

FIFTH GRADE: BIOMES, ECOSYSTEMS, AND ENERGY

Standards Bundle

Standards are listed within the bundle. Bundles are created with potential instructional use in mind, based upon potential for related phenomena that can be used throughout a unit.

5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. (SEP: 2; DCI:LS2.A, LS2.B ; CCC: Systems) **[Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]**

5-PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. (SEP: 2; DCI: PS3.D, LSI.C ; CCC: Energy/Matter) **[Clarification Statement: Examples of models could include diagrams, and flowcharts.]**

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (SEP:8; DCI: ESS3.C; CCC: Systems)

Content Overview

This section provides a generic overview of the content or disciplinary core ideas as an entry point to the standards.

Each component of an ecosystem is connected to the other components in the ecosystem and relies on the other components to survive and exist in a balance. Food and other materials are broken down and cycled between the air, plants, animals, and the soil. All of the energy that drives these systems comes from the sun. Any component in an ecosystem that changes can positively or negatively influence the other parts of the ecosystem. Some of these changes are due to humans using resources within the ecosystem. Today many communities are doing things to help protect and restore resources in ecosystems through wildlife conservation programs, sustainable farming practices, and city recycling programs.

Phenomena

Phenomena can be used at varying levels of instruction. One could be used to anchor an entire unit, while another might be more supplemental for anchoring just a unit. Please remember that phenomena should allow students to engage in the SEP and use the CCC/DCI to understand and explain the phenomenon.

- Trees growing out of rocks or in other peculiar areas.
- Mushrooms or fungus that grows on dead or decaying matter.
- Bear and wolf interactions with limited resources.

- We have an excess amount of rabbits this year.
- Discuss how the Burmese Pythons survive in Florida (or use other invasive species in SD).
- Pine beetle Infestation.
- Fish consumption warnings signs in certain lakes in SD.
- Reintroduction of the wolf to Yellowstone Park.
- The county has set guidelines as to the size and location of feedlots.

Storyline

This section aims to decode not only the DCI connections, but also the SEP and CCC in a detailed account of how they possibly fit together in a progression for student learning, including both rationale and context for the bundle.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models</p> <ul style="list-style-type: none"> ● Develop a model to describe phenomena. ● Use models to describe phenomena. <p>Obtaining, Evaluating, and Communicating Information</p> <ul style="list-style-type: none"> ● Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. 	<p>LS2.A: Interdependent Relationships in Ecosystems</p> <ul style="list-style-type: none"> ● The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. <p>LS2.B: Cycles of Matter and Energy Transfer in Ecosystems</p> <ul style="list-style-type: none"> ● Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain 	<p>Systems and System Models</p> <ul style="list-style-type: none"> ● A system can be described in terms of its components and their interactions. <p>Energy and Matter</p> <ul style="list-style-type: none"> ● Energy can be transferred in various ways and between objects. <p>Systems and System Models</p> <ul style="list-style-type: none"> ● A system can be described in terms of its components and their interactions.

gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.

PS3.D: Energy in Chemical Processes and Everyday Life

- The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water).

LS1.C: Organization for Matter and Energy Flow in Organisms

- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary)

ESS3.C: Human Impacts on Earth Systems

- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

Students develop and use models to gain an understanding of how energy and matter flow through an ecosystem between the air, soil, plants, and animals and are utilized by organisms. All energy begins with the sun and is transferred between components within the system.

Students should be able to develop a model using a food chain, food web, or energy pyramid, etc. to show how energy and matter flow between the different levels of that ecosystem. Plants are the base of most ecosystems that capture energy from the sun, these are producers. They utilize the sun's energy along with material from air, soil, and water in a chemical process to create new plant matter. Food provides animals with the material they need for body repair and growth and the energy they need to maintain body warmth and for motion. Herbivores eat the producers which put energy into the system from the sun for food. Carnivores eat the animals that eat the plants. Omnivore get their energy from both plants and animals. Decomposers, break down dead plants and animals, recycling materials and nutrients back into the soil to be used by plants.

Students construct an argument that an ecosystem's health can be measured by the biodiversity (different species that survive in an ecosystem) where specific needs are met. Changes to biodiversity include over population, under population, invasive species, adaptations, mutations, interdependent relationships, extinctions, competition, etc.

Industrial and agricultural practices can greatly influence the health of a variety of ecosystems found on land, in streams, oceans and the atmosphere. Humans are working to help protect Earth's resource and environment by using bioremediation, building dams to collect mine tailings, natural fertilizers, replanting, and rotation of trees by the logging industry and recycling programs

Formative Assessment

Formative assessment is crucial because all learners benefit from timely and focused feedback from others. It promotes self-reflection, self-explanation, and social learning. It can also make learning more relevant. Each of the questions below might be used throughout the formative assessment process. Specific prompts may focus on individual practices, core ideas, or crosscutting concepts, but, together, the components need to support inferences about students' three-dimensional science learning as described in a given bundle, standard or lesson-level performance expectation.

Resources to inform your formative assessment.

<http://stemteachingtools.org/brief/30>

<http://stemteachingtools.org/brief/41>

<http://stemteachingtools.org/pd/sessionb>

SEP Developing and Using Models

- Create a model of a food web to show energy flow in an ecosystem.
- Develop a model that shows the guidelines and land plots for a feedlot in your county.

SEP Obtaining, Evaluating, and Communicating Information

- Debate the pros and cons of reintroducing the black ferret back into the Badlands.
- Debate the pros and cons of reintroducing the wolf to Yellowstone Park

CCC Energy and Matter

- Research two or more organisms and explain how their interrelationship help move matter through an ecosystem.
- How do living organisms move energy through an ecosystem?

CCC Systems and System Models

- How do interactions in the system of plants, animals, decomposers, and the environment allow multiple species to meet their needs?

Performance Outcomes

These are statements of how students use knowledge and are similar to the standards in how they blend DCI, SEP, and CCC, but at a smaller grain-size. These are potential outcomes for instruction as it plays out in lessons and activities in the classroom. It is important to also think of these as smaller outcomes that build toward the larger goal of mastering the standards.

- Evaluate [interdependent relationships in ecosystems](#) among organisms.

- **Describe** the *movement of matter* among plants, animals, decomposers, and the environment.
- **Develop and use a model** to *describe movements of energy* through Plants, Animals, Decomposers, Environment.
- **Analyze** how the *movement of matter* through an ecosystem creates changes in different organisms and the environment.
- **Obtain, evaluate, and communicate information** about the *cause and effect* of human activities to protect earth's resources.
- **Create a model** that will show the ideal *location* for a feedlot in your county and make a list of guidelines for size and location.