Emergency Preparedness Canada

Protection civile Canada

Research Initiatives at Emergency Preparedness Canada

Emergency preparedness in Canada is based on the following principles:

- First, it is up to the individual to know what to do in an emergency.
- If the individual is unable to cope, the different orders of government are expected to respond.
- Local emergency response organizations are normally the first on the scene.
- If they are overwhelmed, they will seek assistance from the province or territory which, in turn, will ask the federal government for help if necessary.

On behalf of the MREP, EPC:

- develops policies and programs.
- supports provincial preparedness.
- **analyzes and evaluates risks, conducts research.**
- provides education and training.
- enhances public awareness and understanding.
- ensures continuity of constitutional government.
- establishes arrangements for provincial consultation.
- supports and coordinates the development and testing of institutional plans.
- monitors and reports potential, imminent or actual emergencies.
- coordinates and supports the implementation of civil emergency plans by government institutions.
- provides authorized financial assistance to provinces.

Director Research and Development (DRD)

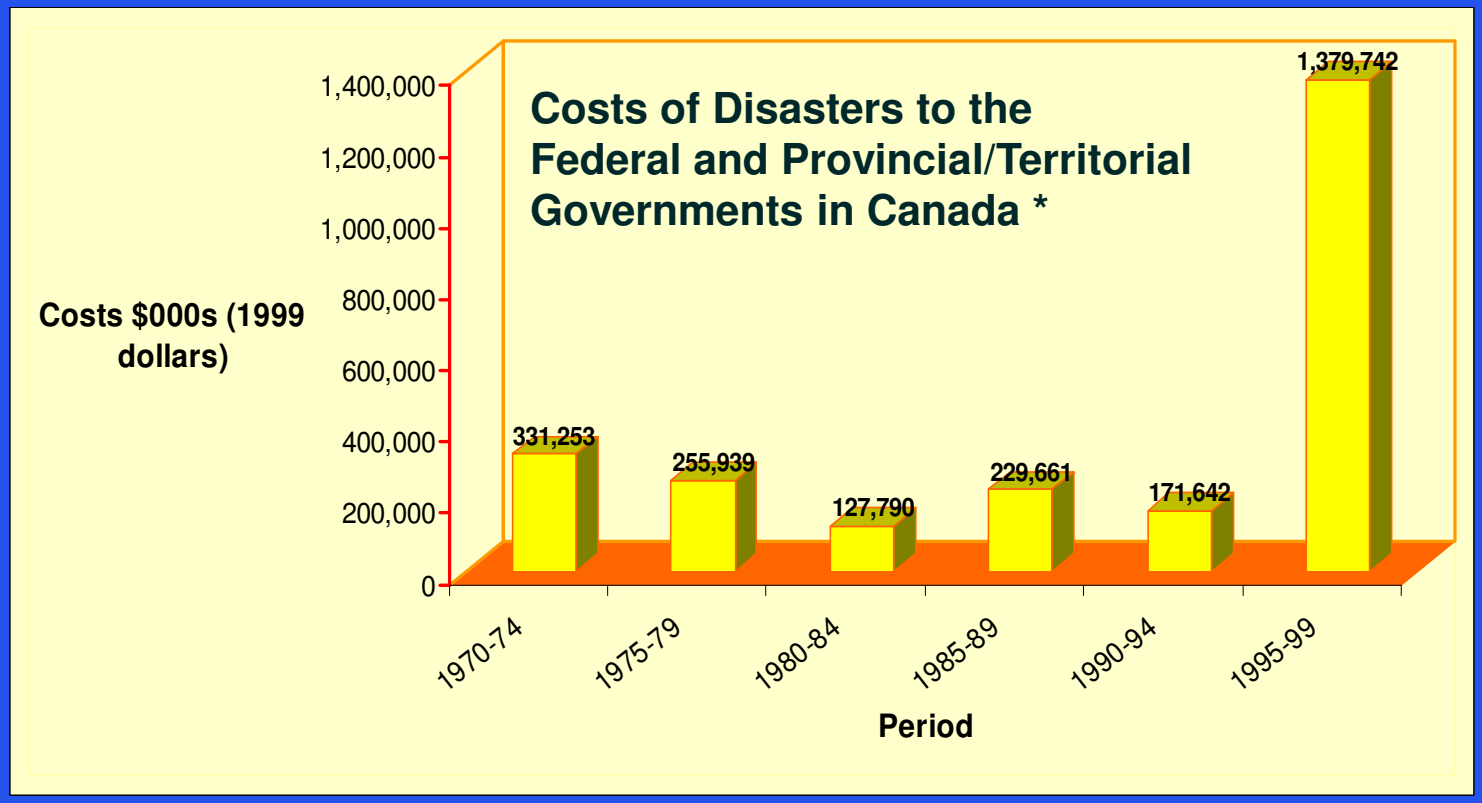
- **Provides scientific consultative services** to support EPC and other federal decision makers on a wide range of emergency preparedness issues.

- **Multidisciplinary research** is carried out in partnership with OGDs, universities, private sector, NGOs and other levels of government (Canadian and international).

Natural Disaster Costs

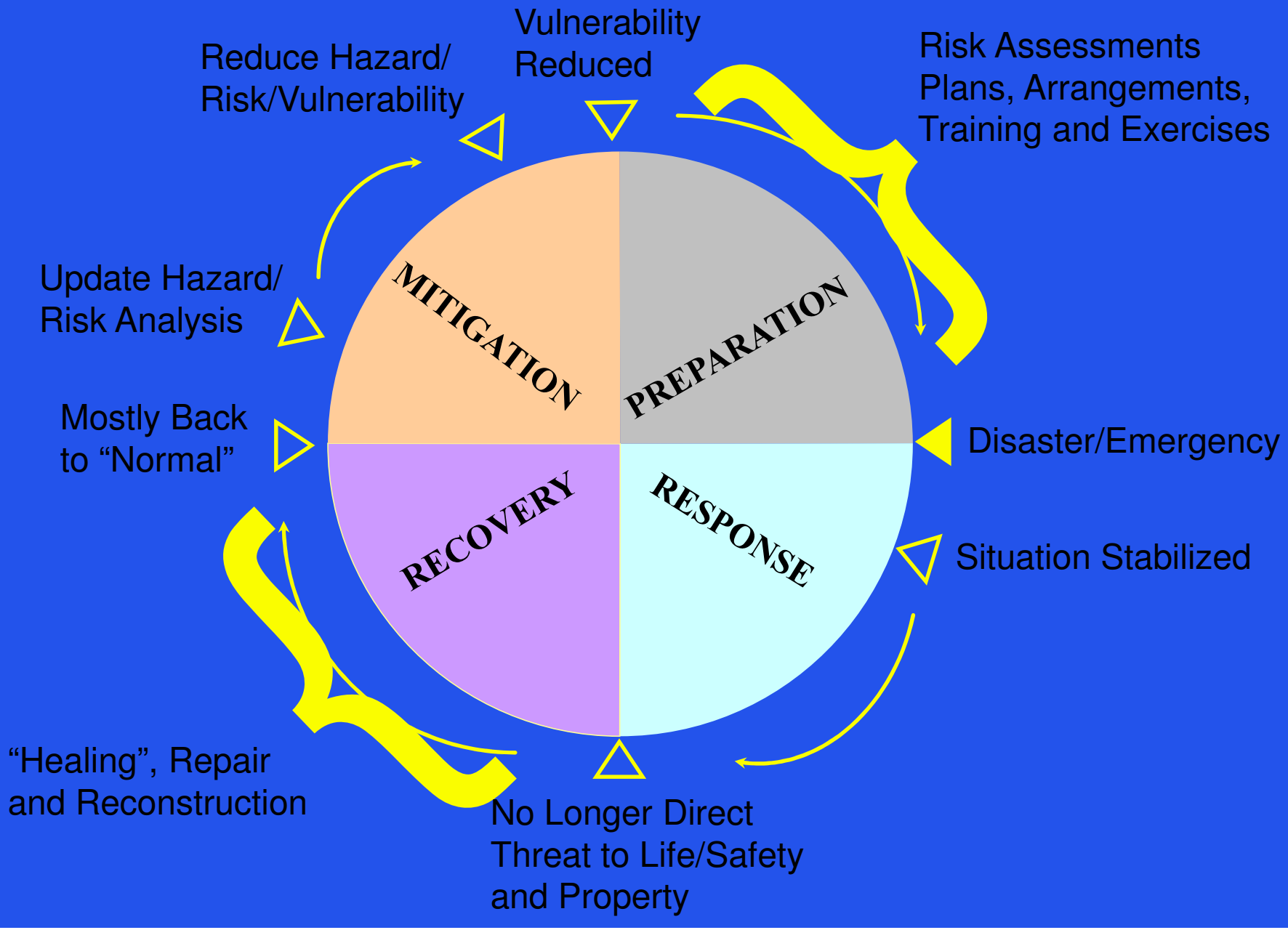
- There have been 536 disasters in Canada from 1970-1999.
- Federal Government has responded to 17% of these disasters (90 out of 536) with Disaster Finance Assistance Arrangements (DFAA).
- DFAA is cost-shared between federal and provincial/territorial governments.

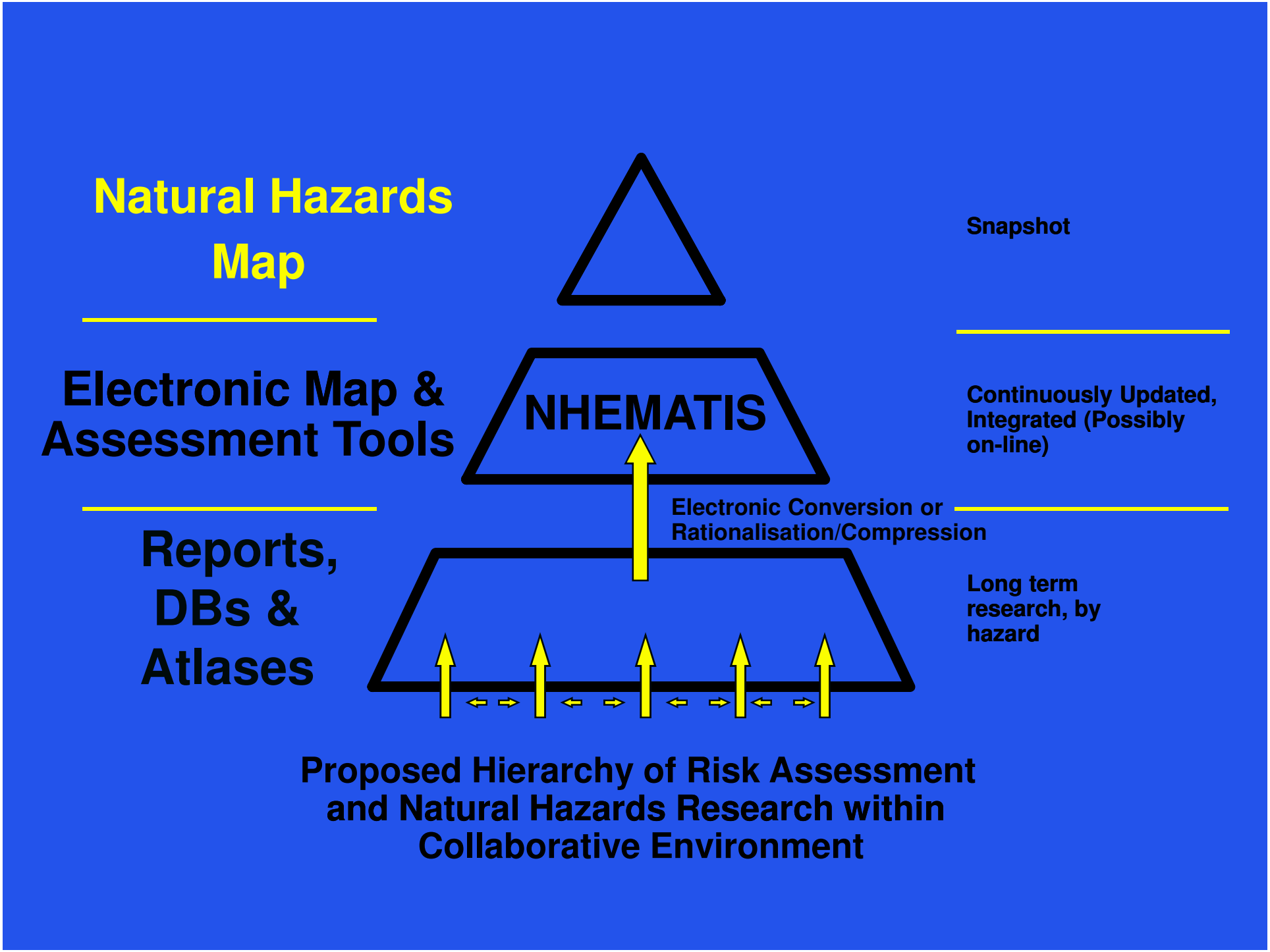
Natural Disaster Costs



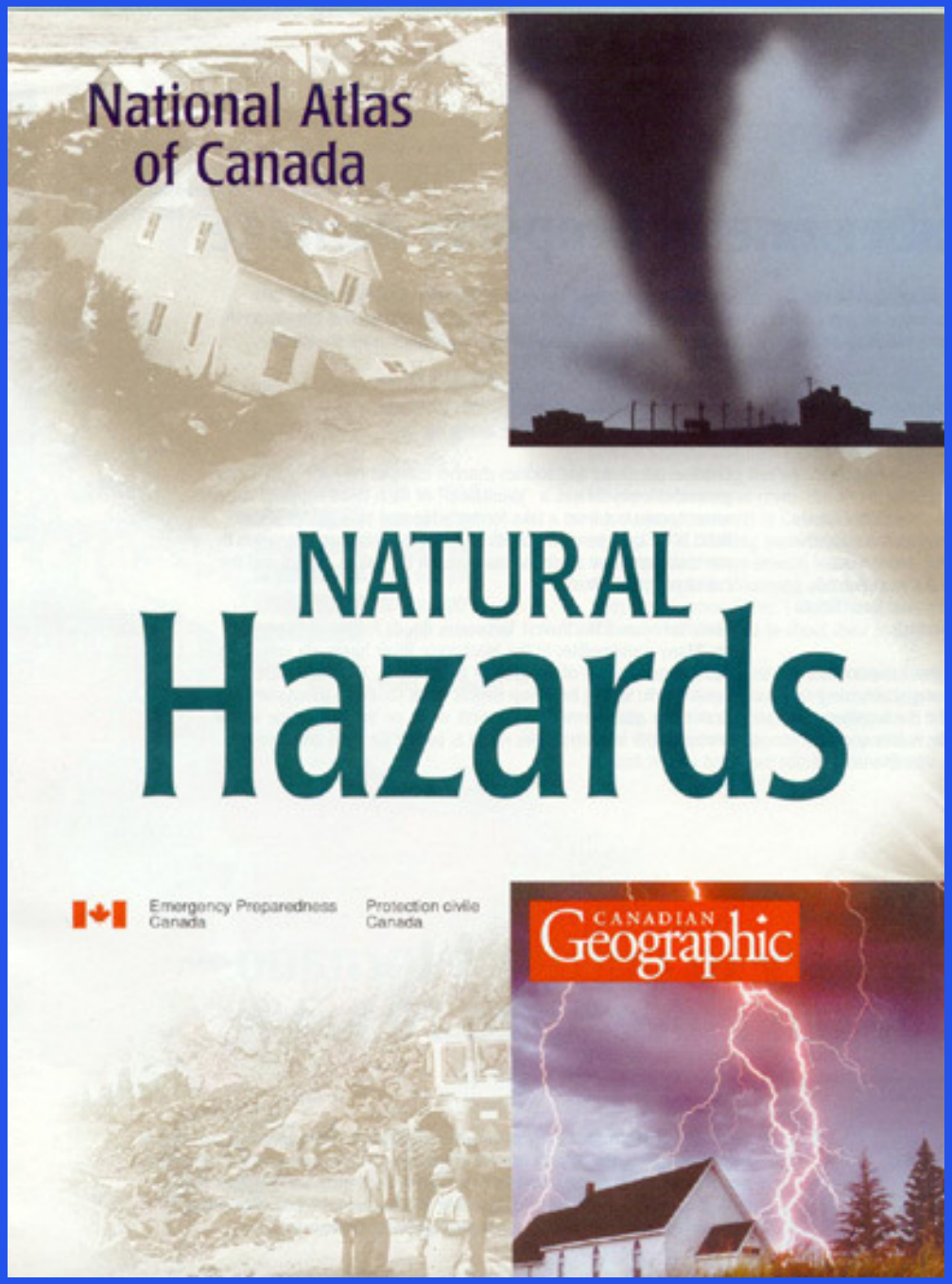
* Represents audited totals of claims made under Disaster Financial Assistance Arrangements (DFAA)

Emergency Management "Cycle"





Proposed Hierarchy of Risk Assessment and Natural Hazards Research within Collaborative Environment


National Atlas
of Canada
NATURAL
Hazards
Emergency Preparedness
Canada
Protection civile
Canada
CANADIAN
Geographic

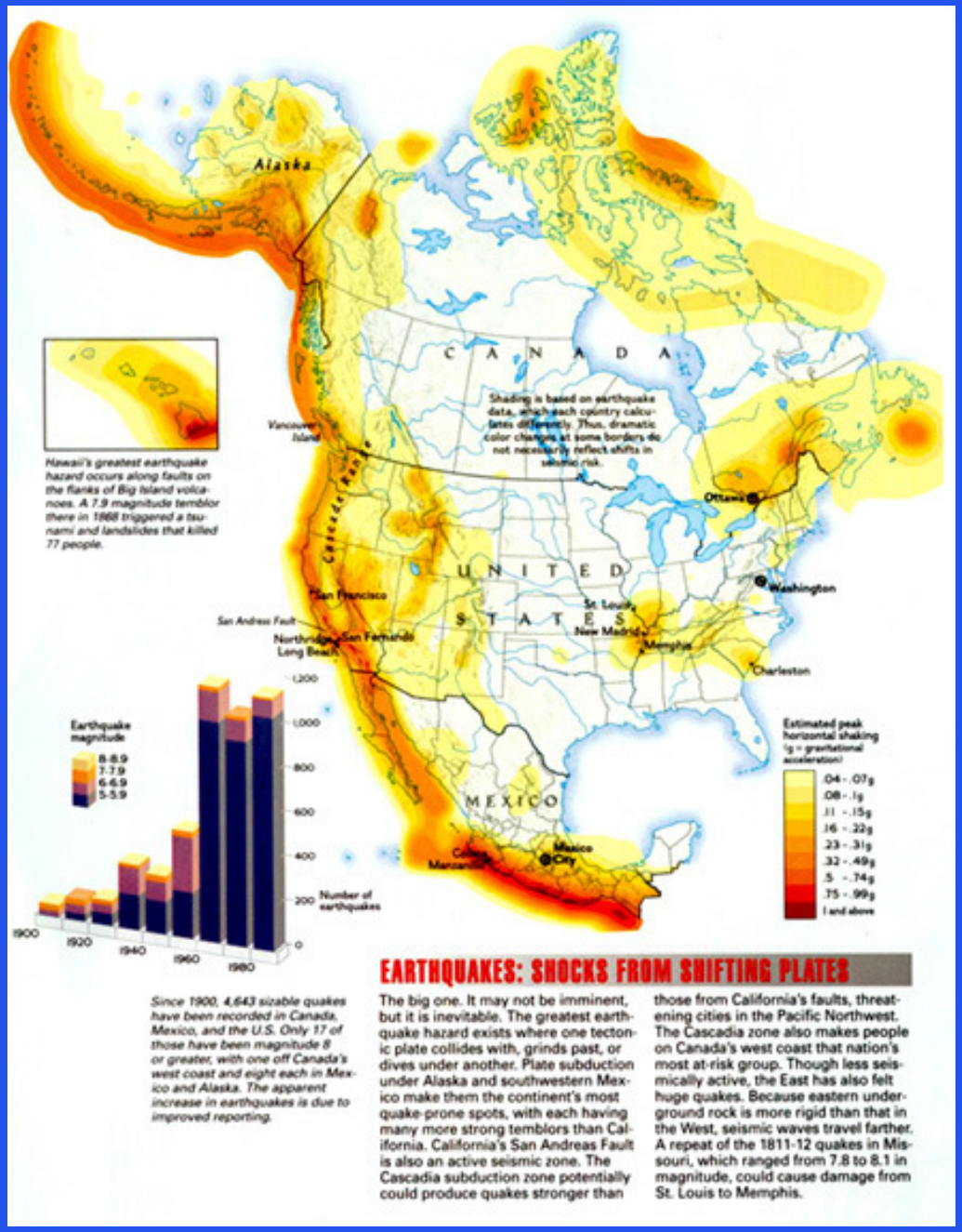
NATURAL HAZARDS OF NORTH AMERICA

Produced by National Geographic Maps for National Geographic Magazine

NATIONAL GEOGRAPHIC SOCIETY

Washington, D.C., July 1998

Disaster can strike as quickly as lightning, though it may evolve as slowly as geologic time, depending on its source. And sources abound. Inspired by the UN's International Decade for Natural Disaster Reduction, more than 50 scientists from Canada, the United States, and Mexico have spent three years in a cooperative effort to map areas of potential disaster in their countries. The resulting maps, shown here, illustrate for the first time the reach of natural hazards across national borders. "We're keen to promote awareness of vulnerability," says project leader Chris Tucker of Emergency Preparedness Canada. Such awareness may help lessen tragic consequences when natural disasters strike.

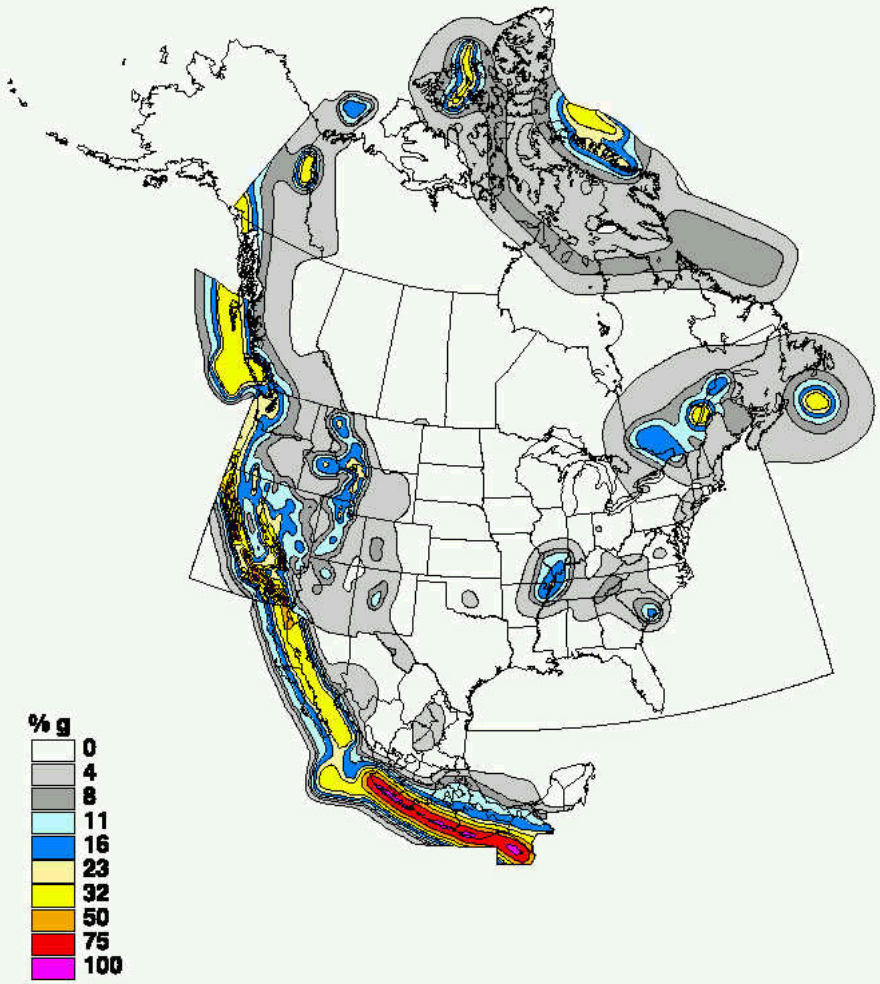


Since 1900, 4,643 sizable quakes have been recorded in Canada, Mexico, and the U.S. Only 17 of those have been magnitude 8 or greater, with one off Canada's west coast and eight each in Mexico and Alaska. The apparent increase in earthquakes is due to improved reporting.

EARTHQUAKES: SHOCKS FROM SHIFTING PLATES

The big one. It may not be imminent, but it is inevitable. The greatest earthquake hazard exists where one tectonic plate collides with, grinds past, or dives under another. Plate subduction under Alaska and southwestern Mexico make them the continent's most quake-prone spots, with each having many more strong temblors than California. California's San Andreas Fault is also an active seismic zone. The Cascadia subduction zone potentially could produce quakes stronger than those from California's faults, threatening cities in the Pacific Northwest. The Cascadia zone also makes people on Canada's west coast that nation's most at-risk group. Though less seismically active, the East has also felt huge quakes. Because eastern underground rock is more rigid than that in the West, seismic waves travel farther. A repeat of the 1811-12 quakes in Missouri, which ranged from 7.8 to 8.1 in magnitude, could cause damage from St. Louis to Memphis.

Expected Earthquake Shaking



Natural Hazards Map

Snapshot

Electronic Map & Assessment Tools

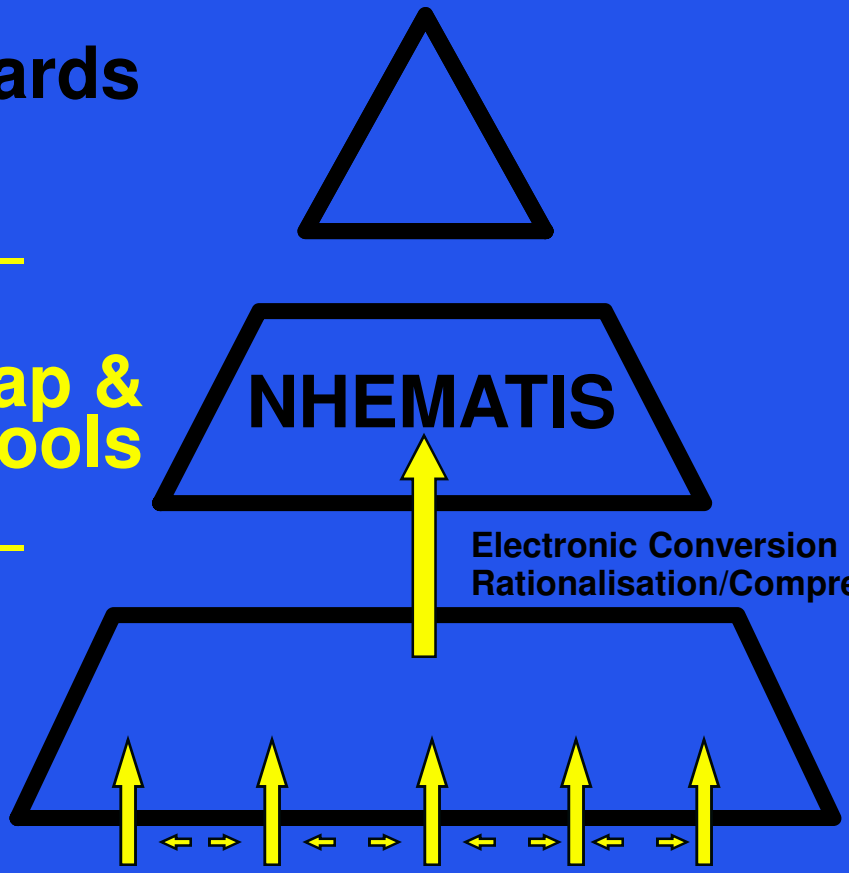
NHEMATIS

Continuously Updated, Integrated (Possibly on-line)

Electronic Conversion or Rationalisation/Compression

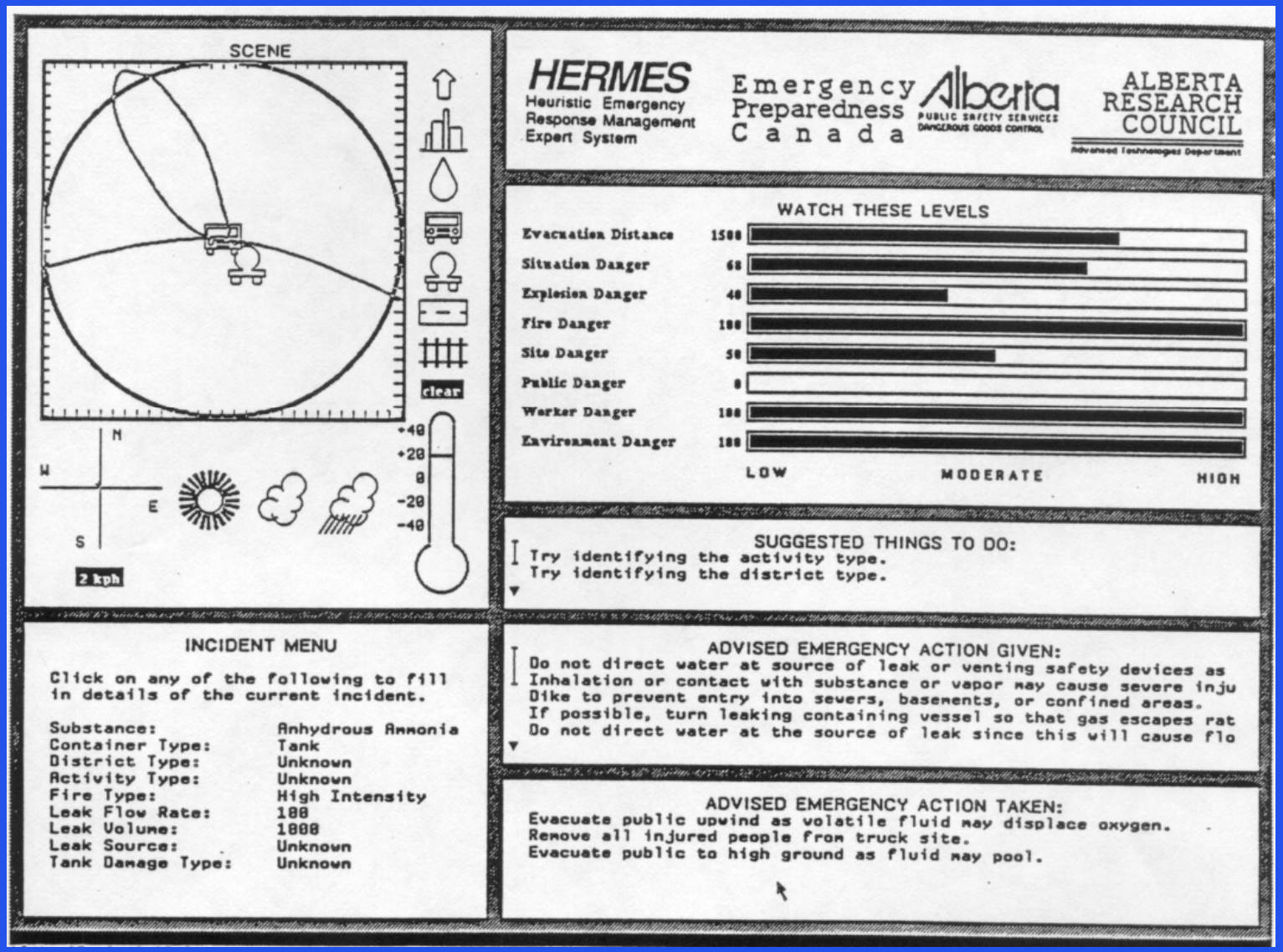
Reports, DBs & Atlases

Long term research, by hazard



Proposed Hierarchy of Risk Assessment and Natural Hazards Research within Collaborative Environment

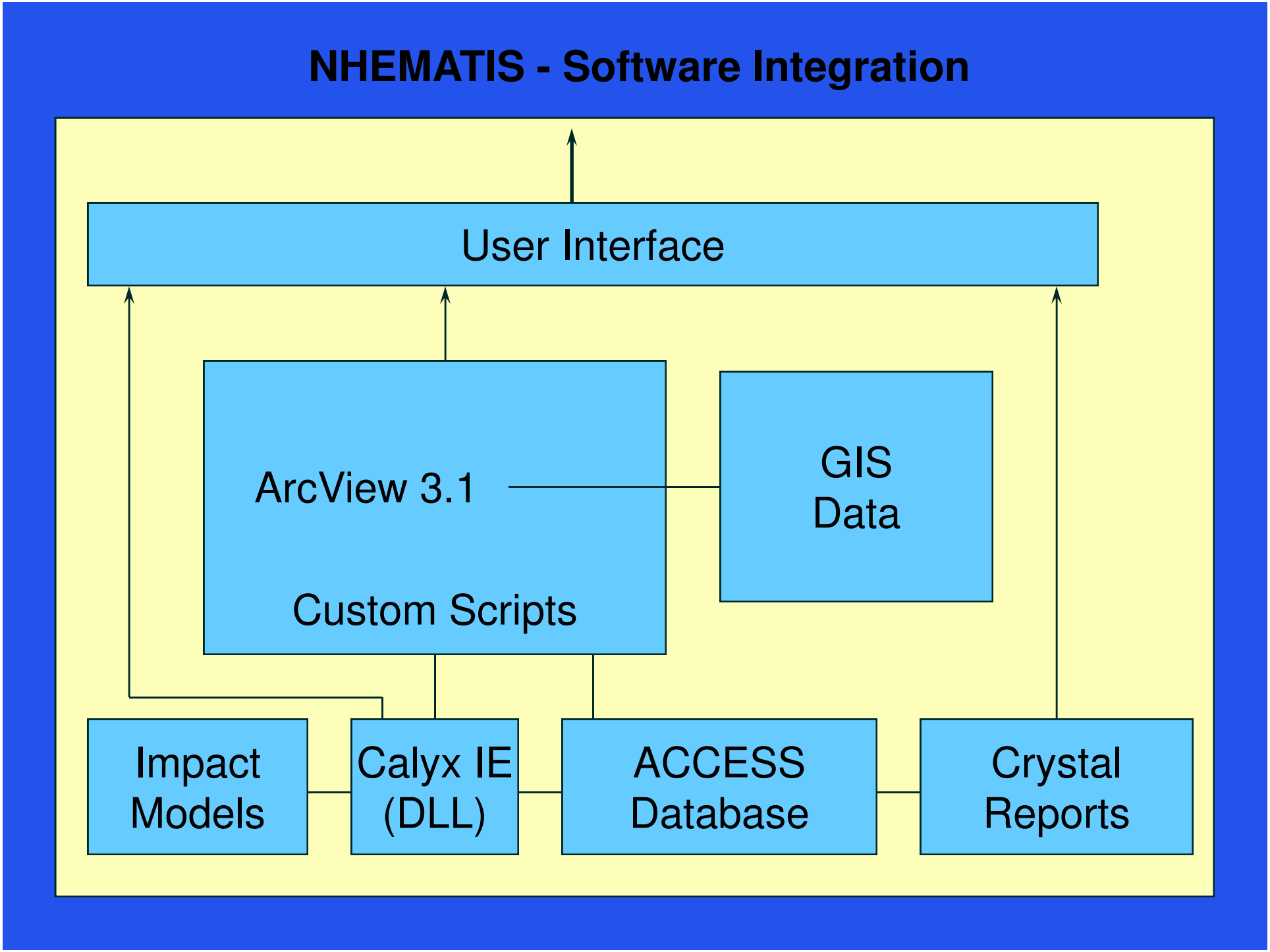
HERMES - Canada



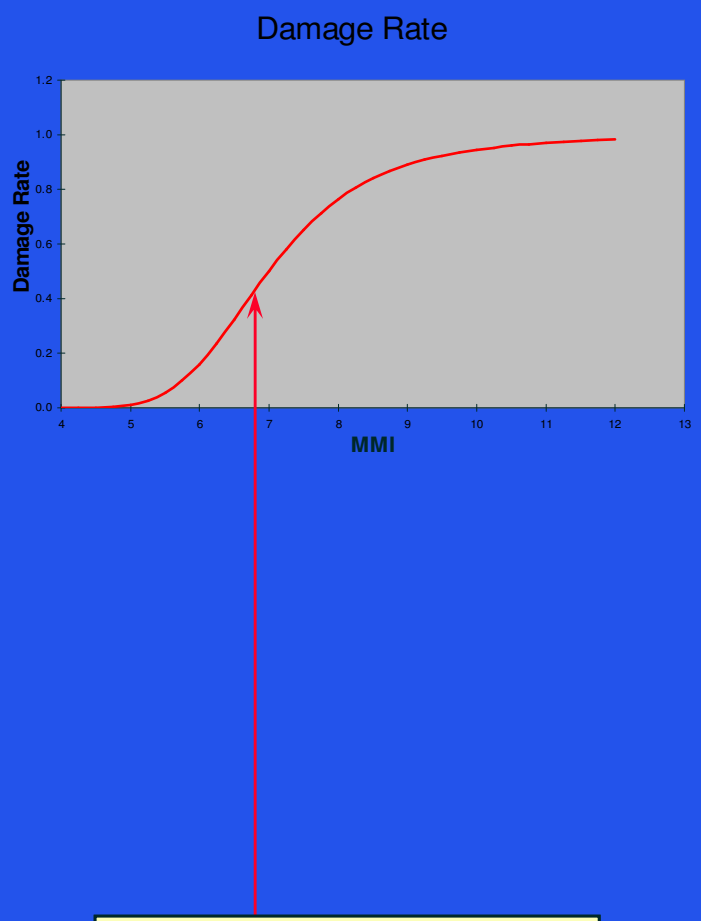
NHEMATIS

Natural Hazards Electronic Map and Assessment Tools Information System

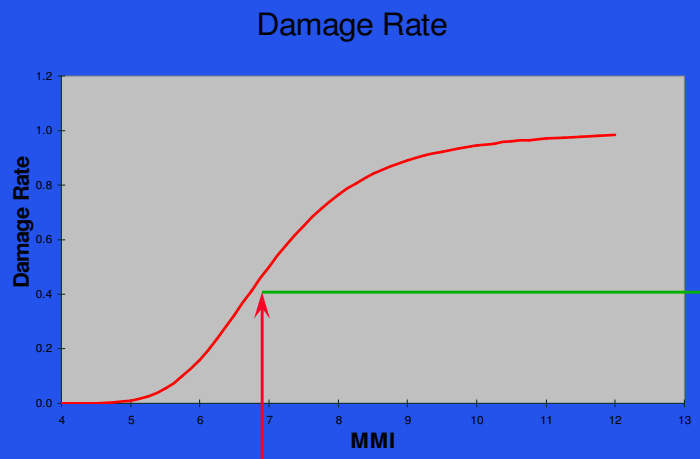
An integrated suite of electronic maps and assessment tools used to assess human vulnerabilities to natural hazards


NHEMATIS - Software Integration
User Interface
ArcView 3.1
Custom Scripts
GIS
Data
Impact
Models
Calyx IE
(DLL)
ACCESS
Database
Crystal
Reports

Estimation of Damage Rates



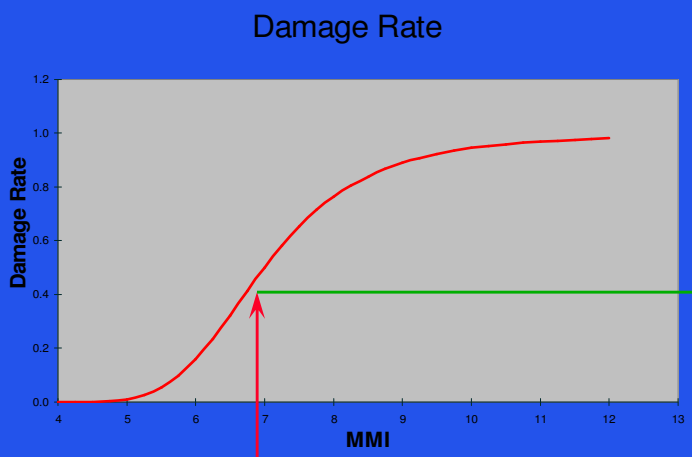
Estimation of Damage Rates



Mean Damage Rate

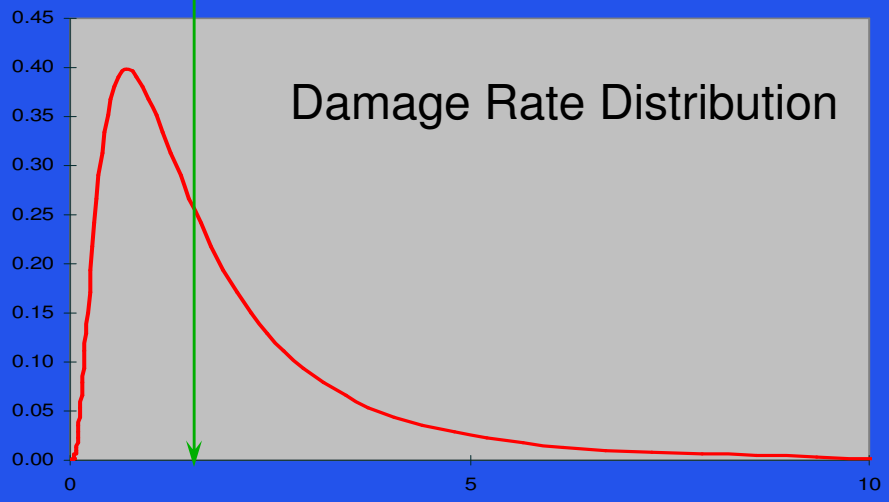
Hazard Intensity

Estimation of Damage Rates



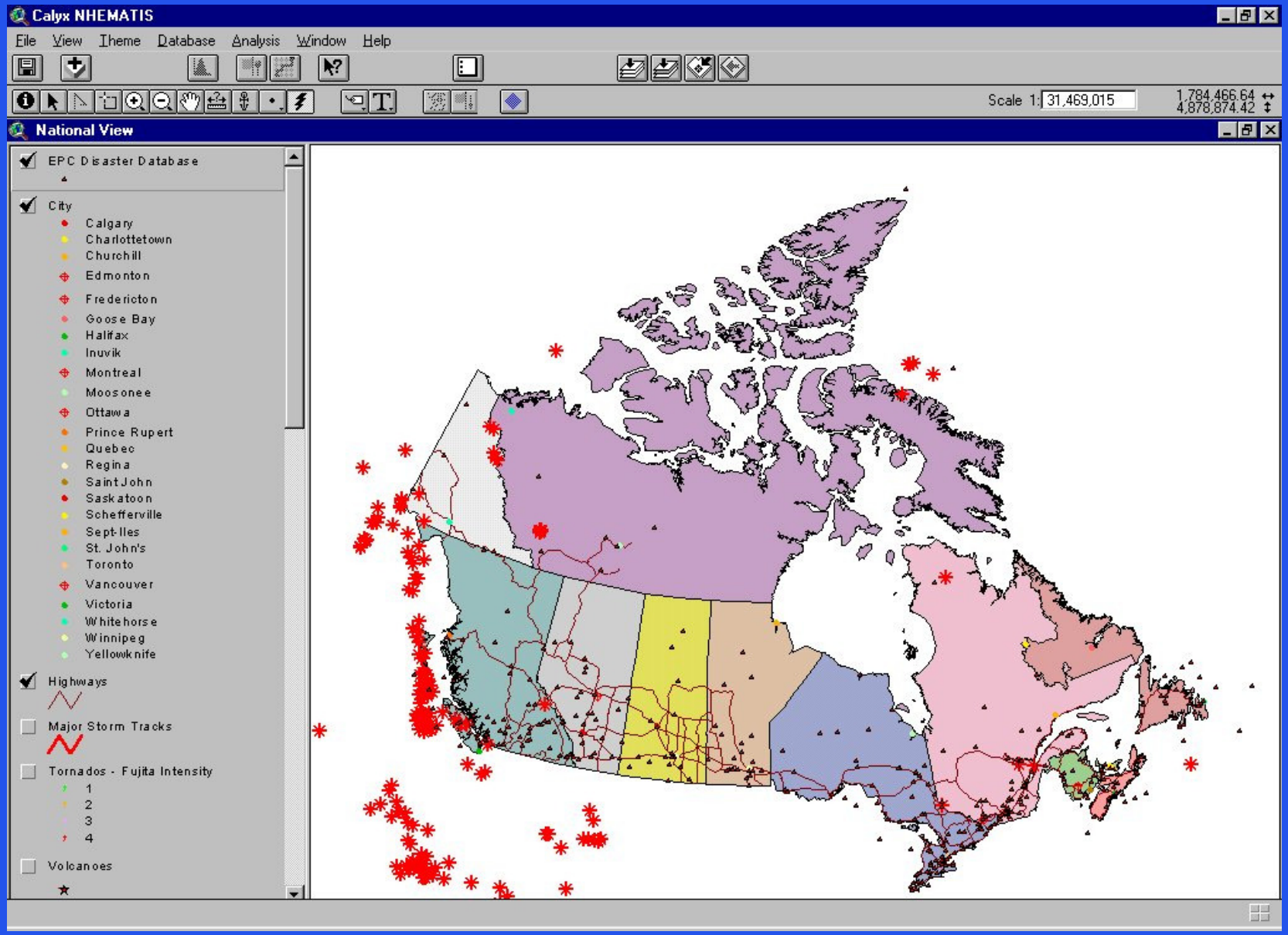
Mean Damage Rate

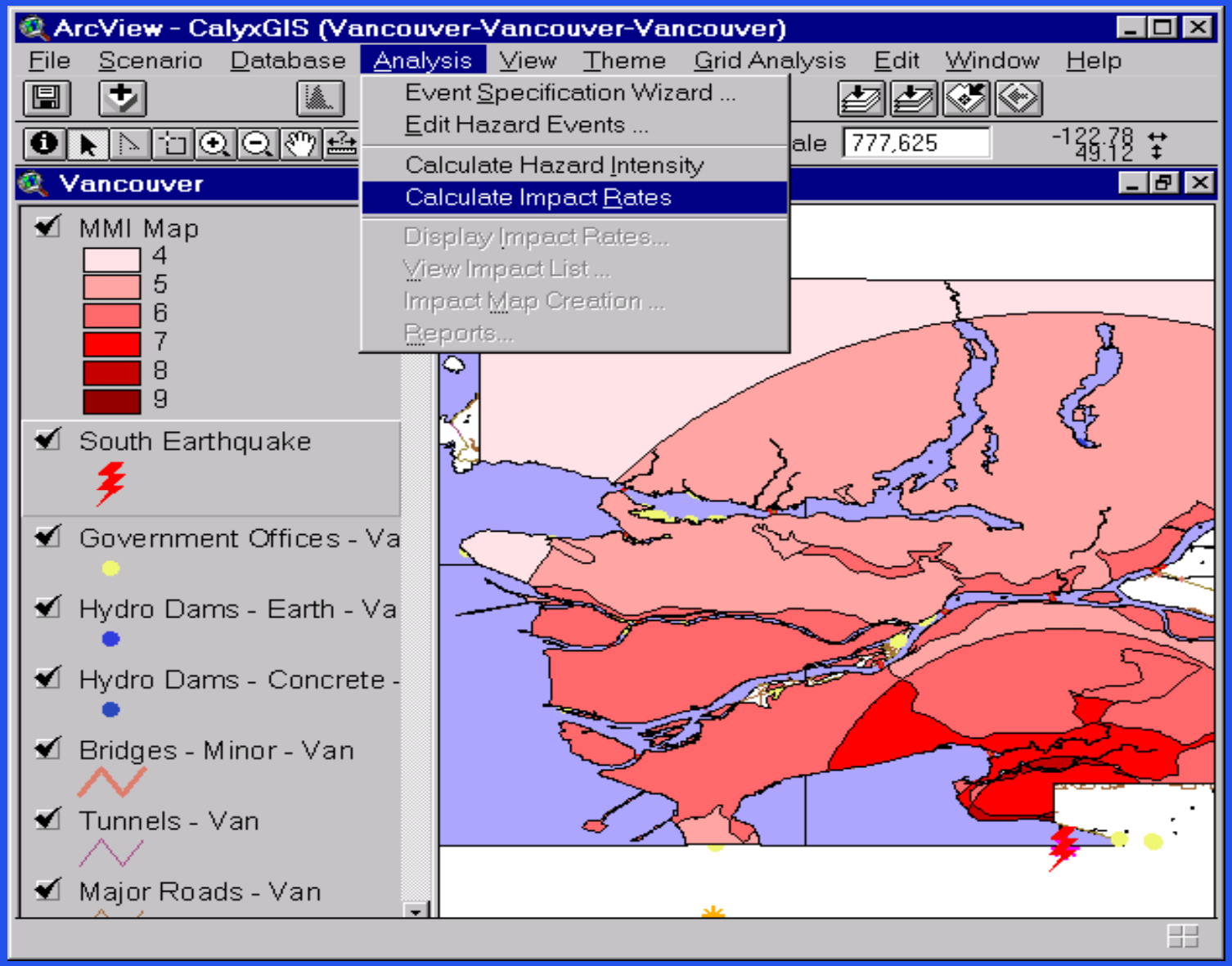
Hazard Intensity

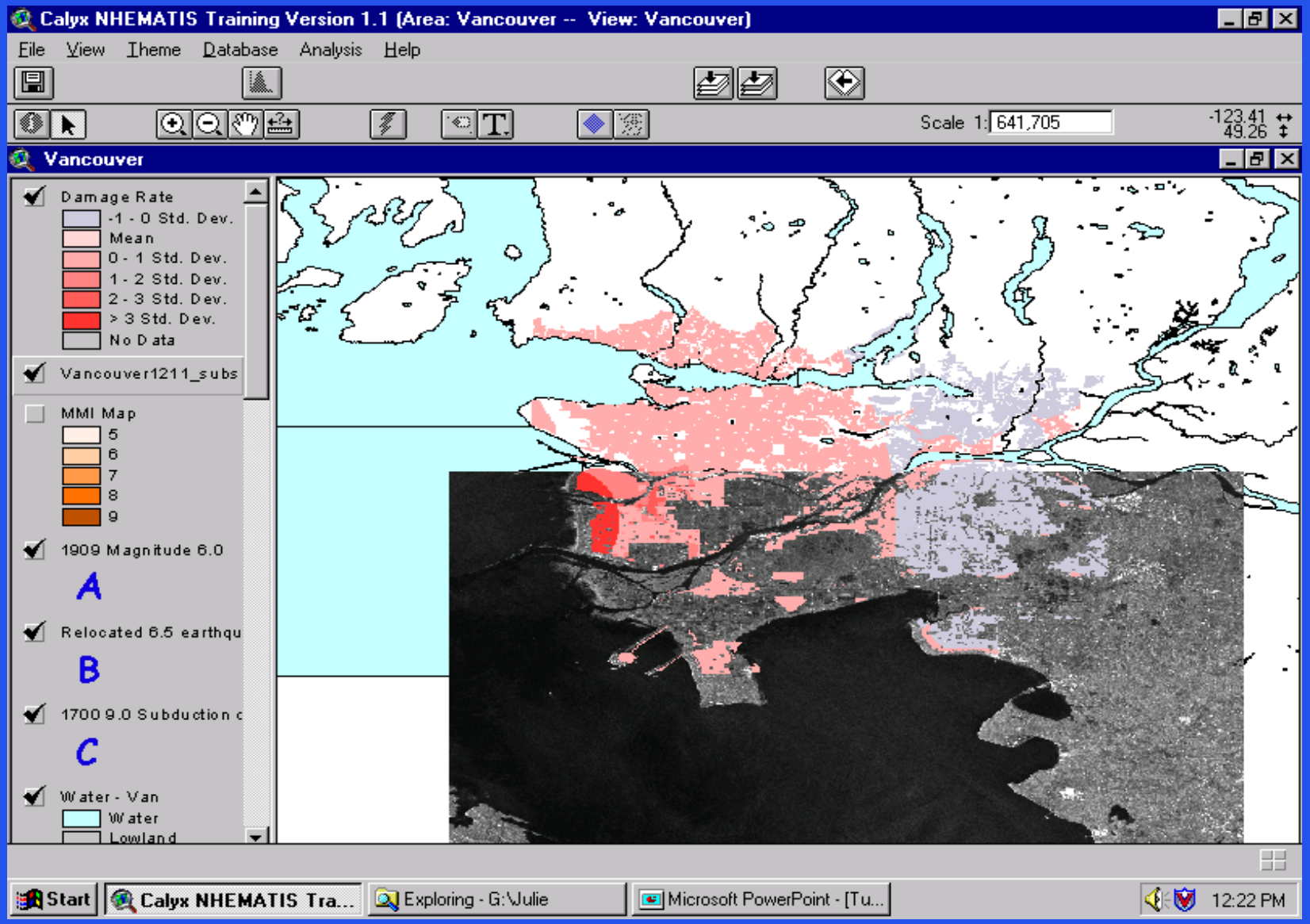


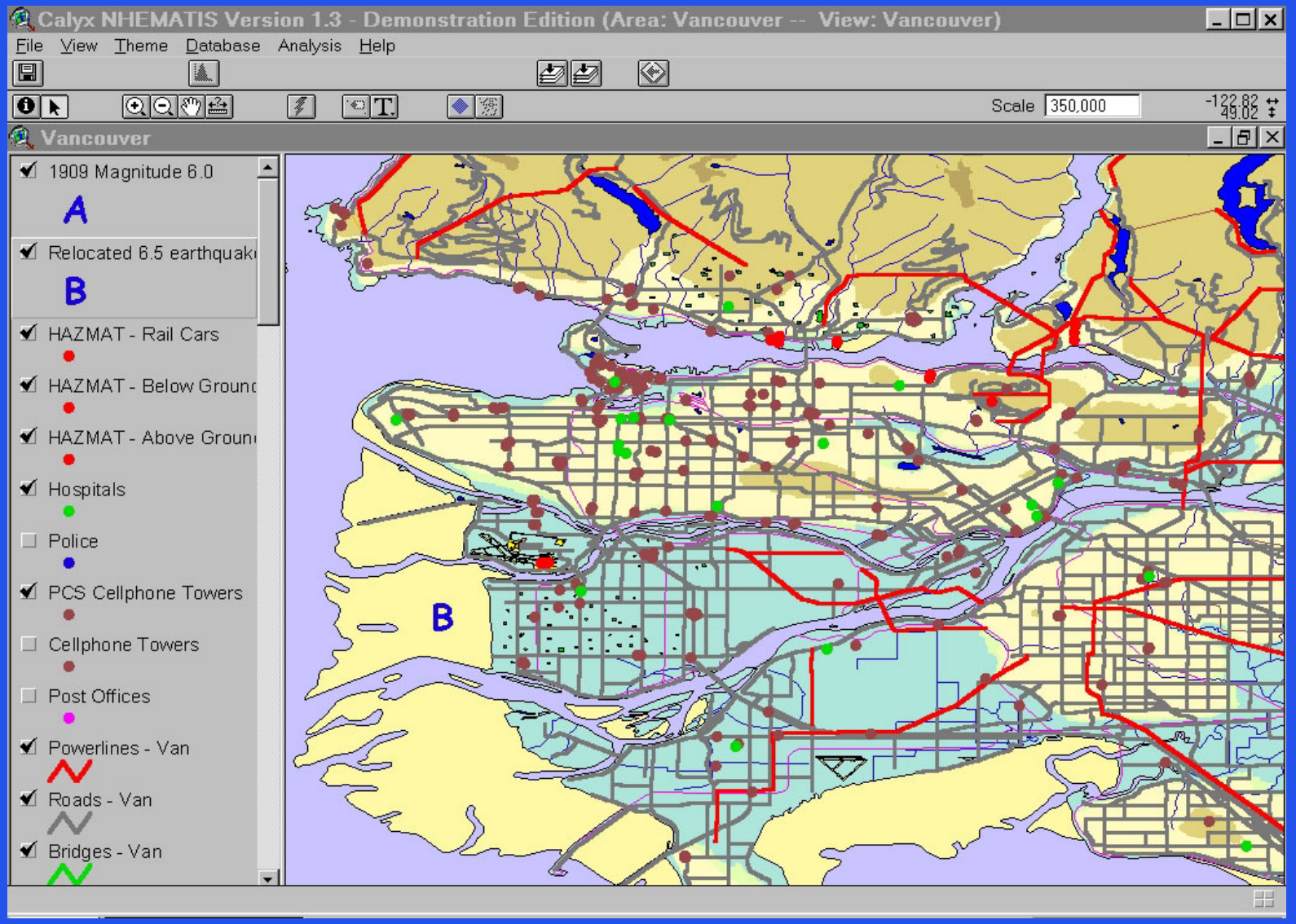
NHEMATIS Benefits

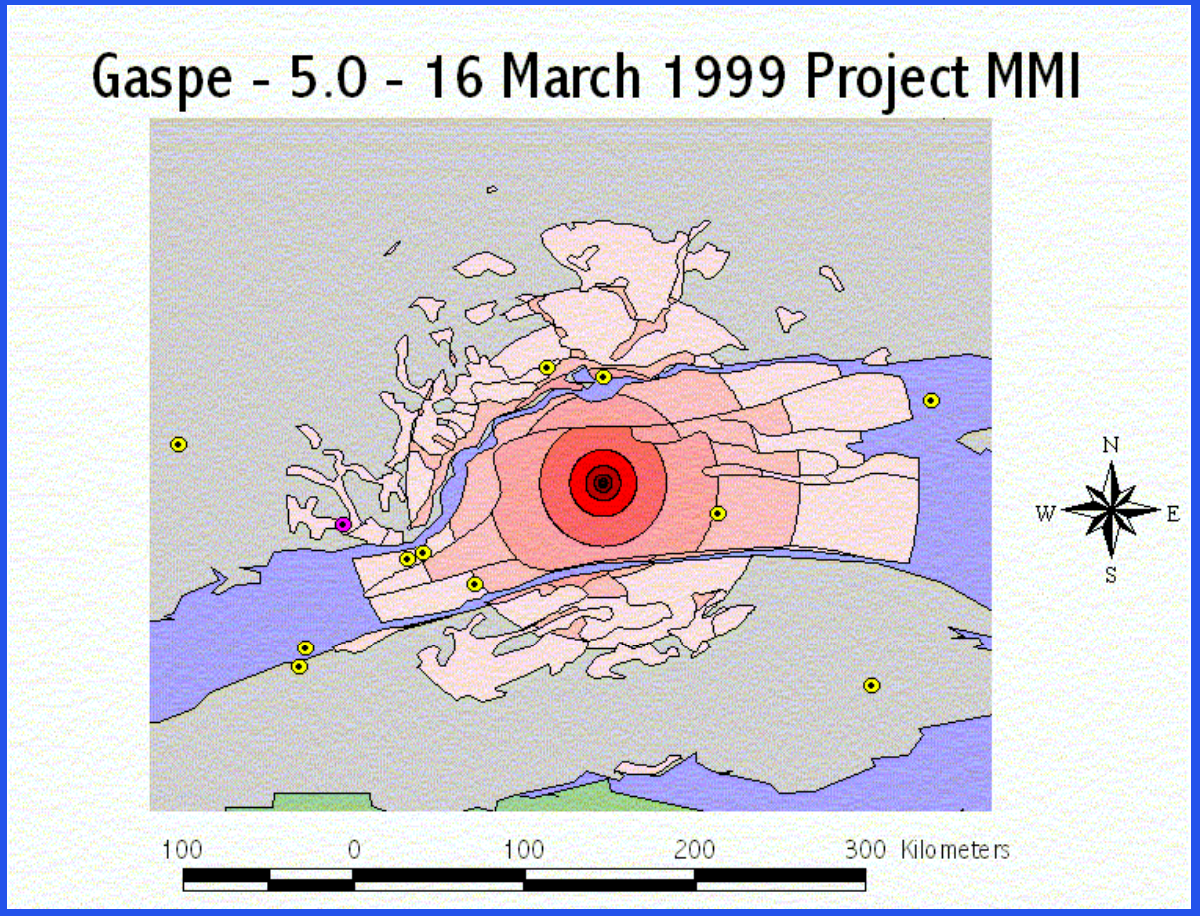
- A tool for planning emergency exercises.
- A means of integrating diverse types of knowledge and data.
- Vehicle for sharing knowledge related to emergency preparedness.
- A research tool, with analytical and forecasting functionality.
- An educational tool.


Calyx NHEMATIS
File View Theme Database Analysis Window Help
Scale 1: 31,469,015
1,784,466.64
4,878,874.42
National View
EPC Disaster Database
City
Calgary
Charlottetown
Churchill
Edmonton
Fredericton
Goose Bay
Halifax
Inuvik
Montreal
Moosonee
Ottawa
Prince Rupert
Quebec
Regina
Saint John
Saskatoon
Schefferville
Sept-Iles
St. John's
Toronto
Vancouver
Victoria
Whitehorse
Winnipeg
Yellowknife
Highways
Major Storm Tracks
Tornados - Fujita Intensity
1
2
3
4
Volcanoes


ArcView - CalyxGIS (Vancouver-Vancouver-Vancouver)
File
Scenario
Database
Analysis
View
Theme
Grid Analysis
Edit
Window
Help
Event Specification Wizard ...
Edit Hazard Events ...
Calculate Hazard Intensity
Calculate Impact Rates
Display Impact Rates...
View Impact List ...
Impact Map Creation ...
Reports...
777,625
-122.78
49.12
Vancouver
MMI Map
4
5
6
7
8
9
South Earthquake
Government Offices - Va
Hydro Dams - Earth - Va
Hydro Dams - Concrete -
Bridges - Minor - Van
Tunnels - Van
Major Roads - Van


Calyx NHEMATIS Training Version 1.1 (Area: Vancouver -- View: Vancouver)
File View Theme Database Analysis Help
Scale 1: 641,705
-123.41
49.26
Vancouver
Damage Rate
-1 - 0 Std. Dev.
Mean
0 - 1 Std. Dev.
1 - 2 Std. Dev.
2 - 3 Std. Dev.
> 3 Std. Dev.
No Data
Vancouver1211_subs
MMI Map
5
6
7
8
9
1909 Magnitude 6.0
A
Relocated 6.5 earthqu
B
1700 9.0 Subduction c
C
Water - Van
Water
Lowland
Start
Calyx NHEMATIS Tra...
Exploring - G:\Julie
Microsoft PowerPoint - [Tu...
12:22 PM


Calyx NHEMATIS Version 1.3 - Demonstration Edition (Area: Vancouver -- View: Vancouver)
File View Theme Database Analysis Help
Scale 350,000
-122.82
49.02
Vancouver
1909 Magnitude 6.0
A
Relocated 6.5 earthquak
B
HAZMAT - Rail Cars
HAZMAT - Below Ground
HAZMAT - Above Groun
Hospitals
Police
PCS Cellphone Towers
Cellphone Towers
Post Offices
Powerlines - Van
Roads - Van
Bridges - Van
B



Modified Mercalli Index: MMI 12-4
Historic Quakes: MMI 3 to 4 (yellow dots)
MMI 4 to 5 (purple dot).

Research Projects FY2000-01 Operations

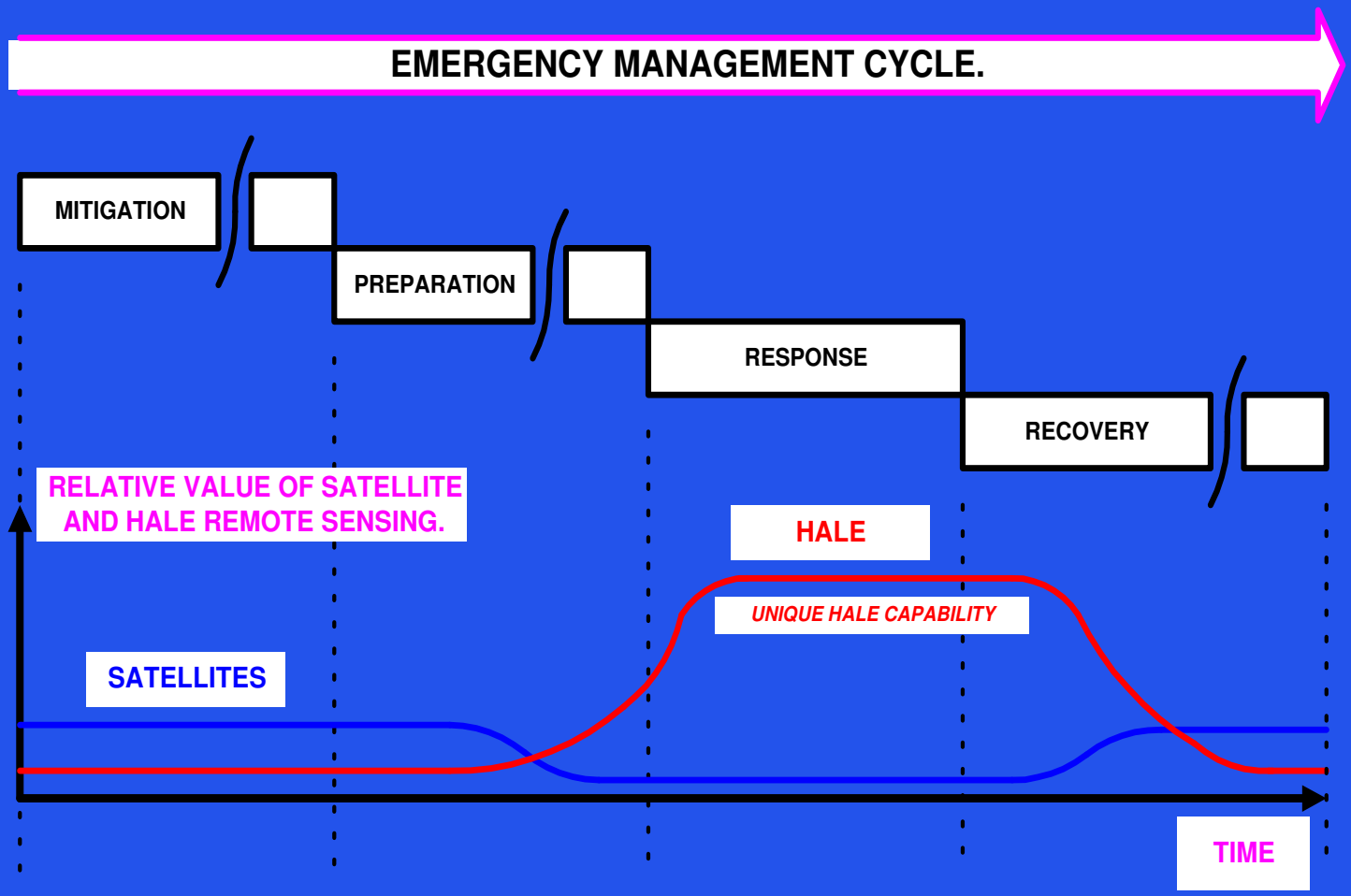
- The Role of Remote Sensing for Disaster Management: Definition and Demonstration of Approaches for GIS Integration (Noetrix Research Inc.)
- Emergency Weather Net - BC (R. Stull, University of British Columbia)
- Enhancing Canadian Emergency Information Exchange Through New Media Applications (P. Anderson, Simon Fraser University)
- Regional Application of the NHEMATIS Technology in British Columbia (RiskWorks Consulting Inc.)
- Automated Emergency Response Planning for Municipalities Susceptible to Flood Hazards (B. Robert, École polytechnique de Montréal)

Emergency Preparedness Canada

Protection civile Canada

Emergency Management-Related Civilian Applications.

HALE-Based and Satellite Remote Sensing in the Emergency Management Cycle



Research Projects FY2000-01
Risk Assessment

- Assessment and Prediction of Prairie Severe Thunderstorm Weather Phenomena (G. Strong, consultant)
- Assessment of Urban Climate and Weather Extremes in Canada (L. Bellisario, Environment Canada)
- Weather-Related Road Transportation Hazards: Risk Assessment and Response (J. Andrey, U. of Waterloo)
- Mapping Flowslide Risk in Eastern Canada for Decision Support (D. Perret, Commission géologique du Canada, Québec)

cont'd

Research Projects FY2000-01
Risk Assessment

- National Assessment of Emergency Planning in Canadian General Hospitals (N. Ferrier, City of Toronto)
- A Community-wide Vulnerability and Capacity Assessment (R. Kuban, Turning Point Group Inc.)
- Community Differentials in Hazard Perception and Emergency Response Needs (M. Rahman, University of Manitoba)
- Computer-Based Behavioural Model for Emergency Planning (Slobodan P. Simonovic Consulting Engineer Ltd.)
- Linking Vulnerability and Assessment Criteria Responses: A Review and Pilot Study (D. Shrubsole, U. of Western Ontario)

cont'd

Research Projects FY2000-01
Risk Assessment

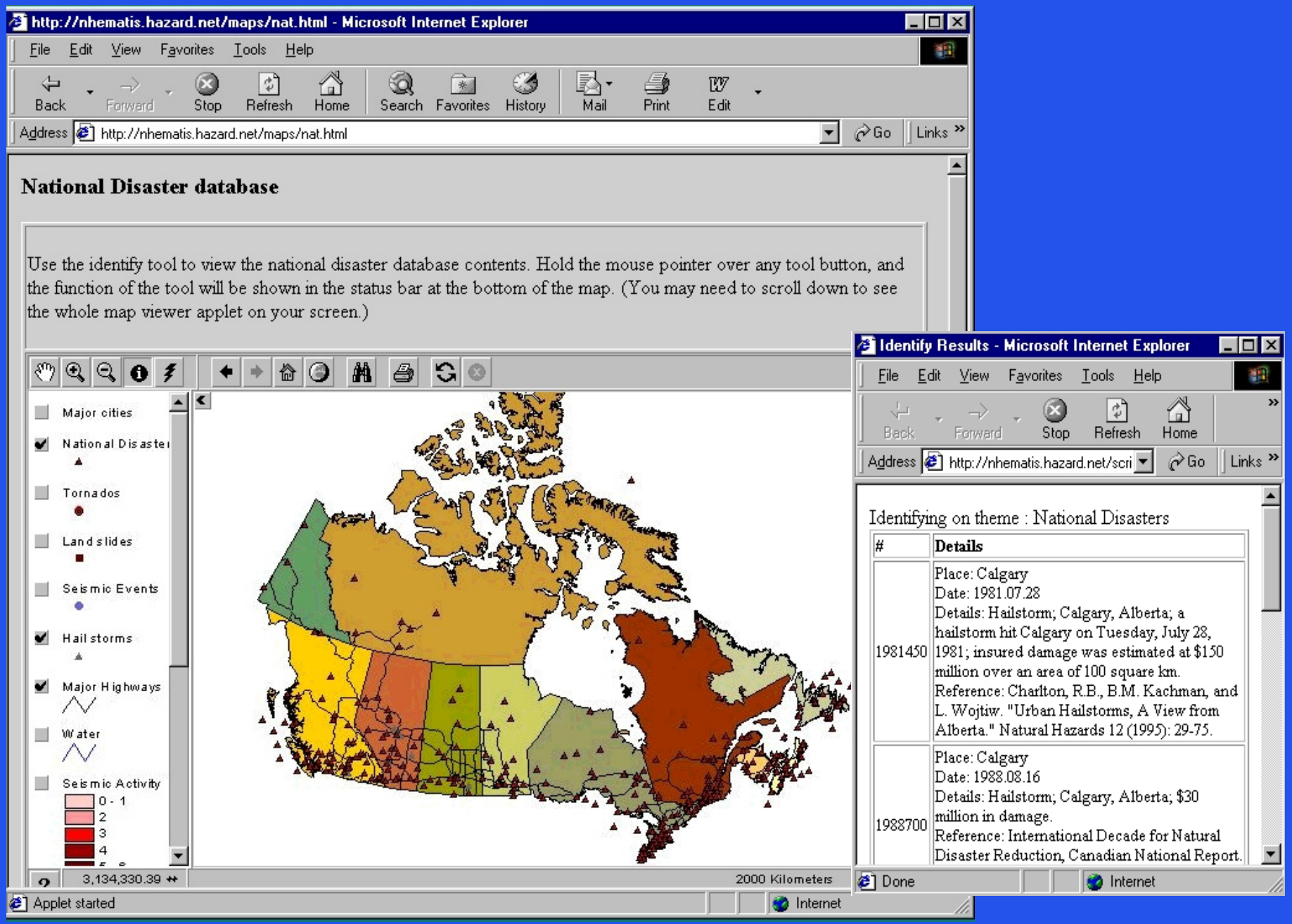
- Seismic Hazard Assessment and Mitigation for Buildings: A Canadian Perspective (M. Saatcioglu, University of Ottawa)
- Earthquake Hazard and Risk in Southwestern British Columbia (J. Clague, consultant)
- Canadian Workshop on Geotechniques and Natural Hazards: an IDNDR Perspective (R. Couture, Canadian Geotechnical Society)
- National Assessment of Natural Hazards and Disasters in Canada (D. Etkin, Environment Canada)

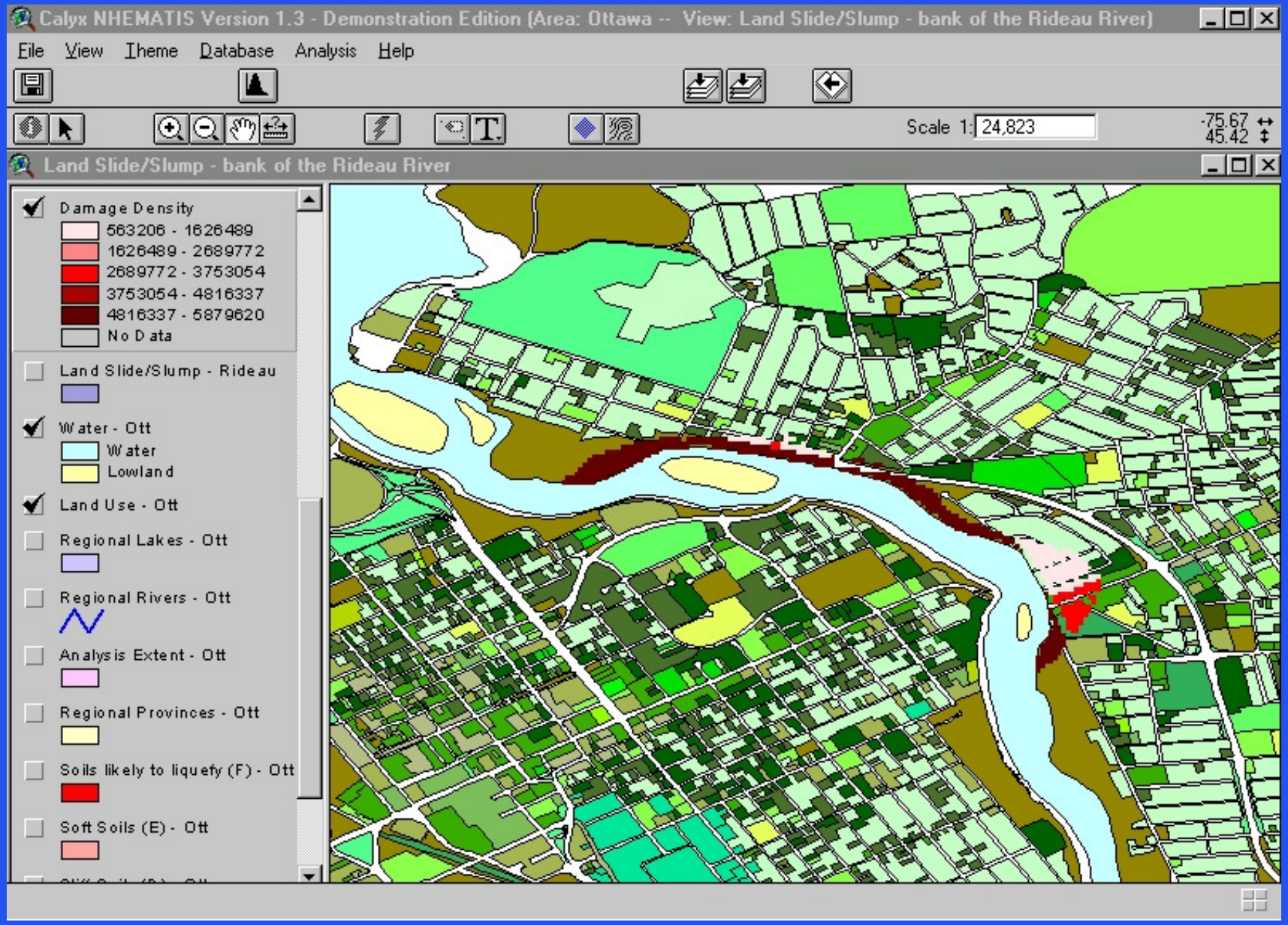
Research Projects FY2000-01 Policy

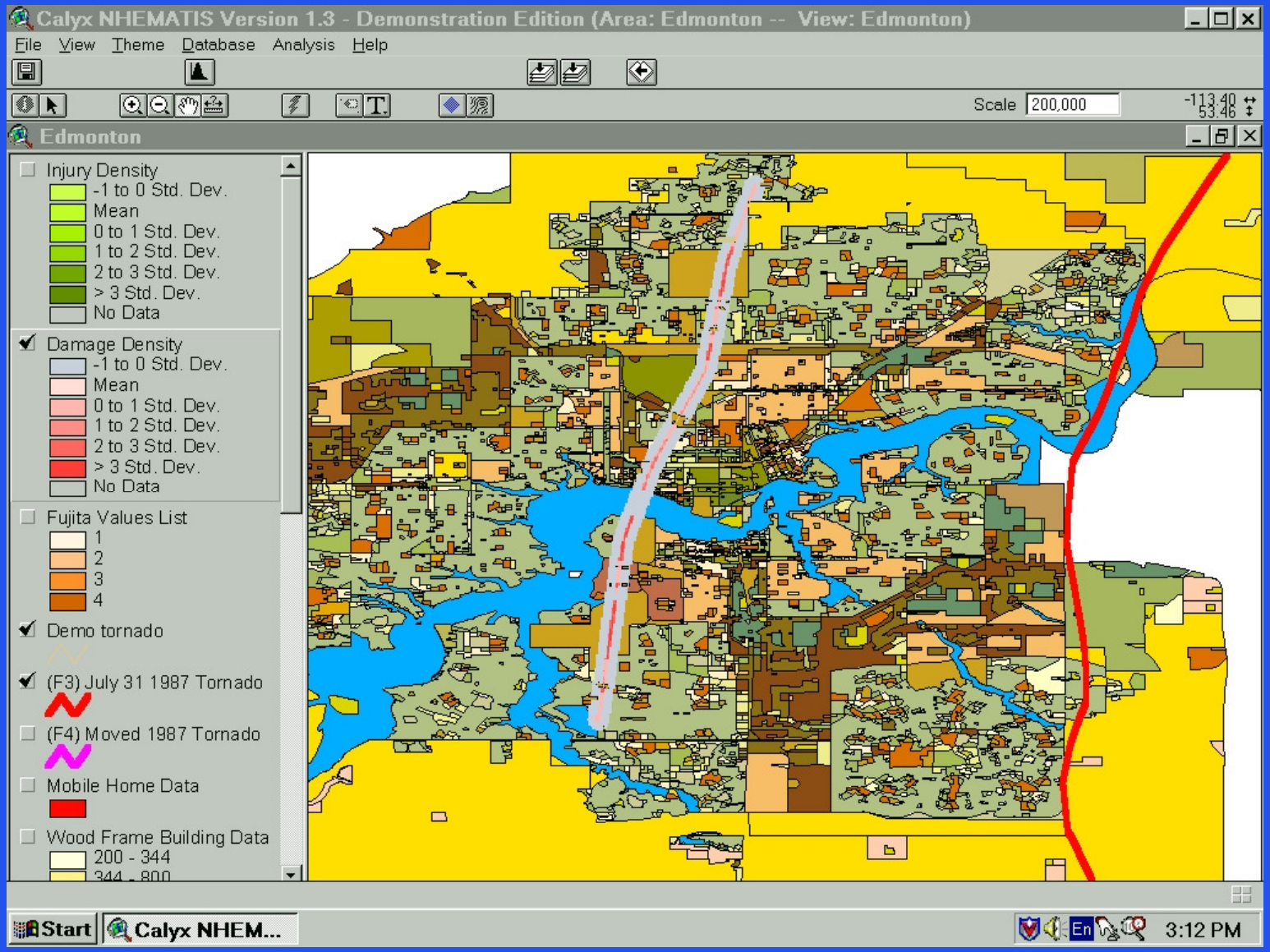
- Flood Hazard Assessment and Response in Canada: The report of an independent Expert Panel (I. Burton, Environment Canada)
- An Investigation of Efforts to Create Safer Communities – Experiences in Canada and the United States (John Newton Associates)
- Research on the Enterprise Model for Canadian Disaster Management Stakeholders (FirstMark Technologies Ltd.)
- Summary Document and Action Plan for 5th Asia-Pacific Conference on Disaster Medicine (W. Greene, U. of British Columbia)

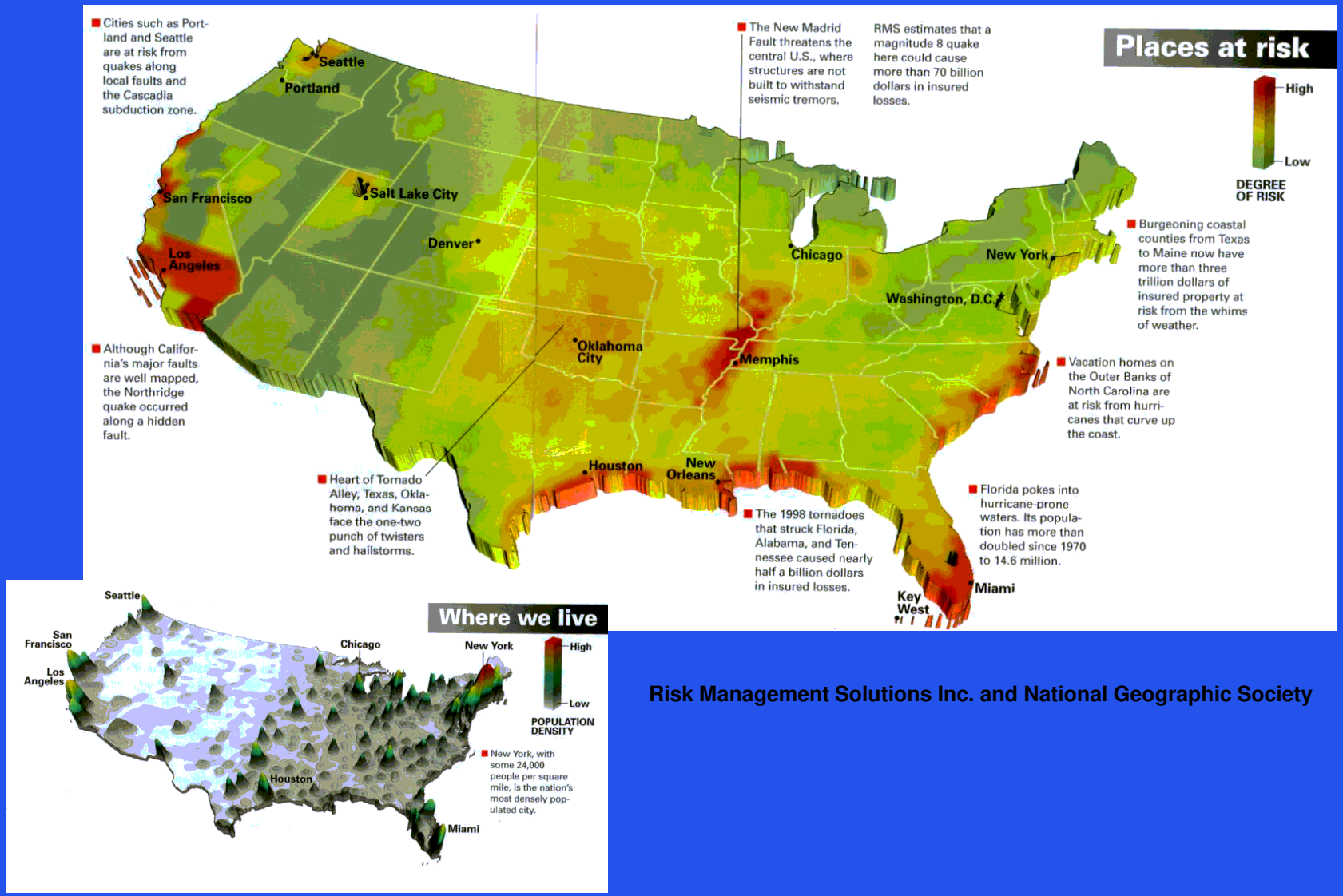
Research Projects FY2000-01 Public Awareness and Training

- NHEMATIS.hazard.net Rollout (P. Bailey, Nobility Environmental Software Systems Ltd.)
- Application of NHEMATIS in the QUEST Model (Envision Sustainability Tools Inc.)


http://nhematis.hazard.net/maps/nat.html - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Print Edit
Address http://nhematis.hazard.net/maps/nat.html
Go Links
National Disaster database
Use the identify tool to view the national disaster database contents. Hold the mouse pointer over any tool button, and the function of the tool will be shown in the status bar at the bottom of the map. (You may need to scroll down to see the whole map viewer applet on your screen.)
Major cities
National Disaster
Tornados
Land slides
Seismic Events
Hail storms
Major Highways
Water
Seismic Activity
0 - 1
2
3
4
3,134,330.39
2000 Kilometers
Applet started
Internet
Identify Results - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home
Address http://nhematis.hazard.net/scri
Go Links
Identifying on theme : National Disasters
Details
1981450 Place: Calgary
Date: 1981.07.28
Details: Hailstorm; Calgary, Alberta; a hailstorm hit Calgary on Tuesday, July 28, 1981; insured damage was estimated at $150 million over an area of 100 square km.
Reference: Charlton, R.B., B.M. Kachman, and L. Wojtiw. "Urban Hailstorms, A View from Alberta." Natural Hazards 12 (1995): 29-75.
1988700 Place: Calgary
Date: 1988.08.16
Details: Hailstorm; Calgary, Alberta; $30 million in damage.
Reference: International Decade for Natural Disaster Reduction, Canadian National Report.
Done
Internet


Calyx NHEMATIS Version 1.3 - Demonstration Edition (Area: Ottawa -- View: Land Slide/Slump - bank of the Rideau River)
File View Theme Database Analysis Help
Scale 1: 24,823
-75.67
45.42
Land Slide/Slump - bank of the Rideau River
Damage Density
563206 - 1626489
1626489 - 2689772
2689772 - 3753054
3753054 - 4816337
4816337 - 5879620
No Data
Land Slide/Slump - Rideau
Water - Ott
Water
Lowland
Land Use - Ott
Regional Lakes - Ott
Regional Rivers - Ott
Analysis Extent - Ott
Regional Provinces - Ott
Soils likely to liquefy (F) - Ott
Soft Soils (E) - Ott


Calyx NHEMATIS Version 1.3 - Demonstration Edition (Area: Edmonton -- View: Edmonton)
File View Theme Database Analysis Help
Scale 200,000
-113.40
53.46
Edmonton
Injury Density
-1 to 0 Std. Dev.
Mean
0 to 1 Std. Dev.
1 to 2 Std. Dev.
2 to 3 Std. Dev.
> 3 Std. Dev.
No Data
Damage Density
-1 to 0 Std. Dev.
Mean
0 to 1 Std. Dev.
1 to 2 Std. Dev.
2 to 3 Std. Dev.
> 3 Std. Dev.
No Data
Fujita Values List
1
2
3
4
Demo tornado
(F3) July 31 1987 Tornado
(F4) Moved 1987 Tornado
Mobile Home Data
Wood Frame Building Data
200 - 344
344 - 800
Start
Calyx NHEM...
En
3:12 PM



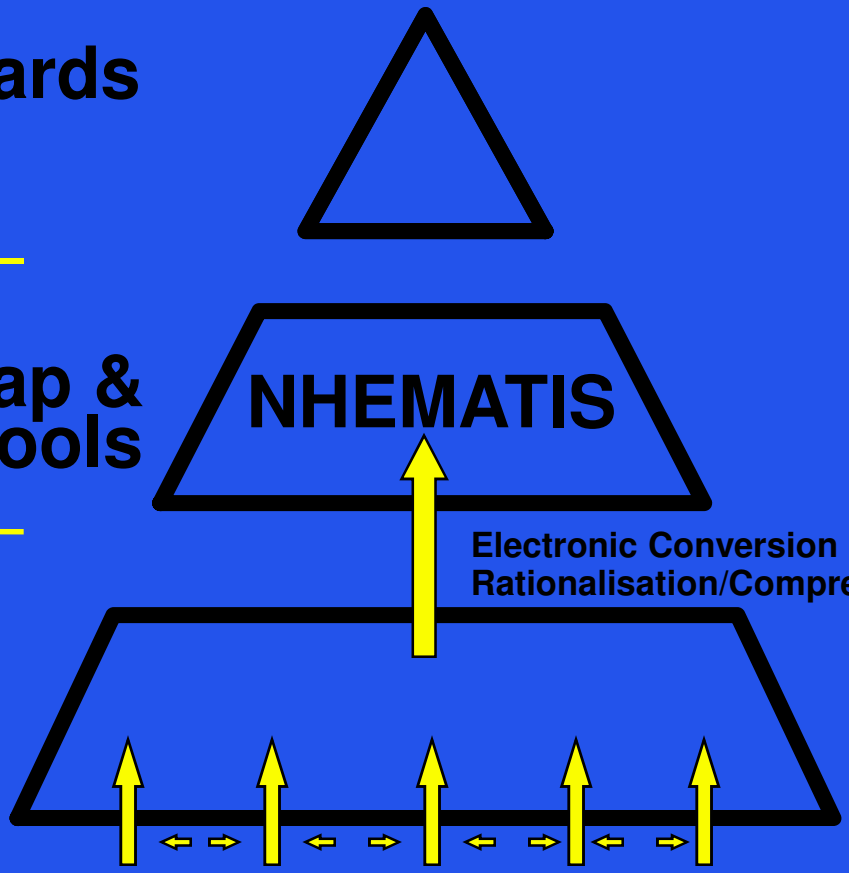
Risk Management Solutions Inc. and National Geographic Society

Risk Assessment for Contiguous United States (hurricanes, earthquakes, tornadoes and hail)

Natural Hazards Map

Electronic Map & Assessment Tools

Reports, DBs and Atlases



Snapshot

Continuously Updated, Integrated (Possibly on-line)

Long term research, by hazard

Proposed Hierarchy of Risk Assessment and Natural Hazards Research within Collaborative Environment

Web Sites

Emergency Preparedness Canada

http://www.epc-pcc.gc.ca

NHEMATIS

http://www.nobility.com/apps/emerg/index_fr.htm

Emergency Preparedness Information Exchange (EPIX)

http://hoshi.cic.sfu.ca/epix/