Small and Medium Size Farmers' Ability and Willingness to Supply Carbon Offsets through Carbon Markets and Conservation Crop Production

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Purpose

The overall goal of this project is to examine small and medium agricultural crop producers' ability and willingness to intensify on-farm conservation efforts to provide carbon offsets in an established carbon market in the Midwestern United States.

Objectives

Objective 1: Develop a natural resource farm management tool that allows small and medium size farmers to assess on-farm conservation practices and systems, including carbon sequestration potential; on-site environmental benefits; production costs and returns; and optimal economic management strategies.

Objective 2: Quantify and predict small and medium farmers' willingness to intensify conservation cropping systems management on-farm in the presence of an established carbon market.

a) Assess and describe on-farm conservation system adoption processes, including the influences of farm typology, landscape, demographic factors, personal goals, culture and social networks; and

b) Assess alternative carbon contract attributes and market mechanisms that would be required by farmers to intensify conservation in existing crop production systems.

Small and Medium Size Farms

The study focuses on small and medium size farms ranging in gross farm sales from $10,000 to $500,000 following USDA guidelines. These farms represent 54.3% of crop producers in the study region.

Farmer Resource Conservation and Carbon Manager

This is an EXCEL based learning tool for farmers to examine their crop production systems. It provides:

- Carbon accounting information for their cropping enterprises;
- Conservation practice cost and return information for different bundles of conservation practices;
- An assessment of environmental impact of adopting new conservation practices (soil erosion, SOC, N & P leaching); and
- A conservation optimizer to provide some guidance for choosing a bundle of conservation practices to use on a user's operation. Farmers can choose to minimize costs, optimize environmental performance, or both.

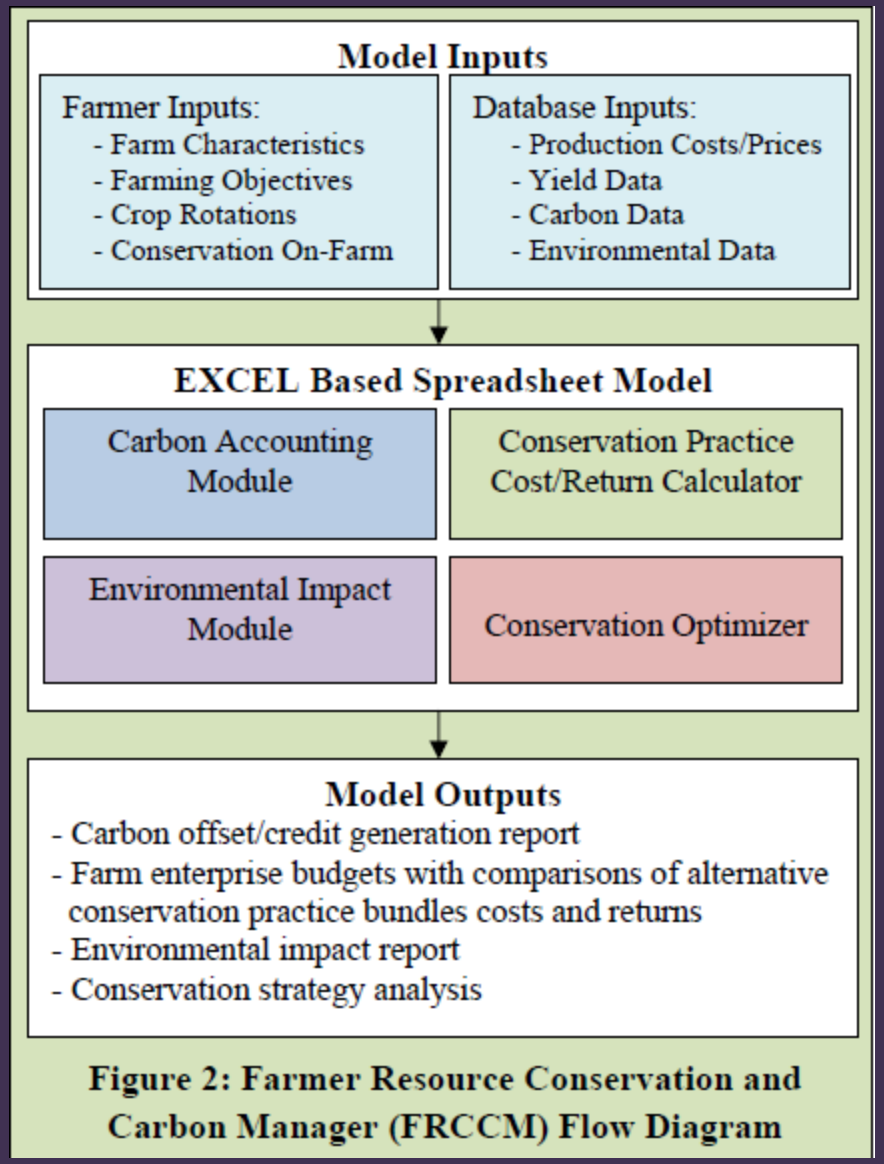
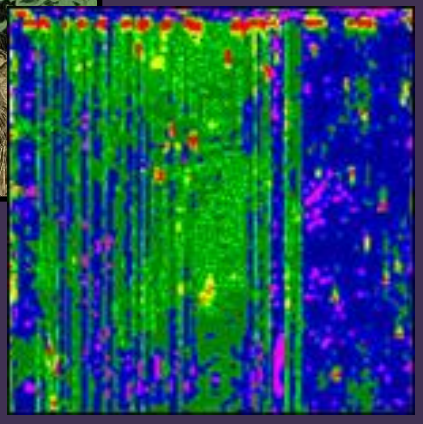


Figure 2: Farmer Resource Conservation and Carbon Manager (FRCCM) Flow Diagram

Conservation Practices Being Examined

- No Tillage
- Reduced/Minimum Tillage
- Cover Crops
- Field/Buffer Strips
- Use of Manure
- Dynamic/Intensified Crop Rotations
- Precision Agriculture
- Use of Bioenergy Crops (e.g. switchgrass)







Environmental and Crop Modeling Database

- We are in the process of generating an environmental impact database from conservation practice adoption for the study region using the Soil and Water Assessment Tool (SWAT) model at the smallest feasible HRU level.

- The database will contain information on crop yields, biomass production, soil erosion, N & P leaching, and SOC content. Changes in carbon sequestration and these indicators will be estimated by SWAT and be “locally” specific.

- The database will provide data for a number of crops (alfalfa, corn, sorghum, soybeans, sunflowers wheat, energy sorghum, switchgrass) under different tillage regimes, climate conditions, irrigation, crop rotations, cover crop options, harvesting of crop residues, and use of conservation practices.

Figure 1: Study Region

Soil & Water Assessment Tool | SWAT

Conservation and Carbon Workshops

- Will hold 8 to 10 workshops with 30 to 40 small to medium size farmers in the study region mid-2013. A significant number of participants will come from the Kansas Farm Management Association, which will provide additional detailed financial and production data for quantitative analyses. Participants will be paid an honorarium for their time.

- The purpose of the workshops is to collect primary data and provide extension training for farmers using the FRCCM tool.

- A number of methods will be used to collect data including:
  - Focus Group Interviews
  - Computer Surveys
  - Stated Choice and Risk Experiments

Stated Choice Experiments

- Working on the design and implementation of the stated choice experiments. Will be doing this using Sawtooth Software on a set of lap top computers purchased to collected primary data for the workshops.

- We will conduct two stated choice experiments examining conservation practice adoption. The first will examine the use of a federal conservation program to promote conservation intensification. The second will be the effect of a local carbon market on conservation practice adoption under contract.

Figure 3: Example of a Participant Choice Set of Conservation Practices

	Contract A	Contract B	Contract C	Option D
Practices	Conservation tillage Cover Crop Use of Livestock Manure Precision Application of N	Conservation tillage Cover Crops	Conservation tillage	Do not enter into a contract.
Carbon Offset	1.4 ton/ac	1.0 ton/ac	0.6 ton/ac	
Carbon Price	$20/acre	$15/acre	$10/acre	
Timeframe	10 years	5 years	15 years	
Default Penalty	100% of Contract Value	75% of Contract Value	50% of Contract Value	
Your Ranking (1-4)				

Some Initial Focus Group Findings

- Soil conservation and residue management are important to farmers to improve soil health; keep nutrients in the soil and prevent leaching; protect against extreme weather and drought; and protect from soil erosion. Farmers mentioned: "*My answer to conservation and how we handle everything is residue*," and " *I want more residue. The more residue the better. That's more moisture, that is more bushels in the bin*."

- Motivations for adopting conservation practices included economics, soil health, crop diversity, soil fertility, water conservation and leaving something for the next generation (lifetime value).

- The adoption of no-till requires a large change in the cropping system than most think (changes many aspects of crop management). The participants found that the benefits from a no-till cropping system really came about after a few years when they increased crop diversity and did more intense crop rotations and conservation practices.

Expected Outcomes from the Study

- Identify strategies and market characteristics/mechanisms that will promote conservation intensification and carbon sequestration on agricultural lands

- Help characterize the adoption and development of conservation practices by farmers in their crop production systems.

- Develop a tool for farmers to help them learn about the impacts of conservation practice adoption under different agronomic, economic and climatic conditions on their farm.