

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

<b>Title of Lesson: Decomposition &amp; Soil Structure (parts I and II)</b>	<b>Submitted by: Vince Case &amp; Steven Henley</b>
<b>Content Area: Science, grade 4 &amp; 5</b>	
<b>Materials Needed: Paper, pencil, ziplock bags, clear glass jars with lids, clear plastic containers with lids, rubber bands, plastic wrap or bags, digging implement, food scraps</b>	
<b>Handouts Attached: Observation log</b>	
<b>Standard Addressed: NGSS 5-LS2 Ecosystems: Interactions, Energy &amp; Dynamics (see attached NGSS standards sheet for full information); 5-PS3-1: Energy; 5-ESS2-1: Earth's Systems</b>	
<b>Skill to be Maintained: Making observations, considering what happens when things dies, asking scientific questions</b>	
<b>Essential Questions: What happens when things die in the ecosystem? How do decomposers function within the ecosystem?</b>	
<b>Academic Vocabulary/Word Wall words: Decomposition, matter, detritivores (&amp; vore), mycelium, scavengers</b>	

**Basic Lesson Description and Procedure:**

**Part I - Decomposers**

1. Students watch the video from the SMNHC.
2. Students review what we've learned so far in the first 6 videos – ecosystems, biotic & abiotic factors, parts of & interrelationships within ecosystems, scat, skulls, leaves, change over time.
3. Students determine what is missing through viewing images of different kinds of mushrooms & mold – fungi!
4. Students learn basics about fungi & bacteria as decomposers.
5. Students understand the difference between decomposers & consumers which break dead things into smaller pieces through fragmentation (detritivores & scavengers fragment dead material into smaller parts).
6. Students learn the definition of matter – the physical stuff that all things are made of.
7. Students visit a composting facility where they see decomposition speeded up.
8. Students recognize that decomposers return dead matter and the energy contained within it to the soil.
9. Students make observations of food scraps and learn how to record these observations in an observation log.
10. Students collect food scraps, seal them in plastic bags, and make observations over a 2-week period while recording in their observation log (see Activity #1 directions below).

**Part II – Soil Structure**

1. Students observe the basic structure of soil (organic matter, top soil, subsoil, parent rock & bedrock) and how soil is formed.
2. Students learn how to collect a soil sample in the video.
3. Students make observations as we play in the soil for a short time.
4. Students learn how to separate the layers of soil collected into the soil layers (organic matter, clay, silt, sand).
5. Students learn how to record results in their observations by describing the sample area collected and drawing and labelling what they will see in the soil structure activity.
6. Students participate in their own soil collection & layer activity (see activity 2 directions below).

**Rotting Food Scraps Activity #1:** Students collect food scraps, place them in a closed, see-through container or zip-lock bag, and make observations of what happens to the rotting material over a 2-week period of time.

**Soil Structure Activity #2:** Students collect a soil sample and learn how soil is composed of layers.

**Lesson Conclusion/Potential Practice at Home:** Students share their observations & drawings with their families and others they live with.

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



## 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\*](#):

<p><b>Science and Engineering Practices</b></p> <p><b>Developing and Using Models</b> 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.</p> <ul style="list-style-type: none"> <li>Develop a model to describe phenomena. (5-LS2-1)</li> </ul> <p><b>Connections to the Nature of Science</b></p> <p><b>Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena</b></p> <ul style="list-style-type: none"> <li>Science explanations describe the mechanisms for natural events. (5-LS2-1)</li> </ul>	<p><b>Disciplinary Core Ideas</b></p> <p><b>LS2.A: Interdependent Relationships in Ecosystems</b></p> <ul style="list-style-type: none"> <li>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)</li> </ul> <p><b>LS2.B: Cycles of Matter and Energy Transfer in Ecosystems</b></p> <ul style="list-style-type: none"> <li>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)</li> </ul>	<p><b>Crosscutting Concepts</b></p> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>A system can be described in terms of its components and their interactions. (5-LS2-1)</li> </ul>
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**Connections to other DCIs in fifth grade:**

5.ESS2.A (5-LS2-1); 5.PS1.A (5-LS2-1)

**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)

**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-LS2-1)

**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-LS2-1)

Mathematics -

**MP.2** Reason abstractly and quantitatively. (5-LS2-1)

**MP.4** Model with mathematics. (5-LS2-1)

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*:

**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.

- Develop a model using an example to describe a scientific principle.

**Disciplinary Core Ideas**

**ESS2.A: Earth Materials and Systems**

- 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.

**Crosscutting Concepts**

**Systems and System Models**

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

Connections to other DCIs in fifth grade: N/A

**Articulation of DCIs across grade-levels:**

**2.ESS2.A ; 3.ESS2.D ; 4.ESS2.A ; MS.ESS2.A ; MS.ESS2.C ; MS.ESS2.D**

**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-ESS2-1)
- 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-ESS2-1)

**Mathematics -**

- MP.2** Reason abstractly and quantitatively. (5-ESS2-1)
- MP.4** Model with mathematics. (5-ESS2-1)
- 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)