This report is intended for policy makers, farmers & ranchers, and all interested San Diegans. It introduces the benefits and opportunities of carbon farming, and highlights the important role that San Diego County agriculture can play in reducing the causes of climate change and building a climate resilient region.

May 2018
THE CHALLENGE:

Climate Change in the County of San Diego

Climate change is presenting challenges to San Diego County that impact every sector of our society and economy. Agriculture faces distinct climate-related challenges.

THE GOOD NEWS:

Agriculture can also be the source of solutions that will benefit everyone.

Climate-smart agriculture, also known as carbon farming, can help farmers, ranchers, and the region as a whole overcome some of the challenges of climate change while also reducing its causes.

Climate change is caused by greenhouse gases (GHG’s), such as:

- CO₂
- CH₄
- N₂O

and others that trap heat in the atmosphere.

GHG emissions come from burning fossil fuels for transportation and electricity, producing and using synthetic fertilizer, landfill fermentation, and several other sources.
TACKLING CLIMATE CHANGE HAS 2 PARTS:

**MITIGATION:**
Slowing down climate change by reducing its causes

**RESILIENCE:**
Maintaining key processes and bouncing back in the face of climate challenges

CLIMATE-SMART AGRICULTURE CAN HELP US DO BOTH.

In San Diego County, GHG emissions are produced by many sectors. The County of San Diego’s Climate Action Plan (CAP), consistent with California-wide mandates, sets targets, strategies and timelines for **mitigating** GHG emissions in the unincorporated county.

Emissions from Agriculture = 5%
(This accounts for agricultural machinery use, livestock emissions, + fertilizer use.)
CLIMATE CHANGE CHALLENGES FOR AGRICULTURE can lead to even greater GHG emissions.

- **Heat** + **Changing precipitation patterns**
  - **Drought** + **Diminishing water supply**
    - **Plant stress** + **Higher water costs**
      - **Crop losses, change in viable crop types, decline in farming economy**
        - **Conversion of farm land**
          - **Increased runoff, flood risk, mudslides, declining water quality**
            - **Increase in GHG’s**
A SOLUTION:
The Multiple Benefits of Carbon Farming

ON ONE HAND...
excessive carbon pollution in the atmosphere is causing climate change.

ON THE OTHER HAND...
carbon is the substance that all living things are made of.

CARBON FARMING
(or climate-smart agriculture)
is a set of farming and ranching practices that build soil carbon, turning carbon pollution in the atmosphere into the forms of carbon that build and nourish living things.

THERE ARE OVER 30 CARBON FARMING PRACTICES.
Examples include:
- Permanent crops such as orchard trees, bushes, and vines
- Compost application to croplands and rangelands
- Riparian restoration with perennials
- Windbreaks and hedgerows
- Mulching
- Cover cropping
- No-till or low-till row crops
- Silvo-pasture, or grazing lands that include trees
THE MITIGATION BENEFITS OF CARBON FARMING

Carbon farming practices reduce levels of GHG’s in the atmosphere.

They do this in 3 ways:

1. They reduce activities that cause GHG emissions, such as tilling, or using synthetic fertilizer.

2. They help plants grow, which locks in, or sequesters carbon for the lifetime of the plant.

3. They sequester carbon in the soil in forms such as soil humus.

WHAT IS SEQUESTRATION?

Plants sequester carbon when they take in carbon dioxide and convert it into wood, roots, and other plant parts. As they grow, they produce liquid carbohydrates which flow through their roots and, with the help of microorganisms in the soil, turn into stable forms of carbon that can stay locked deep underground for centuries.

There is a positive feedback loop between plants and soil.

An increase in soil carbon helps plants to grow, sequester more carbon, and feed more soil microorganisms. This, in turn, causes even more carbon to be sequestered in the soil, and so on.
Carbon farming practices are beneficial for farmers, and also build climate resilience. They prevent erosion, increase soil fertility, and improve the soil’s ability to absorb and hold water. These benefits support several County-wide efforts and will become increasingly important as climate change progresses.

In fact, “best management practices” for storm water reduction, erosion control, manure management, agricultural water quality, and groundwater management recommend planting trees and shrubs (especially along streams and rivers), using compost and mulch, and other practices that, as it turns out, are also carbon farming practices.
SNAPSHOT: AGRICULTURE
One of San Diego County’s Top 5 Economic Industries

CONtributes over $2.8 billion annually to local economy

San Diego County has more small farms & certified organic farms than any county in the U.S.

CROPLAND
50,846 acres

PERMANENT CROPS*
68%

NURSERY/ORNAMENTALS
24%

ROW CROPS
8%

*fruit and nut trees, bushes, and vines

RANGELAND
200,301 acres
The average age of a San Diego County farmer is 62 years old. Younger farmers are largely FIRST-TIME FARMERS, learning the skills of a new profession.

San Diego County agriculture is home to AROUND 3 MILLION FRUIT TREES, BUSHES, AND VINES. They pull some of the excess carbon dioxide out of the atmosphere and sequester it in plant matter and soil.

When trees are removed, carbon dioxide is released, sequestration stops, and we lose an important source of CLIMATE MITIGATION.
MITIGATION POTENTIAL
of Carbon Farming in San Diego County

Almost 70% of croplands in San Diego County are planted in permanent crops – millions of fruit trees, bushes, and vines that continuously perform the invisible service of combating climate change by sequestering carbon.

BETWEEN 2000–2015...

25% OF ORCHARDS

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\text{\textcolor{orange}{\text{\textbf{T}}} \times \text{\textcolor{yellow}{1 \text{ MILLION}}}} = \text{\textcolor{red}{\text{\textbf{CLIMATE IMPACT:}}}}
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\[
\text{\textcolor{red}{\text{\textbf{THE EQUIVALENT OF TAKING OVER 64,000 CARS OFF THE ROAD FOR A YEAR.}}}}
\]

\[
\text{\textcolor{red}{\text{\textbf{Over 300,000 MTCO}_2e^*}}}
\]

WERE TAKEN OUT OF PRODUCTION, largely due to the rising cost of water.

In other words, in our permanent crops we have a strong foundation of carbon farming already. Keeping agriculture viable by reducing the cost of farming can help strengthen that foundation, helping us neutralize GHG emissions and meet the challenges of climate change.

* MTCO\textsubscript{2}e, or metric tonnes of carbon dioxide equivalents, is a standardized measurement for GHG’s, which allows us to make side by side comparisons of how different activities and strategies affect climate change.
CARBON FARMING PRACTICES:

**COMPOST**

San Diego County’s Climate Action Plan has committed to reducing the amount of green waste that gets sent to landfills, and turning it into compost instead. This will take a big bite out of methane emissions.

If all of that compost were applied to **crop** and **rangelands** in the unincorporated areas of San Diego County, we could reduce even more emissions by sequestering up to **227,000 MTCO₂e** every year, for several decades to come.

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**RIPARIAN* RESTORATION**

Restoring **25% of unincorporated county riparian areas** can sequester over **7000 MTCO₂e per year**, and has multiple resilience benefits.

Carbon farming can help us meet our **climate action** targets to reduce GHG’s.

* Riparian areas run along the banks of streams and rivers, where native trees, shrubs, and other vegetation play an important role in the health of the waterway.
MOVING FORWARD:
Building a Mutual Partnership to Tackle Climate Change and Strengthen San Diego Agriculture

The County has much to gain by partnering with farmers and ranchers to scale up carbon farming. As we face increasing temperatures, wildfire risk, and unpredictable precipitation, the costs of farming are also increasing. Climate-smart agriculture can help farmers overcome these challenges, and build climate resilience and mitigation for the entire county.

There are three important strategies by which the County can help scale up carbon farming and move toward a climate smart region. They would be best developed by a CARBON FARMING TASK FORCE that includes stakeholders from agriculture, local government, public utilities, nonprofit, and business.
THE STRATEGIES:

1. Slow down the loss of our climate-friendly orchards by addressing root causes.

   For example, greater water demand combined with increasing water prices pose a major hurdle to the profitability of farming in San Diego County. Solutions such as voluntary interruptable supply, and recycled water provided to agriculture at lower rates than potable water can be win-win solutions that can:

   - Improve the economic viability of farming, and help keep our carbon sequestering food plants in the ground

   - Reduce demand on our limited potable water supply

   - Repurpose water that is otherwise treated as a waste product and flushed out to the ocean
Create incentives that recognize the climate services provided by farmers who practice carbon farming.

There are some state and federal programs that help with the costs of implementing carbon farming, such as NRCS EQIP cost share program, California Air Resources Board’s FARMER program, and CDFA Healthy Soils Program. The County can develop further incentives by providing the educational outreach and assistance needed to learn, implement, and profit from new practices. Some examples include:

- A mitigation fund or a local carbon offsets mechanism to finance carbon farming
- Facilitation of small businesses for production and distribution of high quality compost
- A revolving loan fund to assist with implementation of carbon farming

Alignment of regulations so that they reward carbon farming. For example, ensuring that riparian species habitat creation will result in positive outcomes for a farmer, as opposed to added regulation, could encourage implementation of this climate-smart practice, which is also a best management practice (BMP) for several other programs.
Ease major barriers and enable the new generation of farmers and ranchers to succeed at building a future in climate-smart agriculture.

Some Major Barriers:

- Credit & Capital
- Business & Marketing Skills
- Water
- Training
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For More Information:
This report is a summary of our technical report, Linking Climate-Friendly Farming Practices to San Diego County’s Climate Action Plan: An Opportunity Analysis of Carbon Farming in the Unincorporated County, which you can download from the San Diego Food System Alliance website:  
www.sdfsa.org and the San Diego County Farm Bureau website:  
www.sdfarmbureau.org