



PROJECT TITLE: Soil Health Explorers		GRADE LEVEL: 3-5
DRIVING QUESTION: How can we improve soil biodiversity and overall soil health?		
STANDARDS:		
<p>S3E1. Obtain, evaluate, and communicate information about the physical attributes of rocks and soils.</p> <p>S3L2. Obtain, evaluate, and communicate information about the effects of pollution (air, land, and water) and humans on the environment.</p> <p>S4L1. Obtain, evaluate, and communicate information about the roles of organisms and the flow of energy within an ecosystem.</p> <p>S5L4. Obtain, evaluate, and communicate information about how microorganisms benefit or harm larger organisms.</p>	<p>MGSE3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).</p> <p>MGSE4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.</p> <p>MGSE.5.MD.5 b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.</p>	
GUIDING BACKGROUND KNOWLEDGE:		
<p>Soil is made up of living and nonliving matter and is full of nutrients. Plants take up these nutrients from the soil through their roots and use them to grow. Farmers must be careful with how they use and maintain soil, otherwise their plants will remove nutrients from the soil and then those nutrients are not replaced. Soil health is vital to the health of the plants and other organisms that make our life possible.</p> <ul style="list-style-type: none"> • What is soil biodiversity? Soil microorganisms, soil ecosystems • How do we measure soil biodiversity and what does it indicate about soil health? Presence of macro and microorganisms, physical composition of soil, moisture of soil • How else do we measure soil health? What are examples of soil health indicators? By looking at soil health indicators-- Soil moisture level, pH, amount of organic matter, presence of soil organisms (micro and macro), balance of minerals (nitrogen, phosphorus, potassium, lime, calcium) 		
VIDEO SUGGESTIONS:	BOOK & ARTICLE SUGGESTIONS:	COMMUNITY PARTNER SUGGESTIONS:
<p>Where Does Soil Come From?</p> <p>Layers Of Soil - The Dr. Binocs Show</p> <p>What's the Dirt on ... Dirt?</p> <p>BrainPop Jr Soil</p> <p>Who Needs Dirt?</p>	<p>Dirt: The Scoop on Soil</p> <p>Dirt</p> <p>Wonderful Worms</p> <p>Compost Stew</p> <p>Soil</p> <p>Seed Soil Sun</p> <p>Article: Soil Biodiversity</p> <p>Articles: Soil Health Assessment</p>	<p>Local Farmers</p> <p>Local Farm Bureau</p> <p>Local 4-H Extension Agent</p> <p>Submit a question to an expert. (Only available from March-May 2021)</p>
AGRICULTURE CAREER CONNECTIONS:		RESOURCES:
<p>Farmer</p> <p>Research Technician</p> <p>Soil Scientist</p> <p>Environmental Scientist</p> <p>Plant Scientist</p> <p>Civil Engineer</p> <p>Agriculture Manager</p>	<p>Horticulturalist</p> <p>Extension Agent</p> <p>Ecologist</p> <p>Agronomist</p> <p>Soil Hydrologist</p> <p>Soil Conservationist</p> <p>Landscaping Businesses</p>	<p><i>(These are optional, but will make the project more impactful.)</i></p> <p>Small handheld shovel</p> <p>Bucket</p> <p>Soil test strips or soil test bag from your county Extension office</p> <p>Magnifying glass or microscope</p> <p>Soil moisture probe</p>

LESSON PROCEDURES:

ENGAGE:

Students will begin the challenge by exploring what they currently know about soil. What is soil? What is soil made of? Why is soil important? Teachers should facilitate discussion with the students and rely on outside resources. Teachers are encouraged to use our Ask an Expert option to really connect and engage with a soil expert.

EXPLORE:

Students will be asked to examine a plot of land where they would like to study the soil. For example: this could be their current school garden or it could be a place to plan for and place a school garden in the future. The location is not limiting- any soil location of interest will work. Students will be directed to perform an analysis of the current soil health. Some questions to ask include: What is the current makeup of the soil? Is it rocky, moist, or hard? Describe the soil in detail and the living and nonliving parts that are present.

MATH CONNECTIONS:

3rd grade- students can determine the area of their plot of land by counting unit squares.

4th grade- students can apply their knowledge of area and perimeter to find the measurements for their plot of land.

5th grade- students can use their knowledge of volume to determine the amount of soil that can be collected using various rectangular prisms.

TEST AND IMPROVE:

Students will be asked to perform a series of tests on the soil to determine the current soil health status. It is up to the teacher to determine how they plan to assess the soil but they will use the Guiding Background Knowledge document from the Georgia Agricultural Experience website to do so. Local soil experts can also steer the analysis process and provide helpful information. Recommendations will be made to get the soil professionally tested by submitting soil samples to the [UGA Extension Soil Laboratory](#), which can take about a week to receive results back. Teachers may choose to perform their own soil tests with soil moisture probes, pH test strips, and N, P, K test strips that can be purchased for a reasonable price online. Either way- soil test results will need to be included in their final report. Students can also use magnifying glasses and/or microscopes to observe if any microorganisms are in the soil.

SHARE RESULTS:

After the initial report, the students will get creative about how to improve their soil and will relate their improvements to a real-world impact for their plot of land (i.e. to be used for a school garden, etc). Students will create a presentation on action items to improve the soil and how they will address their current soil status to make it healthier and more viable. They will also detail the future of that site now that the soil is ready to sustain life. It will be great if they actually make the soil improvements although this will not be required. This could be a school veggie garden, a butterfly/flower garden, an herb garden, a fruit tree orchard and more! Presentations can include video presentations, student voices projects and more- feel free to be creative! If you submit a recorded presentation, please ensure it is 5 minutes or less.

REFLECTIONS:

Students will reflect on the following questions.

- What have I learned about soil health and how we can impact the health of our soil around us?
- How can I see improvement to our soil?
- What else can be done to improve our soil and help the plants that grow in that soil?

SUBMISSION GUIDELINES: Upload your submission [here](#) before May 14, 2021: <https://georgiafarmbureau.regfox.com/submitstem>

STUDENT PRESENTATION:

- Must include video presentation of how students plan to improve soil health and real world impacts of those improvements.
- Must include demonstrated knowledge of soil health indicators and factors that contribute to increased biodiversity of the soil.
- Must discuss the role of living and nonliving aspects of soil and how they work together to create a soil ecosystem.

RULES:

- The video should not be longer than 5 minutes.
- One video submission per class.
- Submissions are due any time before May 14.