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Farms Harvest Cuts in Carbon Dioxide via Soil

Farming to improve crops and store more CO₂ gains traction

ClimateWire

By [Camille von Kaenel](#) and [ClimateWire](#) | September 22, 2015 | 0

FALLON, Calif. —Fourth-generation rancher Loren Poncia calls himself a soil geek, and California wants to pay him for it.

“If the soil is healthier, everything is better: the grass, the cows and the pocketbook,” said the rancher, gesturing toward the yellow perennial grasses streaked with green that cover Stemple Creek Ranch in the hills of Petaluma in Northern California.

The planet’s climate might be better off, too. Increasingly more research shows that agricultural practices like cover cropping, no-till farming, composting or even the use of biochar can remove carbon dioxide from the atmosphere through photosynthesis, boosting the organic matter in the soil.

It is a “low-hanging fruit” in the fight against climate change, said Rattan Lal, the director of the Carbon Management and Sequestration Center at Ohio State University. Farmers worldwide using a combination of conservation practices could sequester roughly 1 gigaton of organic carbon per year, he has estimated. That would be like taking nearly 800 million passenger cars off the roads.

The strategy has received attention worldwide, including with the French minister of agriculture, who has said that boosting the organic matter in soils by 0.4 percent each year could compensate for global greenhouse gas emissions. In the United States, the federal government has increasingly funded agricultural practices with climate benefits (*E&ENews PM*, April 23).

But perhaps nowhere is better positioned for “carbon farming” to take off than California. Agriculture is a nearly \$50 billion industry there that emits more greenhouse gases than the commercial or residential sectors. And the state has billions in revenue from its cap-and-trade system slated specifically for programs that reduce greenhouse gases (*ClimateWire*, Aug. 25).

Money to reduce greenhouse gases

“Energy’s got funding, transportation’s got funding,” said Torri Estrada, the director of policy at the Carbon Cycle Institute, a Marin County-based nonprofit advancing biological carbon sequestration. “Agriculture has been so underfunded for these practices, this is part of the catch-up.”



An aerial view of farmland in Sacramento.

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Several programs that reduce agricultural emissions received cap-and-trade revenue last year. One protects agricultural lands from development (*ClimateWire*, Feb. 19), while others fund dairy digesters and water efficiency on farms. This spring, the California Air Resources Board approved rice growers who avoid methane emissions for carbon offsets (*Greenwire*, June 26).

Sequestering carbon in soils is different, but it is also getting its time in the spotlight.

Earlier this year, Gov. Jerry Brown (D) launched what he called the “Healthy Soils Initiative” to support farmers building up carbon in their soils. It remains money-less, but funding could be back on the table early next year (*ClimateWire*, Sept. 14).

California officials hope incentives can offset the costs for farmers who adopt climate-friendly practices and spread interest in sustainability.

“From our perspective, it’s how do we get [farmers] thinking about management practices with carbon sequestration benefits, but also things that bring up food production, soil health and resiliency in the future,” said Amrith Gunasekara, the science adviser for the California Department of Food and Agriculture.

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Incentives are also a way to encourage change without regulating emissions, which could hurt small farmers, added Renata Brillinger, the director of lobbying group California Climate and Agriculture Network.

Measuring the carbon impact

Building agricultural practices into California’s climate policies requires strict greenhouse gas accounting. That isn’t easy when dealing with a complicated ecosystem. Teasing out the individual net effects of stand-alone practices can be hard, cautioned Kate Scow, a soil microbiologist at the University of California, Davis, and the director of the century-old Russell Ranch Sustainable Agriculture Facility.

“There’s a good foundation of science to start with,” Scow said. “Will there be surprises? Yes. But there will be people working on this, because it’s not just about carbon sequestration. The soil is a living body.”

More organic matter in the soil can help it hold on to water, feed microbes, store nutrients like nitrogen and mitigate the negative environmental impacts of pesticides, among other benefits, she said.

The climate benefits of having more carbon in soils represent a more recent, and growing, field. Putting and keeping atmospheric carbon in the soil takes a long-term commitment.

“It’s not a one-shot deal, and then you get magical higher organic matter content—you have to keep adding it, or it’s going to be lost,” she said.

‘A cool opportunity’

Fourth-generation farmer Russ Lester, who grows walnuts on Dixon Ridge Farms, calls himself an “early adopter” of agricultural practices with climate benefits. UC Davis researchers have found that the biochar formed by the walnut shells he burns for energy could help sequester carbon.

“We just did it because we wanted to show it could be done, and could be done today,” he said. “We don’t have to wait decades to do it. We don’t have that luxury.”

Poncia, from Stemple Creek Ranch, is a businessman who rents out his farmhouse to visiting monks, Airbnb guests and farm-to-table dinners for extra revenue, and calls soils, grasses and cows “banks.” Climate change isn’t driving his interest in soils.

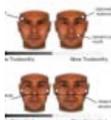
But scientists from the University of California, Berkeley, have measured some increases in soil carbon after he applied compost to

patches of rangeland as part of the grant-funded Marin Carbon Project. If that persuades the state to help cover the costs of planting trees and laying out compost, he won't pass it up.

"I'm not basing my decisions around global warming, I'm basing it around soil health," Poncia said. "But if we can prove we can sequester carbon from grazing, it's a cool opportunity to get cap-and-trade money."

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