Science Learning Packet
Grade 5 Reader
Ecosystem Restoration: Walk in the Woods

Suggested science learning activities for SPS students during the COVID-19 school closure.

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1. Teachers should see that the pupil's name is clearly written in ink in the spaces above in every book issued.
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Walk in the Woods

by Kevin Beals and Gina Cervetti
When you go for a walk in the woods, what do you notice? Do you notice twisted oak trees, green ferns, or screeching jays? Asmeret Asefaw Berhe (AS-meh-ret AS-eh-faw BER-he) notices organisms like these when she walks in the woods, but she also observes something you might not ordinarily pay any attention to: soil.
Berhe is a soil scientist. She studies the different types of matter that make up soil. When Berhe walks in the woods, she looks everywhere for evidence of soil being formed. It might seem strange to think of soil forming, because soil might seem like something that just exists—something that was always there and always stays the same. However, Berhe knows that soil is a system—it’s made of lots of different interacting parts, and it changes all the time. We took a walk in the woods with Berhe to learn more.
As we started down the trail, Berhe picked up a handful of soil and felt its texture between her fingers. She told us the matter in soil comes from many different sources. Rocks break down and their matter becomes part of the soil. Soil matter also comes from dead organisms that decompose, breaking down into smaller and smaller pieces until they become part of the soil. Molecules from water and air mix with these other types of matter and become part of the soil, too.
Berhe explained that everything in the environment could become part of the soil—the rocks along the path, the leaves and wood of the trees, and even the animals could become soil someday.

When organisms decompose, they make rich soil containing lots of nutrients, which are important for plant growth. Nutrients help plants take molecules from air and water and make them into food and body matter.
During our walk, Berhe pointed out evidence of trees decomposing into soil.

This is a bay laurel, a type of tree that grows in forests and woodlands in California and Oregon.

This dead laurel tree fell down a few years ago, and now it is slowly becoming part of the soil.

If you look closely at the part of the tree that is resting on the soil, you can see that the wood is decomposing.

The matter in this soil is partly made up of dead trees that once stood tall in the forest.
Berhe showed us evidence of leaves decomposing into soil, too.

This is a California bay laurel leaf. This type of leaf has a strong smell, and people use it as a spice for cooking.

This leaf died and fell off the tree that it was once part of, then came to rest on the forest soil.

This is a leaf that died months ago.

These are leaves that have decomposed into soil. The nutrients that were in the leaves are now in the soil.
On the side of the path, she noticed the remains of a dead snake. Only the bones of the snake were left. The rest of the matter that made up its body had decomposed and become part of the soil. Eventually, the bones will break down and become part of the soil, too.

Berhe even found evidence of animals decomposing into soil.

This is a gopher snake. It’s not dangerous to humans, but it is dangerous to gophers!

These are the bones of a snake that died months ago.

On the side of the path, she noticed the remains of a dead snake. Only the bones of the snake were left. The rest of the matter that made up its body had decomposed and become part of the soil. Eventually, the bones will break down and become part of the soil, too.
In order to become part of the soil, dead plants and animals need to decompose. What makes them decompose? **Decomposers**, which are organisms that break dead things down into smaller and smaller pieces. Decomposers add nutrients and other matter to the soil. There are lots of different kinds of decomposers, including millipedes, slugs, sow bugs, fungi, and earthworms. Most decomposers are **bacteria** and other organisms that are too small to see without a microscope.
As we were walking with Berhe, she told us it was not good weather for finding decomposers, because it was too sunny! Decomposers like dark, damp environments. On sunny days, Berhe looks for decomposers under leaves and logs, which are good spots for decomposers to hide from the sunlight.
In spite of the sunny weather, Berhe found some decomposers almost right away. She picked up a rotten log and uncovered some millipedes. The name millipede means “a thousand feet,” but that is a bit of an exaggeration—millipedes can have hundreds of legs, but not quite a thousand. These small organisms eat the matter from dead plants and then leave droppings on the ground, adding nutrients and other matter to the soil.

Once we had observed the millipedes for a while, Berhe carefully put the log back the way she found it. She wanted it to stay damp and dark under the log so that the millipedes could keep living there.
Berhe looked under another log and found evidence of soil being formed right before our eyes—there was an earthworm with its droppings. Berhe told us earthworms live in the soil, eating dead things and leaving droppings. Earthworm droppings make more soil by adding nutrients and other matter to the soil.
Farther down the trail, Berhe showed us another kind of decomposer: a beautiful fungus living on a dead tree. This type of fungus uses the matter in dead wood as food. Not many organisms can use wood as food, but a fungus can! The fungus breaks wood down into soil.
Berhe explained that she couldn’t show us one of the biggest groups of decomposers in the woods—bacteria and other microscopic organisms. These decomposers are so small that you need a microscope to see them.

Bacteria are almost everywhere—in the soil, in the water, on animals and plants, and even on you. There are all different kinds of bacteria, but many of them are decomposers that break dead things down into soil.

This photo of bacteria was taken through a microscope. All of the bacteria in this picture could actually fit on the period at the end of this sentence, but the picture has been made much bigger so you can see the bacteria.
Berhe showed us one thing she doesn’t like to find on a walk in the woods—trash that people left behind. Trash takes a long time to decompose.

This is a paper bag that someone left in the woods.

This is the same bag after one month.

After one year, the bag has decomposed.

Some trash, like this glass bottle, will take many years to decompose.
Our walk with Berhe really made us think differently about the world around us. Everything that is living will die one day, and decomposers will break it down into soil. The soil is a complex system, and decomposers are constantly adding nutrients and other matter to the system.

Now you’ve seen how a soil scientist like Berhe looks at the woods—she sees soil and decomposers everywhere, and she wonders about the things she observes in the soil.
Berhe is always asking questions and **investigating** to find out the answers. If you ask questions, you are acting like a scientist. How can you find answers to your questions? Get your hands dirty and investigate!
Glossary

**bacteria:** tiny organisms that are too small to see without a microscope and can be found in the air, water, and soil, as well as inside other organisms

**decompose:** to break down into smaller and smaller parts

**decomposer:** an organism that breaks down droppings or dead organisms

**environment:** all the living and nonliving things in an area

**evidence:** information that supports an answer to a question

**explain:** to describe how something works or why something happens

**interact:** to affect one another

**investigate:** to try to learn more about something

**matter:** the stuff that things are made of

**molecule:** a group of atoms joined together in a particular way

**nutrient:** something taken in by plants and animals that helps them grow

**observe:** to use any of the five senses to learn more about something

**organism:** a living thing, such as a plant or an animal

**soil:** a mixture of rocks, water, air, parts of dead organisms, and tiny living organisms

**system:** a group of parts that work together
Books for *Ecosystem Restoration*

Matter Makes It All Up
Energy Makes It All Go
Why Do Scientists Argue?
Walk in the Woods
Restoration Case Studies

**Lawrence Hall of Science:**
**Program Directors:** Jacqueline Barber and P. David Pearson
**Curriculum Director, Grades K–1:** Alison K. Billman
**Curriculum Director, Grades 2–5:** Jennifer Tilson

**Lead Book Developers:** Ashley Chase and Chloë Delafield

**Ecosystem Restoration Book Development Team:**
Meghan Comstock Ari Krakowski
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Take a walk in the woods with a real soil scientist!

When scientists take a walk, they notice lots of things about the ecosystem that other people might not see. Asmeret Asefaw Berhe is a soil scientist. When she takes a walk, she finds small organisms living in the soil. She discovers what kinds of matter the soil is made from, including fallen trees, bits of rock, and even dead snakes. Take a walk with Berhe in this book all about how soil is made.

Special thanks to Dr. Asmeret Asefaw Berhe, a scientist from Eritrea, a country in eastern Africa. She is an Associate Professor of terrestrial biogeochemistry at the University of California, Merced. Professor Berhe studies how the soil system regulates Earth’s climate.