

5-LS2-1 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

- 5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.** [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.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models

Modeling in 3–5 builds on K–2 models and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop a model to describe phenomena.

Connections to the Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Science explanations describe the mechanisms for natural events.

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- 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.

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

- Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.

Crosscutting Concepts

Systems and System Models

- A system can be described in terms of its components and their interactions.

Observable features of the student performance by the end of the grade:

1	Components of the model
a	Students develop a model to describe* a phenomenon that includes the movement of matter within an ecosystem. In the model, students identify the relevant components, including:
	i. Matter.
	ii. Plants.
	iii. Animals.
	iv. Decomposers, such as fungi and bacteria.
	v. Environment.
2	Relationships
a	Students describe* the relationships among components that are relevant for describing* the phenomenon, including:
	i. The relationships in the system between organisms that consume other organisms, including:
	1. Animals that consume other animals.
	2. Animals that consume plants.

		3. Organisms that consume dead plants and animals.
		4. The movement of matter between organisms during consumption.
	ii.	The relationship between organisms and the exchange of matter from and back into the environment (e.g., organisms obtain matter from their environments for life processes and release waste back into the environment, decomposers break down plant and animal remains to recycle some materials back into the soil).
3	Connections	
	a	Students use the model to describe*:
	i.	The cycling of matter in the system between plants, animals, decomposers, and the environment.
	ii.	How interactions in the system of plants, animals, decomposers, and the environment allow multiple species to meet their needs.
	iii.	That newly introduced species can affect the balance of interactions in a system (e.g., a new animal that has no predators consumes much of another organism's food within the ecosystem).
	iv.	That changing an aspect (e.g., organisms or environment) of the ecosystem will affect other aspects of the ecosystem.