

LSP White Paper: Farming to Capture Carbon & Address Climate Change Through Building Soil Health

Executive Summary

Background

Humans must act to reduce greenhouse gas emissions by at least 25% by 2030 to limit global average temperature increases to less than 2 degrees centigrade. Such a reduction may help us avoid the most catastrophic effects on people, especially the poor and those who live in coastal areas, as well as our life support systems on Earth. Along with reducing fossil fuel emissions, one key way to stabilize atmospheric carbon dioxide levels is by sequestering carbon.

Agriculture is currently a major contributor to emissions that impact climate change — accounting for 9% and 24% of U.S. and Minnesota greenhouse gas emissions, respectively. The good news is that by adopting farming systems that build soil health, agriculture has the potential to sequester significant amounts of carbon and lower greenhouse gas emissions. Many farmers, including farmers in Minnesota, are currently using these practices and showing how this can be done.

Building healthy soil requires the presence of a diversity of plants (and their living roots) on the land via “continuous living cover,” also known as CLC. Examples of continuous living cover systems include cover crops planted between the regular corn-soybean growing seasons, four-year crop rotations that include small grains and a perennial legume, prairie strips in row crops, trees integrated into pastures, agroforestry, rotationally-grazed pastures, and the integration of crops with livestock that are distributed out on the land in a grazing system. Managed rotational grazing (MRG) of ruminant livestock significantly enhances soil health and is the most effective system for managing perennial grasslands and utilizing cover crops.

CLC and MRG, along with reduced tillage, can remove some of the excess carbon dioxide from the atmosphere and store it in soils. By building soil’s organic carbon, more water can be stored in soil, resulting in less runoff, cleaner water, and more resilient crop fields and pastures.

While many farmers currently use these practices, on average only about 3% of Minnesota cropland is planted to cover crops as continuous living cover in a given year. With the right public investments, there is room for significant improvement in a short period of time.

Conclusions

The Land Stewardship Project (LSP) has gathered farmer experiences and reviewed the literature related to managed rotational grazing and continuous living cover. We have tabulated how these practices contribute to soil carbon capture, improve water quality, and produce other environmental benefits.

We conclude that:

- ◆ As much as 9% of U.S. greenhouse gas emissions could potentially be offset by shifting 25% of ruminants to well-managed grazing and 25% of cropland to a combination of perennial cover, diverse rotations, and cover crops.
- ◆ Based on similar adoption rates, we show a scenario that would potentially lower Minnesota crop and livestock net greenhouse gas emissions by 30%, compared to 2016 agricultural emissions totals.
- ◆ A recent life cycle assessment study of managed rotational grazing of beef cattle in the Midwest found it produced a net reduction of greenhouse gas emissions. In comparison, a confined feedlot system was a net emitter.

Adopting policies that help farmers build healthy soil would make agriculture a significant part of the solution when it comes to addressing the climate crisis.

In addition, we found:

- ◆ Overall, the lack of cover and diversity in the dominant agricultural system leads to declining soil health.
- ◆ Integrating continuous living cover and managed rotational grazing could help reduce agricultural nitrogen pollution by up to 45% in surface waters, while capturing rainfall and storing more water.
- ◆ High rates of carbon sequestration have resulted after years of adaptively managed rotational grazing.
- ◆ A wide spectrum of farmers are interested in improving soil health as demonstrated by attendance at field days and increasing adoption of cover crops. Individual farmers have seen increases of 3% or more in soil organic matter in five to 20 years by adopting continuous living cover, reduced tillage, and managed rotational grazing.
- ◆ At least 20% of corn and soybean fields in Minnesota and 26% in the Corn Belt overall can be considered

“marginal,” with consistently low yields resulting in wasted fertilizer and excess greenhouse emissions.

- ◆ The interests of farmers and ranchers and those interested in climate mitigation coincide, because healthy soil helps build agricultural resiliency in the face of climate change, reduces costs of production in the long run, and opens optional markets.

Via peer-to-peer learning networks, as well as supportive markets and public policies, farmers and ranchers can be empowered to adopt production systems involving continuous living cover and managed rotational grazing.

Policy Recommendations

Unprecedented market concentration and record low commodity prices have created a crisis for America’s farmers. Current policies are too often skewed against the wider adoption of managed rotational grazing, continuous living cover systems, or a more diverse, soil-building agriculture in general. In addition, our current market infrastructure often undermines production systems that can build healthy soil here in the U.S.

As a result, before agriculture can play a major role in building the kind of soil health that helps society deal with the climate crisis, several policies must be reformed or put in place on the state and federal level:

- A. Fund research on continuous living cover systems and managed rotational grazing, including the Forever Green Initiative at \$10 million per biennium and \$6 million for infrastructure at the University of Minnesota’s organic dairy and grazing facility at the West Central Research and Outreach Center in Morris.

- B. Make continuous living cover and managed rotational grazing critical components of Minnesota’s climate change efforts, the Green New Deal, and other climate change policy proposals.
- C. Enhance technical assistance and cost-share programs in the federal farm programs and Minnesota state programs to emphasize building soil health through managed rotational grazing and other continuous living cover systems; also limit expansion of large-scale concentrated animal feeding operations (CAFOs).
- D. Enhance markets for products raised by small- and mid-sized farm operations that use managed rotational grazing.
- E. Design a Payment for Ecosystem Services Program at state and federal levels with true cost accounting to help farmers shift marginal fields in summer annual crops to perennials and maintain and expand managed rotational grazing.
- F. Modify and reform federal Farm Bill programs and initiatives that promote bigger, monocultural operations at a significant cost to soil health, small- and mid-sized farmers and ranchers, and rural community viability.

In addition to funding the U of M’s Forever Green Initiative and infrastructure at the West Central Research and Outreach Center, the Land Stewardship Project recommends allocating \$8.5 million in funding during the next Minnesota legislative biennium to support getting more continuous living cover and managed rotational grazing established in the state.



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A full copy of the “Farming to Capture Carbon & Address Climate Change Through Building Soil Health” Land Stewardship Project white paper is available at

www.landstewardshipproject.org/carbonfarming

On that web page, you will also find podcasts and videos featuring farmers who are building resiliency through healthy soils.

For more information and to obtain a paper copy of “Farming to Capture Carbon & Address Climate Change Through Building Soil Health,” contact the Land Stewardship Project’s George Boody at 612-722-6377 or gboody@landstewardshipproject.org.