

CONSERVATION INSIDE THE CLASSROOM AND BEYOND

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Unit Overview

This integrated unit challenges students to think critically about environmental conservation while applying English language arts, science, and social studies standards. Students learn about habitats, community development, and environmental agencies and their roles in influencing conservation efforts and the environment. Additionally, students conduct experiments on plant life to understand and observe various influences on natural habitats. With the help of community members, students conclude the unit with a 24-hour BioBlitz and collect data on and classify all of the animals and plants around the school. Students capture their findings with iPads and other devices and create an eBook for the school.

Standards Addressed

1. **ELA.5.RI.7:** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
2. **ELA.5.W.4:** Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
3. **ELA.5.W.5:** With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
4. **ELA.5.W.7:** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
5. **ELA.5.SL.1:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
6. **ELA.5.SL.5:** Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.
7. **ELA.5.L.1:** Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
8. **ELA.5.L.3:** Use knowledge of language and its conventions when writing, speaking, reading, or listening.

9. **S.5.CS.1:** Students will be aware of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.
 - a. Keep records of investigations and observations and do not alter the records later.
 - b. Carefully distinguish observations from ideas and speculation about those observations.
 - c. Offer reasons for findings and consider reasons suggested by others.

10. **S.5.CS.2:** Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.
 - a. Add, subtract, multiply, and divide whole numbers mentally, on paper, and with a calculator.
 - b. Use fractions and decimals, and translate between decimals and commonly encountered fractions – halves, thirds, fourths, fifths, tenths, and hundredths (but not sixths, sevenths, and so on) – in scientific calculations

11. **S.5.CS.3:** Students will use tools and instruments for observing, measuring, and manipulating objects in scientific activities.
 - a. Measure and mix dry and liquid materials in prescribed amounts, exercising reasonable safety.
 - b. Use computers, cameras and recording devices for capturing information.

12. **S.5.L.1:** Students will classify organisms into groups and relate how they determined the groups with how and why scientists use classification.
 - a. Demonstrate how animals are sorted into groups (vertebrate and invertebrate) and how vertebrates are sorted into groups (fish, amphibian, reptile, bird, and mammal).
 - b. Demonstrate how plants are sorted into groups.

13. **S.5.L.4:** Students will relate how microorganisms benefit or harm larger organisms.
 - a. Identify beneficial microorganisms and explain why they are beneficial.
 - b. Identify harmful microorganisms and explain why they are harmful.

14. **S.5.E.1:** Students will identify surface features of the Earth caused by constructive and destructive processes.
 - a. Identify and find examples of surface features caused by destructive processes.
 - Erosion (water—rivers and oceans, wind)
 - Weathering
 - Impact of organisms
 - c. Relate the role of technology and human intervention in the control of constructive and destructive processes.

15. **SS.5.H.3:** The student will describe how life changed in America at the turn of the century.
- c. Explain how William McKinley and Theodore Roosevelt expanded America’s role in the world; include the Spanish-American War and the building of the Panama Canal.

Essential Question

1. How can we become aware of the loss of native species in our own backyard and what actions can we take to protect those species?
2. How do natural and human forces affect our environment?

Day One – Introduction

Standards Addressed: 1, 5, 7, 8

1. Begin a discussion on environmental awareness, asking students to think about the environment in which they live, work, and play.
2. Then, watch a [video](#) introducing Theodore Roosevelt and his contribution to building awareness of the environment and its conservation.
3. After the video, each student creates a list of what they “need to know” about the environment and conservation. Use this list as a pre-assessment to gauge prior knowledge about the environment and to differentiate instruction. As you progress through the unit, give students a choice for group assignments and research topics.

Day Two – Awareness

Standards Addressed: 5, 9, 10

1. Take students outside for the activity “Oh Deer!”¹ Divide students into two groups, one group of students acts as deer and another as habitat components. The “habitat components” use different signs for each component, i.e. food, water, or shelter. The students line up in two lines, with the “deer” facing backwards. Then, the “habitat components” make their sign and the “deer” turn around. The “deer” try to link hands with the “habitat component” they need. Once each “deer” gets all three habitat components, the group of four students all become deer and each try to get the components again. If any “deer” does not get all of the habitat components before the round ends, they change from a deer to a habitat component and start over.
2. Play the game for 15 rounds, recording the number of deer at the beginning and end of each round.

¹ Project Wild K-12 Curriculum Guide.

3. Once all of the rounds are complete, move back to the classroom and discuss the number of deer at the beginning and end of each round. Ask students what caused some of the deer to die out, connecting answers to the concepts of limiting factors and carrying capacity.
4. Then, have each student create a line graph of the data.
5. Conclude with a discussion of what students learned from the activity. Each student should:
 - a. Identify and describe three essential components of a habitat (food, water, and shelter).
 - b. Describe factors that influence carrying capacity.
 - c. Define limiting factors and give examples of each.
 - d. Recognize that some fluctuations in the wildlife population are from natural changes in the ecosystem.

Day Three – Maps and Land Development

Standards Addressed: 1, 2, 3, 4, 5, 7, 8, 14

1. Begin the lesson by discussing the following questions:
 - a. What do you think the land and water around the cities of Atlanta, New Orleans, Portland, or Washington D.C. looked like 100 or 50 years ago?
 - b. Was our school here 100 years ago?
 - c. What was in our community?
 - d. What do you think the land looked like then?
2. Print multiple maps and photographs of your school and surrounding community from 100 years ago, 50 years ago, and the present. Also print maps and photos of large cities, such as Atlanta, New Orleans, Portland, or Washington D.C. from 100 years ago, 50 years ago, and the present.
3. Divide students into groups of two. Give each pair a set of three maps, showing one location 100 years ago, 50 years ago, and in its present state. Tell students to color each type of land or water a different color until each map is complete. Then, students compare the three maps, answering the following questions:
 - a. Which map has the most land devoted to human settlements?
 - b. What do you think happened to all of the animals?
 - c. What changes to the land do you think were caused by natural forces (erosion, weathering, etc.?)
 - d. Would you have developed this land differently? How?
4. Then, take students on a walking tour of the school. Have each student take notes on areas that contribute to or reduce storm runoff. Relate these contributions to how the land developed over time.

5. To conclude, students complete the following writing prompt:
 - a. Compare the land area occupied by farms, towns, and natural areas in a watershed during different time periods. Respond by writing a letter to your county commissioner. Convince him or her to consider developing land differently in your community. Use facts and evidence from the various maps you observed, or the evidence you found during the school walking tour.

Day Four – Limiting Factors

Standards Addressed: 2, 5, 7, 8, 9, 10

1. Take students outside to complete the “How many bears can live in this forest?”² activity. Give students the following instructions: *“You are now black bears. All bears are not exactly alike, just as you and I are not exactly alike. Among you is a young male who has not yet found his own territory. Last week he met up with a larger male bear and before he could get away, he was hurt. He has a broken leg (tap one student to play the injured bear and tell them they must hunt by hopping on one leg). Another bear is a young female who investigated a porcupine too closely and was blinded by the quills (tap another student to play the blind bear and tell them they must hunt with their eyes closed). The third special bear is a mother bear with two small cubs. She must gather twice as much food as other bears (tap one student to play the mother bear).”*
2. Place colored construction paper on the ground, representing different types of food, i.e. berries, meat, insects, and nuts. Each colored paper is assigned a different point value on the back of the paper, representing pounds of food.
3. Students then walk around the “forest” collecting the food they need. Students return to their “den” after they collect each individual piece of food. Continue until all of the colored pieces of paper are collected from the ground.
4. Once all of the food is gathered, students add up all of their point values (pounds) for the food they collected. Each student shares how many points they have, as well as the injured bear, the blind bear, and the mother bear. Record all of the point values on the board.
5. Tell students a bear needs 80 pounds of food to survive for 10 days. Then, discuss the following questions:
 - a. Do you think there is enough food to meet the need of the bears?
 - b. How many pounds of food did the injured bear collect? Will he survive?
 - c. How many pounds of food did the blind bear collect? Will she survive?
 - d. What about the mother bear? Did she get twice the amount of food she needed to survive? What will happen to her cubs? Will she feed herself first or the cubs first? If the cubs die, can she have more cubs in the future?

² Project Wild K-12 Curriculum Guide.

6. Then, students record how many pounds of food they collected from each category (berries, meat, insects, etc.). Students record these numbers as fractions of the total pounds of food they gathered. Provide students information about what types of food black bears eat so they can compare their amounts to the typical amounts eaten by black bears. Ask students how their numbers compare and if they would be a healthy bear.
7. Students then total the amount of food gathered as a class. Divide this total by the 80 pounds needed for an individual bear to survive for 10 days. Then ask students:
 - a. How many bears could our habitat support?
 - b. What percentage of bears would not survive?
8. As a ticket out the door, students define a limiting factor and describe some of the factors that may limit the survival of an animal.
9. At home, students investigate their own backyard or community for signs of animals. Students record their findings on the [Kid Blog](#) and respond to the following prompt: *What animals live near your home? If you haven't seen the animal, what other things tell you that animals live there?*

**Take some time on this day and have students collect water samples from a nearby stream for an experiment on Day 10 of the unit. Each student collects two vials of water and covers one of the vials with tinfoil. Place the samples in a window of the classroom for five days.*

Day Five and Six – Community Changes³

Standards Addressed: 1, 2, 4, 5, 6, 7, 8, 9, 14

1. Begin with discussion of what students found around their home. What animals or signs did you discover?
2. Obtain a present day [aerial view](#) of your school and surrounding community. If possible, also find a view from 20 – 50 years ago. Give each student a copy of each picture, and display the pictures on a document camera.
3. Divide students into groups of two or three, and give each group a **Grid Template**, a **Human-Related Changes Chart**, and a **Species List**.
4. Then, each group studies the aerial photos and lists features that have been constructed, altered, or eliminated over time (such as roads, ponds, streams, lakes, railroads, forests, trees, etc.). Using a transparent grid, students count the number of squares each feature occupies.

³ Lesson adapted from Project Wild K-12 Curriculum Guide.

Then, they calculate how much of the total grid each feature occupies and use their findings to determine the changes in the environment over time.

5. Using the **Human Related Changes Chart**, each group discusses the ways these changes affect wildlife habitats and species. Using the **Species List**, students predict how each species is affected by the changes.
6. End the activity with a discussion of the following questions:
 - a. What human-made features in our community have been harmful to native wildlife? Why?
 - b. What features have been beneficial to wildlife? (Reservoirs create waterfowl, shorebird, and fish habitats; farm ranches provide grain for animals to eat; golf courses provide open space and food for some species of wildlife)
7. Then, students divide themselves into three groups to complete one of the following:
 - a. Conduct research on the history of land development in our city and county. You may choose how to share your findings with the class. Answer the following:
 - i. How did the community change over time?
 - ii. What laws and regulations controlled the changes?
 - iii. When were these laws and regulations passed and why?
 - b. Research native plants and animals inhabiting the local area prior to human development. Compare the earlier species to those found now. You may choose how to share your findings with the class. Answer the following:
 - i. Have any species become threatened, endangered, or extinct?
 - ii. How has human development affected these species?
 - iii. Do we have any non-native species in our state or in our community? If so, what are they?
 - c. Design your own community. Build a model or draw your community to share with the class.
 - i. What requirements would you have for your community?
 - ii. What laws would you establish?
 - iii. What measures would you take to conserve the environment in your community?
8. Students use the remainder of class and the next day to complete their assignment and share their results with the class.

Day Seven – The Role of Government

Standards Addressed: 1, 4, 5, 7, 8, 11, 15

1. Students complete the **Theodore Roosevelt Activity Sheet**. After completing the activity, discuss the article as a class.
2. Then, divide students into groups of four to conduct the following research:
 - a. What agencies in the executive branch of government run programs and enforce laws related to wildlife and the environment? Which of these existed during Teddy Roosevelt's presidency?
 - b. What is the role of the President in protecting and managing wildlife populations? How has this role changed since the Theodore Roosevelt administration?
 - c. What wildlife issues are of concern to our current President? To our current Congress?
 - d. What wildlife and environmental issues were of concern to Theodore Roosevelt and to the Congress in office during his administration?
 - e. What are the current wildlife concerns of major political parties today? What were their concerns at the turn of the century (early 1900s)?
 - f. What non-government groups influenced wildlife legislation during Barack Obama's administration? During Theodore Roosevelt's administration?
3. Each group shares their findings with the class.
4. As a ticket out the door, students answer the following: *Today, what is the role of the President in protecting and managing wildlife populations? How has this role changed since the Theodore Roosevelt administration?*

**On this day, set up for the soil experiment that will occur on Days 11-12 of the unit. As a class, set up six trays of 50 – 100 grass seedlings each with the same soil. Label the trays 0%, 1%, 5%, 10%, 25%, and 50%. Have students create vinegar and water solutions with the corresponding amounts of vinegar to water. Store the solutions and label each cap. Students water the seedlings regularly and measure and record the height of the seedlings each day.*

Day Eight and Nine – Environmental Agencies

Standards Addressed: 1, 2, 3, 4, 5, 6, 7, 8

1. Prior to class, reach out to the local community to find an expert or representative from an environmental agency to visit class. Consider a member from the local Audubon Society, a National Park Ranger, or another environmental professional. Have the expert share the history of their organization, its mission, and why it started.

2. Students then divide into small groups to research several other environmental organizations: the [*Sierra Club*](#), [*Izaak Walton League of America*](#), [*Ducks Unlimited*](#), the [*National Wildlife Federation*](#), [*The Nature Conservancy*](#), and the [*World Wildlife Fund*](#).
3. Students then contact an environmental organization, or someone with personal experience with the organization, and conduct interviews to learn about the agency. Students must use at least three different sources to gather their information, and answer the following:
 - a. How many members are in the organization?
 - b. What is the mission and goal of the organization?
 - c. How effective is the organization in accomplishing its goals?
4. Students prepare a report or video about their organization and share their findings with the class.

Day Ten – Habitat Exploration

Standards Addressed: 1, 2, 5, 7, 8, 9, 10, 11, 13, 14

1. Begin with discussion of the words *abiotic*, *biotic*, *velocity*, *erosion rates*, and *runoff*. Students may use electronic devices to research these words and share their findings with the class.
2. Take the class outside and ask students to look for areas that have been affected by water and erosion. What has happened to this area? How does erosion affect the area? Does it have an impact on wildlife, plants, or people? What is the impact?
3. Then, discuss the importance of oxygen to aquatic life, as well as factors affecting oxygen concentration (salinity, temperature, biological activity, chemical reactions).
4. Check the water samples from Day 4. In groups, students collect data on each of the samples and determine what changes were made to each sample. Students perform tests to determine the oxygen concentration, temperature, and salinity of each sample. Each group records their findings and discusses the results.
5. Students then answer the following questions for each pair of water samples:
 - a. Were there any significant differences in oxygen concentration or temperature between the two samples? If so, describe them.
 - b. What significant differences were there in the appearance of the two water samples?
 - c. How does the salt content of water affect oxygen concentration?
 - d. How does temperature affect oxygen concentration?
6. Students share their findings on [*Kid Blog*](#).

Day Eleven and Twelve – Acid Rain

Standards Addressed: 2, 5, 7, 8, 9, 10, 11, 13

1. When students are out of the classroom, place a few droplets of vinegar onto four or five paper towels and spread them around the room. When students return, note any reactions or discomfort and ask them what is wrong.
2. Next, collect the paper towels and close them in a plastic bag. Tell students this activity shows what some animals experience when there is pollution in the environment. However, animals cannot get rid of the discomfort as easily as we can put the paper towels in a plastic bag.
3. Check the seedling trays that the class set up on Day 7 of the unit. Have students graph the average heights for each tray of seedlings and for each vinegar solution.
4. Students then discuss and answer the following:
 - a. Which solutions did plants tolerate?
 - b. What would happen to the plants if the solutions were 75% or 100% vinegar? How do you know?
 - c. How would you determine the effects of acid on other plants?
 - d. Do you think other plants will have the same tolerance levels as the grass seedlings?
5. Then, students create devices to collect rainwater from trees or shrubs around the school. Once each device collects enough water, students measure the pH of the water. Students create a bar graph to visualize their findings and discuss the following:
 - a. Which trees or shrubs had the greatest effect on pH?
 - b. Which trees or shrubs made the rainwater more acidic? More basic? Had no effect?
 - c. Is the pH of the soil and water here on our campus suitable for wildlife?
6. Students share their findings on [*Kid Blog*](#).

Day Thirteen – Soil

Standards Addressed: 5, 9, 10, 11, 12, 13

1. In groups of four, students collect four samples of soil from around the school. After collecting the samples, students use a hand lens and record the texture, color, and consistency of each sample and answer the following:
 - a. What size are the particles of each soil sample?
 - b. Is anything living in the soil? What?
 - c. How does this living creature positively affect the soil? Negatively?
 - d. After adding a small amount of water, what type of texture prevails?
 - e. Why is soil important to the area the sample is from?

2. Tell students soil is made of three ingredients: minerals, organic matter, and open space and that soil changes over time. Bring in a composter to show students. Discuss how the compost is made of dead plants and decomposers.
3. Then, allow students to collect a sample from the composter and observe the sample with a hand lens and a microscope and answer the following:
 - a. What types of biotic and abiotic things are in the sample?
 - b. How would scientists classify them? Why?
 - c. Is the soil healthy? Why or why not?
4. Give each group empty jars with lids to fill with one of the soil samples. Students add water to the jar, replace the lid, and shake the jar. Students observe what happens to the soil. What is settling in the bottom of the jar? Why?
5. Leave the jars overnight and have students observe the outcome the next day.

Day Fourteen – Evaluating Habitats

Standards Addressed: 2, 5, 6, 7, 8, 9, 11

1. Students describe the jars of soil. What happened overnight? Why? What layers of soil can you observe?
2. Then, discuss ways to observe invertebrates around the school. Using the **Invertebrate Trap Instructions**, students create a pitfall trap and a potato trap to determine what lives in the soil around the school. Students place the devices around the school and check them daily.
3. Students share their observations and findings on [Kid Blog](#) each day they make a new observation.
4. Then, ask students to define habitat. How is a *habitat* different from an *ecosystem*? (*Habitat is an area defined by the needs of organisms; an ecosystem refers to the biotic and abiotic features of the location*).
5. Students brainstorm a list of potential habitats that might exist in the community. Develop a classification system as a class (field, buildings, trees, forests, streams, etc.).
6. Students walk around the school and document habitat locations using iPads or tablets. Students take a close look at these areas for signs of wildlife and record any type of vegetation found. Are there travel corridors, nesting, or feeding and drinking areas? Are there tracks or scat? Make sure students include evidence in their documentation.

7. Students note the type and location of each habitat on a large habitat map of the school using different symbols created by the class.
8. Conclude with a discussion of the habitats discovered around the school. How many habitats were discovered? How do these habitats affect land use?
9. Students create a poster of the habitat information and pictures from their discovery, using www.flipsnack.com or www.smores.com. Students may also use the [Project Noah app](#) to share their findings.

Day Fifteen through Seventeen – BioBlitz

Standards Addressed: 1, 2, 3, 6, 7, 8, 9, 11, 12

1. Introduce the class to the [BioBlitz](#), and tell students they will *document* and classify plant and animal life around the school for the next 24 hours. Students collect data, identify, and document all of the plants and animals found around the school.
2. If possible, create partnerships with the state Department of Natural Resources, local conservationists, and biologists to assist students in identifying and classifying the animal and plant life. Also recruit parents, teachers, and other community members to assist in the BioBlitz.
3. Throughout the BioBlitz, students create an [eBook](#) and post on [Project Noah](#) to save and share their findings.

Day Eighteen – Conclusion

Standards Addressed: 5, 7, 8, 9

1. Facilitate a student-led discussion on the following:
 - a. What have you learned about our school environment?
 - b. What is the most important thing we can do as a community to protect the native species living here?
 - c. How can we become aware of the dangers of the loss of native species in our own backyards? What actions can we take to protect those species?
 - d. Are there action steps we need to take to protect the wildlife? If so, what?
2. Based on student answers, the class may begin a new project to help protect wildlife around the school.