

KNME K-5 LESSON PLAN
 APS @Home
 APS Curriculum and Instruction TLN
 Sandia Mountain Natural History Center

Title of Lesson: Abiotic Factors – Ecosystems change over time	Submitted by: Vince Case & Steven Henley
Content Area: Science, grades 4-5	
Materials Needed: paper and pencil	
Handouts Attached: None	
Standard Addressed: NGSS 5-LS2 Ecosystems: Interactions, Energy & Dynamics; 5-PS3-1 Energy; 5-ESS2-1 Earth’s Systems (see attached NGSS standards sheet for full information);	
Skill to be Maintained: Discovering how ecosystems change over time as a result of interactions with abiotic factors and natural forces in the environment	
Essential Question: How do ecosystems change over time?	
Academic Vocabulary/Word Wall words: adaptation, erosion, seasonal-cyclical changes, weather/climate, geologic time	
<p>Basic Lesson Description and Procedure:</p> <ol style="list-style-type: none"> 1. Students watch the video at the SMNHC. 2. Students review abiotic & biotic parts of the ecosystem. 3. Students understand how abiotic factors and natural forces impact and change ecosystems over time. 4. Students learn that these changes can happen quickly, over a very long period, and/or over and over again in cycles or seasonally. 5. Students discover how fire can quickly change ecosystems and learn about the fire adaptations of ponderosa pine trees. 6. Students learn about seasonal flooding in the Rio Grande bosque. 7. Students observe erosion in the Sandia Mountains. 8. Students begin to understand the difference between weather & climate. 9. Students observe rocks, think about how they are formed, and understand how fossils are formed. 10. Students learn how scientists know that ecosystems change over time through careful observations and data collection. 11. Students create an observation log and choose at least three different things to observe over time (e.g., daily weather, cloud cover, precipitation, a plant growing in their yard, etc.). 	
Observation activity: With permission of a grown-up, go outside, collect as many leaves as possible from trees, the ground, indoor plants, etc.	

Lesson Conclusion/Potential Practice at Home: Students share their leaf booklets and discoveries with family and others they live with.

Accommodations-Modifications: Just about any grade level can do this lesson and activity

Creating an Observation Log & Beginning to use it

Outdoor-Follow-up Activity

Directions:

1. Using a piece of paper (lined would be best), create 4 columns.
2. Label the first column "Time & Date".
3. Label the second column "Observation 1 – Weather"
4. Label the third column "Observation 2" & choose a second thing to observe.
5. Label the fourth column "Observation 3" & choose a third thing to observe.
6. Make observations daily for at least 10 days, preferably 2 weeks, and record your observations. See examples in video.
7. After you are finished making your observations, analyze your data by asking and answering the questions "what has changed over time in my three observations? What has stayed the same? How do I know?"
8. Write about your observations and your analysis using information from the data you collected in your observation log.

5-LS2 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 expectations above were 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.

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

Crosscutting Concepts

Systems and System Models

- A system can be described in terms of its components and their interactions. (5-LS2-1)

<ul style="list-style-type: none"> Develop a model to describe phenomena. (5-LS2-1) <p>Connections to the Nature of Science</p> <p>Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena</p> <ul style="list-style-type: none"> Science explanations describe the mechanisms for natural events. (5-LS2-1) 	<p>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)</p> <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 gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1) 	
<p>Connections to other DCIs in fifth grade: 5.ESS2.A (5-LS2-1); 5.PS1.A (5-LS2-1)</p>		
<p>Articulation of DCIs across grade-levels: 2.PS1.A (5-LS2-1); 2.LS4.D (5-LS2-1); 4.ESS2.E (5-LS2-1); MS.PS3.D (5-LS2-1); MS.LS1.C (5-LS2-1); MS.LS2.A (5-LS2-1); MS.LS2.B (5-LS2-1)</p>		
<p>Common Core State Standards Connections:</p> <p>ELA/Literacy -</p> <p>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. (5-LS2-1)</p> <p>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. (5-LS2-1)</p> <p>Mathematics -</p> <p>MP.2 Reason abstractly and quantitatively. (5-LS2-1)</p> <p>MP.4 Model with mathematics. (5-LS2-1)</p>		

Students who demonstrate understanding can:

5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun. [Clarification Statement: Examples of models could include diagrams, and flow charts.]

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 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Use models to describe phenomena.

Disciplinary Core Ideas

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)

Crosscutting Concepts

Energy and Matter

- Energy can be transferred in various ways and between objects.

Connections to other DCIs in fifth grade: N/A

Articulation of DCIs across grade-levels:

K.LS1.C ; 2.LS2.A ; 4.PS3.A ; 4.PS3.B ; 4.PS3.D ; MS.PS3.D ; MS.PS4.B ; MS.LS1.C ; MS.LS2.B

Common Core State Standards Connections:

ELA/Literacy -

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. (5-PS3-1)

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. (5-PS3-1)

Students who demonstrate understanding can:

5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]

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

<p>Science and Engineering Practices</p> <p>Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.</p> <ul style="list-style-type: none"> Develop a model using an example to describe a scientific principle. 	<p>Disciplinary Core Ideas</p> <p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> Earth’s major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth’s surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. 	<p>Crosscutting Concepts</p> <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>Connections to other DCIs in fifth grade: N/A</p>		
<p>Articulation of DCIs across grade-levels: 2.ESS2.A ; 3.ESS2.D ; 4.ESS2.A ; MS.ESS2.A ; MS.ESS2.C ; MS.ESS2.D</p>		
<p>Common Core State Standards Connections:</p> <p>ELA/Literacy -</p> <p>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. (5-ESS2-1)</p> <p>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. (5-ESS2-1)</p> <p>Mathematics -</p> <p>MP.2 Reason abstractly and quantitatively. (5-ESS2-1)</p> <p>MP.4 Model with mathematics. (5-ESS2-1)</p> <p>5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS2-1)</p>		