

**California Collaborative on Climate Change Solutions:
Working Lands Innovation Center - Catalyzing Negative Carbon Emissions**

Lead PI: Benjamin Houlton (UC Davis), Director, John Muir Institute of the Environment; Professor and Chancellor's Fellow, Dept. of Land, Air and Water Resources

Partner Institutions:

- UC Berkeley, Whendee Silver (co-PI), Rudy Grah Endowed Chair and Professor, Dept. of Environmental Science, Policy, and Management
- CSU East Bay, Patty Y. Oikawa, Assistant Professor, Dept. of Earth and Environmental Sciences
- Lawrence Berkeley National Laboratory, Andrew Jones, Research Scientist and Program Lead, Earth and Environmental Sciences Area
- UC Merced, Tapan Pathak, Cooperative Extension Specialist, Sierra Nevada Research Institute

Overview: The goal of the Working Lands Innovation Center (WLIC) is to demonstrate and deploy a suite of soil amendment technologies, which hold scalable, near-term promise for capturing atmospheric carbon dioxide (CO₂), reducing greenhouse gases (GHGs), and sequestering carbon in working lands. WLIC's mission is focused on extracting CO₂ and catalyzing negative carbon emissions via approaches that generate multiple benefits for communities, industry, climate, Tribes, and the environment.

Led by PI Houlton and co-PI Silver, WLIC is aligned with the California Collaborative on Climate Change Solutions (C4S) – a consortium of researchers and technologists from leading California institutions, facilitating partnerships with industry, government and researchers to accelerate GHG reductions.

WLIC's research portfolio is focused on three technologies:

- CO₂ capture with co-benefits: rock amendments in cropland and rangeland soil (Project 1);
- Carbon sequestration from compost applications to cropland and rangeland soil (Project 2); and
- Demonstration of combined CO₂ capture technologies: factorial combinations of compost, rocks and biochar amendments (Project 3).

In addition, WLIC will conduct geospatial model analysis to identify best practices for scaling carbon removal statewide (Project 4). Our total project portfolio could, at scale, remove 36-82 (or greater) million tons CO₂e/y in California, including CO₂, methane, and nitrous oxide. WLIC will deploy soil amendment technologies in the form of acre-scale demonstrations (~27 sites proposed), spanning bi-climatic regions, crops (almonds, corn, wheat, alfalfa, tomato, among others), soils, and management practices.

Explicit outreach and engagement activities in WLIC leverage state (i.e., UC Cooperative Extension, Farm Advisors) and national networks, such as the USDA. Further, WLIC is partnering with industry groups (i.e., California Almond Board), commercial manufacturers and farmers, and private land-owners, in addition to engagement with California Tribes.

WLIC's research and development (R&D) strategy is focused on measurement of organic and inorganic soil carbon sequestration rates, GHG emissions, soil and crop health, yields, and model development to ascertain geographic magnitudes of CO₂ removal and drive co-benefits. WLIC's commercialization program leverages the expertise of Larta Institute, an established leader in small business development

and investor-based opportunities for commercialization. Barriers to adoption will be overcome through quantitative analysis of carbon capture, cost-benefit analysis, stakeholder engagement to inform adoption, and WLIC partner activities.

WLIC will engender diverse benefits for low-income and disadvantaged communities, including the state's rural communities, which are economically highly vulnerable to climate/environmental risks.

WLICs demonstrations will:

1. Maintain and protect agricultural economy in rural areas;
2. Promote opportunities for Tribes to take advantage of our technologies/research through collaborative partnerships;
3. Create a cleaner environment in the Central and Imperial Valleys by improving fertilizer use efficiency;
4. Redesign organic waste streams converting problems into solutions;
5. Enhance agricultural workforce development by demonstrating how amendments can improve yields with less, helping with climate adaptation;
6. Increase the affordability of healthy food options by promoting soil health, crop resilience, and aiding in agriculture resilience; and
7. Create opportunities for ranchers and farmers to financially benefit from C offsets through soil restoration practices and GHG reductions.