

Impact of Climate Change on Bees in the Eastern Forest: Diversity and Adaptations of Organisms

Region: Eastern Forests and Woodlands

Grade Level(s): 7-9

Time Required: 2 – 50 minute class periods

Focus Question(s):

- What is the impact of global warming on bees and flowering trees in the Eastern Forest Biome?

Learning Objectives:

- Student will understand why some living things have become extinct or endangered, especially bees and other species in the Eastern Forest biome.
- Student will:
 - Understand the meaning of extinct and endangered.
 - Relate orally the reasons that some animals have become extinct or endangered.
 - Identify and describe some causes for extinction of plant and animal species.
 - Relate the relationship of pollinators and flowering flora to the survival of many organisms.
 - Define "threatened," "rare," and "endangered" as applied to wildlife.
 - Name threatened and endangered animals living in Eastern Forest biome and explain the reasons for their condition.

Materials:

- Information from state and federal agencies about threatened and endangered animals, poster-making materials, writing materials.
- KWL Chart handout.

Background:

- In 1967, 77 species were listed under the Endangered Species Act as threatened with extinction (<http://www.fws.gov/endangered/1966listing.html>). Today, over 1200 animal and 2400 plant species are listed as endangered or threatened by the Department of Interior (<http://www.fws.gov/endangered/listing/index.html>). Although extinction is a natural process, excessive and intensive human activities in the environment have caused a dramatic increase in its rate. Loss of habitat as a result of human activity is considered to be the most pervasive cause of species extermination.
- Generally accepted definitions of the terms to be used in this activity are:
 - Endangered - Species in immediate danger of extinction.
 - Critically Endangered - Species will not survive without direct human intervention.
 - Threatened - Species present in its range, but threatened because of a decline in numbers.

- Rare - Species not presently in danger, but of concern because of low numbers. NOTE: Some species were always rare because of the position in the food chain or due to habitat preference.
- Extinct - Complete disappearance of a species.
- Peripheral - Scarce in area because it is fringe or marginal habitat.
- A list of the U. S. "Endangered Species" is available from:
Director, Office of Endangered Species
U.S. Fish and Wildlife Service
U.S. Department of Interior
Washington, D. C. 20204
www.fws.gov/endangered
- State, province, and federal listings of endangered, threatened and rare species may vary because areas encompass different habitat conditions within their boundaries. An animal or plant may have been lost within one state's boundaries, but may be abundant in another, and therefore not considered threatened. The U.S. Endangered Species Act of 1973 gives the U.S. government power to protect endangered species, under the auspices of the U.S. Fish and Wildlife Service.

Method:

- Students become familiar with classification of animals, conduct research and make a master list of threatened and endangered plant and animals, including factors affecting the plant or animal's condition (include discussion of climate change).

Procedures/Instructional Strategies:

1. Contact your state or province wildlife agency. Ask for a list of plants in your state or province which are classified endangered, critically endangered, threatened, rare, extinct, and peripheral. Also contact local chapters of conservation organizations for additional information about species and habitats of concern in your area, especially as related to climate change and pollinating plants. Stress relationships between bees and pollinating plants in requesting information.
2. Review the relationship. Conduct a KWL chart (See attached) to review and discuss with the students the definitions of threatened, endangered, rare, extinct, and peripheral as used in wildlife conservation, as well as in a dictionary. Understand that words defined in a standard dictionary may have additional legal connotations. Ask each student or group of students to select a plant and animal to learn more about.
3. Ask one or more students to take the information accumulated from the wildlife agencies and private conservation groups and come up with a master list of the animals according the category in which they can be classified, the classification both locally and nationally, and the principal factors affecting the animals or divide the students into teams so they can all participate in constructing this chart; e.g., one team classifying mammals, another reptiles, birds, fish, insects, etc.
4. Make copies of this information for all the students. Discuss the findings. What seem to be the most prevalent factors affecting the plants or animals; e.g., habitat loss, pollution, impact from introduced species?

Extensions:

- Make a poster display showing the principal reasons for endangerment and the animals that are endangered in those ways (climate change should be included in this section). Poster displays can be made separately for both state and national endangered species.
- Have a school-wide contest in which students create posters honoring endangered species—from plants to wildlife.
- Write a short essay, poem, or song about plants and animals facing extinction. What are these organisms "worth?" What are we humans losing?
- Find out what is being done concerning the endangered plants and animals in your state or province. What is being done at the national level? What is being done at the international and worldwide levels? What can each of us as individuals do?
- Each student can pick an endangered animal to find out more about. What will be the consequences of the disappearance of this species? What are the concessions involved? What alternatives are available? What contributions does the animal make ecologically? Economically? Medicinally? Aesthetically? Intrinsically? Pool and discuss all the student's findings.
- Explore the possibility that extinction can apply to human cultural forms; e.g., traditional languages, native peoples.

Outcome/Assessment:

- Arrange the following terms in a list so that they progress from the least amount of danger to a species to the greatest amount: endangered, rare, threatened, extinct, and critically endangered.
- Describe two reasons for possible concern when a plant or animal species become extinct.
- Describe who decides what species are endangered or threatened and how they decide.
- Describe principal causes for extinction.
- Provide a scenario of the status of the bee population in the Eastern US

National Science Education Standards Addressed:

Earth and Space

- CONTENT STANDARD D:
 - Students should develop an understanding of earth's history.
 - Students should develop an understanding of structure of the earth system.

Science in Personal and Social Perspectives

- CONTENT STANDARD F:
 - Students should develop understanding of science and technology in society.
 - Students should develop understanding of populations, resources, and environments.
 - Students should develop understanding of structure and function in living systems.

Life Science

- CONTENT STANDARD C:
 - Students should develop understanding of diversity and adaptations of organisms.

K <u>What do you know?</u>	W <u>What do you want to know?</u>	L <u>What have you learned?</u>