FINAL REPORT – Supplemental Documents

Project Title: Promoting Southeastern Agriculture Resilience with Carbon Farm Planning

Subaward Number: SUB00002297
Award Number: 2019-38640-29878

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Attachment A

Summary of Program Participant Evaluations

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Comments from training participants

- The tool was not easy to use (COMET-Farm).
- COMET-Farm is very in-depth and requires the planner to make a lot of decisions forecasting the next 10 years. It needs to also include what decisions were made on the farm 10 years prior. Retrieving historic farm data was a bottleneck.
- The tool was not designed for southeastern United States – very western US-centric. It was missing key cropping systems such as tobacco, cotton, and forestry. It also did not account for strategies such as silvopasture and agroforestry. With North Carolina being a huge forestry state, not being able to account for existing trees was concerning. Additionally, the solution isn't always "plant a tree". The tool assumed either trees were clear cut or left alone and did not include selective cutting as is commonly done in North Carolina.
- The training was California-specific, with discussions of regional production systems that were not relevant to North Carolina. If a surrogate cropping system was assumed, are the carbon values even valid?
- Took a long time to complete a Carbon Farm Plan – a team of 6 took two years to create one plan.
- Participants needed more training than the initial modules
- The training and planning were drastically affected by the pandemic as well as Tropical Storm Fred.
- There was limited interaction between presenters and participants due to the pandemic and the training team being located in California.
- COMET-Planner is a very useful and fast tool for easy scenario analysis. This is a great tool for that intro meeting with the farmer. It also can be utilized by almost anyone and doesn't require prior training.
- COMET-Farm needs to be utilized by those who are conservation planners. It is too technical for those that have not received prior training.

Recommendations

- Include more data sets for all regions of the country to expand BMPs available as well as cropping systems for the region. Carbon Farm Planning cannot be "one size fits all". An alternative is to consider a customized tool for each state in the country, like the tool that exists for phosphorous loss calculations.
- Develop a library of regional farming cases for carbon farm planners and/or trainees to utilize for guidance.
- Change the learning approach to include better learner evaluation techniques to ensure that concepts are received and retained.
- Update the training modules to provide one module each for COMET-Planner and COMET-Farm.

- During the training, provide an opportunity for small groups to craft a Carbon Farm Plan together, possibly a "fill in the blank" approach. A step-by-step example could also be considered.
- Carbon Farm Planning is not prescriptive and there is room for interpretation. During the training, allow for discussion among the participants as to their "why" for selecting a particular BMP.
- Restructure the training so that the webinars are provided first followed by the modules. Show the trainees what they will learn, walk through the process together, and then have the participant complete the module. The webinars should be interactive.
- Consider including a simple and well-defined case study challenge (5-10 minutes) within the webinars to allow trainees to apply knowledge learned to a scenario with known solutions.
- Virtual learning doesn't always translate to on-the ground implementation. Hands-on, face-to-face learning through field days is ideal for conservation practice training and allows for greater transfer of knowledge among peers.
- Provide on-going training and regular interactions between trainees/trainers during the whole planning process. While Carbon Cycle Institute made themselves available for questions and meetings, a level of accountability was not established through step-by-step task lists and deadlines. While this may have improved the outcomes of this project, the pandemic, Tropical Storm Fred, and staff turnover within the District-level planning teams drastically affected this project.
- Due to existing capacity challenges within Districts, and the complexity of COMET-Farm, many trainees became overwhelmed. It is recommended that an individual whose sole job is Carbon Farm Planning is what is ultimately needed.
- District budgets do not currently allow for hiring additional staff. Dedicated planners could be placed regionally within Districts; however, their salary would need to be subsidized in some way because of existing District budgets.
- As more private foundations and organizations become interested in Carbon Farm Planning opportunities, technical assistance (and conservation practice implementation) will struggle to keep up. Consider supporting the creation of a pipeline of conservation professionals with learned skills in their "toolkit" (such as Carbon Farm Planning) that also receive a competitive wage. There is a talent drain from county, state, and federal conservation organizations, with conservation professionals leaving for private industry due to wage and benefit inequities.
- Consider whether simplified plans can be created by graduate students in college. Also consider the opportunities presented by training Technical Service Providers to complete plans.

- Establish a set of advisors for plan consultation due to the complexity of farming systems in North Carolina. Additionally, build state level technical experts that understand Carbon Farm Planning to streamline the consultation process.
- Build out a learning library to support concepts and tools, such as recommended books, blogs, podcasts, etc. This could be a crowd-sourcing opportunity and be housed on a wiki, for example. Segment the resources by region to make it easier to source relevant information.
- Include either recorded interviews of farmers who have received Carbon Farm Plans or opportunities for trainees to hear from a panel of farmers during the training. By hearing from farmers who have been on the receiving end, it will assist the planners in how they approach planning.
- Find the intersection of Carbon Farm Planning and NRCS conservation practices. Also, include a module that discusses the overlap so that the trainee has foundational practices to consider when starting a plan for a farm.
- Include in the training the opportunity for trainees to bring a specific farm case to allow for trainer assessment of on-farm carbon opportunities. This also allows greater trainer/trainee interaction and opportunities for the trainer to learn more about regional farming systems.
- More case studies about how to communicate the value of Carbon Farm Planning to more culturally conservative farmers.
- Provide a webinar on how to “sell” Carbon Farm Planning to farmers. The high cost of a Carbon Farm Plan (upwards of $10,000 each), and the amount of time dedicated by planners (1-2 years per plan), is a huge hurdle for both the planner as well as the farmer.
- Provide Continuing Education credits for trainees such as through AgLearn.
- Consider what carbon markets need to look like to support small, complex farming systems such as those represented in the southeastern US. Until an appropriate structure is determined for carbon markets, the participation of farmers in the southeastern US in Carbon Farm Planning will be minimal at best.
- The farmer should not be required to give up their rights to participate in the Carbon Farm Planning program. Confidentiality of the farmer is key. Consider having non-District/NRCS planners sign a confidentiality agreement rather than the farmer sign a document allowing release of information. Portions of the Carbon Farm Plan contain Personally Identifiable Information (PII). Advisors and others participating in plan creation can be provided portions of the plan that do not require revealing PII. This is critical to consider as Partnerships for Climate Smart Commodities (PCSC) projects are requiring non-traditional partners to work together to ultimately support farmers. This is especially concerning within North Carolina as entities within this state are either recipients or subawards within that grant program, with no known partnerships with any Districts or NRCS in the state.

- In relation to PCSC projects, and those similar to it going forward, the farmers need to be at the table at the beginning of the project helping to design the program. Ensure that the right team participants are at the table at the start, including the farmer. There is a concern in North Carolina that because Districts and NRCS were not considered partners on these grants that a farmer's needs and wants were not considered and that there will be a lot of "selling" conservation rather than utilizing ready and willing participants. The Districts and NRCS serve as that outreach partner and the lack of this consideration within PCSC projects in NC is concerning.
- The final product created through the Carbon Farm Planning approach presented by Carbon Cycle Institute is lengthy (upwards of 40-75 pages in length). Consider the goal of why the plan is being created and the audience. If it is meant for the farmer, consider a shorter, condensed version without narratives, such as a bulleted list of steps and actions along with a timeline.
- While this is a personalized experience between the planner and the farmer, consider whether farming records can be more readily retrieved from the Farm Service Agency. Confidentiality considerations will also need to be made in this scenario, depending on the planner's affiliation.
- Despite COMET-Farm being a more comprehensive planning tool, it is still based on estimates and does not consider what is actually happening in the soil. Through this project, soil testing did not correlate with values within the plan. Consider better soil testing to validate the assumptions made within the plan.

Attachment B

Summary of Installed Best Management Practices

County/District	Farmer Funds Paid	BMP	BMP Details	Annual MG CO2e *
Buncombe	$4,015	Livestock exclusion fencing	6,600 linear ft	0
		Water tank	1 unit	0
		Cover crop	5 acres	2
		No-till pumpkins	5 acres	3
Caldwell	$4,015	Pasture renovation with cover crop	27 acres (each)	39
Franklin	$4,015.33	Cover crop	25 acres	6
		Pollinator plantings	Small plots	1
Haywood	$8,030	Pasture planting with cover crop	151 acres (each)	219
Madison +	0	n/a	n/a	0
Rutherford	$4,015	Compost application	50 tons	33
		Cover crop w/ grass	3 acres	2
Halifax / Fishing Creek	$4,315	Pasture renovation w/ cover crop	54 acres (each)	77
TOTAL:	$28,405.33			382 **

+ Madison District had staff turnover and was unable to expend BMP funds in their District. Their funds were transferred to Haywood District.
*Amount of CO_2 equivalent sequestered annually
** a total of 382 Metric Tons of CO2 equivalent to be sequestered annually through the installation of prescribed best management practices. Per EPA's greenhouse gas calculator (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results) this equates to 85 gasoline-powered cars for one year or 42,984 gallons of gasoline consumed.

Attachment C

Soil Testing Results

Halifax County

Rutherford County

Haywood County

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On-Farm Research Report

2022-44

Carbon Farm Planning
Soil Carbon Sampling
Johnston Farm – Halifax Co NC

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Soil was sampled on 1-2 December 2021 from 24 locations on the farm (Figure 1). Sampling depth was 0-4", 4-12", and 12-24" from composites of up to 5 cores separated by 10 yards each. Soil was analyzed for total carbon and nitrogen using dry combustion (considered the gold standard for carbon analysis) in the Soil Ecology and Management Lab in Raleigh NC.

Soil organic carbon was determined on 72 samples (24 locations x 3 depth increments), and most of the observations were at a very low level (<10 g kg^{-1}, equivalent to <1% carbon) (Figure 2). The average was 8.1 g kg^{-1} (or 0.81% carbon).

Most of the variation in soil organic carbon was due to sampling depth (Figure 3). Most soils have greatest organic carbon concentration near the soil surface. The shape of the decline in soil organic carbon concentration with depth can be a function of inherent soil formation factors, and sometimes due to long-term management. Root-zone enrichment of soil organic carbon is a calculation assuming that soil organic carbon concentration at the 12-inch depth is where management no longer has much influence on carbon accumulation, and therefore, baseline soil organic carbon content can be subtracted from the total organic carbon content to isolate the portion attributable to contemporary management (i.e. during the past 50 years).

Table 1 shows (1) total stock of soil organic carbon in the surface 12-inch depth, (2) baseline soil organic carbon content (historical portion), and (3) root-zone enrichment (RZE) of soil organic carbon (contemporary portion that is manageable).

Table 1. Carbon contents by land use in the surface 12-inch depth (metric tons per hectare, Mg ha^{-1}; average ± standard deviation)

Land use	Total SOC	Baseline SOC	RZE of SOC
Cropland	21.2 ± 4.2	9.4 ± 2.4	11.8 ± 3.0
Grassland	42.5 ± 10.1	14.0 ± 5.2	28.5 ± 7.0
Woodland	62.1 ± 6.8	24.6 ± 3.0	37.4 ± 4.2
Alternatively, as metric tons of CO_2 per acre (MT CO_2/acre)			
Cropland	31.9	14.1	17.8
Grassland	63.7	21.0	42.8
Woodland	93.1	36.9	56.2

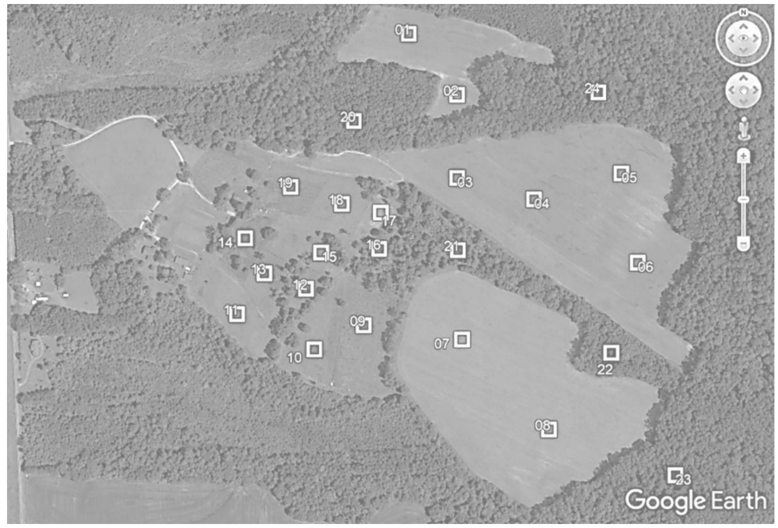

Figure 1. Sampling locations on the farm. A total of 24 locations were sampled.

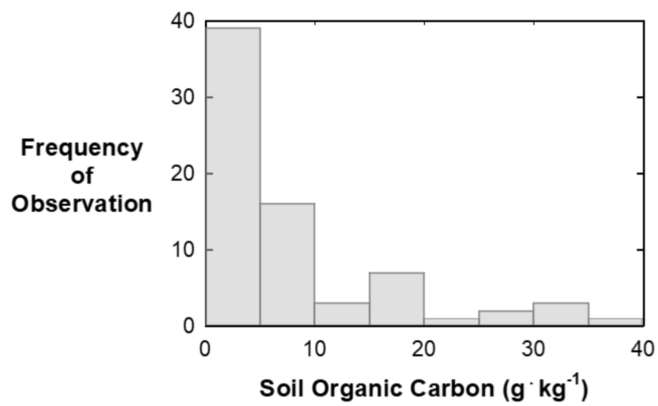

Figure 2. Frequency of soil organic carbon concentration across all 72 observations.

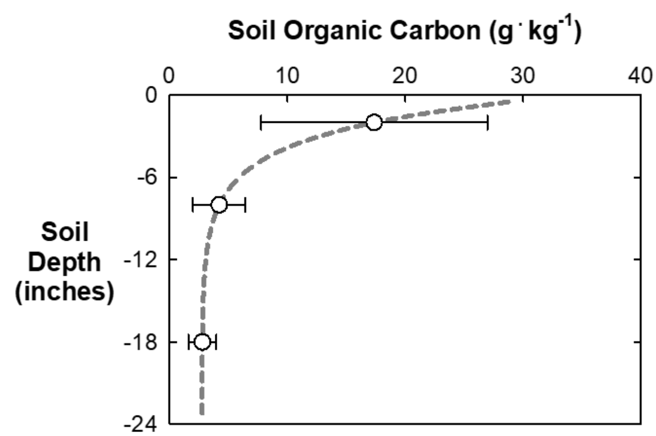

Figure 3. Soil organic carbon concentration as a function of soil depth when averaged across the 24 sampling locations. Horizontal error bars represent the range of concentrations among the 24 samples.

Root-zone enrichment of soil organic carbon was greatest under woodland, and statistically not different from that under grassland, but both land uses had greater values than under cropland. The long-term lack of soil disturbance under woodlands and grasslands is likely the most important reason for greater storage of soil organic carbon. Additionally, the quality of carbon inputs could be having an influence on total carbon accumulation. Obviously, woodlands store a great amount of carbon in the above-ground woody biomass, and much more than in grasslands and croplands. However, the value we place on different types of production should be appreciated. Wood is valuable as timber and wildlife habitat, but grasslands provide forage for livestock production and open space for wildlife and croplands provide food grains for consumption. Seeing the value of grasslands and woodlands as a potentially greater soil carbon reservoir than croplands may be important for some decision-making. Quantification is a key step towards understanding.

Baseline soil organic carbon contents were different among the three land uses, and there are likely reasons for this. The landscape setting and associated soil type may have been one reason. Although soils were all mapped similarly, this was from a coarse level of classification. Soil texture was different among the land uses. In the surface 4-inch depth, clay concentration was similar among all three land uses (12 ± 4%). However, silt concentration was greater under woodland (30 ±8%) and grassland (25 ± 13%) than under cropland (13 ± 2%). This meant that less sand was in the surface 4-inch depth under woodland (57 ± 8%) and grassland (64 ± 17%) than under cropland (76 ± 5%). Sand is known to have less affinity for storing soil organic carbon. Clay + silt concentration generally increased with soil depth from 34% in the surface 4-inch depth to 38% in the 4 to 12-inch depth to 46% in the 12 to 24-inch depth.

Quality of soil organic matter was also assessed with measurement of total soil nitrogen and soil-test biological activity. Total soil nitrogen followed patterns very similar to those of soil organic carbon (Figure 4). This was despite woodlands not likely to have received significant fertilizer nitrogen input like that of cropland and grassland. Almost all nitrogen was organic, that is tightly bound in soil organic matter requiring soil microbial activity to release this nitrogen for plant availability and uptake.

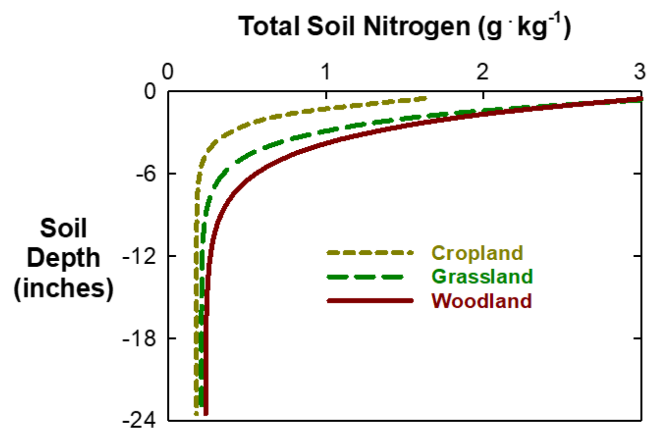

Figure 4. Total soil nitrogen concentration as a function of soil depth and land use.

Table 2 shows (1) total stock of soil nitrogen in the surface 12-inch depth, (2) baseline soil nitrogen content (historical portion), and (3) root-zone enrichment (RZE) of total soil nitrogen (contemporary portion that is manageable). Conservation management with woodlands and grasslands clearly was able to increase the reserves of organic nitrogen in soil as a simultaneous step in the storage of carbon. Despite woodland was not fertilized, root-zone enrichment of total soil nitrogen was almost exactly the same as under grassland. This differed slightly to how land management affected root-zone enrichment of soil organic carbon. Soil under woodland was likely a bit starved for nitrogen, but in the long-term was sequestering nitrogen from the environment.

Table 2. Total soil nitrogen (TSN) contents by land use in the surface 12-inch depth (lb/acre)

Land use	Total TSN	Baseline TSN	RZE of TSN
Cropland	1623	707	916
Grassland	2960	871	2089
Woodland	3173	1135	2037

Table 3. Contents of soil-test biological activity (STBA) by land use in the surface 12-inch depth (mg CO_2-C kg^{-1} 3 d^{-1})

Land use	Total STBA	Baseline STBA	RZE of STBA
Cropland	245	39	206
Grassland	434	80	353
Woodland	492	143	349

Table 3 shows (1) total soil-test biological activity (STBA) in the surface 12-inch depth, (2) baseline STBA (historical portion), and (3) root-zone enrichment (RZE) of STBA (contemporary portion that is manageable). Soil-test biological activity behaved very similarly to that of total soil nitrogen, with no difference in root-zone enrichment between woodland and grassland and both greater than under cropland.

Conclusion – Soil carbon was concentrated near the surface, and therefore, conservation management with minimal soil disturbance and continuous plant cover should be considered essential in storing more carbon on farms in the region.

On-Farm Research Report

2022-46

Carbon Farm Planning
Soil Carbon Sampling
Higgins Farm – Rutherford Co NC

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Soil was sampled on 28 December 2021 from 20 locations on the farm (Figure 1). Sampling depth was 0-4", 4-12", and 12-24" from composites of up to 5 cores separated by 10 yards each. Soil was analyzed for total carbon and nitrogen using dry combustion (considered the gold standard for carbon analysis) in the Soil Ecology and Management Lab in Raleigh NC.

Soil organic carbon was determined on 60 samples (20 locations x 3 depth increments). Observations were distributed across a wide range of soil organic carbon levels (Figure 2). The average was 13.8 g kg^{-1} (or 1.38% carbon).

Most of the variation in soil organic carbon was due to sampling depth (Figure 3). Most soils have greatest organic carbon concentration near the soil surface. The shape of the decline in soil organic carbon concentration with depth is a function of (1) inherent soil formation factors and (2) long-term management. Root-zone enrichment of soil organic carbon is a calculation assuming that soil organic carbon concentration at the 12-inch depth is where management no longer has much influence on carbon accumulation, and therefore, baseline soil organic carbon content can be subtracted from the total organic carbon content to isolate the portion attributable to contemporary management (i.e. during the past 50 years).

Table 1 shows (1) total stock of soil organic carbon in the surface 12-inch depth, (2) baseline soil organic carbon content (historical portion), and (3) root-zone enrichment (RZE) of soil organic carbon (contemporary portion that is manageable).

Table 1. Carbon contents by land use in the surface 12-inch depth (metric tons per hectare, Mg ha^{-1}; average ± standard deviation)

Land use	Cropland		Grassland		Woodland
Total	46.2	=	60.0	=	59.9
Baseline	32.8	=	23.8	=	27.0
Root-zone enrichment	13.3	<	36.2	=	32.9
Alternatively, as metric tons of CO_2 per acre (MT CO_2/acre)					
Total	69.3	=	90.0	=	89.8
Baseline	49.2	=	35.7	=	40.5
Root-zone enrichment	20.0	<	54.3	=	49.3

Figure 1. Sampling locations on the farm. A total of 20 locations were sampled. Note – locations 07, 08, 09, and 10 were not sampled as originally intended.

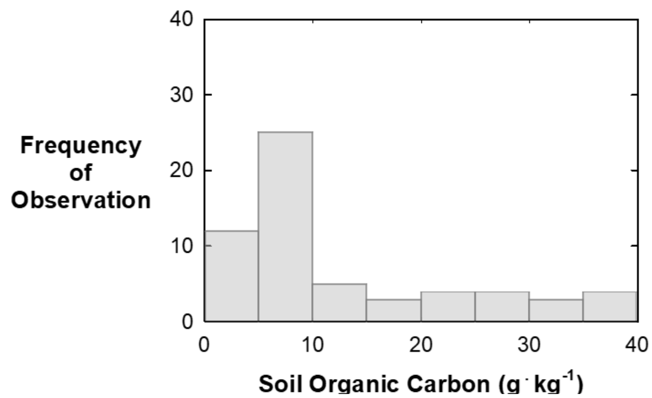

Figure 2. Frequency of soil organic carbon concentration across all 60 observations.

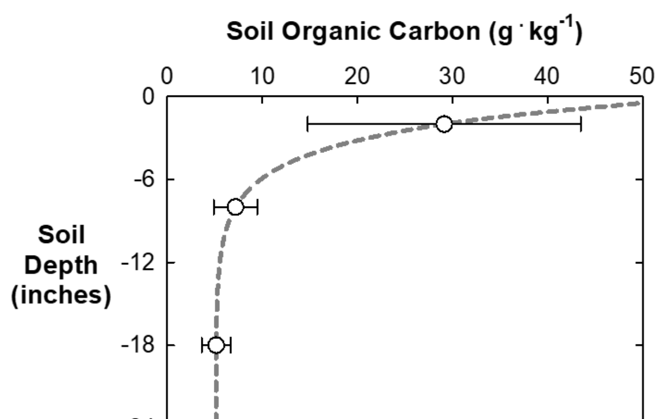

Figure 3. Soil organic carbon concentration as a function of soil depth when averaged across the 20 sampling locations. Horizontal error bars represent the range of concentrations at each specific depth increment.

Root-zone enrichment of soil organic carbon was greatest under woodland, and statistically not different from that under grassland, but both land uses had greater values than under cropland. The long-term lack of soil disturbance under woodlands and grasslands is likely the most important reason for greater storage of soil organic carbon. Additionally, the quality of carbon inputs could be having an influence on total carbon accumulation. Obviously, woodlands store a great amount of carbon in the above-ground woody biomass, and much more than in grasslands and croplands. However, the value we place on different types of production should be appreciated. Wood is valuable as timber and wildlife habitat, but grasslands provide forage for livestock production and open space for wildlife and croplands provide food grains for consumption. Seeing the value of grasslands and woodlands as a potentially greater soil carbon reservoir than croplands may be important for some decision-making. Quantification is a key step towards understanding.

Baseline soil organic carbon contents were not statistically different among the three land uses, although the cropland field tended to have a greater value. The landscape setting and associated soil types were likely the primary reason on this farm. However, soil texture was not greatly different among land uses. The lowland landscape position with cropland had a large effect on baseline soil organic carbon content, which was a function of soil formation factors over thousands of years and not due to contemporary management. In the surface 4-inch depth, clay concentration was similar among all three land uses (23 $\pm$ 6%). Silt concentration was also similar among land uses (14 $\pm$ 4%). Sand concentration tended to decline with depth, averaging 63 $\pm$ 9% in the surface 4-inch depth, 51 $\pm$ 11% at 4- to 12-inch depth, and 43 $\pm$ 12% at 12- to 24-inch depth. Therefore, clay + silt concentration tended to increase with depth, which is typical for mature soils in our region.

Quality of soil organic matter was also assessed with measurement of total soil nitrogen and soil-test biological activity. Total soil nitrogen followed patterns very similar to those of soil organic carbon (Figure 4). This was despite woodlands not likely to have received significant fertilizer nitrogen input like that of cropland and grassland. Almost all nitrogen was organic, that is tightly bound in soil organic matter requiring soil microbial activity to release this nitrogen for plant availability and uptake.

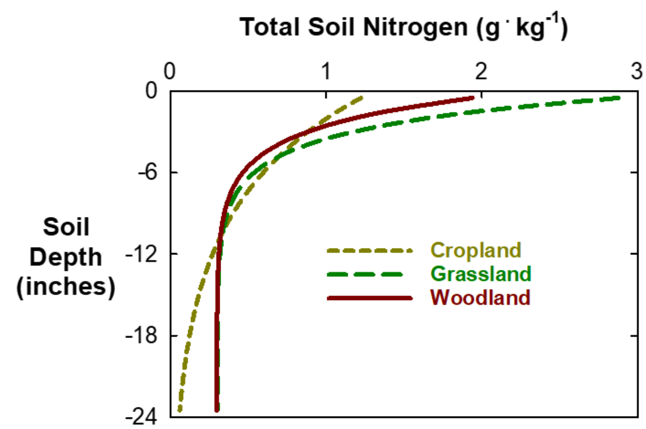

Figure 4. Total soil nitrogen concentration as a function of soil depth and land use.

Table 2 shows (1) total stock of soil nitrogen in the surface 12-inch depth, (2) baseline soil nitrogen content (historical portion), and (3) root-zone enrichment (RZE) of total soil nitrogen (contemporary portion that is manageable). Conservation management with woodlands and grasslands was able to increase the root-zone enrichment of total soil nitrogen. This observation counter-acted the somewhat larger baseline nitrogen content with the lowland cropping conditions.

Table 2. Total soil nitrogen (TSN) contents by land use in the surface 12-inch depth (lb/acre)

Land use	Cropland		Grassland		Woodland
Total	2379	=	2958	=	2422
Baseline	1513	=	1370	=	1327
Root-zone enrichment	867	=	1588	=	1095

Table 3 shows (1) total soil-test biological activity (STBA) in the surface 12-inch depth, (2) baseline STBA (historical portion), and (3) root-zone enrichment (RZE) of STBA (contemporary portion that is manageable). Differences in STBA did not occur, but tendencies were similar to those of total soil nitrogen.

Table 3. Contents of soil-test biological activity (STBA) by land use in the surface 12-inch depth (kg CO_2-C ha^{-1} 3 d^{-1})

Land use	Cropland		Grassland		Woodland
Total	409	=	406	=	433
Baseline	180	=	94	=	129
Root-zone enrichment	229	=	312	=	304

Conclusion – Soil carbon was concentrated near the surface, and therefore, conservation management with minimal soil disturbance and continuous plant cover should be considered essential in storing more carbon on farms in the region. Sampling on this farm suggests that pasture management combined with trees in a silvopasture could be effective not only in storing carbon in wood, but also in soil as organic matter. The quality of plant litter and livestock feces may be contributing significantly to the accumulation of total soil nitrogen, which must be decomposed by soil microorganisms to release plant-available nitrogen.

On-Farm Research Report

2022-45

Carbon Farm Planning
Soil Carbon Sampling
Sorrells Farm – Haywood Co NC

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Soil was sampled on 6 July 2021 from 20 locations on the farm (Figure 1). Sampling depth was 0-4", 4-12", and 12-24" from composites of up to 5 cores separated by 10 yards each. Soil was analyzed for total carbon and nitrogen using dry combustion (considered the gold standard for carbon analysis) in the Soil Ecology and Management Lab in Raleigh NC.

Soil organic carbon was determined on 68 samples (12 locations x 3 depth increments and 8 locations x 4 depth increments). Observations were distributed across a wide range of soil organic carbon levels (Figure 2). The average was 16.3 g kg^{-1} (or 1.63% carbon).

Most of the variation in soil organic carbon was due to sampling depth (Figure 3). Most soils have greatest organic carbon concentration near the soil surface. The shape of the decline in soil organic carbon concentration with depth is a function of (1) inherent soil formation factors and (2) long-term management. Root-zone enrichment of soil organic carbon is a calculation assuming that soil organic carbon concentration at the 12-inch depth is where management no longer has much influence on carbon accumulation, and therefore, baseline soil organic carbon content can be subtracted from the total organic carbon content to isolate the portion attributable to contemporary management (i.e. during the past 50 years).

Table 1 shows (1) total stock of soil organic carbon in the surface 12-inch depth, (2) baseline soil organic carbon content (historical portion), and (3) root-zone enrichment (RZE) of soil organic carbon (contemporary portion that is manageable).

Table 1. Carbon contents by land use in the surface 12-inch depth (metric tons per hectare, Mg ha^{-1}; average ± standard deviation)

Land use	Cropland		Grassland		Woodland
Total	89.2	>	68.9	=	76.3
Baseline	74.9	>	29.9	=	38.6
Root-zone enrichment	14.3	<	37.4	=	37.7
Alternatively, as metric tons of CO_2 per acre (MT CO_2/acre)					
Total	133.8	>	103.3	=	111.4
Baseline	112.3	>	44.8	=	57.9
Root-zone enrichment	21.5	<	56.1	=	56.5

Figure 1. Sampling locations on the farm. A total of 20 locations were sampled.

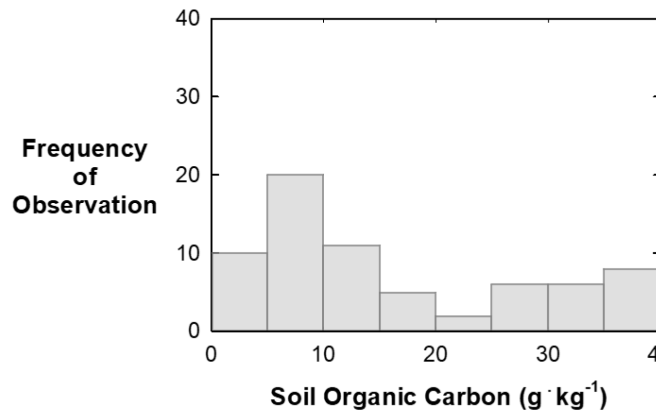


Figure 2. Frequency of soil organic carbon concentration across all 68 observations.

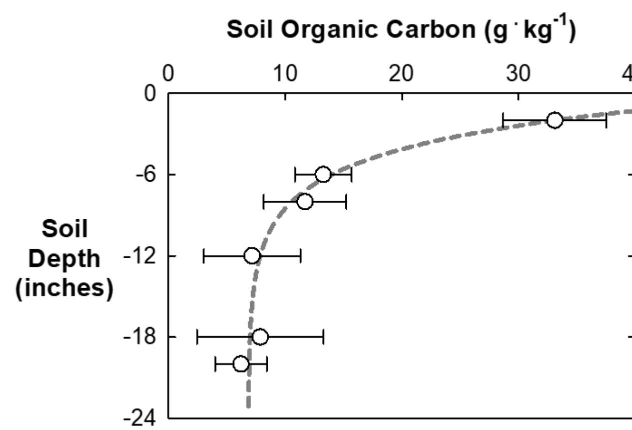


Figure 3. Soil organic carbon concentration as a function of soil depth when averaged across the 20 sampling locations. Horizontal error bars represent the range of concentrations at each specific depth increment.

Root-zone enrichment of soil organic carbon was greatest under woodland, and statistically not different from that under grassland, but both land uses had greater values than under cropland. The long-term lack of soil disturbance under woodlands and grasslands is likely the most important reason for greater storage of soil organic carbon. Additionally, the quality of carbon inputs could be having an influence on total carbon accumulation. Obviously, woodlands store a great amount of carbon in the above-ground woody biomass, and much more than in grasslands and croplands. However, the value we place on different types of production should be appreciated. Wood is valuable as timber and wildlife habitat, but grasslands provide forage for livestock production and open space for wildlife and croplands provide food grains for consumption. Seeing the value of grasslands and woodlands as a potentially greater soil carbon reservoir than croplands may be important for some decision-making. Quantification is a key step towards understanding.

Baseline soil organic carbon contents were different among the three land uses, and there are likely reasons for this. The landscape setting and associated soil types were likely the primary reason on this farm. However, soil texture was not greatly different among land uses. The lowland landscape position with cropland had a large effect on baseline soil organic carbon content, which was a function of soil formation factors over thousands of years and not due to contemporary management. In the surface 4-inch depth, clay concentration was similar among all three land uses (24 $\pm$ 4%). Silt concentration was also similar among land uses (25 $\pm$ 2%). Sand concentration tended to decline with depth, averaging 51 $\pm$ 5% in the surface 4-inch depth, 47 $\pm$ 8% at 4- to 12-inch depth, and 44 $\pm$ 7% at 12- to 24-inch depth. Therefore, clay + silt concentration tended to increase with depth, which is typical for mature soils in our region.

Quality of soil organic matter was also assessed with measurement of total soil nitrogen and soil-test biological activity. Total soil nitrogen followed patterns very similar to those of soil organic carbon (Figure 4). This was despite woodlands not likely to have received significant fertilizer nitrogen input like that of cropland and grassland. Almost all nitrogen was organic, that is tightly bound in soil organic matter requiring soil microbial activity to release this nitrogen for plant availability and uptake.

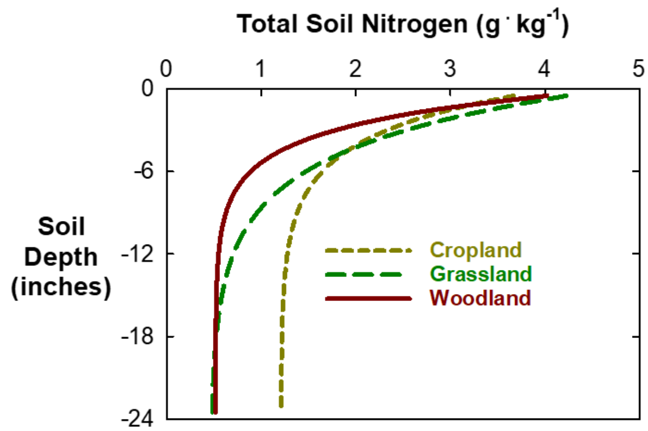


Figure 4. Total soil nitrogen concentration as a function of soil depth and land use.

Table 2 shows (1) total stock of soil nitrogen in the surface 12-inch depth, (2) baseline soil nitrogen content (historical portion), and (3) root-zone enrichment (RZE) of total soil nitrogen (contemporary portion that is manageable). Conservation management with woodlands and grasslands clearly was able to increase the root-zone enrichment of total soil nitrogen. This observation counter-acted the large baseline nitrogen content with the lowland cropping conditions.

Table 2. Total soil nitrogen (TSN) contents by land use in the surface 12-inch depth (lb/acre)

Land use	Cropland		Grassland		Woodland
Total	6475	=	5618	=	4561
Baseline	4549	>	2456	=	2240
Root-zone enrichment	1927	<	3134	=	2320

Table 3 shows (1) total soil-test biological activity (STBA) in the surface 12-inch depth, (2) baseline STBA (historical portion), and (3) root-zone enrichment (RZE) of STBA (contemporary portion that is manageable). Differences in STBA did not occur, but tendencies were similar to those of total soil nitrogen. The ridge tops where woodlands were sampled had reduced baseline condition, but root-zone enrichment was large.

Table 3. Contents of soil-test biological activity (STBA) by land use in the surface 12-inch depth (kg CO_2-C ha^{-1} 3 d^{-1})

Land use	Cropland		Grassland		Woodland
Total	983	=	1082	=	771
Baseline	387	=	338	=	209
Root-zone enrichment	595	=	768	=	562

Conclusion – Soil carbon was concentrated near the surface, and therefore, conservation management with minimal soil disturbance and continuous plant cover should be considered essential in storing more carbon on farms in the region. Sampling on this farm revealed strong evidence that well-managed pastures can store soil carbon effectively, improve reserves of total soil nitrogen, and enhance soil biological activity.

Attachment D

Halifax Team Demonstration Day

Carbon Farm Planning Brochure

Roanoke Cooperative's Forest Landowner Conference (2021 & 2022)

P: 919.510.4599 1401 Sunset Drive | Suite 202 | Greensboro, NC 27408-7200

RA Wills Family Farm, Halifax County (Hulan Johnston, farmer, center)

Halifax Team and Foundation staff – Pictured L to R: Elliot Swain (Brunswick SWCD), Amanda Sand (Foundation), Gail Hughes (Foundation), Terry Best (NRCS), Allie Dinwiddie (Division of Soil and Water Conservation), Dr. Alan Franzluebbers (USDA-ARS), Alton Perry (Roanoke Cooperative)

Halifax Team Demonstration Day, April 2022

FOR MORE INFORMATION:

Contact the NC Foundation for Soil & Water Conservation at 919.510.4599

Or visit their Agriculture Resilience: Carbon Farm Planning information webpage at:

https://ncsoilwater.org/programs/agriculture-resilience-carbon-farm-planning/

NC FOUNDATION for SOIL & WATER CONSERVATION

SOUTHERN SARE Sustainable Agriculture Research & Education

North Carolina ADFP Trust Fund

Agriculture Resilience: Carbon Farm Planning

Improving soil fertility & water holding capacity through increasing soil carbon

Providing solutions for climate change through agricultural resilience

Agriculture as a Solution to Climate Change

Agriculture and working lands play a significant role in climate change, both as a source of roughly one-quarter of global emissions, but more importantly as a potential sink to reduce atmospheric carbon dioxide through sequestration in agricultural soils and biomass. Building upon existing programs in the agricultural sector, climate-beneficial agricultural practices, as identified through a comprehensive Carbon Farm Planning process, can play a key role in significantly reducing atmospheric greenhouse gases, while simultaneously improving the productivity, resilience and ecological sustainability of agricultural landscapes and improving environmental health.

The Carbon Cycle

Carbon constantly cycles through five pools. However, more carbon dioxide is now being released from combustion of fossil fuels than the earth's plant life and ocean waters can absorb. The excess carbon dioxide in the atmosphere is trapping the sun's heat and changing our climate, as seen in shifts in our earth's jet stream, ocean currents, and air temperature. Rainfall patterns are changing and glaciers and polar ice caps (water storage for many communities) are melting quickly. Restoring balance to the carbon cycle by sequestering atmospheric carbon into soils and reducing carbon losses from soils can mitigate climate change, build resilience to drought and increase agricultural productivity.

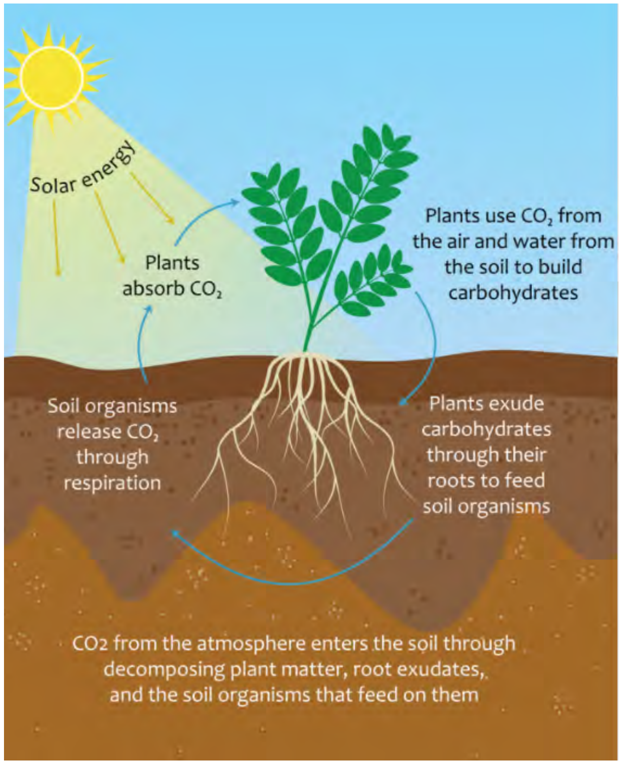


Photo Credit: Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.: https://creativecommons.org/licenses/by-nc-sa/4.0/

Lead Author: Haley Nagle, Colorado State University
Contributing Authors: Lynette Niebrugge and Jeff Creque with Carbon Cycle Institute

Agriculture Resilience: NC Carbon Farm Planning Pilot

In 2020, the Foundation for Soil and Water Conservation organized the creation of a pilot program in North Carolina focused on "Carbon Farm Planning." The goal of the pilot was to build upon groundbreaking work completed by the Marin Carbon Project (MCP), a consortium of independent agricultural institutions including university researchers, resource conservation districts, county and federal agencies, and nonprofits based in Marin County, California. The North Carolina Carbon Farm Planning pilot was designed to promote agriculture weather resilience at the farm level by introducing the NC conservation partnership to USDA technical resources for documenting on-farm carbon sequestration and quantifying greenhouse gas reduction benefits that are not readily used in North Carolina, including COMET Farm and COMET Planner. The overarching goal was for the NC Conservation Partnership to test the process of Carbon Farm Planning pioneered in California to determine if this worked well within the NC Conservation Partnership and met the needs of the state's agriculture community. Seven Soil and Water Conservation Districts (SWCDs) across the state were selected to work with a farmer in their district to evaluate each farmer's production system through the lens of carbon sequestration and greenhouse gas reduction while also addressing other soil, water, plant, and animal resource concerns on the farm. The seven cooperators participating in this pilot project will receive a whole-farm conservation plan that when implemented will address their resource concerns and operation goals while enhancing soil health, sequestering carbon, and reducing greenhouse gas emissions.

Why Carbon Farming?

Land management is the second largest contributor to carbon dioxide emissions on Earth. Yet, land management can transform itself from a net emitter to a net sequesterer of carbon dioxide.

Common agricultural practices, including driving a tractor, tilling the soil, over-grazing, using fossil fuel based fertilizers, pesticides and herbicides, result in significant carbon dioxide releases. Alternatively, carbon can be stored long term (decades to centuries or more) beneficially in soils through a process called soil carbon sequestration.

Carbon Farming involves implementing practices that are known to improve the rate at which carbon dioxide is removed from the atmosphere and converted to plant material and/or soil organic matter.

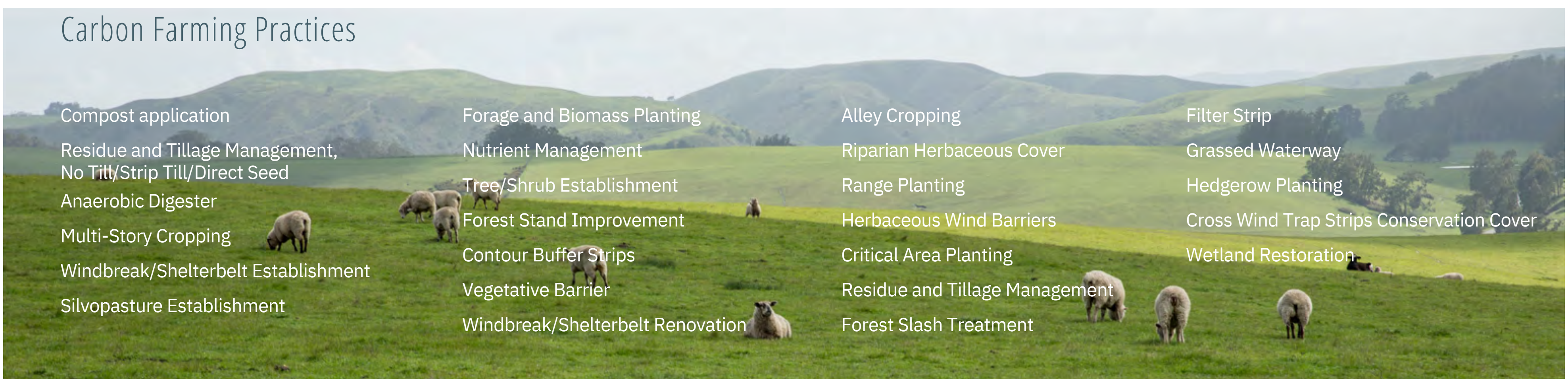
Carbon Farming Practices

Agriculture is the one sector that has the ability to transform from a net source of carbon dioxide to a net sink of carbon dioxide. Although additional North Carolina-specific research still needs to occur, research in other US states demonstrates the efficacy of several carbon-beneficial agricultural practices in increasing soil carbon sequestration. Compost use has been shown to increase the amount of carbon stored in soils and has important co-benefits, such as increased primary productivity and water-holding capacity. Restoration of riparian areas on working lands has the capacity to sequester significant amounts of carbon. There are at least thirty-two on-farm Natural Resources Conservation Service (NRCS) conservation practices that are known to improve soil health and sequester carbon, while producing important co-benefits to ecosystems and producers including increased water retention for crop uptake, hydrological function, biodiversity, and resilience.

Carbon Farming Implementation

Developing a model framework for land management that emphasizes carbon as the organizing principle can lead to enhanced rates of carbon capture, increase the provision of important ecosystem services, and mitigate climate change.

Establishing such a framework relies on sound policies, public-private partnerships, quantification methodologies and innovative financing mechanisms that ultimately empower local organizations and farmers to efficiently implement on-the-ground, science-based solutions. Soil and Water Conservation Districts (SWCDs) are an essential component of this framework to build local interest for Carbon Farm Planning and engage producers in Carbon Farming. For Carbon Farm Planning and Carbon Farming to be adopted in North Carolina, it is critical to strengthen the capacity of SWCDs, local agricultural support organizations, and producers to engage with and build onto the results of this pilot project. With local partnerships and grassroots adoption, it is possible Carbon Farming can achieve measurable carbon capture, mitigate climate change impacts, and increase agricultural resilience.



Forest Landowner Conference

October 26-27, 2021

This is a Virtual Event

Introduction to Forest Carbon Markets

The conference's purpose is to inform and educate landowners on sustainable forestry practices; on programs and technical assistance available through state and federal forestry and natural resource agencies; on the local timber industry, and on strategies for estate planning, including wills and trusts.

This year's conference will focus on the role of conservation practices in forestry and agriculture to address the challenges of climate change; it will feature speakers with expertise in carbon reduction programs and conservation principles in forestry and agriculture soil health.

Sustainable Forestry and Land Retention Project
Roanoke Electric Cooperative
The Roanoke Center

www.recforestry.org

Agenda

https://ncsu.zoom.us/webinar/register/WN_xWIkUfgOSK6OP7T2fgUPlQ

Tuesday, October 26 — Session 1

6 pm	Welcome **Alton Perry,** SFLRP Director
6:05 pm	Roanoke Electric Cooperative Welcome **Dennis McFee** Vice President, Member Services, Marketing & Public Relations
6:10 pm	Greetings **U.S. Rep. G.K. Butterfield** Congressman, North Carolina 1st District
6:15 pm	Greetings **Charles Daniels** Procurement Forester, Domtar
6:20 pm	Keynote Speaker **Dale Threatt-Taylor** Executive Director, The Nature Conservancy — South Carolina Chapter
6:50 pm	**Michael Gavazzi** Coordinator, USDA Forest Service Southeast Climate Hub
7:20 pm	**Kevin Harnish** Forest Analyst, Resourceful Communities Program, The Conservation Fund
7:50 pm	Q&A/Wrap-Up

Wednesday, October 27 — Session 2

10 am	Welcome **Alton Perry,** SFLRP Director
10:05 am	Greetings **Bob Etheridge** State Executive Director USDA Farm Service Agency
10:10 am	Greetings **Timothy Beard** State Conservationist Natural Resources Conservation Service
10:15 am	Greetings **Chris Brown** Senior Community Relations Manager, Enviva
10:20 am	Greetings **Robert Ross** Forest Marketing & Utilization Forester NC Forest Service
10:25 am	**Amanda Egdorf-Sand** Executive Director, NC Foundation for Soil and Water Conservation And **Alton Perry**
10:45 am	**Steve Woodruff,** Regional Agronomist Natural Resources Conservation Service
11:05 am	**Renard Turner** Owner, Vanguard Ranch
12 pm	Q&A/Wrap-Up

Keynote Speaker Biography

Dale Threatt-Taylor

Dale Threatt-Taylor is the Executive Director of The Nature Conservancy — South Carolina Chapter. She received a Bachelor of Science in Conservation from North Carolina State University and a Master of Environmental Management from Duke University in 2011. In 2012, she was selected as one of 30 agriculturalists in North Carolina identified to participate in the Agricultural Leadership Development Program at North Carolina State University.

Her career began as a Soil Conservationist with the USDA Natural Resources Conservation Service, and she later joined the Wake Soil and Water Conservation District. In 2008 she was selected as District Director of Wake SWCD and Wake County Soil and Water Conservation Department. Her role as Executive Director for TNC SC has provided the opportunity to build new relationships between natural resource conservationists and environmentalists nationally.

Dale's conservation and environmental leadership includes service on many national, state and local boards and committees. On Aug. 1, 2020, Dale made history when elected to serve as Chair of the Soil and Water Conservation Society's national Board of Directors. She also serves on TNC's North American Agriculture Committee and on the Executive Board of Sustain SC. On April 22, 2021, Dale was invited to join the Board of Visitors of the Nicholas School of the Environment at Duke University.

Having received many awards throughout her career, one caught her by surprise, The Order of the Long Leaf Pine from North Carolina Gov. Roy Cooper for her dedicated work in conservation. Dale wants everyone to understand that locally led conservation begins with an individual, and together, our conservation work is so important in protecting the lands and waters on which all life depends.

Forest Landowner Conference

"Refresh, Refocus, Take Action Toward Your Goals"

October 25-26, 2022

Rocky Mount Event Center
285 NE Main Street
Rocky Mount, N.C. 27801

The purpose of Roanoke Electric Cooperative's Sustainable Forestry and Land Retention Project Landowner Conference is to inform and educate landowners on strategies for estate planning and conflict resolution; on forest carbon programs; and on programs and technical assistance available through state forestry agencies, U.S. Department of Agriculture agencies, local timber industry and conservation organizations.

www.recforestry.org 252-539-4614

Agenda

MASKS ARE OPTIONAL

Tuesday, October 25

7:30 am	Exhibitor Setup
8:30 am	Registration, Networking, Exhibit Engagement
10 am	Welcome & Remarks **Alton Perry,** SFLRP Director **Dennis McFee,** Vice President, Member Services, Marketing and Public Relations, Roanoke Electric Cooperative **T.J. Walker,** Mayor Pro Tem, Rocky Mount
10:15 am	**Clarenda Stanley**, Managing Director — Farmer Inclusion, Nature4Justice
10:45 am	**Omoyemeh Jennifer Ile**, NC State University PhD Candidate, Tree Physiology and Ecosystem Science Laboratory
11:15 am	Keynote Speaker **Rita Hite,** President & CEO, American Forest Foundation
Noon	Lunch, Networking, Exhibit Engagement, Landowner Focus Group
1:15 pm	Strategies and Tools for Intergenerational Forest Ownership: **Mavis Gragg**, SFLR Director, American Forest Foundation; and **Pamela Harrigan-Young,** Estate Planning Attorney
2:15 pm	(10-minute session break)
3:25 pm	Closing Remarks

Wednesday, October 26

8:30 am	Registration, Networking, Exhibit Engagement
10 am	Welcome **Alton Perry,** SFLRP Director
10:05 am	Princeville Collaboration Model: **Mary Alice Holley**, Director of Community Innovation, Conservation Trust of NC; and **Dr. Glenda Lawrence-Knight**, Town Manager, Princeville, NC
10:35 am	Conflict Resolution **Will Dudenhauser**, Training Director, Dispute Settlement Center
11:30 am	(10-minute break)
11:40 am	Carbon Farm Planning Pilot, Halifax County Team
Noon	Lunch, Networking, Exhibit Engagement
1:15 pm	American Forest Foundation's Family Forest Carbon Program **Tatiana Height**, Southern Regional Director
1:45 pm	USDA Farm Service Agency **Linda Gerron**, State Outreach Coordinator
2:05 pm	USDA Natural Resources Conservation Service **Julius George,** Assistant State Conservationist — NC Programs
2:35 pm	(10-minute break)
2:45 pm	NC Department of Agriculture & Consumer Services **Rob Lipford**, Staff Forester, North Carolina Forest Service
3:15 pm	Wrap-up, Evaluation, Door Prizes

Keynote Speaker

Rita Hite

As president and CEO of the American Forest Foundation, Rita Hite leads the organization's ambitious conservation agenda. Her work centers on scaling AFF's efforts to empower family forest owners from all walks of life to address the most pressing conservation challenges facing our nation today: namely, increasing carbon storage, mitigating catastrophic wildfires and improving wildlife habitat.

In her more than 20-year career in forest conservation, Rita has staffed congressional leaders on the House Committee on Agriculture, built and curated coalitions and partnerships including the Forest Climate Working Group, the Forests in the Farm Bill Coalition and the Women's Forest Congress, and served as a nonprofit leader. She has shaped strategy, programs and public policies that have unlocked billions in support for family forest stewardship and have had a significant impact on climate change, wildfire resilience and forest sustainability across the United States.

Rita felt the call to champion natural resource conservation having grown up on a beef cattle farm in Upstate New York. She finds energy in tackling difficult conservation challenges and bringing together diverse teams, coalitions and resources to create market-relevant solutions.

To learn more about the American Forest Foundation, visit www.forestfoundation.org

Exhibitors

- Black Family Land Trust
- Center for Energy Education
- Domtar
- Enviva
- Extension Forestry
- Farm Service Agency
- Natural Resources Conservation Service
- NC Foundation for Soil & Water Conservation
- North Carolina Cooperative Extension Service
- North Carolina Department of Agriculture & Consumer Services
- North Carolina Forestry Association
- North Carolina Forest Service
- North Carolina Tree Farm Program
- North Carolina Wildlife Resources Commission
- Roanoke Electric Cooperative
- Roseburg Resources Co.
- Rural Advancement Foundation International — USA
- Sustainable Forestry and Land Retention Project
- The Conservation Fund/ Resourceful Communities
- The Roanoke Center
- The Tennie Group LLC
- West Fraser
- WestRock
- Whitaker Small Farm

Sponsors

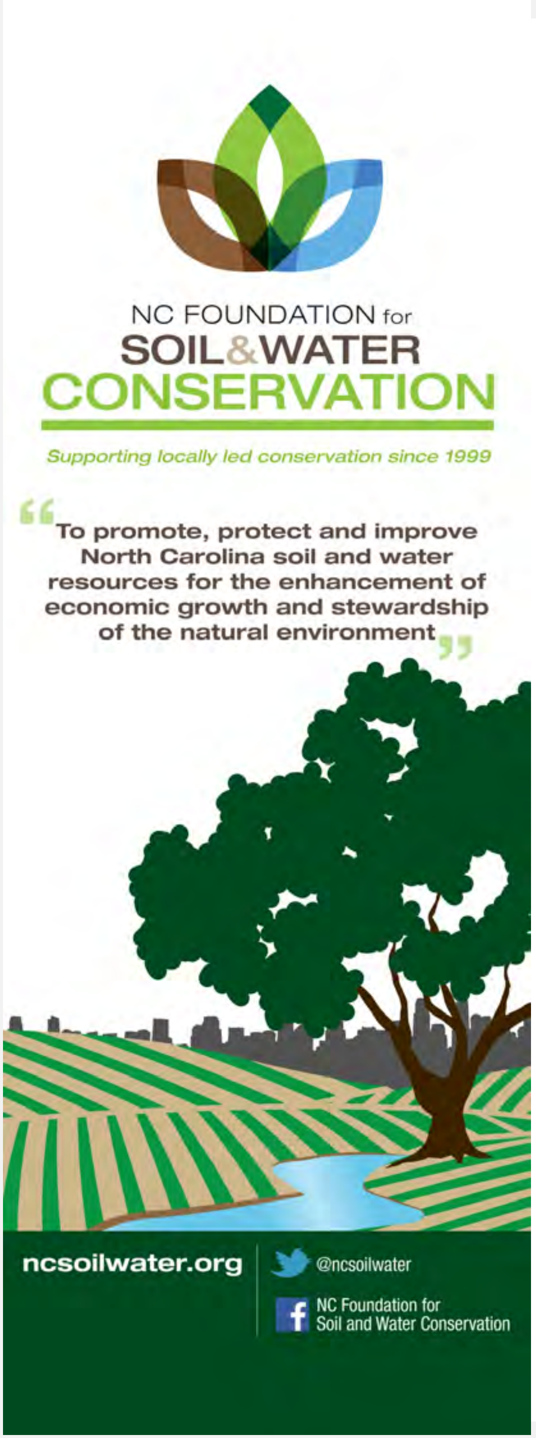
- 3M
- American Forest Foundation
- Domtar
- Enviva
- NC Foundation for Soil & Water Conservation
- Roanoke Electric Cooperative
- The Roanoke Center
- USDA Forest Service
- USDA Natural Resources Conservation Service
- WestRock

“Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it is the only thing that ever has”

~ Margaret Mead

Carbon Farm Planning

Increasing adaptive capacity of working lands



NC Conservation Partners' Foundation

Private, Corporate, State & Federal Resources

Enhance Conservation Leadership

Grow Foundation's Fiscal Security

Build **Conservation** Partnership

Support Locally Led Conservation Message

North Carolina NC Grange Established 1929

N.C. Department of Agriculture and Consumer Services - Founded 1877 -

Farm Bureau North Carolina

NC Electric Cooperatives Your Touchstone Energy® Cooperatives

NC Association of Soil & Water Conservation Districts

Smithfield. Good food. Responsibly.®

Gross Farms

AgCarolina Farm Credit

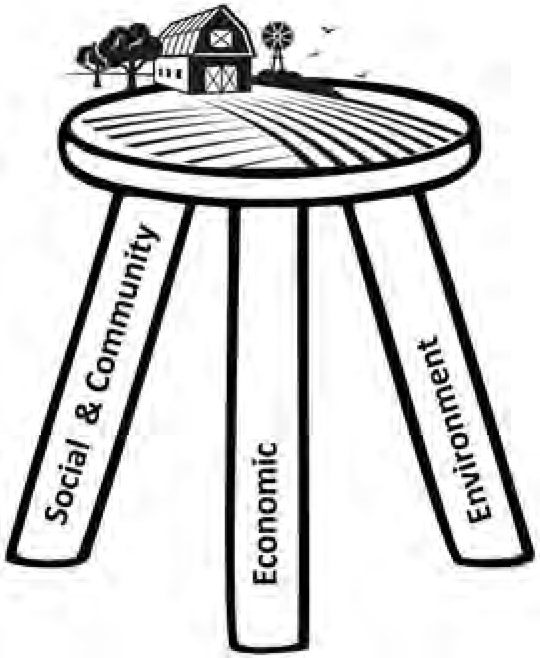
Cape Fear Farm Credit

Carolina Farm Credit Country Mortgages

What is it?

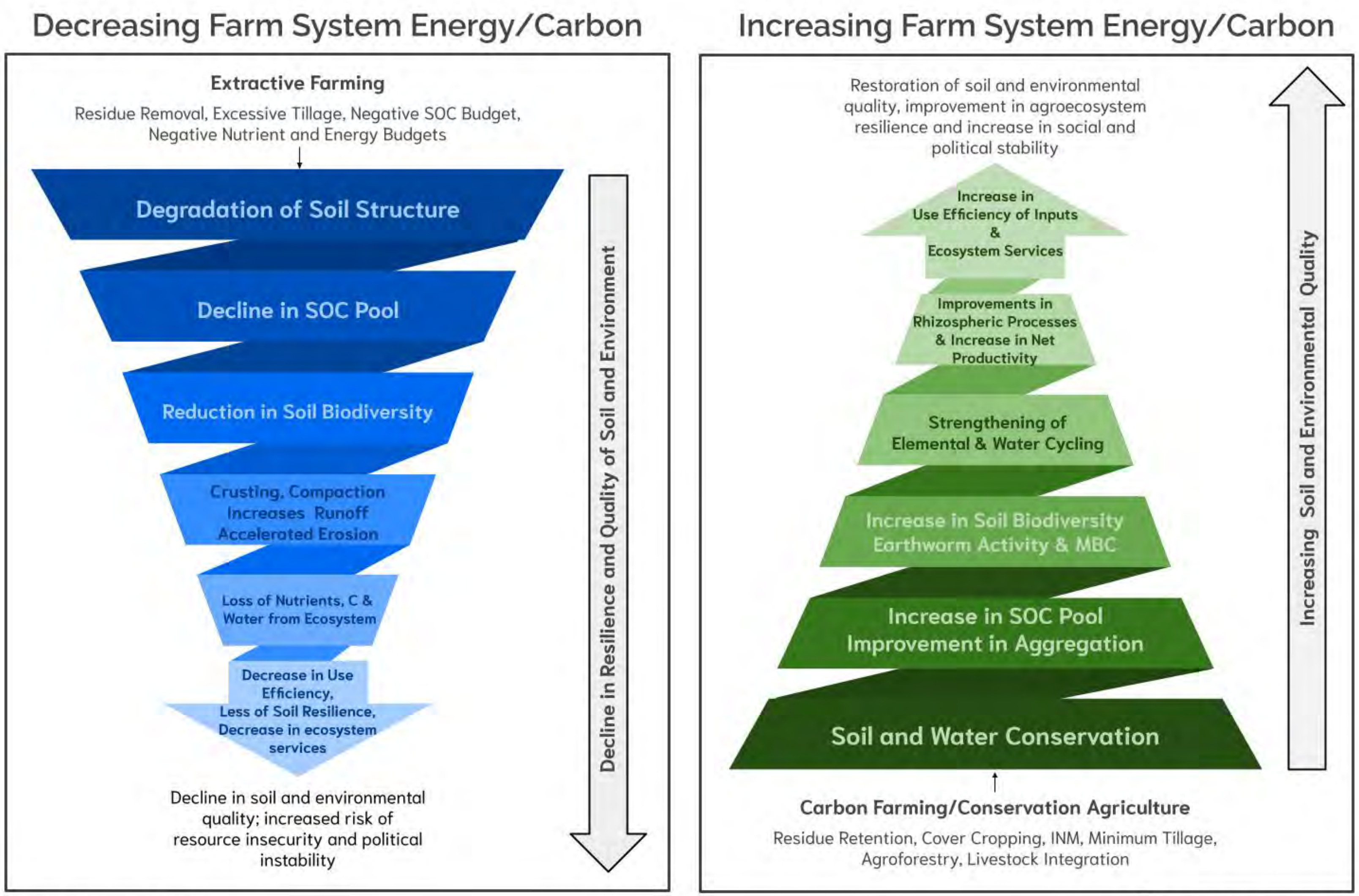
What is it?


Global Challenges
Food
Water
Climate


Social & Community
Economic
Environment

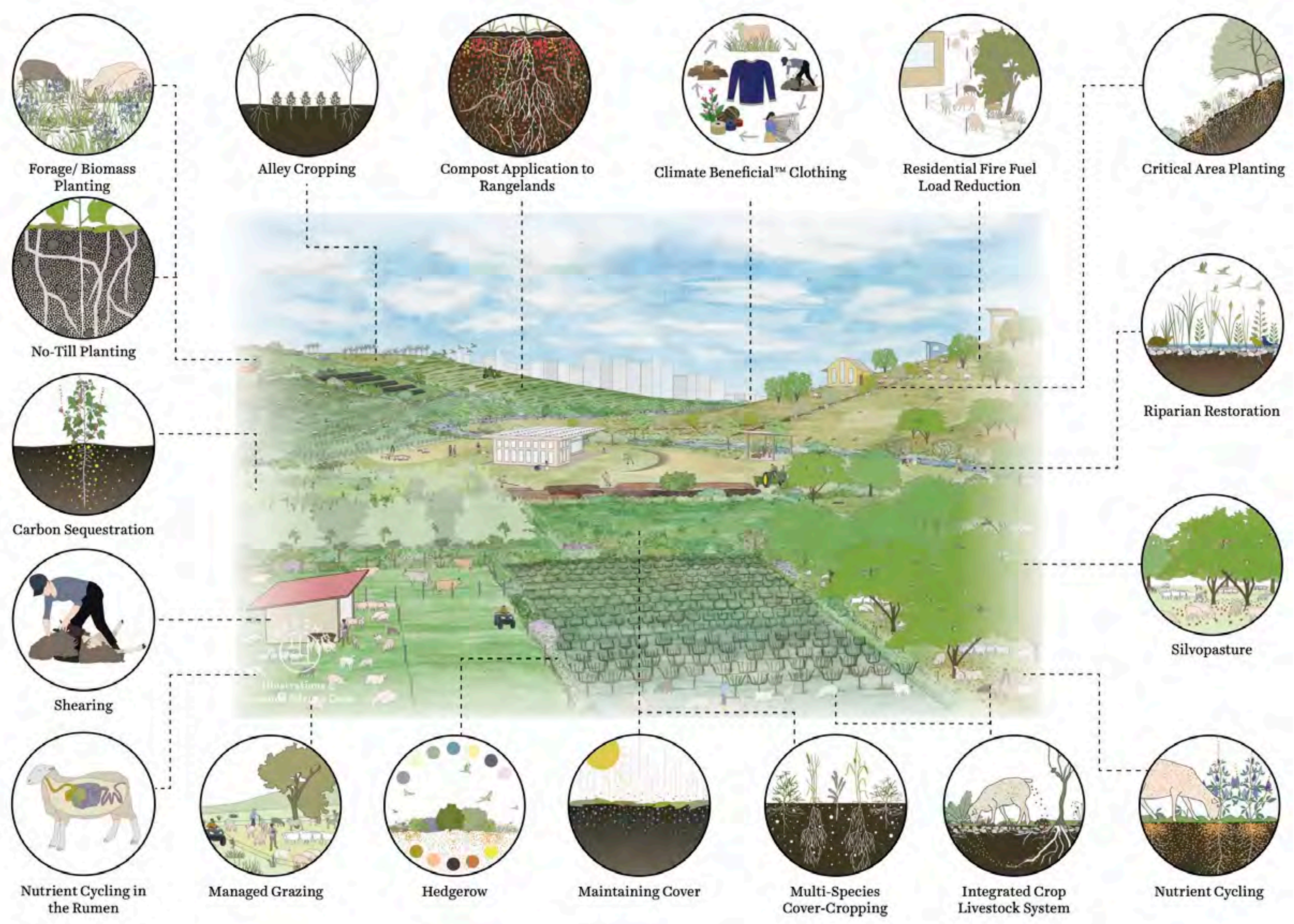
What is it: Soil Health

Soil Health



Adapted from Lal 2015

Carbon Farm Planning

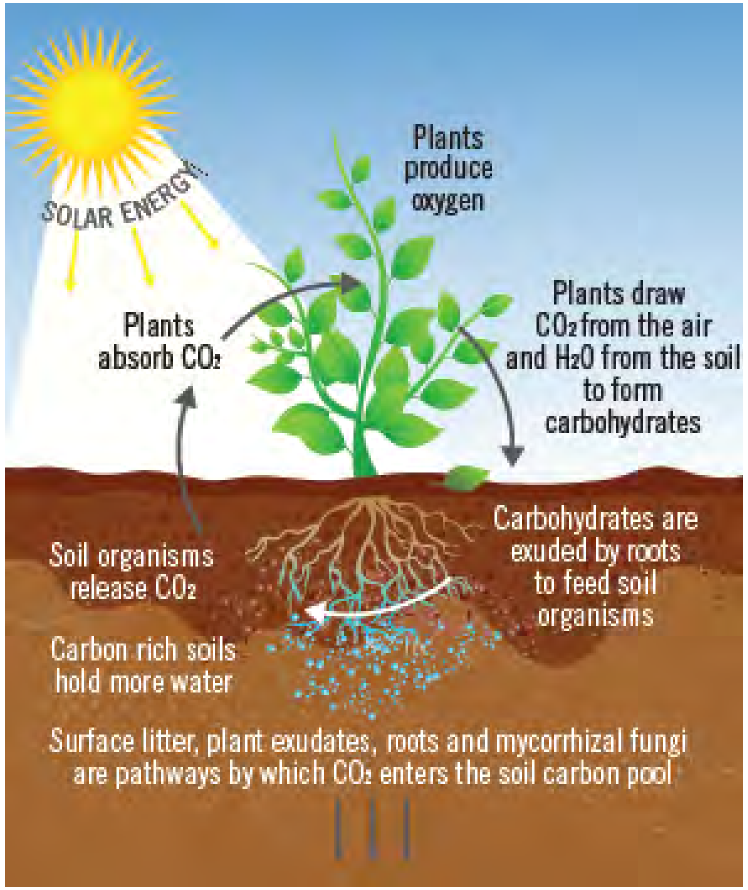


Carbon Farm Planning

Carbon Farm Planning

Conservation Planning through the "lens" of Soil Health

Increase Carbon Sinks & Lessen Carbon Sources



NC Foundation for Soil & Water Conservation

SOUTHERN SARE Sustainable Agriculture Research & Education

Carbon Cycle Institute

NC FOUNDATION for SOIL & WATER CONSERVATION

North Carolina ADFP Trust Fund

Agriculture Resilience Carbon Farm Planning Pilot

National Pilot Training Class of 40

Host Districts: Buncombe, Caldwell, Franklin, Halifax, Haywood, Madison, Rutherford

Draft 7 Carbon Farm Plans &

Host field days

Does the California NRCS Guidance apply to SE Farms?

How does the USDA COMET tool work on SE Farms?

What is NC Agriculture's role in climate change resilience?

Carbon Cycle Institute

NORTH CAROLINA SOIL & WATER CONSERVATION DISTRICTS *Yours for Life*

NC STATE EXTENSION

Sustainable Forestry and Land Retention Project – Roanoke Electric Cooperative – The Roanoke Center

VIRGINIA TECH

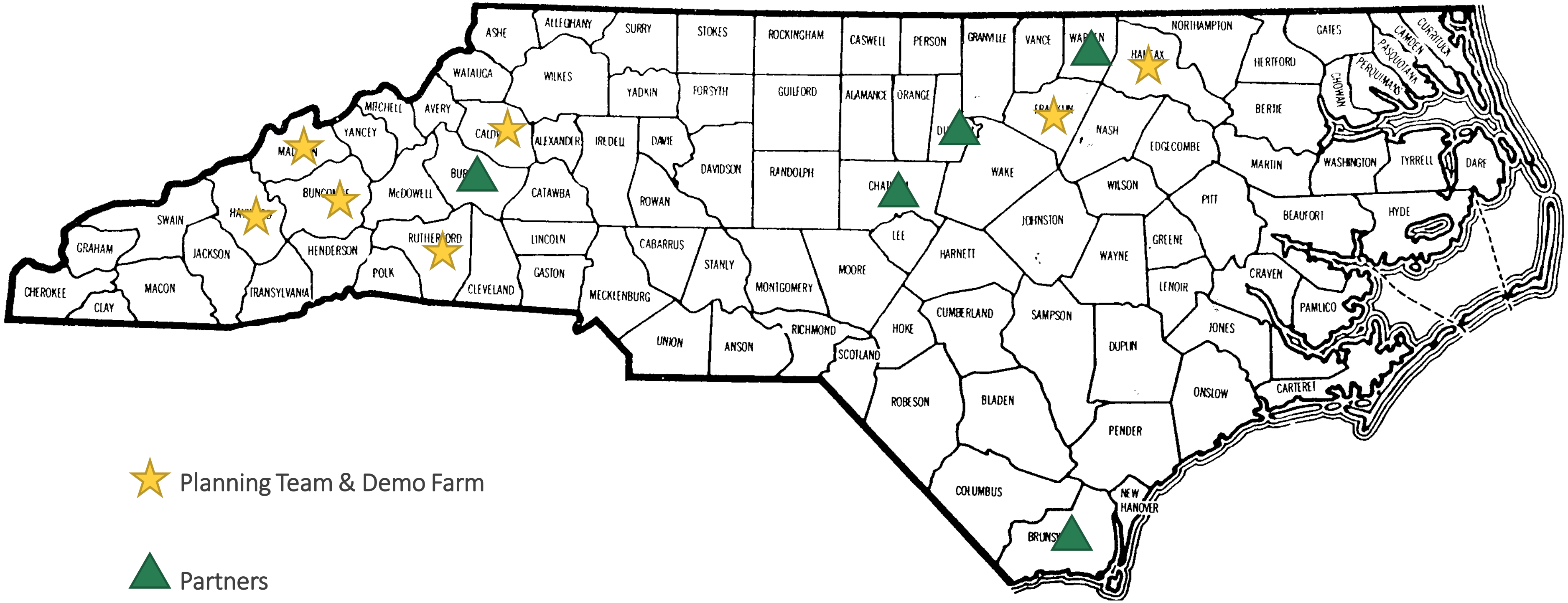
North Carolina ADFP Trust Fund

USDA United States Department of Agriculture

SOUTHERN SARE Sustainable Agriculture Research & Education

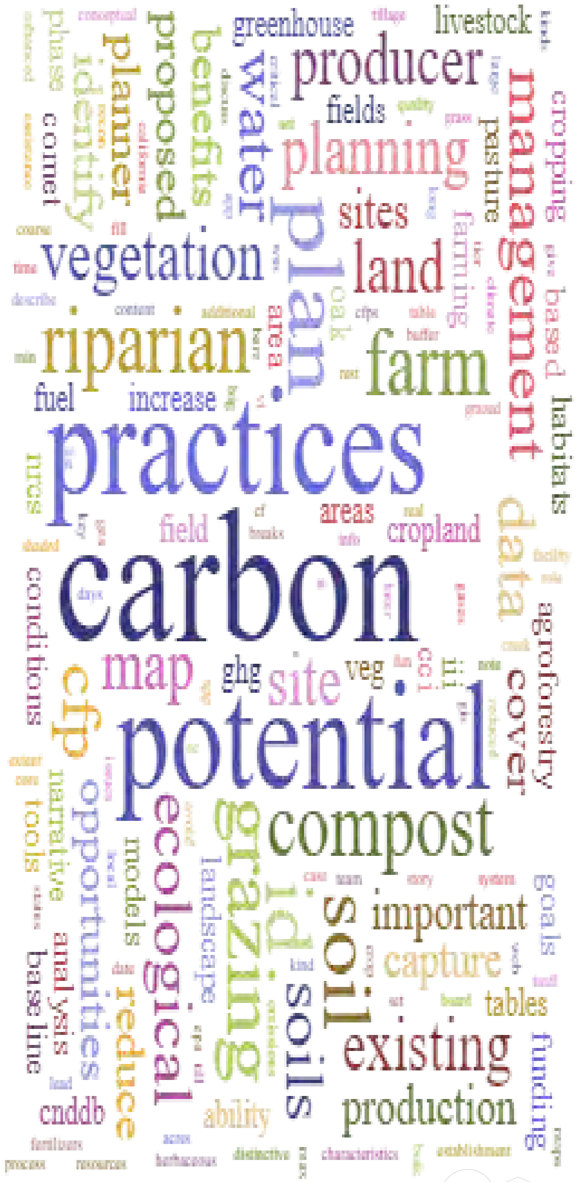
Carbon Farm Planning

Current Plans & Partners



★ Planning Team & Demo Farm

▲ Partners



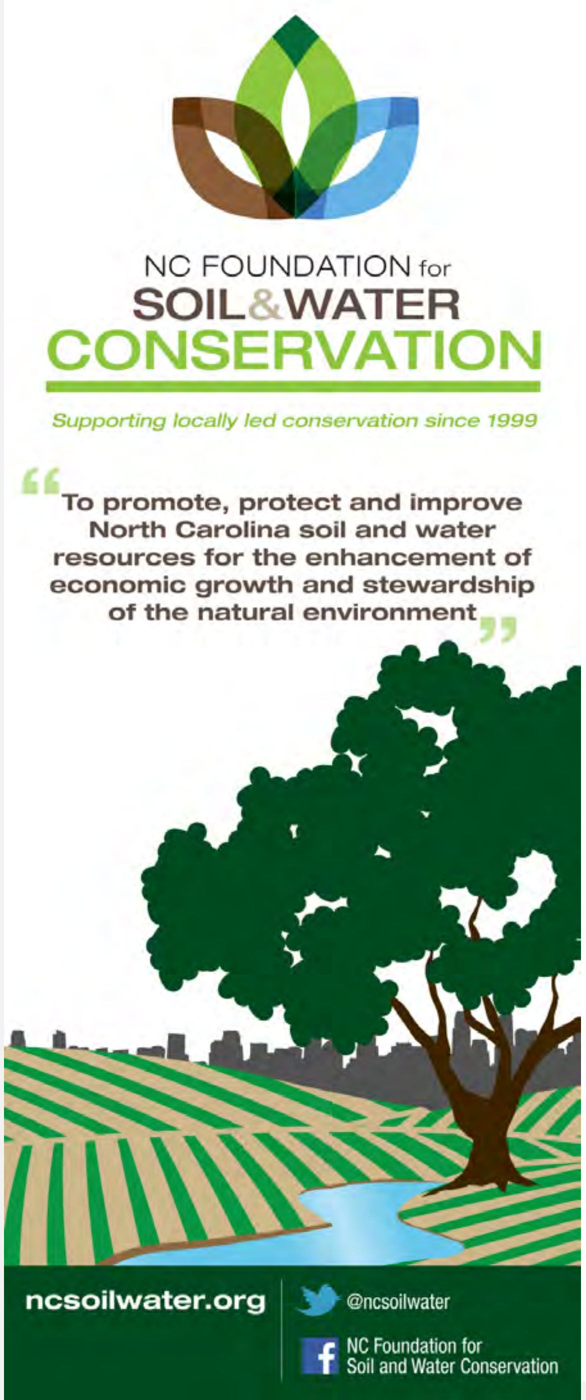
WHAT: The goal of the Ecosystem Services Market Consortium (ESMC) is to launch a fully functioning national scale ecosystem services market conceived and designed to sell both carbon and water quality and quantity credits for the agriculture sector by 2022.

FOUNDING CIRCLE MEMBERS

- ADM
- BUNGE
- Cargill – Helping the world thrive
- CORTEVA agriscience
- DANONE North America
- General Mills
- Land O'Lakes SUSTAIN
- McDonald's
- NFWF
- Nestlé
- Noble Research Institute
- Nutrien Ag Solutions – Sustainable Solutions
- The Nature Conservancy – Protecting nature. Preserving life.
- Soil Health Institute
- syngenta

LEGACY PARTNER MEMBERS

- California Almonds – Almond Board of California
- American Farm Bureau Federation
- American Farmland Trust
- ASA American Soybean Association
- American Sugarbeet Growers Association
- ANUVIA
- ASU Arizona State University
- ARVA Intelligence
- Bayer
- Cornell Atkinson Center for Sustainability
- CTIC
- Farm Foundation
- Farmers Business Network
- FarMobile
- Field to Market
- IL Corn – ilcorn.org
- Silicon Ranch
- Soil Health Partnership
- The Fertilizer Institute
- The Campbell Foundation
- Soil Science Society of America
- Trust in Food – A Farm Journal Initiative
- Tyson
- Sorghum Checkoff
- VENCE
- WWF
- K·COE ISOM
- Low Carbon Prosperity Institute
- MARS
- National Association of Conservation Districts
- NCBA National Cattlemen's Beef Association
- National Corn Growers Association
- National Farmers Union
- native energy
- Newtrient
- OpenTEAM
- Pivot Bio
- Sand County Foundation



Become Involved!

- ✓Honor a Conservationist - make an endowment donation
- ✓Visit www.ncsoilwater.org
- ✓Follow and promote us on Twitter @ncsoilwater and Facebook
- ✓Support us on Amazon Smile
- ✓Employer matching campaign

Amanda Sand
919-510-4599
asand@ncsoilwater.org

Natural Resources Conservation Grant

VA Tech/NC State University, NC Foundation Soil and Water Conservation, Natural Resources Conservation

- **Overarching Goal**
  - Increased Collaboration of Key Organizations Within Each State(VA &NC) and Across state lines
  - Improve Economic and Environmental Sustainability of Agriculture and Forestry VA/NC
  - Outreach to Farmers/Forest Owners on Soil Health Principles and Affects on Carbon Storage
  - Technical Assistance and Implementation of Conservation Practices

THE ROANOKE CENTER
INSIDE EACH OF US IS THE DESIRE TO ACHIEVE.
At The Roanoke Center, we can show you how.

SUSTAINABLE FORESTRY & LAND RETENTION PROJECT
ROANOKE ELECTRIC COOPERATIVE

NC Foundation Soil and Water Conservation Project

Goals

- Carbon Farm Pilot Program& Training by Carbon Cycle Institute- (California based organization) https://www.carboncycle.org/
- Establish Seven Carbon Farm Demonstrations in Soil and Water Districts Across NC
- Engage Underserved Farmers and Forest Owners
  - Collaboration With Sustainable Forestry and Land Retention Project
  - Train staff and landowners: on “A multitude of agricultural practices present the opportunity to significantly increase the amount of carbon stored in long-term carbon pools including soil organic matter and plant biomass, while supporting food production, rural economies, and ecological health” –CCI webite

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SUSTAINABLE FORESTRY & LAND RETENTION PROJECT
ROANOKE ELECTRIC COOPERATIVE

NC Foundation Soil and Water Conservation

Goals

- Carbon Farm Planning Training, Carbon Cycle Institute- Comet Planner & Comet Farm database tools
- Demonstrate Implementation of Conservation Practices
- Benefits of Conservation Practices on Carbon Storage In Soil
- Halifax County Carbon Farm Planning Team
- Develop Carbon Farm Plan
    - Hulan Johnston/Wills Heirs Farm

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SUSTAINABLE FORESTRY & LAND RETENTION PROJECT
ROANOKE ELECTRIC COOPERATIVE

NC Foundation Soil and Water Conservation

Accomplishments/Findings

- Carbon Team Finalizing Carbon Plan
  - Landowner Objectives
    - Crop Rotation
    - Grazing Rotations
    - Silvopasture(Livestock in forests)
    - Estimates of Carbon Sequestered Through Conservation Practices
- Soil Test Completed
- Cost Share to Implement Conservation Practices

Hulan Johnston

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SUSTAINABLE FORESTRY & LAND RETENTION PROJECT
ROANOKE ELECTRIC COOPERATIVE

Demonstration Event
R A Wills Farm
March 2022

Please Contact Alton Perry, aperry@roanokeelectric.com or your county Natural Resources Conservation Office for additional information about conservation planning.

Hulan Johnston

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SUSTAINABLE FORESTRY & LAND RETENTION PROJECT
ROANOKE ELECTRIC COOPERATIVE