FORESTS OF CHANGE (Part I)

GRADE Grade 6

PART 1 of 3

TOPICS Wildfire, attitudes, disturbance, ecology, balance

CURRICULAR CONNECTIONS

Grade 6 Science

Topic E – Trees and Forests

1. Identify reasons why trees and forests are valued. Students meeting this expectation should be aware that forests serve as habitat for a variety of living things and are important to human needs for recreation, for raw materials and for a life-supporting environment
3. Describe the role of trees in nutrient cycles and in the production of oxygen.
8. Identify human uses of forests, and compare modern and historical patterns of use
9. Identify human actions that enhance or threaten the existence of forests
10. Identify an issue regarding forest use, identify different perspectives on that issue, and identify actions that might be taken

OVERVIEW

Students will be introduced to the topic of wildfire and gain an appreciation for the role that it plays in overall forest health. They will look at a few key species that have adapted to rely on fire for their survival and the delicate balance that exists in nature. They will then look at the diverse attitudes that different cultural groups in North America/Turtle Island have had with wildfire and how these attitudes have evolved over time.

OBJECTIVES

- Students will understand that wildfire is a natural process that has both positive and negative effects on forests
- Students will understand the complex historical and present day relationships that various cultural groups have with wildfire

KEY TERMS

- **Controlled burn** – a fire set intentionally for forest management, farming, or ecological restoration. Also called a prescribed burn
- **Disturbance** – a temporary change in environmental conditions (e.g., wildfire, flooding, insect outbreak) that causes a significant change in an ecosystem
- **Fire suppression** – the practice of putting out wildfire
- **Serotinous cone –** a seed cone that remains on the tree until exposure to certain events such as wildfire opens them
- **Wildfire** – a fire originating and occurring away from people or structures

GUIDING QUESTIONS

- How do different species benefit from wildfire?
- In addition to benefiting different species directly, how does wildfire contribute to overall forest health?
- How have evolving human attitudes towards fires contributed to forest composition today?

BACKGROUND ESSAY

Wildfire is a naturally occurring phenomenon that plays a crucial role in the long-term health of forests, as well as shrublands and grasslands. It is a type of **disturbance** that is part of the natural life cycle of the forest. Despite their devastating potential, natural wildfires does not destroy forests but rather help to rejuvenate them. Fire helps clear needles, logs and leaves from the forest floor. In turn nutrients are recycled back into the soil much more rapidly than through natural decomposition. Fire also creates gaps in the forest canopy that allow sunlight to penetrate to the forest floor, reaching seeds and young seedlings that would otherwise not survive. Finally, fire creates habitat that supports many species of insects, mammals and birds.

Some species – such as the lodgepole pine – depend on wildfire to reproduce.[1] The cones of lodgepole pines are tightly sealed by a layer of sticky resin and woody tissue that cements the cones' scales together. The seeds are locked in tight, and the cones aren't able to open unless they're exposed to very high temperatures in excess of 45°C, such as those generated by wildfire. These types of cones are called **serotinous cones**. Lodgepole pines are well adapted to recolonize forests after fire passes through their territory. What other species benefit from wildfire?

DURATION 10-15 minutes

MATERIALS

- Nutcracker
- Hammer
- Vice
- Oven
- Bunsen Burner
- Microwave

ACTIVITY – LODGEPOLE PINE CONE BREAK TEST

To illustrate the resilience of lodgepole pine cones, students (or instructors) will apply different stresses to a serotinous cone to better understand what is required to open the scales.

1. Using a variety of mechanical implements (e.g. nutcracker, hammer) try to break open a lodgepole pine cone.

2. Expose the cone to a heat source (e.g. oven, Bunsen burner, or microwave). Was the heat sufficient to open the cone? How hot did the source need to be to open the cone? What did you find inside when you opened the cone?

3. *Extension: Have students research other plant and animal species that benefit from wildfire. How do they benefit? Some species to consider are woodpeckers, aspen poplars, fireweed, elk and the Canadian lynx.*

Safety Note: Some of the implements suggested in this activity have inherent risks associated with them. Ensure that the proper safety precautions are taking, including performing these experiments in an appropriate location.

If teachers or students have outstanding concerns about performing this experiment, or your school does not have access to these materials, YouTube is a great source of videos of lodgepole pine cones being exposed to heat sources.

KEEP WATCHING

"Imagine the Fire" (Run Time – 14:21) explores ways in which aboriginal practices of controlling fires could be good for land and wildlife. The video is available for viewing at www.cbc.ca/player/play/2392539513.

BACKGROUND ESSAY

Since time immemorial, Indigenous Peoples have used **controlled burns** to manage forests. The time and location of the burns were based on traditional knowledge and represented an important element of stewardship of the land. The reasons for burning were numerous and included maintaining grazing lands for game animals and stimulating the productivity of food and medicinal plants. These burns were carefully monitored and took place during low risk conditions such as early spring or late fall.

[1] Rocky Mountain lodgepole pine reproduces from seeds that may be contained within serotinous or non-serotinous cones. This variety of lodgepole is *more likely* to have serotinous cones than other varieties of lodgepole pine.

As European settlers arrived and Indigenous people were removed from their traditional territories, this practice of controlled burns became less common. European settlers brought with them a very different attitude towards fire than the Indigenous worldview. Fire was seen by many settlers as a destructive force that posed a threat to property and settlements. This attitude meant that putting out wildfires – also known as **fire suppression** – became the norm.

Removing fire from ecosystems is like removing the wind or the rain. All are essential for the ecosystem to function well. The effects of fire suppression on modern day forests and forest fires are important to understand. Many forests across North America are much older and closed-in than they would be under natural conditions. This means that there is less open habitat – the type that is favoured by many wildlife species.

One of the most significant consequences of decades of fire suppression is a build-up of dead wood – fuel – in the forest. When this increased fuel meets the predicted impacts of climate change, the effects can be immense. Today there is growing interest in learning about how traditional Indigenous knowledge can be used to combat wildfires around the globe.

DURATION 10-15 minutes

MATERIALS

- Forest images
- Computer with Internet connection

ACTIVITY – CONTRASTING FORESTS

Students explore their own ideas of what a healthy forest look like in this compare-and-contrast activity.

1. Present students with images of two contrasting forests (e.g. old versus new growth, old versus new burn, deciduous versus coniferous). Ask students to describe the images of the two contrasted forests. How are they different? How are they similar?

2. Based on the descriptions that the students have generated, ask them to brainstorm whether they think the forest is healthy or not. What makes a healthy forest ecosystem?

3. *Extension: Have students investigate how forests in their area have changed over time. The Mountain Legacy Project Explorer (explore.mountainlegacy.ca/) contrasts historical photos against modern day photos. Compare photos from protected areas to photos in areas that are not protected. Are there more or less trees? Why or why not?*

DURATION 15-20 minutes

MATERIALS

- Ball x2

ACTIVITY – THINNING THE FOREST

In this relay-style race, students will experience the relative ease with which fire is able to travel between trees in a forest with a history of wildfire suppression versus one without. Variations can be introduced to emphasize certain concepts such as FireSmart practices or natural forest composition.

1. Split the class into two forests (teams). Have them form two lines, approximately 1.5 metres apart. Have the two teams stand shoulder to shoulder with their feet shoulder width apart, facing the other team.

2. For the activity the students are not allowed to move their feet. Their bodies represent their trunks, which they are only allowed to move side to side (no twisting). Their arms, head and neck represent their branches, which they are allowed to move.

3. Tell the students that they represent a forest that has been subject to decades of fire suppression. Show the students the ball, which represents fire. Their job will be to pass the ball from one end of the forest to the other. They must **pass** (no throwing) the ball from their branches to their neighbours' branches.

4. Lead a discussion about whether the task was easy or difficult.

5. Now thin the forest by removing every other tree and adding them to the end of the line with the same spacing as the other trees. Send the fire through the forest again. Once the fire reaches the end, ask the students if that was easier or more difficult than the first round.

6. Reset one team to have un-thinned trees. See which team is able to pass the fire to the end of the line the quickest. Switch the thinned and un-thinned teams.

Variations:

7. *To make the challenge more difficult, spread the trees out so that they can barely get the ball from one to another.*

8. *A firebreak is a way that communities can protect themselves against fire by removing fuel between a potential wildfire and a community. Represent a fire break by removing a group of trees from the middle of the line. The trees can throw the fire but the trees on the other side have to catch it without moving their legs.*

9. *Create a more realistic forest by varying the spaces between the trees. Explain to the students that forests under natural fire regimes will have a diversity of species present as well as gaps that allow sunlight to reach through to the forest floor.*

This activity has been adapted from "Forests and Fire: A Community FireSmart Game" from FireSmart BC. View the original lesson plan and additional activities for students of all ages related to FireSmart at https://firesmartbc.ca/resource-types/education-materials/.