GFCAB Faculty Fellowship Proposal: Carbon Sequestration in California's Central Valley

Abstract

This project seeks to understand public and local policy elite perceptions of carbon sequestration strategies in California's Central Valley. By conducting a survey of the general public and local policy elites, the study will examine awareness, knowledge, perceived risks and benefits, and policy preferences related to carbon removal techniques such as Biomass Carbon Removal and Storage (BiCRS) and Direct Air Capture (DAC). The anticipated significance of the research is its potential to inform local policy and outreach efforts, particularly associated with the agriculture sector in the Central Valley.

Background

The state of California has laid out ambitious plans to achieve net zero carbon pollution for the state by 2045. While much of the focus is on the reduction of carbon emissions, reaching net zero carbon pollution requires carbon sequestration – the process of capturing and storing atmospheric carbon dioxide (CO2) in order to reduce atmospheric CO2 levels in an effort to mitigate climate change's impacts – in addition to reducing carbon emissions. California's plan includes a carbon removal/capture goal of the removal of 100 million metric tons CO2 equivalent by the year 2045. Similarly, the United States has established carbon removal targets, with a goal of removing 1 billion tons of CO2e per year by the year 2050. While there are many mechanisms by which carbon can be removed from the atmosphere, the process by which carbon removal is most efficient and efficacious is largely dependent upon local conditions. As such, Lawrence Livermore National Laboratory (LLNL) recently released their report entitled "Roads to Removal" that focuses on carbon removal strategies to address climate change at the regional level, including California's Central Valley. Recommended methods of carbon removal in the Central Valley include soil-carbon storage and conservation practices, Biomass Carbon Removal and Storage (BiCRS), and the utilization of Direct Air Capture (DAC) technologies, all of which impact agriculture in the region.

Being an important agricultural hub, California's Central Valley region offers significant opportunities to contribute to both state and national carbon removal goals utilizing both technological and ecological strategies. Using practices such as cover cropping, no-till farming, and planting perennial crops can aid in the storage of carbon while also improving soil health and water retention – an important outcome in a region often dealing with water scarcity. The Central Valley region also produces large amounts of agricultural residues such as tree trimmings and crop waste, which can be used for biomass carbon removal and storage (BiCRS). With this process, biomass is converted into biochar or bio-oil which can be stored in geologic formations or soils for extended time periods. Lastly, the Roads to Removal report recommends the utilization of DAC technologies in the Central Valley. While being energy intensive, these technologies capture CO2 directly from the air, allowing it to be either stored or repurposed for industrial uses.

While there is a large and growing amount of research indicating the need for addressing climate change in a multitude of ways at local, state, national, and international levels, there is not always the political support necessary to implement potential solutions. As such, understanding the attitudes and preferences of stakeholders is vital to developing both policies and business practices at the local level that achieve broader goals aimed at addressing climate change in a way that accounts for the attitudes, opinions, and needs at the local level.

Activity, Purpose, and Significance

This project seeks to understand perceptions, attitudes, and preferences associated with carbon sequestration in California's Central Valley region in order to better understand opportunities and challenges within the region associated with carbon sequestration in the context of the state of California's efforts to achieve net zero carbon pollution by the year 2045. For this, a survey of two broad groups – the general public and local policy elites – will be conducted in order to understand how both the general public and potential decision-makers perceive these issues and opportunities. Understanding

the attitudes of the general public toward agricultural and environmental challenges can help to inform outreach and educational initiatives as well as policy development, as policy success largely depends on the support or opposition that exists among the general public. Local policy elites are important in shaping agricultural, land use, and environmental regulations and policies due to their ability to influence the policy-making process. Further, the efficacy of policies initiatives is often dependent upon the support of those responsible for implementing and enforcing policies (e.g. bureaucrats). As such, understanding this group's attitudes can provide important insights regarding feasibility and support for policies aimed at addressing climate change and, more specifically, carbon sequestration. Specifically, the survey will examine knowledge and awareness of carbon sequestration opportunities, perceived risks and benefits associated with different carbon sequestration activities in the Central Valley, who is (dis)trusted for information regarding these opportunities, and policy preferences associated with carbon sequestration. Together, this will provide insights for policymakers and those in the agriculture sector broadly to help guide policy decisions and public outreach efforts, helping ensure that actions from both public and private actors align with, or are at least informed by, public and stakeholder values, attitudes, and priorities. By examining both the general public and local policy elites, this project will help enable and inform the identification of potential policy pathways that are both feasible and publicly supported.

Research Timeline

October - November 2024: Development of the survey instrument.

December 2024 - January 2025: Administer the survey the general public and local policy elites across the Central Valley via email invitations.

February 2025: Analyze survey data.

March – April 2025: Prepare and distribute report of the findings.