

## Midwest Climate Education Research Coordination Network

### Introduction

If the twelve states that comprise the Midwest were a country, they would be the fifth-largest greenhouse gas emitting nation on the planet. Yet on average, Midwest states lag behind the rest of the country on energy efficiency, decarbonization of the electric sector, transportation electrification, and green building. At the same time, the Midwest is home to states, cities, businesses, and institutions that are national climate leaders and can serve as models and partners for other Midwest entities to increase ambition and action.

The Midwest has the potential to play an outsized role in the coming critical decade by lowering emissions, creating a thriving green economy, and ensuring a just and equitable transition that does not leave any of our rural, suburban, urban, and indigenous communities behind. **One component of success will be climate education that is inclusive and interdisciplinary, that promotes broad understanding and facilitates effective communication, yet supports focused skill development for the next generation of climate leaders.**

In Fall 2020, the Midwest Climate Summit launched with over twenty leading higher education institutions, local governments, non-profits, and private sector organizations coming together in think tank sessions to focus specifically on midwestern climate challenges and how to develop a coherent response to the climate crisis through acceleration of climate action, knowledge, and leader development. Four tracks of inquiry were pursued in the think tank sessions, including teaching and education.

The Think Tank's Teaching and Education track identified the need to incorporate and consider interdisciplinarity, equity, and climate workforce needs in course and curriculum development. Carrying this forward, the MCC defined the following needs that include:

- developing an educator Community of Practice (CoP);
- developing an understanding of existing curricula across academic partners;
- creating a knowledge repository;
- sharing best practices for community-engaged courses; and,
- providing opportunity and collaborative space for discussion of relevant topics including core competencies.

From these needs four strategic goals and an implementation plan were identified.

- establishing a Community of Practice and associated face-to-face and virtual learning/ collaboration spaces and knowledge repository;
- developing capacity for Midwest specific climate learning through curriculum development on central topics such as drought, heat, and floods, as well as business innovation and empowering vulnerable populations;
- increasing access to high quality, equitable information literacy and climate learning for all students; and,
- strengthening and expanding interdisciplinary climate programs at member institutions.

## Strategy

To move forward this agenda in an integrated manner, we propose a **two-part strategy**. First, two foundational workshops will simultaneously:

- establish an initial CoP bringing together interested educators from the MCC;
- place the first content into a knowledge repository including descriptions of community engaged courses; and,
- refine our understanding of specific needs and interests for more in-depth work on Midwest -specific climate learning.

Second, building on this foundation, we will:

- implement a multi-year series of activities that deepen the work of the CoP;
- expand the contents of the knowledge repository; and,
- strengthen capacity for Midwest-specific climate education that is inclusive and interdisciplinary.

### Part 1: Foundational Workshops

Building on discussions at the 2020 [Midwest Climate Summit](#) think tank sessions, the foundational workshops will focus on:

- *Climate Education Across the Curriculum*
- *From Campus to Community: Educating Today's Climate Experts*

These workshops will provide a forum for sharing and discussion in two critical areas as we envision climate education embedded across and within the curriculum:

1. creating climate science literacy for all in the upper Midwest, and
2. developing the workforce needed to address the impacts and opportunities arising from climate change in the upper Midwest in ways that serve all of our residents.

These initial workshops will focus on building common ground around goals, central themes, educational experiences while identifying the areas where further work by the CoP would enhance success and build capacity.

Several values and assumptions have been established by the MC Summit leadership and are foundational to the activities of these workshops.

1. Our educational efforts are Midwest-specific and focus on the needs and opportunities in this region. Strengthening capacity to teach topics of regional relevance, Midwest storylines, and place-based teaching are important parts of our work. The development and use of science is deeply connected to the system of communication, collaboration, and education informed by individual and community experiences, cultures, identities and more.
2. There is an urgent need to make climate education in this region equitable and inclusive which requires attention in how we teach, what we teach, and who we teach.

3. Teaching and learning from indigenous knowledge and developing effective climate communication and co-production strategies will enable the Midwest to break the pockets of climate action resistance and fully embrace its potential as a model for mitigation and adaptation strategies.
4. Climate solutions require interdisciplinary collaboration and draw on expertise from across the full breadth of the academic community. Thus, climate education is interdisciplinary and requires attention to building systems thinking and interdisciplinary problem-solving capabilities. Learning across knowledge boundaries is an imperative.
5. Effective climate education makes use of pedagogic practices that are research-based, active and inclusive.
6. Our goal is to create a better future. This requires education that moves beyond developing knowledge to skill in using knowledge to act.

### Workshop 1: Climate Education Across the Curriculum

The first workshop *Climate Education Across the Curriculum* will provide faculty from all disciplines the opportunity to identify and co-produce core competencies for undergraduate climate literacy in the Midwest and discuss the ideas informing these competencies. Guiding questions might include: What are the characteristics of climate competency? What is the role of systems thinking in climate competency? What is working for developing climate competency? What are the barriers? What next steps would make this easier? What are the affordances for developing climate competency in the Midwest? What competencies are needed to identify, understand and support climate action? What are the compelling regional needs? This approach will encourage discussion on competencies such as:

- Systems thinking (across earth and human boundaries)
- Midwest specific content knowledge (drought, flooding, heat, vulnerability)
- Moving from knowledge to action
- Interdisciplinarity
- Equity and justice

### Workshop 2: From Campus to Community: Educating Today's Climate Experts

In the second workshop, *From Campus to Community: Educating Today's Climate Experts*, the CoP will focus on moving from literacy to building the capacity for graduates to work in the field of climate action. This workshop will uncover disciplinary skills and habits that majors need as well as cross-cutting skills needed for boundary spanning work. To facilitate reflection on disciplinary learning guiding questions might include: What are the skills and habits your graduates will need to empower climate transformation? How do these compare to the skills and habits from another discipline? The CoP will reflect on the cross-boundary work needed for transformation: What are the characteristics of co-production partnerships most urgent in the Midwest? How should higher education enable interdisciplinary and cross-sectoral collaboration and research to address issues of climate justice, and sustainability in the Midwest? From these discussions, what are the cross-cutting competencies needed for change?

## Workshop Formats:

Both workshops will last 2 days and be offered in a hybrid format involving 30 face-to-face participants and up to 60 virtual participants. They will be structured to promote peer learning, discussion, syntheses, and community formation. Two outcomes will be central to the design:

1. creating a shared understanding of the issue, the breadth of approaches currently being implemented, and the characteristics of a desired future, and
2. developing priorities for future work that would move forward the CoP in implementing the desired future.

As preparation for the workshop, participants will submit:

1. short essays envisioning Midwest climate education of the future
2. descriptions of programs, courses, and teaching activities that demonstrate current practice.

At the workshop, in addition to discussions and sharing, participants will create syntheses that can bring the workshop outcomes, including the envisioned future, to educators in institutions throughout the Midwest. These three elements: essays, examples, and syntheses will form the initial contents of the knowledge repository. In addition, a full record of the workshops including presentations will be maintained as part of the repository.

## Part 2: Follow on activities

Based on the needs and interests established at the foundational workshops, we envision developing a series of face-to-face and virtual activities that will build capacity for Midwest climate education and contribute to the knowledge repository while deepening and expanding the CoP. While the details of these activities will be based on the outcomes of the workshops, they might include:

- Topical workshops in a mixture of virtual and hybrid forms
- Virtual skill building workshops
- Virtual or regional learning groups (journal clubs, speaker series, teaching circle)
- Traveling workshops that can be implemented on a specific campus or in a region

Our model is to provide a variety of ongoing activities that will draw a robust group of participants. While participation in longer lasting or repeating events (e.g. teaching circle, journal club, regional group) will create small, deep communities of practice, overlap among participants in different events will create a networked community with distributed capacity for problem solving and action.

## Budget

Phase 1 Approximate budget - \$150,000 (total) - 1 year

Phase 2 Approximate Budget - \$340,000 (total) - 2 year

## Attachment 1: Leadership Team

### Core Faculty

The leadership team includes four core faculty. **Cathy Manduca is the Director of the Science Education Resource Center (SERC) at Carleton College.** In that capacity, she works to improve education, guiding projects to completion and developing new directions, supporting communities of educators in learning together and collaborating to create resources. Dr. Manduca's research focuses on understanding faculty learning and the impact of professional networks on educational practice.

**Beth Martin is a Teaching Professor in Environmental Studies and the Interim Director of the Climate Change Program at Washington University in St. Louis.** She teaches courses at the intersection of science, engineering, and policy and has extensive experience in creating and teaching community engaged and interdisciplinary courses. As the Interim Director of the Climate Change Program, Professor Martin leads a faculty steering committee as they advance climate action through focus on research, curriculum, and outreach.

**Sarah Fortner is a Science Associate with SERC at Carleton College.** Her focus is advancing equity and justice through systems approaches to education, research, & community engagement. Dr. Fortner was previously the director of the Environmental Science at Wittenberg University, leading research and program development focused on community science, K-12 pathways, and environmental advocacy, creating boundary spanning collaborations that link students, faculty, local organizations, and frontline communities together to coproduce knowledge advancing climate resilience planning and environmental justice outcomes.

**Kelly Eskew is a Clinical Professor of Business Law and Ethics at the Kelley School of Business at Indiana University-Bloomington.** Her teaching is focused on business sustainability in the “triple bottom line” context, renewable energy and climate, the role of private enterprise in poverty alleviation, and business and human rights. Her courses include service learning, or micro-consulting, with private and public sector organizations, as well as innovative business plan development.

Professors Martin and Eskew are members of the Midwest Climate Summit Steering Committee and the planning committee for the evolving Midwest Climate “collaborative”. They served as co-chairs of the Midwest Climate Summit’s Teaching and Education track in Fall 2020.

### Core Faculty Roles and Responsibilities

The core faculty will share responsibility and work together to plan the opening workshops. Through this process, core faculty will continue to build on a shared vision for development of the CoP and the content of the knowledge repository. Together, they will debrief on workshop themes and outcomes to identify focused follow-on activities, all from their diverse competencies and experiences. The SERC staff will support implementation through the first year and the initial two workshops.

Follow-on work will shift to a “divide and conquer” model with each of the core faculty identifying the activities and themes with which she is best aligned, e.g., classroom teaching; community-engaged learning; science, engineering, business, and law. By creating a diversity of offerings, the CoP will have the ability to

choose those topics and forms of engagement that best meet their interests and needs. These smaller events may take advantage of our learned comfort with virtual experiences but also develop even more localized groups that meet together and can serve to strengthen campus-based or city-based connections. Thus, follow-on work can build both skill-based and community-based networks.

## Attachment 2: Collaboration with the Science Education Resource Center at Carleton College (SERC)

Our proposed vision of an integrated CoP and knowledge repository requires both technical infrastructure and a design process that integrates CoP formation with the collection and creation of high quality, high utility resources for the repository. SERC has been engaged in this work for the past 20 years creating high functioning, long lasting communities in undergraduate geoscience education and interdisciplinary teaching about the Earth in the context of societal issues and providing technical infrastructure for communities in areas as diverse as Course based undergraduate research projects in biology and systemic change in higher education.

A critical aspect of SERC's approach is the integration of CoP forming activities (face-to-face and virtual) with the generation of repository content. This strategy has generated one of the world's largest collections of online resources for undergraduate teaching including more than 30,000 pages of content, nearly 6,000 teaching activities, and hundreds of course and program descriptions. These resources are visited by more than 5 million unique users annually. Manduca and Fortner bring to the leadership team experience with this design strategy.

Underpinning this work is Serckit, the content management system (CMS) developed and maintained by SERC. This system supports distributed authoring of online resources by individuals and groups that are seamlessly integrated in sites with robust navigation, an integrated look and feel, and robust capacity for customized metadata driven search of resource collections. Further it has been tuned through extended use to effectively support virtual and face-to-face activities including conferences and workshops, working groups, materials development teams, visioning exercises, and project leadership teams. It includes private and public spaces and seamless transitions between them.

The system, in continuous operation for 15 years, handles traffic in excess of 30,000 visitors per day and has been used by more than 160 projects including the InTeGrate STEM Talent Expansion Program Center, the Climate Literacy and Energy Education Awareness Network (CLEAN), and the National Association of Geoscience Teachers, all of which share the goal of improved climate education with this project. Serckit's authoring and collaboration tools form a strong foundation for facilitating cross-institutional networks. In addition to explicit support for face-to-face and virtual events, participants can join groups, collaborate around shared work, and learn about other community members with shared interest through Serckit's profile system that automatically documents individuals' contributions and participation. Serckit can facilitate project data collection including online participant reporting summarized via dashboards and a student data collection system that supports secure collection, management, and scoring of both online and paper student assessments.

The system has successfully supported the work of over 4,000 authors from over 1,000 institutions in creating over 40,000 pages of original content, including community contributions of more than 6,000 teaching activities. The system includes over 340,000 lines of original code and has proven to be highly scalable and reliable, comfortably handling traffic in excess of 30,000 visitors per day while maintaining an 'uptime' of over 99.9 percent since its launch in 2003. In aggregate more than 5 million unique users visited Serckit-hosted sites in 2020.

## Attachment 3: MCC Infrastructure

This Midwest Climate Community of Practice sits within the developing Midwest Climate “Collaborative”. Through the think tank, the need for a Midwestern network to support a coherent Midwestern response to the climate crisis was identified and several projects such as the educator community of practice have emerged. A planning committee is working to determine the best network structure to accomplish the mission and to support the emerging projects. High level network goals are:

- Accelerate Climate Solutions
- Shape Public Understanding and Policy
- Leverage the Power of Science & Research
- Develop Climate Leaders
- Develop an effective network/collaborative

### *Midwest Climate “Collaborative” Strategic Projects*

Through the work of the fall Think Tank, several strategic projects have arisen that align with the high-level goals: accelerate climate solutions; shape public understanding and policy; leveraging the power of science and research; develop climate leaders; and develop an effective “collaborative”

#### I. Midwest-wide Climate Research Agenda

A multi-stage process of literature and data review, key stakeholder interviews and surveys, and community engagement that will identify and define immediate and long-term climate priorities for the Midwest. The Agenda aims to synthesize what is already known about climate impacts and solutions in the Midwest; to develop strategies that can inform and accelerate climate mitigation and adaptation in the Midwest during the next 10 years; and to build a network of climate researchers across the Midwest to facilitate research collaboration, research translation, and in so doing, enhance the profile of Midwestern climate experts.

#### II. Asset map and interactive database of Midwestern climate work

In partnership with Second Nature and Climate Action Systems, this project aims to help external and internal audiences easily access, contribute to, and use the information that exists around climate action. The Pilot will launch at WashU. After demonstrating success, the project will be offered to other institutions across the Midwest network. The project utilizes a software system that will facilitate:

- Connections between academic expertise and those seeking information in other sectors such as local communities, governments, NGOs or private industry
- Connections between external and internal researchers
- Identification of opportunities for integrative research within and across institutions
- Identification of climate-related courses, labs or projects for students or faculty within an institution

#### III. Climate Ambassadors program

Being developed in partnership with AAAS/LSEN at both the faculty/professional and graduate student/postdoc level. The Ambassadors program will provide training in science communication and community engagement to increase capacity for partners. Ambassadors will generate and disseminate climate



change information and act as a liaison between the scientific community and other influential thought leaders.

#### IV. Educator Community of Practice

Washington University, Carleton College and Indiana University are developing a structure (workshops and a resource library) for an midwestern educator community of practice that initially focuses on providing a space to more fully develop and continue conversations begun in the Think Tank series. Initial workshops will include campus-wide climate curricular requirements and specific curricular requirements for majors.

#### V. Student focused Midwest Climate and Sustainability Conference

An annual conference that brings together students across the Midwest to discuss and develop climate action.

#### VI. Climate Commitments

As an overarching consideration across projects, and building on the Fall Think Tank, the MCS is working to support and compile **ambitious, science-informed mitigation and adaptation targets** being developed and adopted by Midwestern institutions across sectors.