

Time To Talk: We Are Running Out Of Soil!

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Grade Level	8
Duration	3 class periods

National Standards	AZ Standards	Arizona Social Science Standards
GEOGRAPHY Element Five: Environment and Society 14: How human actions modify the physical environment. 15: How physical systems affect human systems. 16: The changes that occur in the meaning, use, distribution, and importance of resources. NEXT GENERATION SCIENCE Human Impacts on Earth Systems MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. <ul style="list-style-type: none"> Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. 	SCIENCE Life Science 8.E1U4.8 Construct and support an argument about how human consumption of limited resources impacts the geosphere. ELA Writing Text Types and Purposes 8.W.1 Write arguments to support claims with clear reasons and relevant evidence. b. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.	GEOGRAPHY The use of geographic representations and tools helps individuals understand their world. 8.G1.1 Use geographic tools and representations to analyze historical and modern political and economic issues and events. Human-environment interactions are essential aspects of human life in all societies. 8.G2.1 Examine impact of and responses to environmental issues such as air, water, and land pollution, deforestation, urban sprawl, and changes to climate. Global Interconnections and spatial patterns are a necessary part of geographic reasoning. 8.G4.1 Take an active stance on a geographic issue reflecting its scale (local, regional, state, national, or global)

SIOP Elements		
Preparation Adapting content Linking to background Linking to past learning Strategies used	Scaffolding Modeling Guided practice Independent practice Comprehensible input	Grouping Option Whole class Small groups Partners Independent
Integrating Processes Reading Writing Speaking Listening	Application Hands on Meaningful Linked to objectives Promotes engagement	Assessment Individual Group Written Oral

Arizona English Language Proficiency Standards

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Stage IV

Basic

Writing

Standard 1: The student will express his or her thinking and ideas in a variety of writing genres. Writing Applications - The student will express his or her thinking and ideas by using a variety of writing genres, as demonstrated by:

B-7: writing friendly letters, messages, invitations, and thank-you notes that address the audience, stated purpose and context, and addressing an envelope.

Listening and Speaking

Standard 1: The student will listen actively to the ideas of others in order to acquire new knowledge.

Comprehension of Oral Communications - The student will demonstrate understanding of oral communications by:

B-8: responding to questions and statements in an academic discussion by using key vocabulary in complete sentences.

Overview

Can you picture a world without soil? Where would the crops grow? What kind of landscaping would we have without trees, plants, and grass? Would our whole world be concrete and gravel? Students need to understand that soil is one of our most valuable natural resources in order to ensure that our planet saves itself.

Purpose

In this lesson students will learn the concept of soil degradation, how human activities contribute to the phenomenon, and how such phenomenon impacts human lives. Students will complete various activities such as watching a video, studying a map, analyzing data presented in a graph, creating a poster, and writing a letter to develop a good understanding of the causes and impacts of soil degradation. This lesson contains adaptations for diverse learners (ELs).

Key Vocabulary

soil: the upper layer of earth in which plants grow

soil degradation: the decline in soil condition caused by its improper use or poor management

overgrazing: a situation in which there are too many cows or other animals eating grass in an area

forced migration: when people are made to leave their own place or home

fertile soil: earth that has the ability to grow many plants

Materials

- Video Notes and Assignments and Answer Key
- Chart paper

- Science journals
- Colored markers
- Pots of soil—each pot with a different kind of soil
- Copies of America is Running Out of Soil by Mark Hansen
- Scoring Guide for Poster
- Map Worksheet and Answer Key
- Graph Worksheet and Answer Key
- Writing Prompt Checklist and Persuasive Letter Rubric
- Quiz—Soil Degradation and Answer Key
- Vocabulary Cards and Vocabulary Test

Objectives

Students will be able to:

- Explain the nature of soil.
- Read a map to gain information.
- Analyze the impacts of human activities by reading a graph.
- Orally discuss the meaning of soil and its importance to daily life.
- Write a persuasive letter.

Procedures

SESSION ONE

Prior to the Lesson: Place the magazine article and a container of soil on several desks in the classroom.

Engage

1. Ask students to look at the pot of soil placed on the tables. Ask these questions:
 - What do you see at the center of your table? (pot with dirt/soil) Introduce the vocabulary word: soil.
 - What is the “stuff” inside the pot made of? (dirt/soil)

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- What is the headline of the magazine article on your desk? (America is Running Out of Soil)
 - Do you think that America is running out of soil? Think, pair, share. (**Application: Promotes engagement**)
2. To start exploring this idea, let's watch several videos. Our first one is "[What is Soil?](https://www.youtube.com/watch?v=I6HGPoQ3dZY&feature=youtu.be)" (<https://www.youtube.com/watch?v=I6HGPoQ3dZY&feature=youtu.be> (2.17 minutes). As the video is playing, you should write down the various reasons why soil is important to humans. (Possible answers are for food production, large source of biomass, stores carbon, filters water, prevents flooding, provides building materials and it is the land on which to build.)
3. In their science journals, have students answer this question: "Which of these reasons (why soil is important) has the most impact on you?" Give the students this sentence frame: The use of soil that has the most impact on me is _____ because... (**Preparation: Linking to Background, Scaffolding: Comprehensible input**)
4. Have students share their thoughts with the class in this fashion. One student will share his/her answer using the sentence frame provided and three to five students will comment or react to this idea using one of the following sentence frames:
- I agree with _____ and would like to add...
 - I hear what _____ is saying, however for me...
 - A question I have for the group is...
- (**Integrated Processes: Speaking, Listening**)

Explore

5. Tell the students that they will now investigate the components of soil by looking at the pots of different kinds of soil that have been placed on the tables. Give each group a magnifying glass, a tablespoon, and tweezers. Ask students to pass the samples of soil and scoop a tablespoon of each soil sample onto a piece of paper towel.
6. Direct students to use a magnifying glass and tweezers to closely observe each soil sample. Remind students to focus observations on the composition of the soil itself. What does it feel like, look like, and smell like? What materials are in the soil? (**Application: Promotes engagement, Hands on, Scaffolding: Comprehensible input**)
7. Ask students to record their observations in their science journal.
8. Discuss results of the activity
- Compare the colors of the three soil samples.

- Why is it important to take note of the soil color?
- Which soil sample appears to be or feels moist?
- What does moisture tell about the soil?
- What particles did you see in each soil sample?
- What organic materials did you find in the soil samples? Which sample contains the most organic materials?
- What inorganic materials did you find in the soil samples? (**Integrating Processes: Writing, Speaking**)
- Project the Content of Soil Graph
<https://www.earthsoils.com/soil-composition/>

SESSION TWO

Explain

1. Introduce the new vocabulary by projecting the Vocabulary Cards for fertile, soil degradation, forced migration, and overgrazing.
2. Present the following definitions of soil.
 - Soil is FOOD.
 - Soil is LIFE.
 - Soil is PROTECTION.
 - Soil is HOME.

Ask the students which of these definitions is most relevant? Why? Tell them to write their answer in their science journal. The sentence starter should be: *Among the definitions of soil presented, the most relevant is, "Soil is _____ because..."* Have students share their thoughts with a shoulder partner.

(**Preparation: Linking to Background, Application: Meaningful**)

3. Now show the second video, The Value of Soil. <https://www.youtube.com/watch?v=403sT9CGRI0> (4.45 minutes) Tell students to write down on their worksheet the answers to: a) What are three ways soil is being used around the world? (grazing animals, making biofuels, and over farming); b) What are 4 causes of soil degradation? (over used farmland, bad land management, cutting down trees, too much salt, fertilizers, soil erosion, climate change, over grazing); c) How long does it take to make 10 centimeters of new soil? (2000 years); and d) What are 3 ways soil degradation can affect humans in what ways? (health issues, forced migration, loss of income, famine, conflict) (**Integrated processes: Listening, Writing, Assessment: Individual**)
4. Divide students into small groups and give each group markers and a piece of chart paper. Tell the students to create a poster that shows 4 causes for soil degradation and 3 ways that soil

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degradation impacts human lives. Each student will be given a specific color of marker to use and all colors must be on the poster. **(Application: Promotes Engagement, Assessment: Group, Grouping Option: Small Groups)**

5. Distribute the Map Worksheet. Facilitate a whole group discussion answering the questions about the map. **(Grouping Option: Whole Class, Integrating Processes: Speaking, Writing and Listening)**
6. Distribute the Graph Worksheet. Have students work in small groups to complete the worksheet. **(Grouping Option: Small group, Integrating Processes: Speaking, Writing and Listening)**

SESSION THREE

Elaborate

1. Divide the students into five different groups representing letter recipients.
 - Farmers
 - Food companies/Manufacturers
 - Legislators
 - Parents
 - YouthGive each group a table tent with the recipient written on it.
2. Distribute the Writing Prompt. Explain the assignment and how it will be graded with the Persuasive Letter Rubric.
3. Then initiate a brainstorming session to prepare the students for the writing assignment.
 - Give each group chart paper and marker.
 - Have the group write the letter recipients' name on the top of the paper. (farmers, food companies / manufacturers, legislators, parents, youth)
 - Allow time for the whole group to brainstorm the following ideas. **(Grouping Option: Small Groups, Scaffolding: Comprehensible input, Guided practice)**
 - What is the purpose for writing this persuasive letter?
 - What are the required the vocabulary words?
 - What are 4 ways that human activities impact soil degradation?
 - What are 3 ways that soil degradation impact humans.
 - What are possible solutions (appropriate to the audience) to soil degradation.
4. Start the writing process by reviewing formal letter format and the Persuasive Letter Rubric so students understand how the letter will be graded. **(Scaffolding: Comprehensible input, Preparation: Linking to past learning)**

5. As students finish, allow them to exchange papers to peer edit and then create final products.

Assessment

ELA, Science, and Geography

Letters created by students will be evaluated using the Persuasive Letter Rubric which has numeric rating of 1 – 4 on six areas. Mastery will be considered a score of 19 points or higher.

Student will take the Vocabulary and QUIZ—Soil Degradation. Mastery will be considered a score of 80% or higher.

The poster can be graded using the Poster Scoring Guide. Mastery will be considered a score of 80% or higher.

Geography

Map and Graph Worksheets can be graded for completeness and correctness. Mastery will be considered a score of 80% or higher.

Extensions

- Science teachers may ask students to create an investigation of the soil quality in their local area.
- Students may create an information campaign to make people aware of how human activities contribute to soil degradation and the negative impacts of soil degradation.

Sources

Food and Soil,
<http://www.theglobaleducationproject.org/earth/food-and-soil.php>

Hansen, Matt. America is Running Out of Soil. The Week, 13 May 2015
<http://theweek.com/articles/554677/america-running-soil>

"What is Soil?"
<https://www.youtube.com/watch?v=l6HGPOQ3dZY&feature=youtu.be>

The Value of Soil.
<https://www.youtube.com/watch?v=403sT9CGRI0>

Content of Soil Graph
<https://www.earthsoils.com/soil-composition/>

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Persuasive Letter and Poster Rubric from
read.write.think

(http://www.readwritethink.org/files/resources/lesson_images/lesson875/PersuasiveLetterRubric.pdf)

Essays, UK. (November 2013). Cause And Effects Of Land Degradation Environmental Sciences Essay. Retrieved from
<https://www.ukessays.com/essays/environmental-sciences/cause-and-effects-of-land-degradation-environmental-sciences-essay.php?vref=1>