Institute for Catastrophic Loss Reduction
Building resilient communities

Institut de Prévention des Sinistres Catastrophiques
Construction de resilient communities

The ICLR Strategic Plan 2011 *to* 2015

November 2010

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2011 *to* 2015

Prepared by the Institute for Catastrophic Loss Reduction

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The Stategic Plan

Kathy Bardswick, Board Chair

The Strategic Plan 2011-2015 is an ambitious but achievable program designed to guide ICLR to the next phase in its evolution. In doing so, it will improve our understanding of our ever-changing risk universe, advance the ongoing dialogue about our need to adapt to this new reality and, ultimately, help protect people and property.

To maximize its effectiveness, an organization with as broad a mandate as reducing losses due to catastrophes needs to identify and focus on priorities; that is precisely what this five-year plan does. Work during this period will focus on four major hazards: water damage, severe wind, urban earthquake, and wildfire near built-up areas. Each of these perils represents a major and very distinct challenge for the insurance industry, governments and related institutions.

Water damage has recently become the most costly type of property damage in Canada. Much of it is covered by private insurance, but not all. In a minority of cases, governments step in with financial assistance for uninsured damage. This patchwork approach leads to public confusion and frustration.

ICLR has already proven itself as a world-class research institute in the area of the effects of severe wind on structures. By building upon its previous work, it can provide validated scientific research that will help improve building design and construction across the country and beyond.

The looming threat of a major earthquake in a Canadian city is a very real risk we must prepare for. Risk management work, including a thorough assessment of our vulnerabilities and mitigation strategies will be another priority research area for ICLR.

Wildfires and their growing potential to devastate urban centres is an area of growing concern. It is a risk that has spread closer and closer to the urban interface in recent years. ICLR will work with its partners to better understand and manage this threat, and to raise awareness about it.

To meet its ambitious targets in addressing the risks of these four major natural hazards, ICLR will continue to excel in producing top quality research, building and leveraging effective partnerships, educating the industry and raising public awareness. For more than a decade, the organization has built a deserved reputation for excellence. With a clear vision and focused approach, the very capable team at ICLR will continue to excel in pursuing its mission of building resilient communities.

Kathy Bardswick
Board Chair
Institute for Catastrophic Loss Reduction

Our challenge

The 2010 World Disaster Report identified 4,000 disasters over the past decade that resulted in one million fatalities around the globe and unprecedented economic losses approaching US$1 trillion. In Canada natural hazards resulted in few fatalities over this period, but disaster damage and insurance claims continue to increase at an alarming pace.

The risk of death or injury due to flood, earthquake, windstorm, lightning or other natural hazards is low and falling in Canada and most affluent countries. However, in almost every country, including Canada, property damage and economic losses continue to increase rapidly. Many factors affect this international trend including more people and property located in areas of high risk, aging infrastructure, and the increasing frequency and severity of extreme weather events.

Scientific research can provide the knowledge that can be the foundation to help decision makers invest in public safety and disaster risk reduction. Yet the challenge remains to translate emerging knowledge into effective action.

The Institute for Catastrophic Loss Reduction was established by Canada's insurers at the University of Western Ontario to provide a forum for leaders in the disaster safety research community to work directly with insurance leaders to better understand the factors contributing to the alarming trend of increasing damage due to natural hazards, and to champion actions to build resilience to disasters.

Our early successes

■ Safety research provides a scientific foundation for society to take action to reduce the risk that a natural hazard strikes a vulnerable community and becomes a disaster. Through investments in preparedness we can build disaster resilient communities. ICLR has established itself as a world-class centre for disaster safety research and communications, championing disaster resilience in Canada and around the world.

■ Over its first 13 years, the insurance industry invested $7 million to support the Institute, while 30+ participating researchers secured an additional $65 million in research support, and completed 400+ publications on hazard research and disaster safety. ICLR associates are recognized as leaders in disaster safety research with respect to flood, earthquakes, severe wind and wildfire. In particular, team members are leaders in wind engineering, and have built the best wind research facilities in the world with the Insurance Research Lab for Better Homes (IRLBH), the Boundary Layer Wind Tunnel (BLWT), and the soon-to-be-completed WindEEE Dome.

■ The Institute has established working partnerships with local, provincial and national stakeholders across Canada and internationally, further enhancing ICLR's capacity to use emerging research to champion actions to build disaster resilient communities. In particular, ICLR hosted the 4th International Symposium of Flood Defence. Also the Institute has established itself as a leader working with municipal governments to champion homeowner participation in basement flooding risk reduction. In addition, ICLR is working with the Government of Ontario to identify potential reforms in the building code to reduce the risk of damage to homes due to climate change and severe weather.

■ ICLR has established a strong working relationship with member insurers, with more than 3,000 participants in the Institute's workshop program, while more than 80 percent of member insurers participate on the Insurance Advisory Committee to work directly with leading researchers to guide the Institute's research and communications. Moreover, ICLR continues to work with individual insurers to support specific initiatives including a partnership with The Cooperators to champion the design and construction of disaster resilient homes, with Allstate Canada to promote emergency preparedness, with Swiss Re to identify actions required to make flood an insurable peril for homes, and with Lloyd's of London concerning opportunities to reduce the risk of damage when a major earthquake strikes in Canada.

■ The Institute is also working to enhance public awareness of actions that reduce the risk of losses from earthquakes and severe weather. ICLR has retrofited more than a dozen homes, childcare centres and community centres across Canada to showcase the actions that property owners can take to improve their resilience to natural hazards.

■ The Institute completed its 13th consecutive year within budget.

Planned Activities for 2011-2015

ICLR's new five-year plan (this document) concentrates on turning emerging research into actions that build disaster resilience. Our primary focus is on four major hazards – urban earthquake, water damage, severe wind, and wildfires near the urban interface. We seek to secure and share scientific knowledge that will support action to reduce the risk that these hazards cause harm.

Water damage claims have emerged as the largest cost facing Canada's insurers. This follows several decades of rapid increases in damage due to sewers backing up and other forms of basement flooding. Moreover, many forms of water damage, like flooding, are not covered by private insurance and represent a growing challenge for governments. ICLR provides leadership to address these issues through its documentation of best practices to reduce the risk of basement flooding, and research into actions required if flood damage to homes is to become an insurable risk in Canada.

Flood damage in Peterborough, Ontario, 2004.

Water damage will remain a priority for the Institute over the next five years. ICLR will continue to work with municipal officials who provide advice to residents about the best actions to reduce the risk of damage. The Institute will also continue to work with the Insurance Bureau of Canada (IBC) as that organization seeks to develop a municipal risk assessment tool to measure the effectiveness of municipal storm water infrastructure. ICLR will also support efforts by IBC to explore the idea of flood insurance for homeowners. Most importantly, the Institute will continue to work with member insurers working to better understand and manage water damage, including the development of new information brochures that member insurers may choose to share with policyholders to reduce the risk of damage claims.

It is inevitable that a major earthquake will eventually strike a major urban centre in Canada. The Institute is working with Lloyd's to promote greater awareness of this peril, and seek out options for reducing our current vulnerability. ICLR is also working with the Canadian Seismic Research Network to reduce the vulnerability of Canadians to a major earthquake. Over the next three to five years we will work with Network researchers to make available earthquake hazard maps that will include new, detailed soil information for Vancouver, Montreal, Ottawa, Victoria and Quebec City. New tools will be developed for the engineering and insurance communities to assess seismic vulnerability and identify specific retrofit options for older buildings. Emerging seismic safety knowledge will be introduced in future changes in the building code. ICLR has accepted IBC's invitation to help guide a research project that may provide a current assessment of potential economic losses that would result from a major earthquake in Canada.

Severe wind represents the most active field of ongoing research for ICLR. Our objective is to support research that will provide the foundation for reform in the Canadian Building Code and change building design and construction practices across the country. Priority research will focus on actions required to reduce the risk of wind damage to roofs, prevent water infiltration that leads to mould, and testing emerging technologies including new designs for nails. Research in the lab will continue to be verified by active field research when buildings are damaged and the analysis of insurance information to best prioritize the research.

ICLR will also actively work to assess the growing risk of a wildfire destroying an urban area in Canada. Billion dollar loss events have increased in frequency and severity in the United States, Australia and Europe, and could strike in Canada. The Institute will continue to work with the wildfire research community, the Canadian Forest Service, provincial governments and municipal leaders. In particular we will seek to increase the awareness of the insurance industry about the increasing risk of loss and make established tools, like ***FireSmart***, available to champion loss prevention.

The Institute for Catastrophic Loss Reduction

The Institute for Catastrophic Loss Reduction (ICLR) is a world-class centre for multi-disciplinary disaster prevention research and communications. ICLR was established by Canada's property and casualty insurance industry as an independent, not-for-profit research institute affiliated with the University of Western Ontario. Institute staff and research associates are international leaders in wind and seismic engineering, atmospheric science, risk perception, hydrology, economics, geography, health sciences, public policy and a number of other disciplines.

Mission

To reduce the loss of life and property caused by severe weather and earthquakes through the identification and support of sustained actions that improve society's capacity to adapt to, anticipate, mitigate, withstand and recover from natural disasters.

Principles

- the threat of severe weather and earthquakes is increasing, sustained action can reduce catastrophic losses.
- Hazard assessment and risk identification are the cornerstones of catastrophic loss mitigation.
- Solid, applied research provides an essential foundation for effective action to reduce future losses.
- Those who knowingly choose to assume greater risk must accept an increased degree of responsibility for their choice.
- Communication with the public before a peril strikes is an important means of reducing losses.
- Local and individual actions are the most effective means of reducing the loss of life and property.
- Partnership is the best approach to resolving shared problems, particularly public safety concerns.

Governance

The Institute for Catastrophic Loss Reduction began operations in Toronto in January 1998 as an independent, not-for-profit research institute. Letters Patent were received in July 1999 and the Institute was incorporated in September 1999 under the Canada Corporations Act. Also in 1999 ICLR established a formal partnership with the University of Western Ontario, opening an office on campus in September 1999.

Oversight of the Institute is the responsibility of a Board of Directors. The Board includes up to nine members – between three and five members elected by members of the Institute; between one and three members appointed by the President of the University of Western Ontario; and the Executive Director. Directors are elected annually at the annual meeting of members.

The Board sets the strategic direction of the Institute; prioritizes issues to be addressed; builds consensus among the membership; represents the interests of the industry; ensures that the operations of the Institute are effective and efficient and guided by the Institute's mission; and, evaluates, on a regular basis, the performance of the Executive Director.

The Board has established two Committees. The Insurance Advisory Committee was established in 2008 and provides a forum for the Institute's senior researchers to work directly with insurance industry leaders to guide ICLR's research and communications work. The Research Advisory Committee is presently inactive. It was established in 1999 to help the Board manage the allocation of $2.5 million in research funds provided to the Institute between 1999 and 2004. The Board has retained responsibility for audit, nominations and all other governance activities.

Board Guidelines set out how business is conducted by the Board. The Guidelines were prepared to assist all Directors, with a particular focus on new Directors, as they work to ensure that the Board is run effectively and that the interests of the membership are protected.

In January of each year, the Chair asks directors, via a questionnaire, to make comments as to whether the Board of Directors has fulfilled its objectives. Directors are asked to comment on the performance of the Board as a whole. The Chair summarizes the input of all directors on an anonymous basis and reports to the full Board of Directors at the May meeting. Time is set aside at that meeting for a discussion of Board performance. The questions raised are suggestions of the types of issues Directors may want to consider, however, Directors are encouraged to comment on any issue regarding Board of Directors performance.

Finally, the Board is continuously involved in strategic planning for the Institute. Each spring the Board reviews the Institute's performance with respect to its finances, human resources, research and communications. In January 2010, the Board dedicated a full day to strategic planning, working to establish a new five-year strategic plan. Each fall the Board discusses and determines the plan and budget for the coming year, within the context of the established five-year strategy.

Insurance Advisory Committee

The Insurance Advisory Committee was established in late 2008 to provide a forum for ICLR's senior researchers to work directly with leaders from the insurance industry. The Committee meets quarterly in Toronto or London. All of ICLR's senior researchers attend Committee meetings, depending on the subject addressed. All ICLR member insurers are invited to send staff to Committee meetings and presently almost 80 percent chose to do so regularly. Most industry participation is from senior officials involved in underwriting or claims.

Committee members have chosen to focus each meeting on one topic. The initial topics addressed include urban earthquake hazards in Canada; water damage; severe wind; wildfire; and building codes. The Committee establishes specific action items that ICLR can address through research and communications.

Some early outcomes driven by the Committee include development of a handbook setting out actions that can be taken to reduce the risk of basement flooding, and participation in the revision of the Ontario Building Code.

The handbook has established the insurance industry, through ICLR, as leaders in the effort to reduce the risk of basement flooding. It has been circulated to municipal officials across the country. Several insurance companies are using this information to educate their policyholders. ICLR has also partnered with Toronto, London, Hamilton and several other communities to jointly champion homeowner participation in actions to reduce the risk of basement flooding. This has included demonstration retrofits and community research.

ICLR has requested, on behalf of the insurance industry, three changes in the Ontario Building Code. We propose that all new homes should have:
1. a backwater valve to reduce the risk of basement flooding;
2. roof panels should be nailed every 6 inches to reduce the risk of severe wind damage; and
3. tie down straps should be used on snout-nose garage roofs.

This represents a first step towards a broader effort for the insurance industry to use emerging research to influence the building code across Canada to reduce the risk of damage from earthquakes, severe wind, water damage and wildfire.

The Committee has reviewed and endorsed the Builders' Guide under ICLR's ***Designed for Safer Living*** program. It also established a long-term strategy to promote wildfire safety, including endorsement of the ***FireSmart*** program developed by Partners in Protection. And the Committee has established research and communications priorities for ICLR for promoting resilience to urban earthquakes.

Committee members

Carol Jardine (TD Insurance) Chair

Tracy Waddington (ICLR) Secretary

Research members

Gail Atkinson (UWO)

Mike Bartlett (UWO)

Hanping Hong (UWO)

Grant Kelly (ICLR)

Greg Kopp (UWO)

Paul Kovacs (ICLR)

Gordon McBean (UWO)

Glenn McGilivray (ICLR)

Dan Sandink (ICLR)

Slobodan Simonovic (UWO)

Kristy Tiampo (UWO)

Insurance members

Francoise Boulanger (RBC Insurance)

Nicole Bellefleur (The Cooperators)

Elizabeth Bronson (The Dominion)

Troy Bourassa (Alberta Motor Association)

Paul Cutbush (Swiss Re)

Robert Doiron (Peace Hills)

Gina Ferris (White Mountains)

Ed Forbes (Dufferin Mutual)

Don Keefe (Temple/Munich Re)

Tracy Laughilin (Intact)

Jocelyn Leflamme (Desjardins)

Glenn Matheson (Gore)

Terry Mossman (State Farm)

Rocco Neglia (Economical)

Ina Prugo (Zurich)

Kevin Smart (Aviva)

Laurens Van Eijk (Allianz)

Mike Wallace (RSA)

Daryl Wiebe (Marsh)

Wayne Wyborn (Portage Mutual)

Partners

Partnership is the best approach to resolving shared problems – particularly public safety concerns. ICLR has established strong working relationships with numerous parties.

Current partners

– The University of Western Ontario

Local

– City of London
– City of Toronto - Toronto Water / Toronto Environment Office

Provincial

– Alberta Emergency Management Agency
– Emergency Management Ontario
– Ontario Ministry of the Environment
– Ontario Ministry of Municipal Affairs and Housing

National

– Canadian Red Cross
– Canadian Forest Service
– Environment Canada - Meteorological Service of Canada
– Federation of Canadian Municipalities
– Health Canada
– Insurance Bureau of Canada
– National Research Council of Canada
– Natural Resources Canada - Geological Survey of Canada
– Partners in Protection - ***FireSmart***
– Public Safety Canada

International

– Disaster Prevention Research Institute, Kyoto
– Institute for Business and Home Safety, Tampa
– International Flood Initiative, UNESCO, Tsukuba
– International Strategy for Disaster Reduction, United Nations, Geneva
– Intergovernmental Panel on Climate Change, United Nations, San Francisco
– Integrated Research on Disaster Risk Programme, International Council for Science, Beijing
– United Nations Environment Programme Finance Initiative, Geneva
– World Weather Research Program, SERA programme, WMO, Geneva

Our people

ICLR's research team includes:

Paul Kovacs (Founder and Executive Director) and an economist specializing in insurance issues, natural disaster loss prevention, and public policy. Canada's expert on insurance and climate change. He is President and CEO, PACICC and Adjunct Research Professor, Economics, UWO. Since 1997 he has been an active participant with the UN/WMO Intergovernmental Panel on Climate Change.

Dr. Gordon McBean (Director, Policy Studies) and professor in the Departments of Geography and Political Science at UWO. He is a leading expert on climate change, its impacts and response strategies. He is the former Assistant Deputy Minister for the Meteorological Service of Canada and has worked with colleagues around the world on weather and climate. He is Chair of the Canadian Foundation for Climate and Atmospheric Sciences, and Chair of the hazard research program at the International Council for Science (ICSU).

Dr. Slobodan Simonovic (Director, Engineering Studies) and professor in the UWO Department of Civil and Environmental Engineering. He is a leading expert on flood prevention and management issues. He has been very involved in risk and adaptation strategies around the world. He was a member of the International Joint Commission's Red River Task Force and is serving as an officer for a number of national and international water organizations.

Dr. Ron Stewart, Department Head, Department of Geography, at the University of Manitoba. He is the former MSC/ICLR Industrial Research Chair in Extreme Weather. Ron is leading the study of hydrometeorlogical extremes around the world, including the examination of Prairie drought in Canada.

Dr. Mike Bartlett, Associate Chair and Associate Professor, Civil and Environmental Engineering Department, UWO. He is a registered Professional Engineer in British Columbia, Alberta, Yukon and Ontario. His research focuses on housing damage caused by natural hazards (snow loads, high winds and earthquakes), structural safety (resistance to heavy loads and stresses) and structural engineering (new construction materials and recycling in construction applications).

Dr. Kristy Tiampo, Aon Benfield/ICLR Industrial Research Chair, Earthquake Hazard Assessment, Associate Professor, Earth Sciences, UWO. Her research focuses on reducing losses from Canada's next earthquake through the assessment of earthquake damage risk over shorter time periods, i.e. the next five or ten years. She is developing comprehensive simulation models to assess near term seismic risk in British Columbia, Quebec and elsewhere.

Dr. Greg Kopp, Canadian Research Chair in Wind Engineering with the Faculty of Engineering at UWO. He is a leader in the studies of wind engineering and the response of structures to full-scale loads. His study of the response of structures to wind includes research in the two laboratories (BLWTL and IRLBH), and extensive field research.

Dr. Gail Atkinson, Canadian Research Chair in Earthquake Hazard and Ground Motions with the Department of Earth Sciences at The University of Western Ontario. An international leader in engineering seismology. She is working to enhance building codes, advance community preparedness and map seismic vulnerability.

ICLR Staff

Paul Kovacs (Founder and Executive Director) is an economist specializing in insurance issues, natural disaster loss prevention, and public policy. Canada's expert on insurance and climate change. He is President and CEO, PACICC and Adjunct Research Professor, Economics, UWO. Since 1997 he has been an active participant with the UN/WMO Intergovernmental Panel on Climate Change.

Grant Kelly (Director, Climate Change Adaptation Projects) joined ICLR in January 2010. Prior to joining ICLR, he was the Director, Policy and Chief Economist at Insurance Bureau of Canada. He has more than 10 years experience in developing public policy and project management. He led the insurance industry project that resulted in forming ICLR. He will be providing project management for ICLR's contribution to the Regional Adaptation Collaborative (RAC) project.

Glenn McGillivray (Managing Director) joined ICLR in November 2005 after more than 11 years with Swiss Re, most recently as assistant vice president of corporate communications and corporate secretary. He has 20 years of corporate communication experience in the property and casualty insurance industry. His main duties centre around "getting the word out" on major ICLR projects and initiatives.

Dan Sandink (Manager of Resilient Communities and Research) joined ICLR's Toronto office in 2006 following graduate work at the University of Western Ontario. Dan's work is largely in the area of the human dimensions of hazards, particularly the social aspects of urban flooding. At the ICLR, Dan is responsible for the development of a community level disaster resilience program, which aims to increase the capacity of municipalities in Canada to mitigate natural hazard risk. Dan has authored and co-authored several reports and articles on urban flood risk, public hazard risk perceptions, disaster risk management, and climate change adaptation. He has also presented his research at professional and academic conferences and has presented lectures on urban flood perceptions at the University of Western Ontario and the University of Waterloo.

Tracy Waddington (Manager, Administration and Corporate Secretary) Tracy has been with the Institute for the past six years and has managed several projects for ICLR, including: the establishment of a committee to oversee the Designed for Safer Living Program; retrofitting of a home in Vancouver for presentation to the media during Emergency Preparedness Week; and conducting a member review of ICLR's new Open for Business™ program providing business continuity planning tools for small business). In 2004, Tracy completed a three-year course in association management sponsored by the Canadian Society of Association Executives and in 2005 she completed a Board Governance course.

Greg Oulahen (Research Associate) joined ICLR in May 2008 upon completion of graduate studies in geography at the University of Waterloo. Greg's research has concentrated on hazard mitigation through land use planning, and includes a detailed investigation of the role of citizen participation in planning for flood reduction in Peterborough, Ontario. His current research is focused on advancing hazard mitigation and emergency preparedness through public policy, identifying options to support municipal infrastructure investments that appropriately address the risk of climate change, and assessing actions required to make flood insurable for Canadian homeowners. In addition to his academic background, Greg also brings varied experiences gained from working in municipal planning departments and rebuilding homes on the Gulf coast after Hurricane Katrina.

Research Associates

Lindsay Anderson	(Cornell, Engineering)
Jean Andrey	(Waterloo, Geography)
John Braun	(UWO, Statistics/Actuarial)
Don Burn	(Waterloo, Engineering)
Luc Chouinard	(McGill, Engineering)
Jim Davies	(UWO, Economics)
Matt Davison	(UWO, Mathematics)
David Eaton	(Calgary, Earth Sciences)
Hesham El Naggar	(UWO, Engineering)
Ashraf El Damatty	(UWO, Engineering)
Horia Hangan	(UWO, Engineering)
Dan Henstra	(Windsor, Political Science)
Hanping Hong	(UWO, Engineering)
Diana Inculet	(UWO, Engineering)
Judith Kulig	(Lethbridge, Health Sciences)
Howard Kunreuther	(Wharton, Economics)
Ryan Lee	(Calgary, Risk Studies)
Tara McGee	(Alberta, Earth/Atmospheric)
Craig Miller	(UWO, Engineering)
Brian Mills	(Waterloo, Geography)
Gerry Moschopoulos	(UWO, Engineering)
Brenda Murphy	(Laurier, Geography)
Tim Newson	(UWO, Engineering)
Norma Nielson	(Calgary, Risk Studies)
David Rosowsky	(Oregon, Engineering)
Andy Sancton	(UWO, Political Science)
Eric Savory	(UWO, Engineering)
James Scott	(Toronto, Engineering)
Dan Shrubsole	(UWO, Geography)
Kevin Simmons	(Austin College, Economics)
Al Slivinski	(UWO, Economics)
Dan Sutter	(Oklahoma, Economics)
Keith Thompson	(Dalhousie, Oceanography)
Peter Vickery	(UWO, Engineering)
Ernest Yanful	(UWO, Engineering)
Robert Young	(UWO, Political Science)
Maged Youssef	(UWO, Engineering)

Priorities for 2011-2015

ICLR's research and communications efforts seek to build disaster resilient communities; champion safer design and construction of buildings; and promote increased investment in public infrastructure. These efforts largely focus on four hazards – urban earthquakes; water damage; severe wind; and wildfire. ICLR's work is organized around four key result areas – quality research, effective partnerships, industry education and consumer awareness.

Building resilience to large urban earthquakes

Quality research

ICLR supports research that will reduce the risk of loss from a large earthquake in a major urban centre like Vancouver, Montreal or Ottawa. It is inevitable that an earthquake will strike, nevertheless it is possible to significantly reduce the risk of losses through the application of modern seismic engineering knowledge and emergency preparedness.

Kristy Tiampo is a leader in the identification of earthquake hot spots. These are regions where the near-term risk of a large earthquake is elevated. She is working to complete her analysis of the risks in British Columbia, Quebec and eastern Ontario. This research program is funded by the government of Canada, Aon/Benfield and ICLR. Dr. Tiampo is also working with Aon/Benfield to identify the sources of volatility in earthquake models used by insurance companies in Canada.

Gail Atkinson is leading a number of research projects that have been identified as priorities by ICLR's Insurance Advisory Committee. Dr. Atkinson is leading the Canadian Seismic Research Network team that is conducting soil analysis in Vancouver, Montreal, Ottawa, Quebec City and Victoria, to provide more detailed earthquake hazard maps. This information will be useful for the seismic safety design of new buildings, guiding earthquake retrofits efforts, and underwriting insurance coverage. Dr. Atkinson is also working to improve the timeliness and quality of seismic maps generated immediately after an earthquake strikes in Canada under the real-time ShakeMap program, and to strengthen HAZUS as a tool for emergency management professional to anticipate the damage that will result from a major earthquake.

ICLR continues to work closely with Canadian Seismic Research Network members who are leading a five-year research project to identify actions that will reduce the risk of damage from a major urban earthquake in Canada. This includes assessments of the seismic vulnerability of schools, emergency shelters, hospitals and bridges; a rapid assessment tool for buildings based on year and type of construction; and the evaluation of seismic retrofit options for buildings and essential infrastructure. In particular, ICLR is working with the Network to secure increased funding to enhance the communication of its finds to stakeholders including engineers and insurers.

The Institute would like to update its pioneering analysis of the risk of fire following a major earthquake in Vancouver, and perhaps commission research into the risk of fire in Montreal. The research by Charles Scawthorne published by ICLR in 2001 included specific advice about actions that would reduce the risk of fire in Vancouver and it would be useful, if funding is available, to determine the extent that these opportunities have been addressed. We are not aware of any formal research into the risk of fire in Montreal or any other major centres across Canada.

Insurance Research Lab for Better Homes at University of Western Ontario.

Also ICLR would like to update its earlier work assessing the vulnerability of underground infrastructure. City engineers reported to ICLR in 2002 that it would take months to rebuild sewers and other buried infrastructure after a major earthquake, yet current vulnerability studies are focused on schools, hospitals and bridges. Research by ICLR may bring greater attention to the poor health of Canada's infrastructure.

Effective partnerships

ICLR continues to work closely with the Canadian Seismic Research Network, the Geological Survey of Canada, the Insurance Bureau of Canada and provincial agencies responsible for emergency management to advance our earthquake resilience work. The Network provides important research information. The Geological Survey is the federal source of earthquake hazard analysis and a key organization driving reform to the National Building Code.

The Bureau is leading the insurance industry's advocacy and public relations work, and is an important partner working to identify research needs and realize consumer education opportunities. ICLR has accepted the Bureau's request to help explore and jointly manage a research project to obtain a current estimate of the potential impact of a major earthquake in British Columbia.

Over the next few years there is an opportunity for ICLR to share our work more actively with provincial emergency management officials in vulnerable provinces like British Columbia, Quebec and Ontario. These officials have been directed to move beyond their traditional focus on preparedness to respond to future emergencies, and begin to address loss prevention and mitigation. This transition has proven to be difficult in practice, and ICLR's knowledge may be helpful.

Industry awareness

ICLR is working with Lloyd's to prepare a research paper to identify options for reducing the risk of damage from a major earthquake in Canada. The paper will identify lessons that can be learned from the recent tragic events in Haiti and Chile, stressing the importance of building codes, emergency preparedness and a healthy infrastructure. The paper will strengthen awareness in the Canadian insurance industry of the exposure in British Columbia and Quebec.

The Institute has launched a program to use our research to work with the insurance industry to influence the building code in Canada, working to enhance the resilience of new buildings to damage from an earthquake. Our seismic safety design and construction knowledge will also be included in a Builders' Guide as part of ICLR's ***Designed for Safer Living*** program, encouraging the early adoption of reforms.

We will also update the Institute's advice for enhancing seismic safety in existing buildings, and make this information available to member insurers who want to share loss prevention advice with policyholders.

Consumer education

The Institute operates a showcase program where we retrofit a building to enhance its resilience to local hazards then work with the media to share our safety knowledge with the public. ICLR has completed seismic safety retrofits to homes in Vancouver, Montreal and Ottawa; to a community centre in Victoria; and to a childcare centre in Vancouver. We look to continue this program.

Paul Kovacs discusses ICLR programs with the media in Sudbury, Ontario.

We will also work with our sister organization in the United States, the Institute for Business and Home Safety (IBHS) to identify options for promoting more aggressive retrofit options for homeowners with our ***Designed for Safer Living*** program.

Building resilience to water damage

Quality research

Though ICLR has made significant progress in water damage research, particularly climate change, extreme events and basement flood reduction, there is continued opportunity to develop and apply new information in water damage reduction. Research over the next five years will focus on understanding the conditions that result in urban flooding and water damage, and methods that can be applied to reduce water damage risk.

For a number of years ICLR has been working to understand how homeowners are involved in urban flood mitigation, and methods that can be applied to increase public engagement in basement flood reduction. A primary tool that has been applied is large sample surveys, which have been conducted in Peterborough, Toronto, Edmonton, and London. Over the next five years, ICLR will continue to identify opportunities to understand homeowner perceptions of basement flooding, and how homeowners interact with education tools to increase awareness and willingness to engage in flood reduction.

Dr. Slobodan Simonovic continues active research in water resources systems management, climate change impacts and risk analysis. Dr. Simonovic is leading a study of vulnerability of infrastructure to climate change in the City of London. The study will provide an assessment of the vulnerability of the City of London's infrastructure to climate change, based on a unique modelling approached developed by the study team. The project has already been recognized as a pioneering approach to climate change adaptation, and has resulted in some initial changes in the City of London's approach to stormwater management. This research has established Dr. Simonovic as an innovator in climate change adaptation, and will open further research opportunities. Dr. Simonovic is also applying his expertise in urban flooding to the development of the Insurance Bureau of Canada's urban flood risk assessment tool.

GTA rainstorm, August 2005

In 2010, ICLR – in partnership with Swiss Re – completed a major study that identified how the insurance industry in Canada could insure overland flooding for homeowners. The study identified international approaches to overland flooding, and identified the UK approach as the best model on which to build for Canada. The UK approach may help a Canadian approach avoid problems associated with mutuality and economic viability that has been experienced in other countries. Over the coming years, ICLR will continue to work on applying the findings of this study.

Dr. Ron Stewart continues research into extreme events, including drought and extreme rainfall in the prairies. Specifically, Dr. Stewart examined the interconnectedness of extreme rainfall events and drought, with a focus on an extreme rainfall in 2002 that affected a larger portion of Canada and was aggravated by the drought conditions in existence when it occurred. This research has implications for the management of extreme dry situations which may be followed by extreme precipitation.

ICLR's Handbook for Reducing Basement Flooding has met with a great deal of interest and has widely been adopted as a primary education tool by municipalities, provinces and insurers. In the next five years ICLR will revisit and update the handbook with the latest technologies and practices for basement flood reduction. Further, ICLR will pursue research on the legal implications of large scale urban flood events, and how bylaws can be applied to increase homeowner uptake of basement flood reduction measures.

Effective partnerships

ICLR has developed local, national and international partnerships to promote disaster mitigation. ICLR will continue to build on our existing partnerships and leverage our success to develop new partnerships.

Many Canadian communities have implemented active basement flood reduction programs, which include both municipal infrastructure and homeowner participation components. However, homeowner education programs have been met with varying success, and the advice from ICLR on how to increase homeowner engagement is frequently requested by municipalities. Over the coming years, ICLR will develop a package of best practices in basement flood communication to assist municipalities in the development and implementation of homeowner engagement programs.

Some of the most knowledgeable experts in basement flooding are municipal engineers and planners who deal with the problem daily, and develop infrastructure and homeowner programs to reduce risk. ICLR will develop a forum in which municipal officials can discuss their approaches to urban flooding to ensure that best practices are identified and adopted throughout the country.

Partnership with UNESCO's International Flood Initiative is moving forward as Prof. Slobodan Simonovic has been appointed editor-in-chief of the UNESCO IHP book series on "Management of Water Related Disasters in a Changing Climate." The series will include four books on climate modelling, hydrologic modelling, hydraulic modelling and disaster risk management. Prof. Simonovic will author the book on disaster risk management. Through Prof. Simonovic's partnership with UNESCO, ICLR was one of three research partners endorsed by UNESCO. ICLR hosted the 4th International Conference of Flood Defence, and Prof. Simonovic will be supporting the 5th International Conference on Flood Defence in Japan in 2011.

Industry awareness

ICLR research has revealed that 25 out of 58 companies that cover sewer backup damage in Ontario and are tracked by the insurance rating service provider Compu-Quote consider basement flood mitigation measures when setting premiums, caps or deductibles, and when considering whether to grant or renew sewer backup or water escape endorsements. However, mitigation measures identified by some of these 25 insurers do not follow best practices for homeowner basement flood reduction, including professional plumber inspections, professional installation, downspout connections and when and how foundation drain disconnections should be employed. ICLR will work to increase insurer uptake of mitigation requirements on sewer backup related endorsements, and further identify shortcomings in insurer mitigation requirements. This work will help ensure that insurers are requesting the proper basement flood mitigation measures in sewer backup and water escape endorsements.

ICLR is working to develop a one-day urban flood symposium in 2011. The symposium will feature municipal engineers from several progressive Canadian municipalities who are working on both infrastructure and homeowner aspects of urban flood reduction, and will also feature the work of ICLR researchers on understanding various aspects of the problem of urban flooding. The symposium will be focused on an insurer audience, though professionals from other sectors will likely have an interest in attending.

ICLR will continue to work with individual insurers and the insurance industry on developing consumer education materials and means by which to engage consumers further in basement flood reduction. ICLR will continue to work with the Insurance Bureau of Canada and the Canadian insurance industry on developing a system whereby insurance can be provided for overland flooding for homeowners. As well, Friday Forums that feature practitioners and researchers involved in urban flooding will continue to be a tool for insurance industry education and engagement.

Consumer education

ICLR will develop several strategies to increase consumer awareness and engagement in basement flood reduction. Basement Flood Showcase homes, which include the retrofit of a home that is vulnerable to, or has experienced basement flooding and a media event will serve as a tool to increase general awareness for basement flooding and flood mitigation options. Simplified basement flood brochures based on the basement flooding handbook and best practices in Canadian municipalities will also be developed and distributed through municipalities and participating insurers.

ICLR's website will be updated to include interactive web-based tools for homeowners. The tools will show how basement flooding occurs and the role of different plumbing and construction measures in reducing flood risk. The tools will also show homeowners how drainage and plumbing in their own home affects their neighbours' flood risk and vice-versa. ICLR will also commission the building of a scale model

that can be used for consumer education campaigns. The model will show the interaction of home construction with municipal stormwater management systems, and how homeowners affect flood risk for themselves and their neighbours. ICLR will also develop other education tools, including videos of the installation of basement flood mitigation measures.

The institute will work on understanding the varying knowledge of different players involved in basement flooding. Homeowners interact with a number of key players, including insurance brokers, which may serve as opportunities to educate homeowners about basement flood mitigation. However, the level of knowledge of these players is unknown, and the experience of ICLR staff suggests that messages provided by insurance professionals and municipal officials may be conflicting. ICLR will investigate these issues and work on strategies to ensure that information provided to consumers in consistent regardless of its source.

Building resilience to severe wind

Quality research

All parts of Canada are subject to some type of severe wind hazard (hurricanes, tornadoes, downbursts, or severe thunderstorms) that can cause damage to buildings and public infrastructure. Fortunately, ICLR's partnership with the University of Western Ontario allows us access to Canada's leading wind researchers and the best wind research facilities in the world.

Tornado in Leamington, Ontatio, June 2010.

Severe wind represents the most active field of on-going research for ICLR with the majority of this research being funded by government agencies such as NSERC. It is intended that medium-term research priorities will support ICLR's efforts to make specific recommendations to strengthen Canada's building codes. Example research projects that are currently underway include:

1. Comparing the strength of different types of nails used in residential construction;
2. The role that trees play in causing damage and defusing wind;
3. Impact of construction errors (i.e. missing nails);
4. How wind can contribute to water infiltration around windows and the building envelope.

ICLR's capacity to support wind research will soon increase with completion of the Wind Engineering, Energy and Environment (WindEEE) Dome. ICLR researchers will be able to access the world's first hexagonal wind tunnel. Its large scale structure (25 meters diameter for the inner dome and 40 meters diameter for the outer return dome) will allow researchers to simulate a large variety of wind fields such as boundary layers, portions of hurricanes, tornados, downbursts, low level currents or gust fronts over extended areas and complex terrain.

Effective partnerships

In order to impact disaster resiliency, ICLR must partner with other groups where possible. Examples of successful partnerships include:

- ICLR has established partnerships with Environment Canada that allows researchers access to storm sites immediately following tornadoes. This field experience provides researchers valuable data to support practical research.
- Ontario Home Builders Association to communicate research findings to builders.
- In 2010, ICLR worked with Habitat for Humanity's London office to improve the disaster resiliency of three new homes.

Over the next few years, ICLR will seek to strengthen partnerships with the building industry and ICLR's ***Designed for Safer Living*** program will be an important driver of these partnerships. Potential partners include:

- Canadian Building Code Commission
- Provincial Building Code Officials
- Municipal Building Code Inspectors and Associations
- New home builders
- Canadian Green Building Council (CaGBC) (LEED program);
- General Contractors Associations
- Habitat for Humanity.

Wind damage in Leamington, Ontario, June 2010.

Industry awareness

As research becomes available, it will be shared with insurers with the goal of allowing them to improve underwriting of wind risks.

Over the next few years, ICLR will work to champion the insurance industry's issues to strengthen Canada's Building Code on wind risks (and other hazards where appropriate). The underlying theme of ICLR's research-based interventions will be the need to make buildings more resilient to wind.

In order for insurers to encourage Building Code changes, there will be a need for member companies to volunteer time to participate in the building code development process at the Canadian Commission on Building and Fire Codes. In order for these volunteers to actively participate, ICLR will need to develop, with the assistance of its Insurance Industry Advisory Committee, a systematic way for insurers to communicate problems within the current Building Code that are leading to increased claims. This will be used both to encourage research and to advocate for building code changes.

Consumer education

The Institute operates a showcase program where we retrofit a building to enhance its safety to local hazards and then work with the media to share our safety knowledge with the public. ICLR has completed tornado safety retrofits to an Edmonton home in 2000 to mark the twentieth anniversary of the 1987 tornado, a tornado retrofit in London and a hurricane retrofit in Halifax. Also the first Designed for Safer Living home built by The Cooperators in Prince Edward Island focused on engineering knowledge to enhance resistance to hurricane winds.

As part of its agreement with the Ontario Ministry of the Environment, ICLR will produce a homeowners' guide to provide advice to homeowners to protect their homes from wind risks.

Building resilience to wildfire

Quality research

Where fires were once primarily limited to wildlands, mostly occurring in places far removed from human activities, they are now having a direct impact on humans and their environment. ICLR actively supports research and education/communication strategies that will reduce the risk of loss from wildfires.

The Institute has commissioned Dr. John Braun of the University of Western Ontario to conduct research into the potential impacts on the insurance industry of a worst-case wildfire in Ontario's District of Muskoka. Dr. Braun has completed the first phase of his research and a full report will be published in the coming months.

ICLR will continue to work with Tara McGee of the University of Alberta in furthering her research into assessing community behaviour with respect to wildfire safety. Her research focus is on communities in Alberta and British Columbia that have experienced serious fire events. In November 2009, Dr. McGee provided ICLR with a completed paper entitled Human dimensions of fire management at the wildland-urban interface in Alberta: A summary report, which was published on the Institute's Website as research paper #46 in ICLR's Research Paper Series.

Dan Sandink is working to obtain data from the Canadian Forest Service's evacuation database in order to determine where historical fires have occurred, how many people have been impacted, which areas of the country have had more experience, which areas may be more vulnerable than others, and of the historical and potential impact of fire and wildfire-related evacuations on the insurance industry.

Over the past few years, ICLR has worked with the Canadian Forest Service, primarily to help it advance the Canadian Wildland Fire Strategy. In 2007, the Institute prepared a critique of and plan to further the Strategy and in early 2008, ICLR – in partnership with the Forest Service – hosted a meeting of wildland fire experts from Australia, Canada and the United States. The small and informal two-day meeting was designed primarily to share information among countries with common current and emerging fire issues. ICLR will continue to provide counsel and expertise to the Forest Service with the long view to better understanding the future role wildfire will play in the operations of governments, in the lives of everyday Canadians, and on the business of insurance.

Effective partnerships

Partnerships are the best approach to resolving shared problems, particularly public safety concerns. More than a dozen national and international organizations have committed to partnering with ICLR to reduce disaster fatalities, injuries and property damage, including joint research, sharing of information and communications.

With regard to wildfire specifically, ICLR is working with Partners in Protection, a wildfire safety program supported by the Alberta Department of Sustainable Development. Partners in Protection has established ***FireSmart*** as the national interface fire safety program for property owners and communities. The Institute has been enthusiastically welcomed into the partnership, and this will provide a foundation for our wildfire safety work.

ICLR continues to explore partnership opportunities with the Canadian Forest Service. Paul Kovacs spoke at the Wildland Fire Canada 2010 inaugural conference that will be held in Kitchener in October 2010. The Institute is also formally sponsoring the event.

Industry awareness

Notwithstanding the 2003 wildfire season in British Columbia, the Institute is of the opinion that the Canadian insurance industry may be too complacent about the potential for a major wildfire loss in the not-too-distant future. Hence, whenever possible, ICLR works to get messaging out that insurers need to consider the eventuality, first by becoming aware of the risk and of vulnerable areas of the country and, second, by including wildfire in pricing relevant risks. As part of this messaging, Paul Kovacs wrote an article for Canadian Underwriter (Burning issue – January 2008) and Glenn McGillivray was quoted in Canadian Underwriter's Online news addressing the Institute's concerns (Wildfire risk underpriced in Canadian market – March 26, 2010).

The Institute is also working to spread awareness within the insurance industry of the Canadian Wildland Fire Strategy and the important need to get funding for the plan as soon as possible, as well as awareness with regard to the availability of and need for better tools (including maps) to monitor and assess wildland fire risk.

Much of this work is done via ICLR's Insurance Advisory Committee. The Committee recently endorsed the ***FireSmart*** homeowners manual as the handbook approved by member insurers setting out actions to reduce the risk of wildfire damage.

Also, for the first time, ICLR will conduct a Friday Forum seminar in 2011 which will provide a forecast and outlook of the upcoming fire season. The Institute plans to make this an annual event in its successful seminar series.

Consumer education

ICLR's largest annual consumer education initiative revolves around our participation in Emergency Preparedness Week held on the first week of May each year. In 2010, we provided a ***FireSmart*** tour in Jasper, Alberta. Tracy Waddington worked with the Deputy Fire Chief in Jasper to coordinate the tour. The insurance industry and the media were invited to see how this community has increased its application of wildfire mitigation to decrease the risk of damage. The Insurance Bureau of Canada actively and generously worked to support this event. The Bureau filmed the retrofit and produced a video media release that will recognize the joint contributions of ICLR and IBC. The video is avalable on YouTube.

ICLR will continue to support and disseminate the Partners in Protection ***FireSmart*** material. The Institute also plans to produce a new wildfire hazard safety brochure to provide tips to homeowners on how to prevent wildfire damage to their properties.

Conclusion

Nature's extreme events can be relentless and unforgiving, but need not result in disasters. Hazards demand that individuals prepare, and that communities invest in resilience. Knowledgeable individuals and resilient communities are the best way to prevent hazards from becoming disasters.

This paper outlines strategies to ensure that ICLR will continue to achieve its objectives in four key result areas – quality research, effective partnerships, industry education and consumer awareness over four main perils: urban earthquake, water damage, extreme wind, and wildfire.

Home in Jasper Alberta retrofitted to protect against wildfires, May, 2010.

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