Government of Canada
Office of Critical Infrastructure Protection and Emergency Preparedness

Gouvernement du Canada
Bureau de la protection des infrastructures essentielles et de la protection civile

National Disaster Mitigation Strategy

TOWARDS A CANADIAN APPROACH

A GUIDE FOR DELIBERATION

Canada

Acknowledgements

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On behalf of:

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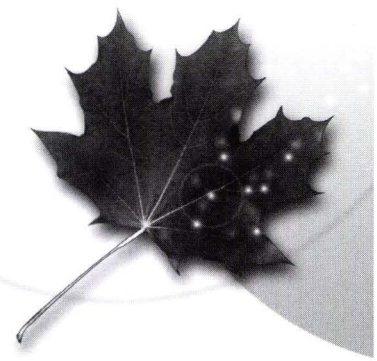

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Preface

Hazards are a part of human existence. In Canada, one in three people live in regions that are susceptible to earthquakes. Severe storms, flooding, hazardous substance spills and transportation accidents affect many other Canadians each year and can severely affect the economy, physical infrastructure, and environment. Experts predict that larger natural disasters are inevitable. As our society increases in population and technological complexity, there is evidence that social and economic costs due to disasters are escalating. The global incidence of disasters and the costs of dealing with them are also escalating. Increasing global interdependencies mean that disasters affecting other regions of the world can impact Canadians. Further, temporary interruptions in production can result in loss of Canadian participation in the global market, costing millions of dollars. Reducing vulnerability to disasters can save lives, reduce property damage and limit the costs of dealing with disasters after they happen.

National consultations held in 1998 on Canada's preparedness for disasters called for the development of a national mitigation policy. Since 1998, progress has been made and momentum built. Some examples are illustrated in Table 1.

In June 2001, the Government of Canada announced consultations on a National Disaster Mitigation Strategy (NDMS) in which all levels of government and stakeholders were invited to co-operate effectively to evaluate, prioritize and implement measures that reduce the vulnerability of Canadian communities to disasters. This Guide is designed to encourage a deliberative dialogue on Canada's first-ever National Disaster Mitigation Strategy.

Reducing vulnerability to disasters can save lives, reduce property damage and limit the costs of dealing with disasters after they happen.

TABLE 1: SOME CANADIAN EXAMPLES OF MITIGATION ACTIVITIES

Partners and Stakeholders[1]	Activity
Government of Canada (Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP) – led initiatives)	◗ Establishment of federal Inter-departmental Mitigation Coordination Committee (IMCC), in January 2001, to assess government of Canada priorities for disaster mitigation. ◗ Establishment of Federal/Provincial/Territorial National Disaster Mitigation Strategy Advisory Group, in June 2001, to coordinate mitigation priorities that are national in scope. ◗ 2001 Emergency Preparedness Week theme — "Reducing the Risk". ◗ 2002 Emergency Preparedness Week theme — "Keeping Canada Safe — *Emergency Preparedness Begins with YOU.*" ◗ Ongoing support to multi-disciplinary research related to disaster management.
Federal Government Departments	◗ Natural Resources Canada – leading research on earthquake and landslide hazards and vulnerability, and modeling forest fire behavior and ignition. ◗ Environment Canada – establishment of a National Doppler radar network that improves detection of severe weather.
Provincial/Territorial	◗ Flood mitigation in Alberta (Peace River), Manitoba (Red River Valley) and Quebec (Saguenay). ◗ Earthquake Mitigation Program and Earthquake Risk Reduction Program in British Columbia. ◗ Avalanche mapping and landslide mitigation in Quebec. ◗ Coastal Erosion Project in Prince Edward Island.
Institute for Catastrophic Loss Reduction	◗ Annual conferences and workshops on disaster mitigation prevention. ◗ Establishment of a disaster prevention and research program.
Insurance Bureau of Canada	◗ Publication of "A Canadian Strategy for Disaster Prevention: Turning Commitments into Action" (2001).

[1] For the purposes of this guide, the term "stakeholder" refers to those groups other than governments i.e. academic, private sector and volunteer agencies and minority groups.

What is deliberation?

Deliberation is a structured dialogue that assists in the discussion of important issues. It allows stakeholders to reason and talk together about basic policy directions in a way that goes beyond a debate, the presenting of positions or a casual discussion. As well, it helps to determine what actions may be in the best interests of those who will be affected. It involves consideration not just about what is best for the individual stakeholder, but what is best for everyone. The objective is to make sound decisions.

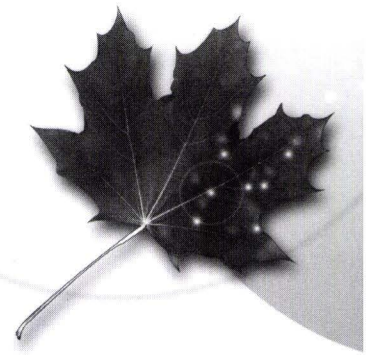
In a deliberation, participants explore what others think as well as their own beliefs. They try to weigh the consequences of various options based on what is truly valuable to themselves and to others.

In the end, this better understanding and the pooling of information and insights can help find common ground, increasing the chance that good judgements are made.

Deliberation changes the way people talk to each other about issues. People who participate in deliberations say that the non-confrontational process helps them better understand the complexity of issues. It gives them a new respect and understanding for other points of view and stimulates new ideas or ways of thinking about an issue. In the end, this better understanding and the pooling of information and insights can help find common ground, increasing the chance that good judgements are made.

Designing Canada's first-ever National Disaster Mitigation Strategy will not be easy. The range of considerations are numerous and often complex. There may be difficult choices among a number of options. If the goal of the NDMS is to create safer communities, what policies, guidelines and incentives are necessary? What should be the guiding principles of a National Disaster Mitigation Strategy? What are the policy considerations? How should initiatives be funded? How should a strategy be implemented and coordinated?

We have to decide what is most important to us as stakeholders, and what we believe will help strengthen Canadian communities against disasters. Then we must find areas of common ground from which we can all move forward.



Disaster Mitigation

In this guide, the term **disaster mitigation refers to sustained actions taken to reduce or eliminate the long-term impacts and risks associated with natural and human-induced disasters**. Our understanding of disaster mitigation reflects an all-hazards approach. However, it is anticipated that the primary focus of the National Disaster Mitigation Strategy will be natural disasters, at least until the strategy has been developed, implemented and some experience with it has been acquired.

Mitigation is based on the principle that prevention is better than cure. There are two main ways to reduce disaster losses: structural and non-structural mitigation. For example, ensuring homes are bolted to their foundations in tornado-prone areas, or constructing dams, river channel diversions, and dykes to prevent or reduce flooding are structural mitigation measures. Non-structural mitigation includes changing land-use zoning to prevent new construction on flood plains, upstream watershed management, or upgrading building codes so that structures can better withstand earthquakes.

The physical environment is changing. A warming climate may cause more events such as floods and extreme temperatures. Demographic changes are also occurring showing increased numbers of people living in cities, of which some are in high risk areas such as earthquake-prone regions and flood plains. The potential losses from natural forces increase as the built environment (transportation systems, public utilities, communications, homes and office buildings) becomes more concentrated. As socio-economic and demographic factors change, more people are vulnerable to hazards and less able to recover from them.

More effective prevention strategies would save not only tens of billions of dollars, but save tens of thousands of lives. Funds currently spent on intervention and relief could be devoted to enhancing equitable and sustainable development instead, which would further reduce the risk for war and disaster.

Building a culture of prevention is not easy. While the costs of prevention have to be paid in the present, its benefits lie in a distant future. Moreover, the benefits are not tangible; they are the disasters that did NOT happen.

— Kofi Annan,
Secretary-General of the United Nations,
Annual Report on the Work of the
Organization of United Nations, 1999,
Document A/51/1, as cited in the draft
background paper for the World Summit
on Sustainable Development. Nov., 2001.
www.unisdr.org.

Decisions and actions taken by developers, industry, government and individuals often increase the risk to a community. Bulldozing steep hillsides for homes and clearing forests have disrupted natural runoff patterns and magnified flood and landslide hazards. Some mitigation efforts degrade the environment and may contribute to the next disaster. For example, the Red River floodway helped save Winnipeg from flooding, but south of Winnipeg and in other areas, dykes have been a mixed blessing. In Manitoba and B.C., floodwaters came from an unexpected direction, and dykes that prevented floodwater from flowing through exacerbated the problem. Furthermore, some attempts to avoid damages from hazards only postpone them and can provide a false sense of security. For example, dykes may encourage community growth because of the protection they presumably provide, increasing the loss when an ageing structure fails. Too many of the accepted methods of coping with hazards have simply postponed losses into the future.

Canada's infrastructure is interdependent and reliant on information technology. A single disruption or failure in one sector could cause other disruptions that would affect millions of Canadians. Add to this the possibility of more severe weather, greater urbanisation and our ageing physical infrastructure (such as roads, dams and pipelines) and the problem is compounded. The natural and related technological disasters of the future may be larger than any experienced before.

Dennis Mileti (1999), has noted that disasters are the result of interactions among the physical environment, the social and demographic characteristics of the communities that experience them, and the buildings, roads, bridges and other components of the built environment. Measures that reduce risk and vulnerability to disaster diminish response and recovery activities and the costs of dealing with all aspects of disasters. Mitigation is an investment in the social, environmental and economic security of Canadians. It's good policy.

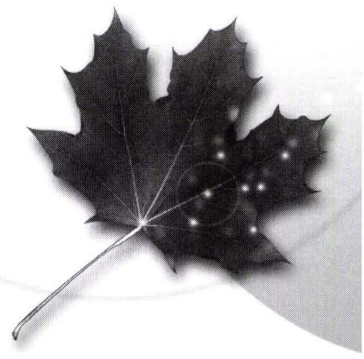


TABLE 2: CANADIAN DISASTERS — SOME FACTS AND FIGURES

- The 1996 Saguenay River flood, the 1997 Red River flood and the 1998 Eastern Canada Ice Storm resulted in estimated damages of more than $7.8 billion (OCIPEP Disaster Database, 2001).
- The Red River Floodway in Manitoba, built in the 1960s for $60 million dollars has been used 20 times to reduce flood impacts. It is estimated to have prevented losses in excess of $6 billion during the 1997 Red River Flood alone (International Joint Commission, 2000).
- Canada's manufacturing, transportation, communications and retail sectors sustained short-term losses of $1.6 billion in economic output due to the 1998 Ice Storm (Lecomte, Pang, and Russell, Institute for Catastrophic Loss Reduction Research Paper Series No. 1, 1998).
- An estimated 2,000 dairy producers in Ontario and 3,500 dairy farmers in Quebec lost production, with 10 million litres of milk being dumped due to the 1998 Ice Storm (Statistics Canada, The St. Lawrence River Valley 1998 Ice Storm: Maps and Facts).
- Ninety-five percent of disasters in Canada are handled exclusively at the local or provincial levels (OCIPEP, Towards a National Disaster Mitigation Strategy Discussion Paper, January 2002).
- In 2001, nearly 80% of Canadians lived in urban centres across Canada (Statistics Canada, Census data 2001). Many of our settlements are in areas of the country which are more vulnerable to nature's perils and, by virtue of our own built environment, to technological accidents and failures.
- As a result of the 1996 Saguenay floods, the 1997 Red River flood, and the Ice Storm in 1998, federal disaster financial assistance payments under the Disaster Financial Assistance Arrangements rose from an annual average of $10-15 million between 1970-1995 to $185 million between 1996-2002 (OCIPEP, Financial Programs, 2002).
- Prior to the 1998 Ice Storm, the 1996 Saguenay River flood, with estimated damages at $1.5 billion was Canada's most expensive natural disaster. (Government of Canada, Natural Hazards of Canada: a Historical Mapping of Significant Natural Disasters, 2001).

Approaches to a National Disaster Mitigation Strategy

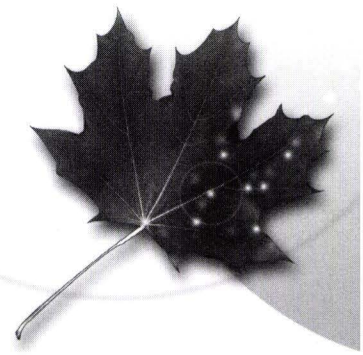
There are various approaches being advocated for disaster mitigation that need to be considered in developing the National Disaster Mitigation Strategy. According to some people, the range of hazards being addressed by current mitigation efforts is not comprehensive; efforts are limited in scope and tend to be inconsistent and reactive rather than anticipatory. These people say that the emphasis should be on a national approach that is consistent, comprehensive, and increases the profile and priority of mitigation.

Others say that even when the knowledge and research necessary for mitigation is available, it doesn't reach the target users in a way that is accessible and usable. As well, it may not be the right information. They recommend an open, circular feedback process to ensure that the right type of information is being produced, that it is communicated to those who need it, and that these people in turn use the information well. They believe that the focus should be on a national research agenda that listens to community and municipal voices to identify gaps in knowledge and areas where research is needed.

Some say that people don't understand the inter-dependent nature of risk. It's assumed that someone else will regulate or take care of it. There needs to be a change in awareness that lets individuals take action within a supportive context. Mitigation is a living process that must be rooted at the local level, and an environment needs to be created that supports local and stakeholder initiative.

Methods for funding disaster mitigation can only be determined once the consultation process has been completed, when a full range of views have been considered and once governments have agreed to next steps. Options for funding mitigation should take into account the preference for cost-shared arrangements among all levels of government and key stakeholders. Questions will need to be answered on whether and how best to fund mitigation and what each stakeholder can do to support the implementation of disaster mitigation in Canada.

This guide presents three approaches that were identified in an issue-framing session hosted by OCIPEP in January 2002, with seventeen government, NGO, and private sector participants. They are not the only approaches possible, but they do offer the basis for a good deliberation. In writing the guide, the approaches were sharpened to provide more distinct contrasts among the approaches. A draft was reviewed by a core group and a second draft by a stakeholder readers' group.



The approaches are not mutually exclusive. Each implies a different starting point and, assuming concurrence among all stakeholders, particular actions that might be considered under each. To illustrate this, each approach offers a scenario – pointers about the types of activities and division of responsibilities that could be occurring in five year's time if the approach was implemented. Each approach may contain some elements you like, and some you don't. It is not expected that you will choose one of these approaches as the one to guide the strategy. However, through the deliberative dialogue, participants will work together to determine common ground on some of the crucial elements that could direct a national disaster mitigation strategy. Briefly the three approaches are described below:

Approach 1: Risk Management

A disaster mitigation strategy guided by a **national all-hazard risk management approach that is comprehensive and consistent**. Champions are needed who can raise the profile of mitigation and make it a higher priority. Developing a solid economic case for mitigation will be crucial.

Approach 2: Knowledge Creation, Dissemination and Use

A disaster mitigation strategy that rests on a solid base of **knowledge creation, dissemination and use**. A **research agenda** is needed that responds to local needs, and a feedback system should be designed to ensure that the appropriate information is being produced and used.

Approach 3: Empowerment — Shared Risks, Shared Choices, Shared Futures

A disaster mitigation strategy centred on empowerment and **public awareness** that will allow **communities and stakeholders** to take **action** within a supportive context. Local and stakeholder initiatives need to be encouraged, and a variety of inter-related, inter-dependent actors will be required.

Approach 1: Risk Management

Issue: The natural hazards and associated risks are not being addressed in a comprehensive fashion. Current mitigation efforts are limited in scope and consistency, and tend to be reactive rather than anticipatory. Decisions and actions taken by developers, industry, government and individuals can actually increase risk rather than reduce it.[2]

Broad remedy: Initiate a co-ordinated national program of hazard identification and risk assessment. These are the basis for mitigation and must be guided by an all-hazard approach that recognises the multiple hazards to which an area is vulnerable. Decisions around mitigation must be based on a clear understanding of the type and extent of risk and of the potential impacts of hazards on communities. Champions who can raise the profile of mitigation should be encouraged. The economic case for preventative actions must be clearly presented.

Arguments In Support of This Approach:

1) A hazard that is recognised does not have to become a disaster if precautions are taken – prevention is better than cure.
2) The exploration of disaster mitigation options may present opportunities to enhance the environment and conserve resources ensuring long-term economic stability for the community.
3) All-hazard risk management can avoid the domino effect. For example, extreme natural hazards can result in a technological hazard followed by an environmental and humanitarian disaster.

Concerns About This Approach:

1) Hazard inventories, risk assessments and mapping take time, and funds need to be available for these activities as well as for mitigation activities.
2) A nationally co-ordinated program focusing on disaster mitigation may make the public feel they are in more danger than is actually the case. It may induce alarm.
3) An all-hazards approach may mean choosing breadth over depth. Rather than focusing on a select few hazards, this approach would attempt to focus on all foreseeable hazards.

[2] It is expected that the NDMS will focus on natural hazard mitigation initially and eventually incorporate mitigation of other non-physical hazards. A risk management approach, therefore, may also have to start by focusing solely on the mitigation of natural hazards in its preliminary implementation.

How Might the Risk Management Approach Look In Five Years?

Local Communities

- Communities would conduct hazard, risk and vulnerability assessments and would evaluate building and land-use codes and regulations in terms of all known hazards and risks.
- Communities would create an inventory of existing facilities and their design standards in identified hazard areas.
- Individuals and communities would support adoption and enforcement of measures designed to reduce their vulnerability and would take appropriate actions to protect against the impacts of hazards.

Stakeholders

- Stakeholders would participate in the review of hazard, risk and vulnerability assessments and would support development of mitigation plans at the community level.
- Local organisations would be encouraged to participate in the implementation of mitigation plans at the community level.
- Local information on hazard events would be collected and fed into a national database.

Provinces and Territories

- All government departments would collaborate on disaster mitigation. They would identify specific activities, time frames and funding associated with implementing identified local mitigation priorities.
- All provinces and territories would create all-hazard risk assessment maps and disaster mitigation plans for communities under the OCIPEP standards/guidelines that include global risks, such as climate change, and local structures and resources.
- Provinces and territories would collect the data generated and would assess the quality of mitigation plans. They would make recommendations regarding co-ordination of mitigation programs and activities.

Government of Canada

- In partnership with provinces, territories and stakeholders, the federal government would set policy and standards/ guidelines to co-ordinate all-hazard risk assessments. Standards/guidelines would be set for multi-hazard risk assessment maps and mitigation plans to be developed by communities.
- The federal government would create a risk assessment database, that includes estimates of possible losses, using information provided by stakeholders, provinces and territories.
- The federal government would take hazard and risk assessment into account at the appraisal stage of all projects/initiatives and would participate in international disaster prevention initiatives.

Approach 2: Knowledge Creation, Dissemination and Use

Issue: Knowledge and research about mitigation is available but it is not necessarily the right information nor does it reach the target users in a way that is accessible and usable. There is no certainty that the information reaching the target audiences and decision-makers is being used correctly. Co-ordination is lacking in the development of research priorities and in the transfer of mitigation technologies necessary for use by both the public and private sectors.

Broad remedy: Successful mitigation rests on a solid base of knowledge creation, dissemination and use. New knowledge from different fields must be acquired and applied to hazards mitigation. For this to work effectively, an open, circular feedback process is required to ensure that the right type of information is being produced and used. A national research agenda is required that listens to local, community and municipal voices to identify the areas of research that have to be addressed.

Arguments In Support of This Approach:

1) Research provides the knowledge to develop mitigation tools including land-use planning, codes and practices, and engineering, that can reduce the impact of natural disasters on the built environment.
2) Mitigation is a complex undertaking. Assumptions and calculations about magnitude, return frequency and the potential physical and economic impact of hazard events in specific geographic settings must be made and the results must be presented in terms that are useful to decision-makers. These calculations provide the information needed to make sound decisions that are viable in the long term.
3) Information is fundamental. Research and development work can directly help Canadians and government offices to reduce costs and suffering. Long-range forecasting, for example, can provide accurate information that enables government offices to reduce potential death, suffering, personal damage, and property loss from a disaster.

Concerns About This Approach:

1) Local constraints and capabilities of communities must be considered. Research and knowledge can easily be overridden by more immediate demands or ignored when other priority issues come into play or alternatively, the research agenda could take up all the resources and energy leaving nothing for local initiatives.
2) A national research agenda cannot be driven only by local needs. It also must be able to address the research issues of a broader nature, whether provincial, territorial, cross-boundaries or national in scope.
3) Comprehensive models and technical assistance must be provided to and managed by local communities. Without proper support, feedback mechanisms between researchers and decision-makers may be difficult to establish.

How Might the Knowledge Creation, Dissemination and Use Approach Look In Five Years?

Local Communities

- Communities would become the source for information and data on past disaster events and current hazards and suggest needed research information to research entities.
- Communities would utilise research data and tools generated to inform risk reduction decisions.
- Communities could undertake hazard mapping and planning under the guidance of the research community and academia.

Stakeholders

- Researchers, including academia and the scientific community, would develop and maintain a national inventory of disaster research, an assessment of research needs, and an agenda for disaster mitigation research.
- They will create a clearinghouse and collect, analyse and store data on losses from past and current disasters establishing a baseline for comparison with future losses.
- State-of-the-art technologies will be evaluated to assess the most effective use of information technology and media for the dissemination of research results on natural hazards and mitigation to the user community.

Provinces and Territories

- Provincial and territorial governments would assist in identifying needed research and encouraging the submission of appropriate research projects.
- Government departments would assist in the collection of research information at the community level and in the evaluation of applied research methodologies.
- A research program on risk assessment and disaster mitigation would be set up.

Government of Canada

- The federal government would co-ordinate a national research effort and support applied research on priority mitigation issues.
- Co-ordinated application of results generated by research programs would be supported by the federal government at the national and international level.
- The federal government would formalise partnerships and collaborative efforts for ongoing, applied research, and promote interdisciplinary research and education.

Approach 3: Empowerment — Shared Risks, Shared Choices, Shared Futures

Issue: Trend lines for hazards are getting worse with losses doubling every seven years. Yet people's awareness of risk is low and there are few proactive measures being taken. There is little appreciation of the interdependent nature of risk. People tend to think that someone else will take care of it or regulate it.

Broad remedy: There is a need for a culture change that empowers people and stakeholders to take action. This will require increased awareness and a supportive context. People need information and the ability to connect it to action. Mitigation is a living process that has to be rooted at the local level and that requires a variety of inter-related and inter-dependent actions and actors. The capacity and capabilities to take on these roles need to be fostered and an environment created that supports local and stakeholder initiative.

Arguments In Support of This Approach:

1) Local action is most effective. This approach recognises that success or failure depends on individuals and communities. Communities make decisions about acceptable risks in their area and to develop the capacity to manage their own environment.
2) Federal/provincial/territorial and local partnerships and public private partnerships are the most effective means of implementing measures to reduce the impacts of natural hazards. Progress in reducing the impact of natural hazards will occur most rapidly when all segments of the community can understand the advantages of mitigation.
3) Increased awareness empowers people and stakeholders to take action within a supportive context. All levels of governments and stakeholders play critical roles supporting programs and incentives for adopting mitigation measures.

Concerns About This Approach:

1) Building local support for mitigation among all stakeholders will be a time-consuming process, and we may not have time. We should use the systems that are already in place and that can move rapidly.
2) Without assistance, local communities and stakeholders do not have the resources necessary to raise awareness for mitigation and to implement risk reduction measures. Allocating responsibility and resources among partnered stakeholders can be challenging, divisive and even disempowering rather than empowering.
3) This approach depends on collaboration among all parties. Experience suggests that collaboration is much harder to achieve in practice than in theory.

How Might the Empowerment Approach Look In Five Years?

Local Communities

- Communities would be key players in a public awareness strategy.
- Communities would develop mitigation action plans and programs to focus resources and generate motivation to improve community mitigation efforts.
- Communities would adopt goals that are broader than local loss reduction and increase awareness of the links between natural hazards and social resiliency.

Stakeholders

- Stakeholders would support communities to compile information on local hazards and implementation of mitigation projects.
- Businesses and other stakeholders would promote awareness of hazard risk and mitigation solutions among customers and the general public.
- Stakeholders would contribute to recommendations on mechanisms and tools for partnership arrangements.

Provinces and Territories

- Provinces and territories would collaborate with local governments and stakeholders to identify local hazards and determine mitigation priorities.
- Provincial and territorial governments would support community planning initiatives and proposals. They would adopt incentives and disincentives to encourage mitigation and develop administrative structures to support implementation of mitigation programs and priorities.
- Provinces and territories would identify mitigation gaps, overlaps and priorities within their jurisdictions and determine measures to address mitigation needs.

Government of Canada

- The federal government would design and implement an all-hazards awareness, training and education program in consultation with all stakeholders and conduct on-going public awareness campaigns. Mitigation successes would be communicated to decision-makers, government agencies, business and industries, and private citizens through OCIPEP.
- The federal government would work in collaboration with provinces and territories to support local disaster mitigation initiatives.
- The federal government would compile an inventory of mitigation stakeholders and would work with interested partners to determine and encourage appropriate partnership arrangements that maximise resources for mitigation activities.

Glossary

All-hazards: comprehensive approach to managing emergencies and disasters whatever their trigger (natural or human-induced).

Collaboration: a mutually beneficial and well-defined relationship entered into by two or more individuals, groups, organisations, agencies, departments or others

Comprehensive Emergency Management: a holistic approach to managing emergencies and disasters that requires mitigation, preparedness, response, and recovery be considered in the development of emergency management programs.

Mitigation: sustained actions to reduce or eliminate the long-term impacts and risks associated with natural and human-induced disasters; activities that will reduce an area's vulnerability to damage from disasters.

Natural Hazards: elements of the physical environment (such as atmospheric, hydrologic, and geologic hazards) that are harmful to people and are caused by forces extraneous to them.

Non-structural Mitigation: mitigation measures which do not directly involve the modification of existing physical structures or the development of new ones such as land-use zoning or upgrading building codes.

Preparedness: developing effective policies, procedures and plans to facilitate the management of an emergency or disaster.

Recovery: activities aimed at restoring normal community functioning after an emergency or disaster.

Response: actions taken before, during or directly after and emergency occurs. Actions are usually initiated after a warning is received and are short term.

Resiliency: the ability of a locale to withstand an extreme natural event without suffering devastating losses, damage, diminished productivity or quality of life and without a large amount of assistance from outside the community.

Stakeholders: those groups other than levels of government, i.e. academics, non-government organizations, aboriginal groups and the private sector.

Structural Mitigation: physical measures taken to limit exposure of people and structures to hazards or limit their impact when they occur such as dykes, dams, and building retrofitting.

Note: The terms defined in this glossary are not all encompassing. They are intended to help readers understand the intent of the Guide.

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The Role and Mandate of OCIPEP, OCIPEP, 2001.

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Appendix 1: Useful Disaster Mitigation Web Sites

Canadian

OCIPEP: www.ocipep-bpiepc.gc.ca

Canadian Natural Hazards Assessment Project: www.msc-smc.ec.gc.ca

Institute for Catastrophic Loss Reduction: www.iclr.org

Insurance Bureau of Canada: www.ibc.ca

Natural Resources Canada on Climate Change: www.nrcan.gc.ca

International

Australia: www.ema.gov.au

United States: www.fema.gov

New Zealand: www.mcdem.govt.nz