Unit 3: Energy and Matter in Ecosystems

Content Area: **Science**
Course(s):
Time Period: **Generic Time Period**
Length: **4 weeks**
Status: **Published**

Disciplinary Core Ideas

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

Plants acquire their material for growth chiefly from air and water. (5-LS1-1)

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. (5-LS2-1)

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. (5-LS2-1)

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). (5-PS3-1)

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 to 5-PS3-1)

Standards

MA.K-12.2	Reason abstractly and quantitatively.
TECH.8.1.5.C.CS1	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media
TECH.8.2.5.B.CS2	The effects of technology on the environment.
SCI.5-ESS2-1	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.5.5.MD.A.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
LA.5.RI.5.7	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.
LA.5.RI.5.9	Integrate and reflect on (e.g. practical knowledge, historical/cultural context, and background knowledge) information from several texts on the same topic in order to write or speak about the subject knowledgeably.
SCI.5-LS1-1	Support an argument that plants get the materials they need for growth chiefly from air and water.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.5.F.CS2	Plan and manage activities to develop a solution or complete a project.
LA.5.RI.5.1	Quote accurately from a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.
LA.5.SL.5.5	Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.
LA.5.W.5.1	Write opinion pieces on topics or texts, supporting a point of view with reasons

	and information.
TECH.8.2.5.B.4	Research technologies that have changed due to society's changing needs and wants.
CAEP.9.2.8.B.1	Research careers within the 16 Career Clusters ® and determine attributes of career success.
TECH.8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
TECH.8.2.5.A.4	Compare and contrast how technologies have changed over time due to human needs and economic, political and/ or cultural influences.
SCI.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.

Objectives and Essential Questions

Student Learning Objectives

A) Support an argument that plants get the materials they need for growth chiefly from air and water.

B) Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

C) Use models to describe the energy in animal's food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

Essential Questions

What happens to the matter and energy that are a part of each organism?

Where do plants get the materials they need for growth?

How does matter move among plants, animals, decomposers, and the environment?

How can energy in animal's food be traced to the sun?

Concepts

Part A

• Matter is transported into, out of, and within systems.

• Plants acquire their material for growth chiefly from air and water.

Part B

• Science explanations describe the mechanisms for natural events.

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

• 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.

Part C

Energy can be transferred in various ways and between objects.

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

• Food provides animals with the materials they need for body repair and growth and the energy they need for motion and to maintain body warmth.

Activities and Lessons

Mystery Science Explorations, Activities and Optional Extras, Web of Life - Ecosystems and the Food Chain- Mysteroes 1, 2, and 3

Mystery 1) Why would a hawk move to New York City?

Mystery 2) What do plants eat?

Mystery 3) Where do fallen leaves go?

(5-PS3-1)

5th Grade NGSS Science Notebook

Animal's Food

(5-LS1-1)

5th Grade NGSS Science Notebook

Photosynthesis

(5-LS2-1)

5th Grade NGSS Science Notebook

Food Chain Vocabulary

Decomposers

Energy in Food Webs

Energy in Food Chains

Nitrogen Cycle

Weaving the Web Activity http://forces.si.edu/main/pdf/2-5-WeavingTheWeb.pdf

Materials and Resources

www.mysteryscience.com

Mystery Science Web of Life Mysteries 1, 2, and 3

5th Grade NGSS Science Notebook

Youtube, Brainpop Videos

Smart Exchange (food chains/webs)

STEM experiments: http://www.siemensstemday.com/educators/activities?g=5&sort=level&sortd=DESC

NEWSELA Text Set: Wonders: New Perspectives, Week 5

NJ Model Curriculum Open Education Resources: Bottle Biology Terrarium - http://ngss.nsta.org/Resource.aspx?ResourceID=94

Biomes Engineering Design Project - http://ngss.nsta.org/Resource.aspx?ResourceID=288

Assessment

Part A

Students who understand the concepts are able to:

• Describe how matter is transported into, out of, and within systems.

• Support an argument with evidence, data, or a model.

• Support an argument that plants get the materials they need for growth chiefly from air and water. (Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.)

Part B

Students who understand the concepts are able to:

• Describe a system in terms of its components and interactions.

• Develop a model to describe phenomena.

• Develop a model to describe the movement of matter among plants, animals, decomposers, and

the environment. (Assessment does not include molecular explanations.)

• Emphasis is on the idea that matter that is not food—such as air, water, decomposed materials in soil—is changed into matter that is food.

Examples of systems could include: Organisms, Ecosystems, Earth

Part C

Students who understand the concepts are able to:

• Describe how energy can be transferred in various ways and between objects.

• Use models to describe phenomena. • 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.

• Examples of models could include: Diagrams, Flowcharts

Assessment Options

-Mystery Science Assessment - Web of Life Assessments Tab

Mystery 1, Mystery 2, Mystery 3, Summative Assessment

-NGSS 5th Grade Science Notebook

Accommodations and Modifications

Group lab/experiment groups

Additional time for classwork

Additional time for assessments

Tests in small group

Use of videos and visual models

Preferential seating

Notes/outlines provided