Healthy Soils, Climate Resilience and Water

The Big Picture

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Outline

- CEC and Food System Work
- Carbon Farming Basics
- The Soil, Climate, Water Connection
- Existing Efforts
- Scaling Up Locally- Opportunities and Barriers
- Next Steps & Conclusion
Linking the Food System to Climate Change
CARBON FARMING PARTNERS

- Cachuma Resource Conservation District
- California Carbon Project
- CalPoly University
- Carbon Cycle Institute
- Community Environmental Council
- LegacyWorks Group
- Santa Barbara Air Pollution Control District
- Santa Barbara Foundation
- Ted Chamberlin Ranch
- UC Berkeley
- UC Davis
- UC Extension
- UC Santa Barbara
- USDA Natural Resources Conservation Service
THE CARBON CYCLE

Plants produce oxygen

Plants absorb CO₂

Plants draw CO₂ from the air and H₂O from the soil to form carbohydrates

Soil organisms release CO₂

Carbon-rich soils hold more water

Carbohydrates are exuded by roots to feed soil organisms

Surface litter, plant exudates, roots and mycorrhizal fungi are pathways by which CO₂ enters the soil carbon pool
WHY SOILS?

Improve plant health and crop yields*
Soil organic matter suppresses disease organisms and increases plant nutrient availability and uptake.

Increase water retention and infiltration*
Healthy soil can hold up to 20 times its weight in water. Increasing soil organic matter 1% can increase soil available water holding capacity by 3.7%.

Prevent erosion and reduce sediment and dust*
Soil organic matter helps build soil aggregate stability and structure and make it more resistant to wind or water erosion.

Sequester carbon and reduce greenhouse gas emissions*
Soils contain approximately 75% of the carbon pool on land—three times more than the amount stored in living plants and trees.

Improve water quality*
Increasing soil organic matter increases infiltration and biological activity that make soil a more effective filter.

Improve biological diversity and wildlife habitat*
At least a quarter of the world’s biodiversity lives in the soil; healthy soils improve habitats and other natural resources.
"Each 1 percent increase in soil organic matter helps soil hold ~ 20,000 more gallons of water per acre."

Source: NRDC
SOIL HEALTH PRACTICES

SOURCE: CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

**REDUCE SOIL DISTURBANCE**

Soil disturbance can be the result of physical, chemical or biological activities. Physical soil disturbance, such as tillage, results in bare and/or compacted soil that is destructive and disruptive to soil microbes, and it creates a hostile environment for them to live. Misapplication of farm inputs can disrupt the symbiotic relationships between fungi, other microorganisms, and plant roots.

**DIVERSIFY SOIL BIOTA**

A diverse and fully functioning soil food web provides for nutrient, energy, and water cycling that allows a soil to express its full potential. Increasing the diversity of a crop rotation and cover crops increases soil health and soil function, reduces input costs, and increases profitability.

**KEEP A LIVING ROOT GROWING THROUGHOUT THE YEAR**

Healthy soil is dependent upon how well the soil food web is fed. Providing plenty of easily accessible food to soil microbes helps them cycle nutrients that plants need to grow. Sugars from living plant roots, recently dead plant roots, crop residues, and soil organic matter all feed the many and varied members of the soil food web.

**KEEP THE SOIL COVERED AS MUCH AS POSSIBLE**

Soil cover conserves moisture, reduces temperature, intercepts raindrops (to reduce their destructive impact), suppresses weed growth, and provides habitat for members of the soil food web that spend at least some of their time above ground.
EXAMPLE: COMPOST

**Compost Results - Moisture**

- **Compost application**
  - Increases soil water holding capacity by 17-25% (only 1 application)
  - Boosts climate resiliency

Source: Marin Carbon Project
EXAMPLE: COVER CROP

Source: Madison County Soil Conservation District
EXISTING EFFORTS: CALIFORNIA CLIMATE STRATEGY

An Integrated Plan for Addressing Climate Change

VISION

Reducing Greenhouse Gas Emissions to 40% Below 1990 Levels by 2030

GOALS

- 50% reduction in petroleum use in vehicles
- 50% renewable electricity
- Double energy efficiency savings at existing buildings
- Carbon sequestration in the land base
- Reduce short-lived climate pollutants
- Safeguard California
EXISTING EFFORTS CONT.

State/Federal Programs
- Marin Carbon Project Trial Project
- California Healthy Soils Program
- 2018 US Farm Bill
- NRCS Soil Conservation Practices
- Environmental Quality Incentives Program
  - COMET Tool

Local Programs
- Local participation in NRCS Trial Project
- Healthy Soils Demonstration Project
- Rancher to Rancher Program
- Air Quality CEQA Project Mitigation
- Compost Analysis

CARBON FARMING NETWORKS
HEALTHY SOILS PROGRAM - DEMONSTRATION PROJECT

- California Department of Food and Agriculture – initiative
- Studying compost application on rangeland
- Greenhouse Gas Reductions
- Forage quality and quantity
- Water retention and drought mitigation

Spring Grant Kick Off March 2018
Emerging Climate Impacts

- Prolonged Drought → Water Supply Issues
- Flooding and soil erosion
- Seawater intrusion
- Depleted groundwater levels
- Water quality concerns
- Increased evapotranspiration
Of the total acreage in the County, about **270,000** acres is suitable for compost application.

If we apply compost on **15%** of those acres we could offset the County’s agriculture sector’s emissions.

A one-time application of compost on those acres would capture **~688 million gallons** of water, or 2000 AF.

Source: City of Denver
CENTRAL COAST - BARRIERS

We will need a lot of this:
CENTRAL COAST – BARRIERS

Regulatory Maze
NEXT STEPS

- Incorporate carbon farming strategies into key planning documents
- Develop regulatory resource guide for compost production, streamline policies and address regulatory barriers
- Support medium scale production of compost at the watershed scale
- Encourage small-scale onsite production of compost in agriculture
Thank you!

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