnings.

Canada has access to a wide range of global, regional and national warning systems covering climatic and geological hazards.

It may be appropriate for the CNC to undertake an initiative to investigate the dissemination of warnings to the public. Such an initiative might explore the special problems related to remote areas and take advantage of the expertise in communications available in Canada. This matter will explored further by the Committee.

There are also opportunities to take advantage of industry groups such as building owners (ICBO) to provide warnings to apartment dwellers.

2. Present national plan for natural disaster reduction

The nature of the country and the division of responsibilities between provinces and the federal government does not lend itself to the development of a unique national plan. However, a continuing Canadian government initiative of considerable significance in the emergencies field is the *Green Plan* presented by Environment Canada in 1990. Three of the many components of the Plan announced to date – Marine Pollution Emergencies; Land, Fresh Water and Air Pollution Emergencies; and Natural Hazards Prediction and Warning – bear importantly on enhancing the national capability for responding quickly and effectively to these specific classes of environmental disaster.

3. Legislation introduced and enacted in relation to natural disaster reduction

- *Emergency Preparedness Act, 1988*

Many government departments and agencies have mandates or responsibility for disaster response, mitigation, reduction, etc. within their enabling legislation, at both the federal and provincial levels.

4. Disaster mitigation activities completed or underway:

The Canadian National Report gives a full account of Canada's ongoing activities in disaster mitigation. Below is a summary of some of the groups involved.

Federal Government

At the federal level, the emergency preparedness function is decentralized. Departments and agencies are required by the *Emergency Preparedness Act, 1988* to identify the

potential emergencies that could arise within their area of responsibility, develop plans to deal with them, and to exercise the plans.

Emergency Preparedness Canada (EPC), Department of National Defence, promotes and coordinates planning by departments. An Emergency Preparedness Advisory Committee is the main forum for interdepartmental consultation and management of the federal governments emergency preparedness program.

Canada has developed, and is still developing, emergency response plans as important mitigation techniques. These include (1) British Columbia Earthquake Response Plan; (2) National Earthquake Support Plan; and (3) Catastrophic Earthquake: Alberta Support Plan.

Some of the key departments involved in disaster management include:

Environment Canada (Atmospheric Environment Service): weather warnings and advisories; statistical estimates of the frequency and magnitude of extreme events.

Natural Resources Canada: information on Canada's landmass and offshore regions relating to disaster management concerns (e.g. earthquakes, landslides, volcanoes); assistance in the event of disaster; remote sensing techniques (e.g. RADARSAT); monitoring and prediction of the incidence and spread of tree diseases and insect pests; forest fire danger rating, detection and fighting.

Agriculture and Agri-Food Canada: emergency management of Canadian Food and Agriculture System; drought programs.

Health Canada: natural disaster preparation and response including medical supplies, transportation of casualties, hospitalization and relief.

Other Governments

The provincial, territorial, regional and municipal governments are in the front line of all disaster management questions. Most responsibilities and activities related to emergency preparedness and emergency response for natural disasters are shared between provincial and municipal governments.

Non-governmental organizations

A wide variety of disaster-related topics are pursued in Canadian universities, research centres and not-for-profit organizations. These extend from emergency medical response to the development of Geographic Information Systems (GIS) and satellite photogrammetry. The Canadian Red Cross, for example, is heavily involved in disaster prevention, preparedness, operations and rehabilitation, both domestically and

internationally. Furthermore, the private consulting industry runs the gamut of research and development projets.

Insurance Industry

Insurance, as a financial hedge against loss, is closely concerned with the problems presented by natural disasters. The insurance industry has an appreciable influence on the behaviour of the public and of industry in the matter of preparedness. By making the right use of the tools of insurance technique, especially deductibles, the insured can be motivated to take preventive measures. After a disaster, the insurance industry gives swift financial help and has, for the most part, an efficient loss settlement organization at its disposal for the purpose.

There is a growing interest within the insurance and reinsurance industry for approaches that best deal with natural disasters. Currently, many studies are being undertaken to assess the damage and frequency potential of disasters and the related insurance needs.

Private Sector

Canadian private sector and industrial infrastructure provides many of the vehicles for risk assessment, mitigation, warning and international cooperation for recovery from natural disasters. This infrastructure provides Canada with an ability to contribute significantly to the IDNDR, both through improving its own situation and assisting in the advance of others. The development of new capabilities will often result from partnerships among government, industry and the universities.

Canada has been a leader in the development of communications, construction methods and standards, consulting engineering and manufacturing. In addition, strong Canadian capabilities in communications and remote sensing, many facets of the transportation, recreational and military industries are pertinent.

5. Plans to fully achieve Decade targets by the end of 1999

The Canadian National Committee has not yet fully identified its plans. However, initiatives are taking shape to improve the estimation of frequencies and intensities of harzards; in construction quality; in landslides; and in public awareness.

See also responses to Section B.

SECTION C: INTERACTIONS

1. Publications on IDNDR-related subjects:

a) Environment Canada. 1993. *Flooding: Canada Water Book.* Edited by Jeanne Andrews. (also available in French)

b) Alberta Public Safety Services. July 1993. *Report to the Canadian National Committee.*

c) Royal Society of Canada/Canadian Academy of Engineering Joint Committee for the International Decade for Natural Disaster Reduction. July 1990. *Toward a Canadian Program for the International Decade for Natural Disaster Reduction.* (also available in French).

2. IDNDR meetings and conferences held or planned:

During the Decade, the Canadian National Committee expects to host or support meetings and conferences. Several to date include:

- "Risk Estimation of Extreme Weather Events," February 1994. Institute for Risk Research, University of Waterloo, Ontario
- "Improving Responses to Extremes in Climate: The Role of Insurance and Compensation," Atmospheric Environment Services, Environment Canada. Scheduled for 1995.

3. Current or planned partnerships and cooperation related to IDNDR with other countries

Plans have not yet been fully identified.

SECTION D: EVALUATION

1. Overall evaluation of national disaster mitigation programmes including, but not limited to, those initiated after IDNDR and achievements up to now

The establishment of the Canadian National Committee in the latter part of 1993 has not enabled this section to be fully analyzed. Although no targets have been set by the Canadian National Committee, the following initiatives are under active discussion:

WITHIN CANADA:

Risk Analysis

The updating of trends, frequencies, intensities, and spatial distributions of the major natural hazards in Canada with the objective of producing comprehensive "risk maps" for users in emergency management, building, codes, insurance, agriculture, etc.; the major risks to be considered would include earthquake risk (especially in British Columbia and Quebec), floods, windstorms, blizzards and forest fires; where feasible, these risks would be converted into vulnerability assessments.

Building Construction

Review the application of risk analysis to construction and building codes; examine the compliance with the code and the strategies for improvement of quality assurance; determine incentives to retrofit existing structures.

Flood Damage Reduction.

Analyze the economic benefits and costs of the Flood Damage Reduction Program as well as risk analyses, with the objective of improving zoning of flood plain regions and increasing awareness with key individuals and institutions who need to know such as planners, builders and home buyers.

Education and Research.

Arrange workshops between key stakeholders in disaster prevention: e.g. industry, insurance companies, researchers, emergency planners with a view to increasing awareness; prepare case studies on Canadian (and international) disaster issues for use in a variety of educational settings such as engineering schools, business schools, courses in disaster management; establish a Canadian committee for investigating the sites of natural disasters.

INTERNATIONAL:

Technical Assistance and Disaster Prevention

Review Canada's participation in and contribution to technical cooperation programs to promote and emphasize prevention and disaster loss reduction in advance of events; take advantage of Canadian expertise in communications, remote sensing, forest fire control; provide leadership for selected international scientific projects e.g. GSHAP, landslides, volcanoes; initiate a study in construction quality and hazard resistance of buildings; expand the educational links between Canada and third world professionals concerned with disaster prevention.

2. Review of the IDNDR

Over the coming months, the Canadian National Committee for IDNDR will be identifying issues and priorities for the latter half of the Decade.