

Carbon Sequestration: A Conservation Income Opportunity

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*"I can't raise the winds that blow, but I can at least put
up the sail so that when the wind comes, I can catch it."
– E.F. Schumacher*

Introduction

Thank you for inviting me to participate in your meeting. I congratulate you for your interest in improving grasslands and grassland management. I have been asked to speak to you about carbon, carbon sequestration, and the opportunities that may exist for additional income for producers. Since I know many of you have attended meetings about carbon sequestration, I will not spend much time on theory, but instead focus on where and at what stage we are with respect to being able to derive income from the storage of carbon on grasslands.

Let me say also that the organization for which I provide technical assistance, the High Plains RC&D Council, is dedicated to finding new sources of income for producers and businesses, and they are always searching many different possibilities. Carbon sequestration is one of the producer-income opportunities that they have been studying. The state leadership team, Natural Resources

Conservation Service, is also vitally concerned about the need for additional income for producers and has kept abreast of the potential development of carbon sequestration in Oklahoma.

Carbon, Carbon Dioxide, and Carbon Sequestration, Defined

Carbon is one of the basic elements of all things living. It exists in the air (atmosphere) as carbon dioxide as well as in organic matter, dead plants, and animals. Carbon dioxide is one of the greenhouse gases that we read about almost every day and the controversy continues over whether or not increasing concentrations of carbon dioxide in the atmosphere contribute to global warming or global climate change.

Added pressure has been placed on the issue since 1997, when a document called the Kyoto Protocol was

About Tom Lucas

Tom Lucas is the NRCS-USDA coordinator of the High Plains Resource Conservation and Development (RC&D) Council, which serves eight counties in northwestern Oklahoma, including the panhandle. He was an active farmer and rancher for 25 years and received conservation awards on his farm. He holds BS and MS degrees from Oklahoma State University in agricultural education.

He is credited with creating a concept called the "ranch conversation" as a way to bring diverse stakeholders together to deal with environmental issues and was among the first in Oklahoma to recognize the potential for creating income for producers by participating in solutions for environmental problems, such as carbon sequestration.

Lucas was also a leader in the effort to develop a voluntary, locally-led plan to improve habitat for the lesser prairie chicken in order to prevent the species becoming listed as endangered and subjecting area producers to unwanted regulation. The result has been 82,000 private land acres and 22,000 public land acres under habitat management programs in his RC&D area in the last three years. Almost \$700,000 has been raised to do on-the-ground

research and provide 100% cost share to participating producers.

He has been recognized by the Partners in Wildlife for his work and was named the Outstanding RC&D Coordinator in Oklahoma in 2000 by the Oklahoma RC&D Association.

His work has resulted in program and grant monies in over \$4 million going directly to the High Plains RC&D area in the last 3 1/2 years. He is the author of one of the six national USDA biomass-conversion-to-energy projects. He is also co-author of a proposal that has resulted in the designation of the High Plains areas of Oklahoma, Texas, Colorado, Kansas, and New Mexico as the national rural economic recovery model by the Economic Development Administration, US Department of Commerce.

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drafted. It is an agreement between nations wherein the ratifying countries agree to reduce their carbon emissions by 7 percent by the year 2010 or face stiff penalties. One hundred sixty countries have ratified the Kyoto Protocol, but the United States has so far refused to do so. There is no point in engaging in a discussion about global warming. We could never agree, and it is really not the issue here today anyway. However, there are some facts on which I think we can agree:

1. Worldwide, there is a greater concentration of carbon dioxide in the atmosphere today than has been the case for hundreds of years.
2. We are experiencing erratic weather and changing weather patterns, but whether or not they are tied to the concentration of greenhouse gases in the air will remain subject to scientific debate for a long time to come.
3. The concentration of carbon dioxide in the air is significantly less in much of the southwestern United States, including Oklahoma. Many feel that this is because of the vast acres of grasslands in the western part of the Southwest and the large acres of forestland in eastern Oklahoma pulling the carbon dioxide out of the air and storing it in the soil.

I consider carbon sequestration the taking of carbon from the air and moving it to the soils and vegetation through the natural process of photosynthesis. The National Association of Conservation Districts, in their document titled *"Global Climate Change, Emerging Issues of a New Century,"* expands on that definition somewhat: "Carbon sequestration is the long-term storage of carbon in the soil and in living and dead vegetation... carbon stored can offset carbon dioxide released... therein lies the possibility of agriculture providing a valuable service to society by storing carbon that offsets the carbon dioxide that is emitted by other sectors." That article was published in October 2000.

The question then becomes: Are there any real opportunities on the horizon for grassland producers to derive income from production activities that sequester or store carbon? And if so, how can individual producers position themselves to take advantage of the opportunity? I will attempt to provide some insight into those questions, but first let's discuss some other pertinent information that we know at this time.

Types of Carbon Credits and Verifiable Trades

There are at least two types of carbon credits that have been traded that directly involve agriculture. I would characterize the transactions that have occurred as a loosely established free market trading system wherein a few buyers and sellers have found one another and made a trade. As we begin to talk about these trades and carbon

credits, let me state at this point that a carbon credit is one metric ton (approximately 2,205 pounds) so when I use the term carbon credit, I am referring to one metric ton of sequestered carbon.

The first type of carbon credit is a carbon emission reduction credit, referred to as CERC, which is a registered and copyrighted trademark. A carbon emission reduction credit can occur when an individual, company, or entity takes steps to reduce the amount of carbon dioxide released into the atmosphere. For example, this can occur when a company that emits carbon changes or modifies its equipment to emit less carbon or takes other steps that reduce the amount of carbon it puts into the air.

I have been able to verify at least one carbon emission reduction credit trade that has occurred in agriculture. I verified this trade verbally with the vice president of the company that handled the transaction. That company put together a group of conventional-till corn and soybean growers in Iowa who wished to convert to minimum-till and no-till farming. The amount of carbon dioxide reduction was calculated since there would be fewer farming trips over the fields, and the amount of carbon reduction was determined. The total carbon tonnage reduction became the carbon emission reduction credits, and these were then bundled by the company handling the transaction. These CERC's were then sold to a Canadian utility consortium seeking to offset carbon emissions from its operations.

Details of the actual agreement are sketchy, but I am led to believe that it was a ten-year agreement that will result in an average annual payment of six dollars per acre as long as the producers keep up their end of the bargain. One million dollars was paid up front, with annual payments based on verification by the purchasing company each year that the practices agreed to by the farmers are continued.

Since carbon is lost when the soil is disturbed, this trade had nothing to do with the storage of carbon in the soil. The important thing is that it was a trade involving agriculture offsetting the carbon emissions of another industry, which helps to establish agriculture's role in the process.

There has been at least one trade which involved carbon credits issued and sold for storage. I was able to verify this trade through the organization that served as the portfolio manager for the transaction. This trade took place in Washington and Oregon and was for credits developed on forestlands in that region. I was unable to determine the price per credit, although I do know that it involved fifty producers and the sale was for one million dollars. There is controversy, however, over the percentage of carbon stored in trees in the aboveground portion of the tree versus the below-ground portion. Some maintain that a majority of the carbon is aboveground, and if a fire occurs, carbon

is lost back into the atmosphere. This controversy does not appear to apply to grass, since the majority of the carbon is stored in the roots of the grass. The portfolio manager for the trade on the trees did discuss the fact that insurance may be needed for the purchaser to protect loss of the credits against fire.

To my knowledge, there has not been a trade involving the production of carbon credits from grasslands.

However, due to the work that has been done in Oklahoma, it is my hope that the first such carbon credit trade will take place on Oklahoma grasslands.

There continue to be indications that companies are considering ways to either lower or offset emissions. In October 2000, it was announced that DuPont, BP Amoco, and five other international chemical companies formed a coalition with the Environmental Defense Fund. It was called the Partnership for Climate Action. The companies said they are motivated by the realization that the world's governments are going to demand reductions in carbon dioxide, whether or not the Kyoto Protocol is ratified.

The State of the Science

It might be well, at this point, to discuss what is known about the ability of grass to sequester carbon in the soil. We are fortunate in Oklahoma to have two major agricultural research stations, Southern Plains Range Research Station at Woodward and Fort Supply and Fort Reno. They have been studying carbon for close to seven years at the Woodward station, and the knowledge that has been gained as a result of their research has put Oklahoma in a unique position. The Southern Plains Range Research Station at Woodward, under the direction of Dr. Phil Sims, has been studying carbon dioxide flux over different grassland plots. They have specialized equipment that can take measurements and transmit data every twenty minutes.

Since I am not a scientist, the best explanation or definition I can offer about carbon dioxide flux is that it is the movement of the gas up and down from the earth's surface. Downward movement indicates that plants are absorbing carbon dioxide, and upward movement indicates that carbon dioxide is being released from the system. It is a dynamic system with a complex behavioral pattern. During the growing season in daylight hours, the plants take in carbon dioxide, and at night, the plants release carbon dioxide. On cloudy days, in the dormant season, and during dry periods, the plants do not readily take in carbon dioxide and may in fact release it. These movements of the carbon dioxide flux allow the research center to calculate the amount of carbon that actually ends up stored in the soil. In order to get positive carbon additions to the soil, the plants must have taken up more carbon dioxide than was

released during the year. Obviously, there are many variables that include climatic conditions and types of vegetation.

What has the research revealed? The research station has data indicating that overgrazed lands often have a net annual loss of carbon, with as much as four hundred pounds lost per acre per year on some of the measurement sites. On the other hand, well-managed grasslands have sequestered from two hundred pounds per acre up to almost a ton per acre, depending on a variety of factors. The scientific community has accepted the methodology and results of this work. This information has been published and is available to the public.

The United States Department of Energy is also a participant in carbon sequestration studies. Some of their work is being conducted not far from here, at the Los Alamos National Laboratory in New Mexico. That laboratory has developed a prototype instrument called a laser-induced breakdown spectroscope referred to as LIBS. The LIBS technology allows the user to determine soil carbon content at any given point in a few seconds. Once this technology is accessible, it will allow more efficient verification of soil carbon content, which can be compared to management practices and other data that may have affected the amount of carbon being stored.

Private companies are also participating in the development of the science. One Illinois company is a private partner with the Los Alamos National Laboratory in the development of the LIBS technology. This company holds national and international patents on the intellectual property rights to a formula for calculating carbon credits from grasslands.

The National Resource Ecology Laboratory at Colorado State University is using a procedure called the Century Model to estimate carbon sequestration. The Century Model permits the estimation of carbon credit potential over large areas, such as an entire state. Some states have raised the funds and conducted a study of their states' carbon sequestration potential. While this model is useful for economic planners and government agencies, it probably has only limited application for individual producers.

During its last session, the Oklahoma legislature passed a bill that established a carbon task force to study the carbon matter. The task force has been appointed by the governor and has had several meetings. The Oklahoma Conservation Commission and various stakeholders, including producers, who are represented on this task force are administering this legislation. They will make a report and recommendations to the governor and Oklahoma legislature.

In May 2001, Ford Motor Company said that greenhouse gas emissions for all Ford vehicles on the road is

400 million metric tons. Ford said it would partner with the World Resources Institute and the World Business Council for Sustainable Development to create a plan to curb emissions. In October, Shell Chemical announced that it would sell 60 percent of its excess carbon dioxide to Air Liquide for soda manufacturing. This carbon dioxide was previously being vented into the air. Also in October, Nike executed an agreement with the World Wildlife Fund and the Center for Energy and Climate Solutions to reduce greenhouse gas emissions worldwide from their operations. These are all positive signs and evidence of major companies' increasing need and willingness to reduce emissions.

The U.S. Department of Energy's Energy Information Administration (EIA) appears to be emerging as the federal entity responsible for reporting and tracking carbon credits. Voluntary carbon credits can now be reported to the EIA, and various entities are doing so. There is the belief that emitting companies may receive credit for early voluntary action in the anticipation of later regulation. Some producers are using the patented technology to determine carbon credits they are producing and reporting those to the EIA, anticipating that a buyer might appear as a result of that reporting. Further, I am advised that in reporting to the EIA, producers can claim credit if they save existing grasslands as well as credit for upgrading practices.

At one point, I was reviewing proposed federal legislation with respect to regulation of carbon dioxide, including those bills that included provisions for qualifying carbon credit. I finally abandoned attempting to follow it when the number of bills introduced exceeded fifty. This level of concern and activity in the Congress is evidence that some type of law, rule, or regulation is not far away. However, regulation might be avoided if there is sufficient voluntary action in the private sector to convince society that the situation is going to be handled through the free market system.

Why Bother?

When the pioneers settled this land and took a moldboard plow to the fertile prairie lands for the first time, the carbon content of some of the soil may have been 5 to 6 percent. Now the carbon content of some overgrazed soils may be as low as 1 percent. From research, we know that overgrazed lands lose carbon, that grassland not grazed at all ceases to store carbon at some point, and that properly managed grasslands store carbon. Carbon sequestration, then, is about more than managing to produce carbon credits for income. It is about farm and ranch sustainability over the long haul. It is about the things you do, managing your ranch so that it will sustain itself and produce for you during your lifetime as well as the

lifetimes of those who will inherit your land. It is about doing the right thing for the land over which we are the stewards.

Positioning for Income from Carbon Sequestration

Obviously, this is a market that has not yet developed. The events of September 11 and the nations' current economic situation have temporarily distracted some from the needs of the environment. I cannot tell you when the market will develop or what a carbon credit will be worth when it does develop. I do believe that among all agricultural production systems, carbon sequestration through proper grassland management is the most likely, realistic, and consistent source for agriculture to become a long-term player in the carbon offset market.

In your handout material, I have provided you with a copy of the USDA-NRCS brochure, *"Growing Carbon: A New Crop That Helps Agricultural Producers and the Climate Too."* In this brochure, twelve conservation practices are identified that increase carbon storage. Some of you are doing those practices now. It is logical to believe that base lines will be established for lands to determine where they are at the time of entering into an agreement to produce carbon for income.

To store carbon or continue to store carbon may or may not require a management change on your part. A criticism of programs in the past has been that benefits for improving production are extended to the poor managers to encourage them to implement better conservation and management measures. I do not believe that this will be the case with carbon sequestration.

If you are already managing your grasslands in such a way that they are storing carbon, I believe you will be among the first able to sell your credits. Further, if a retroactive date is established by a buyer or by legislation, you may be able to obtain income from your past good management. I mention this because many of the pending bills in Congress contain a retroactive clause. I further believe that once a major emitting company makes a purchase of grassland carbon credits, others will quickly follow.

Increasing carbon dioxide concentrations are a worldwide concern, and when the market begins to develop, it probably won't matter that the United States has not and may never ratify the Kyoto Protocol. The United States is home to many multinational companies who may be required to offset their emissions in other countries. They can buy those offsets here as well as anywhere in the world, as we know with the Carbon Emissions Reduction Credits trade between Iowa producers and Canada.

Emerging Related Income Opportunities

I would be amiss if I did not mention other opportunities on the horizon that will allow agriculture the potential to

receive financial rewards for helping clean up the air. These include ethanol production, which replaces a certain amount of fossil fuel. Methane production can turn greenhouse gases into power. Biomass production and conversion to electricity can also reduce carbon emissions. Oklahoma is taking some initial steps to encourage development in all three of these areas.

A legislative task force will be making recommendations to the governor and legislature with regard to the incentives needed to encourage the development of ethanol plants in Oklahoma. Some livestock feeding operations are using methane to power irrigation and other engines. Both Oklahoma State University and Southwestern Oklahoma State University have projects ongoing that are studying biomass conversion to ethanol. An application by the High Plains RC&D to the Commodity Credit Corporation to harvest Conservation Reserve Program (CRP) grass and use it as a cofiring component in electrical generation has been approved as one of the six national biomass projects. All of these are positive steps, and some of them will most likely result in the creation of new and increased markets for Oklahoma producers.

Concluding Remarks

Carbon is necessary for plant life. A large percentage of our soils do not contain adequate carbon to promote optimum plant growth, but soil carbon can be increased through proper management. The air around us contains too much carbon dioxide, but again, through proper management, we can lower those carbon dioxide levels in the air and place it in our soils, making our farms and ranches more sustainable.

I believe overgrazing is a form of ecological degradation. If we overgraze under the guise of making more money from our operations, we set ourselves on a course of ultimate economic destruction. It is difficult to make a profit. Low food prices subsidize consumers, keep farm and ranch profits low, and cause pressure to be increased on production from all lands, especially marginal lands. We should instead look for additional ways to make income that result from our good management of the land, additional ways such as hunting, fishing, wildlife viewing—and perhaps carbon sequestration.

We have come to a time when producers, economic developers, and environmentalists must go forward together. I cite as an example of this the effort undertaken by the High Plains RC&D Council and the High Plains Partnership for Species-at-Risk to prevent the lesser prairie chicken from being listed as an endangered species through a program of voluntary habitat improvement. This was a historic effort, because under the Endangered Species Act, funds are not available to help until after a species is listed.

Since January 1999, 81,000 acres of private lands are under habitat improvement programs, with 24,000 more acres to be added this year. Some 22,000 acres of public lands are under habitat improvement programs. Almost \$700,000 of state, federal, and private funds have been directed to this effort, which has provided monies for on-the-ground research and 100 percent cost share to the producers who elected to participate. Over the three-state contiguous regional area including the High Plains RC&D area, the Comanche Pool area of Kansas, and the Texas Prairie Rivers area, 161 new jobs have been created as a result of this work. This project is an example of producers and community and economic developers working together because separately they could not be successful.

This is the case with carbon sequestration as well. All sides have more than adequate reason to try new approaches. I encourage you to keep abreast of all the information that you can access. As E.F. Schumacher said, "I can at least put up the sail so that, when the wind comes, I can catch it."

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