New Jersey School of Conservation
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Wildlife Ecology

This activity deals with the diversity of our wildlife resources and the critical reasons for preserving biodiversity on the planet. Through observations made on a hike, participants will formulate a list of wildlife values. Possible values stressed: 1) source of limited food and clothing; 2) maintenance of ecological stability which is crucial to the health and well-being of a variety of living things, including humans 3) integral part of food chains related to all living things 4) inseparable part of human history and culture 5) recreation resource, and 6) an environmental indicator that verifies the health and stability of the surrounding environment. In addition, the relationship between wildlife and humans will be discussed.

OBJECTIVES:

1. Students will be able to recognize the values of wildlife.
2. Students will understand that wildlife species are indicators of environmental quality.
3. Students will understand the connection between biodiversity and the quality of life.
4. Students will recognize the natural relationship between wildlife species and humans.

BACKGROUND INFORMATION:

Wildlife species have provided humanity with the very basis of civilization in the form of crops, domesticated animals, a wide variety of industrial products, and many important medicines. Since the emergence of modern humans some 300,000 years ago, we have grown in population and spread across the globe. From our roots in central Africa, our highly developed transportation systems and innovative shelters, have allowed our species to effectively occupy virtually every habitat on the planet. In addition, highly mechanized agricultural and extraction techniques make food and resource production possible on a scale unheard of just decades ago. Until recently, these developments were viewed with little skepticism as “human progress.” However, today we have turned a critical eye towards the trend of habitat alteration and simplification, and along with it, the alarming rate of species extinctions.

Biologists predict the loss of one quarter of all a living species over the next 25 years if we continue to alter habitats at the current rate.

The areas of the globe where the most wild species live are also the areas where habitat destruction is proceeding the fastest. These tropical (rainforest) areas in Africa, South America, and Asia are second only to coral reefs in terms of wildlife diversity. Using satellite data, it is estimated that 40 to 50 million acres of rainforest are being destroyed annually. If present deforestation rates continue, all tropical will be cleared in 177 years. Latin America has lost 37% of its tropical forests, Asia has lost 42%, and Africa has lost 52%. Worldwide, 76% of the planet’s original primary forests have already been destroyed or degraded. The effects have

been devastating with anywhere between 4,000 and 6,000 unique types of forest-dependent plant and animal species becoming extinct annually. Meanwhile, the livelihoods and cultures of numerous indigenous forest-dwelling peoples and the economies of many forest-dependent communities are also in danger of completely disappearing.

The consequences of lost biodiversity would be numerous and devastating, including: 1) local climates will become harsher as the amount of natural vegetation, which helps to buffer climatic changes, decreases; 2) crop yields will decline in the face of these climate changes and the loss of raw genetic material from natural plant species to replenish and develop new crop species, will decline; 3) loss of dependable water supplies as the purifying ability of natural ecosystems decline; 4) decline in pollinators will effect crop yields and the ability of natural vegetative communities to sustain themselves; 5) increase in pest species populations will decrease crop yields, increase vectors for the spread of diseases, and further reduce biodiversity; 6) conversion of productive land to wasteland will accelerate as soil quality diminishes and deserts continue their seemingly inexorable expansion; 7) air pollution will increase without forests to process respiratory gases and industrial air pollutants; and 8) since many medicines are directly extracted from wild plants and new medicines are developed from chemical compounds found in wild plants, it will become harder to find cures for current diseases and future diseases which threaten our species.

Although it is hard for most of us to fathom, the consequences of massive species extinction is undeniably devastating. As ecosystems services falter, mortality from respiratory and epidemic disease, natural disasters, and especially famine will lower life expectancies significantly. If we do not slow down the destruction of the planet's biodiversity, it appears that civilization will disappear some time before the end of the next century – not with a bang but with a whimper.

Although it is sometimes difficult for the average student to relate to the problems of habitat destruction and species extinction on a global scale, the student does not have to look far to understand the magnitude of the problem. For its size, New Jersey has one of the most varied and diverse populations of wildlife of any state in the country. Countless upland, freshwater, marine, and estuarine habitats support flourishing populations of wildlife from bugs to bunnies, from bluefish to bobcats and bears. Yet, these populations are threatened by a burgeoning population of humans that seems intent on "developing" every square inch of our state. Perhaps the greatest threat to New Jersey's wildlife is the ignorance and apathy of those who do not realize the values of wildlife diversity, and what we stand to lose if we were to continue to diminish our biological diversity. This session gives students an opportunity to articulate these values.

MATERIALS NEEDED:

- "What is Wildlife?" picture cards
- Food pyramid cans
- NJMap
- Clipboards w/ animal signs checksheet
- Pencils

PROCEDURE:

1. Begin the session by asking the students to define 'WILDLIFE'. (Webster's: wild animals, trees, and plants collectively; especially wild animals). Also, distinguish between domesticated organisms and wild organisms. For the purpose of this lesson we will confine the definition of wildlife to mean wild animals.

2. Present a stack of “What is Wildlife?” picture cards and ask each student to choose one. Have students decide whether the living thing on their card is considered “wildlife”, “domestic”, or “both”. Instruct students to place their card in a row on the floor indicating one of the three choices. Discuss the groups choices.

3. Introduce the concept of wildlife values and have students run through a “brainstorming” session on the comparative values of wildlife today vs. 200-300 years ago. Hopefully, the students will recognize that wildlife was directly linked to the survival of our ancestors. It provided the FOOD, CLOTHING, and SHELTER necessary for survival. Today most people do not regularly eat wildlife (with the exception of fish), they don’t wear clothing made from wildlife products (even leather boots and coats are made from cowhides), and most do not live in teepees made of animal skins. However, if we include wild plants in our definition of wildlife, we do build our homes out of lumber from wild grown trees – some lumber comes from tree farms. Also, ask the group which are more important, wild or domestic animals, both today and 200- 300 years ago.

4. Introduce the idea of a “Web of Life” in which all life depends on the life of others, particularly plants. Use the Food Pyramid can activity to demonstrate the food chain and nutrient flow relationships. Using wooden blocks with pictures of acorns, mice, snakes and hawks, have the students stack them in food pyramid form. Ask students what the basis for all food chains is (plants). Have students holding the cans that read “acorn” to place their cans in a row on the floor. These cans represent all plants (producers). Next, ask students with animal wildlife cans that eats plants to place their cans on tops of the acorns (deer mice/consumers). Then, have weasels placed on top of mice. Finally, ask the student with the owl to place that can at the top. Discuss nutrient flow and how each part of the pyramid depends on vegetation either directly or indirectly for food. Demonstrate the significance of vegetation and forests by having one student, representing a human developer, remove a “forested area” or acorn from the pyramid. Discuss how the pyramid was affected. Remove another “forested area” and discuss.

5. Show a map of New Jersey to observe forested areas compared to developed areas. Point out the student’s hometowns and Stokes State Forest. Discuss the wildlife present in these 2 locations and what basic needs are met. Discuss fragmentation and over-development.

6. After listing possible wildlife living in Stokes State Forest, inform them that they will be given the task of going out to observe wildlife and look for signs of wildlife. Their objective is to take a count of the variety of wildlife species present in Stokes. From this number and the kinds of species found, students will determine the overall quality of the Stokes State Forest environment. Discuss the significance of biodiversity and the reasons to protect it.

7. Introduce students to a checksheet in which these findings will be recorded. Ask one student to be the “recorder” for the class and give this student a clipboard, pencil and Wildlife Check Sheet. Tell all students that they will be going on a Discovery Hike, looking for signs of wildlife. A record of all the signs and sightings of wildlife during their hike will be kept by the Recorder and remind students that by the end of class, the students will determine the overall health of the environment according to what they found.

8. Proceed outside and stop along the way noting sounds and sights surrounding the group. Stop at objects such as decomposing logs, birds nests, mouse boxes, etc. Give tips on where and how to look for certain wildlife signs, such as scat, tracks, partially eaten food, etc. Point out and mention the brush piles that have been created as

shelters for wildlife. Allow time for students to explore, search for wildlife and signs, and record their findings on the checksheets.

9. Discuss biodiversity of vegetation and its effect on biodiversity of wild animals

WRAP-UP / CONCLUSION:

Although wildlife, at one time, provided humans with an important source of food and clothing, the values of wildlife in today's world are less direct, although no less important. The diversity of wildlife is directly related to ecosystem stability and sustainability. Without a diverse wildlife community the consequences outlined above (see background information) are sure to threaten all life on the planet, including ours.

1. Review wildlife findings. Gather group with their check sheets. Ask groups to share their findings with the class. Decide whether their species counts were relatively high or low and what the quality of Stokes State Forest is. Why are there so many wildlife species in Stokes compared to other areas? (protected area, little human interference)
2. Discuss why we need to protect wildlife and forested areas. Show Wildlife Value cards, including some of the following information:

   a) Inseparable part of human history and culture

   - Share paintings, photographs, literature, or other cultural materials that illustrate the historical human links and ties to wildlife.
   - Talk about the development of crop species from wild species that enabled a change from nomadic hunter/gathering societies to sedentary agricultural societies.
   - Discuss the historical and modern use of plants to treat diseases and the search fornew plant species to treat current diseases such as cancer and other life threatening diseases.
   - Ask the group if humans are animals. When they figure out that we are animals youcan explain that by studying other animals on the planet, especially ones that are closely related to us, like primates (monkeys and apes), we can learn something about ourselves as well.

   b) Ecosystem function and health

   - Emphasize food chains and webs, and how they contribute to a healthy ecosystem.
   - Demonstrate how the cycling of nutrients in food chains/webs occurs (carbon, nitrogen, oxygen, calcium, etc.)
   - Talk about pollination of wild plants and domesticated crops.

   - Wild animals act as dispersal agents for plants (burrs, hitchhiking seeds, fruit with seeds inside, etc.)

   - Predator/prey relationships help to keep pest species in check (what would happen to the mosquito population if we eliminated all the birds or bat species?)

   c) Recreation resource

   - Show some statistics (New Jersey, US or global) that reveal the significance of wildlife as a recreational resource; define the many variations in wildlife-related recreational activities: photography, sketching/painting, bird-watching, sport hunting/fishing, whale-watching, etc.)

d) An environmental indicator that verifies the health and stability of the surrounding environment.

- Use study-skins and posters of select wildlife species to emphasize their value as environmental indicators. Select those that show special sensitivity to the quality of air, water, and/or soil. (Example: Bald Eagle, or some other bird of prey).

e) Significant source of food and clothing

- In some countries, wildlife still represents a significant source of nutrition. Have the students hypothesize about which countries/cultures might still rely on wildlife for food and clothing (e.g. Inuits of the northern regions, indigenous peoples of the rainforests in Asia, Africa, and Latin America, etc.)

3. Ask what we can do to protect wildlife and forested areas. (Support protected areas, plant trees/wildlife gardens, establish ponds, put up feeders and houses, etc.)

FOLLOW-UP:

Have students take an inventory of the wildlife species that exist in their community and assess the various values that they seem to represent through their presence.

Have students contact the DEP, Department of Fish and Game, Endangered and Nongame Species Program (Northern District Office, RD#1 Box 383, Route 173 West, Hampton, NJ 08827, 908-735-8975; or the Trenton Office at 609-292-9400. This Program offers informational pamphlets, speakers who can come to your school, and wildlife programs that the students can be involved in back in your community.

Have the students help wildlife by setting up bird feeding stations, constructing nest boxes, planting trees, shrubs and wildflowers that attract wildlife.

GLOBAL / MULTICULTURAL EXTENSIONS:

Encourage students to conduct research on species of wildlife in other countries that are threatened or endangered of going extinct.

In addition to library resources, if you have access to the Internet try these World Wide Web sites:

World Resources Institute (http://www.wri.org/wri/biodiv/gbs-ix.html);

Ecology, Biodiversity, and the Environment (http://conbio.rice.edu/vl/);

Biodiversity and Ecosystems Network (http://straylight.tamu.edu/bene/lg/losses.html);

Biodiversity in India (http://www.cyberindia.net/cyberindia/links/ilnatenv.htm);

Involve the students in helping to save the rainforests of Africa, Asia and South America. There are many organizations which will help you organize your school population to help save these important ecosystems such as the Rainforest Action Network at (415) 398-4404 (http://www.igc.apc.org/ran)

BIBLIOGRAPHY:

Biodiversity. E.O. Wilson (ed). 1998, National Academy Press. 521pp. Conservation Biology: The Science of Scarcity and Diversity. M.E. Soule (ed). 1986, Sinauer Associates Inc. 584pp.

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NJ Student Learning Standards

This field lesson touches upon the following NJ Science Performance Expectations and can be tailored to focus on any of the following standards

MS-LS2: Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

- MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
- MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

MS-ESS3: Earth and Human Activity

Students who demonstrate understanding can:

- MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
- MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Climate Change

- MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Social Studies

- 6.1.8.CivicsPI.3.c Distinguish the powers and responsibilities of citizens, political parties, interest groups, and the media in a variety of governmental and nongovernmental contexts.
- 6.1.8.EconNE.4.a Explain how major technological developments revolutionized land and water transportation, as well as the economy, in New Jersey and the nation.

Comprehensive Health and Physical Education

- 2.2.8.MSC.7 Effectively manages emotions during physical activity (e.g., anger, frustration, excitement) in a safe manner to self and others.

- 2.3.8.PS.1 Assess the degree of risk in a variety of situations, and identify strategies needed to reduce deliberate and non-deliberate injuries to self and others

Scientific and Engineering Practices / NGSS

This field lesson can be tailored to have students directly involved with

- Asking Questions and Defining Problems
- Planning and Carrying Out Investigations
- Analyzing and Interpreting Data
- Constructing Explanations and Designing Solutions
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

Social and Emotional Learning

All of our field lessons integrate the concepts of self-awareness, self-management, social awareness, responsible decision-making, and relationship skills found in the New Jersey's Core Social and Emotional Learning (SEL) Competencies.