



Central Midwest COLEARN

a NOAA Climate Adaptation Partnerships (CAP) team

Performance Period: June 1, 2024 through May 31, 2025
NA230AR4310629



**Climate Adaptation
Partnerships**
Formerly RISA

Introduction

Established in 2023, COLEARN is the Central Midwest NOAA Climate Adaptation Partnerships (CAP) team. We bring together community members and researchers in Iowa, Nebraska, Kansas, and Missouri to foster community-led projects that improve resilience to extreme weather events. We produce strategies and tools driven by the needs of residents in our region. Our goal is to build more economically resilient communities that can prepare for and respond to increasing extreme weather events such as floods, storms, droughts, and extreme heat.

COLEARN's scientific and communication foci include a wide array of natural hazards, ranging from floods to droughts, winter storms to heat stress, and water quality to water quantity. However, the most important element of COLEARN is creation of "a community of learning" in which members learn from and adapt to each other's needs, constraints, and knowledge, leading to more climate-resilient communities. Through this "learns from and adapts to" framework, we explicitly capture feedback in the learning processes connecting social scientists, natural scientists, humanists, communities, and decision-makers. We do not envision learning as something that happens in silos, but rather as an iterative process in which all parties are involved as collaborating experts.

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COLEARN GOALS:

- **Build a community of learning** through deliberate and continued relationship building.
- **Improve local resilience and preparedness** to extreme weather events via increased data literacy, access to tools and services, and improved policies.
- **Train and mentor** a highly qualified workforce of professionals and leaders.

Year in Review

ANNUAL MEETING 2024: BUILDING COLLABORATIONS

We hosted our first annual meeting of all community and scientific partners on June 5, in Iowa City and June 6 in Des Moines IA.

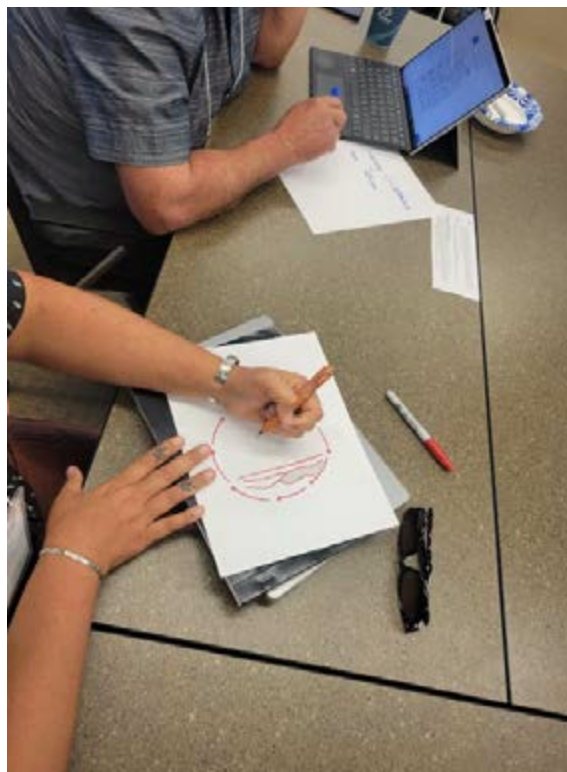
The goals of the meeting were to:

- Develop direction for future COLEARN decision making.
- Enhance connections among our growing network of landowners, tribal nations, and researchers.
- Grow our networks of learning where all participants contribute their knowledge, skills, and experiences (offers) as well as benefit from the knowledge, skills, and experiences of others (asks).

Each day included a series of interactive sessions on the following topics:

- Building trust as we pursue local resilience
- Data management for local communities
- Supporting local resilience and preparedness: Action Projects
- COLEARN team development

The meeting established new collaborations with community partners, helped develop new areas of focus for the project, and resulted in a new Community Action Project focused on agricultural conservation.



TOP

Jerome Okojokwo-Idu, University of Nebraska, Lincoln with Martha Durr, Nebraska Indian Community College.

ABOVE

Meeting participants talked in small groups to identify new projects and collaborations.

LEFT

Participants created visual representations of COLEARN's work.

Year in Review

COMMUNITY ACTION PROJECTS: INVESTING IN COMMUNITIES

In our second year we funded seven new Community Action Projects (small grants) in Iowa and Nebraska. All projects support the building of local resilience and preparedness through agricultural conservation, data management, food production, or building cohesive networks that support effective decision making. We have promoted these opportunities through direct email and webinars. These community-driven projects help guide the overall research portfolio of COLEARN.

Using GIS-based maps to assist landowners in taking conservation action

This project creates and implements storytelling programming that integrates a GIS-based tool, the Agricultural Conservation Planning Framework (ACPF) to support landowners in adopting conservation practices. The ACPF provides maps that chart the history, current conditions, and future possibilities of agricultural land that enhance decision making. This project will foster conservation projects with landowners in Iowa, build relationships with additional collaborators, and create the programming infrastructure to extend this work to elsewhere in the Central Midwest region.



Jones, Delaware, Dubuque Counties Outreach Events in Eastern Iowa

This project will support six events over various topics such as Pasture Grazing and Farm Succession. The planning committee consists of representatives from the county offices of NRCS, Iowa State Extension, Farm Bureau, Farmers Savings Bank, county commissioners, watershed coordinators and local landowners. The team has a social media presence and sends out a yearly newsletter to highlight events and other relevant articles.

Widening the Circle: Expanding relationships between an existing landowner cohort and relevant human resources/ expertise to enhance knowledge, communication skills, and confidence for conservation

Work with our first landowner cohort has been highly successful and has identified and elevated additional needs. Specifically, cohort members have expressed interest in furthering their knowledge and skills to sensitively and effectively engage with their tenants, including connecting them to helpful (human) resources. This ongoing project will support additional learning/engagement sessions that would bring in external expertise and take place in comfortable settings conducive to meaningful conversation.

Year in Review: Community Action Projects

Community Led Conservation Through Composting, Natural Pest Control, and Water Conservation Practices.

This project will provide workshops and demonstrations on the environmental benefits of home composting and watering conservation. This project, which will be extended to the 6,557 residents of Thurston County, NE, and will be conducted in Walthill, NE, in partnership with the Nebraska Indian Community College in Macy, NE. The project aims to address the unique challenges of home gardeners in this region by offering resources to increase the conservation practices of composting, natural pest control, and limited water waste.

Neighbors to networks: Outreach to landowner-supporting partners

We are a committee who has organized to offer programming for landowners and influencers in our Raccoon River Watershed through a collaborative partnership with COLEARN partners Shenk, Eells, Gutowski, Franz, and agricultural organizations. This proposal now takes the next step in offering more programming for this local community to begin sharing the initial successes and methodology of this work with new partners in the region.



Iowa landowners meet to discuss conservation strategies as part of a COLEARN Community Action Project.

Exploratory Ag Discussions for Iowa Landowners

We propose a pilot project to break through an information barrier that has been mostly intractable to us in our quests to use our land to raise human food and drought resistant alternatives to corn and soybeans. We aim to see if we can reframe a discussion with specialty crop experts that is tailored to the needs of local landowners to understand the level of challenge we may be asking our farmers to undertake as we weigh the complexities of the business, social, ecological, and community relationships. We want to try guiding a Zoom-based discussion with an expert that 1) helps us hear more about the types of barriers to solve (labor, equipment, markets), and 2) uses a debriefing discussion afterwards to brainstorm ways we can address the barriers on our own farms, individually.



Resilience Kits for Nebraska Farmers

This project will provide 20 kits to farmers and landowners in our current programs and communities we work in across the state of Nebraska. These kits will provide essential tools for addressing resource concerns related to farming and conservation in the face of extreme weather. Each kit will be put together and hand-selected by staff based on the needs of each individual applicant. Participants who receive the kits will fill out an application and questionnaire selecting which tools would most benefit their land and production situation. Kits will include tools such as soil thermometers, soil moisture sensor, materials for DIY soil infiltration testing, Midwest Labs soil test materials, cover crop seeds, native pollinator mix seeds, hand-broadcaster, drip irrigation materials, weather stations, row covers, stainless steel season-extension hoops, broadforks, rain barrels and more.

Year in Review

FOCUS GROUPS: LEARNING ABOUT RESILIENCE IN OUR REGION

We convened focus groups with landowners from Iowa and Nebraska to better understand the local needs, strengths, and knowledge in our region. Participants included members of conservation groups, small farmers and landowners, and members of agricultural organizations.

The focus groups aimed to elicit information about perceptions of the impacts of extreme weather and how to promote future community resilience. The conversations were recorded, transcribed, and analyzed to identify recurring themes. Participants shared stories of weather-related impacts on their communities and personal lives, discussed adaptation strategies, and offered visions of their ideal futures. Barriers to obtaining these futures were also discussed, providing valuable insight into the challenges and opportunities for collaboration on resilience activities in this community of learning.

Themes that emerged from the sessions include:

Individual and Community Impacts of Extreme Weather

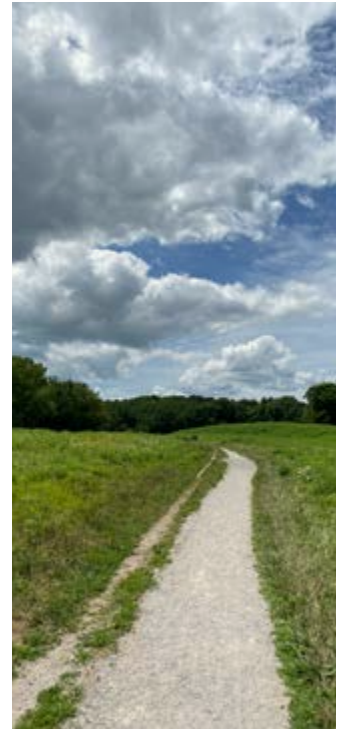
Participants described how extreme weather events have made their lives and work in the agricultural sector more difficult and uncertain. The impacts discussed included flooding, drought, and rising temperatures as well as financial burdens. For example, describing how high winds cause damage to property and fields, affecting the quality of their land through wind erosion. On flooding, one participant added:

“It’s sometime in the last 10 years where a dam washed out above the town of Niobrara. Some of the roads washed out, and bridges, and then that resulted in some people really had to drive long distances to get around. And even in Niobrara, people were using a boat to get their kids to school. I guess that sort of thing has happened before on a milder level, maybe where you couldn’t drive for a couple days, but some of this was months.

Preparedness and Adaptation Strategies

Participants prepare for extreme weather in various ways, such as diversifying their crops, using more irrigation, and seeking drought-tolerant flora and fauna. One participant encapsulated the scope of adaptation strategies in the following:

“I’m taking steps to make us as resilient as possible for our individual operation. Rotating crops to some that have less water demands or can handle the stress better. Looking at different hybrids that we could use, evaluating the efficiencies of all of ours. Wells and anything that holds water, uses water or applies water, we look at very closely for proper pressure, no leaks, and the best application pattern so that nothing runs off. Doing what we can with whatever water we’re given from above so that it stays on our ground and doesn’t go in the ditch. We’ve switched to almost exclusively no-till, which is helping our soil. Again, that’s about conservation. In some ways, we’re doing more with less every year.



Year in Review: Learning About Resilience

Community Support and Networking

Participants were heavily involved in community efforts to enhance preparedness, including participation in professional agricultural groups. Participants strongly indicated a need for access to experts and education in their communities. One participant spoke on the lasting impact of the knowledge gained by membership in these groups, stating:

“I went to a Women in Farming meeting, I think it was in Bartlett years ago. And these ranch people were presenting, and I’ve never forgotten what they said. They said, “We have switched from maximum production to optimum production.” And I thought that was so powerful, because they said they’re making more money, but they let some of their land rest.

Envisioning Prepared and Resilient Futures

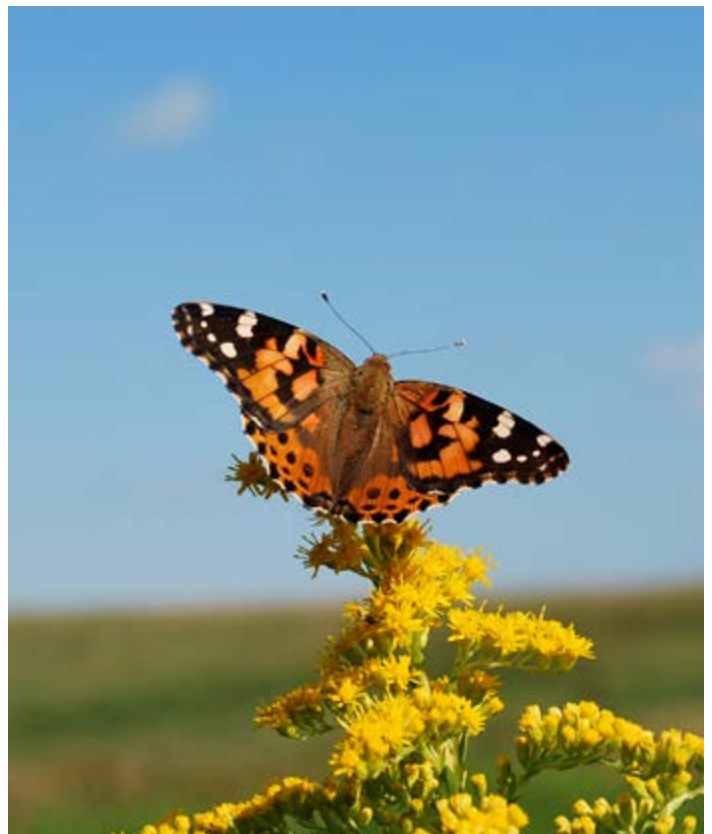
Participants shared their visions for the future, imagining what a prepared and resilient world could look like. Participants mentioned the abundance of wildlife, grassroots change, and the involvement of young people in the agricultural sector as cornerstones of a prosperous rural America. Participants also indicated that their vision for the future includes the safety, security, and prosperity of animals and wildlife, illustrating another long-term goal of biodiversity. One participant described their vision as follows:

“I’m hoping to be not driving the operations here at the farm anymore. I hope to be supporting another younger person or group of young people that are here. And so, my vision for those youngsters would be that there’s just abundance. Abundance of everything, the abundance of water and pasture and the milk pails are nice and full because all the goats are happy, and their pastures are lush, and their nutritional needs are being met through what we grow here in the soil. And so, production is high, and all the animals are really healthy and thriving.

Barriers to Progress Towards Preparedness and Resilience

Barriers such as the scale of change needed and financial, knowledge, and resource gaps were identified as preventing preparedness action. Participants mentioned that the financial, governmental, and educational resources needed to adequately confront changes in extreme weather and their impacts on agriculture are immense and interrelated, leading some to feel overwhelmed. One person elaborated:

“I just think the needs and the resources are so many. I’m working on water systems and water quality. I’m working on soil health. I’m working on how we bring pollinators back. How do we bring the bird community back? What is the wildlife community that is beneficial to the farm? So, I mean, just the resources around all those things. How do you work at soil health and water health and habitat, and what are the plant species that are going to contribute to those things? It just feels like the resources that are needed are so vast.



Impact and Accomplishments

Our team has only been funded for two years, but we have begun to develop impactful strategies for farmland owners and Tribal nations in the region that build local resilience and preparedness.

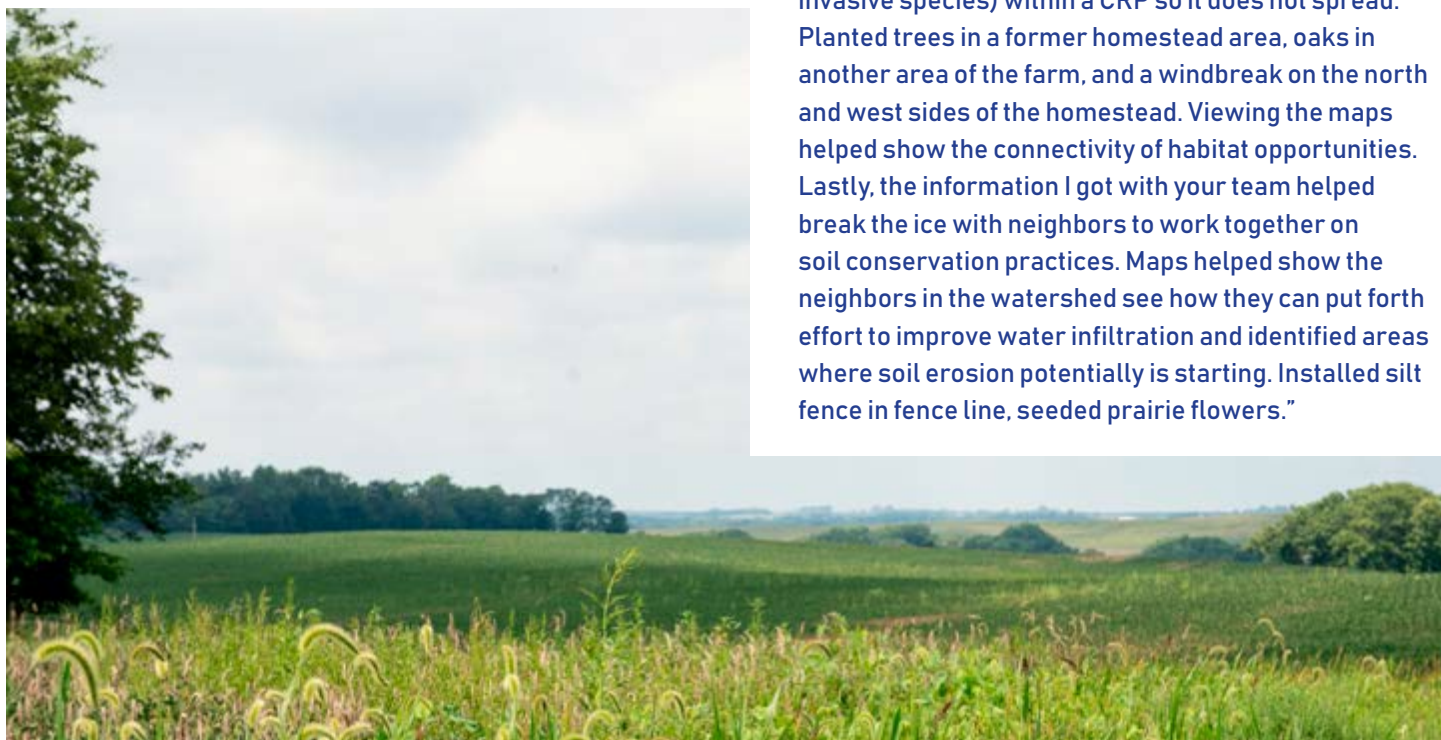
ENHANCING CONSERVATION

We expanded our team's tools to support the capacity of landowners to work with their tenants and government offices to implement practices on nearly 700 acres of farmland that reduce soil erosion and improve soil quality. Using the GIS-based tool called the Agricultural Conservation Planning Framework (ACPF), we collaborated with landowners and their tenants, providing them with not only maps of their land with suggested new practices but also information that preserve profitability and farming efficiency. According to the landowners themselves,

“The ACPF project helped me better understand some alternative ways of looking at conservation we can do – cover crops in just waterways or maybe sidehills, using prairie strips and terraces, and looking for other sources to educate myself.”

“The project and session encouraged us to pursue sap testing of the corn and soybean plants to see what additional changes we could make that might help maximize the crop yield. What also came out of the session was a greater focus on collaboration—not only between our family and our tenant but also with neighboring farmers. We already work together with our tenant very well, and the session provided more mid-season reasons to talk about farming and in the action steps we took afterwards, we reached out to three more nearby farmers to discuss how they are diversifying their practices to make their land more resilient to changing weather.”

“[We] rebuilt grassed waterway that had been washed out. The views of the maps showed how critical that one really is to the function of the rest of the farm. Also working on getting rid of Reed Canary Grass (an invasive species) within a CRP so it does not spread. Planted trees in a former homestead area, oaks in another area of the farm, and a windbreak on the north and west sides of the homestead. Viewing the maps helped show the connectivity of habitat opportunities. Lastly, the information I got with your team helped break the ice with neighbors to work together on soil conservation practices. Maps helped show the neighbors in the watershed see how they can put forth effort to improve water infiltration and identified areas where soil erosion potentially is starting. Installed silt fence in fence line, seeded prairie flowers.”



Impact and Accomplishments



TOP

The final Ecological Calendar developed by the 2024 Stories of the Seasons Cohort, including banner art created for the project by artist Caylin Jade

MIDDLE

An annotated draft of the Ecological Calendar

BOTTOM

Participants organize images of seasonal indicators and include additional input using post-it notes on the ecological calendar draft during in-person gathering

STORIES OF THE SEASONS

We co-developed a new program and set of strategies for supporting adaptation for farmers and landowners who are navigating changing weather patterns (such as more intense spring rains) that affect the times and viability of their agriculture-related practices. In collaboration with our community partners, we created a year-long, multi-session program that used storytelling around seasonality to leverage collective knowledge among landowners, producers, and researchers around how to align connections among seasonal indicators with timing of agricultural practices. As part of the program, each community participant had the opportunity to conduct an individual action project, and the entire group co-created an art-based ecological calendar (see top image). The ecological calendar integrates observed seasonal indicators and weather events alongside agricultural decision-making. The action projects that the landowners and producers completed as a result of this program included seeding cover crops, organic garden and prairie strip installation, native prairie ecosystem restoration, rehabilitating a native oak savanna ecosystem, increasing pollinator habitat, community building with a neighboring farming family, and arts-based outreach activities (stamp-making with natural dyes, portraying keystone species), performing arts piece development (spoken-word poetry and accompanying choreography), and the visual renderings of native Iowa wildlife included as the banner on the ecological calendar.

“The meetings of our Stories of the Season cohort group helped me become much more observant about signs of the seasons. The leaders of the group were very encouraging about being creative for whatever made sense in my situation. These two things together helped the idea emerge of nurturing community with new neighbors around good stewardship, including helping the kids learn about native pollinators, native plants and growing foods with organic methods.”

“Being in this community and having these conversations and learning what indicators other people are paying attention to, I would theorize that we collectively are increasing our capacity for awareness and our sensitivity to, the natural world and to all these kinds of layers of things that require attunement. ...So I would just say, I see a collective consciousness expanding here in these conversations that we’re having. I think that’s super valuable.”

Our team has leveraged this work to secure additional project support from Iowa State University, and the program coordinators are receiving invitations to facilitate this type of work in other community groups in Iowa, at a local library, and as part of a national webinar on partnerships.

Impact and Accomplishments



DATA INFRASTRUCTURE ON TRIBAL LAND

Improvement of environmental monitoring for Tribal Nations is an area of focus of the COLEARN and Community Action Projects. This is a long-standing identified gap in information needed for decision-making and fostering a sense of agency. These projects focused on the design and installation of equipment suitable for local needs, data archiving, data summary development, and educational outreach. Work has been performed in collaboration with established tribal and non-tribal partners (such as the National Weather Service). Products include summaries of local observations presented in lay language. Currently, 42 interested parties receive monthly reports, which incorporate Native language. As related by a Tribal Land Management Office, “the reports are read each month and provide helpful information as to environmental conditions on the reservation.” Due to these efforts in Santee, the Ponca Tribe has requested installation of similar monitoring equipment and infrastructure.

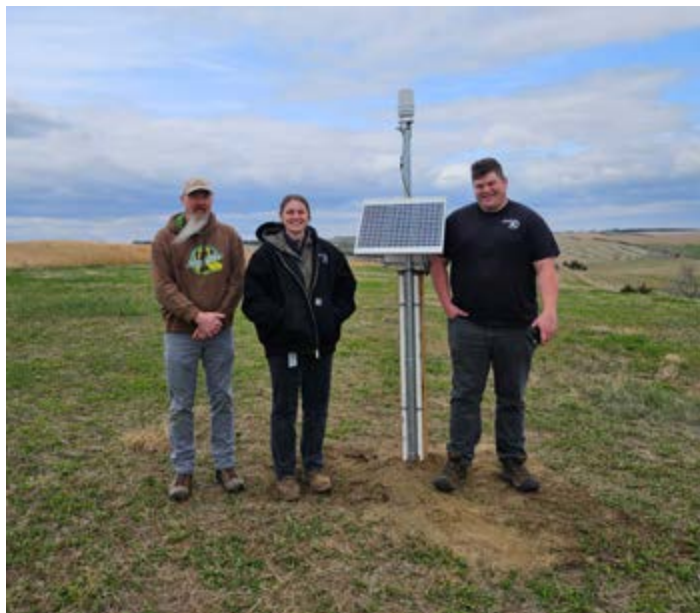
These environmental monitoring projects include education and outreach, which has centered on student research opportunities, curriculum enhancements and a deeper understanding of weather conditions for the communities. Our team has leveraged this work to obtain funding from the National Aeronautics and Space Administration (NASA) and the U.S. Department of Agriculture (USDA) to further increase community preparedness. Five courses at Nebraska Indian Community College now utilize monitoring information from the weather station. Furthermore, survey results from a community-based educational webinar delivered in February 2025 found a significant improvement in knowledge for participants. It was helpful for personal and professional growth to “Increase understanding of local patterns” and have “Better preparedness for weather and drought situations.”

TOP

Nebraska Indian Community College (NICC) student of the year Rosalind Grant (UmoNhoN, Winnebago) installs weather station on Santee Sioux Nation land and NICC campus.

BOTTOM

A weather station, called Unáštą ábatè wí’ in the Ponca language, being installed on Ponca Tribe of Nebraska buffalo grazing lands. Pictured from left to right, Stonie Cooper (UCAR), Kayla Vondracek (Ponca Tribe of Nebraska), and Cody Barta (Ponca Tribe of Nebraska).



Looking Ahead

In the coming year, the COLEARN team will continue to build relationships across the region to enhance local resilience. We will also expand regional data collection to understand extreme weather needs and preparedness and have several upcoming projects planned.

We know there is a need for better environmental monitoring for planning on Tribal Lands in our region. Our team will develop flood inundation maps for Tribal Nations in our region to identify risk and vulnerability and assist with hazard plan development. These maps will be based on outputs of the Hillslope-Link Model (HLM), which will then be converted to flood inundation maps with a resolution of at least 30 meters. Results will be provided for different return periods (e.g., 10-year, 100-year, 500-year). In addition, we will continue to work with Tribes in our region to install additional weather monitoring infrastructure on Tribal Land.

We have convened a team of researchers to help us expand the utility of the Agricultural Conservation Planning Framework (ACPF). Participants in our current projects have noted that the ACPF provides excellent historical land use data. However, they have identified a need to adapt the tool to include additional weather-related data that will advance conservation decision making and support more prosperous agricultural production.

Drawing from the content of the Community Action Projects, brainstorming sessions at community and scientific meetings, and the early focus group results, we have identified the following portfolio areas for future research:

- Agricultural Conservation Practices
- Environmental Monitoring and Data Sovereignty
- Adaptation Planning
- Food Systems and Sovereignty
- Policy and Advocacy

These portfolios will guide COLEARN's future research initiatives, outreach, and engagement across our region.



Project Team

LEAD PRINCIPAL INVESTIGATORS

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Martha Durr, Nebraska Indian Community College
Linda Shenk, Iowa State University
Gabriele Villarini, Princeton University

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Angelina Magerl, Center for Rural Affairs
Emily Rountree, NOAA/Mid-American Regional Council
Jennifer Studebaker, Women, Food and Agriculture Network
Dennis Today, USDA Midwest Climate Hub
Roger Trudell, Santee Sioux Nation

SCIENCE TEAM

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- **Antonio Arenas**, Department of Civil 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

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- **Joshua Roundy**, Civil, Architectural, and Environmental Engineering

UNIVERSITY OF IOWA

- **Ellen Carman**, Iowa Flood Center
- **Kate Giannini**, IIHR Hydrosience and Engineering
- **Ted Neal**, College of Education
- **Laurie Nowatzke**, Department of Occupational and Environmental Health
- **Felipe Quintero Duque**, Iowa Flood Center
- **Blake Rupe**, Hubbel Environmental Law Initiative
- **Breanna Shea**, Iowa Flood Center
- **Larry Weber**, IIHR Hydrosience and Engineering

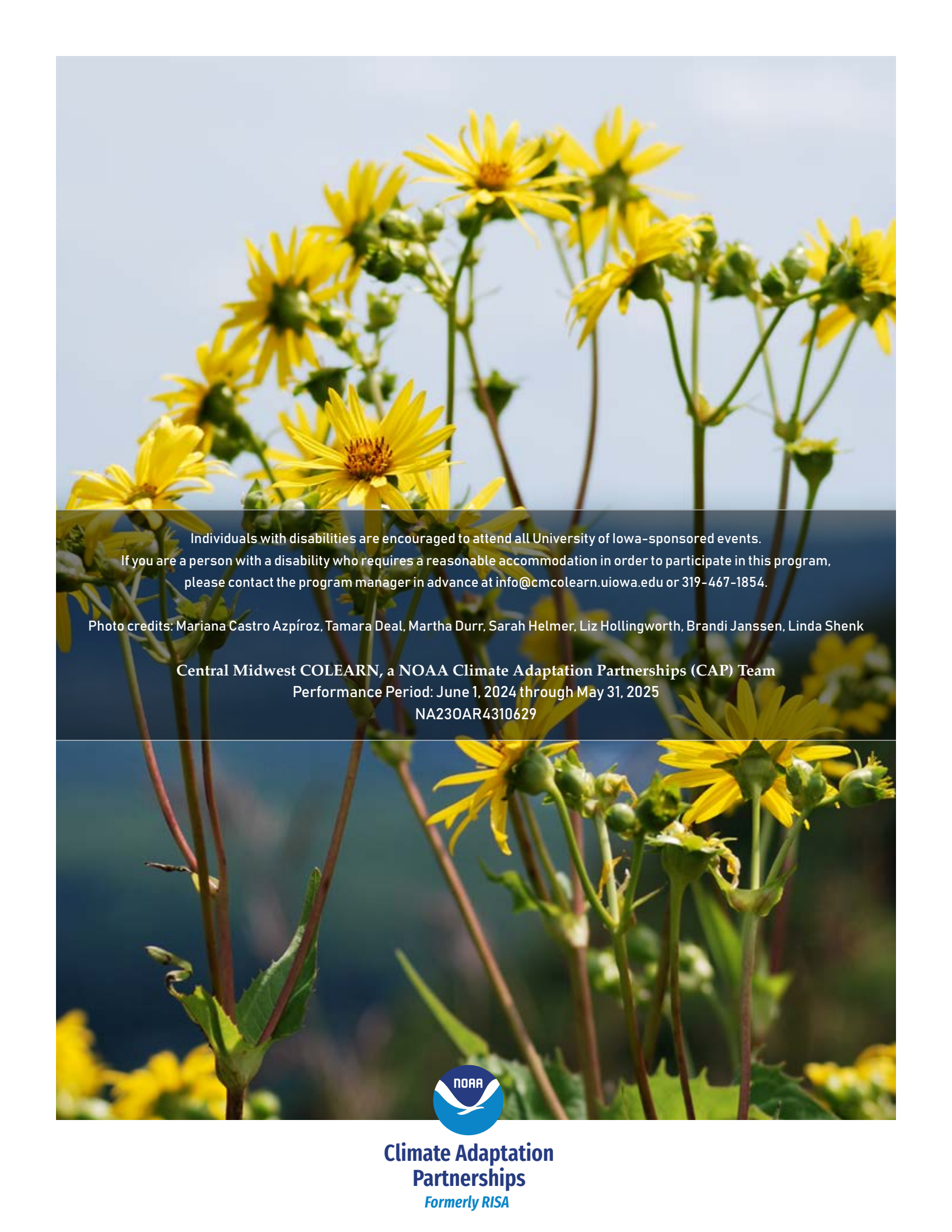
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- **Trenton Franz**, School of Natural Resources
- **Aemal Khattak**, Department of Civil and Environmental Engineering
- **Michael Hayes**, School of Natural Resources
- **Tirthankar Roy**, Department of Civil and Environmental Engineering

Presentations and Publications

Our multidisciplinary team contributes to the scientific literature on community resilience and regularly gives presentations at scientific conferences and public meetings.

- Durr, M. (2024) Panel Presentation: "Creating an Equitable Climate Landscape: The role of land-grants, extension, and multi-state collaboration." Climate, Water, and Equity Workshop. Minneapolis, MN
- Durr M., Murie-Mazariegos M., Haque M., Kosola S., Snake L., Miller H. (2025) Measurable and Meaningful: Toward Indigenous FEWS at Nebraska Indian Community College. Tribal College Journal of American Indian Higher Education Volume 36, No 3 – Spring 2025
- Durr, M. (2025) Environmental Health Takes Root at Nebraska Indian Community College. Native Resilience Working Group, virtual presentation.
- Fisel B.J., Garbers S.J., Haar D., Zoerner M.M. and Gutowski W.J. (2024) Object-oriented analysis as a foundation for building climate storylines of compounding short-term drought and crop heat stress. *Frontiers in Climate*, 6:1357391. <https://doi.org/10.3389/fclim.2024.1357391>
- Gutowski, W.J. (2024) "Modeling Climate & Its Change." Department of Physics, Grinnell College. Grinnell, IA.
- Gutowski, W., Fisel, B., Ellingworth, A., Erickson, N., Linde, E., Todesco, C. and Shenk, L. (2024) Invited Lecture: Stakeholder-motivated Analyses for Building Probabilistic Climate Storylines. HyperFACETS Project Spotlight Session, virtual presentation.
- Gutowski, W. J., Fisel, B.J., and Shenk, L. (2024) Invited Keynote: Decision-Relevant Climate Storylines for Societal Partnerships & Climate Resilience. Scientific Forum for Numerical Simulation of Asian Regional Climate Change and Earth System Process, Nanjing University.
- Janssen, B. (2024) Invited Keynote. "Upstream Thinking: Rebuilding the Commons for Water Quality and Health." Iowa Water Conference. Coralville, IA.
- Janssen, B. (2024) Panel Discussion. "Heat and Climate Change: Science and Health Impacts Panel." Workers on the Frontlines of a Hotter Planet: 2025 Iowa Labor and Climate Conference, Iowa City, IA.
- Janssen, B., Rountree, E., Severin, J. (2025) Panel Discussion. "New Centers Supporting Frontline Community Climate Resilience and Equity in the Heartland," Midwest Climate Summit, Madison, WI.
- Janssen, B. (2025) Panel Discussion. "Community Based Participatory Research Webinar," International Society of Environmental Epidemiologists, North American Chapter, virtual.
- Shenk, L. (2024) Distinguished Lecture. Climate, Communities, and Collaborative Action: Lessons from Shakespeare's Theater. College of Liberal Arts Dean's Distinguished Lecture Series. Ames, IA.
- Shenk, L. & H. Bensen (undergraduate researcher). (2024) "When They Don't Drive the Tractor, Have Them Drive the Story: Engaging Women Landowners in Regenerative Ag Through Storytelling-based Programming." Growing Outreach Conference: Leveraging Social and Behavioral Sciences in Agricultural Sustainability Efforts. National Wildlife Federation. Madison, WI.
- Shenk, L. Eells, J., Gutowski, W., Franz, K., and D. Robinson (2025) Conceptualizing co-produced climate research as care: Practical lessons learned with women farmland-owners in the Central Midwest US. *Climate Resilience and Sustainability*, 4:e70005. <https://doi.org/10.1002/cli2.70005.2>
- Shenk, L. (2025) Creating cognitive ecologies: Shakespeare's collaborative storytelling and climate resilience. In *Strategic Shakespeares: Transformative Leadership for the Future of Higher Education*. Eds. A. M. Balizet, N. K. Eschenbaum, and M. Kostihova. New York: Routledge. pp. 179–186
- Shenk, L., Durr, M., Gutowski, W., Community partner Van Meter, C., and undergraduate student Grant, R. (2025) Fostering Climate Resilience, Together, Iowa City Foreign Relations Council. Iowa City, IA.

A close-up photograph of several bright yellow flowers with dark brown centers, growing on green stems. The background is a clear blue sky. The flowers are in various stages of bloom, with some fully open and others as buds.

Individuals with disabilities are encouraged to attend all University of Iowa-sponsored events.
If you are a person with a disability who requires a reasonable accommodation in order to participate in this program,
please contact the program manager in advance at info@cmcolearn.uiowa.edu or 319-467-1854.

Photo credits: Mariana Castro Azpíroz, Tamara Deal, Martha Durr, Sarah Helmer, Liz Hollingworth, Brandi Janssen, Linda Shenk

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