Hazard Identification and Risk Assessment

Introduction

The *Emergency Management and Civil Protection Act* (EMCPA), ushered in a new risk-based approach to Ontario's emergency management programs.

Hazard Identification and Risk Assessment (HIRA) assists by providing a tool that can be used to assess risk based on potential consequences and frequencies.

The purpose is to identify which hazards should be the focus of emergency management programs at a particular point in time.

Systematic risk assessments can shift the focus of programs from being solely reactive to being pro-active. A pro-active approach to emergency management can result in a more disaster-resilient Ontario.

Purpose of a HIRA

Reasons why a HIRA is useful to the emergency management profession:

- Helps emergency management professionals prepare for the worst and/or most likely risks;
- Allows for the creation of exercises, training programs, and plans based on the most likely scenarios;
- Saves time by isolating hazards that can not occur in the designated area;
- It can help to reduce financial costs which can then be redirected towards other emergency management projects.
- Helps your program to become proactive rather than solely reactive.

2012 HIRA Report

The 2012 HIRA Report and Workbook can be used as a guide for ministries, communities and First Nations to develop and maintain their own HIRAs if they so choose.

The 2012 Provincial Hazard Identification and Risk Assessment (HIRA) Report:

- Founded on a comprehensive scientific study of the hazards that have or could impact Ontario
- Serves as a reference document for the provincial level; however, it is scalable
- Assessed risk for natural, technological and man-made hazards in accordance with the definition of an emergency in the *Emergency Management and Civil Protection Act*

HIRA Requirements

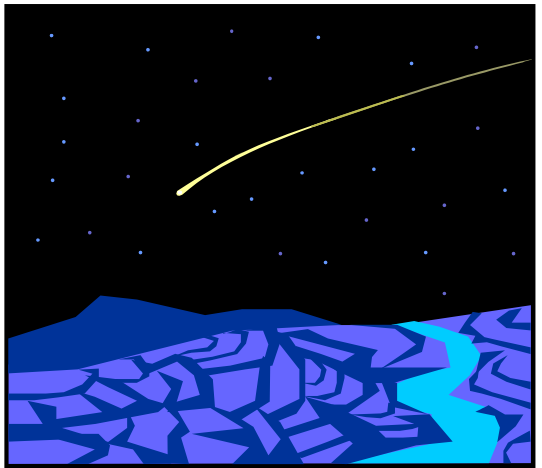
The revised HIRA methodology was required to:

- be risk-based;
- assess different types of hazards (natural, technological and human caused)
- allow for the addition of currently unknown and evolving hazards in subsequent revisions;
- incorporate both qualitative and quantitative information;
- incorporate as much scientific information as possible;
- be applicable to a range of event consequences and frequencies;
- be scalable so that it can be used at both a provincial and a municipal level;
- to be easily understood by a diverse group of people with different professional backgrounds.

Revised HIRA

Some of the changes from the previous HIRA are:

- Updated hazard narratives and risk information
- Addition of 3 new hazards:
  - cyber attack
  - geomagnetic storm
  - natural space object crash
- Expansion of other hazards
- New Methodology
- Risk rating of the hazards



Natural Hazards

- Agricultural and Food Emergency
  - Farm Animal Disease
  - Food Emergency
  - Plant Disease and Pest Infestation
- Drinking Water Emergency
- Drought/Low Water
- Earthquake
- Erosion
- Extreme Temperatures
  - Heat Wave
  - Cold Wave
- Flood
  - Riverine Flood
  - Seiche
  - Storm Surge
  - Urban Flood
- Fog
- Forest/Wildland Fire
- Freezing Rain
- Geomagnetic Storm
- Hail
- Human Health Emergency
  - Epidemic
  - Pandemic
- Hurricane
- Land Subsidence
- Landslide
- Lightning
- Natural Space Object Crash
- Snowstorm/Blizzard
- Tornado
- Windstorm

Technological Hazards

- Building/Structural Collapse
- Critical Infrastructure Failure
- Dam Failure
- Energy Emergency (Supply)
- Explosion/Fire
- Hazardous Materials Incident/Spills
  - Fixed Site Incident
  - Transportation Incident
- Human-Made Space Object Crash
- Mine Emergency
- Nuclear Facility Emergency
- Oil/Natural Gas Emergency
- Radiological Emergency
- Transportation Emergency
  - Air Emergency
  - Marine Emergency
  - Rail Emergency
  - Road Emergency

Human-Caused Hazards

- Civil Disorder
- Cyber Attack
- Sabotage
- Special Event
- Terrorism/CBRNE
- War and International Emergency

HIRA Steps


Hazard Identification
Risk Assessment
Risk Analysis
Monitor and Review

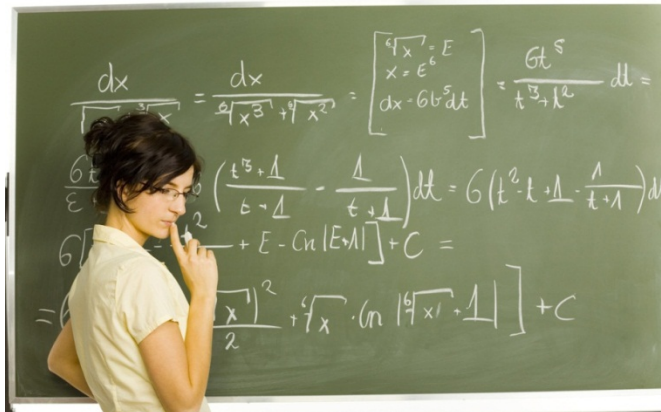
HIRA Methodology

- The core of most risk assessment methodologies is:

Risk = Frequency * Consequence

- After consultation with the scientific and risk assessment communities, a third variable was added:

Risk = Frequency * Consequence * Changing Risk



HIRA Method - Frequency

Frequency	Category	Percent Chance	Description
1	Rare	Less than a 1% chance of occurrence in any year.	Hazards with return periods >100 years.
2	Very Unlikely	Between a 1- 2% chance of occurrence in any year.	Occurs every 50 – 100 years and includes hazards that have not occurred but are reported to be more likely to occur in the near future.
3	Unlikely	Between a 2 – 10% chance of occurrence in any year.	Occurs every 20 – 50 years
4	Probable	Between a 10 – 50% chance of occurrence in any year.	Occurs every 5 – 20 years
5	Likely	Between a 50 – 100% chance of occurrence in any year.	Occurs >5 years.
6	Almost Certain	100% chance of occurrence in any year.	The hazard occurs annually.

HIRA Method - Consequence

Consequence is divided into six categories based on recommended practices:

- Social Impacts
- Property Damage
- Critical Infrastructure Failures
- Environmental Damage
- Business/Financial Impact
- Psychosocial Impact

The consequence categories in this HIRA methodology are a scale of impact, rather than a prioritization. Therefore, the same value in two categories does **not mean that the consequences of the two are equal and interchangeable**.

Changing Risk

- Hazards are NOT static

- The frequency and consequence can be influenced by factors such as mitigation actions and climate change. Changing Risk helps to account for these changes

Changing Risk = Change in Frequency + Change in Vulnerability

Level of Risk

Level of Risk	Description	Hazards
>50	Extreme	Flood, Forest/Wildland Fire, Freezing Rain, Hazardous Materials Incident, Human Health Emergency, Snowstorm/Blizzard, Tornado
41 – 50	Very High	Drinking Water Emergency, Geomagnetic Storm, Oil/Natural Gas Emergency, Terrorism/CBRNE
31 – 40	High	Agricultural and Food Emergency, Critical Infrastructure Failure, Drought/Low Water, Nuclear Facility Emergency
21 – 30	Moderate	Civil Disorder, Cyber Attack, Earthquake, Human-Made Space Object Crash, Landslide, Transportation Emergency, Windstorm
11 – 20	Low	Building/Structural Collapse, Dam Failure, Explosion/Fire, Extreme Temperatures, Hurricane, Natural Space Object Crash, Radiological Emergency
<10	Very Low	Energy Emergency (Supply), Erosion, Fog, Hail, Land Subsidence, Lightning, Mine Emergency, Sabotage, Special Event, War and International Emergency

Next Steps

Vulnerable Groups

- Some people may be more vulnerable to certain hazards than others and are more likely to suffer from the negative impacts of a hazard

- Not all people who identify themselves as belonging to one of these groups may be at an increased risk during an emergency, it depends on factors such as the individual's specific situation, the type of hazard, etc.

- Assessing vulnerability is a key consideration in planning and it can assist in mitigation action decision-making

Next Steps Continued

Mitigation Actions

- Mitigation is defined as “actions taken to reduce the adverse impacts of an emergency or disaster” (EMO, 2011).
- A HIRA is only one part of a comprehensive emergency management program.
- Once a HIRA has been done, attempts must be made to reduce risks, beginning with the hazards identified as having extreme and very high levels of risk.

Thank you!

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