



Extreme Ecosystems: A Biodiversity Lesson

Grade Level: *Grades 4-8*

Time: 2–3 hours for all activities

Materials

For Activity 1:

- Computers with Internet access
- Encyclopedia access (books, CDs, Internet)
- Poster paper
- Colored pencils, markers, or crayons
- Pencils and erasers

For Activity 2:

- Index cards
- Colored pencils, markers, or crayons
- Pencils and erasers
- Notes/facts from species report

Key Words

Threatened: Any species likely to become endangered in the foreseeable future within all or a significant part of its range. Threatened species are less protected as endangered species, but are monitored for changes in population.

Endangered: A species found in such small numbers in its natural environment that it is in high danger of becoming extinct in the near future due to natural or man-made changes.

Special Concern: Species declining in population or range at a rate that could lead to being listed as endangered or threatened under the Endangered Species Act.

Biodiversity: The degree of variation of life forms within a given ecosystem, biome, or an entire

planet. Biodiversity is a measure of the health of ecosystems and is in part a function of climate. For example, tropical regions are typically rich whereas polar regions support fewer species.

Ecosystem: A biological environment consisting of all the organisms living in a particular area along with all nonliving components of the environment, such as air, soil, water and sunlight.

Adaptation: A physical attribute an organism has that helps it survive in its habitat.

Food Web: Depicts feeding connections (what eats what) in an ecological community.

Sea Ice: Formed from sea water that freezes. Sea ice supports the species within the Arctic ecosystem.

Objective

Students will identify and categorize plants and animals in the Arctic with an emphasis on which animals are endangered, threatened, or a species of special concern. Students will participate in individual species studies, presentations, and an interactive class trivia game. They will gain a deeper understanding of the biodiversity in the Arctic and their own role in helping to protect the Arctic's unique inhabitants. Included topics of study are the indigenous peoples of the Arctic who rely heavily on various species in their ecosystem for food, clothing, and building materials.

Background Information

Arctic species have developed special adaptations to survive in their harsh environment. The arctic food web is made up of fewer species and is more fragile than those in other regions of the world. A smaller food web makes it more sensitive to disruptions—the decline or extinction of a single species will impact the ecosystem as a whole, because each species depends on another for survival. Interconnectedness of these species supports the biodiversity of this region.

Non-living elements of the Arctic environment, such as sea ice, are also necessary. At the top of the food chain, the polar bear requires sea ice to hunt its primary food source, the ringed seal, which—along with the walrus—uses the sea ice for its birthing grounds. The arctic fox trails closely behind polar bears to scavenge the remains of seals, and gulls fly in to compete for what might be left in this dynamic food web. Without sea ice, none of these species would survive.

Teacher Prep Notes

This lesson contains several activities. Timing for all activities will take 2-3 hours (more or less if research is conducted as homework or in class). Print the Arctic Species Table, and using the arctic species provided, have students pick a species randomly. Make sure all categories are represented to ensure that students understand the concept of interconnectedness in the arctic ecosystem.

Activity 1: Species Reports

To Do

1. As a class, define and discuss the terms: Endangered, Threatened, and Species of Concern. Add the definitions to a class poster (as students conduct their presentations, list their animal of study in the appropriate category).
2. Have each student draw the name of a species from a hat. After researching their species, have them create a short Power Point or poster board presentation for the rest of the class (have students work in pairs or small groups as an option).
3. Use the following guidelines for presentation content:
 - Common and scientific name/ other names (given by Native Peoples)
 - Category (land/ marine mammal, bird, fish, invertebrate, plant)
 - Scientific picture of the species
 - Physical adaptations that allow it to survive in the Arctic
 - Habitat (specific geographical location)
 - Diet (if animal)
 - On whom or what does it depend in the ecosystem?
 - What or who depends on it in the ecosystem? (Example: What eats me?)
 - Threatened? Endangered? Special Concern? (If so, why? Who/what is affecting this species?)
 - Fun Facts

Activity 2: What Arctic Species Am I?

To Do

1. Students will create a trivia card from their species report for an interactive game at the end of the activity and class presentations.
2. On an index card, have each student write five facts about the arctic species they researched. Note: Clues should go in order from most to least difficult, with the last fact allowing the audience to easily guess the species.
3. Divide the students into teams and keep score.
4. Read one fact at a time, allowing teams to confer and share their guess after reaching a consensus.

Example:

- I am a marine mammal.
- I live in the Arctic.
- I live on the land and the frozen sea.
- I am at the top of the arctic food chain.
- My favorite meal is the ringed seal.

Answer: I am a polar bear.

Taking it Further:

Discuss how the arctic ecosystem might be affected if one species was removed from it and what might happen if a new species was introduced. What are current threats to the species (natural and human-caused)? Which scientists study the species? What are the findings of their research? How are the findings impacting the arctic ecosystem and species management? Discuss examples of your community/regional ecosystem. Which species is threatened/endangered/special concern in your community? Who/what is affecting this species? How can you help? What are others are doing to help?



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Arctic Species Table

<u>Mammals</u>	<u>Other Animals</u>	<u>Plants</u>	<u>Indigenous Peoples</u>
Land	Birds	Arctic Moss	Inuit
Caribou	Ivory Gull	Arctic Willow	Inupiat
Snowshoe Hare	Arctic Tern	Caribou Moss	Sami
Arctic Fox	Snowy Owl	Bearberry	Athabaskan
Moose	Arctic Goose	Tufted Saxifrage	Koryak
Marine	Ptarmigan	Labrador Tea	Yu'pik
Polar Bear	Fish	Cotton Grass	Chukchi
Bowhead Whale	Greenland Shark	Kelp	Gwichin
Bearded Seal	Arctic Cod	Ice Algae	
Ringed Seal	Whitefish	Phytoplankton	
Harp Seal	Invertebrates		
Humpback Whale	Krill		
Narwhal	Copepod		
Beluga	Mollusk		
Walrus	Nose-bot Fly		
	Warble Fly		
	Mosquito		



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