

# Evaluating Climate Mitigation Potential of Natural & Working Lands in Santa Barbara County

## AUTHORS

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## CLIENT

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## OBJECTIVES

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The objective of this project is to evaluate the existing carbon stock and land-based GHG emissions within Santa Barbara County's natural and working lands. The ancillary objective is to identify implementable policies and strategies that support the County's climate mitigation goals which landowners and land managers can adopt. To build a strong case for the strategies identified, students will quantify the co-benefits (e.g., crop value, water quality, air quality, terrestrial habitat value, and groundwater banking potential) using TerraCount, a land use scenario planning tool. Throughout the project, students will:

- Create an inventory that identifies the landscape carbon stock and land-based greenhouse gas emissions across the entire jurisdiction. The inventory will help the County better understand the potential of natural and working lands to store and emit greenhouse gases;
- Use the inventory to develop a baseline reference scenario against which to compare potential management activities;
- Evaluate co-benefits of different land management activities and use TerraCount tool to run an analysis of future scenarios; and
- Prepare a report that analyzes the result of the inventory along with a policy brief that recommends implementable strategies based on quantitative analysis.

## SIGNIFICANCE

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Natural and working lands have the potential to support climate mitigation and adaptation goals due to their ability to sequester carbon, reduce greenhouse gas emissions, and improve an area's ability to withstand climate impacts. Conservation, restoration, and management activities on California's natural and working lands have the potential to account for 4-17% of California's 2030 greenhouse gas emissions reduction goals.<sup>1</sup> In Santa Barbara County, natural and working lands account for approximately 85% of the total land area.<sup>2</sup> But the loss of working land is occurring, mostly due to conversion to urban uses, threatening to diminish the potential climate benefits of natural and working lands. The conversion of working lands to urban uses is expected to persist as the county-wide population is projected to increase by 23% by 2040.<sup>3</sup> At the same time, Santa Barbara County is expected to experience climate impacts that can affect the timing of seasons and temperatures, precipitation, and potential sea-level rise, all of which can negatively impact the overall health of the agricultural sector.

This project aims to support Santa Barbara County's greenhouse gas reduction and climate adaptation goals by evaluating the potential of natural and working lands to store and emit greenhouse gases. In addition, this project will examine how future land-use scenarios could impact this potential, and how a range of complementary

benefits may be impacted in different scenarios. Climate mitigation strategies can help farmers, ranchers, and land managers respond to climate change and economic uncertainty. Well-designed emission reduction strategies can prevent conversion risk by helping landowners implement best management practices. For example, carbon farming projects piloted on grazing lands in the Santa Barbara region have shown to sequester carbon and improve forage production, soil health, and water retention.<sup>4</sup> These co-benefits are quantifiable and can be modeled using TerraCount, a spatial analysis tool.

## **BACKGROUND**

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Like many local governments throughout the State of California, the County of Santa Barbara approaches climate mitigation through the framework of a Climate Action Plan (CAP). The County adopted its CAP in May 2015, which set a goal of reducing greenhouse gas (GHG) emissions in the unincorporated county to 15% below 2007 levels by 2020. Measurable strategies designed to meet the 2020 reduction target were codified into the CAP. Unfortunately, a recent GHG emissions report showed that emissions were 14% above the 2007 baseline in 2016, and the County was not on track to meet its 2020 target. As a result, the County Board of Supervisors has doubled down on climate mitigation efforts setting a target of reducing GHG emissions to 50 percent below 2007 levels by 2030. To meet this more aggressive target, the County seeks to broaden the scope of the CAP by incorporating the natural and working lands sector. Natural and working lands include forests, rangelands, farms, urban green spaces, wetlands, and soils.<sup>5</sup>

In late 2019, the County was awarded a planning grant from the Department of Conservation to incorporate natural and working lands into the CAP. The DOC grant is currently funding this project which builds off the framework and tools developed by Merced County.

## **EQUITY**

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Many of Santa Barbara County's disadvantaged communities are located in the northern part of the County, which contains the majority of the County's agricultural lands and operations.<sup>6</sup> Residents in these communities are, as a whole, more dependent upon the agricultural economy than residents in the south county areas. By modeling future land-use change and climate scenarios, this project can support agricultural communities in planning for the future.

In addition, this project looks beyond greenhouse gas emissions in evaluating the impacts of different land management activities. The TerraCount tool specifically seeks to assess how a host of co-benefits, including water quality, crop value, and air quality, might be improved or degraded in response to changes in natural and working lands. Modeling these complementary benefits can help Santa Barbara County incorporate equity-based decision making into the natural and working lands component of its climate action plan.

## **AVAILABLE DATA**

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To complete the inventory and run TerraCount, this project will use the following publicly available datasets:

- LANDFIRE
  - Dataset from the U.S. Department of Agriculture Forest Service and U.S. Department of the Interior that includes spatial data with land cover classes, as well as the type, density, and size of vegetation in each 30x30 meter pixel.<sup>7</sup>
- Santa Barbara County Association of Governments' Land Use Model
- Soil Survey Geographic Database
  - Spatial data from USDA on soil type and climates
- USDA Cropland Data Layer<sup>9</sup>
- TerraCount

- A scenario planning tool developed by California Department of Conservation to model GHG and natural resource implications of land management activities. The tool is available for use from the Department of Conservation and includes data from numerous sources that are used to estimate co-benefits.
- Merced County piloted the use of TerraCount and, along with the Department of Conservation and The Nature Conservancy, and has provided detailed guidance on TerraCount and its implementation. For more information, see *Resilient Merced*.<sup>10</sup> Pages 28-29 specifically detail data sources used to calculate co-benefits.

## APPROACH

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- **GHG inventory:** The carbon inventory in Santa Barbara County will be estimated using LANDFIRE and Santa Barbara County Land Use spatial data to designate land cover classifications for all county land. The land cover information for each pixel will be translated to estimated carbon stocks using LANDFIRE vegetation data, USDA Soil Survey and Cropland data, and methods developed by California’s Air Resource Board.<sup>11</sup> The carbon stocks in each pixel will be added together to estimate the total carbon sequestered in the county.
- **Baseline reference scenario:** The carbon inventory analysis will be completed for two points in time to develop a baseline reference scenario, “business-as-usual.” The baseline will be a linear extrapolation of past trends in carbon inventory, which will be used to reference changes from potential implementation of land use policies and management activities.
- **Complementary benefit assessment:** Changes from land use policies and management activities can provide many additional environmental and economic benefits. The co-benefits that are relevant to Santa Barbara County will be identified and estimated using the TerraCount tool and available data sources.
- **Forecasting:** The TerraCount tool will be used to develop multiple scenarios of changes in land use and management, and to estimate the resulting changes to carbon inventories and co-benefits. The TerraCount tool is configured with 12 management activities, such as “urban forestry” and “native grassland restoration.” TerraCount applies the activities to the pixels of land suitable for the activity and estimates the resulting impacts to carbon inventories and co-benefits.
- **Policy and management recommendations:** This project will culminate in a report detailing the results of the quantitative analysis described above. The report is intended to outline implementable strategies related to natural and working lands that can support the County in meeting its climate action goals.

## DELIVERABLES

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Beyond a final written report, policy brief, poster, and oral presentation, the group will provide:

1. A landscape carbon inventory, analyzing carbon storage and greenhouse gas emissions from natural and working lands in Santa Barbara County
2. An evaluation of possible co-benefits to include in further natural and working lands analysis
3. Results of scenario modeling using TerraCount, incorporating one complementary benefit (water quality) and related management recommendations

## INTERNSHIPS

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The Sustainability Division of the County of Santa Barbara will sponsor one internship with funding of \$5,000.

## SUPPLEMENTAL MATERIALS

### REFERENCES

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1. California Air Resources Board. "California Natural and Working Lands Inventory." December 2018.
2. Cameron, D. et al. (2017) Ecosystem management and land conservation can substantially contribute to California's climate mitigation goals. Proceedings of the National Academy of Sciences; Marvin, D. et al. (2018).
3. Santa Barbara County Association of Governments. "2040 Fast Forward Regional Transportation and Sustainable Communities Strategy. August 2017.
4. Walker, Tanner. Carbon Farming Coming to Santa Barbara. The Bottom Line. <https://thebottomline.as.ucsb.edu/2018/05/carbon-farming-coming-to-santa-barbara>.
5. California Air Resources Board. "Natural and Working Lands" <https://ww2.arb.ca.gov/our-work/programs/natural-and-working-lands>.
6. California Department of Water Resources. Disadvantaged Communities (DAC) Mapping Tool. <https://gis.water.ca.gov/app/dacs/>
7. LANDFIRE, LF Reference Database, U.S. Department of Agriculture and U.S. Department of the Interior. Available at <http://landfire.gov>.
8. Natural Resources Conservation Service. 2015. Web Soil Survey. United States Department of Agriculture, Available at <https://websoilsurvey.nrcs.usda.gov>
9. USDA-NASS. 2009–2014. Cropland Data Layer. Published crop-specific data layer. Available at <https://nassgeodata.gmu.edu/CropScape>. USDA, National Agricultural Statistics Service, Washington, DC.
10. The Nature Conservancy. "Resilient Merced: A County Guide to Advance Climate Change Mitigation and Complementary Benefits through Land Management and Conservation. August 2018.
11. Saah D, Battles J, Gunn J et al. 2015. Technical improvements to the greenhouse gas (GHG) inventory for California forests and other lands. Submitted to California Air Resources Board, Agreement #14-757.55 pages. Available at [https://www.arb.ca.gov/cc/inventory/pubs/arb\\_pc173\\_v004.pdf](https://www.arb.ca.gov/cc/inventory/pubs/arb_pc173_v004.pdf).

### BUDGET & JUSTIFICATION

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It is not anticipated that the proposed project would require additional funding beyond the \$1,300 contributed by the Bren School. However, the County is prepared to fund any additional project costs that might incur as the project progresses. As mentioned in the Letter of Support, the County will be hiring a consultant to manage and troubleshoot the Department of Conservation Grant, which this project is a part of.



**Community Services Department**  
*Connecting People to Opportunities*

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 Sarah York Rubin, Executive Director, Office of Arts & Culture  
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 Jeff Lindgren, Superintendent, Park Division  
 Ashley Watkins, Co-Division Chief, Sustainability Division



Group Project Committee  
 Bren School of Environmental Science and Management  
 University of California, Santa Barbara

January 24, 2020

Dear Group Project Committee,

We are writing to express our support for the Master's group project: **Conducting a Land-Based Carbon Inventory on Santa Barbara County's Natural & Working Lands (NWL) and Running TerraCount, a Land Use Scenario Planning Tool for Modeling GHG and Natural Resource Impacts.** The Department of Conservation is funding this project through the Working Lands and Riparian Corridors Grant Program. Outcomes of this project will inform the 2020 update of the County's Energy and Climate Action Plan, which seeks to reduce GHG emissions by 50 percent below the 2007 baseline by 2030.

NWLs are vital to the County's economic and environmental health. Working lands comprise approximately half of the County's land area, and the agricultural sector alone contributes 2.8 billion dollars to the County's economy annually. This project will allow the County to identify GHG mitigation strategies concerning sustainable land-use and conservation of NWLs.

Conducting land-based carbon inventory is still a relatively new field in the world of climate action planning. Fortunately, there are great examples of this work in California. The Nature Conservancy, in partnership with Merced County, published the Resilient Merced Guide intended to help local governments conduct a land-based carbon inventory and adopt TerraCount for planning scenarios. Bren students working on this project will mostly use the same data and methodology detailed in the Resilient Merced Guide.

To further assist the students, the County will hire a consultant to assist with grant management and technical support. It will be part of the consultant's scope of work to provide quality assurance and control for the student's work product. The County will also be directing \$5,000 from the Department of Conservation grant to sponsor a summer internship.

Sincerely,

  
 George Chapjian  
 Director, Community Services Department

  
 Ashley Watkins  
 Division Chief, Sustainability Division