

Trouble in the Top Soil: Erosion as a Global Threat

Top soil is the outermost layer of soil, 2 inches to 8 inches, and is an important part of ecosystems on Earth. Comprised of rich nutrients and minerals, the topsoil is home to most of Earth's biological soil activity. While there are plenty of insects and microorganisms digging living within it, the most readily visible life it supports are plants, who concentrate their roots in this layer for the nutrients. Without plants, the community of animals that earth harbors would not exist as we know it.

Topsoil erosion has been an environmental and natural resources issue for many years, especially in the United States. The "Dust Bowl" catastrophe of the 1930's is a perfect example of how climate change and human activities can negatively affect the environment drastically. During the late 1800's the Great Plains experienced a period of unusually high precipitation. This created an inaccurate concept of how weather worked known as "Rain follows the Plow", where settlers assumed that by cultivating the land and settling it, they made the region productive, spurring more farmers out west. The appearance of cattle ranchers increased the size of the land that was cultivated, and overgrazing forced the ranchers to seek even more land. Mechanical advances in the early 1900's only helped to increase large-scale agriculture.

So what does the rapid increase of agriculture have to do with soil erosion? The answer lies in the farming methods used. Farmers were generally concerned with maximizing the amount of farmland available and used methods such as deep plowing, which eliminated any sort of natural vegetation within the area. Plants that kept the topsoil in place and store moisture were being removed on a massive scale. To complicate matters, farmers used "mono-cropping": the practice of only growing one crop. This method is problematic because different plants require different nutrients, and if farmers use the same plant over and over, essential nutrients are quickly depleted, making the soil less fertile. With "crop rotation" on the other hand, farmers use two or more crops that are dissimilar with each other, that way the nutrients that one crop uses up is replaced with the next crop. Crop rotation allows for farming during multiple seasons. The mono-cropping method used by the farmers before the dust bowl left the fields bare during winter, so high winds easily blew the topsoil away.

What compounded the Dustbowl was a severe drought and unusually high winds, thus with no crops growing and high winds, topsoil was eroded away and ultimately there was no way to grow anything in the region causing an environmental and agricultural crisis.

The dust bowl happened 70 years ago, and while modern farming methods have improved, Americans are now facing a situation that could potentially be worse than the Dust Bowl: worldwide topsoil erosion. This is due to many factors. Deforestation clears away vegetation that protects the top soil, while chemical fertilizers and pesticides damage the quality of soil which makes it easier for erosion to move.

So what does this mean for aquifers? Topsoil erosion negatively affects aquifers, as aquifers rely on topsoil and plants to slowly allow water to percolate (absorb) into the ground. Without adequate topsoil, rainwater travels on the land's surface, eroding more topsoil on its way into streams and rivers. Globally this is a serious situation, and with the trend of dry areas getting drier and wet areas getting wetter, topsoil erosion rates are going to increase which could lead to a shortage of farmable land.

Sources:

- **Modern Topsoil problem:**
<http://suite101.com/article/topsoil-erosion-the-ecological-disaster-no-one-is-talking-about-a376645>
- **History of Dust Bowl:**
http://en.wikipedia.org/wiki/Dust_Bowl