



Technical Assistance for Continuous Living Cover Agricultural Practices

University of Minnesota
Humphrey School of Public Affairs
in partnership with
Green Lands Blue Waters



Photo credit: Eric Cates

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Executive Summary

Green Lands Blue Waters (GLBW) is an organization devoted to bringing about “a new generation of multi-functional agricultural systems in the Upper Mississippi River Basin and adjacent areas that integrate more perennial plants and other Continuous Living Cover into the agricultural landscape.” In late 2020, GLBW approached the Humphrey School of Public Affairs at the University of Minnesota to ask for a master’s degree student capstone team to assist in their work regarding agricultural technical assistance (TA). This report is the result of the student capstone team’s research.

In this report, the student capstone team (“we” or “the team”) explores opportunities to improve agricultural practices that improve soil health and retention while benefiting farmers, specifically by improving training for providers of technical assistance (“TA” or “technical assistance providers” or “TSPs”).¹ We are focused on TA for agricultural practices known as continuous living cover (CLC). At its core, CLC is the idea that you always have something alive in the soil: not just mulch, and not just summer commodity crops, but living roots at all times.

This research seeks to answer three primary questions:

1. In places where CLC adoption has been successful, how has TA played a role?
2. How are technical service providers (TSPs) trained?
3. Is CLC implementation currently part of a TSP position’s expectation and performance evaluation?

Research for this report included a review of relevant literature and a survey conducted by Green Lands Blue Waters, but the primary source of this report’s findings is a collection of interviews with 11 individuals connected in various ways to soil health technical assistance.

Short Answers

1. TA can be a factor in CLC adoption, and according to our research, it can be especially effective when TA providers are A) able to create access to information on CLC practices and soil health through networks of producers, and B) sensitive to the social and economic influences that producers experience, including the TA provider’s own relationship with the producer.
2. TSPs receive training from various sources, including the Natural Resource Conservation Service (NRCS), the Soil & Water Conservation Service (SWCS) and local SWCS Districts (SWCDs), the American Society of Agronomy, other webinars, field days, and producer experience. Certifications exist both for private CCAs and for NRCS TSPs. The NRCS offers a certification track to specialize in soil health.
3. Official performance evaluations do not currently include implementation of CLC practices specifically, but NRCS conservationists consider the acreage and number of producers who adopt conservation practices generally.

Our research revealed mixed perceptions of TA availability, knowledge, and training on cover crops, but a few major themes arose: trust, relationships, networks, information, and economics.

What emerged in our research was a complex intersection of historical precedent, farming economics, land management, personal psychology, and social influences, overlapped with climate change challenges. These factors are important to understand because they all influence how and why CLC practices are implemented. Interviewees perceived that outside influencers may shape education, research, and incentives for implementing

¹ Although there are more precise meanings given to the term “technical service provider” in various circles, we are using these terms interchangeably.

CLC, through actions such as large corporate donations to policymakers and universities as well as funding available through programs like the Farm Bill.

With better training resources, TA providers could be better equipped to convince and train farmers to move toward CLC practices while navigating these complexities.

Introduction

“Worldwide, soil erosion continues unabated while the human population and its requirements for food, fiber, and other resources expand geometrically. Indeed, achieving future food security for all people depends on conserving soil, water, energy, and biological resources. Conservation of these vital resources must receive high priority to ensure the effective protection of managed and natural ecosystems. If it is ignored, the quality of life for all humans will suffer.” (Pimentel & Kounang, 1998, p. 423).

Modern agricultural practices that result in loss of sediment and nutrients have degraded soil across the Upper Mississippi Basin and caused issues of excess nutrients downstream. One piece of correcting these issues is the provision of technical assistance (TA) to farmers and ranchers (“producers”) to help them implement continuous living cover (CLC). To that end, Green Lands Blue Waters has been asking “Who will be the next generation of technical assistance providers? How do we ensure that they are adequately trained, and that funding and policy supports increased capacity for these TA providers to reach farmers, leading to the changes we want to see on the landscape?”

CLC is a broad category of practices, but Green Lands Blue Waters divides it conceptually into [five CLC cropping strategies](#): agroforestry, cover crops, perennial biomass, perennial forage, and perennial grains.² There are many ways to keep living roots in the ground, and many species of organisms that can work together to keep soil ecosystems healthy, retain water, sediment, and nutrients, improve infiltration, reduce runoff, sequester carbon, and more.

Research on CLC is constantly evolving, and researchers and farmers alike are learning new techniques and developing new crops and cropping systems. That said, there is not a linear path for getting ideas from experimenters onto the large-scale landscape. **There is an opportunity to improve training resources for TA providers to better spread knowledge of CLC practices.** Green Lands Blue Waters, for whom this report has been prepared, wants to better understand the barriers to providing technical assistance for CLC in the Upper Mississippi River Basin (namely Iowa, Illinois, Minnesota, and Wisconsin). GLBW has reason to believe there is insufficient technical assistance (TA) available to farmers regarding continuous living cover crops and cropping systems. Existing provision of TA is not resulting in farmers’ widespread or rapid adoption of continuous living cover. This research attempts to delve into a few specific aspects of the opportunities to expand CLC adoption through TA.

Sources

GLBW recently conducted a survey of stakeholders and constituent organizations to gauge where further efforts in improving TA for CLC would be most effective. GLBW’s analysis of the results of that survey informed the Team’s research. More data were gathered for this report from a review of relevant literature, an observation, and interviews we conducted.

GLBW is well established in the agricultural scene. Our goal, as researchers, was to have a fresh and new perspective on researching soil health management practices. Understanding the work that they have already done helped to shape and inform our work on this complex issue of social change in CLC adoption, which reflects personal psychology, social influence, and larger environmental responsibilities.

² Five cropping strategies of Continuous Living Cover - <https://greenlandsbluewaters.org/continuous-living-cover/>

Guiding Questions

We began our research with a desire to better understand the barriers to providing technical assistance (TA) for regenerative agriculture in Upper Mississippi River Basin states. To help us determine how best to help TA providers share CLC practices, we developed three guiding questions, which led to a number of follow up questions.

First, in places where CLC adoption has been successful, how has TA played a role? What does this tell us about the effectiveness of TA channels and methods of delivery? What does this tell us about varying levels of trust by farmers?

Second, how are technical service providers (TSPs) trained? To what extent are TSPs trained in issues of regenerative agriculture? How much do TSPs know about what's happening with climate change?

Finally, is CLC implementation currently part of a TSP position's expectation and performance evaluation? If so, what are the expectations and/or evaluation?

Guiding Questions

1. **In places where CLC adoption has been successful, how has TA played a role?**
2. **How are technical service providers (TSPs) trained?**
3. **Is CLC implementation currently part of a TSP position's expectation and performance evaluation?**

Background Research

Literature Review

To investigate our questions, we relied on a variety of sources including weekly meetings with GLBW, researching literature on our topic, conducting interviews, and doing observation research at a field day event. Integrating all of these into our research project allowed us to investigate what is already known and to learn about what's happening on the ground.

The literature review for this project included articles and peer-reviewed papers recommended by GLBW. The review also included literature we found through searches on Google Scholar and on the University of Minnesota library website, focusing on combinations of the following terms: agriculture, technical assistance, agroforestry, sustainable, and regenerative.

Another element of our literature search focused on Certified Crop Advisers (CCAs). CCAs are a special focus because of their importance to farmers and their potential to serve as both gateways or barriers to CLC implementation. CCA research was conducted primarily through a review of the American Society of Agronomy (ASA) website (<https://www.agronomy.org>) and <https://www.certifiedcropadviser.org>. State divisions of the ASA also had information, but the national website outlined the majority of what is included in this report.

GLBW Survey

As this project was beginning, GLBW was surveying their partners, asking questions about technical assistance for CLC. The GLBW survey included an online survey as well as an interactive Google Jamboard. The Jamboard was designed for participants to provide input on what they thought were the best sectors to focus their collective energy and where TA was coming from. The survey questions are available in Appendix A. The survey asked GLBW contacts about their perceptions of demand for CLC Technical Assistance and TSP training.

GLBW compiled the results of the survey and Jamboard into a "[Continuous Living Cover \(CLC\) Technical Assistance Training Gap Analysis & Roadmap](#)."³ Key findings from the GLBW survey included:

- 1) a "limited awareness of CLC practices, benefits, and funding options among farmers and/or TA providers;"
- 2) a "lack of prioritization and funding for delivery of TA, particularly CLC-related TA;" and
- 3) a "lack of training in CLC practices for TA providers."

These findings helped the team formulate and refine its research questions and interview approach. By understanding the state of affairs in agricultural TA, we were better able to state the problems and opportunities and ask questions that will test and clarify GLBW's findings.

Interviews

Integrating interviews into our research contributed to our understanding of our topic and provided various perspectives regarding some of the strengths and barriers that exist with CLC. The interviews provided us direct contact with people experienced and committed to soil health management practices.

³ [Continuous Living Cover \(CLC\) Technical Assistance Training Gap Analysis & Roadmap - https://greenlandsbluewaters.org/wp-content/uploads/2021/06/GLBW-CLC-Technical-Assistance-Training-Gap-Analysis-Roadmap.pdf](https://greenlandsbluewaters.org/wp-content/uploads/2021/06/GLBW-CLC-Technical-Assistance-Training-Gap-Analysis-Roadmap.pdf)

Each member of our team conducted 3 to 4 interviews independently of other team members. The interview script is included in Appendix B. GLBW provided names of potential interviewees, but many of them did not know GLBW and none of them had contacted GLBW to be interviewed. Interviewees were all familiar with soil health practices, but not necessarily the term “CLC.” They work as consultants, farmers, SWCD conservationists and representatives, NRCS conservationists, cover crop seed specialists, and county coordinators.

The interviews were conducted mostly by telephone and audio recorded for later transcription and coding. Codes included: Motivation, Finances, Social Behavioral Influences, Information Barriers, Trust in Institutions/Institutional Science, Impact, Representation, and Training. We created a spreadsheet with a row for each interviewee and a column for each research question and for each code. Data from interviews were entered into the appropriate cells. Each team member selected a handful of columns and provided a synthesis of the findings for each code.

We also observed a field day event focused on Kernza® perennial grain, which was developed as an alternative to annual grains that are often tilled and have smaller root systems. The observation took place July 8th on a farm in West Central Minnesota.

Interview Limitations

An expected bias amongst interviewees was their positive perception of cover crops and CLC practices. As such, they were quite responsive to interview requests, despite most interviewees not knowing GLBW or their work specifically. With a larger, more comprehensive research project, a diverse group of participants would be identified and interviewed. Ideally, participants should reflect a broader reflection of demographics such as: class, age, race, gender, and ability. Indigenous knowledge and wisdom should be specifically sought out and incorporated. In addition, interviewing people who have opposing viewpoints would be valuable to identify additional variables or confirm results.

Findings

Our findings explore examples of successful CLC adoption from our interviews. Each of the following sections addresses one of our three primary research questions. First, we highlight themes regarding TA providers and successful soil health management practices with practitioners, address barriers that negatively influence CLC implementation, explore the path that information on CLC takes before it can create visible change on the landscape, and discuss perceptions of agroforestry practices in the Upper Mississippi River Basin. Second, we cover the process for certification of CCAs, we note the sources of training for TA providers, and we discuss strategies for effective TA provision. Finally, we discuss what is expected of TSPs (including how to meet those expectations), how TSPs are evaluated or self-evaluated, and how CLC fits into that evaluation.

1. TA can play an important role in CLC adoption

The interview data suggest that many barriers to CLC adoption can be reduced.

Our interviews served as our source for answering the first guiding question of this report, and they revealed several stories of TA providers advising their communities on the adoption of CLC practices. These stories and quotes from our interviews are used throughout this paper to illustrate TA and its relationship to CLC.

One interviewee noted that Taylor County, Iowa, has been successful with CLC. Soil samples are periodically taken before and after seeding down the side hills. There is confirmed improvement in organic matter, organic life, and soil health in general. Taylor County's success has influenced the state of Iowa. The interviewee said the state wants to encourage this model in other areas because there is demonstrated improvement in nutrients staying in the field and not escaping to streams and rivers.

"It starts with the soil. If you have good structure, that goes a long way. When you have good soil structure you have plant life, which will then help on the grand scale of climate change or climate protection."

- Water Quality Specialist

In Illinois, Champaign County conservationists developed the [STAR program](#),⁴ which is a free tool for farmers to input data about their farm practices and receive a star rating for their farm based on the Natural Resource Conservation Service's (NRCS) best management practices. The tool also offers support for improving practices to receive a higher rating and improve soil health. Although STAR began in one county, it is now used across four other states and offers many success stories.

TSPs can look at the data from STAR and provide farmers with individualized suggestions on how to improve the soil. Meanwhile, farmers can gauge their conservation effectiveness and see the roadmap toward success with better soil health management practices.

One surprising success story from the STAR program is of a farmer who was near retirement and planning to transfer his farm to the next owner soon. He was aware of no-till practices but interacting with his TA provider and STAR influenced him to finally convert to no-till. As a result, he saw CLC's benefit to the farm. As someone close to retirement and not expecting his farm to stay in the family, he could have fallen into the stereotype of being *unmotivated* to make a change. He had little reason to invest long-term in the soil's health, but STAR made the path clear for him, along with its benefits.

⁴ STAR program - <https://starfreetool.com/about>



Photo credit: Green Lands Blue Waters

Trusting relationships are key

Perhaps the most common theme that arose in our interviews was the importance of trust and the relationship between TSPs and farmers. Establishing rapport is paramount. Our data suggest that the perceived financial and social risk in switching to CLC practices is hard to overcome, and that risk may be actualized if there is not enough support to succeed. Trust is a consistent theme throughout our research and findings that cannot be overemphasized.

"I have a personal relationship with all the farmers I work with. I understand who their family is, what their names are, and what's going on in their lives. We have a bond, and I am authentically invested in them. They trust me because of it."

- Cover Crop Seed Specialist

"There are shortcomings in the relationships with farmers. This creates detachment, or gaps in trust. I think this is really hard to address, because it's difficult to train for relatability."

- Farmer and Soil and Water Conservation Specialist

TSPs can build and use networks of producers to spread CLC practices

Some interviewees noted the importance of networks in helping producers implement CLC practices. Although not in the Upper Mississippi River Basin, one interviewee recommended the example of Adam Daugherty, an NRCS conservationist in Coffee County, Tennessee, as a TA provider encouraging CLC adoption by creating a network of farmers who can share their experience with CLC. He has managed to learn from this network and has been able to implement CLC alongside them and help them learn.

The idea of "Mentor Farmers" is significant because they are role models and help to support adopters. **Farmers have a high level of trust in other farmers who have gone through the transition to CLC.** Farmers also trust TSPs who can empathize with the enormous paradigm shift required to transition away from agricultural practices like full tillage. The strong emphasis on empathy that appeared in several interviews was surprising.

The image below illustrates the path that information takes, going from the field to researchers and back again onto the landscape. Prior experimentation and research (conducted by producers, corporations, and institutions) lead to information on new crops, cropping systems, and technical details. Some but not all this information goes to TA providers through training, though training can filter out portions due to funding or focus. For TA providers to get the remaining information to producers, they must have trusting relationships. Consequently, some information held by TA providers is also filtered out before it gets to producers. TA providers must recognize the networks and relationships that exist (or could exist) between producers and know how that affects the information that producers have or believe. Finally, for this information to lead to actual implementation of CLC practices, producers must overcome several barriers: expectations from society, personal risk, economic viability, etc. Once these barriers are overcome, that adoption of continuous living cover practices leads to more knowledge about how to make it successful, and the cycle starts again.

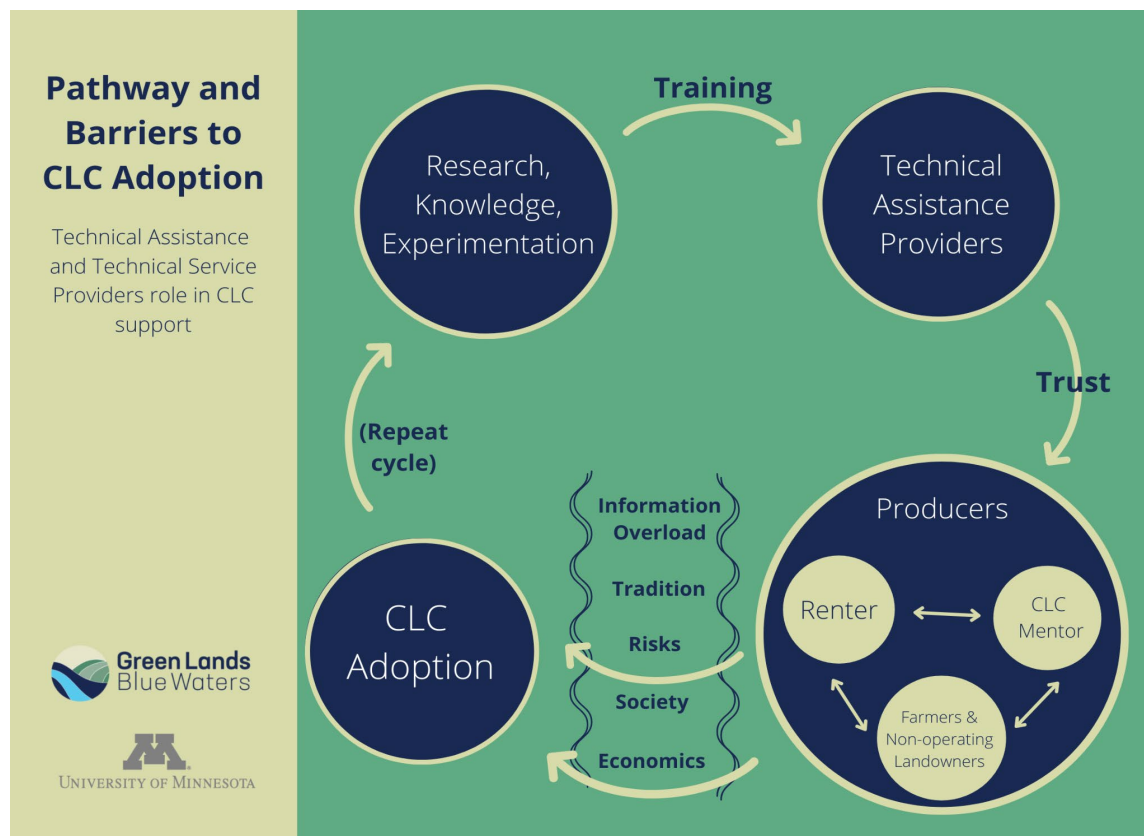


Figure 1. Pathway and barriers to CLC Adoption. This diagram summarizes how information from research, knowledge, and experimentation move through a cycle.

Perceptions of Agroforestry

Agroforestry holds an important and unique niche in continuous living cover crop strategies, and was of particular interest to GLBW and its partner, the [Savanna Institute](https://www.savannainstitute.org/).⁵ Therefore, the topic of agroforestry was also explored in our interviews. During the interviews we gauged interviewees’ knowledge of, interest in, and questions about

⁵ Savanna Institute - <https://www.savannainstitute.org/>

agroforestry. Some felt that the landscape of the prairie is not typically associated with agroforestry crops, resulting in minimal interest. However, many parts of the Upper Midwest are forested and are ripe for agroforestry practices. Even open prairie can benefit from certain types of agroforestry, and historically trees and shrubs have played an important role in the landscape of the prairie and the sustenance of its peoples. Many of our interviewees are intrigued by agroforestry, but do not necessarily have experience or knowledge of practices. They have questions about using farming equipment in agroforestry and about technical aspects of making agroforestry work for their locale, but few have answers.

The Midwest is known for wind, and wind is a contributor to soil erosion. Researchers Pimentel & Kounang (1998) noted that “Land areas covered by plant biomass, living or dead, are protected and experience reduced soil erosion because raindrop and wind energy is dissipated by the biomass layer” (p. 417). Through their deep and wide roots, branches, and leaves, trees add significant protection from the impact of both rainwater and wind (p. 419). Some interviewees believe that the prairie of the Midwest is not associated with agroforestry, and that perception might be acting as a barrier to engagement or interest.

One interviewee is familiar with agroforestry in Oregon and their success with hazelnuts. He believes that if a tangible profit in agroforestry can be made, interest will follow in the Midwest.

Another interviewee considers agroforestry a big part of his farming. He has a sawmill and logs 120 acres of woods. He learned about agroforestry from growing up on the farm and being mentored by others who were knowledgeable about timber species and who were strategic about managing woodland. He feels most people simply treat their woodlands like a “cash cow” or as a resource for deer hunting versus being invested in true timber stand improvement.

Yet another interviewee has been experimenting with agroforestry in Northern Minnesota, specifically with oak and ash silvopasture and hazelnut production. This work has led to more questions on the recommended intensity of pasturing: how can one keep cattle from congregating around a white oak and consequently killing the tree when they tear up the ground? Very few TSPs seem to have information on these practices, although the interviewee was able to find one technician, working with the University of Minnesota, who had some advice on agroforestry.



Photo credit: Ranjith Udawatta

2. TA providers get training from many sources, but bottlenecks exist

The guiding question about TSP training is being answered by both our interview data and our search for information on CCA training. NRCS and CCA training and certification follow different tracks and TSPs end up with

different goals in each (namely conservation or profitable producers, respectively). Training can be throttled by the government funding available any given year, and with few other options, NRCS TSPs have seen delays in training and certification. CCAs, on the other hand, have several sources for training, but they are not explicitly geared toward CLC or ecological soil health.

CCAs receive Soil Health training, but their primary motivator is grower profitability

For our research, trying to understand who influences practitioners, and how that influence affects behavioral change, was central to our work. Therefore, understanding crop advisers' educational requirements and certification was an important component in this project.

Certified Crop Adviser (CCA) training and certification is one way that TSPs are given an official status. CCAs are of particular interest to GLBW because people who train and provide services to farmers are needed to help educate, train, and implement soil health practices. CCAs are also part of an international group of agronomists who learn from each other, share their knowledge, and provide learning resources. As CLC becomes a more common practice, CCAs will be an important avenue for information and training to get to TSPs and farmers.

According to the [American Society of Agronomy](#),⁶ people who become CCAs include: "Any individual whose education, experience, and career path is associated with the practice of agronomy, including field agronomists or salespeople working in public, private, or commercial sectors, consultants and farm managers, natural resource conservation personnel, educators and extension specialists, government and academic scientists and agronomy researchers, and technical support personnel."

In order to become a CCA, the first requirement is to get a combination of both formal education and on-the-ground experience. The application form [Certified Crop Adviser Application and Credential Information for United States & Canada](#)⁷ requires the following:

- Applicants must pass an international CCA exam and have at least two years of documented crop advising experience or a Certified Professional Soil Scientist certification. For those without a college degree, it requires at least four years of crop advising experience. The Agronomy website says CCAs must, "Pass two comprehensive exams covering nutrient management, soil and water management, integrated pest management, and crop management."
- Each state/province that participates will nominate a local CCA board to review applications and develop a local board exam.
- CCA participants, once certified, must commit to the Code of Ethics and pay an annual renewal fee. The code of ethics requires them to always focus on grower profitability while optimizing and protecting natural resources.
- To keep the CCA certification valid, advisers also must earn 40 hours of continuing education units over a two-year period (averaging 20 credit hours per year).

The local CCA board administers the ICCA program and consists of at least seven members with "at least one representative from agribusiness, the state/provincial agency for environmental protection, and extension, to ensure the program is educationally sound and meets the needs of industry and government. The American Society of Agronomy's responsibilities are to coordinate the national activities, which include providing the

⁶ American Society of Agronomy - <https://www.agronomy.org/files/certifiedcropadviser/promotional-materials/prospective-cca-brochure.pdf>

⁷ CCA Application and Credential Information - <https://www.certifiedcropadviser.org/files/certifiedcropadviser/cca-us-canada-credential-booklet.pdf>

international exam and act as liaison with the federal agencies to keep the ICCA program in tune with public policy. ASA serves as registrar and assists the local CCA boards with processing applications, grading of all exams, and recording continuing education credits.”

Through our research, we have found that there are quite a few online training tools available to CCAs who are interested in sustainability, are managing landscapes in a changing climate, or are curious about regenerative agriculture, environmental impacts and soil health. This information about how to become a CCA is relevant because GLBW would like to engage more CCAs in continuous living cover trainings, provide them more resources, and learn how soil health can become a key part of their education and knowledge.

In addition to CCA as a national entity, there are also a number of outlets that provide online training and resources to CCAs including: Crop Protection Network: <https://ceu.cropprotectionnetwork.org/>; Soil Science Society of America: <https://www.soils.org/education> ([Assessing Soil Health Webinar Series](#)), Certified Training Institute: <https://www.certifiedtraininginstitute.com/certified-crop-advisor/>, 4R Plus CCA Courses: <https://4rplus.org/cca-courses/>, and Midwest Organic & Sustainable Education Resources (MOSES): <https://mosesorganic.org/ceus/>.

As an example of the importance of CCA training, one farmer-interviewee told us about a time he was working with an agronomist who was skeptical about the chemical application the interviewee was using when interseeding corn in his rye field - not purely because of a skepticism about interseeding, but because the agronomist lacked information about how chemicals interact with the process. This uncertainty can hamper the success of an operation and diminish trust. To help CCAs understand the relationship between CLC and some of the products they sell, it could be important to ensure training is available through official sources like those listed above.

Through NRCS and SWCDs, TSPs can get training in various soil health practices, but lack of funding and other training sources can delay training

Based on our interview data, perceptions of the availability and subject matter of training for TSPs appeared to be complicated and varied by interviewee age and position. There was nevertheless an agreement that soft skills are important for TSPs to gain.

Government (NRCS, SWCD, etc.), university, and nonprofit entities provide training for TSPs regarding soil health practices. This is usually for free or for small fees. However, funding and availability (especially throughout COVID) have caused delays in the past two years for NRCS TSPs. Additionally, slow institutional adaptation means training and certification in newly necessary skills might lag behind the ideal timeframe for getting the newest information into the field.

Indeed, when the information in this report was presented to a group of stakeholders, they recognized that some of this information is already commonly known. However, universities, extension offices, and institutions have often lagged behind the on-the-ground reality in their training and resources. CLC practices are moving forward thanks to driven and curious producers, TSPs, and nonprofits, and they have realized the importance of relationships, of networking, of economics, and of showing producers the data. Yet, institutional training for agronomists and even conservationists has not been updated to reflect the newest information.

Interviewee perceptions of training received at universities are mixed. Older interviewees tended to believe this training looks too much at physical/chemical soil balance, with insufficient focus on biological/ecological understanding of soil. However, younger interviewees (more recent college graduates) seemed to have a solid understanding of soil health and soil ecology. This may be because of a bias in our sample. A survey of university soil health curricula could better illuminate this issue.

Emphasizing training for soft skills can support TSP effectiveness

Throughout our project, the relationship between a TA and a practitioner surfaced as a major contributor to the successful adoption of soil health management practices.

One consideration for training that came up in many interviews was the need for soft skills training. A major part of a TSP's job, as our interviewees seemed to view it, is building a network that trusts them to provide reliable information on CLC. That trust, however, requires many skills to build. **Leadership, communication, interviewing, emotional intelligence, patience, and empathy are foundational skills for someone asking farmers to adjust their professional practices.** Some TSPs interviewed noted that they did receive training (through NRCS) on how to best communicate with farmers. Some of those skills, however, come only through experience and time. As one interviewee suggested, newer TSPs have technical knowledge to pass on to seasoned TSPs, while the seasoned TSP or retailer has a network of trust that could be shared with the newer TSPs.

All interviewees were cognizant of the delicacy of politicized topics. At least two interviewees felt that there was a lot we do not know about climate change, and we need to continue to learn about its impacts. However, most interviewees recognized the significance of climate change impacts. Agriculture, for instance, has a big impact on carbon emissions (USDA, 2021). Everyone interviewed is aware of the political nature of bringing climate change into the conversation. Almost all interviewees recognized the importance of taking climate change into account when implementing soil health, water conservation, and water quality practices. Many were also aware of the potential impact on soil health practices coming from emerging carbon markets. Skills for navigating such conversations may be helpful for TSPs who must deal with it.

Plenty of information on CLC is available online, but the best training might be in the field

Most interviewees agree that hands-on learning, such as field days and workshops, is more desirable than classroom or Internet trainings. A benefit of field days is that they build community, connection, and networking, and they provide information and training. All these support an informational component of CLC, and they contribute to a larger network with shared values and belief systems.



Photo credit: Edith Barrett

Currently, there are plenty of options for TSP trainings mostly through NRCS, and through Universities and SWCDs. NRCS provides skills-development tracks for various certifications, including soil health. It includes

training on [NRCS's principles of soil health management](#): disturbing the soil as little as possible, growing as many different species of plants as practical, keeping living plants in the soil as often as possible, and keeping the soil covered all the time.⁸

Training is also available through the Fish and Wildlife Conservation Commission, the Land Stewardship Project, the Soil Health Coalition and many other organizations, which are mostly supported through federal and state public funding, as well as philanthropic sources. National conferences are also a training resource. Funding for TSP training is often through NRCS/SWCDs, which can sometimes be a bottleneck for better training. When it is a bottleneck, it suggests the system may hold too many eggs in one basket, and other sources may need to be identified.

One interviewee told the story of Adam Chappel, a cotton farmer in Arkansas, who discovered CLC when he came across YouTube videos from regenerative soil health experts. This came at a time when his cotton farm was in a rough financial state, and he was desperate. The information available on YouTube convinced him to give CLC a chance. With cover crops and no-till practices (plus others along the way), he managed to go from almost broke to almost out of debt, and he is now the president of the Soil Health Alliance in Arkansas. The point of desperation Adam experienced is an example of the enormous pressure and paradigm shift that can be necessary before producers switch to CLC. **Changes like the switch to CLC do not happen easily for people who are comfortable where they are.**

TSPs are aware that climate change is a touchy subject, but they find other benefits of CLC to convince producers

The general belief amongst interviewees is that the climate is getting more erratic, resulting in climatological extremes, especially over the last 10 years. Soil resilience with climate change is a goal because good soil structure goes a long way. If you have a good soil structure, you have plant life which will help in the grand scale of climate change or climate protection. There is a domino effect if we do not take care of the soil; everything starts with the soil, according to those we interviewed.

Despite this motivation, interviewees noted that it may be difficult to convince producers on these merits alone. One benefit of CLC that our interviews suggested was particularly convincing was economics. Many farmers might be wary of changing their processes unless they can see that what they are switching to would be financially viable for them.

"We live in a post-factual world. People have trouble sorting out the difference between opinions and data and understanding science. They go into it with a bias. We have to work against that. As a society we don't unilaterally accept that climate change is a science and that it's very real. This shouldn't even be a debate anymore."

- Farmer and Soil and Water Conservation Specialist

3. TSPs are expected to have a wealth of knowledge and connections. Criteria for success vary.

TSPs need to know - or know who might know - the answers

Most farmers appear to expect that TSPs possess a certain degree of CLC understanding (and any other technical questions they might have). TSP interviewees gave differing answers as to whether they feel TSPs are expected to have expertise on CLC by the larger agricultural community. Some perceive the number of TSPs who have a good

⁸ NRCS Soil Health Management - <https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/mgmt/>

understanding of CLC to be very low but increasing. CLC implementation specifically is not part of TSPs' work evaluation, except perhaps in their own evaluation of their work. However, TSPs working with NRCS might feel a certain pressure to see the producers they work with adopt conservation practices more broadly. When TSPs are unable to provide the answers that farmers need in the moment, as one TSP interviewee noted, it could be harmful to their relationship with farmers. TSPs need to connect farmers to the information needed, which might be through another TSP, another farmer, or some other resource. The most effective, however, might be other farmers. A TSP that does not have a trusting relationship with CLC-practicing producers may find it more difficult to call on their experience.

"We're beyond the cheerleading phase. We need to move into the technical phase of tailored plans for producers: equipment advice, detailed planting advice, planting conditions and conditions advice, termination on cover crops like during a dry period or during a wet period. What types of herbicides to use for termination. We're at the next level, the cheerleading phase should be behind us"

- Farmer and Soil and Water Conservation Specialist

Professional and personal measures of success differ

In trying to understand how to include CLC in the work of TSPs, it is helpful to know what is involved in TSPs' evaluations and expectations currently.

As professionals, TSPs working for NRCS or SWCDs suggested that their work is measured primarily by the following: number of producers that they are working with, practice changes, the number of acres affected, and dollars spent on the work. Some numeric criteria are also estimated based on scientific research on the effects of certain practices. For instance, a TSP might estimate the amount of carbon sequestered based on the conservation practices implemented over a given amount of land.

The TSPs we talked with included some degree of CLC implementation in their personal measure of their own success, but what elements of CLC implementation varied by interviewee. Some emphasized the numeric change by acres, others by the visible change in the landscape. Other criteria for personal success included increased farmer participation, increased inquiry and interest, specific scientific measurements, new clients, retained clients, or hearing a farmer say thank you or come back for more information. As with much of our interview findings, relationships also showed up as a measure of success.

A limitation in our research on this question is that we primarily interviewed people already interested in changing practices to improve soil health. CCAs that are not currently aware of or interested in CLC might have professional and personal evaluations and influences very different from those of our interviewees.

Including CLC in the specific, measurable goals of grant funding may facilitate implementation

One way to ensure there are measures of success related to CLC implementation is to include it in grant funding conditions and requirements. Grant funds often include measurable criteria for TSPs to compare their work against.

"We need to expand how we think about farming systems as a whole, versus just practices. That's very difficult to do, because how do you fund a concept so to speak. It's easier to simply fund a practice specifically."

- Water Resource Specialist

Recommendations for training technical assistance providers

For this research, our goal was to specifically look at TAs and their relationship with practitioners. Throughout this project we were trying to understand what supports successful CLC and what barriers exist. In this section, we will outline specific recommendations.

Build relationships first

Trust is absolutely essential for a farmer to follow the direction of a TA provider, especially if they are being asked to overhaul practices they or their predecessors have been using for decades. **A TA provider needs to be known and trusted by their community**, and they also need to empathize with the human aspect of the changes they are asking for.

Psychological resilience is required when trying new farming practices. Risk is involved -- as well as embracing the unknown -- with an investment in long-range goals. The individual and social influence of perception, beliefs, and biases factor into farms and regional demographics. Farmers are aware of what neighboring farms are doing. They might find social barriers to trying CLC practices, such as judgment from neighbors. As one interviewee put it, "Social conditioning is brutal." This interviewee compared trying new farming practices to an experiment in which chimpanzees were all sprayed with water whenever any one of them reached for a certain bunch of bananas. They learned not to go near them. When a new chimpanzee was introduced to the group and went for the bananas, the others beat him up to avoid getting sprayed. Going against the flow can lead to ostracization.

Conversely, seeing more farmers adopt CLC can encourage others to join. Social influence is a two-way street, but tradition and established practice can be hard to overcome. The complexity of each individual farmer, land ownership, and the characteristics of the land itself all factor into motivations and embracing CLC practices. TSPs need trusting relationships with farmers because they might be asking them to go against the grain and take social risks.

Connect with producers who have succeeded in CLC

A strategy that may be easier than establishing trusting relationships right away with all producers in their community is for TSPs to focus on farmers with CLC experience or with significant social influence. These farmers may be better suited to convincing farmers to try CLC practices but may also have limits in how much they can assist TSPs. "Mentor Farmers" need to be identified and honored for their contributions as role models in the emerging shift to soil health practices.

Those farmers who have had significant personal challenges seem to be more empathetic or sensitive to the risk that farmers feel in adopting CLC and may exhibit more characteristics of resilience in terms of risk-taking with unknown outcomes. Those farmers with a high degree of empathy and resilience could be encouraged or incentivized to lead trainings, presentations, and hands-on CLC learning.

Help farmers help other farmers with CLC

Our interviews suggest that when farmers see the results from CLC, they are more likely to consider adopting soil health practices. When farmers hear success stories from other farmers, this helps to support adopters. This is another reason that field days are a good way to encourage new practices: it can be easier to trust what you have seen with your eyes than trust the mere words of a researcher from the university. The visual impact can be greater too, when a farmer sees the difference between healthy soil using CLC and soil not using CLC.

Again, there is a need to better support "Farmer Mentors" who are usually not compensated or employed by anyone. Yet, they are teaching others and setting an example for practices that contribute to soil health and

reduce erosion. Farmers who act as role models are very effective at assisting other practitioners in gaining understanding and the confidence to try cover crops, agroforestry, and new approaches for livestock grazing. Supporting and recognizing these farmers is one more way to promote the spread of CLC practices.

Show farmers the data, especially from their own fields

There is a disconnect between some local farmer beliefs and peer-reviewed research data. There was also a distrust of the practicality of government and university research. Farmers who view data from the soil on their own farm or from other farmers they know might better recognize the more immediate benefits of practices that are incidentally beneficial to the climate. While our interviews highlight that the primary motivator might often be financial stability, they also note that people still value water quality, water conservation, and soil health. They just need proof that it all goes together.

Emphasize the economic benefits. Recognize the risks

Like all businesses, finances play a significant role for farmers in understanding CLC adoption. Finding additional support in the form of funding for implementing new practices takes time and knowledge. This type of barrier contributes to the status quo of traditional farming. A number of midwestern states provide funding that support CLC (e.g. NRCS EQIP), but these funds are limited and often only available on a first-come, first-serve basis. Even when this type of funding is available, we heard from an interviewee who said they think many producers do not want to participate in these programs because logistics are complicated and if a farmer does not meet the criteria and the expectations, they may not be chosen for funding or may have to pay back the money. In addition to connecting producers with available funding opportunities such as NRCS EQIP, it is equally important to provide producers with other economic tools such as enterprise budgets, information on developing markets, and – when possible – connection to supply chain partners.

One interviewee said, “We need to expand how we think about farming systems as a whole, versus just practices. That is very difficult to do, because how do you fund a concept, so to speak? It is easier to simply fund a practice specifically.” This reframes the question of how we support farmers in trying new crops and cropping systems. Convincing a producer to try and succeed in one new CLC practice may lead to more trials and successes, but failure or bad experiences could lead to distrust of these emerging CLC practices.

Our data suggest that the risk of failure is important to recognize for those who seek to expand adoption of CLC practices. Supporting those who decide to make the change could be vital to their success, which can lead to their neighbors being convinced and succeeding. Necessary support includes both social support (e.g. empathy) and technical knowledge (e.g. planting schedules or special equipment know-how).

Improve TSP training on technical questions about CLC practices

As researchers, we acknowledge that adoption to CLC is complex on many levels: there is a historical precedent, a gravitational pull towards status quo with predictable outcomes, economics, land ownership, and as we just explored, the importance of relationship, to name a few. Another important component to successful CLC adoption is technical knowledge of a diverse array of soil health practices.

Equipment, planting conditions, details on termination of cover crops, etc.

Farmers need more information on the specific methods to use when implementing various continuous living cover crops. Given the newness of some CLC crops and cropping systems, it can be daunting to switch when there

is limited access to information about basic agronomic management techniques – information that is well established and easily accessible for row crops such as corn and soy. Farmers need answers to all manner of technical questions: everything from the various species that can be used as cover crops, when to plant, using an interseeder or other specialized machinery, how and when to apply chemicals, how and when to terminate a cover crop, using large equipment in agroforestry settings, etc.

Work with CCA boards and practitioners to improve adoption

GLBW could potentially work with state-level CCA boards to push for training that includes more soil health components and principles of continuous living cover. However, because there are many different CCAs with different areas of focus, GLBW might consider identifying a certain CCA specialty. For example, Certified Soil Technicians, Sustainability Specialists, and Nutrient Management Specialists might be the best positions for GLBW to work with in the beginning, since those people will have the best perspective of how GLBW can help.

GLBW might also look into working with local CCA Boards. Local CCA boards administer the ICCA program and consist of at least seven members with “at least one representative from agribusiness, the state/provincial agency for environmental protection, and extension, to ensure the program is educationally sound and meets the needs of industry and government.” GLBW could work with local boards to bring awareness to needing more people who are well-versed in the practices of soil health and continuous living cover.

A caveat for the CCA information is that many of the resources for CCA sustainable agriculture, soil health, and climate change training are online or in classrooms. This is positive in the sense that they are accessible to someone who is motivated to learn in these settings. However, as mentioned in other parts of this report, many folks who were interviewed emphasized the importance of field days. While online trainings are a good place to start, CCAs may need hands-on training to provide the best knowledge and information to farmers and TSPs who ask them about implementing continuous living cover.



Photo credit: Dave Hanson

Other Avenues for Action

Certain suggestions from our research fell outside the scope of this project. However, they are possible routes to increasing the adoption of CLC which TA providers may want to be aware of. These are likely to be long-term, ongoing efforts.

Incentivize crop advisors and retailers to help farmers implement CLC and use less chemicals

Currently, agriculture retailers and many crop advisors working for retailers have financial incentives that discourage them from recommending CLC practices. In the current system, those who sell chemicals do not benefit from farmers using practices that require less chemical. Retailers and crop advisors are a vital piece of the puzzle, as they serve as a primary source of information for many farmers - essentially serving as TA providers.

Some interviewees recommended that everyone surrounding the farmer should be rewarded only for the farmers' (long-term) success, not for the profit they make from selling pesticides, herbicides, and other things to the farmer. Otherwise, those in the farm industry will continue to discourage changes to farming practices because they will continue to lose money.

Work with landowners to encourage CLC practices

Landowners with large farms that have been generationally managed exhibit more reluctance to embrace farming paradigm shifts due to historical procedures that have worked for them in the past (Inwood, 2013, p. 2). Farmers who intend to pass the farm on to loved ones might take a more long-range view of the sustainability of the operation, but this long-term thinking may compete with long-time practices.

For non-operating landowners (NOLs), the benefits of CLC practices as a form of asset protection should be made clear. They can require or encourage CLC practices in their land lease agreements. Conservation easements could also be leveraged by landowners to ensure that whoever uses the land uses it in a soil-health-conscious manner.

Work with short-term renters to receive some return on the long-term investment of CLC

Currently, short-term renters can lack incentives to invest in long-term benefits to the land they work. One interviewee perceived that a majority of Minnesota agricultural land is currently being rented, usually for terms of one to five years. This can be a significant barrier to motivating producers to adopt CLC practices. If their lease is almost up and they are not sure that they will be on the same piece of land in a few years, a switch to CLC could be an investment with no return.

"I like to talk to farmers about soil as an asset...When people start using words like regenerative or sustainable or healthy farming, I think that's great, but there are so many variables in those terms. When we understand resources as assets there is a desire to protect them, because we protect our assets. An appreciated asset is great, not a depleted asset."

- Cover Crop Seed Specialist

Change crop insurance incentives

The current crop insurance system does not incentivize soil health practices or farming in a sustainable way. A producer might farm corn in a place where it is not the optimal crop, but they do not carry the entire risk themselves.

Literature suggests that “crop insurance may have a negative effect ... since conservation practices may be perceived by some operators as a redundant risk management strategy for buffering themselves against extreme weather” and “Innovative conservation practices such as cover crops may interfere with previously purchased crop insurance.” (Prokopy, et al., 2019)

One interviewee even suggested that crop insurance could start recognizing that a producer’s decision to not use no-till or cover crops makes a producer riskier to insure, relative to a producer who is using CLC to protect the soil from weather extremes and drought.

Final Thoughts

Summary

This project parallels many other social challenges facing the world right now. Components include how people get their information and who is providing it (and why), how issues of comfort and tradition influence attitudes toward social or environmental responsibilities, and how peer pressure can help or hinder adoption of new practices.

As appeared many times in our interviews, the establishment of trust and relationships are prominent themes for CLC implementation. The adoption of and expertise in CLC practices can be accelerated by farmer-mentors who have adopted CLC practices, more information about CLC economics, and living and working examples of the potential of CLC (including data from farmer’s own land and water).

Once they have started to adopt CLC practices, farmers need ongoing help on how these new crops and cropping systems work. TSPs can do their best to be trained on all the new information coming their way, but it may also be important to share that information with farmer-mentors who can immediately implement and share it. Farmer-mentors should also be recognized as sources of new information on CLC strategies, and TSPs would do well to create networks of innovative farmers and TA providers.

The long-term resilience of agriculture in the Upper Mississippi River Basin depends on the health of its soil. Investing in the sustainability of the state’s agriculture ensures the state’s future well-being. Implementing CLC, and reaping the benefits, is a responsibility that large-scale agriculture has to future generations. Like human-induced climate change, human-induced soil loss and the lost chance to sequester carbon are problems that humans can solve. Adopting a diversity of soil health management strategies serves our own well-being and we become stewards of the land and leaders for others.

Acknowledgements and Thanks

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Photo credit: Susie Theis

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Appendix A: GLBW Survey Questions

See more information on the results of these questions in GLBW's CLC Technical Assistance Training Gap Analysis & Roadmap here: <https://greenlandsbluewater.org/wp-content/uploads/2021/06/GLBW-CLC-Technical-Assistance-Training-Gap-Analysis-Roadmap.pdf>

Survey Questions

- Do you think there is a demand for information and/or technical assistance resources on continuous living cover crops & cropping systems?
- Where do you think farmers are getting reliable technical assistance on CLC crops and cropping systems? What do you see as the biggest opportunities or gaps in where farmers could or should be getting this info?
- To what degree do you think technical assistance providers have adequate training to assist farmers with implementing/ adopting CLC crops and cropping systems?
- What are your thoughts on why better training on CLC crops and cropping systems doesn't exist?
- What are your thoughts on how training could be improved?
- What insights do you have about how train-the-trainer/ professional development content is prioritized or delivered in any given channel(s)? (NRCS, SWCD, Extension, specific ag retailers, specific CEU training programs, etc.)
- Would you be interested in participating in working collaboratively to address these issues?
- What are 1-3 concrete ideas you have regarding how to begin to address any current challenges with TA for CLC, or to replicate successful examples or programs?

Appendix B: Interview Questions

Semi-structured Interview Guide

Thank you so much for agreeing to participate in this research project. As I believe you know, this is a capstone research project and is part of the requirements for the master's degree completion at the Humphrey School of Public Affairs.

We are working with Green Lands Blue Waters, an organization working to support smart farming practices.

Project Purpose:

Green Lands Blue Waters ("GLBW" or "the client") wants to better understand the barriers to providing technical assistance for regenerative agriculture in the Upper Mississippi River Basin (namely Iowa, Illinois, Minnesota, and Wisconsin). This interview, and your contributions, will help us to understand the intersecting dynamics between TA providers, farmers, and seeing change in the agricultural landscape.

I sent you an information sheet titled IRB Form, via email, regarding this study. Do you have any questions or concerns before we begin?

Before we begin, I just want to say thank you so much for your time and your interest in being part of this research. You'll be helping to improve the understanding of technical assistance and how it can best be used to meet the needs of farmers and society. GLBW will use this information to support their mission of outreach and applied research in partnership with public universities and nonprofit partners.

I will be recording our interview. Is this acceptable to you?

My goal is to complete this in 30 minutes, but in case we go a little longer, do you have any immediate commitments I should be aware of?

Interview Questions

- Would you please tell me what your current job is, who you work for, and your job title?
 - Could you also tell me your location?

- Could you briefly describe your professional background and how you came to your current role? How would you describe your specialization?

- What can you tell us about how you were trained?
 - Do you feel like your training adequately prepared you for the work that you do? What all is included in this training?
 - Do you receive ongoing training? Are there options?
 - Who provides this training? How is it funded? What does funding cover?

- Do you feel like anything was missing or could be improved?
- People use different terms for the sort of farming we're talking about, whether it's soil health, continuous living cover, or regenerative agriculture. How do you like to refer to it?
- Did your training include anything about [regenerative agriculture, continuous living cover, or soil health]?
 - Anything about the impacts on water resources?
 - *Focus Area 1* GLBW works with the Savanna Institute on TA training for agroforestry. How familiar are you with agroforestry practices?
 - How did you learn about it?
 - Do you find many farmers interested in agroforestry?

Agroforestry is a land management approach that integrates trees and shrubs with plant and animal farm operations. Agroforestry usually includes five general categories: silvopasture, alley cropping, forest farming or multi-story cropping, windbreaks, and riparian forest buffers, all of which involve strategically planting trees so that they provide economic and environmental benefits (soil health, carbon sequestration, etc.). The trees and their fruits can be harvested, and they help stabilize waterways and soil.

- With regards to [continuous living cover crops & cropping systems], do you think there is a demand for information and/or technical assistance resources?
 - If so, are current TA providers and resources able to meet that demand?
 - If not, why the disconnect? If farmers are demanding more help, why do you think they're not able to get it?
- How do you measure the success of your work?
 - What kind of results would you like to see?
- Is there an expectation that a TA provider would be familiar with [regenerative agriculture or continuous living cover] practices?
 - Is [CLC] implementation currently part of a TSP positions' expectation and performance evaluation?
 - If so, what are the expectations and/or evaluation?
- Are you aware of any instances where [CLC/regenerative farming] was successfully implemented?
 - What can you tell us about that instance?
- How might your work influence future agriculturally-focused policymaking (local, state and/or federal)?
- What is your perception of the availability and accessibility of funding for [regenerative agriculture] practices?
- What do you believe are the most systemic challenges in implementation of in-field farm practices? Why?

FOR LATER IN INTERVIEW [reword to fit their work/thinking]:

- What is your personal perspective on climate change?
- When you engage with farmers, how do you perceive their understanding of climate change?

WRAPPING UP (3 MINUTES LEFT)

- Is there anything else you would like to tell us?
- Who else should we be talking to as part of this project? (Any key sectors, organizations or names of specific individuals? Maybe an example of a TA provider and/or farmer associated with successful [CLC] implementation/transformation?)

Appendix C: IRB Form for Interviewees

Information Sheet for Research

Technical Assistance for Continuous Living Cover in Agriculture

You are invited to be in a research study analyzing technical assistance for continuous living cover in agriculture. You were selected as a possible participant because of your role in agricultural technical assistance. We hope that you will consider being a part of our study. Please read this form and ask any questions you may have before agreeing to be in the study. This research is being conducted by: Ashley Peters, Edie Barrett, and Jack Stinogel, under the direction of Dr. Robin Phinney from the Humphrey School of Public Affairs at the University of Minnesota.

Procedures: If you agree to be in this study, we would like to talk with you for approximately 30 minutes by phone or video call. At the beginning of our conversation, we will ask your permission to audio-record, and we will not record unless you give permission. Recording our conversation will let us concentrate on our conversation and also accurately portray your comments in our final report.

Confidentiality: Upon request, records relating to your interview for this study will be kept private between the student researchers and Green Lands Blue Waters. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject without your express consent. Only researchers will have access to the research records, including the recording of our conversation.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to decline answering any question or withdraw at any time without affecting those relationships.

Contacts and Questions: The primary researchers conducting this study are: Ashley Peters, Edie Barrett, and Jack Stinogel. You may ask any questions you have now. If you have questions later, you are encouraged to contact them at pet03177@umn.edu, ediebarrett@gmail.com, or stino003@umn.edu or Dr. Robin Phinney at rphinney@umn.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Appendix D: Field Day Observation Report

Observational Research, Capstone Workshop

University of Minnesota, Humphrey School of Public Affairs

Date: July 20, 2021

Project Title or Focus: Technical Assistance for Continuous Living Cover Agriculture

Client Organization: Green Lands Blue Waters

Student Consultants (names): Ashley Peters, Edie Barrett, Jack Stinogel

Active Participant and Observation Submitted by: Edie Barrett

Capstone Course Instructor: Dr. Robin Phinney, Humphrey School of Public Affairs, University of Minnesota, rphinney@umn.edu

Observation at The Fernholz's A-Frame Farm in Madison, MN: Kernza Field Day Event

My Positionality in Analyzing this Observation

I have lived in Ortonville, Minnesota for the last 11 years. Ortonville is in West Central Minnesota. I am known in this region as a fine artist, collaborative artist, writer, and by my support of the arts. In addition, I have done regional leadership projects. My sister has lived in Madison for almost 45 years. Once upon a time, my mother and aunt lived in Madison. It was impossible for me to be an “invisible” observer at this event.

Context

This observation took place on July 8, 2021 between 1 PM and 4:30 PM on the farm site and property belonging to Sally and Carmen Fernholz, located in West Central Minnesota. I was interested in observing the activities and the educational structure of the Field Day. During this observation, I participated by mingling among friends, participants, organizers, and vendors while observing the networking and connections happening between people.

I also drove my vehicle, and took four unknown passengers, to the Kernza field, which was approximately three miles away. The education and demonstrations at the Kernza field took about one hour. I did not enter the field, but instead watched from the dirt road and visited with organizers and participants.

Location

The main location of the observation was The Fernholz A-Frame Farm in Madison, Minnesota. It is an outdoor location with dirt road access just off highway 40, two miles east of Madison. It was an idyllic Minnesota day with a temperature of 72°, slightly overcast, and no wind. This farm site is typical, with a home, farming equipment, and large farm dwellings that are surrounded by fields. There was an open garage that had been set up as the registration area for name tag distribution. A very large open Quonset hut had been converted to an auditorium with cinder blocks and boards for seating. Multiple vendors were also set-up in the Quonset hut, around the perimeters. Vendors stood by their display tables which were decorated and showcased samples of their Kernza products. In the driveway, there were also educational displays to illustrate Kernza grains, its root system, and a water demonstration site to compare tilled soil to soil with rooted Kernza. There was also an outdoor porta potty.

A second observation location was the Kernza field, approximately 3 miles from the Fernholz Farm.

People & Activities

As I arrived, a steady stream of cars entered the farm site. When I drove up the long dirt road driveway, I was immediately ushered by a parking attendant who instructed me where to park my vehicle. I was then met by a University of Minnesota representative who had a document for me to sign regarding the release of my image for publication and publicity. Parking occurred in a field and in the farmstead area. Our client is Green Lands Blue Waters (GLBW). To my delightful surprise, Erin Meier and Aaron Reser were present. Aaron was working at the registration table, which led me to understand our client was part of the organization of this event and part of its administrative management.

I estimate that participants represented 60% males and 40% females. There was a wide age range, with most people in their 30s 40s and 50s. I identified one person of color, a vendor and baker using Kernza flour, out of Granite Falls. Everyone was casually dressed, mostly in jeans, and wore tennis shoes, hiking boots, or Keen style sandals. Proper attire was included in the invitation because of the tour in the nearby field and the soil pit. Socioeconomic clues of the participants were not obvious. Most automobiles were SUVs, followed by pickups, and then sedans. Most were American automotive manufacturers, such as Chevrolet, followed by Subaru. This event drew people from the region, all over the state, and from out of state. It was my understanding that 130 people registered, I would estimate that over 200 attended the event.

I identified nine different types of people in my view: Mentor Farmers, the next generation of farmers committed to soil health practices, event organizers, people involved with product development and sales, students and researchers, investors such as Patagonia Provisions and General Mills, landowners, non-farmers who were interested and curious, and a few children who were off on summer vacation being supervised with their parents.

Carmen Fernholz embodies the definition of a Mentor Farmer. He has been involved with organic farming for 30 years, and first planted Kernza in 2011. He is close to retirement and is collaborating with Luke Peterson, A-Frame Farm manager. Luke exemplifies the next generation of young farmers who are committed to soil health practices. What makes this relationship significant, in terms of mentoring, is that Luke is not related to Carmen. During the afternoon presentation, Carmen introduced Luke and the history of their relationship. Mutual respect, admiration, and appreciation between the two of them was articulated and transparently visible. Carmen was very happy, often laughing and smiling, he appeared to be very social and was observed throughout the afternoon meeting, greeting, and talking to people. He was the spokesperson during the afternoon presentation and a primary organizer on the Kernza field.

Another Mentor Farmer showcased was Anne Schwagerl from Prairie Point Farm in Beardsley. Their farm is certified organic as well as transitional organic. Along with her husband, and in-laws, they farm various grains including Kernza. They also raise pastured pork and laying hens. As a Mentor Farmer, Anne's engagement and visibility is paramount, simply because she is a woman deeply engaged in a full range of diversification of soil health practices, and she is from a younger generation. I would estimate she is in her mid-30s. She spoke at the afternoon presentation about the new co-op.

Don Wyse received a significant amount of attention from participants and from the representatives of Patagonia Provisions. The energy around him led me to conclude that he is someone important in agriculture. Carmen introduced him in the Quonset hut, although I could not hear the details of the introduction. Internet research revealed that he is a professor at Michigan State and is the Co-Director at The Center for Integrative Natural Resources & Agricultural Management.

There were three women present who are also defined as Mentor Farmers: Kay and Annette Fernholz (Carmen's sisters) of Madison, and Audrey Arner, of Montevideo. These three women have worked for decades in responsible agriculture and livestock, while functioning as educators and role models for others. To my knowledge they are not involved with Kernza, and therefore were not front and center with attention.

The second group of people would be defined as the next generation of regenerative agricultural farmers. There was no specific way to identify them, this is an assumption based on their age and their attendance.

The third group of people would be defined as the organizers of the event and working. The University of Minnesota staff were easy to recognize due to their matching shirts with the U of M emblem. Their movements and engagement with the crowd was distinctively different: they often had a clipboard and moved with a focused sense of purpose. GLBW was also supporting the administrative structure of the day, demonstrated by Aaron working the registration table. There may have been other organizations also in support but were not visibly distinctive to me.

The fourth group of people were involved with Kernza product development and sales. There were people (5-8?) showcasing their flours and bakery goods. There were brewers and distillers, and a James Beard award-winning cookbook writer who was showcasing her cookbook, *The Perennial Kitchen*. These people illustrated the variety of marketing opportunities for those interested in growing Kernza. There was a man there from Minneapolis who works with food co-ops and he specifically said during the afternoon presentation: "When you work in a food co-op, you need to understand the story behind the food. I am here to understand the story of Kernza."

The fifth group of people were students and researchers. During the Quonset presentation when introductions were being done, Carmen Fernholz asked all students and researchers to raise their hands. There were 10 to 15 students and researchers. I would not have been able to identify these people on my own.

The sixth group of people who were there, were small in numbers, but large in terms of significance. A representative from General Mills introduced herself and talked about their interest in supporting research and product development. There were two women there from Patagonia Provisions. One of those women was actively taking photographs throughout the day, and the other woman mingled in the crowd.

For the seventh group, I identified two older men who are landowners and are trying to responsibly engage with soil health practices. One of them is actively farming the land and uses his property as a community garden. The other man was out of Minneapolis and owns land in North Dakota. I was particularly interested in the second gentleman. In our research we have identified landowners, versus land leasers, as a population to target for soil health conservation. Meeting him confirmed our hypothesis that landowners have an investment in asset management.

The eighth group were people from the community who are interested and curious. I was not able to visibly identify these people, but through some casual conversations, determined their presence.

The ninth group were children who are off on summer vacation and were with their parents.

Observation & Research Integration

Field Day events were noted in our literature review and across-the-board in our interviews as being the most effective form of education. My personal goal in attending this event was to engage with our research on a personal level and try to articulate why Field Day events are so effective.

The energy of the group was palpably vibrant, which felt like an agricultural festival. People engaged with each other easily and freely. I attended the event by myself but had no challenge in meeting people or engaging in conversation. What I observed was a sense of excitement, enthusiasm, shared values, connections, belonging, and networking. The event was impressively organized, in terms of time, structure, engagement, and social opportunity. I left the event around 4:30 PM, but a social event was scheduled to begin as I was leaving.

During this event an announcement was made regarding the official incorporation of the Perennial Promise Growers Cooperative. This co-op will help to address some of the challenges and barriers that were revealed in our research regarding the marketability of cover crops.