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From Hazard Research to Risk Reduction Action: An Evolution at the Geological Survey of Canada

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Geological Survey of Canada



Mission: Provide authoritative geoscience knowledge to inform the stewardship of Canada's onshore and offshore lands, to sustain responsible resource development for future generations and to ***keep Canada safe from natural hazards and related risks.***



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Geohazard Research Evolution

- Initially, research on earthquakes, terrestrial and marine landslides, tsunami sources, volcanoes and space weather were consolidated within the GSC
- Research focussed on geological and geophysical processes



“Gather terrestrial, marine and space weather information required to conduct hazard assessments.

Define the magnitude, frequency and extent of hazards.

Develop testable hypotheses to account for the processes and conditions that generate hazards.”



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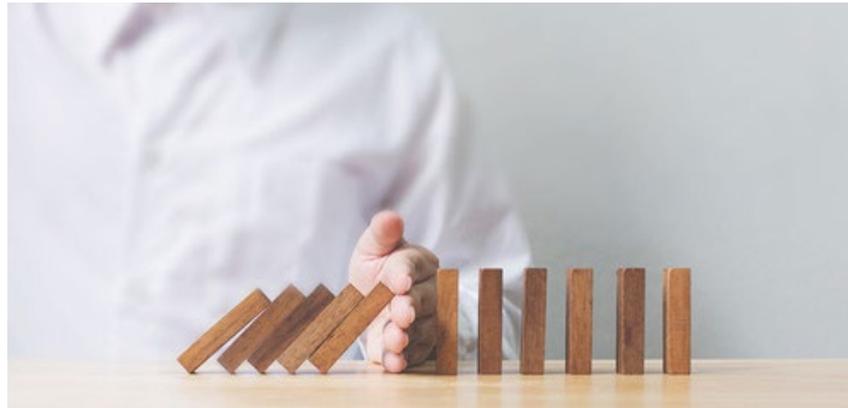
Some Outcomes and Highlights

- Discovered subduction zone off Canada's west coast
- Discovery of episodic tremor and slip in subduction zone process
- Development and update of seismic hazard model to underpin seismic provisions of building code
- National landslide susceptibility map
- Tsunami assessment for Canada
- Recognition of submarine landslide deposits in areas of development for marine and coastal infrastructure



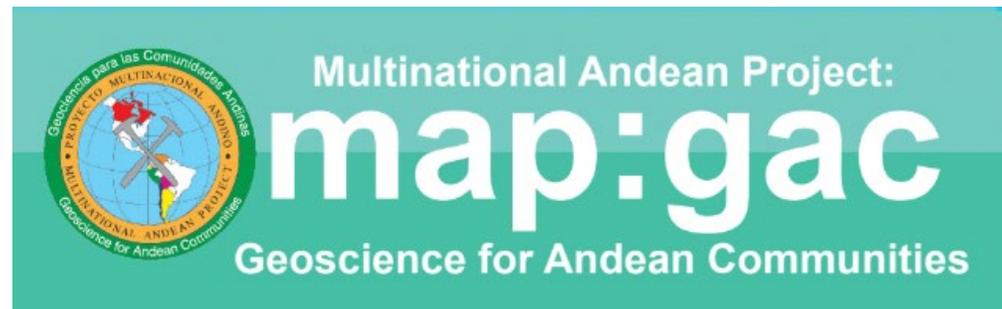
But...

- There was a gap in uptake of knowledge of hazards into emergency management, planning and other disaster risk reduction actions.

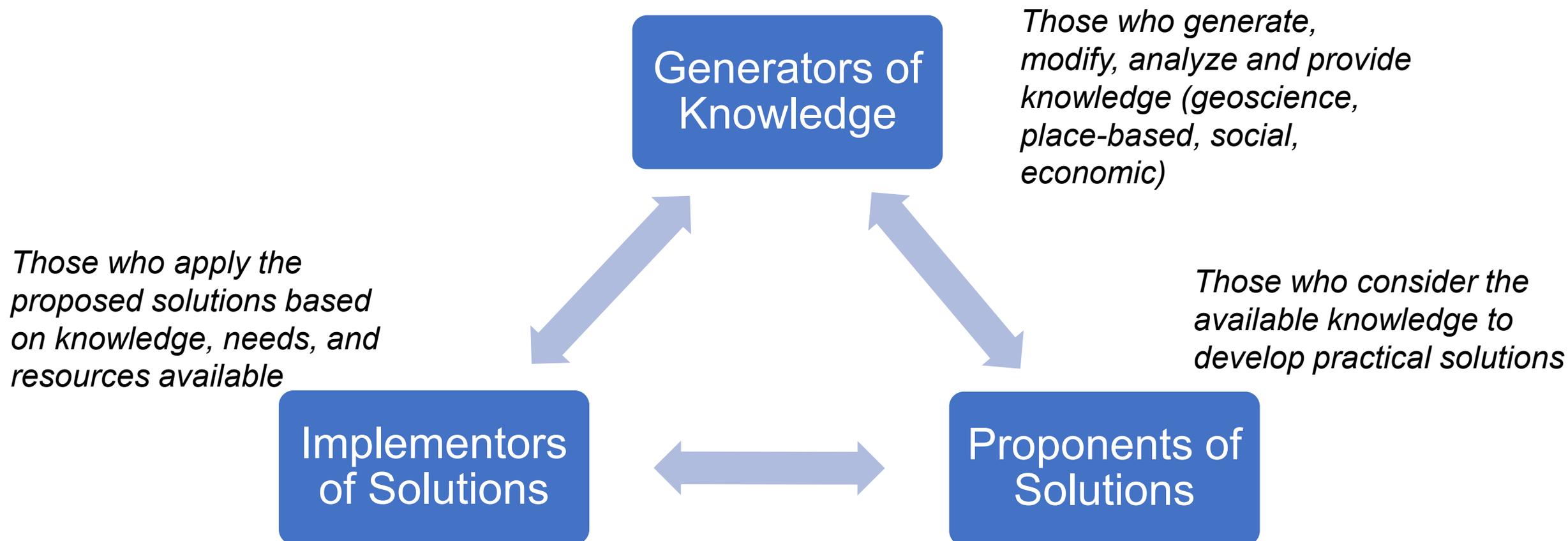


Meanwhile...

- The GSC was collaborating through a regional international project in South America to better connect the geological survey organizations with civil defense and land use planning.



Transformative Communication



And...

- The GSC was initiating case study-based research to determine and demonstrate how and where geoscience fits in risk reduction decision making at the municipal level for emergency management and planning.
- Worked with municipalities and regions
- Adapted Hazus for Canada
- External funding provided opportunity

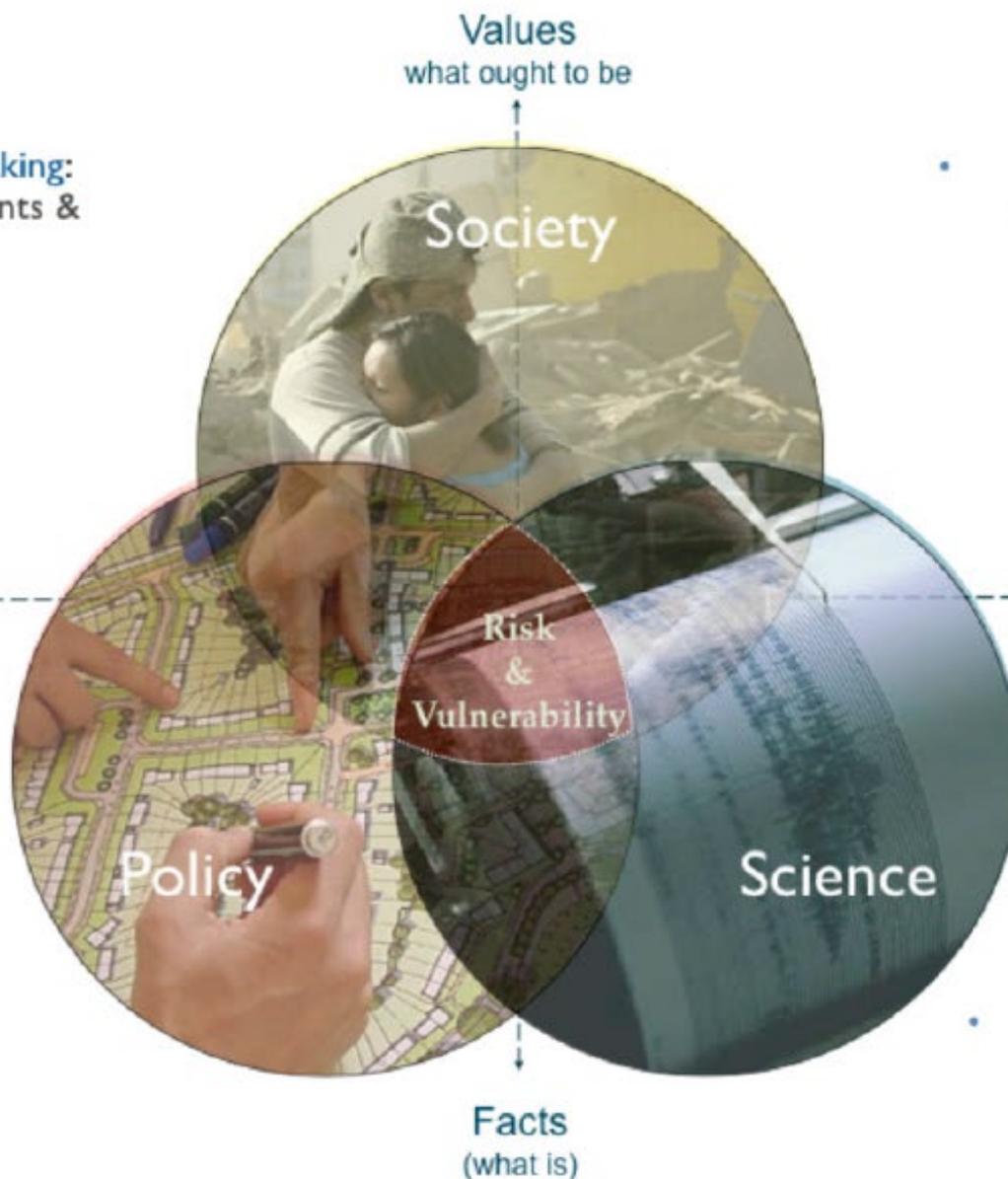


- A consequence of decision making: resolving conflicts between wants & needs
evidence-based

- A normative concept: what is considered vulnerable and in need of safeguarding
value-based

Risk Reduction
(decisions)

Info & Knowledge
(understanding)



- A consequence of planning: balancing opportunities & liabilities of risk decisions
knowledge-based

- An objective measure: impacts & consequences of hazard threats
science-based

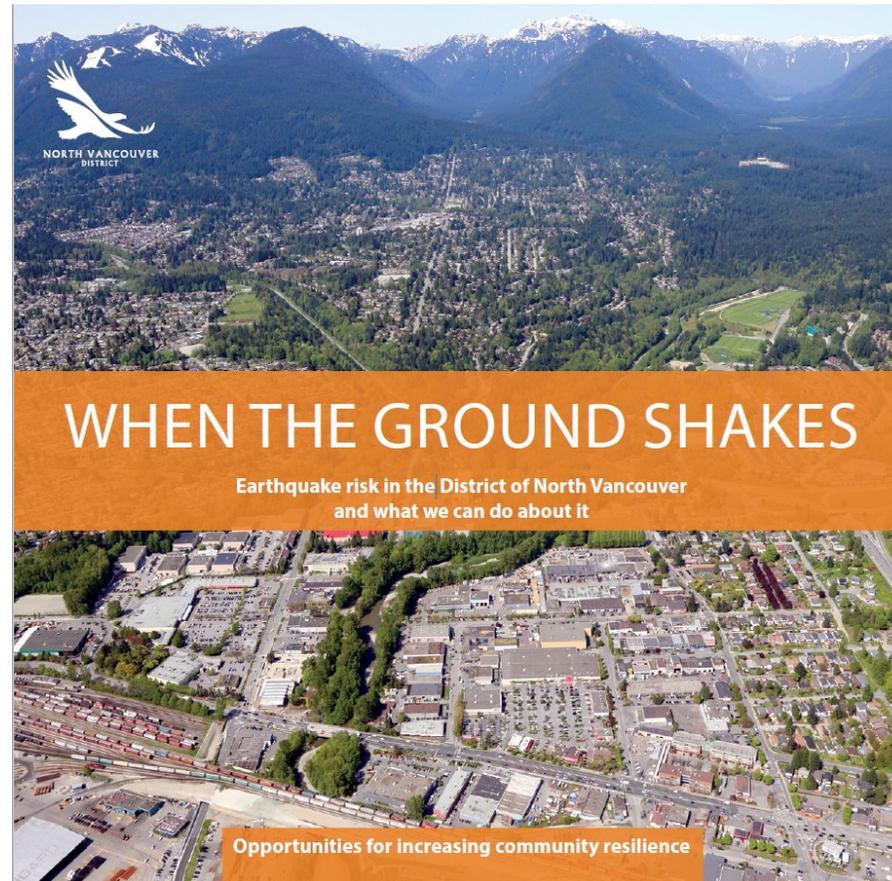


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Knowledge to Action

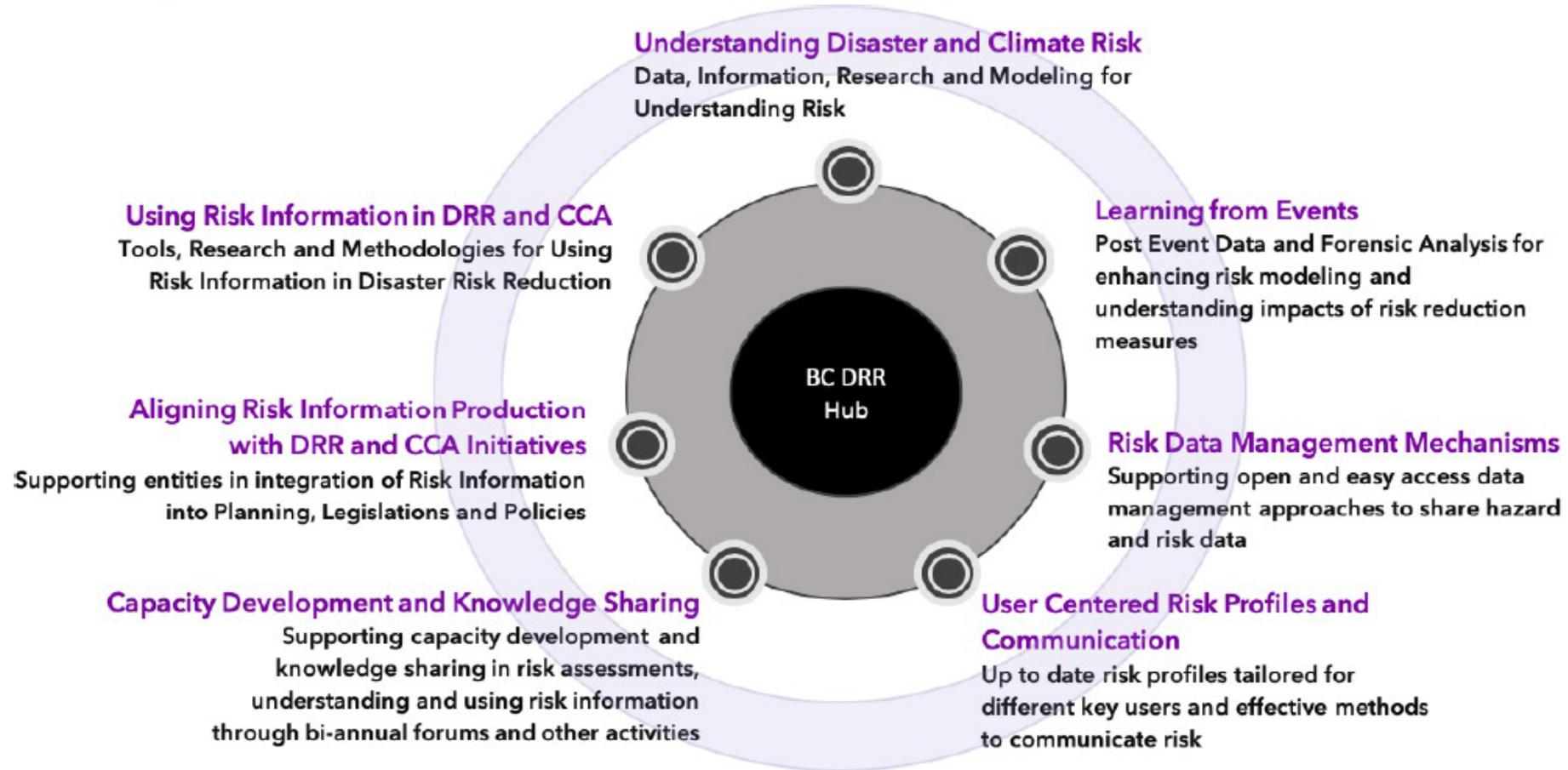


Analytic Methods and Tools to Assess:

- Damage potential and likely consequences of natural hazard threats.
- Underlying causal structures and driving forces of vulnerability in human-natural systems.
- The capability of these systems to mitigate and/or adapt to changing conditions of vulnerability and risk over time.
- Deliberative methods and tools to assist in:
 - Articulating the goals and intended outcomes of the planning process.
 - Characterizing thresholds of tolerable risk that will be used to evaluate the strengths and weaknesses of mitigation alternatives.



Creating space for DRR



What is needed?

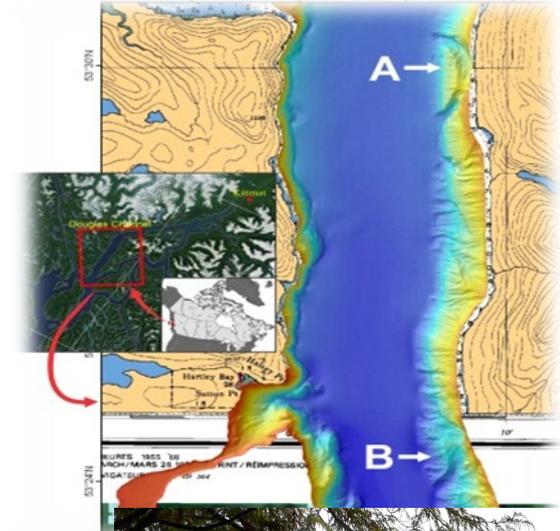
- Improved understanding of risk
- Business case – cost/benefit analysis for risk reduction measures
- Indicators of risk to support decision making
- Coordination among emergency management, planning, scientists, and data holders



Public Safety Geoscience Program

PSGP conducts investigations of natural hazards and the risks they pose with the goal of reducing their economic, social and environmental impacts. The program supports the UNDRR Sendai Framework and undertakes research that includes:

- Ongoing **earthquake research** to inform the national seismic hazard model and the seismic provisions of the **National Building Code of Canada**;
- **Assessing risk** from earthquakes and working with stakeholders to support decision making for risk reduction;
- Understanding **volcanic hazard and risks** from sources within and outside Canadian borders;
- Developing **tsunami** hazard models to support risk assessment;
- Integrating **climate change** and hazard knowledge to better understand **coastal hazards** and the risks they pose to develop effective mitigation options;
- Assessing **slope stability** hazards on the **seafloor** and on land in key areas of development or infrastructure corridors; and,
- Developing **landslide monitoring** techniques to protect infrastructure.



Earthquake risk information for emergency management and planning in Canada.

QUICK LINKS

[Explore Earthquake Scenarios](#)

[Consider Probabilistic Earthquake Risks](#)

[Learn More](#)

[Download Data](#)

Tools to help Canadians build resiliency to seismic risk through planning and emergency management.



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Challenges

- Participative processes create big resource demands
- Constantly changing hazard and risk environment (work is never done)
- Each domain requires a different set of indicators and resolution for decision making
- Consistent data foundation for exposure and vulnerability models across hazards
- Matching the speed of policy making with scientific knowledge and research
- Positioning geological hazard and risk work in the DRR and CC adaptation policy frameworks



Thank you

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