

Soil Health

Description

Land use and management can build or reduce soil carbon depending on the particular management practices used. As a result, opportunities for GHG mitigation in agriculture include encouraging practices that increase soil carbon or discouraging those that reduce soil carbon. Management practices that improve soil health decrease erosion of carbon-rich top soil and increase soil organic matter. These practices result in organic matter stabilization and

carbon sequestration. Additionally, soil health management systems (SHMS, or suites of soil health promoting practices) and improved soil health status can reduce net CO₂ and N₂O emissions, both directly on farm and indirectly, for example through reductions in inputs and fuel usage.

This building block is cross-cutting; changes in soil health impact and are impacted by a number of the other

CASE STUDY

Leon Moses has transformed the farm he operates. More importantly, he has also transformed his thinking. He no longer sees the soil as just a medium for producing crops. Instead, he sees a living soil that's the focus of his operation. "I'm doing something good for the soil, and in turn the soil rewards me with yields that don't even compare to what we used to have," says the superintendent of the 492-acre North Carolina A&T State University farm. Moses began experimenting with no-till and strip till farming 25 years ago as a research technician. "I saw what happened there and decided no-till was the right thing to do. When I became superintendent in 2004, we began using no-till for all our corn and soybeans," he says.

In 2006, he added cover crops — not for what they could do for the soil, but because he had a shortage of hay for the farm's livestock. "But I began to learn very quickly that no-till and cover crops combined to make healthy soils that rewarded me with higher yields," Moses says.

Now, he uses no-till and cover crops on 100 percent of his operation. "In 2004, some soybean yields were at 25 bushels an acre. Now we can easily get 65 bushels per acre of soybeans," he says. "It used to take 40 acres of corn to fill our silo and now we only have to cut 10 acres of corn to fill the silo. We were getting 10 tons per acre of silage and now it's 22 tons an acre. The yield we used to get just doesn't begin to compare with what we get now."

"The return on my investment on this farm is easily a 35-percent to 45-percent increase, and we get three or four times more production," Moses says. "It's the best way to go. The proof is always in the pudding."

More information on soil health in North Carolina, including a video with Leon Moses, can be found here: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/nc/soils/health/>.



Corn emerging through a terminated cover crop on the North Carolina A&T State University farm near Greensboro. Photo courtesy of USDA NRCS.

building blocks. As such, the benefits of improved soil health for climate change mitigation and many other desirable environmental, social, and economic outcomes are diverse, are an opportunity in all land management systems, and can be challenging to quantify completely. This summary provides a broad overview of the potential opportunities that exist for mitigation. Some of these will be accounted for in other related building blocks, such as soil health benefits of improved Grazing and Pasturelands, and Conservation of Sensitive Lands. Other opportunities cannot yet be quantified due to lack of existing data and methods for proper estimation.

The estimated GHG reductions for this building block are a conservative estimate for crop lands. However, the broader implementation strategy, particularly with respect to education, revision of NRCS Conservation Practice Standards, and technical and financial assistance, will interact with and enhance results achieved by the Building Blocks on Nitrogen Stewardship, Grazing and Pasturelands, Conservation of Sensitive Lands, and others.

Greenhouse Gas Reduction Goal

| Goal | GHG Reduction Goal (MMTCO ₂ e per year by 2025) ¹ |
|--|---|
| Increase soil carbon sequestration by improving soil health, decreasing erosion of carbon-rich top soil, and increasing soil organic matter. | 4 - 18 ² |

¹ For more information on how to interpret this goal, see p. 6.

² The lower bound of this goal continued patterns of adopting individual Conservation Practice Standards related to soil health, while the upper bound could be achieved by broad adoption of soil health management systems.

Partnership Opportunities

Numerous partnership efforts will facilitate broad national impact on practice adoption by leveraging skills, resources, and shared goals to accomplish the plan laid out below. The NRCS is and will be partnering with a number of other organizations:

- USDA’s Risk Management Agency and Farm Service Agency, the National Soybean Association, Midwest Cover Crops Council, National Wildlife Federation, Land-Grant Universities, National Crop Insurance Services, Inc., and others to develop national and regional guidelines (as applicable) for cover crops to ensure their beneficial use in crop production.
- National Corn Growers Association, Monsanto, The Nature Conservancy, Environmental Defense Fund, USDA’s Agricultural Research Service, and numerous universities, among others, to establish and evaluate soil health demonstration field sites to encourage adoption of soil health-promoting practices.
- National Association of Conservation Districts to inventory SHMS demonstration sites and various interested partners to train agricultural service providers in Soil Health Management Planning.
- USDA Climate Hubs, Land-Grant Universities, Cooperative Extension Service, Farm Foundation, and the Samuel Roberts Noble Foundation and their diverse partners in the Soil Renaissance program and Soil Health Institute. Additional stakeholders include independent crop consultants; fertilizer, equipment, seed dealers and other industry partners; soil testing laboratories; and non-profit organizations with interest in improving farm sustainability. More information on Soil Renaissance and the Soil Health Foundation can be found at <http://soilrenaissance.org/> and <http://soilhealthinstitute.org/>.
- National Grazing Lands Coalition and other grazing groups to be identified to increase soil health in rangelands and pastures. See Grazing and Pasture Lands building block for more details (p. 29).

Proposed Actions

FY 2016

| Action | Lead USDA Agency(s) |
|--|---|
| Complete staffing, orientation, and training of NRCS Soil Health Division, and implement mechanism for States to efficiently receive technical assistance. | NRCS |
| Continue to build capacity among partners to increase the adoption of SHMS. | NRCS |
| Develop advanced soil health training course and complementary webinar series to train trainers; start development of certification requirements for soil health management planners. | Primarily NRCS Soil Health Division in collaboration with the Agricultural Research Service (ARS), NIFA, and partners |
| Provide advanced soil health training for at least 500 field, area, and State technical staff to build capacity for improved technical assistance to stimulate adoption. | NRCS |
| Develop and implement pilot cost sharing for Soil Health Assessment and Management Planning and integrate soil health into conservation planning. | NRCS |
| Continue to leverage partnerships to develop and make available standardized comprehensive soil health assessments and economic data. | NRCS in collaboration with ARS, NIFA, and partners |
| Develop plans for a Soil Health Monitoring and Enhancement Network, which will routinely assess and monitor soil dynamics across the United States, provide producers with science-based options for enhancing soil health, and leverage partners to accelerate adoption of these practices. | NRCS |
| Review and update Conservation Practice Standards related to SHMS. | NRCS |
| Support building block implementation through research, data, tools, and educational activities related to soil health within USDA and USDA-funded research programs. | ARS, Economic Research Service (ERS), NIFA |

FY 2017

| Action | Lead USDA Agency(s) |
|--|--|
| Continue to build capacity among partners to increase the adoption of SHMS. | NRCS |
| Update advanced soil health training course and complementary webinar series to train trainers, as well as certification requirements for soil health management planners. | Primarily NRCS Soil Health Division, in collaboration with ARS, NIFA, and partners |
| Provide advanced soil health training for at least 750 field, area, and State technical staff to build capacity for improved technical assistance to stimulate adoption. | NRCS |
| Continue to leverage partnerships to develop standardized comprehensive soil health assessment availability and economic data. | NRCS in collaboration with ARS, NIFA, and partners |
| Implement Soil Health Management Planning as part of Conservation Plans via additional Technical Service Provider (TSP) and Field Office Technical Assistance support on at least 250,000 acres. | NRCS |
| Implement Soil Health Monitoring and Enhancement Network. | NRCS |
| Support building block implementation through research, data, tools, and educational activities related to soil health within USDA and USDA-funded research programs. | ARS, ERS, NIFA |

FY 2018

| Action | Lead USDA Agency(s) |
|--|--|
| Continue to build capacity among partners to increase the adoption of SHMS. | NRCS |
| Provide advanced soil health training for at least 1,000 field, area, and State technical staff to build capacity for improved technical assistance to stimulate adoption. | NRCS |
| Continue to leverage partnerships to develop standardized comprehensive soil health assessment availability and economic data. | NRCS in collaboration with ARS, NIFA, and partners |
| Implement Soil Health Management Planning as part of Conservation Plans via additional Technical Service Provider (TSP) and Field Office Technical Assistance support on at least 500,000 acres. | NRCS |
| Continue implementation of Soil Health Monitoring and Enhancement Network. | NRCS |
| Support building block implementation through research, data, tools, and educational activities related to soil health within USDA and USDA-funded research programs. | ARS, ERS, NIFA |