ADDRESSING ECOSYSTEM SERVICES, CONSERVATION PROGRAMS, AND MARKET POTENTIAL ACROSS NEW MEXICO

Based on outcomes of the virtual

Listening Session: Conservation Program and Market Options to Enhance Producer Economic Resilience

June 2, 2021

Hosted and supported by the USDA Southwest Climate Hub and the Natural Resources Conservation Service in collaboration with the New Mexico Department of Agriculture

INTRODUCTION

In June 2021, the USDA Southwest Climate Hub (SWCH) hosted a virtual listening session, *Conservation program and market options to enhance producer economic resilience*. The session was part of a project of the SWCH and supported by the New Mexico Department of Agriculture working lands group to assess New Mexico's (NM) existing carbon pools, variability across different land-use types and available estimation tools.

Literature Synthesis and Tool Evaluation

While there are existing tools to estimate the carbon storage potential of different land types and management actions, they are often at a national scale and may not adequately incorporate the nuances of land management and potential at local scales, especially in the arid or semiarid Southwest. At the same time, there is a continued need to estimate and document the carbon sequestration potential of differing lands to minimize greenhouse gas emissions. Burgeoning efforts to establish a carbon bank and provide financial incentives for carbon sequestration compound the need to adequately estimate carbon sequestration, as well as the sequestration potential of differing land use and management.

The first step in the project was the literature synthesis of our knowledge regarding the existing carbon stocks. The second step was to evaluate the utility of existing tools in adequately assessing current and management-related changes in carbon storage potential to allow for an evaluation of trade-offs regarding carbon storage as compared with other management options. The goal of the project was to enhance producers' ability to evaluate current carbon stores and future carbon sequestration potential on NM lands to support economic and environmental land management decision-making. This project resulted in a succinct literature review of soil and biomass carbon in NM, soil carbon stock estimates per land-use type, and a compilation of existing sequestration tools.

Listening Session

The virtual listening session provided an opportunity to share the findings and key takeaways of the project with producers and land managers while offering a space for discussion and input. The goals of this listening session were to:

1. Discuss carbon in soils and plants in NM
2. Hear about past conservation programs and carbon and ecosystem services markets
3. Identify information used and needed to decide if participation in a carbon (or other) market would be a value-added income opportunity.

We convened agricultural professionals from across the state of NM including producers, land managers, NRCS field office personnel, conservation district members, and county extension agents. Presentations detailed results from the literature synthesis, analysis of existing carbon estimation tools, conservation program and market history in the U.S., Chicago Climate Exchange (CCX) participant perspective, and NRCS technical assistance and programs. Throughout the listening session, participant interaction was encouraged through engagement activities including chat box questions and discussion sessions. These questions spurred conversation and highlighted knowledge gaps

and participant expectations and interest in a potential ecosystem service market.

Figure 1. Visualization of participant responses to the question: *What do you hope to gain from this listening session?*

DISCUSSION QUESTIONS

The following questions were posed to the participants and initiated discussion.

Discussion Question: *What are some creative options for a monitoring program to gather information about carbon, precipitation, etc.?*

Participant answers to this question ranged from digging more holes in the soil to creating large-scale producer-researcher collaboration initiatives. Although digging more holes sounds like a simple solution, significant funding and workforce development would be necessary to precisely sample soil and measure soil carbon across the state. Other ideas included citizen science and incentivized programs for DIY monitoring. The overall impression was that more data needs to be collected state-wide and the effort would require dedicated producer-researcher collaboration and considerable resources.

Discussion Question: *What is needed to make a carbon or ecosystem services market viable in NM?*

To make a carbon market viable in NM, participants responded with the necessity of more precise data collection, more extensive research of what carbon is currently available, and full transparency in the potential market process. Others mentioned the arid low-productivity Southwest U.S. might not be the most viable landscape for a carbon market and we should possibly consider other ecosystem service markets.

Discussion Question: *What are some things producers need before deciding to participate in a carbon market or conservation program?*

Participants mentioned there should be a consideration of the significant input and commitment required for implementing conservation practices and how they will complement farming and ranching operations. Producers with experience in carbon markets suggest their peers should consider the economic portfolio of conservation practices before participating and markets must be viable enough to meet producer needs. Producers stated that before committing to a market program, it is important to read all the terms of the contract and think through all the "what if's".

PARTICIPANT QUESTIONS

The following questions were asked by participants and answered by presenter Dr. Joel Brown.

Q: Does the stocking rate take into consideration management type? For example, research by Dr. Richard Teague (Texas A&M University) indicates that AMP grazing (Adaptive Multi-Paddock grazing) can support substantially more animals on the land while building soil carbon. **A:** No management type will overcome stocking rate. The scientific community is having difficulty reproducing the results from the research out of Northeast Texas. There are many studies in Cheyenne, Wyoming (climatically similar to eastern NM) on multi-paddock grazing that do not support those findings.

Q: Will producers have to reimburse money they were paid from a potential carbon market, if a natural disaster occurs on their farm or ranch, for example drought or wildfire that releases carbon? **A:** CCX dealt with natural disaster risk by using a predetermined discount factor. They developed a price that takes risk into account then put the risk on the aggregators, so the producers did not own the risk. Aggregators would need to have a portfolio big enough to take on the risk by distributing projects around the landscape.

Q: What is the amount of Carbon Dioxide (CO_2) lost to the atmosphere with burning and is it replaced by the grass that comes back? **A:** Herbaceous material turns over every few years so in the longer term burning grasses does not contribute to CO_2. Burning can speed up the cycle, but the grass that grows back in the following growing season will make up for the losses to fire. However, trees and shrubs are a different story. When forests burn, you see the biomass carbon burning. The amount of carbon lost will depend on the forest type and fire type. For example, in ponderosa pine and dry mixed conifer forest, a surface fire will not remove all the carbon in a forest stand, and the time to carbon recover in regrowth is fairly short, however if you have a stand replacing fire or canopy fire like the Los Conchas then you do indeed lose all the carbon stored in the forest to combustion.

NEW MEXICO CATTLE GROWERS' ASSOCIATION MEETING

Dr. Joel Brown, co-lead of the USDA Southwest Climate Hub, presented *Prospect of Market Based Carbon Sequestration on New Mexico Range Lands* at the New Mexico Cattle Growers' mid-year meeting on June 7th, 2021. After his presentation, there was time for questions and a brief discussion.

Question: *What is the role of planting more trees in response to climate change and sequestering more carbon?*

Dr. Brown responded with the answer that planting more trees is beneficial if you live in a forest. One of the biggest risks to climate functioning is the loss of rainforest. We have lost a lot of trees in these forests and planted pastures in their place which has a significant effect on the global dynamic, releasing carbon into the atmosphere and a hydrologic effect on trees cycling water. However, prairies and grasslands, are just as endangered as forests. Grasslands are endangered by shrub invasion which does not increase soil carbon, decreases the quality of habitat, water quality, and increases fire occurrence. Historically, trees are not part of rangelands, you can look at specific Ecological Site Descriptions on your land to know what vegetation your area should have. Planting trees on grasslands is not the answer to increasing carbon sequestration, however,

managing trees to keep them where they belong can be helpful.

Question: *How is soil carbon measured?*

Measuring carbon is well defined but every method involves digging a hole. On rangelands, measuring carbon requires some upfront thought and work as the soil is highly variable. Changes to the carbon pool are hard to detect with the level of technology we have now. We will know more as more samples are taken but this is costly. Trying to measure something that changes in space and time costs a lot compared to a relatively low value of the commodity.

Question: *Is there a difference between soil organic matter and soil carbon?*

There is a correlation between soil organic matter (SOM) and soil carbon. Generally, on grasslands, organic matter is 60% carbon.

DATA GAPS AND NEXT STEPS

Soil carbon can vary dramatically across a landscape due to variation in topography, parent material, and past management (Bruce, 1999) making more long-term and precise measurements a necessity. There are data gaps specifically for NM as carbon stocks are estimated on a national scale but not as thoroughly regionally or locally. The lack of long-term, consistently measured data makes it difficult to know how much carbon is truly available and how much can potentially be earned from carbon credits in the event of a carbon market.

A difficulty specific to quantifying New Mexico's total carbon stock stems from the lack of a comprehensive stock evaluation for both soil and biomass carbon by a single agency. The USDA NRCS Soil Science Division initiated a rapid carbon stock assessment (RACA) dataset with the goal to provide the United States with a quantitative estimate of soil carbon across the U.S. (Soil Survey Staff and T. Loecke, 2016). The RACA dataset is New Mexico's most comprehensive source for carbon stock and sequestration estimates per land-use type. However, the RACA data only provides an estimate for soil carbon and has large areas of missing data in central and southern New Mexico. The USFS provides a biomass carbon estimate for New Mexico, but only for the national forests. Published work from the literature review which cites carbon stock values for New Mexico are reported at varying depths and in units inconsistent and uneasily comparable with those cited from the USFS or RACA, making an estimate of New Mexico's total carbon stock per land-use type difficult to ascertain with certainty with the existing data.

There is a need for more in-depth analyses of carbon stock across NM with long-term field experiments incorporating robust statistical designs. Direct sampling would be more helpful to farms and ranches, as well as helping to inform national estimates and models. To make carbon markets accessible, a well-informed carbon tool would be beneficial. Modeling soil carbon has been done but often needs region-specific data to be calibrated. With more small-scale data collection, the models could be more accurate and useful in informing carbon markets and their potential in NM.

The high levels of both spatial and temporal variability means that designing a monitoring system to accurately reflect carbon changes can be difficult. Statistically valid measures of the carbon content at the farm scale are generally not economically viable. An effective strategy to support carbon markets

and management systems should focus on experimental strategies to support model improvement rather than attempting to introduce voluntary, low-intensity monitoring across a range of operations.

ACKNOWLEDGEMENTS

We would like to thank the listening session participants for attending, engaging, and sharing their knowledge and input which we hope to reflect accurately in this report. We value the opportunity to share relevant scientific knowledge and engage with those who are stewarding the land. A special thanks to Joel Brown and Jim Thorpe for sharing their experience with the Chicago Climate Exchange and expertise on this topic. This effort was conduced in collaboration with the New Mexico Department of Agriculture. Recorded listening session presentations are hosted here: https://www.climatehubs.usda.gov/hubs/southwest/topic/carbon-pools-and-decision-support-tools-new-mexico

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RELEVANT PUBLICATIONS

Upland Bare Ground and Riparian Vegetative Cover Under Strategic Grazing Management, Continuous Stocking, and Multiyear Rest in New Mexico Mid-grass Prairie

Engaging Ranchers in Market-Based Approaches to Climate Change Mitigation: Opportunities, Challenges, and Policy Implications

Profiting from the Sale of Carbon Offsets: A Case Study of the Trigg Ranch

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