
Soil Health and Carbon Sequestration in US Croplands: A Policy Analysis (Executive Summary)

Prepared for: Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture, and the Berkeley Food Institute (BFI)

By: Léopold Biardeau, Rebecca Crebbin-Coates, Ritt Keerati, Sara Litke, and Hortencia Rodríguez, Goldman School of Public Policy, University of California Berkeley

May 2016

Soil health is a key driver of agricultural productivity, environmental resilience, and human security worldwide. In the United States, soils are one of the most valuable commodities, producing \$835 billion in agriculture and related industries annually, and providing 17.3 million jobs at 9.4% of total employment (USDA ERS 2015). Healthy soils also provide numerous environmental co-benefits to society, including carbon sequestration and reduced risk of flooding, erosion, pest and plant disease outbreak. Yet our most productive soils have already been exploited (Amundson et al. 2015), and many conventional agricultural practices such as intensive tilling threaten long-term soil health.

Despite the numerous agronomic and ecological benefits, there is not enough sustained adoption of soil health practices by farmers in the US. This constitutes a type of market failure known as a positive production externality. With rapid urbanization, increasing demand for food, and shifting climate conditions, a critical public policy question is how to improve and maintain cropland soil health.

We examine current policy challenges and opportunities for the Natural Resources Conservation Service (NRCS) of the US Department of Agriculture (USDA) in increasing the adoption of soil health practices. **We are particularly interested in how the co-benefit of capturing carbon in soils can help motivate the adoption of soil health practices.** Our research methodology includes seventeen stakeholder interviews with farmers, NRCS staff and partners, and private-sector firms; a literature review; and data analysis. Case studies of Iowa and California are presented with state-specific challenges and opportunities to represent the diversity of agriculture, climate, and political landscape in the US.

We find multiple challenges – both systemic and operational – to the adoption of soil health practices. These include prohibitive transaction costs for farmers; limitations of soil and carbon sequestration science; insufficient technical assistance for farmers; a lack of NRCS staff capacity and underutilization of partnerships; and poor targeting and misalignment of owner/renter incentives.

Our goal is to provide a set of recommendations that NRCS can pursue to overcome both systemic and operational challenges facing farmers and NRCS in increasing the adoption of soil health practices. Our policy options are summarized below:

	Policy Effectiveness	Cost Effectiveness	Equity	Political Feasibility	Overall
6.a. Status Quo	Low	Low	Low	High	Low
6.b. Adjust Program Implementation	Medium	High	High	Medium	High
6.c. Increase Public-Private Partnerships	Medium	Medium	Medium	Medium	Medium
6.d. Promote End-market Demand	Medium	High	High	Medium	High
6.e. Cap-and-Trade for Farmers	Low	Low	Low	Low	Low
6.f. NRCS as Carbon Bank/Broker	Medium	Medium	High	Low	Medium

We advise NRCS pursue a number of opportunities in the near term to modify existing programs and spending to address operational challenges. **Our primary recommendation is that NRCS pursue Alternative 6.b. Adjust Program Implementation, specifically by:**

- **Increasing technical assistance and offsetting/minimizing transaction costs for farmers,**
- **Increasing partnerships through the Regional Conservation Partnership Program (RCPP), and**
- **Better targeting of outreach to absentee and female landowners, given recent and expected shifts in land ownership and historic gendered challenges.**

These actions can increase uptake of soil health and carbon sequestration practices without requiring significant resources beyond NRCS' existing budget.

In the long run, NRCS may also explore the options of promoting end-market demand for crops grown through sustainable practices (6.d), and enhancing mechanisms to promote public-private partnerships beyond RCPP (6.c). Both of these represent cost efficient and scalable alternatives for NRCS, as they leverage participation by the private sector and create long-term incentives for farmers to adopt soil health practices.

In contrast, other alternatives that specifically leverage the benefits of carbon sequestration involve significant administrative and legislative complexities and provide minimal incentives for farmers to adopt soil health practices (Options 6.e Creating Cap-and-Trade Market for Farmers, and 6.f. Creating a Protocol to Allow NRCS to serve as a carbon bank/broker). For instance, creating a cap-and-trade market for farmers will increase farmers' income by less than three percent, while the implementation entails significant transaction costs to measure, monitor, and verify the carbon offsets that farmers generate, particularly given the heterogeneous nature of farms in the United States.