

MASTER 3.8

DISRUPTING THE SOIL HORIZONS: THE DUST BOWL

NAME
DATE

THE DUST BOWL

During the late 1800s, an unusual amount of rain fell on the Great Plains. This led farmers and agricultural experts to overestimate how much rainfall the region could expect. This unusually wet period caused more people to settle in the area and begin farming. Starting at the beginning of the twentieth century, a large wave of European settlers came to the Great Plains to farm. As demand for wheat increased, farmers sought to increase their profits by cultivating more and more land. The United States government encouraged more farming in the Great Plains. Homesteaders in western Nebraska were granted 640 acres of land to farm. Farmers elsewhere in the Great Plains were granted 320 acres.

The Russian Revolution and World War I caused crop prices to rise. Farmers began to use mechanized farming to plow fields and harvest crops over an ever-expanding area. For example, in eastern New Mexico and northwestern Texas, the area of farmland doubled between 1900 and 1920. It tripled again between 1925 and 1930. Agricultural experts recommended that farmers use drought-resistant strains of wheat and practice so-called “deep plowing.” As the name suggests, in deep plowing the land is plowed to a greater depth than usual. It is designed to help the roots of grain crops use moisture in the topsoil more efficiently.

In the 1920s and early 1930s, most farmers plowed their fields right after the previous harvest. Deep plowing removed the native grasses that grew in the fields before the farmers began farming. This left the soil unprotected for months until the next planting. When the weather was wet, this method of farming worked well. However, in 1930 an extended drought began that caused crops to fail. The dry soil was plowed into fine particles that were easily blown away by the near-constant wind.

High winds carried massive amounts of topsoil eastward. Throughout the 1930s, the area including the Texas and Oklahoma panhandles plus parts of New Mexico, Colorado, and Kansas experienced a series of huge dust storms. Some of these storms blew dust all the way to Chicago and eventually Cleveland, Buffalo, Boston, and New York City. During the winter of 1934–1935, snow fell in New England that was red because of the dust it contained.

Such large dust storms could be deadly. People who were caught outside during a severe dust storm ran the risk of being suffocated by breathing in large amounts of dust. However, most of the damage to human health was caused by living in the presence of dust for extended periods. The dust found its way into the homes, clothing, and lungs of the people living in the affected areas. Many people suffered from what became known as “dust pneumonia.” Dust that settled in the lungs caused inflammation and produced symptoms such as fever, chest pain, difficulty breathing, and coughing. Young children and the elderly were especially vulnerable to dust pneumonia. It has been estimated that hundreds of people died from it.

Starting in 1930, the country began its decade-long economic struggle known as the Great Depression. This near economic collapse combined with the overproduction of wheat and severe drought hit farmers in the Great Plains like a perfect storm. Prices for wheat crashed. Many farmers could not pay their bills and had their mortgages foreclosed by the banks. Many people became homeless and left the area to look for work. Many farms were abandoned and the barren land was subject to erosion by high winds.

MASTER 3.9

FARMING PRACTICES

NAME
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FARMING PRACTICES

The cruel lesson of the Dust Bowl is that topsoil is a precious resource that must be protected. Some of the challenges associated with maintaining healthy soils include nutrient depletion, erosion, and water runoff. Different farming practices have been developed to address these challenges.

For each farming practice described below, write down which challenge(s) the practice is designed to address. Be sure to include an explanation of your reasoning.

CROP ROTATION

Long ago, farmers discovered that growing the same crop in the same field year after year led to unhealthy plants and decreased crop growth. To address this problem, farmers use crop rotation. They plant crops with different nutrient requirements one after the other in the same field. The aim is to strike a balance so that not all of the crops are depleting any given nutrient in the soil.

STRIP FARMING

This practice involves dividing the field into parallel, long, narrow strips. The strips are organized so that they are perpendicular to the prevailing winds. Every other strip is planted with seed while the strips in between are left unplanted.

CONTOUR FARMING

Contour farming involves plowing a field along its elevation lines. This means that the ruts formed by the plow run perpendicular to the slopes. The furrows form level curves around the field. This keeps rain from running rapidly downhill, causing erosion.

MASTER 3.10

DUST STUDY

NAME
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ARE SOIL HORIZONS STILL IN DANGER?

The amount of dust blown across the landscape has increased over the last 17 years in large swaths of the West, according to a study led by the University of Colorado, Boulder.

For the new study, the research team set out to determine if they could use calcium deposition as a proxy for dust measurements. Calcium can make its way into the atmosphere—before falling back to Earth along with precipitation—through a number of avenues, including coal-fired power plants, forest fires, ocean spray, and, key to this study, wind erosion of soils.

The amount of calcium dissolved in precipitation has long been measured by the National Atmospheric Deposition Program (NADP), which began recording the chemicals dissolved in precipitation in the late 1970s to better understand the phenomenon of acid rain.

Brahney and her colleagues reviewed calcium deposition data from 175 NADP sites across the United States between 1994 and 2010, and they found that calcium deposition had increased at 116 of them. The sites with the greatest increases were clustered in the Northwest, the Midwest, and the Intermountain West, with Colorado, Wyoming, and Utah seeing especially large increases.

Other areas of the world are more affected by dust movement than is the US. For example, satellite images have tracked large amounts of dust moving all the way from Africa to South America.

REFERENCES

Brahney, J, Ballantyne, A P., Sievers, C., and Neff, J. C. (2013). Increasing Ca²⁺ deposition in the western US: The role of mineral aerosols. *Aeolian Research*, 10, 77-87.

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