

Erosion: Don't Let the Soil Get Carried Away

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LESSON DETAILS

Subject Area(s): Earth Science

Focus Grade Level: 4th

Grade Level Range: 3rd- 5th

RESEARCH BACKGROUND

Erosion is a set of natural processes that transport the surface materials from one location to another location by natural agents such as wind, water, or glacial ice. Although it is a natural phenomenon responsible for creation and modification of landforms, it does bring some unique challenges for earth and its inhabitants. Soil erosion decreases soil fertility, which can negatively affect crop yields. It also sends soil-laden water downstream, which can create heavy layers of sediment that can lead to flooding. The fine soil (dust) particles transported in the air due to wind erosion are also a health hazard and cause Valley Fever and other respiratory diseases. To mitigate the issue, traditionally we have depended on methods such as growing trees and stabilizing soil with water. But depending on local conditions, these solutions may be neither sustainable nor economical. Therefore, in recent years, scientists are trying to improve the soil erosion resistance using geotechnical engineering techniques such as Carbonate precipitation and using Fungus to strengthen soil

LESSON SUMMARY

This lesson is part of a unit about Soil erosion. Students will explore different types of erosion and the factors that affect erosion (slope, particle size, wind speed etc.) We will discuss the issues arising out of soil erosion (soil fertility, air pollution, health hazards etc.) and some ways they are mitigated. In this lesson, Students will work in groups and demonstrate different ways to solve the problem by strengthening or compacting the soil using various solutions such as water, glue, flour solution, EICP. At the end, we will discuss the pros and cons of different solutions.

MATERIALS AND EQUIPMENT

Scales	Nasco soil erosion kit
Soil samples (at least 3 different types)	Trays
Cardboard boxes	Jack beans
Hair dryer	Cheesecloth
Pie dishes	Powdered milk
Dust masks	Pocket Penetrometer



ATTACHMENTS

PowerPoint

Quiz

Journal Notes

Additional Readings

Educational Standards

K-12 TEACHERS

NGSS: ESS2.A: Earth Materials and Systems: Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)

AZ State Standards :4. E1U2.10 Define problem(s) and design solution(s) to minimize the effects of natural hazards.

LEARNING OBJECTIVES

- SWBAT write a hypothesis that predicts which material will create the most resistance against erosion.

VOCABULARY

Erosion	the wearing away of the soil by water, ice, or wind
Mitigate	To reduce the harmful effects of
Physical properties	The qualities or features of a matter that can be observed without changing the identity of the substance (color, density, hardness etc.)
Soil crust	The top layer of soil at the ground surface, often firmer than the soil below.
Soil loss	The amount of soil that has been carried away by wind or water during the process of erosion
Fugitive soil	environmental air quality term for very small particles suspended in the air. It can also be known as a dust cloud.



Cementation

The process of binding together carbonates mineral matter in pores within sediments or sealing cracks in rocks.

Gravel

small, rounded stones in the soil

LESSON PROCEDURE

Provide an in-depth explanation of how the lesson will progress in the classroom, including step-by-step instructions so another teacher could implement the lesson as intended.

INTRODUCTION/MOTIVATION

Engage:

We have recently learned about soil erosion and how it forms or changes the landforms.

In this lesson we will explore how we can strengthen the soil and control soil erosion. Let's start with why we need to protect soil. Here is a video that gives us some insight.

<https://www.youtube.com/watch?v=ETRK0tUKMjA>

Explain:

Think pair share - How can we protect soil from eroding

[Soil Erosion powerpoint](#)

Explore

Students will be divided into teams and investigate the effect of different ways of controlling soil erosion - Teams are - Team water, Team vegetation, Team EICP, Team Cornstarch, Team Glue. Each team will evaluate the effectiveness of their solution by using hair dryer to simulate wind erosion and comparing it with controlled soil sample and measuring the soil loss

Elaborate

Whole class discussion- What are some of the other factors that make a solution a good or bad solution

At this point I am hoping to invite an expert from CBBG to come and present their research.

Snowball fight- Each student will write a pro and con about one of the solution and make it into a snowball. then everyone picks a snowball and reads it . Some students will share their thought or findings.



Evaluate

Let's discuss which are the best solutions and why - Writing activity

Quiz

LEARNING ACTIVITIES/STRATEGIES

Describe any learning activities and strategies you intend to use. Not all teachers know the same strategies by the same names, so describe how the activities and strategies work, or connect to a document that you will attach that has more description.

Science Journal

Guest Speaker

Hands-on Activities

Demonstration Video

CLOSURE

Help students bring it all together. Written toward the students.

ASSESSMENT

Provide a description of any assessments used to evaluate student outcomes aligned with the learning objectives.

FORMATIVE ASSESSMENT

Describe how you will check for understanding during the process of learning. Include detailed sample items and/or list the name of the actual assessment that you will be attaching.

SUMMATIVE ASSESSMENT

Describe the final check for understanding after learning is complete. Include detailed sample items and/or list the name of the actual assessment that you will be attaching.



CONTRIBUTORS

INDIVIDUALS

List the names of any person who participated in the development of this instructional unit (teachers, mentor, lab director, education staff, etc.).

REFERENCES

List citation information for any graphics or copyright material used in the development of this lesson.

SUPPORTING PROGRAM

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