Carbon Farming

Good for the soil, good for the planet

Miguel A. Garcia Ph.D, CCA

Sustainable Ag Program Manager
Napa County resource Conservation District
miguel@naparcd.org
707-690-3122

Benefits of carbon sequestration

CALIFORNIA
SUSTAINABLE WINEGROWING
ALLIANCE

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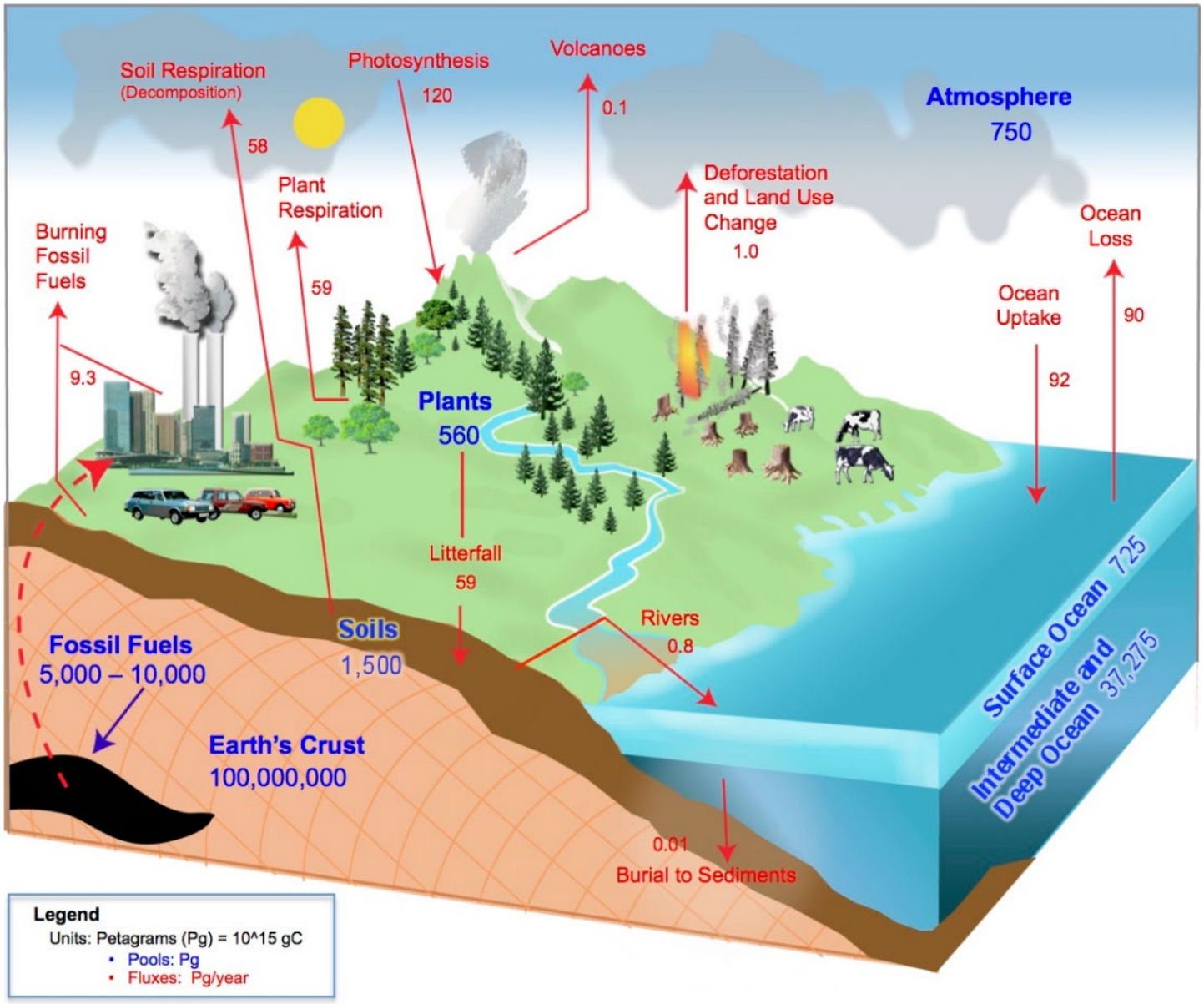

GLOBE®2017 Global Carbon Cycle Diagram Biosphere

Data Sources: Adapted from Houghton, R.A. Balancing the Global Carbon Budget. Annu. Rev. Earth Planet. Sci. 007.35:313-347, updated emissions values are from the Global Carbon Project: Carbon Budget 2017.
Diagram created by a collaboration between UNH, Charles University and the GLOBE Program.

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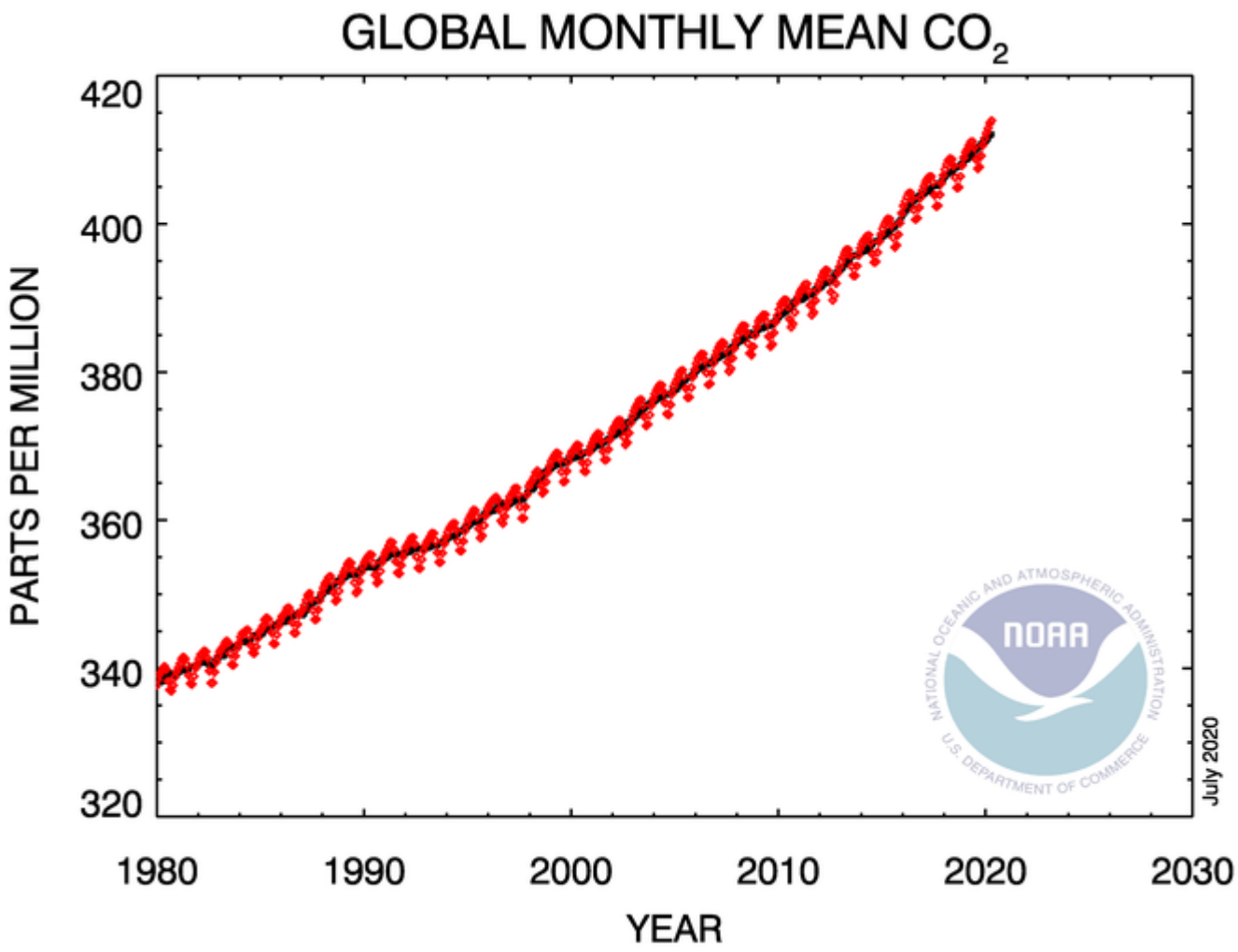
GLOBAL MONTHLY MEAN CO_2
PARTS PER MILLION
420
400
380
360
340
320
1980
1990
2000
2010
2020
2030
YEAR
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
July 2020

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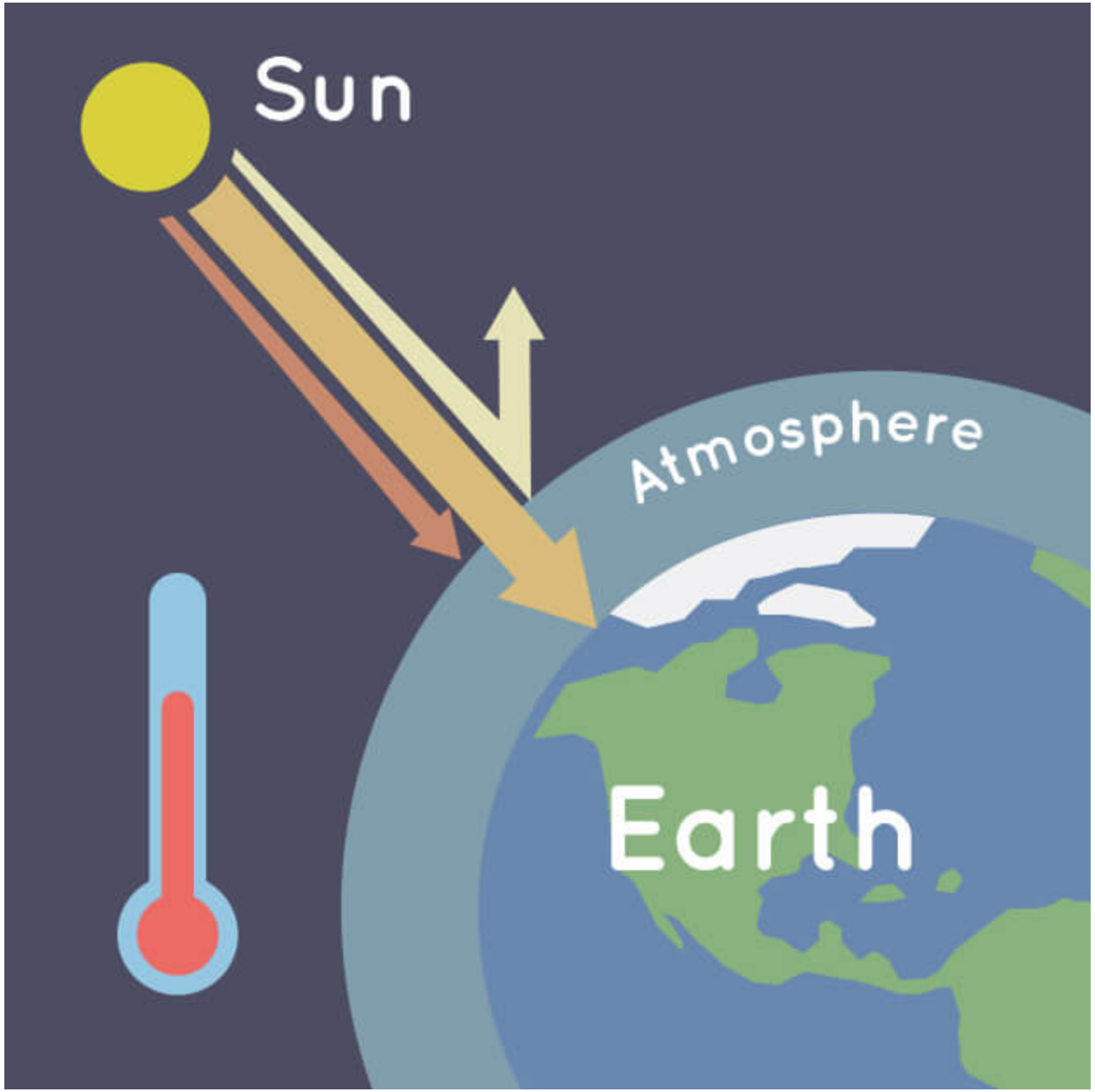

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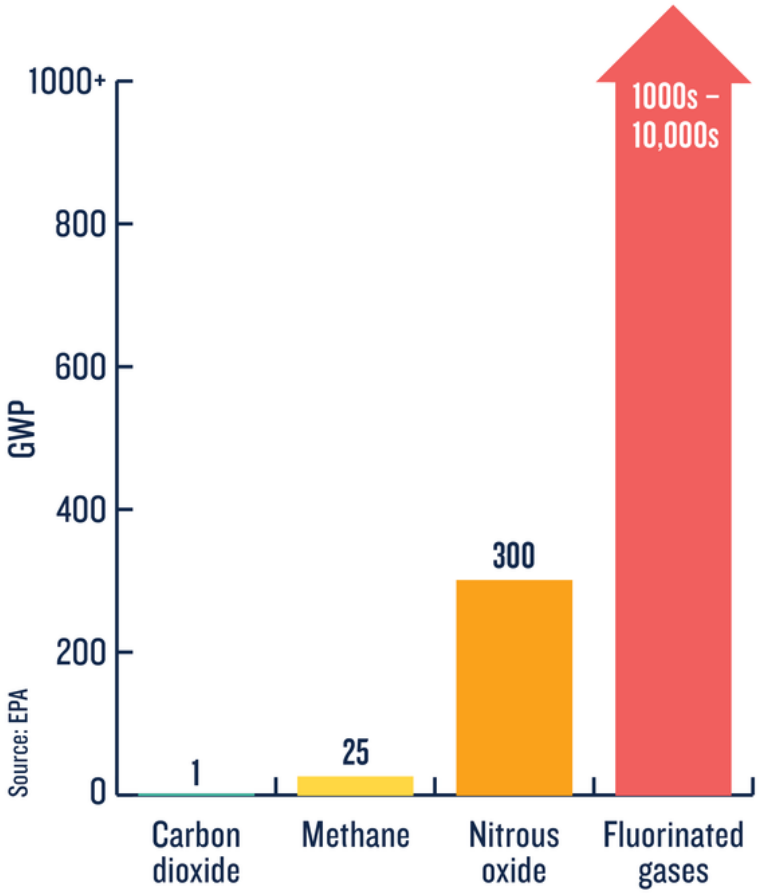
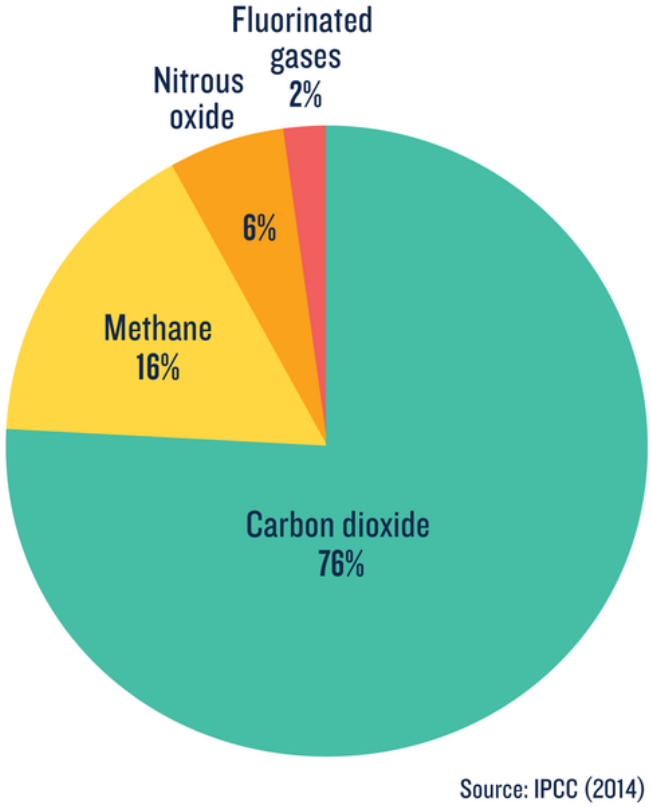
HOW GREENHOUSE GASES WARM OUR PLANET



The global warming potential (GWP) of human-generated greenhouse gases is a measure of how much heat each gas traps in the atmosphere, relative to carbon dioxide.



How much each human-caused greenhouse gas contributes to total emissions around the globe.

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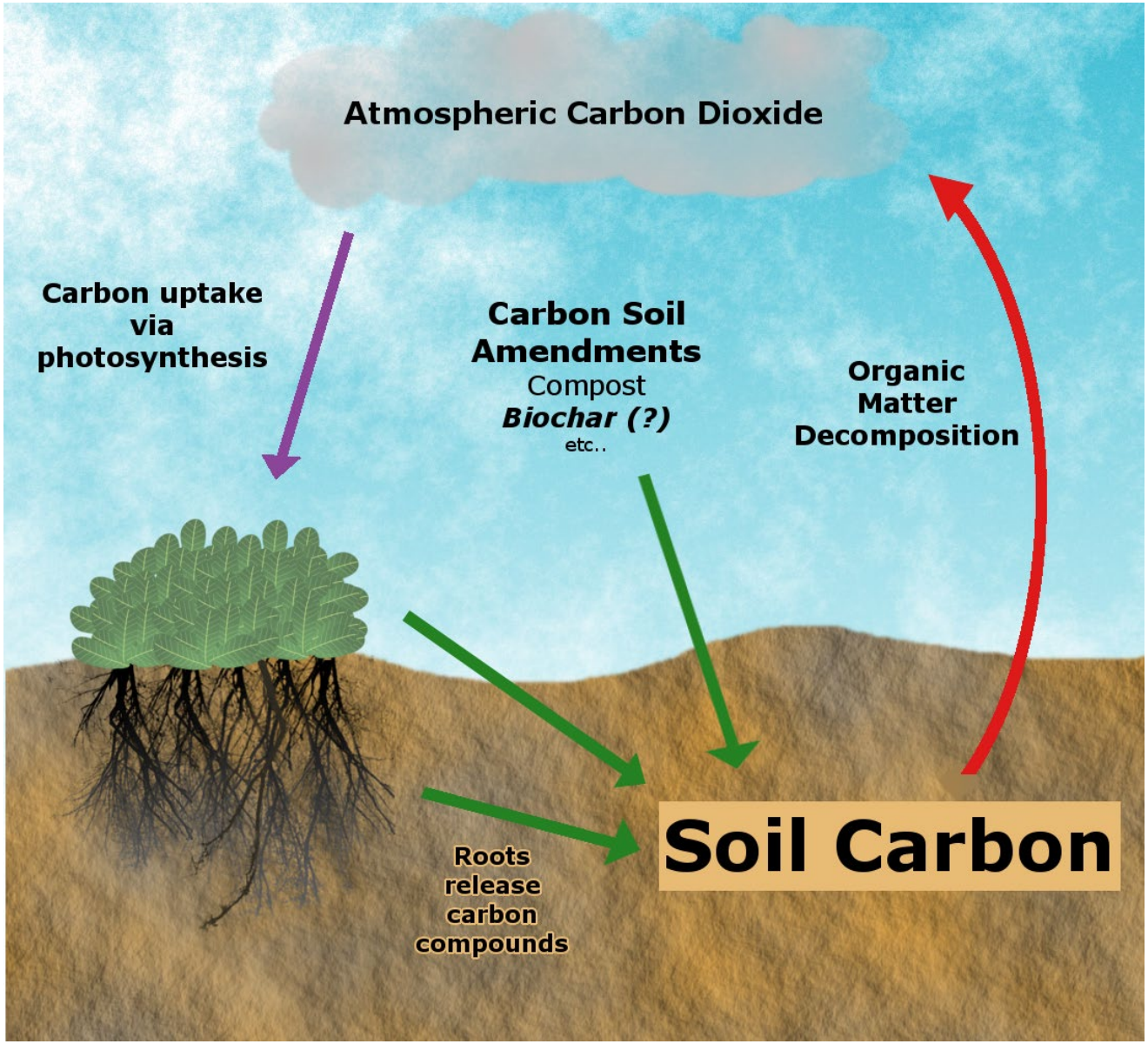
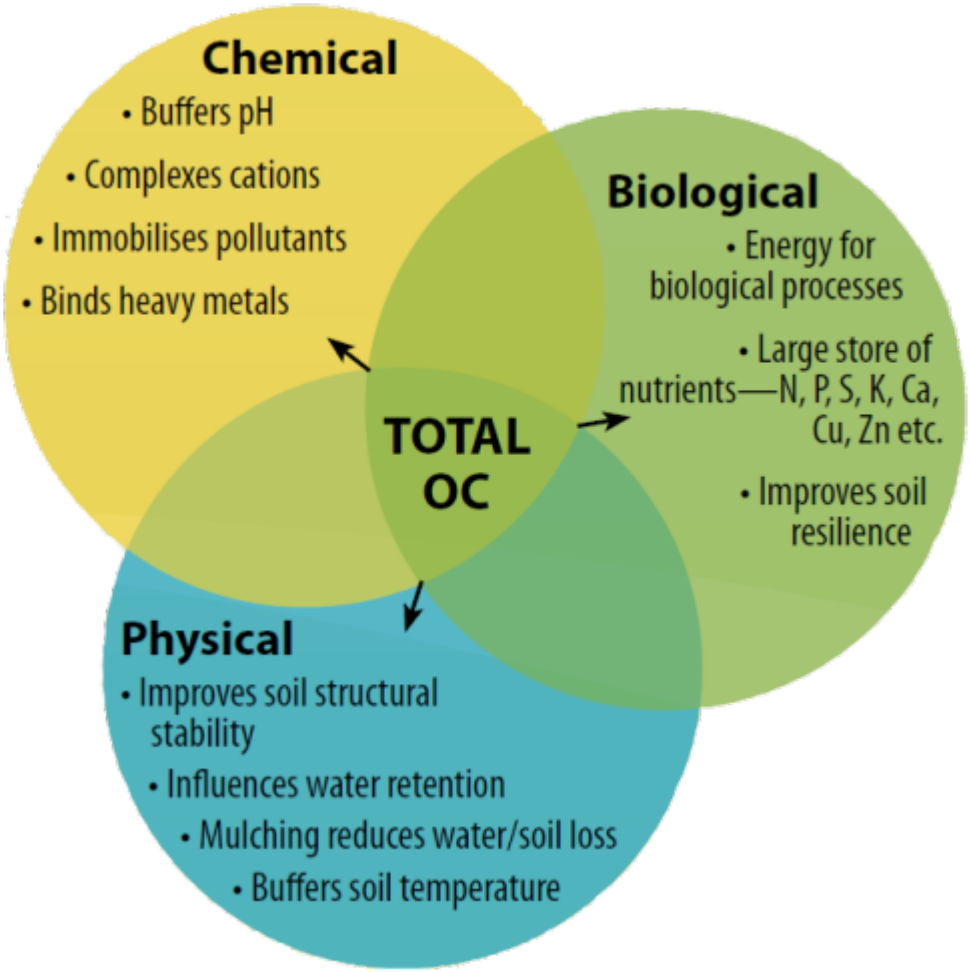
WMO Climate Risks, Extreme Events and Related Impacts
ESTIMATED
821 MILLION
UNDERNOURISHED
PARTLY DUE TO
DROUGHT
(SOURCE: FAO)
+35 MILLION
PEOPLE
AFFECTED BY
FLOODS
(SOURCE: CRED)
+2 MILLION
PEOPLE
DISPLACED
BY WEATHER &
CLIMATE-LINKED
DISASTERS
(SOURCE: IOM)
OCEAN
ACIDIFICATION
IS ONGOING
(SOURCE: UNESCO-IOC)
DECREASE IN
GLOBAL OCEAN
OXYGEN
CONTINUES
CLIMATE CHANGE
THREATENS
PEATLAND
ECOSYSTEMS
(SOURCE: UN
ENVIRONMENT)
OUT OF
883,000 INTERNAL
DISPLACEMENTS,
32% ARE LINKED TO
FLOODS AND 29%
TO DROUGHTS
(SOURCE: UNHCR)
+1600 DEATHS
ASSOCIATED WITH
HEATWAVES AND
WILDFIRES
(SOURCE: WHO)


Atmospheric Carbon Dioxide
Carbon uptake via photosynthesis
Carbon Soil Amendments
Compost
Biochar (?)
etc..
Organic Matter Decomposition
Roots release carbon compounds
Soil Carbon

Carbon is critical to maintain proper soil health



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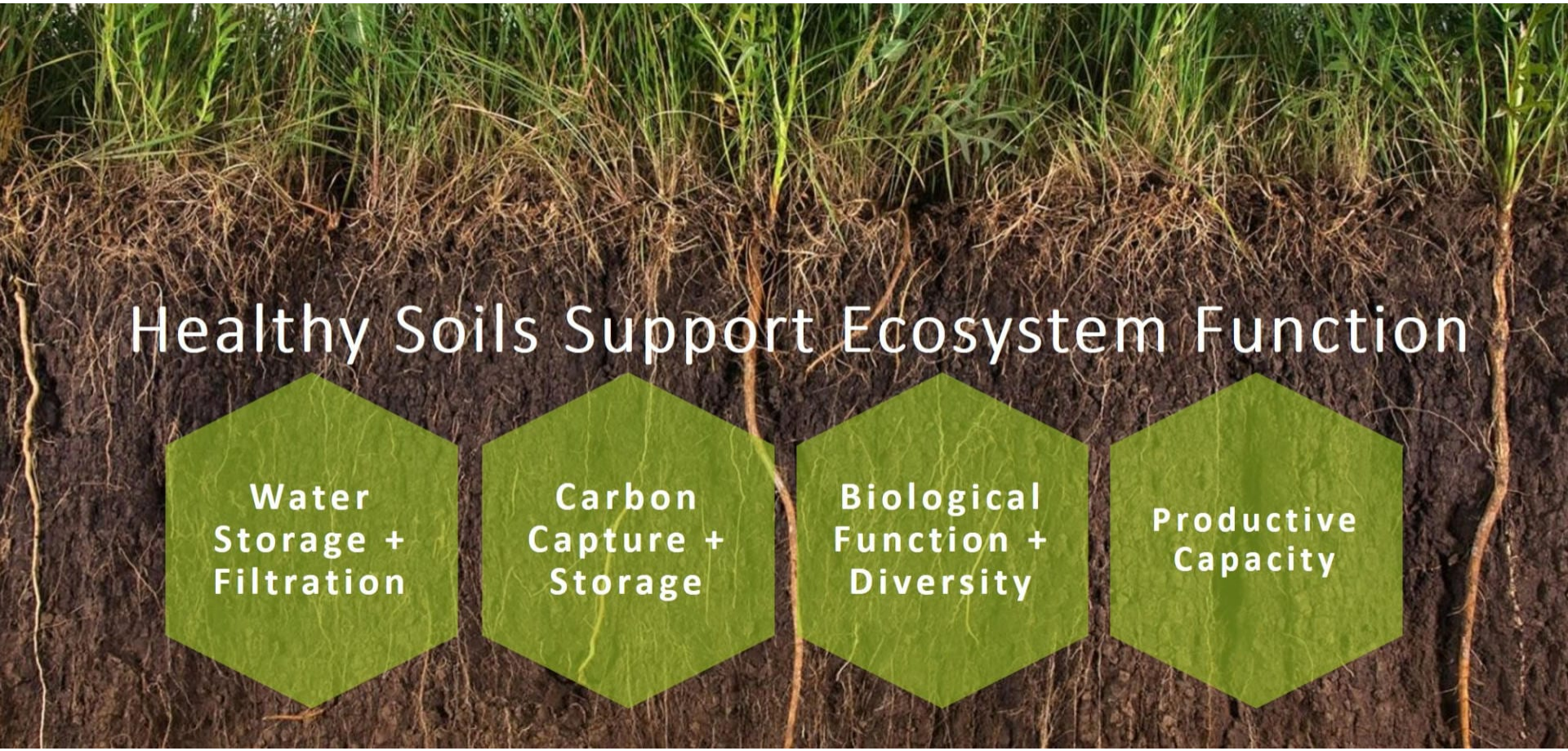

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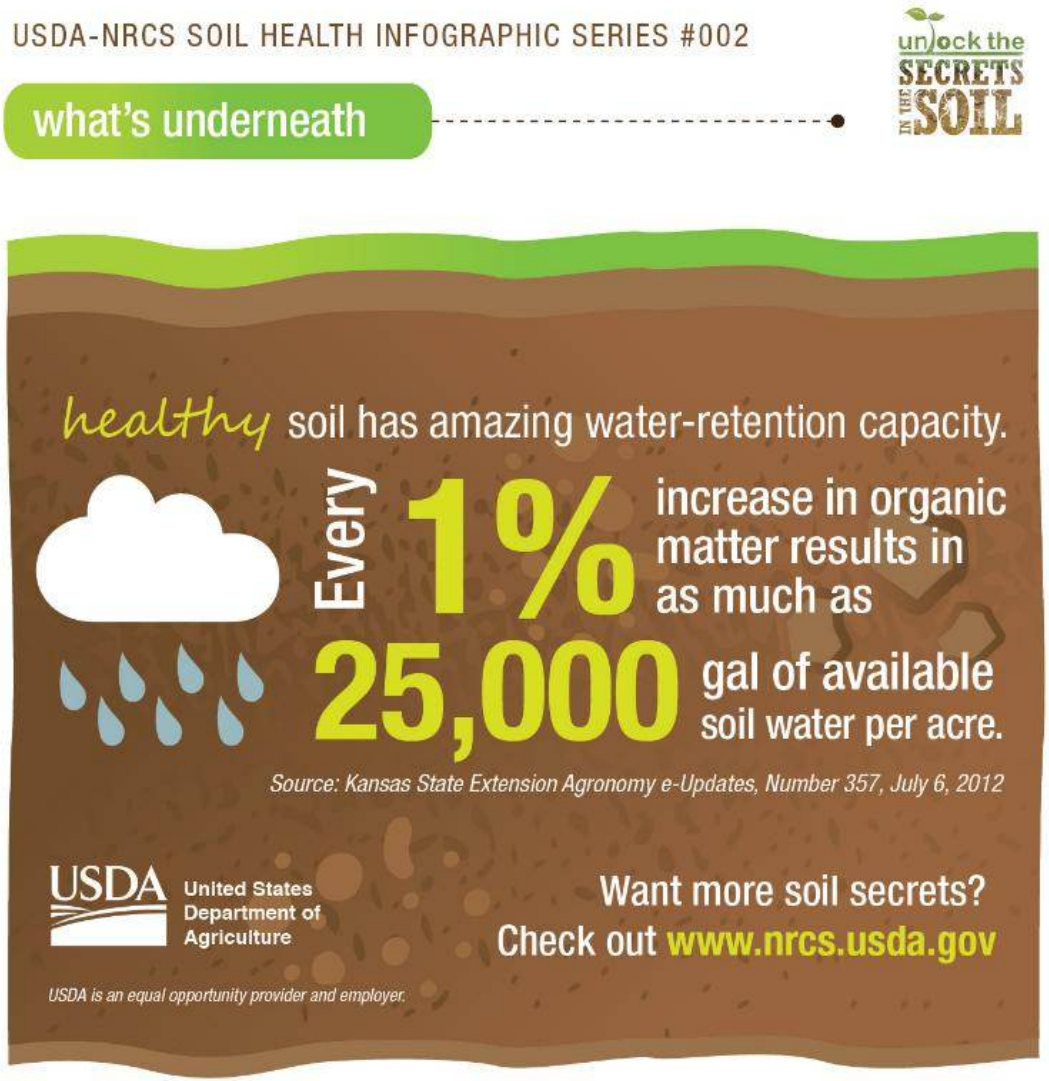

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The Five Principles Of Soil Health

SOIL COVER: ***Keep plant residues on the soil surface.*** Look down, what percentage of your soil is protected by residue? Erosion needs to be minimized before you can start building soil health.

LIMITED DISTURBANCE: ***Minimize tillage as much as possible.*** You will start building soil aggregates, pore spaces, soil biology, and organic matter.

LIVING ROOTS: ***Keep plants growing throughout the year to feed the soil.*** Cover crops can add carbon to the soil, providing a great food source for micro-organisms. Start small to find the best fit for your operation.

DIVERSITY: ***Try to mimic nature.*** Use cool and warm season grasses and broad leaf plants as much as possible, with three or more crops and cover crops in rotation. Grassland and cropland plant diversity increases soil and animal health.

INTEGRATING LIVESTOCK: Fall/winter grazing of cover crops and crop residue increases livestock's plane of nutrition at a time when pasture forage quality can be low, increases the soil biological activity on cropland, and improves nutrient cycling. Proper grassland management improves soil health.

COMET-Planner

Not secure | comet-planner.com

Step 1 Begin by naming your project and selecting your state and county

Project Name: | State: CA | County: Napa

Step 2 Select the class of conservation practices that best describes the practice you would like to evaluate

Cropland Management | Grazing Lands | Woody Plantings | Cropland To Herbaceous Cover | Restoration Of Disturbed Lands

Step 3 Select a NRCS Conservation Practice Standard and a Practice Implementation that best describes your system. You may add multiple practices. If you would like to add a practice under a different class of practices, return to Step 2.

Conservation Practice Standard (CPS)

- Combustion System Improvement (CPS 372)
- Conservation Crop Rotation (CPS 328)
- Cover Crop (CPS 340)
- Mulching (CPS 484)

Conservation Practice Implementation

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Approximate Carbon Sequestration and Greenhouse Gas Emission Reductions[1] (tonnes CO_2 equivalent per year)

NRCS Conservation Practices (Click Practice Name for Documentation)	Enter Acreage	Carbon Dioxide	Nitrous Oxide	Methane	Total CO_2-Equivalent
Cover Crop (CPS 340) - Add Legume Seasonal Cover Crop to Irrigated Cropland [delete]	100 ac	88	-36	0	52
Residue and Tillage Management - No-Till (CPS 329) - Intensive Till to No Till or Strip Till on Irrigated Cropland [delete]	100 ac	24	2	0	26
Mulching (CPS 484) - Add Mulch to Croplands [delete]	100 ac	32	0	0	32
	Total	**144.00**	**-34.00**	**0.00**	**110.00**

[1]Negative values indicate a loss of carbon or increased emissions of greenhouse gases
[2]Values were not estimated due to limited data on reductions of greenhouse gas emissions from this practice

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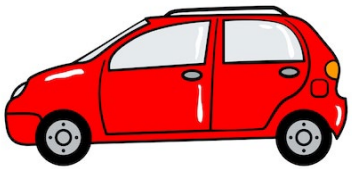

1 typical vehicle = 5 tonnes of CO_2/year

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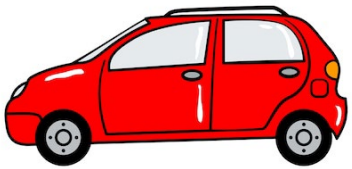

1 typical vehicle = 5 tonnes of CO_2/year

110 tonnes of CO_2 = 22 vehicles

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Limitations to carbon sequestration

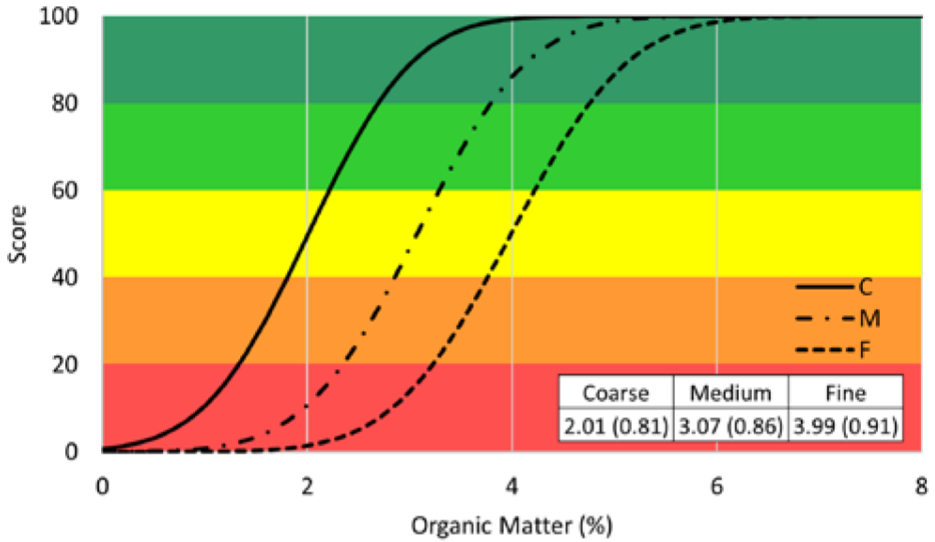

Figure 1. Soil Organic Matter (OM) scoring functions and upper value limits for Coarse (C), Medium (M) and Fine (F) textural classes. Mean and standard deviation (in parenthesis) for each class are provided. Soils with higher OM scores generally require lower inputs of nutrients and are more resilient to drought and extreme rainfall. (Comprehensive Assessment of Soil Health – The Cornell Framework Manual, 2016)

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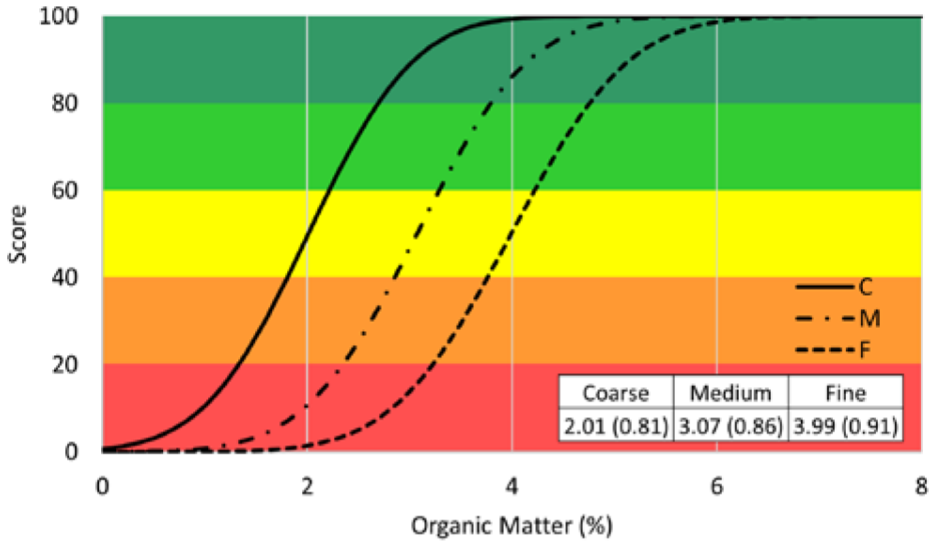

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Average organic matter % in Napa soils = 4%

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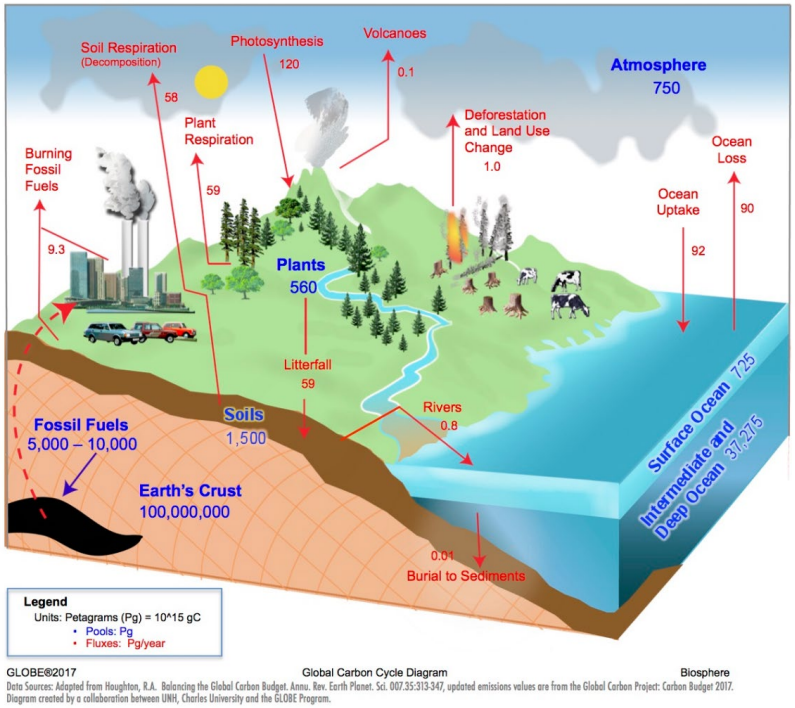
Limitations to carbon sequestration

Carbon sequestration slow, be patient.

Best way to assess progress is by conducting regular soil testing.



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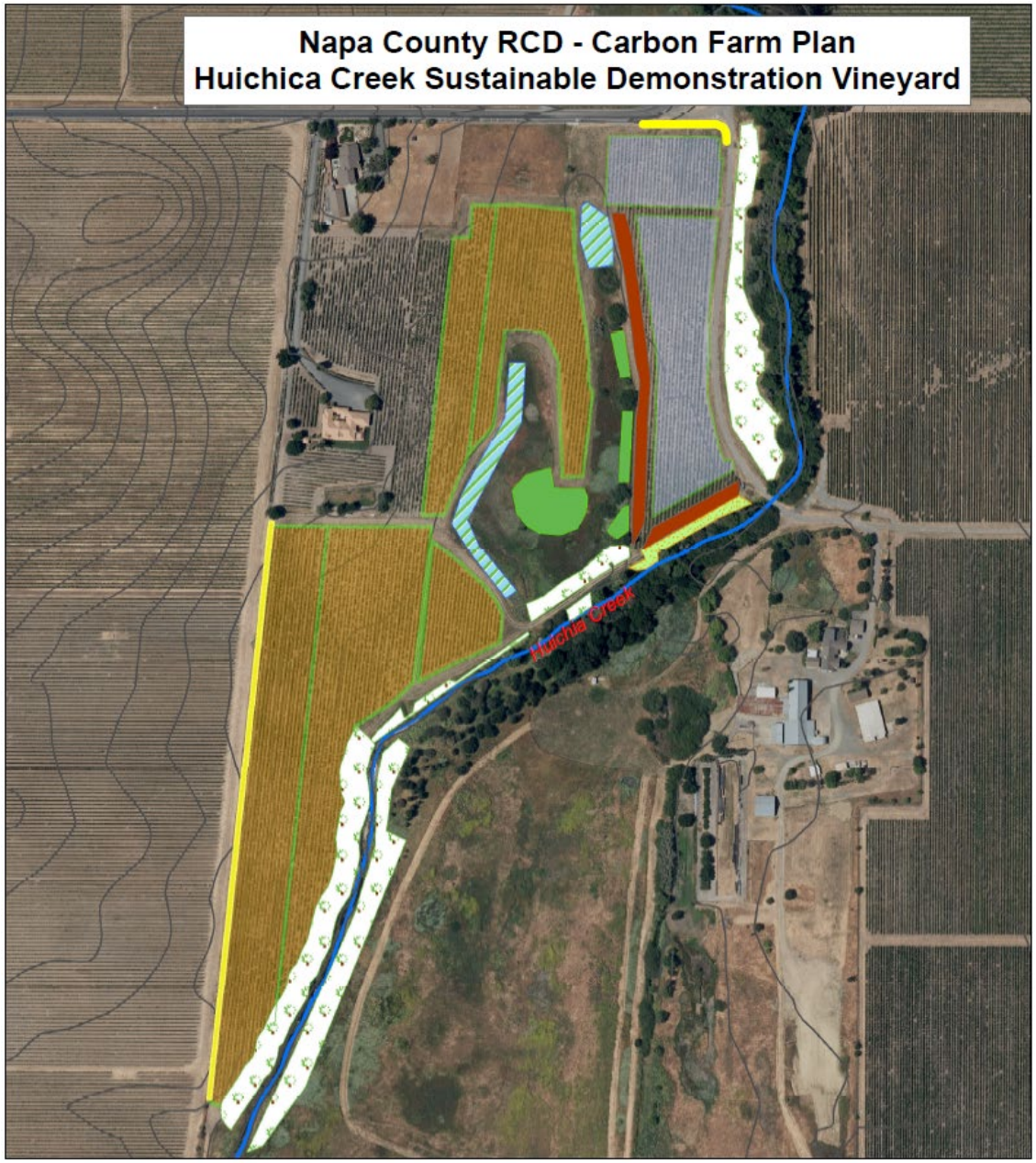


Current Practices

- Blocks A-E: Alternate Row Till
- Block F & G - No Till
- 5 Foot Contour
- Huichica Creek

Planned Conservation Practices

Compost Application in all vineyard blocks

- 327, Conservation Cover
- 380, Tree and Shrub Planting
- 390, Riparian Restoration
- 422, Hedgerow
- 657, Wetland Restoration
- Alternate-Row Tillage to No-Till
- Multistory Cropping

Carbon Farm Practices (NRCS Practice)

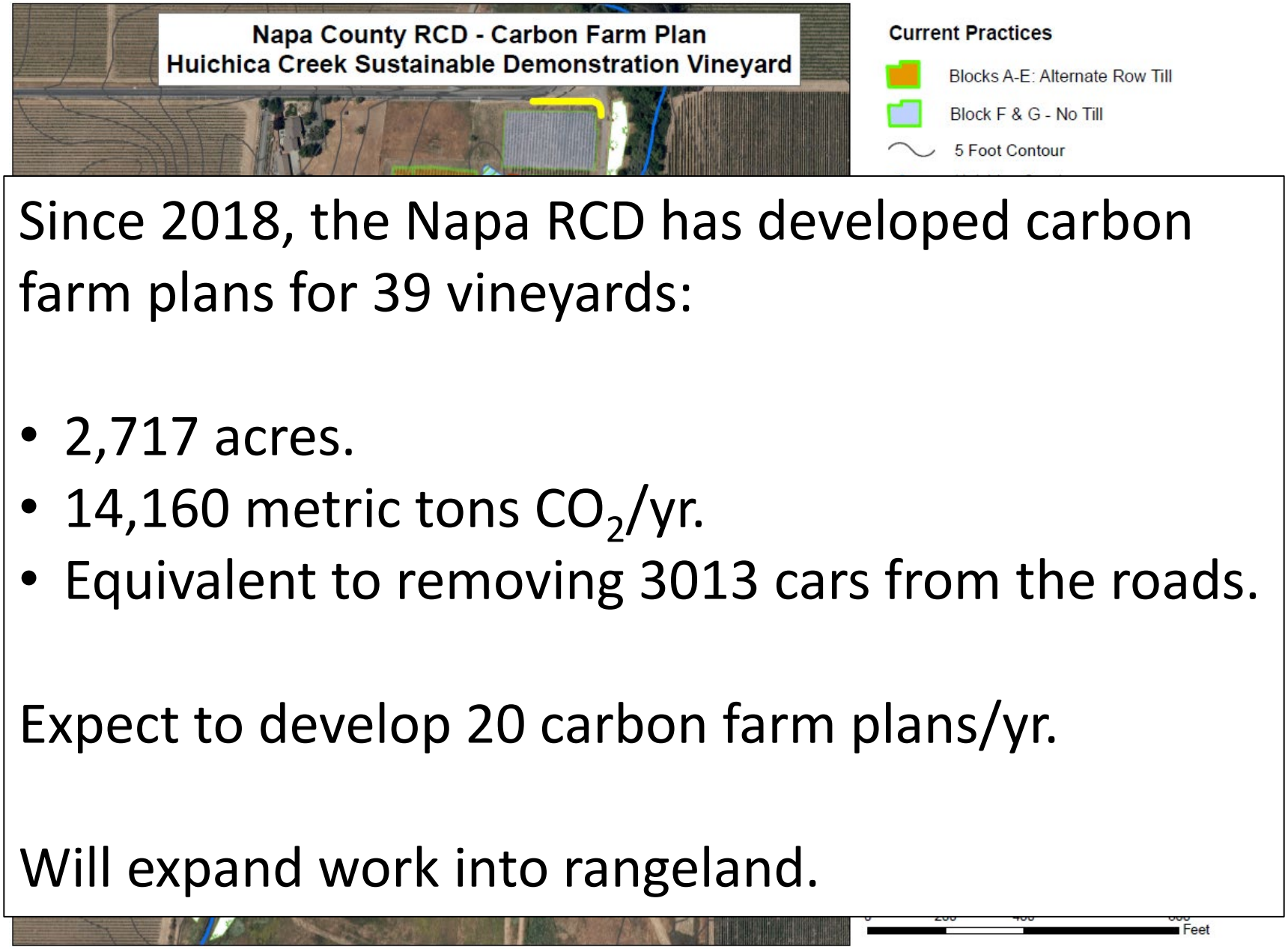
1. Riparian Restoration (390
2. Hedgerow Planting (422)
3. Conventional Tillage to No Tillage (329)
4. Compost Application Mulching (484)
5. Cover Crop Establishment (340)
6. Multistory Cropping (379)
7. Windbreak Establishment (380)
8. Wetland Restoration (657)

N W E S

LandSmart® Productive lands. Thriving streams.

NAPA COUNTY RCD Resource Conservation District

0 200 400 800 Feet



Since 2018, the Napa RCD has developed carbon farm plans for 39 vineyards:

- 2,717 acres.
- 14,160 metric tons CO_2/yr.
- Equivalent to removing 3013 cars from the roads.

Expect to develop 20 carbon farm plans/yr.

Will expand work into rangeland.


Thank you!
Do not disturb!
Soil at work