

Science
Unit 4: Ecology

Essential Understandings	<ul style="list-style-type: none"> ▪ Many natural processes occur in cycles. ▪ The components of natural systems are interrelated and are made up of subsystems, which have inputs, outputs, and feedback loops. ▪ Terrestrial and aquatic living things depend on one another and on nonliving factors within the biosphere and hydrosphere. ▪ Changes in specific population or conditions affect other parts of the systems. ▪ Natural systems may appear to be unchanging even though the parts of systems may be changing. ▪ Individual systems continually change in response to human and other factors. ▪ Weather is a daily event and climate involves weather patterns over longer periods of time.
Essential Questions	<ul style="list-style-type: none"> ▪ What is ecology? ▪ What is a biome? ▪ What is an ecosystem? ▪ What are some examples of biotic (living) and abiotic (nonliving) factors in an ecosystem? ▪ What are populations and communities? ▪ How is the size of a population determined? ▪ What are some examples of local terrestrial and aquatic populations? ▪ What are the water, carbon, and nitrogen cycles and how do they work? ▪ How is soil formed and how does it affect a biome or ecosystem? ▪ How do organisms interact? ▪ How do food chains and food webs act as systems and sub-systems? ▪ How are weather and climate different? ▪ How does the ocean impact weather and climate?

Science
Unit 4: Ecology

Essential Knowledge	<ul style="list-style-type: none"> ▪ Ecology is the study of the relationships between organisms and the abiotic parts of their environment. ▪ A biome is a major regional community of organisms and a particular climate. ▪ An ecosystem is a community of interacting organisms and abiotic factors. ▪ Organisms interact in a number of ways (e.g., competition, predator/prey, symbiosis). ▪ Food chains and food webs represent major relationships between organisms within a given ecosystem. ▪ Producers, consumers, and decomposers are parts of food webs that cause energy to flow. ▪ Finite resources in an ecosystem limit the types and populations of organisms within it. ▪ Ecosystems can change over time (e.g., through succession). ▪ Various mechanisms found in the natural world transport biotic and abiotic matter (e.g., ocean currents, geologic processes). ▪ Soil is an abiotic component of an ecosystem that is formed over time by the breakdown of rock and organic matter. ▪ Many factors affect the flow of groundwater. ▪ Many products are derived from the Earth’s crust. ▪ Weather affects and is affected by cycles in the environment. ▪ Climate affects biomes over geologic time. ▪ Personal choices can affect ecosystems and climate over time.
Vocabulary	<ul style="list-style-type: none"> ▪ <u>Terms:</u> <ul style="list-style-type: none"> ○ producer, consumer, decomposer, predator, prey, parasitism, mutualism, commensalism, symbiosis, food web, food chain, biotic, abiotic, population, community, biome, ecosystem, environment, competition, flora, fauna, habitat, weather, climate, sub-systems, interaction, feedback, cycle, physical and chemical change
Essential Skills	<ul style="list-style-type: none"> ▪ Describe an ecosystem through careful observation and data collection. ▪ Explain how finite resources and various limiting factors affect the type and variety of organisms in an ecosystem. ▪ Describe a food chain and a food web of a particular ecosystem. ▪ Compare and contrast terrestrial and aquatic ecosystems. ▪ Show how energy travels through an ecosystem. ▪ Show how materials cycle through ecosystems. ▪ Identify some factors affecting the flow of groundwater. ▪ Identify some products that are derived from the Earth’s crust. ▪ Use soil and air thermometers. ▪ Examine weather data and compare to climate data.

Science
Unit 4: Ecology

<p>Related Maine Learning Results</p>	<p><u>Science</u></p> <p>A. Unifying Themes</p> <p>A1. Systems</p> <p>Students apply the principles of systems, models, constancy and change, and scale in science and technology.</p> <ul style="list-style-type: none">a. Explain how individual parts working together in a system (including organisms, Earth systems, solar systems, or man-made structures) can do more than each part individually.c. Describe how systems are nested and that systems may be thought of as containing subsystems (as well as being a subsystem of a larger system) and apply the understanding to analyze systems. <p>A3. Constancy and Change</p> <p>Students describe how patterns of change vary in physical, biological, and technological systems.</p> <ul style="list-style-type: none">a. Describe systems that are changing including ecosystems, Earth systems, and technologies.b. Give examples of systems including ecosystems, Earth systems, and technologies that appear to be unchanging (even though things may be changing within the system and identify any feedback mechanisms that may be modifying the changes.c. Describe the rates of change and cyclic patterns using appropriate grade-level mathematics. <p>C. The Scientific and Technological Enterprise</p> <p>C3. Science, Technology, and Society</p> <p>Students identify and describe the role of science and technology in addressing personal and societal challenges.</p> <ul style="list-style-type: none">a. Describe how science and technology can help address societal challenges including population, natural hazards, sustainability, personal health and safety, and environmental quality.b. Identify personal choices that can either positively or negatively impact society including population, ecosystem sustainability, personal health, and environmental quality.
--	---

Science
Unit 4: Ecology

<p>Related Maine Learning Results</p>	<p>D. The Physical Setting</p> <p>D2.Earth</p> <p>Students describe various cycles, physical and biological forces and processes, position in space, energy transformations, and human actions that affect the short-term and long-term changes to the earth.</p> <p>b. Describe Earth's Systems – biosphere, atmosphere, hydrosphere, lithosphere- and cycles and interactions within them (including water moving among and between them, rocks forming and transforming, and weather formation.)</p> <p>f. Give examples of abrupt changes and slow changes in Earth Systems.</p> <p>E. The Living Environment</p> <p>E1.Biodiversity</p> <p>Students differentiate among organisms based on biological characteristics and identify patterns of similarity.</p> <p>a. Compare physical characteristics that differentiate organisms into groups (including plants that use sunlight to make their own food, animals that consume energy-rich food, and organisms that cannot easily be classified as either.)</p> <p>E2.Ecosystems</p> <p>Students examine how the characteristics of the physical, non-living (abiotic) environment, the types of behaviors of living (biotic) organisms, and the flow of matter and energy affect organisms and the ecosystem of which they are part.</p> <p>a. List various kinds of resources within different biomes for which organisms compete.</p> <p>b. Describe ways in which two types of organisms may interact (including competition, predator/prey, producer/consumer/decomposer, parasitism, and mutualism) and describe the positive and negative consequences of such interactions.</p> <p>c. Describe the source and flow of energy in the two major food webs, terrestrial and marine.</p> <p>d. Describe how matter and energy change from one form to another in living things and in the physical environment.</p>
--	---

**Science
Unit 4: Ecology**

<p>Sample Lessons And Activities</p>	<ul style="list-style-type: none"> ▪ Observations and data collection of forest, pond, stream, field and ocean ecosystems. ▪ Use soil corers, quadrats, soil and air thermometers, nets, transect lines, field guides, and hand lenses to collect data. ▪ Intensive lessons and practice in field equipment use
<p>Sample Classroom Assessment Methods</p>	<ul style="list-style-type: none"> ▪ Interpretation and justification of collected data ▪ Life in the Ecosystem (LAD) Common Assessment ▪ Draw Food Chains and Food Webs ▪ Use materials and prior learning in the unit to count invasive species at Reid State Park
<p>Sample Resources</p>	<ul style="list-style-type: none"> ▪ <u>Publications:</u> <ul style="list-style-type: none"> ○ <u>Biomes of the World</u> – Michael Allaby ○ <u>Disappearing Wetlands</u> – Helen Challand ○ <u>Ecology</u> – Steve Pollock ○ <u>Ecology - The Study of Living Things</u> – Terry Jennings ○ <u>Food Chains and Webs</u> – Holly Wallace ○ <u>Pond and River</u> – Steve Parker ○ <u>Rainforests</u> – Rodney Aldis ○ <u>Tundra, the Arctic Land</u> – Bruce Hiscock <u>Videos:</u> <ul style="list-style-type: none"> ▪ <u>Amazon: Land of the Flooded Forest</u> ▪ <u>City of Coral</u>