

# Central Midwest Climate Opportunities and Learning (CM CO-Learn)

**Performance Period:**  
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# Introduction to CM CO-Learn

Communities in the Central Midwest states of Iowa, Nebraska, Kansas and Missouri are experiencing intensifying climate-related hazards, as major floods, droughts, heat stress, severe storms, and water quality degradation are becoming the norm. Climate projections indicate that increasingly frequent combinations of severe heat and drought events will be of particular concern. These events will compromise natural ecosystems, human health, water resources, and industries such as agriculture, construction, and transportation.

To create a more inclusive and equitable adaptation planning process, the Central Midwest Climate Opportunities and Learning (CM CO-Learn) team brings together community members and researchers to co-produce and co-manage climate knowledge, build relationships, and empower community-led projects that will improve resilience to a changing climate. Our team is focused on two important communities in our four-state region: women landowners and tribal nations. Both populations practice relational, holistic approaches to stewarding the land that resemble, but go far beyond, current research emphases on coupled social-environmental systems for climate adaptation and resilience.

We apply social science methods and storytelling across all project activities to illuminate the experiences of our partner communities, developing a framework to understand how they perceive, plan for, and adapt to climate hazards in our region.

The funding for our team was announced at the first White House Summit on Building Climate Resilient Communities on September 28, 2023. Since then, the CM CO-Learn team has focused on expanding our existing relationships with women landowners and tribal communities across our region. We have developed a Community Action Project grant program that invites communities to identify their priorities for climate adaptation and their preferred strategies for building capacity and resilience. We have also established a Community Advisory Board to guide project decision making.

## YEAR ONE GOALS

- **Foster partnerships** that elevate and support the climate agency and wisdom of women landowners and tribal nations
- **Improve the quality of research** by including the perspectives of communities often underrepresented in decision making
- **Increase the adaptive capacity of our region** by supporting community-driven climate adaptation strategies

# Learning by Doing

## COMMUNITY ACTION PROJECTS

A primary activity of our new team has been developing a small-grants program we call Community Action Projects. We distributed the first invitation for proposals in December 2023 and funded the following initial projects from community partners:

### STORIES OF THE SEASONS FOR RESILIENCE

#### Climate Change and Women in Iowa Agriculture

Women Food and Agriculture Network

This project gathers a cohort of 12 women who steward Iowa land to compile their existing knowledge of the relationships they use to guide agricultural decision-making. They will leverage their collective expertise and work with researchers to develop action projects to make their land more resilient. They will create artifacts that will present stories, ecological expertise, data, and art that can help guide other Iowa land stewards toward greater climate resilience.

### RESILIENCE IN CENTRAL IOWA THROUGH THE BUTTERFLY EFFECT

#### Engaging new women in conservation through shared stories and social circles

Blue Planet

This project will develop and apply two methods of outreach that leverage women's social-circle connections and that address the communicative and economic barriers they experience in making conservation changes. The first method is purposeful gatherings of women who never come to agricultural or conservation meetings. The second method engages women who have previously attended other events to attend small-group coffee conversations around focused topics, such as crop diversification; cover crops; and negotiation with tenants and others in their decision-making circle.

Iowa women  
landowners share  
conservation stories  
and strategies





## COMMUNITY ACTION PROJECTS, CONTINUED

### SOVEREIGN NATION ENHANCED ENVIRONMENTAL MONITORING AND DATA SHARING

University Corporation for  
Atmospheric Research

Agencies specific to the Santee Sioux Nation and the Sac & Fox Nation of Missouri in Kansas and Nebraska have long sought real-time observation capabilities on sustainable and easy to maintain platforms. The Nebraska Indian Community College has used previously awarded funding to test environmental monitoring capabilities for the classroom. This project combines the needs of both to assist in the design and implementation of a sustainable and affordable meteorology and climatology monitoring network. The goal of this project is to provide technical expertise in the design and implementation on a per-station basis as it relates to siting, instrumentation, installation, and maintenance for meteorological/climatological observations. Santee Sioux Nation and NICC stakeholders will provide desired observation locations for a minimum of five locations on or near Santee Sioux Nation lands.

### ENVIRONMENTAL MONITORING TO ENHANCE DECISION-MAKING ACROSS THE SANTEE SIOUX NATION

Nebraska Indian Community College

The goal of this community action project is to monitor environmental conditions to enhance decision-making capabilities for the Santee Sioux Nation through the design and implementation of a weather sensor network. The project deliverables include real-time operational weather stations across the Santee Sioux Nation. Data from the stations will be accessible from the Office of Environmental Protection and Nebraska Indian Community College. Community engagement about the project will be provided across Santee and at neighboring Nations as desired. Training materials regarding station maintenance and operation will be produced to support long-term sustainability. A framework and guidelines for data accessibility will be drafted. Weather summaries based on local observed conditions will also be produced.

Collectively, we anticipate that these action projects will form the foundations for CM CO-Learn's various portfolios of interest. Our primary research questions are: What are the focal communities' current capacities, barriers, and strengths to address climate change? How can understanding these contexts foster new partnerships across diverse under-served and under-represented groups that have not previously worked together?" As the Community Action Projects progress and mature, we anticipate learning from our partners about their concerns and strengths. This knowledge will help the CO-Learn scientific team understand where and how to deploy scientific knowledge and relationship building while respecting local knowledge and processes.

Rosiland Grant,  
Omaha and  
Winnebago  
Tribes, and Stonie  
Cooper, UCAR,  
install weather  
stations on the  
Santee Sioux  
Nation.



# Cultivating Community

## COMMUNITY ADVISORY BOARD (CAB)

CM CO-Learn is guided by a committed group of community advisors, including women landowners, tribal members, supporting organizations, and agency representatives. CAB members provide feedback on CM CO-Learn's engagement in the region. They also help guide our team's development by leading many of the initial Community Action Projects.

- **Jean Eells**, E Resources Group
- **Stephanie Enloe**, Women, Food and Agriculture Network
- **Kristine Flyinghawk**, Center for Rural Affairs
- **Matt Helmers**, Iowa Nutrient Research Center
- **Bobbi Jo Howard**, Center for Rural Affairs
- **Emily Rountree**, National Oceanic and Atmospheric Administration
- **Juliann Salinas**, Women, Food and Agriculture Network
- **Dennis Todey**, USDA Midwest Climate Hub
- **Roger Trudell**, Nebraska Indian Community College

## ADDITIONAL PARTNER ORGANIZATIONS

In our first year, CM CO-Learn has begun a deliberate process of outreach and engagement to introduce ourselves to new partner organizations. These include community non-profit organizations, university-based centers, and agency-supported resource centers.

- American Farmland Trust
- Heartland Environmental Justice Center
- Hubbell Environmental Law Initiative
- Iowa Flood Center
- Iowa Watershed Approach
- NOAA Midwestern Regional Climate Center (MRCC)
- NOAA High Plains Regional Climate Center (HPRCC)
- NOAA North Central Climate Adaptation Science Center
- NOAA Regional Collaboration Network – Central
- The Land Institute
- The Nature Conservancy
- University of Iowa Native Center for Behavioral Health
- Wichita State University Environmental Finance Center
- Women, Land, and Legacy

## NEW PROJECT HIGHLIGHT

Lead PI **Martha Durr** and Lead PI **Linda Shenk** are beginning discussions with CAB member **Roger Trudell** and other members of the **Santee Sioux Nation** around local projects that support food sovereignty such as seed saving and creating a community food preservation center.

## NEW CONNECTION HIGHLIGHT

Lead PI **Janssen** and Co-PI **Roesler** are planning policy-related events for women landowners in partnership with the National Institute for Environmental Health Sciences-funded Environmental Health Sciences Research Center at the University of Iowa. We will engage University of Iowa law students and environmental advocacy groups (e.g., Environmental Working Group, the Iowa Environmental Law and Policy Center, and the Iowa Environmental Council) to provide resources and insights for women landowners interested in environmental policy and regulations.



# Evaluation and Impact

CM CO-Learn's primary metric of success will be whether we have produced actionable climate information for sustainable and resilient decision-making driven by local communities' needs and knowledge. While the application of the climate information may not be observable until project years 4 or 5, in the short term, our evaluation documents incremental progress related to engagement, research participation, and collaborative learning. We use social science methods, such as brief interviews, surveys, and social network analysis, to tell the stories of the team's deepening knowledge and enhanced relationships.

## EXPECTED OUTCOMES

1. Enhanced relationships and connections among groups
2. A sense of shared knowledge and responsibility among different populations in the region
3. Empowered communities that are more climate-resilient via policy change, increased climate literacy, increased access to climate services, and an enhanced workforce
4. Co-produced and co-managed knowledge among the communities and the academic team members from different backgrounds and disciplines
5. A climate-aware workforce

Women landowners learn about soil health with project partners Dr. Jean Eells and Women, Food and Agriculture Network.

## IMPACT

Our team is just in the beginning stages of our work in the region. However, early input from community members and collaborators suggests that our approach has high potential for impact.

For example, the Tribal Response Coordinator of the Sac and Fox Nation of Missouri in Kansas and Nebraska communicated the following about data collection capacity among tribal nations: "The Sac and Fox Nation has had to consistently rely on data from neighboring communities to fill in the blanks of our Drought Early Warning System. Because these are often anywhere from 5 – 30 miles from our Reservation the amount of error is compounded with distance. We have been flirting with drought for

the past two years and as we educate our Tribal leaders and community it is imperative that we have accurate data that we can communicate to all decision makers. Knowing that our data comes from a reliable source on the reservation helps us communicate the factors influencing climate change in a very tangible way."

In the programming and action projects with women landowners, the women are recognizing the power of their influence and the options for climate-wise practices they had not yet considered. They have underway action projects that include trying cover crops for the first time; putting in prairie strips; conducting native planting projects with neighboring farmers to support pollinator habitat and reduce runoff; planning events



## IMPACT, CONTINUED

for women who have influence over large-acreage farms that will occur over the summer (one on soil health and another on including conservation practices in leases); supporting practices on a woman-owned organic farm that distributes produce to low-income and vulnerable populations. Some of these action projects involve verbal and visual storytelling as a way to engage more individuals new to climate-wise work. For example, some of women in the Stories of the Seasons action project are including dance/movement work and song to foster community, and the women in the Butterfly Effect project will not only hear other women's stories and share their own but also engage in staging a light-hearted skit about the microbial network to help understand this hidden and powerful ecosystem.

Although our academic team brings considerable experience in community engagement with our partner communities, we have already seen several areas where our own knowledge has been deepened by our engagement so far. In particular, we are gaining a richer understanding of how differences between sovereign nation policies and procedures should guide how we effectively and meaningfully engage with Tribal Nations going forward. Each Nation's particular historical context informs how we initiate engagement and relationship development. For non-tribal members in particular, it is vitally important to learn Sovereign nation history for each specific tribe in advance of engagement. Furthermore, a recognition and general understanding of intergenerational trauma is also a worthwhile and helpful endeavor.

In addition, the academic team began this project with a strong commitment to interdisciplinarity. That commitment has only increased, and we are quickly seeing the value in numerous storytelling-derived, "non-scientific" ways of approaching our work. For example, from the women landowners, we are finding that when we ask questions about what "information" they would find useful, we do not get nearly as many requests as when we listen to their stories for their language of care and support those areas, then they connect this material with their stories much more deeply. Several team members will be submitting a journal article on this work at the beginning of the summer, and this fall, we will be discussing ways of incorporating this learning into our larger team's project. We are also discussing the addition of other arts-and-humanities

approaches in programming and team meetings. For example, we are thinking about adding in some "flash theater" in Butterfly Effect action project for one of the meetings with the women. Likewise, we are thinking about partnering with a group at Luther College who included women landowners as participants in an event called "Soul of Soil." Lastly, in our team meetings, we ask what works of fiction, art, or media have resonated with people. These conversations help us to connect around issues that tribal communities and women are experiencing. The CO-Learn team is filled with readers, photographers, storytellers, musicians, makers, and artists. We are excited to share these assets with our region through reading lists, performance art at our annual meetings, visual media, and other creative endeavors.

In particular, we are gaining a richer understanding of how differences between sovereign nation policies and procedures should guide how we effectively and meaningfully engage with Tribal Nations going forward.



## Looking Forward

CM CO-Learn's initial work is focused on developing and enhancing relationships across our region to ensure community-appropriate strategies for adaptation and resilience. We have several new projects in development that will support these goals.

**PhD Candidate Lily Kraft** is conducting an assessment of Hazard Mitigation Plans developed by Tribal Nations in the U.S. She is also working with leadership of the Santee Sioux Nation to better understand their process in developing a Hazard Mitigation Plan, including the challenges and resources required for the plan's development, and how the Nation hopes to address the action items outlined in the plan.

**Lead PI Janssen** is working with partners at University of Kansas and the Missouri Institute of Science and Technology to identify community partners and future projects in Kansas and Missouri.

**Co-PI David Bennett**, University of Iowa Department of Geographical and Sustainability Sciences, is collaborating with CAB member and landowner Jean Eells, Lead PI Linda Shenk, and The Nature Conservancy. Their project will create and implement storytelling programming that integrates a GIS-based tool, Agricultural Conservation Planning Framework (ACPF) to support women landowners in adopting climate-wise conservation practices.

**Lead PI Martha Durr and the Women, Food, and Ag Network members** (including CAB members Stephanie Enloe and Juliann Salinas) will be developing ideas for building pathways for women landowners to engage in just land transition to support such practices as land return to tribal communities and a just land transition to land stewards from under-represented populations.

**Lead PIs Janssen and Shenk** have begun discussion with the Women in Agriculture program in Nebraska on future action project possibilities for supporting women landowners, particularly those in the western half of the state where support is especially needed with increasing drought.

**Science Team members Giannini and Shea** have connected us with the Women, Land, and Legacy (WLL) chapter that serves Jones, Delaware, and Dubuque Counties in Iowa. The chapter, which formed in January 2023, is planning a series of events for women farmers in 2025 that will be supported by CM CO-Learn. These events will facilitate collaboration and communication among women farmers in the three-county area, providing important social support for conservation practices.



# Academic Team Members

## LEAD PRINCIPAL INVESTIGATORS

**Brandi Janssen**, University of Iowa  
**Martha Durr**, Nebraska Indian Community College  
**Linda Shenk**, Iowa State University  
**Gabriele Villarini**, Princeton University

## PROGRAM MANAGER

**Sarah Helmer**, University of Iowa

## PROGRAM EVALUATOR

**Liz Hollingworth**, University of Iowa

## FACILITATORS

**Lisa PytlikZillig**, University of Nebraska, Lincoln  
**Kurt Montoya**, University of Nebraska, Lincoln

## CO-PRINCIPAL INVESTIGATORS

**David Bennet**, University of Iowa  
**Ibrahim Demir**, University of Iowa  
**Shannon Roesler**, University of Iowa  
**William Gutowski**, Iowa State University  
**Rezaul Mahmood**, University of Nebraska, Lincoln  
**Hank Miller**, Nebraska Indian Community College  
**Mark Junker**, Sac and Fox Tribe

## GRADUATE STUDENTS

**Mariana Castro Azpiroz**, Iowa State University  
**Kayleigh Koester**, University of Iowa  
**Lily Kraft**, University of Iowa  
**Liv McCauley**, Iowa State University  
**Jerome Okojokwo-Idu**, University of Nebraska, Lincoln

## UNDERGRADUATE STUDENTS

**Hannah Bensen**, Iowa State University  
**Rosalind Grant**, Omaha and Winnebago Tribal Affiliation  
**Chun Hang Chan**, University of Iowa  
**Grace Iversen**, Iowa State University

## SCIENCE TEAM

### IOWA STATE UNIVERSITY

- **Antonio Arenas**, Department of Civil, Construction, and Environmental Engineering
- **Kristie Franz**, Department of Geological and Atmospheric Sciences

### MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

- **Joel Burken**, Civil, Architectural and Environmental Engineering
- **Robert Holmes**, Civil, Architectural, and Environmental Engineering

### UNIVERSITY OF KANSAS

- **Mary Hill**, Geology Department
- **Joshua Roundy**, Civil, Architectural, and Environmental Engineering
- **Marcia Schulmeister**, Geology Department

### UNIVERSITY OF IOWA

- **Kate Giannini**, IIHR
- **Witold Krajewski**, IIHR and Iowa Flood Center
- **Marian Muste**, IIHR
- **Ted Neal**, College of Education
- **Felipe Quintero**, Iowa Flood Center
- **Keith Schilling**, Iowa Geological Survey
- **Breanna Shea**, Iowa Flood Center
- **Larry Weber**, IIHR

### UNIVERSITY OF NEBRASKA, LINCOLN

- **Trenton Franz**, School of Natural Resources
- **Aemal Khattak**, Department of Civil and Environmental Engineering
- **Michael Hayes**, School of Natural Resources
- **Tirthankar Roy**, Department of Civil and Environmental Engineering

CO-Learn Academic  
Team Members



## Science Team



UNIVERSITY OF  
**Nebraska**  
Lincoln

**STATE**

**IOWA**

**KU** THE UNIVERSITY OF  
KANSAS

MISSOURI  
**S&T**

### PUBLICATION HIGHLIGHTS

The CM CO-Learn academic team is a highly interdisciplinary group with expertise in climatology, social sciences, humanities, climate modeling, and geographical information systems, among others. They are each respected and well-published in their fields. Recent publications include:

- Chavez, Alexis and Hayes, Michael J. and Burbach, Mark E. and Durr, Martha E., Towards Usable Science: A Case Study with the Santee Sioux Nation. SSRN: <https://ssrn.com/abstract=4632812>
- Kraft, L., Villarini, G., Czajkowski, J., Characterizing the 2019 Midwest Flood: A Hydrologic and Socioeconomic Perspective. *Weather, Climate, and Society*, 15 (3) 603–617. <https://doi.org/10.1175/WCAS-D-22-0065.1>
- Shenk, L, Franz, K.J., Gutowski, W.J. (2023) Minding the Gaps: How Humanists, Climate Scientists, and Communities Can Become Collaborating Storytellers. *Environmental Humanities*, 15 (3): 83–103. <https://doi.org/10.1215/22011919-10746001>
- Tanir, T., Yildirim, E., Ferreira, C. M., & Demir, I. (2024). Social vulnerability and climate risk assessment for agricultural communities in the United States. *Science of The Total Environment*, 908, 168346. <https://doi.org/10.1016/j.scitotenv.2023.168346>

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