MONTANA INSTITUTE ON ECOSYSTEMS

Spring 2023 Newsletter

Spring Events

Rough Cut Science

February 15- Dr. Andrew Felton, presents "Greater Than the Sum of Their Parts: the Necessity and Complexity of Collaboration Across Disciplines."

March 1- Dr. Cascade Tuholske, presents, "From Surveys to Pixels: Fostering Actionable, Interdisciplinary Research Synergies in the Age of Climate Change."

March 22- PIs of successful proposals from the IoE Research Development Initiatives Solicitation will give an overview of their project.

March 29- Dr. Paul Bradley, Research Hydrologist with USGS presents, "National Drinking Water Exposome Research: USGS-Community Partnership Studies."

April 12- Dr. Justine Becker, presents "Interdisciplinary Approaches to Understanding Wildlife-Habitat Relationships."

April 26- Dr. Andrew Hansen, MSU IoE director, presents the MSU IoE Year in Review.

Please join us in Byker Audtiorium or via WebEx from 12-1 PM. To view the complete agenda for the Rough Cut Seminar Series, visit www.montanaioe.org/roughcut

April 19- IoE IDEA Exchange. Please join us at 10 AM for coffee, treats and a low-key discussion led by Dr. Ryan Thum in LJH 617. The goal is to stimulate new ideas and research and secure research funding and science products.

Communications

IoE Research Development Initiative Solicitation Recipients

The MSU IoE aims to accelerate the impact and success of interdisciplinary research in environmental science. To that end, the MSU IoE will provide meaningful support for interdisciplinary environmental research initiatives for 2023-2025, the themes being New Directions in Interdisciplinary Environmental Sciences and the Greater Yellowstone Ecosystem. Many outstanding proposals from faculty across a wide range of expertise areas were submitted. The projects selected for funding (as determined by the solicitation review committee) are outlined below.

PI: Dr. Andrew Felton
Title: *Ecological Implications of Bison Reintroduction in the Northern Great Plains*

Ongoing bison reintroductions across the North Great Plains (NGP) provide a unique opportunity to advance basic understanding of their role in these ecosystems and to inform conservation and restoration efforts. While bison reintroductions are assumed to achieve a suite of ecological objectives,

most of the proposed mechanisms by which bison enhance and sustain ecosystem function remain untested. The project's goal is to consider how the re-establishment of large bison herds influences ecosystem dynamics across the NGP. The researchers have proposed the development of important pilot datasets, analyses, and groundwork with key collaborators focused on better understanding the ecological implications of bison reintroduction across the NGP.

PI: Dr. Wyatt Cross
Title: *Toward Balancing Water for Irrigation and River Ecosystems in the Face of Increasing Climate Uncertainty*

A grand challenge in water resource science is the development of integrated models and tools that adequately represent the convergence of water demands for agriculture and ecosystems, thus helping to maximize the use of water supplies while minimizing conflict among users. The team aims to address the challenges of understanding socioeconomic drivers of water use and river flow depletion and understanding how flow timing and magnitude influence river ecosystem health. They will address these challenges by integrating aspects of hydrology, farm socioeconomics, and river ecosystem ecology to understand and quantify tradeoffs between water for agriculture and river ecosystems.

PI: Dr. Adam Sigler, Dr. Mari Eggers, & Dr. Michelle Grocke-Dewey
Title: *Uncovering and Addressing Environmental Health Risks Associated with Montana Groundwater*

This project aims to characterize the extent of and mitigation options for poor groundwater quality in Montana, to create a public health campaign to reduce environmental health risks associated with water use from private wells, and to increase understanding of and interest in local water quality by leveraging concern about the water individuals and their families are consuming. The researchers will utilize existing water quality data and collect preliminary behavior change data, engage community members via a pilot water testing clinic, form technical assistance and community advisory boards, and develop a plan to employ community-engaged research methods to translate research findings into public health action.

Communications and Publications

2023 Glacier Bay Year with the Tidelines Institute

Urgent! Application period ends March 1!

The Glacier Bay Year brings six students ages 18-24 into an immersive educational experience in the heart of Southeast Alaska.

Students will live, study, and work together from June 14-November 11 of 2023 as they consider how to be better leaders, community members, and citizens of the world. Students will explore mossy old-growth forest, paddle through icy fjords, and climb the rugged alpine summits of Glacier Bay National Park and the Tongass National Forest. Students may choose to register for college credit. Visit Tidelines Institute to learn more and apply.

Montana State University College of Letters and Science Cohort Hiring Initiative

MSU's College of Letters and Science is seeking five tenure track faculty members across CLS departments (including Earth Sciences and Ecology) with a demonstrated record of or potential for scholarly activity that promotes the wellness of underserved communities and whose scholarship may speak to rural communities, the environment, community empowerment, community sustainability, health disparities, climate, and teaching pedagogy. For more information visit CLS Cohort Hiring Initiative.

MSU Conservation Geneticist Position

The MSU Ecology Department is hiring for a tenure-track Assistant Professor position. The department is seeking candidates that use genomics to assist the conservation of biological diversity in plants or animals at any level of biological organization from genes to ecosystems.

Selected candidates will be giving research seminars starting Monday, February 27 through March 7.

Visit MSU's Ecology website to view the calendar of events for the seminar schedule and to learn about the candidates.

Recent Publications from IoE Faculty

Declines in body size of sockeye salmon associated with increased competition in the ocean
IoE author: Timothy Cline
Journal: *Proceedings of the Royal Society B*

Prediction of Winter Wheat Using a Novel Two-Dimensional Deep Regression Neural Network Trained via Remote Sensing
IoE author: Bruce Maxwell
Journal: *Sensors*

Advancing the scholarship and practice of stakeholder engagement in working landscapes: a co-produced research agenda
IoE author: Sarah Church and Adam Sigler
Journal: *Socio-Ecological Practice Research*

Research Highlights

The Diverse Corn Belt Project

The Diverse Corn Belt (DCB) is a multi-disciplinary project funded in 2021 by a $10M 5-year grant from USDA's National Institute of Food and Agriculture (NIFA). The project is led by Purdue University with university partners from 17 institutions and government agencies, as well as other organizations across the US Midwest, including the IL Nature Conservancy, Practical Farmers of Iowa, and the Conservation Technology Information Center.

The DCB is an interdisciplinary project exploring agricultural diversity from a variety of perspectives (including soil health, entomology, economics, sociology, policy, and more) and scales (field, landscape, market) to understand the elements necessary to diversify the landscape and create opportunities for resilient agriculture in the US Midwest. The goal of the DCB project is not to transform the landscape in 5 years, but to initiate conversations on visions and framework needed to create that transformation. Our goal is to engage with farmers and other agricultural stakeholders to finding concrete options for diversification and to understand the real-world agronomic, economic, social, infrastructure and policy changes that could make a more diversified Corn Belt viable for future generations.

Dr. Sarah Church (Assistant Professor of Planning and Geography in the Department of Earth Sciences at Montana State University) is part of the social science team working on understanding challenges and constraints that currently make diversification difficult, and the leverage points that could reduce those challenges. She will also be part of a team that will be working on scenario development.

The DCB project emphasizes co-creation, a collaborative process built on ideas contributed by a range of stakeholders. Farmers and other stakeholders engaged in Diverse Corn Belt project discussions participate directly in developing the question, process and vision of what a diversified Corn Belt could look like. Concrete steps toward diversification have the potential to create thriving economic activity in rural Midwestern communities, attracting the next generation back to farms and rural communities with new energy and diverse perspectives. The processes we use and the lessons we learn could also translate to farming and ranching in Montana.

Stay tuned for more and check out the DCB website for more information: https://diversecornbelt.org/

New Faculty Spotlight

Dr. Cascade Tuholske

How did you end up at MSU?

I got incredibly lucky! I grew up in Missoula and always dreamed of coming home to Montana to work on climate change. But I never imagined that an academic job would appear in Montana when I started my PhD at the University of California, Santa Barbara, much less an Asst. Prof. in Human-Environment Geography position at MSU. Oddly enough, when I applied, I had just moved to New York City from Missoula, where I had been doing a postdoc at Columbia University remotely since the start of the pandemic. The stars aligned, and I am grateful to be home in Montana, working with amazing colleagues, teaching curious students, and getting outside as often as I can.

What are your current research topics of interest?

Broadly, I am keen to map how demographic change and climate change impacts are converging to target adaptations for vulnerable communities. A project recently funded by NASA, explores the relationship between human-driven land-cover change and increases in humid-heat stress in the Arabian Peninsula. One hypothesis we have is that ground water pumping for agriculture in the rapidly warming and arid Arabian desert is adding moisture to the air that can actually create humid-heat conditions that exceed the limit of human survivability.
I am also increasingly doing work on understanding compound climate hazards: where do humid-heat waves follow or proceed dangerous tropical storms? Who is vulnerable to both extreme heat and bad air pollution? Despite decades of research on climate change, we are just now really learning how climate change is causing cascading hazards for vulnerable peoples.

What led you to study climate change?

Because it is the most pressing challenge humans face today. Climate change teleconnects to nearly every other societal challenge. Structural racism, rural livelihood loss, mental health, nutrition, political polarization – all are being impacted by climate change. We have to adapt if we are going to create a better future for our children. More personally, I was lucky enough to spend my whole childhood exploring Montana's mountains, rivers, lakes, forests and plains. These places are near to my heart and it pains me to watch them change – from snowpack declines to increasing aridity to species decline. As someone fortunate enough to have immense agency and privilege, I can't stand idle. Rather I chose to dedicate my career to tackling the challenges climate change poses, not just to reduce impacts in Montana but for all peoples worldwide.

What do you do in your free time?

I ski. And when the snow melts, I get out on my mountain bike, though I am a total kook on a bike. In graduate school, I also spent far too much time at UCSB's ceramics studio and I hope to get back into pottery here in Bozeman.