Natural Disasters in Canada

Part 2: Wildfires
Exploring Canadian Geography — Grade 9

Wildfires Experiment

Learning Goals

- analyse the connections within and between natural and human environments and communities
- be responsible stewards of the earth by developing an appreciation and respect of both natural and human environments and communities

Overall Expectations

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
C2. Sustainability and Economic Development — analyze issues related to sustainable development of resources and industries in Canada

Specific Expectations

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
C2.2 analyze issues related to the sustainable development of various resources and industries in Canada from a variety of perspectives

Description

Students will have the opportunity to learn about wildfires and more specifically, the elements required to create fire, their sources, the factors that affect how they spread as well as their ecological role. An engaging activity will allow students to use their thinking and inquiry skills to create and observe how various features in their "landscape" affect the spread of fire.

Materials

Lesson:

- PowerPoint Presentation — "Natural Disasters – Wildfires"

Activity:

- Large container of water
- Cookie sheet with a lip
- Playdough or modelling clay
- Wooden matches
- Lighters

Introduction

Fuel, oxygen and heat are the three elements that are needed to start a fire.
Sources of fuel could include vegetation such as dried leaves and twigs or man-made structures. Oxygen is a component of air making up 21% of the earth's atmosphere and the sources of heat could include lightning strikes and human activities. If one of these elements is not present, the fire will not burn.
The goal of wildfire fighters is to try to remove at least one of the elements to control and stop the forest fire from spreading. Removing access to fuel, adding a fireguard and using water or a flame retardant on unburned sections at the edges of the fire would allow them to gain control and extinguish it. Cooling the air by using water could remove the element of heat and smothering the fire with earth and/or water would control the fuel source.
The main factors that influence the spread of wildfires are fuel, topography and weather.
Forest fuel sources include grasses, deciduous and coniferous types of vegetation. Grasses and smaller twigs will burn much quicker than larger pieces of wood. The amount of fuel and their dryness greatly affect how quickly the fire will burn. Their arrangement is also considered in terms of their continuity and spacing. Horizontal spacing is the spacing of the fuel as it lies on the ground. When fuels are close together, the fire will spread faster. When fuels are scattered or separated by natural barriers such as water bodies, rock or areas of bare ground, the fire will be irregular and spread more slowly.

Topography is the physical features of the earth's surface. A slope is a slant in the earth's surface that is either upward or downward. If the fire is burning up a slope, vertically, it will burn faster because the fuel receives heat, drying it out before the flames reach it. The aspect describes which direction that the slope is facing. If it is facing south, it will be much hotter and therefore the fuels will be warmer and drier making it easier to burn. And, if there are water bodies nearby such as lakes, rivers and ponds, they can slow or stop the spread of the fire.
In terms of weather, humidity levels, precipitation, temperature and wind are all factors that affect fire behaviour. Wind is one of the greatest factors that affect fire and could determine the direction and rate of speed at which it spreads. Moreover, blowing embers could possibly ignite fuels downwind.
It is important to note that forest fires do have an important ecological role by maintaining biodiversity and creating different landscapes. Jack pine for example need fire to reproduce because this is the only way that their cones will open to disperse the seeds within them.
Controlled burns are important for forest and wildlife management. These highly regulated burns can assist in removing insect pests and diseases, remove undesirable plants that compete for soil nutrient, clear areas to prepare for planting and enhance wildlife habitat.

Action

Safety considerations: Make sure there are no fire bans in place if doing this activity outside. Have water nearby to put out any fires, dispose of used matches properly, set up in an area with no flammable materials nearby (for example: on pavement) and make sure it is not a windy day.
Procedure:

1. Working in groups of 2 or 3, hand out a cookie sheet and some playdough to each group of students.
2. Using the playdough, have the students create a landscape with various hills and flat spots. Water features could also be added.
3. Have some of the student groups prop up their cookie trays on a rock to represent a slope.
4. Place the matches in the playdough to represent trees. Several matches could be clumped together to represent a dense forest, or they can be spaced out for a sparsely treed forest.
5. Using a lighter, start a fire on some of the trees and observe how the fire spreads.

Analysis: Have students make observations on the following:

- Does the angle of the tray affect how the fire spreads?
- Do densely treed areas light up faster than sparse areas?
- Is the fire able to jump large gaps in trees or build in waterways?
- What preventative measures could be used to slowdown the spread of fire?

Consolidation/Extension

Canada's Natural Resources
Canada is one of the world's largest producers and exporters of softwood lumber. To extend this lesson, students can research the impact of wildfires on the lumber industry and what is being done to mitigate their impact.

Additional Resources

Ontario Forest, Wildland and Outdoor Fires:
https://www.ontario.ca/page/forest-wildland-and-outdoor-fires