

The Dust Bowl

Focus question	How might we minimize human impact on soil?
Learning target	Students see the effects of the Dust Bowl and determine how to avoid another event like it in the future.

MS-ESS3 Earth and Human Activity

Performance expectation MS-ESS3-1	Classroom connection: Students are introduced to The Dust Bowl as an historic event and begin an investigation of how humans have impacted soils to determine a way to avoid it happening again.
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Science and engineering practices

Constructing Explanations and Designing Solutions	Classroom connection: Throughout this unit students will be looking for best management practices for soil conservation.
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Disciplinary core ideas

ESS3.C: Human Impacts on Earth Systems	Classroom connection: More than 95% of the Earth's soils have been affected by human activities. In what ways can soils be protected, yet continue to be productive?
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Cross-cutting concepts

Cause and Effect	Classroom connection: Students will connect current practices with potential problems <i>and</i> as solutions to avoid another Dust Bowl.
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Background

Soil is made up of three different particle sizes in varying amounts: sand, silt, and clay. Clay are the smallest particles, yet they hold the most water and nutrients. Clay particles are charged particles and can hold onto the ions in nutrient compounds, allowing roots to easily absorb and use them. The disadvantage of clay soil is that it can become water-logged and when it dries, the soil surface may become hard as rock. Clay soils also may become easily compacted, since the spaces between the particles are so small. Water does not easily move through clay soils, so it is said to be less permeable than other soils.

Sand is the largest soil particle. Sandy soil does not hold nutrients or water. Generally, sandy soils do not have a lot of organic material nor many microbes. Without the organic material to feed on, there isn't much for microorganisms to eat. Sandy soils are the most permeable and porous, with large spaces between the particles.

Silt is another soil particle, between clay and sand in terms of size. Silty soils result from wind, water, ice, and snow carrying dust particles. River sediments are usually classified as silt. Silt is found everywhere and most soils are a combination of all three soil particles.

Other materials found in soil include organic matter (once-living material, commonly referred to as humus—not to be confused with hummus that you can eat!), along with nutrients (forms of nitrogen, phosphate, and potassium) and minerals (such as sulfur, calcium, boron, etc).

The objective of this lesson is to introduce students to the Dust Bowl and pose the question: How might we avoid another Dust Bowl-type of event?

Materials

- Video presentation History Brief: The Dust Bowl youtu.be/n-rBhbkvtm0
- Slide presentation The Dust Bowl
- Student observations

Teacher preparation

1. Watch the video at youtu.be/n-rBhbkvtm0
2. Watch the slide presentation to introduce weather factors that played a role
3. Listen to this podcast at pri.org/stories/2018-02-03/trees-helped-save-america-farms-during-dust-bowl-are-now-under-threat

Procedure

1. Begin with an overall presentation on the Dust Bowl event. Allow students to watch/listen to at least one additional presentation and discuss what they learned with members of their lab group.
2. Begin a Driving Question Board (DQB) with student questions from their handout and their research. Once questions are generated on sticky notes or a white board, have students work together to group the questions into categories to investigate. This may generate more questions.
3. Determine the direction of future study: soil types, soil structure, human impacts (agriculture, development), aspects of healthy soil, importance of soil, etc.

Differentiation

Other ways to connect with students with various needs:

- **Local community:** Students may investigate the soil types for their local community by visiting <https://websoilsurvey.nrcs.usda.gov/app/> .
- **Students with special needs (language/reading/auditory/visual):** Allow students to choose how they want to learn more about the Dust Bowl.
- **Extra support:** Check out Classzone.com for information about human impacts on soils. (classzone.com/science_book/mls_grade7_FL/248_252.pdf)
- **Extensions:** Students could be divided into groups to research the effects of different land uses on soil (Construction/Development, Mining, Farming).

Assessments

Rubric for assessment (for use at the end of unit)

Skill	Developing	Satisfactory	Exemplary
MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	Student designs a method to minimize human impact on soil with none or one scientific principle applied.	Student designs a method to minimize human impact on soil and applies two or more scientific principles.	Student designs a method to minimize human impact on soil, applies two or more scientific principles, and describes the costs and benefits of at least one method.