CCST EXPERT BRIEFING SERIES

A Carbon Neutral California: Natural Pathways for Carbon Sequestration in California

Briefing held **JUNE 2020**

One Pager

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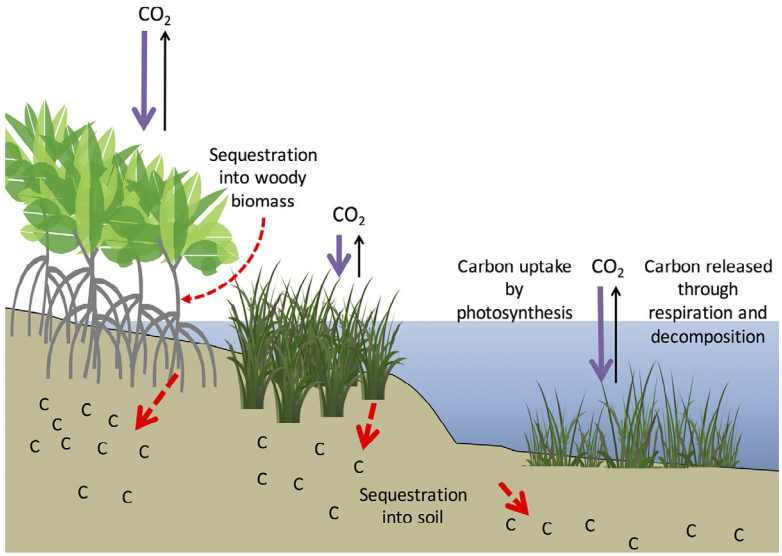

Figure: Natural carbon sequestration pathways. Howard and Sutton Grier et al., 2017

BACKGROUND

- Anthropogenic **carbon emissions** are a leading cause of **climate change**.
- California has set an ambitious goal of being **carbon neutral** by 2045.
- A combined approach of reducing emissions and **sequestering carbon** – physically removing CO2 from the atmosphere and storing it long-term – can help California reach its goals.
- CO2 can be sequestered using either technological pathways or **natural pathways**.
- Natural and working lands, such as forests, wetlands, grasslands, and agricultural lands, provide opportunities to remove CO2 from the air and serve as a place to store it.

SEQUESTERING ATMOSPHERIC CO2 IN NATURAL AND WORKING LANDS

The natural carbon cycle maintains a balance between CO2 found in the atmosphere and CO2 held naturally by the environment. Human activities have dramatically increased atmospheric CO2. Historically, over a quarter of those increased emissions have been captured by natural and working lands.

Natural pathways for carbon sequestration rely on plants, which capture CO2 from the air during photosynthesis. Carbon can then be stored long term in soils or woody biomass.

Land management practices on natural and working lands can (1) increase the rate at which CO2 is removed from the atmosphere through natural pathways, and (2) reduce the rate at which naturally stored CO2 is released back to the atmosphere.

Benefits of Natural Pathways

1. **Reduced** atmospheric CO2
2. **Lower** cost than other carbon sequestration pathways
3. **Improved** air and water quality
4. **Improved** ecosystem and soil health
5. **Reduced** wildfire severity
6. **Improved** resilience to climate change, drought, and floods

Over 90% of California is covered by natural and working lands. These lands include coastal areas, wetlands, forests, grasslands, farmland, and urban green spaces. Using natural solutions, California could achieve 25.5 million of the estimated 125 million tons of CO2 in negative emissions needed annually by 2045, at a relatively low cost.[1]

[1] Values from LLNL Negative Emissions Report (2020)

SELECT EXPERTS

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EXAMPLES OF NATURAL PATHWAYS FOR CARBON SEQUESTRATION

1

Photo: Restored tidal marsh, SF Bay **(Patty Oikawa)**

WETLANDS AND MARSHES

Wetlands and marshes can take up large amounts of carbon into the soil, where it can be stored for thousands of years. As wetlands grow, they draw in more carbon. When wetlands are deteriorated, they release their stored carbon back to the atmosphere.

Example:

- Restoration of corn fields and irrigated pasture to tidal or managed wetlands.

Sequestration potential in California by 2045:

- **1.1 MILLION TONS** of CO_2 equivalent per year[1]

2

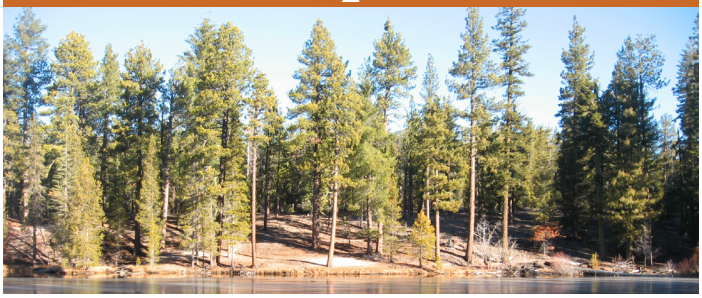

Photo: Lassen Volcanic National Park (NPS)

FORESTS AND WOODLANDS

Forests and woodlands store carbon primarily in the trunks, branches, foliage, and roots of trees and to some extent in soils. Carbon continues to be sequestered in durable wood products.

Examples:

- Reforestation of degraded habitats
- Enhanced management of timber land

Sequestration potential in California by 2045:

- **20.4 MILLION TONS** of CO_2 equivalent per year[1]

3

Photo: Antelope Valley CA Poppy Reserve, Florence Low, CA DWR

GRASSLANDS

Grasslands sequester most of their carbon underground in roots and soils. Much of this carbon remains sequestered when grasslands burn, making grasslands a relatively stable carbon sink as the severity of wildfires increases.

Example:

- Restoration of grasslands from annual row crops or tree crop cultivation.

Sequestration potential in California by 2045:

- **0.1 MILLION TONS** of CO_2 equivalent per year[1]

4

Photo: Farm in Monterey County, John Chacon, CA DWR

AGRICULTURAL LANDS

Modern techniques have reduced the amount of carbon in agricultural soils. Carbon sequestration depends on the balance of carbon uptake into soils via photosynthesis and the decomposition of carbon sources by microbes. Increasing the amount of carbon stored in deeper layers of soil, or the amount of carbon bound to the surface of minerals can increase sequestration potential.

Example:

- Cover cropping, reduced tilling, compost application, conversion to deeply-rooted perennial crops

Sequestration potential in California by 2045:

- **3.9 MILLION TONS** of CO_2 equivalent per year[1]

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