Natural Disasters in Canada

Part 1: Inquiry and Analysis
Course/Unit: Exploring Canadian Geography (Grade 9)

Learning Goals

- Develop an understanding of the characteristics and spatial diversity of natural and human environments and communities on a local to global scale.
- Be responsible stewards of the earth by developing an appreciation and respect of both natural and human environments and communities.

Curriculum Expectations

Overall Expectations

- **A1. Geographic Inquiry:** use the geographic inquiry process and the concepts of geographic thinking when investigating issues relating to Canadian geography
- **B2. Interactions between the Natural Environment and Human Activities:** analyze interrelationships between physical processes, phenomena, and events and the ways in which various communities in Canada respond to and interact with them

Specific Expectations

- **A1.2:** select and organize relevant data and information on geographic issues from a variety of primary and secondary sources, ensuring that their sources reflect multiple and diverse perspectives
- **A1.3:** Apply critical-thinking skills to assess the credibility and biases of relevant sources from a wide variety of media forms, including print, online, and social media as well as content produced using current innovations and technologies, including artificial intelligence
- **A1.5:** use the concepts of geographic thinking when interpreting and analyzing evidence, data, and information relevant to their investigations; evaluating and synthesizing their findings; and formulating conclusions, predications, and judgements about geographic issues relating to Canada

- **A1.6:** communicate their ideas, arguments, and conclusions about geographic and other terminology, formats, and styles appropriate for specific audiences and purposes, and use accepted forms of documentation to acknowledge different types of sources
- **B2.1:** analyze interrelationships between physical characteristics in specific regions of Canada and various human activities and communities these characteristics support
- **B2.2:** explain how human activities can alter physical processes and affect natural events and phenomena in Canada, including in their local region
- **B2.3:** analyze the risks that various physical processes and natural events, including disasters, present to communities in Canada, and assess ways of responding to these risks
- **B2.4:** analyze environmental, economic, social, and/or political consequences for Canada of changes in some of the Earth's physical processes, including the impact of climate change, and assess local and regional mitigation and adaptation strategies

Description

Students will have the opportunity to learn about a variety of natural disasters that can occur in Canada. They will be able to make connections between the different landform and climate regions of the provinces and their link to the natural disasters that occur in those areas. Students will end the lesson by researching the human impact on a chosen natural disaster and presenting key findings. This lesson is best taught after students have learned about the landform and climate regions in Canada.

Materials

- PowerPoint Presentation "Natural Disasters in Canada"
- Handout 1.1 - PowerPoint Reflection Questions
- Handout 1.2 - Matching Activity
- Handout 1.3 - Labeling Natural Disasters in Canada

Introduction

Natural disaster can occur in many parts of Canada, and they are typically related to landform and climate regions. This lesson is designed to allow students to observe and reflect on how these disasters occur and use their critical thinking skills to make connections between these natural events, Canada's geological features, and how human behaviour is affecting them.

Action

Part 1: Observe and Reflect

Begin this lesson with the Natural Disasters in Canada PowerPoint. Each slide depicts a different natural disaster. Students are asked to reflect on what they think happened in the image, what caused the event to happen and where in Canada do they think the natural disaster occurred. This can be discussed through conversation in the classroom, or the teacher could use Handout 1.1 - "PowerPoint Reflection Questions" where students can jot down their ideas and share at the end of the presentation.

Part 2: Matching Definitions

Next, Handout 1.2 - "Matching Activity" gives students the opportunity to match 8 different natural disasters to their correct definition. Take up the worksheet once they are finished.

Part 3: Differentiating Regions

The last worksheet, Handout 1.3 - "Labelling Natural Disasters in Canada", provides students with the opportunity to label the provinces and use their knowledge of landform and climate regions of Canada to identify by letter where they believe that these events could occur.

Part 4: Update Information

Revisit the PowerPoint and provide students with the following information about each of the 8 natural disasters.
Throughout this conversation students can add to their handout with the reflection questions (Handout 1.1) and their map of Canada (Handout 1.3) to identify the areas prone to each of the disasters.

Disaster #1: Floods

Floods can occur in many parts of Canada, but they are most common in coastal areas as well as areas of flat terrain, mountainous areas where snow melts rapidly in the spring and low-lying areas near rivers. New Brunswick and other coastal Atlantic communities, Quebec, Ontario, Alberta, Manitoba, Saskatchewan, British Columbia are all areas that are prone to floods. Northern communities where there is melting permafrost and extreme weather are also susceptible. One of Canada's most expensive natural disasters was the Southern Alberta flood in 2013 that destroyed several communities. It cost $6 billion dollars in damage and killed 5 people.

Disaster #2: Earthquakes

Earthquakes occur in a few areas of Canada but mostly near the edges of tectonic plates. British Columbia has a high-risk value due to the boundaries of the plates and the Yukon and Northwest Territories are at high to moderate risk. At moderate risk of earthquakes are Quebec, the Ottawa Valley and southern Ontario mostly from fault lines. The worst earthquake in Canadian history was in 1949 in Haida Gwaii, formerly known as the Queen Charlotte Islands off the coast of British Columbia. It had a magnitude of 8.1 and generated a tsunami.

Disaster #3: Tornados

Most tornadoes in Canada occur in Southern Ontario in an area that is known as Tornado Alley. Southern and Central Quebec as well as the Southern Prairie Provinces are also susceptible. These areas have wide, flat terrain and are prone to intense summer storms caused by warm, moist air mixing with the cold fronts from the Great Lakes. The worst tornado in Canadian history was in Regina in 1912 where 28 people died, a couple hundred people were injured and many more lost their homes. The tornado was an F-4 on the "Fujita scale" where wind speeds measured 332-418 km/h and the damage was considered devastating.

Disaster #4: Wildfires

Wildfires can occur in most places in Canada where there are large, forested areas, dry conditions and lightning. They occur in all provinces but are at lower risk in Atlantic Canada where there are wetter conditions. The costliest forest fire was in Fort McMurray, Alberta in 2016. In 2021, wildfires in Ontario led to the evacuation of several First Nations communities. And, in 2023, record breaking wildfires in Quebec affected air quality across most of North America.

Disaster #5: Severe Storms

Severe thunderstorms occur mostly in spring and summer in Southern and Central Canada where warm, moist air collides with colder air masses. Severe storms also include hailstorms, ice storms and blizzards in winter among others. Southern Ontario, the Southern Prairies, Atlantic Canada, Quebec and British Columbia have experienced intense storms. The most destructive ice storm in Canadian history was in 1998 in Eastern Ontario and Southern Quebec where millions of people were without power, 1000 people were injured and many more were displaced.

Disaster #6: Tsunamis

Tsunamis are rare in Canada but have occurred on the Pacific Coast of British Columbia where undersea fault lines are found and cause underwater earthquakes. The Atlantic Coast of Newfoundland and Nova Scotia could also experience tsunamis however, they are rare. Canada's deadliest tsunami was in Newfoundland where 28 people were killed and significant damage

occurred. Nunavut, Northwest Territories and the Yukon are also at low risk due to landslides and glacial activity.

Disaster #7: Heatwaves

Heatwaves are more common in the southern parts of Canada. Ontario, Quebec and the Prairie Provinces are particularly prone to intense hot temperatures. Due to climate change, these weather events are becoming more common and longer lasting. The southern interior of British Columbia is also affected by heatwaves which is where in 2021, record breaking temperatures were measured and over 600 heat related deaths occurred. Wildlife suffered, agriculture crops were destroyed and wildfires sparked because of the intense heat.

Disaster #8: Avalanches

Avalanches occur in mountainous areas of Canada. Most commonly in the coastal mountains of British Columbia and Rocky Mountains of British Columbia and Alberta. Steep slopes, deep snow and changing temperatures increase the risk of avalanches. Remote areas of the Yukon have experienced avalanches as well as in Quebec, Newfoundland and Labrador. The 1910 Rogers Pass Avalanche was the worst in Canada's history where 58 railroad workers died.

Part 5: Research, Evaluate, and Present

Have each student select one of the eight natural disasters that have been identified.
Based on the natural disaster they selected, have students prepare a summarized response to the following question:
How has human activity affected the impact of this natural disaster?
Students will have to research this question and can provide their answer as either a two-minute presentation or as two-paragraphs of text.
You can provide students with the following prompts to help them in their research:

- What human activities alter this natural event?
- Do these activities vary by region? What can you do differently where you live?
- What patterns and trends in the frequency, severity, and distribution of the natural disaster exist in Canada
- What are the economic, social, or political consequences of climate change and the impact on this natural disaster?
- What have various communities in Canada done to protect themselves from this natural disaster?

Students can use the Canadian Disaster Database to support their research:
https://cdd.publicsafety.gc.ca/srchpg-eng.aspx
To best present their information, students will need to organize data from a variety of primary and secondary sources, find sources that reflect diverse perspectives, and apply critical-thinking skills to assess the credibility of relevant sources.

Consolidation/Extension

Career Responses to Natural Disasters

To build onto this lesson, students can conduct research on what careers are impacted by natural disasters. Have them consider careers that are changing as well as new careers that will start becoming more prevalent as Canadians work to mitigate the risks of climate change.

Additional Resources

Governmental of Canada – Natural Hazards
https://www.canada.ca/en/services/policing/emergencies/hazards.html