Wildfire: Not in my backyard! Lesson Plan

Keywords: Wildfire, forests, weather, environment, watershed

Lesson Plan Grade Level: 5th-8th grade

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Total Time Required for Lesson: two 30-minute sessions

Setting: Classroom

Subject Covered: Social Science, Environmental Science, Weather, Geography, Writing, Reading

Topics: wildfires, ecosystems, communities

Goals for the Lesson:
Students will be able to describe a wildfire.
Students will be able to list and explain wildfire stages.
Students will be able to identify wildfire causes.
Students will be able to recommend ways to protect homes and communities from wildfires.

Materials Needed:
PA Wildfire PowerPoint® including movie clips
From the Woods: Wildfire publication
Wildfire Vocabulary Activity Sheet (one per student)
Wildfire Student Handouts (one per student)
Fire Pre-test (one per student)
Fire Post-test (one per student)
Pencils (one per student)

State Standards Addressed: (2002 Environment and Ecology)

- 4.2.7.B. Examine the renewability of resources.
- 4.3.7.B. Describe how human actions affect the health of the environment.
- 4.6.7.A. Explain the flows of energy and matter from organism to organism within an ecosystem.
- 4.6.7.C. Explain how ecosystems change over time.
- 4.8.7.C. Explain how human activity may affect local, regional and national environments.

Common Core State Standards in English Language Arts:

- Reading Standards for Informational Text 5-8: key ideas and details; craft and structure; and integration of knowledge and ideas
- Writing Standards 5-8: text types and purposes; research to build and present knowledge

Preparation:
Read through the entire lesson including teacher background information, vocabulary list, *From the Woods: Wildfire*, and Wildfire PowerPoint presentation to ensure you understand the materials. Be sure to have all the materials assembled before beginning the class.

Methods: Question relay, think-pair-share

Doing the Activity:
Introduction to the lesson plan:
"Today we will be learning about wildfires. Our ultimate goal is to understand what they are and how to prevent them."

Steps:

1. Use the pre-test as a question relay. Divide students into pairs. Each table has a different pre-test question. Student pairs move from table to table; they have about one minute to read and answer the question at each table. Their answers are written on one piece of paper with the pair's names at the top. Student pairs are graded based on speed and accuracy. Modification for 7^{th} and 8^{th} grade students, remove multiple choice options and ask them to write one or two sentence responses. *Note: Pretest answers are 1D, 2B, 3 B and C, and 4C.*
2. Review some of the questions and answers with the students. "The first question asked what time of year wildfires occur. What was your answer? Why do you think it happens then? When we watch the television news, we often see stories about summer wildfires in California and other western states. We might think all wildfires are the same, but they are not. Pennsylvania wildfires occur in the spring and fall."
3. Think-pair-share: "Let's start with a vocabulary activity to familiarize you with wildfire terms you will hear during the lesson." Pass out the vocabulary activity sheet. (This activity takes 10 minutes.) Students spend a few minutes quickly writing a definition for each word. Students divide into pairs and to agree on a definition for each word. They write their answer in the middle column. Each pair is assigned a word to look up in the dictionary or on-line source. The class reviews each word and each pair provides their definition.
4. Distribute the Wildfire Student Handout to students. "Now that you know some words associated with wildfire, I have a Pennsylvania Department of Conservation and Natural Resources wildfire presentation. As I go over the first set of slides, you need to fill in the blanks in the "introduction" section of the handout." Review slides 1-11. Stop at slide 11.
5. Quickly review the ways wildfires impact people and the environment. Possible ways fires can impact their community include burning structures (houses and cabins), fields, and forests. Wildfires kill plants and trees and destroy wildlife habitat including food sources. Severe fires can destroy plants and their root systems, organic matter and seeds in the soil. Loss of plant roots to stabilize the soil can increase the potential for soil erosion. This could cause sedimentation in streams which could affect aquatic life.
6. "There are simple things we can do to reduce the risk of wildfires in our community. It helps to know the three components of wildfire behavior. You need to fill in the blanks in

the ‘fire behavior and the environment’ section. Show slide 12-23. Review the handout. “Which of those three (topography, weather, or fuels) can we control?” Answer: fuels.

7. “In the final section we will learn about wildfire causes and ways we can reduce wildfire risk including wildfire fuels.” Have students fill in the blank in the final section of the student handout as you cover slides 24-32. Go over the handout.
8. “We have talked about wildfire dangers. For homework, I want you to read *From the Woods: Wildfire* with your parents and go over the ‘You can Prepare’ diagram on the back page. Please look at your home and see what you can do to reduce the risk of wildfire spreading to your home. Have your parents sign the back of the booklet. I also want you to write one-page on what you and your family can do to reduce the risk of wildfire. We will discuss these reports briefly tomorrow.”

Assessment:

Give students post-test which could be set up as another question relay. Allow them five to ten minutes.

Conclusion to the Lesson (next day):

“What did you learn from the brochure? What did you and your parents learn when you reviewed the “You can prepare” diagram? What do you need to change around your home? What else do you need to consider to reduce wildfire risk? (e.g., campfire safety, raking and removing leaves from under the deck/porch…) Your family and our community can do simple things to prevent wildfires from happening.”

Alternative Activities:
Experiment: Collect and bring in leaves, grass, and branches of various diameters. Have students measure the diameter of each fuel. Have students categorize fuels based on the rate they dry out as noted in the wildfire vocabulary list. Have students look up precipitation per day for the past year. Use this information to discuss which fuels are most likely to dry out based local weather, especially number of days without rain.

Experiment 2: Divide students into five groups. Each group is given the same number of matches but different types of materials to burn. Each group’s task is to burn as much of the material they can with the matches they have. Some groups have only large fuels to burn while others have damp or wet materials. Only one group has materials that burn easily. At the end of the activity, discuss how oxygen, heat, and/or fuels affected whether or not the materials they were given burned.

Experiment 3: Build three match forests using three pie pans filled with clay. Insert and evenly space matches in the clay of each pie pan. One pie pan is flat. Elevate the second pie one to two inches to create a moderate slope. Elevate the third pie pan three or more inches to create a steep slope. Ignite matches in the first row of the flat pan. Students record how long it takes the match forest to burn and percent of matches burnt before the fire extinguishes. Repeat with the second pie pan followed by the third pie pan. Students use results to determine the affect of slope by comparing the burn times and percentage of trees burned in each forest.

Additional resources:

Firewise: http://www.firewise.org/Information/Who-is-this-for/Homeowners.aspx
http://www.firewise.org/Information/Who-is-this-for/Educators.aspx

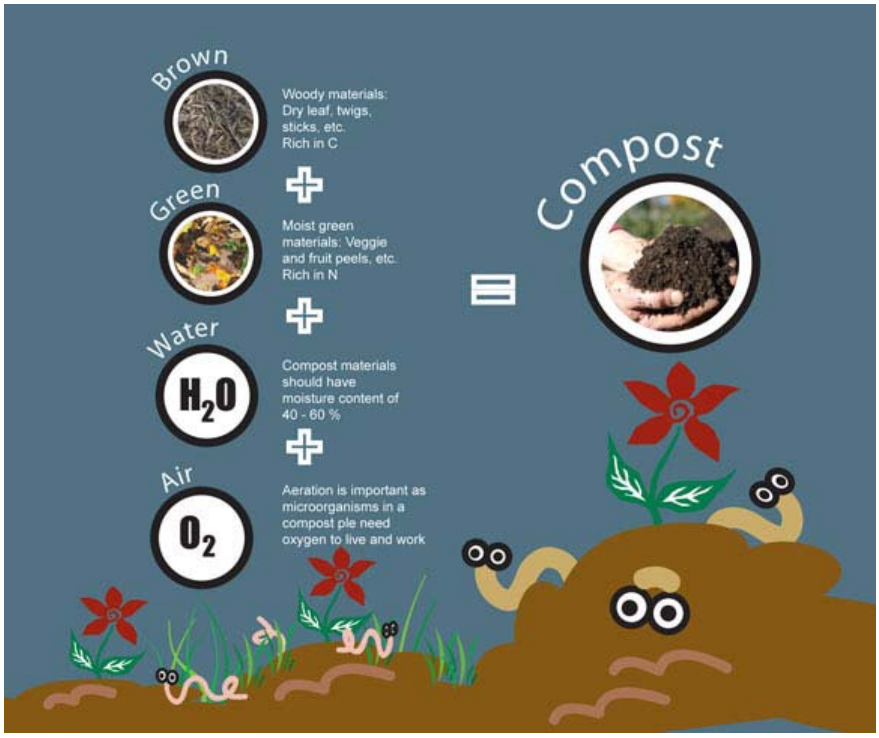
State Standards: The lesson plan also addresses these 2009 Environment and Ecology Standards

- 4.1.7.E. Identify factors that contribute to change in natural and human-made systems.
- 4.2.6.C. Identify natural and human factors that affect water quality.
- 4.2.8.A. Describe factors that affect the quality of ground and surface water.
- 4.5.7.A. Describe how the development of civilization affects the use of natural resources.
- 4.5.7.C. Explain how human actions affect the health of the environment.
- 4.5.8.C. Describe how humans can reduce pollution.

Background information & key concepts

Organic matter: From US Natural Resource Conservation Service[1]. Healthy, fertile soil is a mixture of water, air, minerals, and organic matter. In soil, organic matter consists of plant and animal material that is in the process of decomposing. When it has fully decomposed (to break down physically into simpler chemical compounds) it is called humus. This humus is important for soil structure because it holds individual mineral particles together in clusters. Ideal soil has a granular, crumbly structure that allows water to drain through it, and allows oxygen and carbon dioxide to move freely between spaces within the soil and the air above.

1 http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=SubNavigation&cid=nrcs143_023543&navid=220120000000000&pnavid=220000000000000&position=Not Yet Determined.Html&ttype=detail&pname=orgmtrsl.html



One of the best ways to improve soil fertility is to add organic matter. It helps soil hold important plant nutrients. Application of organic matter (compost, dead plants, and/or animal manure) to the soil adds carbon, which promotes the growth of beneficial bacteria (microbes), which increases the likelihood of hearty plants.

Dew point is a measure of how much water vapor is actually in the air.

Relative humidity is a measure of the amount of water in the air compared with the amount of water the air can hold at the temperature it happens to be when you measure it. In the image below, water vapor is constant at 7.76 grams per cubic meter. As the air temperature increases from ten degrees celsius to 30 degrees Celsius, the relative humidity decreases because warmer air can hold more water.