Soil Science Society of America

Helping to Create Solutions from the Ground Up

Why is Soil Important?

Soil provides ecosystem services critical for life: soil acts as a water filter and a growing medium; provides habitat for billions of organisms, contributing to biodiversity; and supplies most of the antibiotics used to fight diseases. Humans use soil as a holding facility for solid waste, filter for wastewater, and foundation for our cities and towns. Finally, soil is the basis of our nation's agroecosystems which provide us with feed, fiber, food and fuel.

SSSA Members & Professionals

SSSA members are researchers, educators, extension agents, consultants and industry advisers. Our members, along with practicing Certified Professional Soil Scientists (CPSSc) and Certified Professional Soil Classifiers (CPSC), advise land managers in decisions that meet our nation's modern agricultural, water quality, land management, and environmental challenges. SSSA members educate, train, and mentor the future workforce of scientists, science educators, and extension agents to ensure the availability of expertise in soil science for sustainable agricultural production, natural resource management, and environmental protection.

Ecosystems Services

Advances in watershed, natural resource, and environmental sciences have shown that soil is the foundation of basic ecosystem function. Soil filters our water, provides essential nutrients to our forests and crops, and helps regulate the Earth's temperature as well as many of the important greenhouse gases. As our awareness of the value of natural and managed ecosystems services grows, new biodiversity, carbon, and water markets are emerging, such as the Chicago Climate Exchange, and the nutrient trading programs under the new Executive Order on the Protection and Restoration of the Chesapeake Bay. These markets place an economic value on management practices which increase those ecosystem services, producing goods that enhance human and environmental health.

Environmental & Human Health

Industrial, household, and non-point source pollution jeopardizes the health of the environment and humans. Over the past several decades, soil scientists have identified new practices which limit the mobility of contaminants and rehabilitate polluted land. As a result, land managers now have access to new, innovative soil management strategies that can mitigate soil, water, and air pollution, while also enhancing ecosystem performance.

Food Security

We must develop new technologies and techniques to produce more feed, fiber, food and fuel with less— less land, less water, less energy, and fewer nutrient inputs. Achieving this will require improved crops and novel soil management strategies that can only be accomplished through investment in interdisciplinary research and development.

"To Forget how to Tend the Soils is to Forget Ourselves"

- Mahatma Gandi

Climate Change

Almost 35% of all greenhouse gases (GHG) released into the atmosphere due to anthropogenic activities since 1850 are linked to land use changes. Crop, grazing, and forest lands, as well as wetlands, all have the potential to contribute to or, through sound management strategies, mitigate GHG emissions through soil carbon sequestration, while also enhancing ecosystem services. Soil stores carbon dioxide (CO_2) and other GHGs in soil organic matter. Soil organic matter offers several added benefits: it filters and cleans water, enhances water retention and storage, mitigates the impacts of extreme weather events, improves soil structure, reduces soil erosion, provides microbial habitats, and serves as a source of long-term, slow-release nutrients.

Science & Education Workforce Development

Funding for science education and workforce development must, in addition to other important disciplines, include soil science. Research, education and training provided through the U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA) and Land-Grant University System (LGU), as well as the U.S. Environmental Protection Agency (EPA), National Science Foundation (NSF), U.S. Department of Energy (DOE), and U.S. Geological Survey (USGS), are essential to train the next generation of interdisciplinary soil scientists. Only with adequate investment in soil science will the nation have the workforce (educators, researchers, and land managers) necessary to safeguard this irreplaceable resource and ensure ecosystem health as well as the continued sustainable production of feed, fiber, food and fuel.






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Soils Sustain Life

Soil Science Society of America

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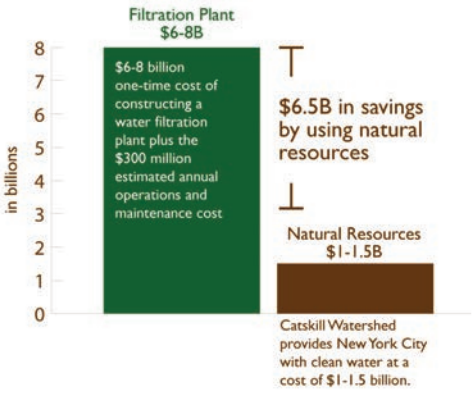
Soil science integrates scientific principles from physics, biology, and chemistry to elucidate how soils provide these essential services. Soil science provides an understanding of how soil properties relate to and can be managed for optimal agricultural production, forest, range, and wetland management, urban land use, waste disposal and management, and reclamation of drastically disturbed sites, such as mines. Soil science addresses nutrient management, sustainable agriculture, global biogeochemical cycles and climate change, ecosystem structure and function, or nuclear waste disposal and management, among many others.

Soil scientists research soil biogeochemical and physical processes, map soil characteristics, and teach aspiring scientists about soil processes. Soil scientists perform soil surveys, develop land use plans, conduct site evaluations for septic systems or storm water facilities, examine soil function and health, identify optimal food production methods, develop climate change mitigation strategies, and develop new approaches for clean water and resource management at many spatial scales.

Important Facts about Soil

- Wetlands deliver a wide range of ecosystem services that contribute to human well-being, such as fish and fiber, water supply, water purification, climate regulation, flood regulation, coastal protection, recreational opportunities, and, increasingly, tourism. Despite these important benefits, the degradation and loss of wetlands is more rapid than that of other ecosystems.
- Through natural processes, such as soil adsorption, chemical filtration and nutrient cycling, the Catskill Watershed provides New York City with clean water at a cost of $1-1.5 billion, much less than the $6-8 billion one-time cost of constructing a water filtration plant plus the $300 million estimated annual operations and maintenance cost.



- U.S. agriculture produces about 500 million tons of crop residue annually, most of which contributes to maintaining soil organic matter. Plans to use crop residues for bioenergy production could deprive agroecosystems of important inputs for future soil productivity, potentially upsetting existing agroecosystem balances.
- Arsenic from smelter emissions and pesticide residues binds strongly to soil and will likely remain near the surface for hundreds of years as a long-term source of exposure.
- Archaeologists have determined that the demise of many sophisticated civilizations, such as the Mayans of Central America and the Harappan of India, resulted directly from the mismanagement of their soils.
- Covering just 6% of Earth's land surface, wetlands (including marshes, peat bogs, swamps, river deltas, mangroves, tundra, lagoons and river floodplains) currently store up to 20% (850 billion tons) of terrestrial carbon, a CO_2 equivalent comparable to the carbon content of today's atmosphere.

Soil Trivia

- Did you know that there are more living individual organisms in a tablespoon of soil than there are people on the earth?
- Did you know that almost all of the antibiotics we take to help us fight infections were obtained from soil microorganisms?
- Did you know that agriculture is the only essential industry on earth?
- Did you know that soil is a non-renewable natural resource?
- Did you know that the best china dishes are made from soil?
- Did you know that about 70% of the weight of a text book or glossy paged magazine is soil?
- Did you know that putting clay on your face in the form of a "mud mask" is done to cleanse the pores in the skin?

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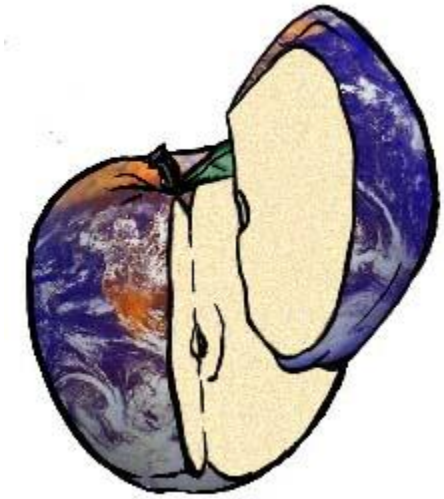
How Much Soil Is There?

A Learning Activity to illustrate the amount of soil on planet Earth

Pretend that this apple is the planet Earth, round, beautiful, and full of good things. Notice its skin, hugging and protecting the surface. Water covers approximately 75% of the surface.

Right away, cut the apple in quarters. Put three quarters (75%) aside.



The three quarters (75%) you just removed represents how much of the earth is covered with water - oceans, lakes, rivers, streams. What is left (25%) represents the dry land.

50% of that dry land is desert, polar, or mountainous regions where it is too hot, too cold or too high to be productive.

So cut that dry land quarter in half and toss one piece away.

When 50% is removed, this is what is left. (12.5% of the original)

Of that 12.5%, 40% is severely limited by terrain, fertility or excessive rainfall. It is too rocky, steep, shallow, poor or too wet to support food production.

Cut that 40% portion away.

You are left with approximately 10% of the apple.

Peel the skin from the tiny remaining sliver.

The remaining 10% (approximately*)- this small fragment of the land area - represents the soil we depend on for the world's food supply.

This fragment competes with all other needs - housing, cities, schools, hospitals, shopping centers, land fills, etc., etc. And, sometimes, it doesn't win.

*There is difficulty within the scientific community in coming up with an exact figure

Courtesy of: ***The Natural Resources Conservation Service,*** Syracuse, NY, U.S. Department of Agriculture