



C-AGG | Coalition on Agricultural Greenhouse Gases



C-AGG July 2017 Chicago Meeting Final Summary

Wednesday 19 July 2017 – Thursday 20 July 2017

Hotel InterContinental Magnificent Mile

Chicago, IL

Presentations and meeting materials available at <http://www.c-agg.org/event/2017-july-chicago-il>

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Meeting Overview

On July 19 and 20, 2017, C-AGG participants met for a 2-day meeting in Chicago IL; many also attended the preceding day's [C-AGG workshop on Double Counting and Double Attribution](#). As part of the opening session for the meeting, Debbie Reed, C-AGG Executive Director, led a review of the [C-AGG Guiding Principles](#) with all participants and facilitated feedback on updates to those Principles to reflect the progression of C-AGG's work. Reed then introduced the day's theme of Soil Health and Soil Carbon. Charles Rice provided a keynote presentation on the subject, highlighting 28-year experimental field trials that showcase how no-till farming in Western Kansas has caused large soil carbon increases in various depths of the soil profile. Steven Shafer of the Soil Health Institute (SHI) followed the keynote with a presentation on the SHI Action Plan for Soil Health and the creation of a national soil health assessment. Next, Stephen John of the Agricultural Watershed Institute and Madhu Khanna of the University of Illinois presented on opportunities to add perennial crops to agricultural areas that have been growing corn and soy, noting that multi-functional perennial cropping systems can produce a suite of ecosystem services. Keith Paustian of Colorado State University and Mindy Selman of the USDA Climate Change Program Office then provided an overview on updates to the COMET suite of tools, including the addition of a water quality module to COMET-Farm, currently underway. The first day concluded with a discussion on monetizing soil health and soil carbon and C-AGG's role in that approach. Day 2 began with a presentation by Erica Meta Smith, of TerraGlobal Capital LLC, who provided an overview and lessons learned from the sale of rice cultivation carbon offsets. Next, Max DuBuisson of Climate Action Reserve and Karen Haugen-Kozyra of Viresco Solutions presented an update on the Western Climate Initiative and work happening with cap-and-trade/offset protocol efforts in California, Ontario, and Quebec. The meeting's final presentation was given by Doug Kueker and Audrey Denney of Vivayic who discussed how to design decision support tools based on models and educational theory to promote sustained behavior change among farmers and ranchers.

High-Level Outcomes

- Although soil carbon is a good soil health indicator, there are many additional assessment criteria that are important to include. Soil health cannot just be measured with numbers; trends over time are needed to determine what practices improve, sustain, or degrade soils. Trends can evaluate the relative contributions of management factors, environmental conditions, and cropping systems for changes in soil health. Soil health and soil health measures will vary geographically.
- The cost and time required to verify land-based carbon offset projects can make data collection, reporting, and verification barriers to scaling. User-friendly data management tools, Application Programming Interfaces (API), and in-field/farmer-friendly methods of data management (as was developed for the rice protocol) can lower these barriers.
- C-AGG should focus on permanence of activities rather than solely permanence of carbon molecules because activities are ongoing and can provide short-term, as well as long-term, successes.
- Policy remains an important driver for change and can significantly influence the carbon offset market as evidenced by the CA cap-and-trade bill 398 and protocol development in Ontario and Quebec. It can also spur new potential markets, such as those for perennial biomass crops.
- C-AGG and C-AGG participants have amassed a wealth of knowledge and experience working with agricultural carbon offset protocols. The community has progressed significantly over the last ten years and there are many lessons learned that can be shared through education and outreach.

Wednesday, July 19, 2017: Soil Health Day

Welcome & Introductions: C-AGG Guiding Principles Review

[Debbie Reed, C-AGG Executive Director](#), opened the meeting and welcomed all attendees to Soil Health Day. She asked participants to capture thoughts on how to monetize soil ecosystem services throughout the presentations and discussions in order to provide input to the day's final session. Reed then reviewed the nine C-AGG Guiding Principles developed in 2009, asking participants to identify whether updates or clarifications are desired. Overall, participants found much of the text still relevant to C-AGG and the community, but also noted that the community has learned a great deal since those principles were drafted and has evolved beyond focusing solely on carbon offset markets. C-AGG is working on other ecosystem service markets as well as agricultural and food and beverage supply-chain efforts as drivers and incentives for change. The reality of farming, ranching, and land use makes 100-year permanence approaches to policies and programs difficult or irrelevant (biologically); rather C-AGG should consider permanence of the system or the cycle more important than permanence of the molecule (i.e. residence of the carbon molecule in one particular storage pool). The goal is to increase residence time of carbon in beneficial carbon pools. It is important to not focus too much on the long-term to the potential detriment of effective shorter-term solutions. As a community, C-AGG should strive for continual improvement over continuous improvement.

Session 1: Keynote Address: Soil Health and Soil Carbon

[Charles Rice, Kansas State University and Chairman of the Board on Agriculture at the National Academy of Sciences](#), gave a keynote presentation on soil health and soil carbon. He opened with a definition of soil health (*continued capacity of soil as a vital living system whereby plant and animal growth and environmental quality is sustained; a holistic approach in which plant, animal, and human health is promoted*) and highlighted that soils deliver ecosystem services that enable life on earth. Soils around the world are degraded due to many factors, but mainly due to the loss of soil carbon. Rice presented that in addition to conferring myriad benefits such as improved soil structure and increased fungal activity, no-till farming systems restore and enhance soil carbon. This benefit highlights the ability of no-till systems to increase soil carbon sequestration. It also enables soils to preserve water and act more like undisturbed prairie soils. As an example, he showcased an experiment in Kansas (dryland agriculture) in its 28th year that shows significant continued gains in soil carbon going down 60 cm into the soil and reduced nitrous oxide emissions from no-till practices. These field trials also highlighted continuously improving aggregate soil structure. Building the aggregate soil structure allows soils to retain water more effectively. When Rice approached farmers who had been practicing no-till for ten years asking them to till once to allow the impact to be measured and monitored, most farmers declined; the few that reluctantly agreed tilled only once, and monitoring showed that the single disturbance did not change soil carbon content or soil structure. Rice concluded his talk by underscoring the importance of assessing soil health and soil carbon through monitoring over time using dynamic tracking systems and noting overall trends. He stressed that trends rather than numbers are important to assess soil health.

Session 2: Enriching Soil, Enhancing Life: An Action Plan for Soil Health

[Steven Shafer of the Soil Health Institute \(SHI\)](#) provided an overview of the [SHI Action Plan for Soil Health](#) which was developed through an iterative process with a community of soil health scientists and practitioners. It is a plan to bring all the research around soil health together to better understand what is known and what is not known, and better identify research gaps and priorities for action, creating a national soil health assessment. The plan focuses on research, measurement and assessment, economic analysis, communications and education, and policy to cover all aspects of soil health. Shafer focused much of his presentation on the research and measurement/assessment portions of the document noting key soil health improvement practices such as no-till and use of cover crops. Participants engaged in a full discussion on how SHI's work could potentially help fill data gaps for protocol development by providing access to data sources or researchers working on those issues. Shafer also discussed how SHI is working to develop larger scale (regional, watershed, national) testing protocols which may be similar to local, farm-based testing protocols but may have different sampling design and outreach aspects.

Session 3: Perennial Biomass Crops for Multiple Ecosystem Services in Corn – Soybean Landscapes

[Stephen John of the Agricultural Watershed Institute \(AWI\)](#) and [Madhu Khanna of the University of Illinois](#) presented on opportunities to add perennial crops to agricultural areas that have been growing corn and soy, noting that multi-functional perennial cropping systems can produce a suite of ecosystem services. John began his presentation with lessons from 20th Century agricultural history highlighting the growth of the soybean industry as new technologies, fertilizers, and systems allowed all parts of the plants to be utilized and fostered renewable energy production. This led to a significant growth in corn/soy cropping systems, but the downside has been high nitrate runoff from the tile-drained croplands of Illinois, Iowa, and Indiana. John and AWI have found that converting from annual crops to perennials can reduce nutrient loss by up to 90%. The addition of perennial crops to existing cropping systems can increase soil carbon, reduce irrigation needs, and provide habitat in addition to producing food, feed, fuel, and fiber. A remaining challenge is lack of policies and markets to make these cropping systems economically viable.

Madhu Khanna discussed her research on perennial energy crops and 15 years of experimental research on Miscanthus and Switchgrass at the 300-acre University of Illinois Energy Farm. In addition to the benefits of growing perennial biomass crops noted by John, Khanna highlighted the energy benefits—Miscanthus and Switchgrass ethanol have 100 – 160% lower carbon intensity compared to petroleum-based gasoline. However, the ethanol is significantly more expensive. Due to the increased risk of yield variability (compared to corn) for some perennial energy crops, lack of an established market, lack of comprehensive crop insurance to cover these risks, and high upfront costs, there is a strong need for policy and market-based incentives for farmers to plant more perennial biomass crops for energy.

Session 4: COMET-Farm and COMET-Planner Updates

[Keith Paustian of Colorado State University \(CSU\)](#) began the session with a presentation on updates to [COMET-Farm](#) and [COMET-Planner](#). The COMET suite of tools allow for conservation and 'best management' practice scenario analyses and were developed jointly by CSU and the USDA Natural Resources Conservation Service (NRCS). The COMET-Farm platform lets users input field- and farm/ranch-specific management practices to estimate baseline GHG footprints, and to change management practices scenarios to assess changes to GHG emissions and carbon sequestration. COMET-Planner is a simpler, less rigorous tool that provides carbon and GHG evaluation for approved NRCS conservation practices. Although the COMET-Farm tool is data intensive, COMET-Planner was designed to be a "3-click" easy-to-use tool. CSU has completed many updates to the tools, including development of an API which allows users to access the platform outside its user interface; CSU hopes to complete previously announced updates to COMET-Farm by August, including regionally-specific data sets for specialty crops, uncertainty calculations associated with modelled estimates, and a new N₂O estimation methodology to replace the methodology in the USDA text ([Quantifying Greenhouse Gas Fluxes in Agriculture and Forestry: Methods for Entity-Scale Inventory](#)). Because COMET-Planner only uses NRCS conservation practice scenarios (CPS), practices such as composting and compost additions to soils which do not have a CPS are not included. However, CSU worked with the CA Air Resources Board (ARB) to create a COMPOST-Planner for use in California.

[Mindy Selman of USDA Climate Change Program Office](#) presented on work underway to use COMET-Farm to estimate water quality impacts of agricultural practices. She noted that NRCS previously developed the [Nutrient Tracking Tool \(NTT\)](#), a web-based tool that uses the [Agricultural Policy Environmental eXtender \(APEX\) model](#) to estimate changes in water quality based on management practice changes. NRCS is integrating the APEX model into the COMET platform to add a water quality component which will also be integrated into the existing COMET API; programming for this is currently underway. APEX data inputs are similar to COMET data inputs, so with a few additional details, a user can estimate water quality impacts as well as GHG impacts associated with changes in management practices. USDA is planning to develop the capacity to provide uncertainty calculations associated with use of the APEX tool within the COMET tools.

Session 5: C-AGG Discussion: Monetizing Soil Health and Soil Carbon

Debbie Reed began the final session of the day by asking three questions on the monetization of soil health and soil carbon, inviting C-AGG participant input on actionable steps where C-AGG can create value:

1. What/where is the Value?
2. What/where are the Opportunities?
3. What is the role for C-AGG?

Participants discussed the following ideas:

- Methodologies and tools to measure soil health on farms require further development, testing, and implementation. C-AGG participants noted that additional clarity would be useful to better determine what data is needed in what volume over what period.

- Soil health protocols and tests should be the same for multiple soil health communities, including academic, policy, regulatory, and ecosystem market communities. In other words, the tests and protocols used to demonstrate soil health to farm managers and policymakers should be the same as those used for market-based purposes. These soil health communities should collaborate on issues such as data needs, measurement tools and technologies, and lessons learned.
- Soil carbon and crop resilience offer an opportunity to create a business case for increased soil carbon content, and with SHI coordinating research results, the community can collaborate to help develop this business case. Insurance companies require data to develop actuarial tables to create crop insurance products that reflect improved resilience of soils with enhanced soil carbon content. Bill Salas is the C-AGG representative to the AGREE crop insurance working group and offered to work with that group to identify what specific information is required to develop the necessary actuarial tables.
- C-AGG will work with the SHI communications platform to communicate the ideas of SHI to the C-AGG network, focusing on soil health policy and program creation.
- US withdrawal from the UNFCCC Paris Climate Accord opens some new opportunities and closes others. Jason Funk noted that it is important for the C-AGG community to understand the history of the UNFCCC process to better understand what has worked and what has not worked. He offered to draft a background document with C-AGG.
- Participants suggested a C-AGG participant and stakeholder sign on letter for the [We Are Still In](#) campaign on the UNFCCC Paris Climate Accord. Because the We Are Still In effort has been established for cities and counties, states, higher education, and businesses and investors (not non-profits, e.g. C-AGG), we will draft a letter encouraging our participating organizations stakeholders who qualify to sign on to the effort.

Thursday, July 20, 2017

Session 6: Rice Cultivation Offsets Project Sale of Credits: Successes & Challenges

[Erica Meta Smith of TerraGlobal Capital LLC](#) provided an overview of the recent sale of carbon offset credits from a rice cultivation project to Microsoft, noting that the success was the culmination of a long collaborative process that included many organizations and stakeholders (including C-AGG). The process began with a 2011 USDA NRCS Conservation Innovation Grant (CIG) grant, which helped to develop the American Carbon Registry's (ACR) [Protocol on Voluntary Emission Reductions in Rice Management Systems](#). A 2015 NRCS CIG grant helped to further develop the work that led to the successful market outcome. The ACR Protocol defines eligible practices in the rice-growing regions of California and the Midsouth and uses the DNDC biogeochemical process model to model soil carbon dynamics, CH₄ and N₂O emissions in the baseline, and changes to those emissions with eligible project improvement practices which are specific to the rice-growing region. Meta Smith reviewed the timeline of the work from the start of methodology development in 2010, to engagement with farmers, to the sale of credits to Microsoft in 2017. She also provided an overview of [PRESTO](#), the Producer's Environmental Sustainability Tool, which is the data collection tool developed by TerraGlobal Capital for use by farmers. Many lessons were learned over the

lifetime of the project and leading to the sale of the rice credits, but most notably that farmers must have strong reasons beyond potential carbon sales to participate in projects. This was the first round of rice offset project credits sold and the amount of work needed/verification costs to complete the sale was high—thus the cost benefit for carbon reduction was low. Moving forward, TerraGlobal Capital sees the need to reach out to farmers for more farmer buy-in, and with that buy-in, provide on-field support including with data collection. Participants discussed different labeling programs and the market demand for a climate-friendly rice label (which TerraGlobal Capital is working on with Mars Inc.). Participants also suggested that this example would serve as an excellent C-AGG case study of lessons learned.

Session 7: Ontario and Quebec Cap-and-Trade Program and CA Linkages

[Max DuBuisson of Climate Action Reserve and Karen Haugen-Kozyra of Viresco Solutions](#) (Canada) provided an update on the Western Climate Initiative (WCI), which includes the state of California and provinces of Ontario and Quebec. A new cap-and-trade bill was passed by the California legislature in July 2017 with a 2/3 vote which means the bill cannot be subject to legal challenges. The bill continues cap-and-trade in CA through 2030, but reduces offset usage allotments for entities from 8 percent down to four percent and requires that 50% of offsets must offer environmental benefits to the state of CA. Both requirements will have a dampening effect on the carbon offset market. DuBuisson and Haugen-Kozyra also reviewed the Ontario and Quebec cap-and-trade programs which are similar to California's, although each has specific requirements and restrictions that differ. The two Canadian provinces are working to adapt a number of carbon offset protocols for use in their respective cap-and-trade programs and possibly other jurisdictions across Canada. Other Canadian provinces have wide ranging rules and regulations on carbon offsets which makes creation of a national standard difficult.

Session 8: Designing Decision Support Materials to Engage Farmers & Ranchers

[Doug Kueker and Audrey Denney of Vivayic](#) discussed how to make learning exciting and how to design decision support tools/models/educational theory to promote sustained behavior change. Vivayic's learning solution model focuses on 20% information and 80% practice and implementation to allow learners to fully grasp, incorporate, and implement new information and practices. They have found that trainers often try to frontload too much information and hope that this will lead to behavior change without providing implementation and follow up support. The presenters emphasized that a strong educational program will both incentivize and educate participants. Kueker and Denney highlighted that farmer/rancher decision-making is influenced by many factors—education being just one. Policies and markets also influence farmer and rancher decision-making, and C-AGG has a role to play in supporting farmers and ranchers through not only education but also practice implementation, behavior change, and innovation. A key takeaway from the session was that adult learning is targeted, self-directed, multi-modal, and starts socially or by search. A recent survey of farmers and ranchers found that agriculture-related periodicals, workshops/trainings, and field days are the preferred channels for education and learning.