Forest Fires and Climate Change

Activity Info

Level: junior/intermediate
Subjects: science, ecology, art
Duration: one class
Group: class and individual
Setting: classroom
Preparation: news sources or Internet, art materials

Summary

Students will look at the relationships between forest fires, the formation and health of the forest, weather and climate change.

Learning Outcomes

Students will:

- recognize that fire occurs naturally and affects the health and formation of forests
- look at how weather conditions affect forest fires and from this, older students will investigate the possible effects of climate change on forest fires
- depict, through art, some of the changes fire brings about in a forest

Since 1980 Canada has lost an average of 2.4 million hectares of forest to fires each year, a 140 per cent increase over the previous 30 years.

Background

Forest fires, the health of Canada's forests, and climate change are all closely related.

- Canada's forests, in many regions rely on fire. Despite the devastating effects that fires can have, as a natural process fire ***does not*** destroy a forest but rejuvinates it. Fires remove dead trees and litter from the forest floor, release nutrients to help new growth, and allow new plant and wildlife species to move in. In some forests, the seeds of trees such as jack pine and lodgepole pine, will not be released from their cones unless exposed to fire.
- Climate change may lead to more forest fires due to warmer and drier weather, and increases in lightning storms (a natural cause of fires).
- Canada's forests play an important role in helping to reduce the amount of carbon in the atmosphere and, by doing this, reduce carbon dioxide, one of the main greenhouse gases.
- Changes in the frequency of fires will change the carbon cycle and increase the release of CO_2 to the atmosphere.

Although research is conducted on all of Canada's forests, the boreal (taiga) forest which occupies much of the northern hemisphere plays an important role in climate change. As part of these studies, the International Geosphere-Biosphere Program has established permanent study areas in North America, Europe and Asia with researchers from the CFS and many other organizations participating. Some of the many questions that they are seeking to answer include:

- What are the past and present fire and weather patterns?
- How much carbon is lost during and after a fire due to direct burning and subsequent decay?
- After a fire, when does a forest turn from a source of carbon back into a carbon sink?
- How will this affect the overall global climate budget?
- How will fires and climate change affect the forest and its distribution?

Answering these questions will help scientists in many ways. Understanding historical climate/fire relationships will provide insight when projecting future patterns under a warming climate, and in understanding the ways fires might develop and behave on a large scale. On a smaller scale, understanding future fire patterns may help in making local forest management decisions and in planning for human safety in communities near high-risk areas.

When doing your research, check out the following web sites:

- www.msc-smc.ec.gc.ca/ccrm/bulletin
- http://nofc.cfs.nrcan.gc.ca/science/research/climate_change_e.php (click on: downloads — climate change — facts sheets)

1. As a class, discuss the causes of forest fires, for example: campfires, sparks from trains, cigarettes thrown from cars and lightning.

2. Ask the students to look at news or Internet sources for information about recent or past forest fires, and long term fire and weather records.

- Can the students detect any changes or trends in the records?
- Do they see a relationship between the long term fire records and the long term weather records?
- Do the reports of individual fires include information about the weather conditions or type of season leading up to the fire, such as a dry spring?
- How did the individual fires start? Did weather conditions affect the cause of the fire, the fighting of the fire, or its spread?

3. Based on this research and the students' observations, what are some of the ways weather affects forests? For older students you may wish to link this to some of the projected impacts of climate change outlined on pages 6 and 7.

4. Use a class discussion to help children understand that fire is a natural process with both positive and negative effects on the forest, and that many of our attitudes about fire are based on how it affects humans (loss of timber, damage to homes and communities, risk to human life, loss of life). This activity's Background information, and various other teaching resources such as the ones listed below, can help you.

5. Students can create a drawing or a class mural showing the different ways a forest changes after a fire. A few ideas to get you started:

- squirrels and owls nest in old, large trees that are often left standing after a fire
- many young tree seedlings grow up quickly after a fire, nourished by the newly released nutrients
- deer eat the tender young shoots of trees and bushes that sprout after a fire.

Forest Fire Resources for Educators:

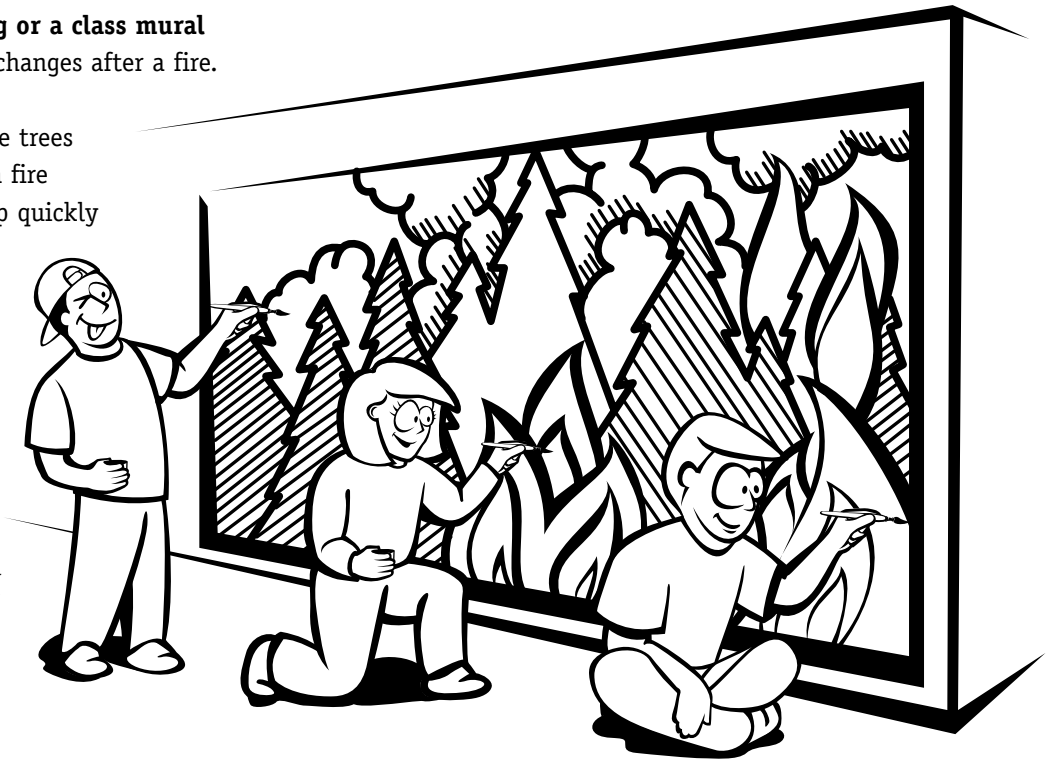
Forest Fires: Handle with Care! National Forest Week Teaching Kit, Canadian Forestry Association, 1999.

Focus on Fire: A Forest Fire Education Supplement for Teachers and Resource Educators, Ontario Ministry of Natural Resources/Ontario Forestry Association, 1998.

Lightning is a natural cause of forest fires. Both lightning and thunder are the result of electrical discharges given off by the reaction of the positive and negative charges found in rain clouds. These charges build up static electricity that can react between clouds or between clouds and the ground.

You can demonstrate static electricity by rubbing a ping pong ball on a piece of wool. Use the ball to pick up small bits of paper or to attract someone's hair. Students may want to experiment with combs or balloons. If you darken the classroom you may be able to see the sparks jumping between objects.

Researchers are studying the charcoal found in lake sediments throughout Canada's boreal forest to understand the relationship between climate and fire since the last Ice Age, 10,000 years ago.



THE NATURAL ROLE OF FIRE

Recent research suggests that nature's own forest management plan, which makes use of fire, insects and disease, flooding and wind damage, is the best model for conserving biodiversity in the forest.

Partners in the 2.75 million hectare Foothills Model Forest in western Alberta are aware that wildfires have always played a role in the forest. They set out to map the pattern of natural disturbances to use as a guide for planning forest harvesting, prescribed burns and other management strategies. This multi-year project includes research in selected locations and on different scales.

The forest company, Weldwood Canada Ltd., is using the research results to ensure that harvesting and reforestation emulate natural disturbances as much as possible. Weldwood has initiated an experiment to study the ecological, economic and cultural impacts of larger harvest areas. As well, Jasper National Park is using this same research to determine the intensity, location, range and size of its prescribed burns to conserve biodiversity and reduce the potential for catastrophic wildfires.

Additional research is being conducted to study the needs of the 284 land-based wildlife species to ensure that the range of habitat they require, from young forests to mature forests, is maintained.

MODEL FOREST NETWORK
RÉSEAU DE FORÊTS MODÈLES

The Native people of the Canadian Arctic say they are now experiencing natural events previously unknown in their oral history — thunder and lightning. Electrical storms in the high Arctic are among the evidence of climate change being reported in a new study by the International Institute for Sustainable Development.