

# Sample Unit Plan

## Ecology Explorers

Classroom Information
<b>Subject Area</b>
Science, Language Arts
<b>Grade Level(s)</b>
6–8
Unit Summary
In this project, students study problems that arise as wildlife and human habitats increasingly overlap in our growing world. Taking the role of wildlife conservationists, students become experts on an endangered animal or plant in their region. They study the organism's needs and understand interdependencies in the ecosystem in which it lives. Using the <i>Seeing Reason</i> causal mapping tool, students model their developing understanding of the intricacies of a balanced ecosystem, and then map the human factors that influence that balance. Through a Webquest research project, they learn how human activity affects an organism's survival, and consider ways to lessen human impact on local populations. They prepare a presentation for the local conservation board, in which they describe the habitat needs of the species they have researched and offer practical and economically feasible solutions to ensure its survival.
Building the Foundation
<b>Habits of Learning Taxonomy</b>
Analysis — connect, compare, appraise Synthesis — propose, plan, formulate Evaluation — predict, assess, support, defend Problem solving Thinking flexibly
<b>Standards</b>
<b><i>Benchmarks for Science Literacy - Benchmark 5 Level 6-8 and 9-12</i></b>
<ul style="list-style-type: none"> <li>▪ Two types of organisms may interact with one another in several ways: They may be in a producer/consumer, predator/prey, or parasite/host relationship. Or one organism may scavenge or decompose another. Relationships may be competitive or mutually beneficial. Some species have become so adapted to each other that neither could survive without the other.</li> <li>▪ Ecosystems can be reasonably stable over hundreds or thousands of years. As any population of organisms grows, it is held in check by one or more environmental factors: depletion of food or nesting sites, increased loss to increased numbers of predators, or parasites. If a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages that eventually result in a system similar to the original one.</li> <li>▪ Like many complex systems, ecosystems tend to have cyclic fluctuations around a state of rough equilibrium. In the long run, however, ecosystems always change when climate changes or when one or more new species appear as a result of migration or local evolution.</li> </ul>

<b>Standards</b> (Continued)	
<ul style="list-style-type: none"> <li>Human beings are part of the earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.</li> </ul>	
<b>Kyrene School District Standards</b>	
<ul style="list-style-type: none"> <li>A2.100.63 — Generalize about changes that may take place in organisms and populations of organisms within an ecosystem.</li> <li>2.100.64 — Describe the relationship between humans and the environment.</li> </ul>	
<b>Learning Objectives</b>	
Students will:	
<ul style="list-style-type: none"> <li>Understand the importance of balanced systems</li> <li>Distinguish between a food chain and a food web</li> <li>Identify some interactions/relationships between organisms in an ecosystem</li> <li>Assess an organism's needs and propose practical and economically feasible solutions to ensure its survival</li> </ul>	
<b>Curriculum-Framing Questions</b>	<b>Essential Question</b>
	How can we all get along?
	<b>Unit Questions</b>
	What influences the biological success of a species? How can people and animals co-exist?
	<b>Content Questions</b>
	What are limiting factors? What are the organisms within an ecosystem and how are they dependent upon each other? What makes a species endangered?
<b>Student Assessment</b>	
<b>Assessment Summary</b>	
<p>Have students use manipulatives (balancing nail activity) to help them understand the concept of interdependence. Through the questioning and discussion, assess and build upon their prior knowledge. Use the <i>Oh Deer!</i> activity and discussion to assess their understanding of limiting factors. Use the Webquest to help guide their learning, keep them on track, and find resources for their research. Assess the quality of their science journal entries and <i>Seeing Reason</i> maps (causal relationship explanations, sources, overall understanding of the ecological system) to monitor progress and understanding of content. Use questioning throughout the unit to help students develop their higher-order thinking skills and process content. Have students use the scoring guide to help them self- and peer-assess work prior to their report and presentation's completion. Use this same scoring guide and the details in the Webquest and research paper outline to assess and grade the final project.</p>	

Student Assessment (Continued)		
Assessment Timeline		
Before Project Work Begins	While Students Work on Projects	After Project Work Ends
Analogy/ manipulatives Questioning Webquest Science journals	Questioning Science journal Seeing Reason map detail Scoring guide Research paper outline Self- and peer-review	Science journal Questioning Webquest Scoring guide Research paper outline
Seeing Reason Elements		
Seeing Reason Project Title		
Ecology Explorers: Overlapping Habitats		
Project Description		
In preparation for your study of endangered species during the Webquest, research the relationships between humans and animals in general and identify what happens when their habitats overlap.		
Research Question		
What happens when human and animal habitats overlap?		
Practice Map		
Unit Details		
Approximate Time Needed		
Four weeks, 20 - 50 minute class periods		
Prerequisite Skills		
Reading for information, basic research writing and presentation skills, basic knowledge on interdependencies of life		

**Unit Details** (Continued)**Procedures****Prior to Instruction**

In advance of instruction, prepare the materials for the introductory “balanced systems” investigation. In individual plastic bags (one set for every four students), include:

- 13 8-penny nails with flat heads (not finishing nails)
- 1 block of wood, approximately 10 cm by 4 cm, with one of the above nails embedded in the center

Provide science journals for each student to reflect on and respond to activities and questions throughout the unit.

Review the Ecology Webquest. Make sure associated Web sites are active, and replace inactive sites if necessary. An alternative Webquest could be designed so that students research animals only from their local region, rather than worldwide—especially if you want the students to get involved in any community or regional action plans.

Consider how you could incorporate an authentic audience for your students’ presentations. Contact local or state government officials, governing boards, wildlife specialists, community members, parent organizations, local clubs or organizations, etc. to set up a date and time when students can present their findings. If this is not possible, identify their audience as the (simulated) National Wildlife Conservation Board.

**Setting the stage**

Pose the Essential Question, How can we all get along? Prompt students to think about this question related to the world of science. Allow students time to write their thoughts in their science journals. Have students share their examples and thoughts in pairs. Turn the discussion back to the whole group and have individuals share what they’ve discussed. Chart student responses and save this chart to refer to throughout the unit. If some responses touch on ecosystems or other related topics, make sure to point out that this will be investigated further in the unit.

Begin the unit with an activity that focuses on the concept of balanced systems. Provide student teams with prepared sets of blocks and nails, and challenge them to create a “balanced” system by arranging the 12 loose nails so they all balance on the head of the one stationary nail that is embedded in the wood block. None of the loose nails can touch the wood or the ground. Allow plenty of time for exploration, and assure students that there is at least one solution, if not more.

After students complete the challenge, lead a discussion about the ways the nail-balancing activity serves as a model for concepts that govern all systems, natural and manufactured. Reinforce the idea that parts of one system also interact with parts of other systems. Encourage thinking with questions such as:

- What are the parts of this system?
- How does this system of nails balance? What forces and conditions influence this system?
- How do members of this system depend on other members?
- How many nails can be removed before the system fails and becomes unbalanced? What other actions could upset the balance?

In the natural world, overlapping systems all work together to achieve a balanced ecosystem. Chemical, biological, and physical conditions all influence systems. Discuss examples, and ask:

- What are some natural ecosystems? What features do they share?
- What parts of an ecosystem might the nails represent?

**Procedures** (Continued)

- What are some interactions and relationships between organisms in an ecosystem?
- How do natural ecosystems become unbalanced?

Discuss the interdependence of life, and review food chains and food webs. You may want to have students draw food webs from different biomes (for example, desert food web, temperate forest food web) in their journals, and have them identify producers; primary, secondary, and tertiary consumers; and decomposers. Discuss symbiosis and symbiotic relationships: parasitism, mutualism, and commensalism.

**Explore limiting factors**

Discuss the fundamental necessities of living things: food, water, shelter, and space in a suitable arrangement. Discuss how limiting factors (the availability of these necessities) influence animal and plant populations. Discuss how additional limiting factors, such as competition for resources, predation, and disease, also influence populations. To have students experience how changes in limiting factors change animal and plant populations, play *Oh Deer!* This simulation exercise is described at *Teachers.net Gazette*, and available in print in the Arizona Game and Fish publication *Project Wild*. Afterward, discuss how limiting factors in play during the game affect food webs. Give student pairs the population data collected during the game. Have them enter it into a spreadsheet and then build animal population graphs. Ask students to explain why the fluctuations in population occur, using data from the game. View limiting factors team sample. Once students have a good grasp of the concept of population fluctuations, pose the Content Question, *What makes a species endangered?* Have students discuss their ideas in small groups and then share their ideas with the whole group. Have students write about their ideas in their science journals and consider some initial answers to the Unit Question, *What influences the biological success of a species?*

**Discuss Plant Ecology**

In *Oh Deer!* and the activities relating to limiting factors, students focused on animals. Take time now to address plant ecology and the concept of succession, from initial colonizers to climax communities. Mention succession cycles due to short- and long-term natural events (fire, climatic change), but focus on how human actions influence succession.

**Study human-wildlife interaction**

To explore and answer the Unit Question, *How can people and animals coexist?*, assign students to teams of four. Introduce the Ecology Webquest. Explain each section of the Webquest and their roles as wildlife conservationists. Hand out the scoring guide for students to self-monitor their progress as they move through the project.

Discuss how human and wildlife habitats overlap and how interactions in both rural and urban areas can influence wildlife as well as humans. Discuss human-wildlife interactions in your community, such as wild animals encroaching on populated areas or the effect of roads and fencing on animal migration patterns.

Have students use *Seeing Reason* to help them understand what happens when human and animal habitats overlap. Before they start mapping, follow these steps to introduce *Seeing Reason* to your class.

Have each group of four split into two teams. Have student teams log in to the *Seeing Reason* project, Ecology Explorers: Overlapping Habitats and map their response to the question, "What happens when human and animal habitats overlap?" Have students use the Webquest links to conduct research on this topic and provide evidence for their causal relationships. As students build their maps, circulate around the room. Look at maps, listen to conversations, and ask students to describe their map. Help students think through their map by asking questions such as:

**Procedures** (Continued)

- What other factors relate to this one?
- What is your evidence for the relationship you show between these factors?

Ask questions that prompt deeper thinking about the intricacies of the topic, such as:

- Why are animal homes so important? How do animals that live in the forest depend on trees?
- How is an animal's success affected by its direct or indirect interactions with humans?
- What do you think might be the long-term effects of these encounters on animal behaviors and social structures?

When maps are complete, show several maps from the teacher workspace using a projector. Ask teams to describe their maps and the thinking behind them. After discussion, ask students to refine their maps based on what they learned from their peers.

Have students write about their findings in their science journals and consider some initial answers to the Unit Question, How can people and animals coexist?

**Review Research and Presentation Guidelines**

Return to the Webquest and review the required tasks. Discuss the research and presentation assignment with the class, and teach necessary research skills, such as taking notes and citing references. Review the research paper outline and scoring guide to clarify expectations. You may need to help students locate specific statistics and other "buried" content in lengthy reports and understand how to read charts and tables. Encourage students to include interviews with people they may have contacted for information or opinions, such as ranchers, logging or mining company spokespeople, government officials, environmental groups, and people representing state wildlife organizations. Identify the audience for which each team is writing and/or presenting.

**Create Causal Maps and Research Papers**

Have students use the research paper outline and Webquest to guide them in conducting their research and planning the individual reports for their species. Ensure students engage in the writing processes of drafting, revision, peer review, and publishing. Students need to make sure their research applies to and can help them answer the Essential, Unit, and Content Questions.

As students are conducting research, have them share what they have learned regarding their endangered species within their group of four. Have them compare and identify similar situations that are affecting the various species they are reporting on. In groups of two, have student teams go to their *Seeing Reason* account and log on. They are to choose one of the two species they have researched—or they can choose both if they feel their species have similar issues—to construct a series of maps within the Ecological Explorers: Species Success project. Maps should address the following main question: "What influences the biological success of your species?"

As students create their maps, take the opportunity to gauge understanding and guide learning. Look at maps, listen to conversations, and ask students to describe their maps. Ask questions that prompt deeper thinking about the intricacies of the topic, such as:

- Can you compare the ways in which humans and animals have adapted to life in this habitat?
- In what ways might the presence of humans in this habitat affect animal behaviors?

Have students work with each other during the mapping, research, and revision process. Arrange a "gallery walk," where during several rotations, one partner in each team stays at the computer to explain the team's map, while others rotate from computer to computer

<b>Procedures</b> (Continued)	
<p>to view and ask questions about different teams' maps. Allow time for students to reconsider and fine-tune their maps after this activity.</p> <p>Instruct students to use the information from their research and the creation of their map in the development of their research report and presentation on their group's species. Remind students to keep their targeted audience in mind as they research and write their report. Have students use the Webquest instructions, research paper outline, and the scoring guide to self- and peer-assess. Provide students a second revision phase after these assessments.</p>	
<p><b>Create Presentations</b></p> <p>When reports are finished, have student teams begin developing their oral presentations and supporting multimedia. Remind students that the different presentation formats may include Web page, multimedia presentation, poster, video, a play, or other approved visual format. Remind them they have the role of conservationists, and that the purpose of their presentation is to inform the wildlife conservation board (or other assigned audience) about the group's species and give viable, research-based solutions that will ensure the continued existence of all their species. Approve an outline of the presentation before students develop multimedia elements. Remind students to abide by copyright rules when using pictures or video in their presentations. Require peer-review prior to the oral presentation.</p>	
<p><b>Present Proposals</b></p> <p>As students complete their presentations, finalize arrangements for an event where they present their proposals to the (simulated) National Wildlife Conservation Board or their authentic audience. You may want to ask civic leaders, wildlife specialists, and community members to represent this "board." Give students sufficient time to practice their presentations in small groups before they present to the larger audience. Assess student reports and presentations using the scoring guide and the details in the Webquest and research paper outline.</p>	
<p><b>Wrap It Up</b></p> <p>Revisit the Essential Question, How can we all get along? Refer back to the chart created at the beginning of the unit and review student ideas. Create a new chart with student responses and discuss how ideas have changed or stayed the same based on what they've learned in the unit. Post the Essential and Unit Questions and allow students to choose one or more of the questions to reflect upon. This question can be used as a portfolio piece or as part of unit reflection in their science journals.</p>	
<b>Materials and Resources Required for Project</b>	
<b>Printed Materials</b>	Textbooks, curriculum guides, story books, lab manuals, reference manuals, etc.
<b>Supplies</b>	13 - 8 penny nails with flat heads (not finishing nails), 1 block of wood approximately 10 cm by 4 cm (or a big chunk of clay could substitute for the wood). Computers, Digital camera, Video camera, Word processor, Presentation development software, Multimedia atlas, Encyclopedias
<b>Internet Resources</b>	United States Environmental Protection Agency Student Center, <a href="http://www.epa.gov/students">www.epa.gov/students</a> United States Fish and Wildlife Service Endangered Species Program, <a href="http://endangered.fws.gov">http://endangered.fws.gov</a>

Accommodations for Differentiated Instruction	
<b>Resource Student:</b>	Narrow students' research focus by assigning specific topics to investigate. Some animal topics have more information at a more basic level than others. You may choose to pair up students in a way that a resource student is paired with another who is not a resource student.
<b>English Language Learner</b>	Provide texts from language of origin. Encourage students to research their animals using native language sources.
<b>Gifted Student:</b>	Require students to add sources and resources to their description of factors and relationships in all their <i>Seeing Reason</i> maps. Require more in-depth information on all aspects of their project.