

Soils and Climate Change

Soil is a complex mixture of minerals, organic matter, gases, liquids, and countless organisms. Together these materials help to support life on Earth by growing the plants that we depend upon for food and fresh air. Soil also helps to filter freshwater as it moves through the soil as part of the water cycle.



Soil has an important role to play in the carbon cycle, absorbing carbon dioxide (CO₂) from the atmosphere. As carbon moves through the Earth's systems, it is exchanged and stored in various forms, including in our soil. Soils store carbon in the form of organic matter, and the processes that occur in soils, such as respiration and decomposition, have a direct effect on the amount of CO₂ soils can absorb and therefore the amount of CO₂ in the atmosphere. Soil plays a vital role in the carbon cycle, and after oceans, the soil is the second largest natural carbon sink, surpassing forests and other vegetation in its capacity to capture CO₂ from the air (source).

Rising CO₂ levels in the atmosphere due to the burning of fossil fuels have meant more CO₂ in the atmosphere. The increasing CO₂ in the atmosphere acts like a blanket around the Earth, trapping heat from the sun in the atmosphere and heating up the Earth (global warming). This warming is leading to changes in our climate (climate change).

Our growing understanding of the role that soil plays in the carbon cycle - and its potential role in global warming and climate change - has seen a rising interest in how we can improve the capacity of our soils to absorb carbon. Healthier soils absorb more carbon because the soils are capable of absorbing carbon directly and because the soils support more plant growth, and these plants pull carbon from the atmosphere through photosynthesis. This means that healthy soils are fundamental to meeting the challenge of climate change.

However, soil quality has been declining due to increased and more intensive agricultural activity around the globe. In addition, climate change itself is affecting soil health by leading to drier conditions that dry out soils and make them harder to support plant life and soil organisms. In addition, extreme weather events such as floods and droughts can lead to soil erosion. Rising temperatures can also lead to an increase in soil salinity, as salt water from the ocean can infiltrate coastal soils. This can lead to a decrease in crop yields and an increase in soil acidity, which can be damaging to plants.

Because the agriculture industry is the largest industry directly involved in working with soil, the focus on improving the health of soils has been shifting to agriculture. Farmers are becoming increasingly aware of how they farm can contribute to climate change, which in turn can affect the productivity of their farm. A growing number of farmers are looking for ways to care for soils and improve soil health without compromising crop yields and farm productivity.

These practices include regenerative agriculture, conservation agriculture, sustainable agriculture, organic farming, and permaculture. In the case of regenerative agriculture, the 5 principles directly address soil health and its ability to absorb carbon. Recent research into regenerative farming practices has shown that it significantly increases the carbon stocks in the soil ([source](#)) and therefore presents a genuine opportunity to meet the challenges of climate change.

The 5 Principles of Regenerative Agriculture

