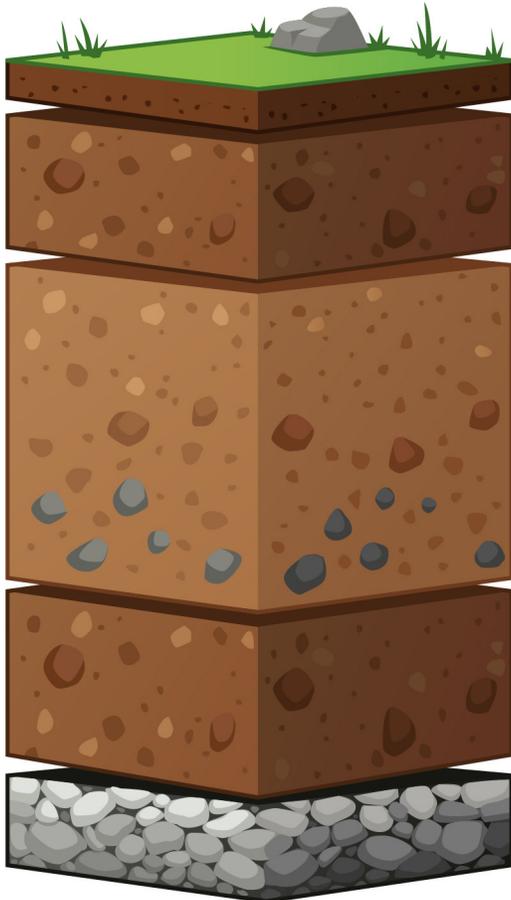




**Level 4**  
**Grades 6-8**

## Intro Story

Do you know what a natural resource is? Some things may come to mind like water, trees, fossil fuels and air. But there's another natural resource that we don't often think about - it's soil! Soil is the upper layer of the Earth, where plants grow and where billions of organisms are found. Farmers and ranchers depend on healthy soil to grow crops and raise livestock so we can lead healthy lives. Soil scientists study the soil to understand more about its characteristics, how soil stores nutrients, and more. Read on to learn more about how we are all connected to the soil.



## Did You Know?

Soils may seem sterile but they are actually teeming with life! A teaspoon of soil can actually contain more microorganisms than there are people on Earth.

Fertile soil is important to food production and life on Earth, but this resource can take a long time to form. It can take up to 1,000 years for a half-inch of topsoil to form.

Soil has three main particles: silt, sand and clay. Each has its own unique characteristics and these particles can combine in different ways to form different types of soils. A gram of coarse sand can contain about 1,000 particles, but a gram of clay contains about 90 billion particles!

Soil that contains equal parts of sand, silt and clay is called loam.

Soils have structure! A handful of healthy soil will remain intact, even when placed in water. This is called a slake test and farmers or soil scientists may use this technique to learn more about the health of soil.

Every place has a unique type of soil. In your state there may be multiple soil types!

## Keep on Discovering!

What is something that you'd like to learn about soils? Jot down your question here.

## Meet a Soil Health Champion!

Meet Kirsten Holland Robertson! On the Pecan Dale Farmstead in Pelzer, South Carolina, Kristen and her husband Jonn farm sheep for meat, goats for milk and chickens for eggs. Their farmstead includes a pecan orchard and 300 native fruit and nut trees.

Since incorporating soil health practices into their operation, Robertson says the biggest change she has experienced is that farming has now become a joy. She had become so frustrated with the endless mud, deworming activities, filthy animals and barnyard smells that she was about ready to sell the farm. Now, the Robertsons use practices like planting cover crops, adding perennials to increase soil fungi, and pollinator plots under their pecan trees.

“Moving the animals is the best part of the day for me now,” Robertson said. The mud is completely gone, they no longer have to deworm, and the wildlife on the farm has expanded unbelievably because of their new soil health management system. Through this journey, Robertson has made hundreds of new friends and has found the journey to healthy soil to be, what she considers, the most fulfilling challenge she’s ever accepted.



## Soil Science - Dig in to this STEM Career!

Do you like science? What about being outside and exploring the environment? Becoming a soil scientist might be the career for you! Soil science is the study of soils as a natural resource. This includes understanding soil formation, classification, and mapping; learning about the unique properties of soil including their physical, chemical and biological properties and how fertile they are; and understanding how soil can be managed based on these characteristics.

There are a variety of careers in soil science and many of them intersect with agriculture. Soil scientists may work for a university, state and federal agencies, or in the private sector. People who become soil scientists usually have at least a bachelor degree in Soil Science or Environmental Soil Science.

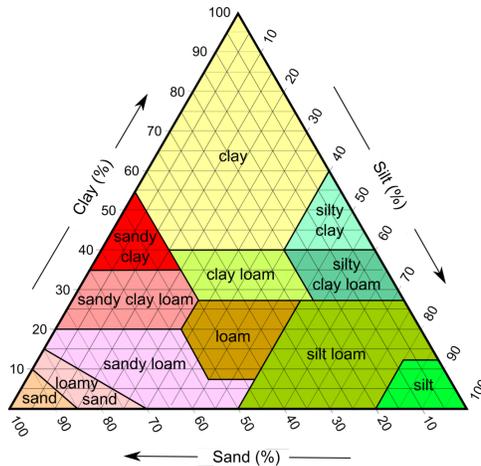
You might be interested in becoming a soil scientist if you:

- Have a passion for science and STEM
- Like to communicate what you know to help people make sound decisions about the environment
- Enjoy solving problems and designing solutions related to agriculture and the environment
- Like spending time in and working outdoors
- Have curiosity about ecosystems and how humans interact with the land

# Soil Sleuths

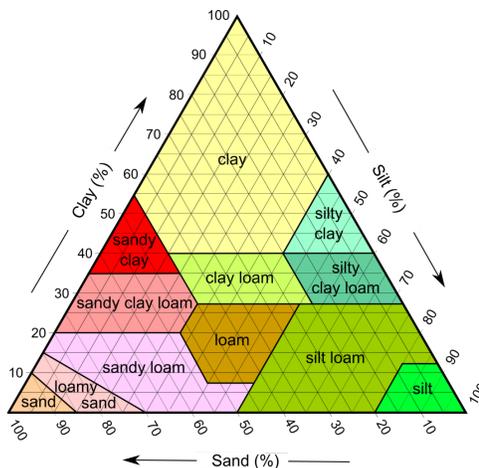
Soils are a natural resource and form a unique ecosystem. Soil consists of sand, silt and clay and the different amounts of these soil particles form different soil types. But how can we figure out the type of soil that's around us?

We can determine the type of soil by measuring the different amount of each particle present. Soil scientists and farmers may use a tool called a soil texture triangle to identify a soil type. The soil texture triangle looks like this:



There are 12 different soil categories, including clay, sandy clay, silty clay, sandy clay loam, clay loam, silty clay loam, sand, loamy sand, sandy loam, medium loam, silt and silty loam. Which one do you think can support the most life, or grow the most crops?

To determine the soil type, you can measure the percentage of each particle and use the soil texture triangle to figure out how it's classified. Let's say you have a sample with 60% sand, 30% clay and 10% silt. Starting with sand, find the 70 on the bottom of the triangle. You can draw a line here:



Then, find the percentage of clay. Draw another line at 20, for the 20% clay found in this sample.

Where the lines intersect, this will indicate the percent silt. In this case, it's 10%. This intersection also indicates the soil type. Here, the soil sample is sandy clay loam.

You can practice being a soil sleuth! Below is information for a few different samples and a table of soil texture properties. Use the numbers to determine the type of soil texture and figure out what makes it unique. Do you think you can grow crops in this type of soil?

Sample	% Sand	% Silt	% Clay	Texture Name	Properties	Could I grow crops or plants in this soil? Why?
A	75	10	25			
B	10	80	10			
C	40	30	30			
D	20	60	20			
E	45	45	10			

Soil Texture	Can Hold Nutrients	Water Can Filter Through	Water Retention	Soil Contains Air	Soil is Easy to Work
Clay	Good	Poor	Good	Poor	Poor
Silt	Medium	Medium	Medium	Medium	Medium
Sand	Poor	Good	Poor	Good	Good
Loam	Medium	Medium	Medium	Medium	Medium

# Soil is a Natural Resource

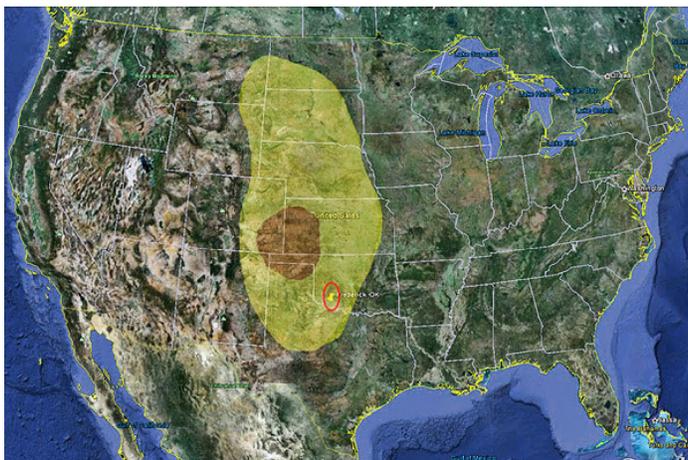
*Farmers depend on healthy soils.*

Our food supply depends upon our ecosystems, and every ecosystem has a carrying capacity. Some of the components of an ecosystem that affect the organisms living within it are the amount of living space, the supply of nutrients, the absence or presence of predators and the number of competing organisms. Farmers can modify an ecosystem with fertilizers and pesticides to increase the carrying capacity for crops (like corn or oranges) and decrease the carrying capacity for competing organisms (like weeds or beetles.) What does this mean for us? More food is available because of an increase in crop yields!

How can we keep soils healthy?

There are a number of things that farmers, and even people like you, can do to keep soils healthy. See if you can unscramble these words and match them to their definition.

RUNEITNS	Managing nitrogen and phosphorous is important for soil health. This can be done by adding fertilizer or organic material.
TARTEO	Moving crops around can improve crop health and reduce excess nutrients.
BIAHATT	Providing places for beneficial organisms to live can reduce pests and create a healthier ecosystem.
STIPCDIEES	Mitigating this can keep soils in place so they don't erode.
OVREC	Reducing this can keep soils aerated, providing more space for water filtration and drainage.
GRAINCO TAMRET	Using these sparingly or only when necessary can help beneficial insects thrive.
PCAMCTOINO	Planting these types of crops can help prevent erosion.
SRBCAENUTIDS	Adding this material can be important to crop health. Crops can produce this, or it can be added.



In the 1930's, sections of the Great Plains, including Colorado, Kansas, Texas, Oklahoma and New Mexico became what was called the Dust Bowl. These areas were used to raise livestock but were then plowed to grow wheat. After years of over cultivation and poor management, followed by a drought, the soils became unhealthy and dry. This soil, unprotected by cover crops, was blown by spring winds, creating dust storms. Some of these storms blew across the country! In addition to creating poor conditions and impacting crop production, many families were displaced. We can look back at this time in history to understand why managing our soils and farmlands is so important to creating a healthy life for all people and organisms.