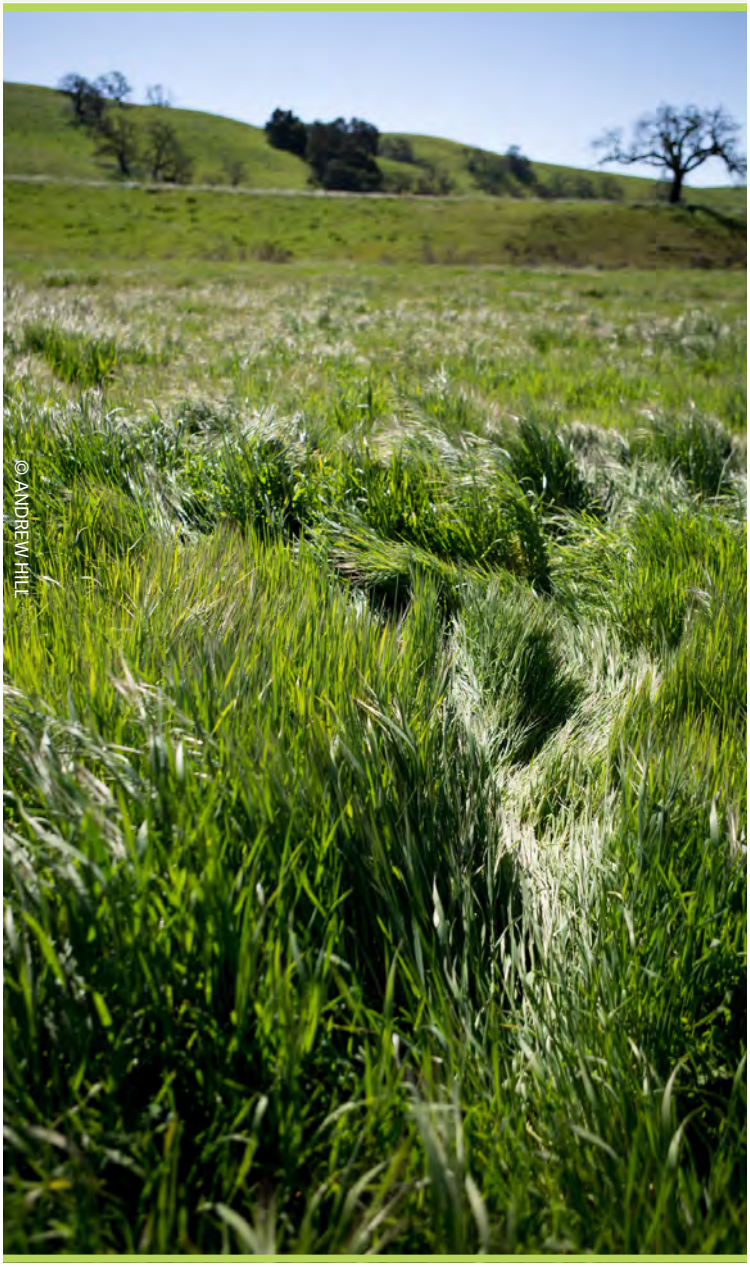
CARBON FARMING
A PRACTICAL CLIMATE CHANGE SOLUTION



Community Environmental Council

CACHUMA RESOURCE CONSERVATION DISTRICT CRCD

WHAT IS CARBON FARMING?

It's a way to capture excess carbon from the atmosphere and store it in the soil, through managing agricultural land to improve soil health and restore its carbon content. With carbon farming, farmers and ranchers restore balance within the carbon cycle.

HOW DOES SOIL STORE CARBON?

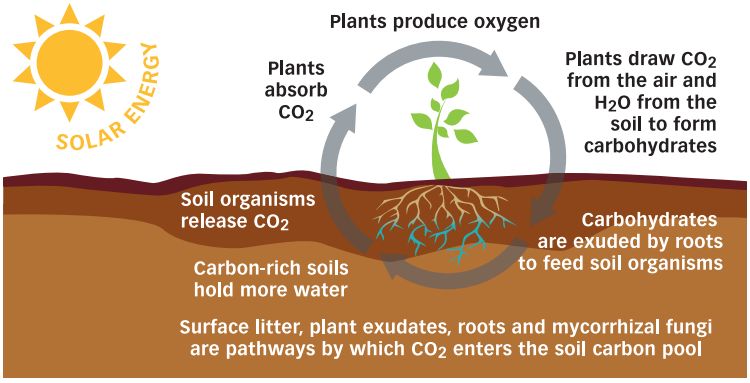
Through photosynthesis, plants naturally pull carbon in from the air. With help from the sun and water, they convert carbon into carbohydrates. Then they pump some of these carbohydrates down through their roots to feed microorganisms, who use that carbon to build soil. Over the last century, we have released or burned much of the carbon stored underground. Plants can help bring that carbon back by pumping it down from the air through their roots and storing it in the soil.

Unlike in the atmosphere where too much carbon is creating problems, more carbon in the soil makes it healthier, full of nutrients and able to hold much more water. In healthier soil, plants are able to:

1) **grow**, becoming more productive and increasing photosynthesis (which in turn pulls in more carbon)
2) **develop stronger and longer root systems**, making the plant more efficient in uptaking water and nutrients and helping it store more carbon
3) pump carbohydrates down through their roots to **feed microorganisms** that in turn use carbon to **build healthier soil**

Carbon farming creates an ongoing positive feedback loop. Each year, plants grow stronger, bringing more and more carbon into the soil, making the soil healthier, helping the plants grow even better.

THE CARBON CYCLE



WHY IS IT IMPORTANT TO THINK ABOUT CARBON?

Earth's carbon is stored in five main pools: soils, ocean, atmosphere, biosphere, and fossils. Carbon flows between these pools in an exchange called the carbon cycle -- shifting carbon out of one pool and putting it in another.

Currently, there's too much carbon in the atmosphere and not enough in our soils. An estimated 50-70% of the world's cultivated soils have lost their original carbon stock due to soil tilling, deforestation, and other practices that leave soil bare. So we have two problems: not enough carbon in soils (making them less healthy) and too much carbon in the atmosphere (creating a greenhouse effect that is warming the atmosphere and destabilizing the climate).

WHAT'S CAUSING THE IMBALANCE?

When humans began extracting fossil fuels from the ground and using them for power, we started to disrupt the carbon cycle balance. Each time we burn or release fossil fuels for transportation or to make electricity , we agitate the cycle more. In addition, the way we historically managed the land and produced food has moved even more carbon from the soil into the atmosphere.

Recently, carbon dioxide levels surpassed 400 parts per million for the first time in recorded history -- moving us toward levels that is expected to create a climate unsuitable for animal and human life. Humans face increasing intensity and frequency of extreme weather events, such as violent storms and severe drought. Extreme heat, changes in weather patterns, and cycles of drought and flooding all affect farming and food production.

HOW DOES CARBON FARMING HELP?

Even as we replace fossil fuels with renewable energy sources, we have to draw down the excess carbon dioxide already released in the atmosphere. To mitigate the worst effects of climate change and stabilize the climate, we must rapidly sequester carbon back in the soils.

The most effective mechanism for doing this is through plants. Certain agricultural practices increase plant growth and enhance photosynthesis. That's carbon farming -- a natural solution to carbon sequestration.

LOOKING AT ROOT GROWTH AFTER COMPOST APPLICATION

Carbon farming enhances root growth and helps plants grow deep, strong roots. Roots of some grassland plants can extend 10 feet or more below ground, with a potential for carbon storage ranging from .30 - 1.7 metric tons per acre per year just from the roots alone.

HOW IS CARBON FARMING DIFFERENT THAN OTHER FARMING?

Common farming practices – such as tilling the land or leaving soil bare in between plantings – lower the amount of carbon in soil. Tillage exposes soil carbon to oxygen, which releases it into the air as carbon dioxide (CO_2). Bare soil emits more carbon than healthy soil covered with plants and living organisms, which otherwise would be conducting photosynthesis and bringing carbon down through their roots.

The USDA Natural Resource Conservation District acknowledges 34 carbon farming practices, which range from new methods of tilling (called conservation tillage) to planting trees along the edges of fields (called shelterbelts). Carbon farming practices strive to leave plant matter in the soil and carbon in the ground. They support the growth of stronger plants and longer roots, increasing the amount of carbon plants pull into the soil and setting off the positive feedback loop.

If applied globally, these practices have the capacity to sequester hundreds of billions of tons of carbon from the atmosphere in the coming decades. Combined with the reduction of fossil fuel use, carbon farming can return our atmosphere to a healthy level of 350 parts per million of carbon dioxide.

Carbon farming can greatly improve agriculture's resilience to climate change and its effects, like severe drought and heat waves.

BENEFITS OF CARBON FARMING INCLUDE:

- Improved soil structure and aeration
- Increased nutrient availability
- Greater water-holding capacity
- Reduced soil runoff and erosion
- Longer and more vigorous roots, better at storing carbon and accessing nutrients and water

All these things lead to healthier soil and healthier, stronger plants.

CARBON FARMING IN SANTA BARBARA COUNTY

Santa Barbara County has a robust and diverse agricultural sector; there is very little that cannot be produced here. With so much of our regional economy dependent on this sector, we must carefully steward our soil and water to preserve the bounty of this region. **Carbon farming strengthens agriculture's resilience and ability to adapt to long-term drought and future climate change scenarios.**

One carbon farming practice particularly stands out for Santa Barbara County: putting compost on grazed grassland. According to an analysis conducted by the Community Environmental Council and the Cachuma Resource Conservation District, more than 240,000 acres are suitable for compost application.

In fact, according to our analysis, applying a light dusting of ¼ inch of compost to just 15% of the suitable grassland in our county – or 42,000 acres -- could offset the annual greenhouse gas emissions for the entire county's agricultural sector.

What's more, scientific models show that applying this compost just once kickstarts plant growth to a level that will have a lasting effect for 20 or 30 years. The amount of carbon stored in the soil as a result is like taking 11,350 cars off the road every year for over two decades.

In addition, converting food waste, yard trimmings and agricultural byproducts into compost keeps this rich organic material from ending up in a landfill, where it creates methane – a powerful greenhouse gas. With California now banning food waste and green waste from landfill disposal, our region is in a unique position to close the loop on the carbon cycle, by turning organic waste into compost and using it to rebuild soil and sequester atmospheric carbon.

The agricultural sector in Santa Barbara can shift from a contributor to climate change to a vital part of the solution.

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