



The Dust Bowl and the Depression in the Dirty Thirties

Grade 5

Standards

SS-5H5; S-5E1
ESS3.C

Time

4.5 hours

Supplies

For the class

- Crock pot
- Veggies from garden or home
- Water or broth for soup
- Garden beds or in-ground garden
- Leaf blower
- Seeds or plants such as perennial grains, sunchoke, sunflower, red clover
- Gardening tools

For each student

- Paper bowl and spoon
- Balloon and very dry soil in garden (or flour)

Garden Connection

The class will adopt a soil conserving practice for the school garden based on what they learn.

STEM Connection

Students will engineer their own erosion solutions in order to combat dust bowl-like conditions.

Overview

Students will experience eye-witness accounts of the Dust Bowl, including bread lines and soup kitchens, and then create and eat their own “stone soup.” After researching the Dust Bowl, students will be able to identify three causes of the Dust Bowl and three solutions, including soil conservation techniques to test in the schoolyard. Students will engineer and demonstrate their recommended solutions to soil degradation and loss.

Essential Question

What were the causes of the Dust Bowl?

How did people living during that time adapt to the changing conditions?

How can we prevent soil loss in farming areas and future Dust Bowls?

Engaging Students

Students will watch and experience primary source accounts of the Dust Bowl era. Students will try a “stone soup” and then discuss what it would be like to live during the Dust Bowl era.

Exploration

Students will research the causes of the Dust Bowl and how to combat Dust Bowl conditions as if they were a farmer. Students use their research to design solution to soil loss problems.

Explanation

Students will draw on the results of class experiments to argue in favor of soil conservation or soil-repairing farming techniques.

Environmental Stewardship

As a class, students will select one or more practices to incorporate in the school garden, on an ongoing basis.

Evaluation

Assessment of student work will be based on Dust Bowl knowledge, project rationale, project completion, and understanding of why soil loss solutions worked or did not work.

Extension

Students will research the importance of aquifers, specifically the Ogallala Aquifer.

Standards

Georgia Performance Standards

Social Studies

SS-5H5 - The student will explain how the Great Depression and New Deal affected the lives of millions of Americans

- a. Discuss the Stock Market Crash of 1929, Herbert Hoover, Franklin Roosevelt, the Dust Bowl and soup kitchens.
- b. Analyze the main features of the New Deal; include the significance of the Civilian Conservation Corps, the Works Progress Administration, and the Tennessee Valley Authority.

Science

S- 5E1 - Students will identify surface features of the Earth caused by constructive and destructive processes.

- a. Identify surface features caused by constructive processes.
 - Deposition (Deltas, sand dunes, etc.)
- b. Identify and find examples of surface features caused by destructive processes.
 - Erosion (water—rivers and oceans, wind)
 - Weathering
 - Impact of organisms

Next Generation Science Standards

5-ESS3.C: Human Impacts on Earth Systems

Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

Teacher Background Information

Eye witness accounts of the Dust Bowl for teacher to show to class during Engage part of lesson

Dust Bowl photos from the Denver Post

<http://blogs.denverpost.com/captured/2012/11/19/dust-bowl/5794/>

Dust Bowl photos <http://www.pbs.org/kenburns/dustbowl/photos/>

Dust Bowl as Environmental Catastrophe video <http://www.pbs.org/kenburns/dustbowl/watch-videos/#2284399360>

The Plow that Broke the Plains documentary from 1936 <http://archive.org/details/gov.fdr.352.2a.1> (26 minutes)

Dust Bowl Living History Farm: first person interviews http://www.livinghistoryfarm.org/farminginthe30s/water_02.html

The Dust Bowl – slides <http://www.history.com/photos/the-dust-bowl#the-dust-bowl>

Stone Soup Stories (choose one to share with the class) and actual Dust Bowl-era Soup Kitchen pictures

Soup kitchens and bread lines <http://www.history.com/topics/great-depression/photos#soup-kitchens-and-bread-lines>

Stone Soup Story for World Food Day <http://home.wfp.org/stellent/groups/public/documents/webcontent/wfp202398.pdf>

Stone soup stories and Yeats play: <http://www.pitt.edu/~dash/type1548.html>

Stone Soup story retold: <http://www.vcnt3.org/images/StoneSoupStory.pdf>

Teacher Preparation

At least one day earlier than needed, ask each student to bring an ingredient to make Stone Soup in class OR allow students to harvest vegetables from the school garden for Stone Soup. Allow students to prepare vegetables for the soup early on the day the lesson is taught, so they can taste it by the end of school.

Acquire materials needed for the lesson and set aside empty garden space for the Dust Bowl Challenge. Review these resources and select those to share with the class using a smartboard or LCD projector. Make copies of both student handouts (back to back): Resources for Guided Research and The Dust Bowl Lab Report.

PROCEDURES FOR LESSON ACTIVITIES

Engagement (45 min – 1 hour)

Eye witness accounts of the Dust Bowl

Show students [images](#) and [film](#) as an [introduction](#) to the [Dust Bowl](#), using a smartboard or LCD projector and monitor. (See Resources section for links). Out in the school garden, have students blow up balloons and rub them against their heads to create static electricity, and then hold the balloons above an unplanted part of the garden with exposed dry soil to see how dirt can be picked up into the air by static electricity as it did during the giant dust storms. (This can also be done indoors using dry soil or flour).

Stone Soup

Show photos of Dust Bowl-era [soup kitchens and bread lines](#) and read the [Stone Soup](#) story to the class. After reading the story, ask each student to add their soup ingredient to a crock pot containing ½ - 1 cup of water or vegetable stock per person and allow it to cook on high for four to six hours (Use lower temperature and less time, if vegetables are diced and pre-cooked in microwave). At the end of the day, allow students to eat the soup and discuss what it would be like to be live through years of drought and dust storms, unable to grow vegetables or keep farm animals alive, back in a time when there were no grocery stores.

Providing Context for the Dust Bowl

While the soup is cooking, have students individually or collectively create a timeline of the early 20th century, to include expansions of the Homestead Act in 1904 and 1909 (which gave away land to farmers and drew settlers to the Great Plains, leading to the Great Plow-Up), World War 1 which lasted from 1914-1918, the prosperous Roaring '20s, the bumper wheat crops of 1930 (which caused the price per bushel to fall, and led farmers to increase the acreage they planted to try to make enough money to survive or to walk away from farming, leaving the soil exposed in empty fields), the Stock Market Crash of October, 1929, the Dust Bowl drought years of 1930-31, 1934, 1936, and 1939-40 (the “Dirty Thirties”), and World War 2 from 1939-1945. Check out a map of the Great Plains such as that shown in the opening scenes of [The Plow that Broke the Plains](#).

Share with the class some [oral histories](#) of the Dust Bowl and the Depression from web links in the Resources section. To cover all parts of the GA social studies standard, be sure to include an introduction to President [Herbert Hoover](#), the [Stock Market Crash of 1929](#), [President Franklin Roosevelt](#), the [Dust Bowl](#), and the [New Deal](#) including the [Civilian Conservation Corps](#), [Works Progress Administration](#), and [Tennessee Valley Authority](#).

Exploration (30 – 45 min)

Guided Research: The Dust Bowl

Provides students with computer access and internet connectivity, and have them go to the interactive web site: [What if You Had Lived in the Dust Bowl?](http://www.pbs.org/kenburns/dustbowl/interactive/) <http://www.pbs.org/kenburns/dustbowl/interactive/> The Dust Bowl area became a giant wasteland where few plants and animals could live, because all the organic top soil blew away in the storms. Provide the web links from the Resources list to students and encourage them to research the Dust Bowl, identifying three causes and three solutions, as well as a technique to use in the school garden.

Engineering (45 – 90 min for project + 2 – 3 weeks for roots to grow)

Soil Conservation Engineering Design Challenge

Bring the class back together to present and discuss their research findings. Keep a list of the causes and solutions they identify. Then have each team select one promising solution to demonstrate in the garden or schoolyard. Provide a timeframe for design and development of the projects (several weeks), assign and mark space in the garden or schoolyard for each team, and let students know that the ultimate test of their project will be whether it can withstand the effects of a simulated dust storm, brought on by a leaf blower.

The class’s list of solutions to the Dust Bowl soil loss problems may include the following:

- Plant cover crops between seasons, to keep soil from blowing away and to restore nutrients
- Practice no-till farming, where the previous crop is knocked down in place and used as mulch
- Grow / eat perennial, long-rooted grains instead of short-rooted annual grains that get pulled up yearly
- Practice horizontal contour plowing or terraced planting on hillsides, to avoid gullies and erosion
- Plant trees in shelter belts, to break up wind and protect crops
- Practice crop rotation (moving a crop to different field each year and allowing fields to remain fallow)
- Diversify by inter-cropping with nitrogen fixing plants such as legumes, to restore soils, limit pests
- Grow native crops that require less water than corn and wheat, such as sunflowers and sunchokes
- Plant trees and take vulnerable land out of farming, to recreate conservation reserves
- Restore native Great Plains grasses and create a Buffalo Commons in place of some farm land

Note that students may also uncover solutions to Dust Bowl problems such as changing national policy on farm subsidies, tariffs, drilling deep wells, etc., but for purposes of this Challenge, direct students to soil conservation practices that are testable with simulated wind.

On the appointed day of Challenge, have students present their projects and subject each one to the leaf blower to see how successful it is. Standardize the power level, distance and amount of time each project area is blown. Afterwards, have students debrief the activity by identifying which solutions seemed to work best. Ask students to take into account the short timeframe that was available for this project and consider whether some projects might have succeeded with a longer timeframe for root growth.

In wrapping up the challenge share with students that even after the Soil Conservation Service was created and farmers were taught techniques for saving soil (or land was taken out of farm production so it could recover), it took a long time for the topsoil to be replaced. That is because most of lower soil is created from loose, weathered bits of rock, but the top part of soil is made when organic (once living) matter on the ground such as fallen leaves, rotting logs, dead insects, and animal scat decomposes into rich organic topsoil over a period of many years. [One inch of topsoil can take 100 – 500 years](#) to form. Though there are some intrepid plants that grow in poor soils, most agricultural crops require nutrient-rich soils. Soil conservation techniques that farmers began to use after the Dust Bowl enabled them to survive a worse drought in the 1950's without dust storms.

Explanation

Students will draw on the results of class experiments to argue in favor of soil conservation or farming techniques that can reduce soil loss, replenish soil nutrients, and prevent a recurrence of Dust Bowl conditions or desertification in the future.

Environmental Stewardship (90+ min)

Based on soil conservation techniques learned in the Challenge activity, have the class select one or more practices to incorporate in the school garden, on an ongoing basis. In addition to the practices demonstrated in their Dust Bowl Challenge, students might also want to consider creating a demonstration [hugelkultur](#) garden bed in the school yard, or building a [compost pile](#) to nourish and replenish garden soils. Teams of students should determine how they will communicate the importance of the practice or project they have introduced in the school garden, and explain it to teachers and students at other grade levels.

Evaluation

Assessment of student work will be based on Dust Bowl knowledge, project rationale, project completion, and ability of team to articulate reasons for the Dust Bowl and to identify and argue about soil conservation techniques from evidence, not whether their demonstration project withstood the leaf blower. (Some of the most effective soil conservation techniques require more time for root growth, for instance.) Rubric provided.

Extension

Ogallala Aquifer

The Great Plains is located atop of the Ogallala Aquifer (as shown on [this map](#)). In an area where there are few rivers, irrigation with water from the aquifer has enabled farming to thrive in the Great Plains since the Dust Bowl era. This fragile and limited water resource is being depleted at a rate of 18 Colorado Rivers a year, and only replenished by rain at a rate of ½ inch per year. In addition, it may be at risk from leaking pipelines carrying oil and gas to refineries and ports. Students may want to research [conservation](#) of the [Ogallala](#) and [groundwater](#) in general, and try the engaging aquifer [modeling activities](#) and Awesome Aquifers [Science Olympiad](#) events created by the Groundwater Foundation. See links below.

Extension Research and Activities about Aquifers and the Ogallala

Groundwater Foundation activities for kids <http://www.groundwater.org/kids/>

Groundwater Foundation Science Olympiad event <http://www.groundwater.org/kids/getinvolved/so/>

Ogallala Aquifer <http://www.hpwd.com/aquifers/ogallala-aquifer>

The More Things Change the More they Stay the Same: Oglalla Aquifer

<http://www.pbs.org/kenburns/dustbowl/educators/whirlwind-activities/#plow>

Conserving the Oglalla Aquifer (Scientific American Earth 3.0) <http://lanbob.com/lanbob/H-Future/Ogallala.htm>

Literature Connections

The Worst Hard Time by Timothy Egan (non-fiction)

<http://www.hmhco.com/shop/books/the-worst-hard-time/9780618773473>

The Grapes of Wrath by John Steinbeck (fiction about Dust Bowl refugees)

Movie info for: *The Grapes of Wrath* <http://www.imdb.com/title/tt0032551/>

Tools for Creating Timelines

Xtimeline: Create online timelines: <http://www.xtimeline.com/index.aspx>

Dipity: Create timelines featuring Internet Memes: <http://www.dipity.com/>

Timetoast: Quick and simple online timelines: <http://www.timetoast.com/>

Capzles: Personal timelines displayed on social media: <http://www.capzles.com/>



Resources for The Dust Bowl Lab Report

Guided Student Research on the Dust Bowl, Its Causes and Solutions

The Depression and Dirty Thirties in General

Great Depression student-created weebly <http://autumnjena.weebly.com/index.html>
Great Depression Jeopardy Game (interactive) <https://jeopardylabs.com/play/great-depression86>
5 Causes of the Great Depression <http://americanhistory.about.com/od/greatdepression/tp/greatdepression.htm>
Hoover's vs Roosevelt's approach to the Depression <http://www.nytimes.com/learning/general/specials/elections/1932/index.html>
Herbert Hoover bio and role in photos <http://www.history.com/topics/great-depression/photos#herbert-hoover>
Franklin Roosevelt bio and role in photos <http://www.history.com/topics/franklin-d-roosevelt/photos>

The Great Plains before the Dust Bowl

Wildlife of the Great Plains <http://dsc.discovery.com/tv-shows/north-america/animals/wildlife-of-the-great-plains>
Soil microbe communities in undisturbed tallgrass prairies <http://www.hngn.com/articles/16402/20131101/microbes-could-help-restore-americas-once-abundant-tallgrass-prairies.htm>
Habitats and species of the Great Plains http://www.greatplainslcc.org/PDFs/GPLCC_fact_sheet.pdf

New Deal programs designed to help end the Dust Bowl Problems

New Deal programs in photos <http://www.history.com/photos/the-dust-bowl#new-deal-programs>
Federal Relief, Regulations and Reform <http://www-tc.pbs.org/kenburns/dustbowl/media/docs/dust-bowl-lesson-plan-a-new-deal.pdf>
WPA film http://www.youtube.com/watch?v=Aq5UiGdje8U&list=PLTxdrEEsMBVljSfnNQOSvqfYU_eZlc5V&index=4
TVA film <http://www.youtube.com/watch?v=eoge1KmeMy8>
CCC film: 3 billion trees planted and 800 parks built in 9 years: <http://www.youtube.com/watch?v=II9YcPahmUg>

Causes of the Dust Bowl

Dust Bowl Interactive: What if You Had Lived in the Dust Bowl? <http://www.pbs.org/kenburns/dustbowl/interactive/>
Interview with author: The Worst Hard Time http://www.houghtonmifflinbooks.com/readers_guides/egan_worst.shtml#conversation
10 Things to Know About the Dust Bowl <http://www.history.com/news/10-things-you-may-not-know-about-the-dust-bowl>
Causes of the Dust Bowl <http://www.u-s-history.com/pages/h1583.html>
Increase in wheat prices → overproduction of wheat → falling wheat prices → increased planting in desperation: <http://science.howstuffworks.com/environmental/green-science/dust-bowl-cause.htm>
Overview of soil conservation/replacing native perennial long-rooted plants with annual short-rooted grain crops http://newswatch.nationalgeographic.com/2010/06/17/perennial_grain_crops/
Scaling the Dust Bowl: research shows dust storms occurred during earlier droughts even without widespread plowing <http://downloads2.esri.com/ESRIpress/images/133/knowles.pdf>

Solutions to the Dust Bowl

Civilian Conservation Corps: planting trees and controlling erosion http://www.livinghistoryfarm.org/farminginthe30s/water_12.html
Agriculture Adjustment Act: limiting supply, taking land out of cultivation and paying farmers not to grow crops http://www.livinghistoryfarm.org/farminginthe30s/water_11.html
Farm Security Agency: loans to tenant farmers http://www.livinghistoryfarm.org/farminginthe30s/water_13.html
Soil Conservation Service: contour plowing and terraces http://www.livinghistoryfarm.org/farminginthe30s/crops_11.html
Additional Soil Conservation Techniques <http://www.infonet-biovision.org/default/ct/265/soilManagement>
No till farming (film and text) <http://curiosity.discovery.com/question/how-was-dust-bowl-stopped>
Permaculture <http://en.wikipedia.org/wiki/Permaculture>
The Land Institute / Buffalo Commons <http://www.landinstitute.org/vnews/display.v/ART/2010/04/09/4bbf6458773a8>
Perennial grains <http://ngm.nationalgeographic.com/2011/04/big-idea/perennial-grains-text>
Other soil nourishing ideas to consider for school projects:

- hugelkultur: <http://www.mnn.com/your-home/organic-farming-gardening/stories/hugelkultur-the-ultimate-raised-garden-bed>
- compost piles <http://www.organicgardening.com/learn-and-grow/how-build-compost-pile>

Lessons Learned from the Dust Bowl to Prevent Future Environmental Problems

Plants as Drought Detectors <http://www.climate.gov/news-features/featured-images/plants-drought-detectors-us-great-plains>
No Till Plowing and Crop Rotation Reduce Loss of Nutrients from Soil and Lessen Greenhouse Gases http://www.huffingtonpost.com/2011/01/05/study-notill-farming-reduces_n_804604.html
Drought mitigation lessons learned in the 1930s limited the impact of a larger drought in the 1950s <http://drought.unl.edu/DroughtBasics/DustBowl/TheDustBowlLegacy.aspx>



The Dust Bowl Lab Report

Researcher (s): _____

Sources Used

Causes of the Dust Bowl

1. _____
2. _____
3. _____

Solutions for the Dust Bowl

1. _____
2. _____
3. _____

A soil conservation technique that could prevent soil loss in the school garden and why it would work:



The Dust Bowl and the Depression in the Dirty '30s

Student Name(s): _____

Date: _____

<p style="text-align: center;">Level of Mastery</p> <p style="text-align: center;">↓</p> <p style="text-align: center;">→</p> <p style="text-align: center;">Benchmark or Performance Measure</p>	 <p style="text-align: center;">EMERGING Not yet proficient 1 point</p>	 <p style="text-align: center;">COMPETENT Partially proficient 4 points</p>	 <p style="text-align: center;">PROFICIENT Mastered task 5 points</p>	<p style="text-align: center;">TOTAL POINTS</p>
<p>Stone Soup</p>	<p>Student neither contributed an ingredient to the stone soup nor taste-tested it.</p>	<p>Student either contributed an ingredient to the stone soup or taste-tested it.</p>	<p>Student contributed an ingredient to the stone soup and taste-tested it.</p>	
<p>Research</p>	<p>Student did not use at least two sources for research; listed fewer than three causes of the Dust Bowl; listed fewer than three solutions; and did not identify a soil conserving technique that could be used in the school garden.</p>	<p>Student used two sources and identified at least two causes and two solutions for the Dust Bowl, and identified a soil conserving technique that could be used in the school garden.</p>	<p>Student used at least two sources for research; lab report lists three causes for and three solutions to the Dust Bowl; and student identified a technique that could be demonstrated in the school garden.</p>	
<p>Soil Conservation Engineering Challenge</p>	<p>Student (or team) attempted but did not complete a model or demonstration of a soil conserving technique, and was not able to articulate how soil loss, soil moisture or soil fertility could be retrained.</p>	<p>Student (or team) built a model or demonstrated effectiveness of a soil conserving technique, but did not effectively argue from evidence about how this approach limits soil loss, retains soil moisture, or improves soil fertility</p>	<p>Student (or team) built a model or demonstrated the effectiveness of a technique for conserving soil; and effectively argued from evidence about how this approach limits soil loss, retains soil moisture, or improves soil fertility.</p>	