

Carbon Management Program – Sierra Resources Conservation District January 22, 2018

Summary

In May 2017, Sierra Resource Conservation District proposed to the Carbon Cycle Institute (CCI) to develop a District-wide Carbon Management Program (CMP), and incorporated this initiative as an integral part of its Annual Plan for 2017/18 (*adopted by the Board of Directors on July 24, 2017*). The District covers nearly 2 million acres consisting of irrigated agricultural lands, rangelands as working landscapes, and forestlands for ecological and economic purposes. The District looks at the development of a Carbon Management Program as an opportunity to reduce greenhouse gases, sequester for useful purposes carbon derived from excess biomass in agriculture and forestry – and improve soils conditions for water and nutrients in support of California’s Healthy Soils Initiative.

When fully implemented, the Plan will cover nearly 2 million acres consisting of irrigated agricultural lands, rangelands as working landscapes, and forestlands for ecological and economic purposes. The development of the Carbon Management Program will be the operating framework to reduce greenhouse gases, sequester for useful purposes carbon derived from excess biomass in agriculture and forestry – and improve soils conditions for water and nutrients in support of California’s Healthy Soils Initiative under SB-859. The Sierra RCD Carbon Management Program is a living document and aims at providing the RCD with a framework to inform land management decisions using carbon as the organizing and unifying principle.

Background

The District has been in existence since 1957 and has been involved in many of the resource challenges facing not just the District in Fresno County, but the Central Valley and Sierra Nevada regions of California as a whole. In the last 15 years, the District has been involved with a number of state and federal agencies facing our water and other natural resources such as the CALFED Bay Delta Program. They have also partnered with several research institutions such as the Kings River Experimental Watershed (KREW) and California Water Institute (CWI) at CSU Fresno. Most recently, the District has been severely impacted by the drought with its significant water restrictions to agriculture for irrigation purposes, impact to sufficient forage on working landscapes, and stressed forestlands that have been decimated by the bark beetle pandemic that has resulted in the loss of over 20 million conifers within the District.

Like the *hydrologic* cycle, the District has now recognized that co-equally there is the *carbon* cycle that needs to be understood and managed for ecological and economically beneficial purposes as well. These broad landscape processes within the Central Valley and Sierra Nevada are inseparable and cannot be de-coupled. Each provides a contribution to the other. Unfortunately, historically the integration of these two landscape processes has not been very successful. And, these rich

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natural resources are the foundation of a vanishing rural lifestyle in California and for fueling the economic engine of Fresno County as one of the largest agricultural producers in the United States. Agriculture is the county's main trade industry and is based on orchard crop, cattle and timber production. The legacy of cattle ranching remains at the cultural and economic core of Fresno County. The production of carbon emissions is common throughout, whether through equipment operations, transport, open burning and other forms of biomass production and/or disposal through non-use. Carbon farming will allow farmers, ranchers, forestry and other operators to increase their productivity and resiliency, while transforming their operations, and being perceived positively by the public, driving towards constructive solutions through optimized carbon sequestration on their landscape.

As urbanization increases within the valley floor in Fresno County, much of the lower foothills and rangelands are being converted to irrigated perennial orchard crops, a land use practice that is not well suited for the ever-increasing demand for limited water in the San Joaquin Valley, along with increased carbon emissions. With nearly 1 million acres in pasture and rangeland use, Fresno County can play a role in enhanced carbon sequestration and enter the Cap and Trade arena with strength. While orchards are a prime land use that can also sequester carbon, it requires a significant amount of groundwater for crop production and carbon management. Fresno County's rangelands are ideal for carbon farming and are less water intensive than orchard production. In addition to supporting livelihoods from livestock management, rangelands contribute to three main ecosystem services: carbon sequestration, water quantity, and wildlife habitat. Ecosystem services provided by rangelands include flood protection, filtration of contaminants for water quality improvements, and ground water recharge. In addition, these lands have the potential to remove significant amounts of carbon dioxide from the atmosphere.

Most of these landscapes are privately owned with few protections. Working with the ranching community to optimize carbon sequestration and the ecosystem services that take place on their lands is important to safeguard water resources. Implementing sound grazing methods, applying compost where appropriate, and engaging rangeland Best Management Practices (BMPs) to enhance carbon capture are all strategies to help insure the long-term productivity of the region's rangelands. Achieving increased carbon sequestration on the County's rangelands is based on management practices that correspond with ecological processes, as opposed to engineering ourselves out of unfavorable conditions. Compost application on California's livestock grazing land is a relatively inexpensive, low tech approach to increasing carbon capture that works with natural processes and increases rangeland production.

Secondly, the forestlands within the District have now been severely impacted due to the Tree Mortality Crisis. Conservatively, it is estimated over 60 to 80% of the conifer forest has been decimated – and in some areas closer to 100%. Water quality in these critical watersheds -which are the source of nearly 2/3's of California's water – will be impacted for many years. Erosion and debris flows will threaten aquatic species – and sediment deposition will reduce the storage capacity of several major reservoirs within the District and the Sierra Nevada region. The nexus between carbon (C) and water (H₂O) play out within the headwaters and forestlands in the District.

Since its formation, the District's mandate has been to provide assistance to organizations, public

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agencies, and private entities involved in the conservation of natural resources, as well as improving the District's socioeconomic and cultural heritage, and to facilitate collaborative efforts with these organizations, public agencies, private entities, and citizens. The public benefit realized will be the protection, enhancement and resiliency of valuable private and public resources. It is the goal of the District to encourage, guide and assist private landowners to be stewards of their lands. The Sierra Resource Conservation District sees the development of a Carbon Management Program as a framework in which to further engage private landowners in embracing these innovative ways to address their own individual resource challenges.

Opportunities

The Carbon Management Program (CMP) project, as a District-wide plan, will investigate the potential for specific land management practices to enhance sequestration of atmospheric carbon dioxide as organic matter in rangeland and agricultural soils and as vegetation in the county. Increasing soil organic matter has innumerable benefits in addition to helping to slow or reverse the potential impacts of adverse climate change. Improved water holding capacity, improved fertility, improved tilth, improved water quality, decreased need for petroleum-based pesticides, herbicides and fertilizers, decreased erosion and increased production are all known effects of increasing soil organic matter.

- a) Identify and to the extent possible quantify opportunities to enhance on-farm carbon capture in terrestrial plant biomass and soil organic matter on natural and working landscapes within the District, including a list of potential practices, acreage and all the environmental co-benefits (ecosystem services) and multiple beneficiaries both locally and in downstream communities including implementation of AB-2511 (Biochar/carbon as an approved soil enhancement)

The District has begun to quantify opportunities within public and private forest lands and has been awarded \$250,000 for the establishment of a mobile biochar production unit through CAL FIRE's Healthy Forest Grant Program and in partnership with the Sierra National Forest – U.S. Forest Service. In addition, through the Dinkey Creek Landscape Collaborative, the District has initiated discussions with Sierra National Forest, U.S. Forest Service, on the targeted management of over 3,000 acres of massive slash/log piles. These piles are scheduled to be disposed of by open burning – and the District is working to target these piles on public lands for biomass conversion into biochar (carbon) for soil carbon sequestration with mobile production unit(s). Additionally, the District has begun targeting non-merchantable logs on private forest lands for managed processing into biochar.

The District has also targeted a 160-acre forest in-hold as a carbon farming opportunity that is within the project site as noted above. Sierra RCD also holds a Conservation Easement (CE) on a 240-acre private forestry operation, which may be an additional opportunity. Finally, the District has a Statement of Mutual Interest (SOMI) with Southern California Edison (SCE) Forestry Operations, and, they have indicated an interest in the concept and practice of carbon farming. This encompasses over 20,000 acres of privately managed forestlands.

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- b) Work with its current agency and technology partners on developing tools and practices for the proper management of the carbon cycle through state-of-the-art biomass utilization and land management methodologies and technologies.
- 1) *The District has been evaluating and going through training for the COMET-Farm forestry module and COMET-Planner to assess its suitability for quantifying GHG benefits of forestry management practices.*
 - 2) *The District has initiated discussions with UC Cooperative Extension Fresno – and received interest from their Rangeland and Livestock Specialist to participate in carbon management opportunities – including the potential establishment of research and demonstrations at the San Joaquin Experimental Range.*
 - 3) *The District has received interest from UC Riverside and UCCE for collaborating on performing field research in irrigated lands within the District and Fresno County.*

Barriers

Identify barriers (economic, regulatory, outreach, education and others)

- *The primary barrier is funding for innovation and the element of risk as perceived by funders. Additional barriers are being identified – but have not been cataloged*

Assets and needs

- *Funding to support the implementation of a comprehensive carbon management program is the primary need. Additionally, the other major need is technical support*

Partners

Listed below are over 30 potential partners that can help meet the RCD needs for successful implementation of the CMP:

- Sierra National Forest
- Natural Resource Conservation Service (NRCS)
- Governor’s Office of Planning and Research
- U.C. Cooperative Extension
- Carbon Cycle Institute
- California Department of Conservation
- California Association of Resource Conservation Districts (CARCD)
- National Association of Conservation Districts (NACD)
- California Resources Agency / Sierra Nevada Conservancy
- California Department of Water Resources
- Dinkey Creek Landscape Collaborative
- Yosemite/Sequoia Resource Conservation and Development Council (Y/SRC&D)
- Fresno County Resource Advisory Council (FCRAC)
- Sierra/San Joaquin Noxious Weed Alliance

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- Highway 168 FireSafe Council
- Oak to Timberline FireSafe Council
- Fresno County Board of Supervisors
- Sierra Foothill Conservancy
- Back Country Horsemen of California
- San Joaquin River Trail Council
- Local Chapter of the Sierra Club - Tehipite
- Southern Sierra Integrated Regional Water Management Group
- Kings River Basin Integrated Regional Water Management Group
- Fresno/Kings County Cattlemen’s Association
- California Rangeland Conservation Coalition
- Fresno County Board of Supervisors, Districts 4 and 5
- State Assembly and Senate Representatives
- Fresno County Planning
- Shaver Lake Chamber
- Sierra - San Joaquin Noxious Weed Alliance
- Fresno County Agriculture Commissioner
- CAL FIRE

a) *The District has been working very closely with the Governor’s Office of Planning and Research – which has become a key partner. They have advocated for the District to participate in the Healthy Soils Initiative multi-agency planning team with CDFA.*

b) *Most recently Sierra National Forest, U.S. Forest Service has become a key partner with the award of the CAL FIRE grant. This is expected to be executed as a five (5) year Participating Agreement in January 2018. Additionally, they have executed with the District a two-year Cost-Share Agreement for managing the facilitation services in support of what is known as the Dinkey Creek Landscape Collaborative that went into effect September 2017.*

2) The RCD will keep project work connected with local and regional GHG reduction efforts. As a liaison between scientists and the landowner/operator, the District will be responsible for facilitating those relationships. In addition, the District will work with farmers, ranchers and forestry operators to support carbon farming efforts.

a) *The District has initiated the pragmatic elements for achieving this objective including meeting with the Fresno Economic Opportunity Commission (EOC) and Fresno Local Conservation Corp (LCC). The District and EOC/LCC will establish an MOU (Memorandum of Understanding) and an initial agreement in January 2018.*

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Funding

The District has engaged on multiple fronts on securing funding including the following:

- 1) \$250K for biochar production utilizing burn-pile/slash materials and non-merchantable logs – Awarded November 2017. Project start: January 2018*
- 2) \$500K for watershed/reforestation efforts – Qualified for awarding – not currently funded and needs to be resubmitted to California State Water Resources Control Board (SWRCB)*
- 3) \$3M to produce biomass-based renewable energy with the California Energy Commission (CEC) with Technology Partner All Power Labs (APL) – Qualified for awarding – not currently funded*
- 4) \$500K for two mobile biochar production units (1 for Ag and 1 for Forestry) with the San Joaquin Valley Air Pollution Control District (SJVAPCD). Reviewed by SJVAPCED – and awaiting call for proposals*
- 5) \$74K pre-application submitted to Sierra Nevada Conservancy (SNC) for the acquisition of the former Auberry Mill Site (AMS). Site visit conducted by SNC on September 13th – and full proposal submitted November 2017*
- 6) \$6,200 Awarded to the District by the Fresno County Resource Advisory Committee (RAC) for conducting a property appraisal of the AMS as part of the full proposal submittal scheduled for November 2017. Appraisal completed.*
- 7) The District has been awarded approximately \$10K in technical services from the California Association of RCDS (CARCD) to develop in partnership with the Tulare County RCD (TCRCD) a Durable Regional Collaboration Plan for the southern Sierra Nevada*
- 8) The District will be a recipient of CARCD's RCPP (Regional Conservation Partnership Program) grant award of \$10M from the NRCS which is anticipated to start no later than in mid-2018*
- 9) Reviewing the submission of a proposal to USFS's Wood Innovation Grant program to address the disposition of excess biomass for debris piles and produce biochar – Due on 1/21/2018*
- 10) Reviewing the submission of a proposal to SWRCB to address the disposition of excess biomass from debris piles and produce biochar – Due on 2/8/2018*
- 11) Reviewing the submission of a joint concept proposal with the USFS to CAL FIRE which would include increasing the ability to process excess biomass from debris piles and produce biochar based upon a campus cluster – Due on 2/21/2018*
- 12) Reviewing the feasibility to submit a proposal or loan application to CalRecycle for biomass waste stream reduction based upon a campus cluster – Tentative date release March 2018*
- 13) Tracking Conservation Innovation state grant opportunity directed towards support of the development of a campus cluster – Date release is TBD in 2018*

Other potential sources of funding include:

- CDFA - Healthy Soils Program*
- NRCS: CIG and RCPP (planning), EQIP (Implementation)*
- Private foundations*

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Begin supporting as feasible the implementation of California's Healthy Soils Initiative (SB-859) and how it is implemented through the California Department of Food and Agriculture and other state agencies.

The District through the invitation of the Governor's Office of Planning and Research (OPR) participated in CDFA's 2nd Healthy Soils Program Interagency Working Group meeting on August 22, 2017. Requested to become member.

Incorporate the CMP Framework as an integral part of the RCD's current 5-year 2015-2020 Long Range Plan for its remainder from 2017 to 2020.

Updated LRP reviewed and updated by CCI. Submitted and unanimously approved by the Board of Directors on 10/23/2017

Phase II: Implementation

A. Carbon Farm Plan (CFP) Development and Implementation (*Once additional funding is secured and within January to December 2018*).

- 1) The District will develop a selection process that will identify a suitable landowner/operation to undergo the CFP development process. This is an important step in the selection of a pilot site and model for other landowners in the community. The District will ensure that a CFP is developed that meets the present and future goals and objectives of the ranch while identifying and supporting implementation of carbon beneficial practices.
- 2) The District will identify a farming, ranching and/or forestry operation to enlist to develop a Carbon Farm Plan (CFP) and explore funding opportunities for the creation of the plan. As a starting point, these relations call for ecosystem carbon communication; an overview of basic carbon science and the importance of climate resiliency on their property for their own economic viability. Recruiting will require extensive effort in developing local interest in the project that will lead to participation in the planning process and implementation as a pilot project site.
- 3) The District will coordinate rancher and technical staff meetings, interviews, and site visits to discuss their ranch history, management practices and goals as well as gather data in developing a detailed resources portfolio.
- 4) In using the NRCS Conservation Planning Process as a guide, Plan development begins with an overall inventory of natural resource conditions and concerns on the landowner's operations that will largely be conducted by Sierra RCD's staff. With assistance from the NRCS, the two entities will develop a detailed ranch assessment requiring data collection and baseline soil sampling. The District or NRCS will use the gathered data to generate a GIS map of the operation to show all existing and potential on-farm carbon capture practices such as hedgerows, windbreaks, riparian corridors, riparian pastures, and restoration plantings and their locations. The map will include the location of infrastructure such as fence lines and pipelines as well as historical land management details. It will be a useful tool in identifying and documenting areas for conservation practice implementation and where to avoid compost application, if that is one of the practices

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selected as part of the Plan, such as slopes greater than 30%, native plant communities, and specific soil types and established soil organic matter. To quantify the amount of carbon associated with each practice, planners will use the new online tool, called COMET-Planner™, a whole farm and ranch greenhouse gas accounting system. The tool is used to quantify the greenhouse gas impacts of potential management practices. A report is then generated that identifies the carbon capture opportunities from implementation of identified practices, providing an estimate of metric tons of carbon dioxide that would be removed from the atmosphere and sequestered on farm by each practice.

- 5) The CFP will identify a suite of site-suitable NRCS conservation practices with carbon capture potential at the forefront and will showcase the connection between on-farm practices and climate change mitigation and climate resilience, as well as soil health and farm productivity.
- 6) The District will work with NRCS staff to ensure the CFP meets all the requirements outlined in the NRCS Carbon Plan Criteria.
- 7) The RCD will also help provide potential financing options that are available to implement the Plan. Two opportunities for financing these conservation practices have been identified. The first is the Healthy Soils Initiative through the California Department of Food and Agriculture (CDFA). The Governor and legislative leaders made available \$7.5M from the Greenhouse Gas Reduction Fund in 2017 for this Initiative. Awards were announced in December of 2017. This program allows CDFA to distribute funds to farmers and ranchers for practices that enhance soil health through increased soil organic matter. The second opportunity is CAL FIRE's California Climate Investments for Healthy Forests in 2018.

B. Biochar Integration into USFS, CAL FIRE, NRCS Forest Management & Conservation Practices and CDFA Healthy Soils Initiative (January 2018 through June 2020)

- 1) Work with USFS-SNF as Agency Partner to review and integrate Reforestation Framework under Dinkey Creek Landscape Collaborative
- 2) Work with USFS-Stanislaus National Forest / Rock Mountain Research Station to review and apply as feasible biochar as part of Reforestation Framework under Dinkey Creek Landscape Collaborative
- 3) Work with NRCS as Federal Sponsor and Agency Partner to review relevant Forestry Conservation Practice Standards (CPS) within their Environmental Quality Improvement Program (EQIP) within forestry operations
- 4) Work with CAL FIRE, Governor's Office of Planning and Research, CA Dept. of Food and Agriculture and others State entities on the feasibility of using biochar for carbon sequestration on forest, rangeland and agricultural lands; such as CDFA's Healthy Soils Initiative

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- 5) Promote modification/implementation of Conservation Practice Standards by NRCS that will contribute to reduced emissions; reduce open burning as disposal method; contribute towards improving nutrient, water retention and conservation; and carbon sequestration
- 6) Work with UC Merced Biochar Researchers; UC Cooperative Extension and CSU Fresno on potential research support of utilizing biochar for carbon sequestration on forest, rangeland and agricultural lands
- 7) Investigate for use emerging management tools developed on behalf of the NRCS by Colorado State University – in particular: COMET-Farm (<https://cometfarm.nrel.colostate.edu/ActivityType>) for Forestry
- 8) Implement COMET family for demonstration purposes within national forestry, agroforestry and agricultural operations and conduct sample analyses
- 9) Provide baseline analysis information from COMET family on emissions; energy use and other criteria as basis for determining different reduction scenarios that can be implemented by the ranching, farming and/or forestry management operator

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