



Nelson Institute for  
Environmental Studies  
UNIVERSITY OF WISCONSIN-MADISON

# THE COMMONS

*For alumni and friends of the Nelson Institute for Environmental Studies at the University of Wisconsin-Madison*



## *When the River Runs Dry*

*In Zambia, traditional knowledge mitigates climate change impacts.*

Nelson advises the  
Department of Defense  
Page 4

A new institute supports  
rural communities  
Page 6

Remembering  
Lewis Hanson  
Page 31

## EDITORIAL STAFF

Kevin Berger, Graphic Designer  
Eric Klister, Web Editor  
Chelsea Rademacher, Editor  
Diane Stojanovich, Managing Editor

## STAFF WRITERS

Rachel Carrier  
Anica Graney

## CONTRIBUTORS

Abigail Becker  
Colleen Henegan  
Dea Larsen Converse  
Allyson Mills

## DEAN'S OFFICE

Paul Robbins, Dean, Nelson Institute for Environmental Studies  
Shelly Strom, Assistant to Paul Robbins  
Anna Gade, Associate Dean for Research and Education  
Colleen Godfriaux, Associate Dean for Administration  
Ann Swenson, Associate Dean for Advancement  
Diane Stojanovich, Distinguished Associate Dean for Communications

## CONTACT US

We'd love to hear from you! [Send us](#) feedback or questions about this issue, or share story ideas for future issues.

Nelson Institute for Environmental Studies  
550 Science Hall  
Madison, WI 53706  
[communications@nelson.wisc.edu](mailto:communications@nelson.wisc.edu)



Facebook



Instagram



Twitter



LinkedIn

Stay connected by updating your [contact information](#) or by joining our [LinkedIn group](#).

We're reducing our carbon footprint! We hope you enjoy our digitally published magazine, sent monthly to Nelson alumni, students, and friends.

Cover photo by Colleen Henegan. Zambia, 2022. This photo was selected by the Pulitzer Center for its "[2022: Year in Photos](#)" article.

# INSIDE

## FEATURES

- 2 Campus at Rest**  
Between the fall and spring semesters, campus enjoys a four-week respite from activity.
- 4 Operation Wisconsin Idea**  
Led by the Nelson Institute, UW-Madison and the U.S. Army announced a partnership on environmental issues.
- 6 UW Establishes Rural Partnership Institute**  
Nelson's Center for Climatic Research partners on statewide effort to support rural communities.
- 7 Nelson Embraces the Work Ahead**  
Student body shares their experience through a campus climate survey.
- 8 Creating A Buzz for Mosquito Hill Nature Center**  
UniverCity Year pairs UW students with Outagamie County nature center to boost engagement.
- 10 Adapting to Evolving Climate Challenges in Wisconsin**  
WICCI's Community Sustainability Working Group addresses challenges and shares recommendations.

## FACULTY/STAFF IMPACT

- 12 Hannah Zanowski, Center for Climatic Research**
- 14 Tracey Holloway, Environmental Studies**
- 16 Matthew Ginder-Vogel, Office of Sustainability**

## FRONT AND CENTER

- 17 Center for Ecology and the Environment**
- 18 Director's Cut: Sean Schoville**

## STUDENT SNAPSHOT

- 20 Allyson Mills, Environmental Studies Certificate**
- 24 Colleen Henegan, Environment and Resources**

## ADVANCEMENT

- 31 Remembering Lewis Hanson**
- 32 Introducing the Stephen Born Scholarship**

# FROM THE DEAN

Happy New Year!

I hope you had a fulfilling holiday season and are heading into 2023 with renewed energy. It's been quiet here in Science Hall during break, but students are starting to trickle back to campus as the spring semester approaches. I'm looking forward to another great semester here at the Nelson Institute. This spring, I'll be in the classroom with Rob Beattie and Emily Reynolds introducing our undergrads to "Careers in the Environment" with the help of our many alumni. I'll also be power washing my aging 1947 house, previously owned by the great professor and historian George Mosse, whose name still is attached to the old Humanities building here on Park Street (though, for not much longer!).

Our Nelson faculty and research centers are also gearing up for what I'm sure will be another outstanding term. We already have some exciting new projects on the horizon, which you can read more about in this issue. These projects, and the other stories featured within these pages, all relate to one central theme that the Nelson Institute prides itself on: partnership and collaboration. The Nelson Institute acts as a great connector for the UW–Madison campus: linking students and faculty across schools, colleges, and departments; as well as bridging university expertise to communities across the globe.

On pages four and six, read about two hallmark partnerships that the Nelson Institute is embarking on. First is a partnership with the [Department of Defense](#), where we'll be teaching and

advising on environmental issues that the U.S. Army Civil Affairs regularly faces. Second, our Center for Climatic Research (CCR) is a key partner on a new, nationwide initiative to support [rural communities](#). For our part, CCR will be revitalizing the Wisconsin State Climatology Office, which is housed in the Department of Atmospheric and Oceanic Sciences. I'm thankful for Michael Notaro, Steve Vavrus, and Dan Vimont's leadership on this effort. Tracey Holloway is part of another key partnership here in town; her expertise is helping to advise the [City of Madison](#) on a new air-quality-monitoring project that will create a network of publicly accessible data.

This issue's cover story demonstrates the reach of the Nelson Institute's partnerships. In [southern Zambia](#), environment and resources PhD candidate Colleen Henegan has been researching the impacts of climate change on traditional agriculture. As a Pulitzer Center Reporting Fellow, she's published three pieces that explore how Zambian farmers are adapting in this "climate change hotspot."

Lastly, don't leave without browsing our robust list of [upcoming events and lectures](#). Classes may be on pause, but our community engagement team has been hard at work planning several of our Nelson signature events, including this year's Tales from Planet Earth film screening, Sustainable Success lecture series, and annual Earth Day celebration. Be sure to watch your inbox for more information, coming soon.

What do you want to read about in future issues of *The Commons*? I appreciate your suggestions; please either reach out to [me](#) or our [editorial team](#) with ideas or improvements.

Take care,



**Paul Robbins**  
Dean, Nelson Institute



## Campus at Rest

In the four-week stretch between semesters, the heartbeat of campus slows to a nearly imperceptible rhythm. Activities pause, students return to their hometowns, and faculty and staff blend in among the denizens of Madison as campus buildings are blanketed in a hush of snow. But in just a few short days, the hustle and bustle will return when the spring semester [officially kicks off](#) on Tuesday, Jan. 24.

Photo by Jeff Miller / UW-Madison





SCIENCE HALL

## Operation Wisconsin Idea

*Led by the Nelson Institute, UW–Madison and the U.S. Army announced a partnership on environmental issues.*

From left: Major Angela Smith; Nathan Schulfer, director of the Nelson Institute's international and professional programs; Nelson Institute Dean Paul Robbins; Chancellor Jennifer L. Mnookin; Brigadier General Dean Thompson; Lieutenant Colonel Dale Kooyenga; and Dean Amhaus and Karen Frost of The Water Council at the memorandum of agreement signing on December 14, 2022. Photos by Jason Gohlke / UW-Madison (2)

By Chelsea Rademacher

On Wednesday, Dec. 14, Bascom Hall hosted an intriguing trio: leaders from UW–Madison, the Nelson Institute for Environmental Studies, and the United States Department of Defense (DOD). The group convened to sign a [memorandum of understanding \(MOU\)](#) to launch a new partnership between the UW and the DOD. The partnership will take the form of a two-year pilot program focused on the environmental issues that the U.S. Army Civil Affairs and Psychological Operations Command (Airborne) regularly face.

“Environmental factors often lead to conflict, and conflict often leads to environmental degradation,” Brigadier General Dean Thompson of the U.S. Army’s 353rd Civil Affairs Command said at the signing.

“UW–Madison is the kind of institution with the kind of knowledge that can really help in the reconstruction of those kinds of environments,” Paul Robbins, dean of the Nelson Institute, [told WKOW](#). “We’re totally on board with supporting the larger mission, which is to support people and the environments they live in.” With its inter-

disciplinary leadership and expertise, the Nelson Institute will serve as the campus lead for the partnership.

“UW–Madison’s leadership in environmental studies positions us as an ideal partner for the U.S. Department of Defense,” said Chancellor Mnookin. “Our interdisciplinary environmental research and education, combined with our experience partnering with governments, businesses and communities will assist in addressing the complex environmental problems faced by Civil Affairs personnel.”

The types of support that Nelson and the UW will provide include training materials, workshops, and conferences; analysis and recommendations for environmental projects; and assisting with the integration of proven management practices and technologies.

“This partnership fits perfectly within our work to advance a more environmentally, economically and socially sustainable world through innovation and collaboration,” said Paul Robbins. In his remarks, Robbins also thanked Lieutenant Colonel Dale Kooyenga, a Wisconsin State

Senator who was instrumental in securing funds and connecting the DOD with the Nelson Institute.

Robbins also noted that UW–Madison has a proud history of supporting military efforts, specifically Civil Affairs officers. “It was here, at UW–Madison, that during World War II, a Civil Affairs Training School – or CATS – was established for the purpose of training officers in the key skills necessary for reconstruction and development,” Robbins said. In October 1943, the UW housed 100 officers who took classes in fields deemed critical for Civil Affairs activity. The program lasted

until 1944 when the CATS officers deployed to Europe as the war’s end drew near. Also during World War II, the UW hosted recruits for the Women Accepted for Volunteer Emergency Service (WAVES) program, training women to serve in the Navy as radio operators.

***“This partnership fits perfectly within our work to advance a more environmentally, economically and socially sustainable world through innovation and collaboration.”***

— Paul Robbins

“As befits our mission, Nelson’s job is to catalyze cross-campus work in environment and sustainability that serves the Wisconsin Idea, the communities and peo-

ple of Wisconsin, but also people and their natural environments across the country and around the world,” Robbins concluded. “For all these reasons, we at the Nelson Institute for Environmental Studies are enormously proud to help lead the effort to coordinate training and knowledge support for Civil Affairs military government specialists at UW–Madison.”



Paul Robbins speaks with a photojournalist from WKOW-TV 27 after the signing.



## A History of Collaboration

By Jason Gohlke,  
University Communications

UW–Madison and the Department of Defense (DOD) have a collaborative and ongoing relationship. As far back as World War II, Civil Affairs personnel received training on campus. In 2020-21, the DOD awarded UW–Madison researchers \$54.8 million, 7 percent of \$745 million in annual federal research funds awarded to the university.

UW–Madison was the first academic institution to partner with the Defense POW/MIA Accounting Agency (DPAA) through the University of Wisconsin Missing in Action Recovery and Identification Project (UW MIA RIP). The university is a member of a consortium that allows investigators to apply for limited DOD medical research funds. Also, UW–Madison is one of 22 universities nationwide participating in the DOD-funded Project Global Officer (Project GO), an intensive summer language program for ROTC students.

# UW Establishes Rural Partnerships Institute

*Nelson's Center for Climatic Research partners on statewide effort to support rural communities.*

Photo by Bryce Richter / UW-Madison

By Chelsea Rademacher

The Nelson Institute's [Center for Climatic Research \(CCR\)](#) will be partnering on a new initiative to support Wisconsin's rural communities. With \$9.3 million in funding from the U.S. Department of Agriculture, UW-Madison will establish the [Wisconsin Rural Partnership](#), a combined effort between CCR, the College of Agricultural and Life Sciences (CALs), and the Division of Extension.

The Wisconsin Rural Partnership is part of a larger initiative to support rural communities across the country. Led by U.S. Senator Tammy Baldwin and with funds from the 2022 Agriculture Appropriations Bill, a total of \$28 million is being divided between the UW, [Auburn University](#), and the [University of Vermont](#). Together, the three university's individual work will comprise the Institute for Rural Partnerships.

***"This will essentially put a weather station in everyone's backyard."***

— Dan Vimont

Of the UW's \$9.3 million, CCR has been allocated \$1.3 million to revitalize and expand the [Wisconsin State Climatology Office](#), which is housed in the Department of Atmospheric and Oceanic Sciences but has been unfunded for years.

"We're excited to be able to revitalize the state climatology office," says Michael Notaro, CCR's director. "It will allow that office to serve communities across the state in a more interactive way and by being more in touch with folks. That's the key."

An additional \$3 million of the UW's portion will go to the

creation of the Wisconsin Environmental Mesonet. Mesonets are networks of weather and environmental monitoring stations that provide the public with up-to-date data, including temperature, atmospheric pressure, and even soil moisture.

"Our state has a thin observational network compared to other states. The mesonet will expand our statewide weather data, including soil moisture which is critical for monitoring drought," says Dan Vimont, CCR researcher and professor of atmospheric and oceanic sciences. "This will essentially put a weather station in everyone's backyard."

Wisconsin currently has 14 monitors, but the new funding will bring at least one mesonet station to each of Wisconsin's 72 counties. CCR, CALs, and Extension will work together to roll out and maintain the mesonet, and Nelson affiliate Chris Kucharik will lead its development.

"A much denser network allows us to get up-to-the-minute, real-time weather and soil environmental data that supports the livelihoods of rural farmers, land and water managers, and forestry decision-making," Kucharik [told Wisconsin Public Radio](#).

The UW's proposal for the funding came together relatively quickly, thanks in part to a previously published white paper that Vimont authored in 2020, outlining the need to fund the State Climatology Office and providing recommendations and examples. Now with its total funding, the Wisconsin Rural Partnership will be able to directly support rural communities through outreach efforts, as well as provide sophisticated yet accessible data to benefit the entire state. "I always say, 'That's so Nelson!'" jokes Vimont. "Bringing everyone together to make something more."



# Nelson Embraces the Work Ahead

*Student body shares their experience through a campus climate survey.*

By Diane Stojanovich

Since an initial Campus Climate Survey in the [fall of 2016](#) and a [follow-up in 2021](#), the Nelson Institute has prioritized addressing the experience for its faculty, staff, and students.

Through shared governance, there are now policies seeking to diversify the faculty; the launching of an anti-precarity campaign to improve the lives of graduate students; a framework for undergraduate student input; and a standing committee, the Welcoming and Inclusive Nelson Committee, comprising faculty, staff, and students.

The focus on this work has resulted in favorable findings from both Nelson graduate students and undergraduate students pursuing an environmental studies major when compared to their peers across campus. Nelson graduate students reported their comments/questions being respected in class by faculty or instructors; and being more comfortable approaching their faculty or instructors with questions/concerns. Undergraduate students indicated a feeling of belonging, connectedness to UW–Madison, and they shared the sentiment that their comments/questions were respected in class by faculty or instructors.

“As UW–Madison works to make its campus inclusive, welcoming, and respectful for all students, the Nelson Institute is rethinking undergraduate and graduate student education and attending to the needs of a complex student body,” said Paul Robbins, dean of the Nelson Institute. “We’re making progress but have a long way to go.”

*“We’re making progress but have a long way to go.”*

— Dean Paul Robbins

# Creating A Buzz for Mosquito Hill Nature Center

*Through UniverCity Year, UW students work to bolster the nature center's stream of visitors and revenue.*

During a visit to Outagamie County's Mosquito Hill Nature Center, UW-Madison journalism students toured the grounds. Photos by Abigail Becker (3)

By Abigail Becker, UniverCity Alliance



***“Not only can we learn from working with Outagamie County, but maybe some of our ideas can be picked up by them to make a difference in what they do.”***

— Doug McLeod

On a brisk October afternoon, a group of University of Wisconsin–Madison students set out on three miles of trails winding through Mosquito Hill Nature Center to fully experience the outdoor community resource in Outagamie County.

They traveled about two hours north of Madison to New London, Wisconsin, to learn more about the nature preserve's strategic communication needs, which will inform their work through Evjue Centennial Professor Doug McLeod's Journalism 455: Creative Campaign Messages class. After working on a hypothetical project earlier in the semester, senior Lindsay Pollack said working with Mosquito Hill Nature Center staff heightens the reality of their work.

“Now it's actually a real client,” Pollack said. “We're going to be working in bigger groups and we're going to feel like a mini marketing agency.”

During their day-long visit, the students learned about the history of the [nature center](#), which is part of the Outagamie County Parks System, and existing activities from staff. They toured the indoor educational exhibits in the interpretive building, visited the center's library, and said hello to the turtles. The nature center's outdoor activities include hiking and snowshoe trails (both wooded and prairie), observatory for stargazing, and a natural playscape for children.

The students' time at the center will support the creation of strategic communication materials and a campaign to boost the number of visitors to Mosquito Hill and participation in events that bring in revenue. Mosquito Hill Nature Center naturalist Mike Hibbard said their work is appreciated and will enhance programming and marketing efforts.



Top: From left, Evjue Centennial Professor Doug McLeod, Mosquito Hill Nature Center naturalist Mike Hibbard, and UniverCity Alliance managing director Gavin Luter meet at the nature center. Below: Hibbard speaking to a class of students discussing programming strategy efforts.

In a question-and-answer session with the students, Hibbard outlined issues to address at the center that include drawing more families to Mosquito Hill, developing new programming, and encouraging visitors to participate in events that raise revenue like Honey Sunday and the Harvest Moon Festival.

“Even though marketing is a priority, the day-to-day limits what we can do on that,” Hibbard said. “This helps us tremendously.”

Mosquito Hill Nature Center is working with the UW–Madison students through a partnership with [UniverCity Year \(UCY\)](#), which is the hallmark program of [UniverCity Alliance](#). From 2021–24, [Outagamie County is working with UCY](#) on projects that aim to build a more resilient community, expand opportunity for all residents, and optimize county operations.

In addition to McLeod’s journalism class, three students pursuing a master’s degree in business administration from the Wisconsin School of Business (WSB) are working with Mosquito Hill Nature Center staff to create a sustainable business plan to enhance programs and boost program participation.

“It’s one thing to talk about an interdisciplinary partnership,

but it’s another thing to see the students in different classes off campus interacting with our community partners and each other,” UniverCity Alliance managing director Gavin Luter said. “Visiting Mosquito Hill Nature Center made the project come to life for the students! It also allowed them to learn from our community partners, and from each other, which will result in a stronger deliverable.”

Sarah Scheffler, Heather VanderWielen, and Krista Lauring all chose this project in their business consulting class because of their shared love of the outdoors and desire to work with a local community organization. They are conducting a survey to learn more about who currently visits the nature center and what brings them there.

“It feels like you can really make a difference in the community,” VanderWielen said. “I like the outdoors, and I also used to work in nonprofits, so it’s fun for me to come back to those roots and help out.”

Echoing Pollack, Lauring said partnering with a community organization rather than working with a fabricated situation creates a more meaningful learning experience because they are solving actual problems with real groups.

The two classes will also be working together later in the semester. Student groups in McLeod’s journalism class operate like creative agencies, and they will work with the WSB students as consultants. This mirrors another real world connection.

“It creates this working relationship you might see out in the professional world where research strategy consultants work with people who are specialists in creating messages that are an effective part of strategic communication campaigns,” McLeod said.

As an instructor, McLeod values the ability to take his students outside of the classroom and campus. “In the classroom, we can give them hypothetical clients. We can give them hypothetical scenarios. We can do all the research, but they don’t actually get to get real feedback,” McLeod said. “They don’t operate under the pressure of having a real client with real needs look at their work and give them real feedback.”

In addition to these learning outcomes, the partnership with Outagamie County can foster two-way knowledge sharing. “Not only can we learn from working with Outagamie County,” McLeod said, “but maybe some of our ideas can be picked up by them to make a difference in what they do.”



## Adapting to Evolving Climate Challenges in Wisconsin

*WICCI's Community Sustainability Working Group addresses challenges and shares recommendations.*

More intense and frequent heavy rainfalls, like this weather event in Wisconsin Rapids, affect the stability of Wisconsin's communities and economies. Photo by Anna Haines

By Dea Larsen Converse, Wisconsin Initiative on Climate Change Impacts

Wisconsin's climate is changing and affecting the stability of Wisconsin's communities and economies as well as human health and safety. The recently published report from the [Wisconsin Initiative on Climate Change Impacts \(WICCI\)](#) shows that more hot and muggy weather, more intense and frequent heavy rainfalls, freezing winter rain instead of snow, and deep winter freezes known as polar vortexes are challenging Wisconsin's communities, including environmental resources and activities that are important to Tribal Nations, such as wild rice and subsistence fishing.

Recent extreme weather events throughout Wisconsin have shown the shortcomings of existing infrastructure and disaster relief systems and highlight the need for better access to relevant scientific information to promote climate resiliency in Wisconsin communities. Interviews

included in the 2021 [WICCI Assessment Report](#) illustrate these impacts, such as "[Stories from the Flood](#)," "[Climate Impacts in Northern Wisconsin](#)," and "[Climate Impacts to Cultural Resources](#)."

Comprehensive plans are important tools that can guide communities towards climate resiliency and sustainability by addressing issues such as land use, transit, green energy, and economic development. Creating the plan also provides an opportunity to identify populations vulnerable to climate change impacts and sets the stage for more sustainable development. Plans required by the Federal Emergency Management Agency are also important tools to guide communities and identify at-risk populations, mainly to address flood issues but also to plan for extreme weather events, like extreme heat or cold.

Yet, the capacity to plan and adapt to evolving climate challenges varies widely across the state. Efforts to

provide accurate climate data would help more Wisconsin communities address these challenges and relieve the burden of data assembly that is disproportionately heavy for small, rural, or at-risk communities. Efforts at the state level to allow stretch, or reach, building codes would provide important tools for communities looking to make buildings more energy efficient and reduce greenhouse gas emissions.

The [WICCI Community Sustainability Working Group](#) recommends more funding for planning, research, adaptation education, and climate adaptation grants, and provides planning resources for communities. There is hope for the future, but it's up to us.

***“To become climate resilient, communities need policies and practices that consider long-term perspectives, holistic thinking, and a focus on place, all while supporting active involvement in problem solving.”***

– WICCI Community Sustainability Working Group

**Support WICCI**

The Wisconsin Initiative on Climate Change Impacts (WICCI) is a statewide collaboration of scientists and stakeholders formed as a partnership between UW–Madison’s Nelson Institute for Environmental Studies and the Wisconsin Department of Natural Resources. WICCI’s goals are to evaluate climate change impacts on Wisconsin and foster solutions. Gifts to the [WICCI Program Fund](#) provide general, discretionary program support and enhance and expand WICCI’s teaching, research, and public service roles. Gifts also support partnership-building activities, including faculty, staff, and student recruitment, retention, and morale.

This article is part of a series highlighting the contribution from each WICCI working group for the 2021 WICCI Assessment Report. Next month, read about the Agriculture Working Group.



Photo by Travel Wisconsin

**Community Sustainability Working Group**



**Climate resiliency in city planning**



**Approaches to community sustainability in Milwaukee**



**Barriers and opportunities to build resilient infrastructure**





***“You should wake up every day and thank the ocean that we don’t live in a fiery hellscape.”***

— Hannah Zanowski

## Q & A: Meet Hannah Zanowski

*Grab your wetsuit and take a plunge into polar oceanography.*

Did you know that the ice sheets over the Antarctic and Greenland are so big, they gravitationally attract the ocean to them? Photo by Anya Berkut / iStock

By Rachel Carrier

If you have ever asked yourself the question “What’s really going on in the ocean,” Assistant Professor Hannah Zanowski has the answers for you. Zanowski has studied just about every ocean on Earth and carries her curiosity and fun spirit with her on each of her many journeys.

Originally from the sunny state of Arizona, Zanowski obtained her undergraduate degree not too far from “home” from the University of Arizona in math and physics before moving across the country to get her PhD in atmospheric and oceanic sciences at Princeton University. Following graduation in 2016, Zanowski went on to do some postdoctoral work at the University of Colorado–Boulder and the University of Washington.

When she’s not in the classroom, Zanowski mainly studies the Arctic and Antarctic oceans, giving herself the title of “polar oceanographer.” She has recently been using climate models in attempts to answer broad questions about what will happen in the future or explain past oceanic events. But, as you will come to understand about Zanowski, “I’ve really jumped around in terms of my research; I tend to go down the path of whatever I’m interested in at the moment.”

**What does your research primarily focus on?**

[As a graduate student,] my research was focused on studying the influences of open ocean polynyas on the abyssal ocean circulation. Polynyas are basically these giant holes that open up in wintertime sea ice in the Arctic and Antarctic. I used a bunch of climate models to help

me answer questions about the impacts of various events. I then pivoted to focus on the west Antarctic region and continental shelf, as well as thinking about the equatorial Indian and Pacific oceans.

More recently, I've been doing some work using a few different climate models to understand freshwater in the Arctic as well. I'm working on running simulations where we're looking at polynyas in the Arctic and asking how the hydrography of northern Baffin Bay in Canada evolved as a result of the melting ice sheets and glacial adjustment causing land uplift in the Holocene (the past 10,000 years or so).

This recent research has gotten me more interested in paleoceanography and deep time paleoceanography — when the ocean first formed four billion years ago — and how that potentially relates to the origins of life on Earth.

#### **How did you find your interest in oceanography?**

My first love was astronomy and astrophysics, actually. But I took an oceanography class during my time in undergrad and really liked it. It was a 200-level class that covered topics like atmospheric circulation, ocean circulation, plate tectonics, and other basics of the ocean. I wrote to one of the professors asking if she needed help in her research and ended up being mentored by her and helping her with her research, which was just an amazing experience.

#### **What classes are you currently teaching?**

I teach Computational Methods in Atmospheric and Oceanic Sciences (AOS 573) for graduate students. The class focuses on teaching Python for earth science research. Next semester I'm piloting an AOS 401 class for undergraduates to see if we want to add an oceanography class as an elective in the atmospheric and oceanic science major.

#### **What was something you learned early on in your time as a professor?**

One thing I promised myself through the process of accepting this job was to put myself first and figure out what my hard limit is and when to choose to walk away. So, I guess I just learned when to put myself first before my work.

#### **What do you enjoy most about being a professor?**

It's an honor to be able to stand in front of a group of students and have them place their trust and faith in me and help them in their educational journey. It's just humbling that students would look to me in this way. I really value and am touched by the fact that I can help people grow and learn the things that they want to learn.



Top: Zanowski strikes a pose with the Polarstern research ship from her 2014 research cruise. Photo by J. Rohde. Bottom: Zanowski worked on an Antarctic research cruise during graduate school. Photo by N. Janinhoff

#### **What is a fun fact about atmospheric and oceanic sciences that you love?**

Well, you should wake up every day and thank the ocean that we don't live in a fiery hellscape, because it takes up 90 percent of the excess heat that is created in our atmosphere as a result of greenhouse gasses. Another fun fact is that the ice sheets over the Antarctic and Greenland are so large, that they actually gravitationally attract the ocean towards them. So, when the ice sheets melt, the sea level falls in the vicinity of the ice sheet because there is less mass to attract the ocean even though there is more water going into the ocean.

# Partnership in the Air

*With UW faculty expertise, the City of Madison is launching a new network of air-quality sensors.*

By Chelsea Rademacher

Imagine you're on a beach, and you pick up one single grain of sand. Now imagine dividing that single grain of sand 36 times. That's about how big [PM2.5](#) are — a miniscule yet omnipresent air pollutant. Appearing in either liquid or solid form, PM2.5 are one of the most dangerous pollutants to public health: they've been associated with negative health outcomes including heart disease and shorter life expectancy. They're also the subject of a new project to monitor the varying air quality across Madison's neighborhoods.

In late November, Madison Mayor Satya Rhodes-Conway [announced](#) that Madison received nearly \$430,000 from the U.S. Environmental Protection Agency to boost the city's air-quality monitoring. With partnership from three nonprofit groups and expertise from UW faculty advisors, the city will purchase and place 68 low-cost sensors across Madison. The end goal is to assess how air quality varies among historically underserved neighborhoods and develop action plans to mitigate those health disparities.

The project's community partners — [Foundation for Black Women's Wellness](#), the [Hmong Institute](#), and the [Latino Health Council](#) — will provide community-based expertise for the project's development and help disseminate the findings. Two UW professors have already been tapped to provide technical and scientific expertise: Tim Bertram, professor of chemistry and affiliate professor of atmospheric and oceanic sciences; and the Nelson Institute's own Tracey Holloway.

Holloway was a key connector in bringing the project to Madison. When exploring the grant opportunity, the City of Madison's chief sustainability officer, Jessica Price (a Nelson Institute [alumni award winner](#) and former student of Holloway's), connected with Holloway to see if it could be a good fit for Madison. "Tracey has tremendous experience leveraging air-quality research to improve decision-making, benefit public health, and tackle climate change, which is exactly what we hope this project can do. Knowing her body of work, I reached out to her right away," Price says.

Price and Holloway discussed what air pollutants would be the most important to measure. As it happened, Holloway and recent Nelson graduate Clara Jackson had just finished [a paper](#) about PM2.5 in Madison. "We used a computer model to map out PM2.5 over Madison," Holloway says. "What the computer model allowed us to do is to kind of pull apart what is contributing: how much does transportation contribute, how much does agriculture contribute, and how much do power plants contribute?"

What Jackson and Holloway found was that on-road transportation, like cars and trucks, is the leading contributor to the city's PM2.5 concentrations, fol-



lowed by “non-point” sources like homes, restaurants, and other buildings, with power plants as the third-largest contributor. They found PM2.5 varied across the city, with highest pollution levels on the isthmus. These downtown levels are about 50 percent higher than surrounding rural areas, according to their modeling study.

But why is PM2.5 the star of the show? First, it is the pollutant most strongly connected to health impacts and shortened life expectancy. And, unlike a pollutant like carbon dioxide, PM2.5 acts more locally; you can even see street-to-street differences. “One of the things that makes PM2.5 really interesting is that it comes from a mix of different sources, some of which can travel pretty far, and some of which may be higher right near where they’re emitted,” Holloway says. “Some of those may be from a barbecue like at Picnic Point [at the UW’s Lakeshore Nature Preserve]. Other ones may be chemically formed in the atmosphere from agricultural emissions.”

***“The city is really trying to empower the community, provide local information, and support the engagement of community members in knowing what’s in their air.”***

— Tracey Holloway

Although her work helped inform the project, Holloway sees her current role as one of support, specifically in ensuring that the work supports the community groups’ priorities. “The kind of work that I do — looking at clean air and energy issues — is motivated by the needs of partner organizations,” Holloway says. “I am really looking forward to understanding more about how these community groups [can use] the information and helping connect the dots.”

Another dot Holloway helped connect was introducing Price to Bertram, one of the world’s leading experts on air-quality-measuring technology. Bertram’s knowledge led to the selection of QuantAQ sensors, which cost about \$1,500 (compared to \$20–50,000 for a regulatory monitor). The small, solar-powered boxes will provide minute-by-minute readings, which will be publicly accessible through a to-be-developed sensor network. “The city is really trying to empower the community, provide local information, and support the engagement of community members in knowing what’s in their air relative to the city average,” Holloway explains.

Currently, the City of Madison only has two air-quality sensors: one on the UW campus and one at Demetral Park on the city’s east side. “In Madison, like almost everywhere else in the United States, the purpose of most monitors is to show or to assess compliance with the Clean Air Act,” Holloway says. Once the new monitors are in place, they’ll paint a picture of how PM2.5 varies from one place to another — and put that information directly into the communities’ hands, laying the groundwork for informed action.

“My perspective is that you can’t solve a problem unless you know the problem exists. Step one is figuring out what is in the air. Step two is where is it coming from — and is this what we expect from living in a city or is this something that is reflecting an unequal [system]?” Holloway says. “One reason I like working on air pollution is because it is in many ways a good news story. There are solutions, and our air is getting cleaner in the United States. This is a solvable problem, but you can’t solve a problem if you don’t know it exists.”



Tim Bertram



Tracey Holloway



Jessica Price

# From the Office of Sustainability

*A monthly update from faculty, staff, and students in the Office of Sustainability – Education and Research. This month’s column is from the interim director of sustainability education and research, Dr. Matthew Ginder-Vogel. Ginder-Vogel is an associate professor of civil and environmental engineering, chair of the environmental chemistry and technology program, and codirector of the Core Facility for Advanced Water Analysis.*



As Professor Hicks begins her sabbatical in Ireland, I am thrilled to be stepping into the role of interim director of sustainability education and research. I am especially excited by the opportunity to work with faculty, staff, and students from across UW–Madison towards the goal of integrating sustainability into our campus. I would like to take this chance to introduce myself to the Nelson Institute and to the broader UW–Madison sustainability community.

I am an associate professor in the Department of Civil and Environmental Engineering, and the chair of the environmental chemistry and technology graduate program. My research is interdisciplinary by design, drawing upon knowledge developed in many other scientific disciplines and requiring a fundamental understanding of soil science, geology, biology, and chemistry. My research group seeks to understand long-term changes in Wisconsin groundwater geochemistry, with a specific focus on processes controlling radium prevalence. This issue is particularly important because, while Wisconsin is rich in groundwater resources, the suitability of that water for human consumption is often limited by such geogenic (naturally occurring) contaminants.

Additionally, my research group is developing novel methods to quantify groundwater contaminants, examining the environmental impacts of recycled concrete, developing a molecular scale understanding of arsenic geochemistry, and examining transport processes controlling environmental carbon and nutrient speciation. As part of my interim role at the Office of Sustainability, I hope to establish new, interdisciplinary collaborations with researchers around campus and lend my expertise to furthering sustainability efforts on campus. The next nine months promise to be action-packed in the Office of Sustainability. We are piloting the Faculty Sustainability Fellows Program, in which fellows will provide essential recommendations and perspective with respect to how UW–Madison approaches sustainability. Additionally, we will be hiring a new cohort of sustainability student interns for our campus program, and are working on a new, soon-to-be-announced internship program that will engage with partners outside campus. The Green Fund has many projects underway or under consideration, and the Facilities Planning & Management staff at the Office of Sustainability are hard at work on renewable energy solutions, waste reduction, and much more.

I am looking forward to the next nine months and encourage anyone to reach out to me with comments, concerns, or encouragement. Future updates will feature the voices of the staff and students working in the Office of Sustainability. This will allow you to hear about the exciting and unique projects that we’re working on.

## KEYNOTE SPEAKER



Mercedes Pascual

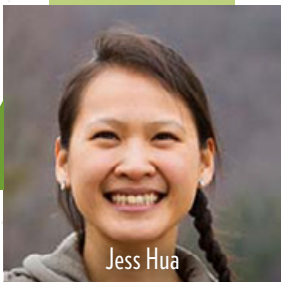
## FACULTY SPEAKERS



Sarah Ensor



Nisa Karimi



Jess Hua



Olaf Jensen

# Recap: CEE Fall Symposium

*The Center for Ecology and the Environment's fall symposium showcased the breadth of ecological research on campus.*

By Chelsea Rademacher

When Sarah Ensor was invited to open the Center for Ecology and the Environment (CEE)'s 2022 Fall Symposium, she accepted with a disclaimer: "What I would have to say as a literary scholar, environmental humanist, and queer theorist, would undoubtedly sound like it was coming out of left field," joked Ensor, a Nelson affiliate and assistant professor of English, in her opening remarks. "And so I've come to think of these remarks as 'a geography of left field.'"

But Ensor's talk was more of a line-drive, as it showcased the breadth of ecological research happening on the UW–Madison campus. Held twice each year, the two-day CEE Symposium features a keynote address from a prominent researcher and gives early-career faculty from the UW's ecology community the opportunity to highlight their expertise. This year, nearly 300 learners attended either in-person or virtually.

Ensor was one of four UW–Madison faculty who spoke at the symposium. The lineup was particularly interdisciplinary, including talks from Ensor; Nisa Karimi from the botany department who spoke on African Baobab pollination; Jess Hua from the Department of Forest and Wildlife Ecology who discussed disease in the face of environmental change; and Olaf Jensen from the Center for Limnology who analyzed the sustainability of the world's largest fisheries.

This fall's visiting researcher was Mercedes Pascual, a professor in the University of Chicago's Department of Ecology and Evolution, who gave a keynote talk on each day of the symposium. Pascual is a theoretical ecologist interested in the temporal and spatio-temporal dynamics of ecological systems, from populations experiencing the spread of pathogens to large communities of interacting species in ecosystems. Her research focuses on complex systems in ecology and epidemiology to understand and predict patterns of variability and their connection to structure and scale.

The Fall Symposium kickstarted the stretch between Thanksgiving and winter breaks, with its first day of talks on Monday, Nov. 28. Sean Schoville, the center's director, opened the event, then CEE researcher James Crall introduced the day's lineup, which started with Ensor and Karimi and concluded with Pascual's first talk, "The Structure of Hyper-Diversity and Niche Emergence in Host-Pathogen Systems." Symposium co-organizer Wendy Turner opened day two, introducing Hua and Jensen before Pascual closed the event with her talk, "Polarization in the Science and Communication of Climate and Infectious Diseases."

Both days were recorded and are available for viewing [online](#) — and save the date for the CEE Spring Symposium, coming up May 1–2, 2023.

## Director's Cut

Meet Sean Schoville, director of the Center for Ecology and the Environment.

Schoville (center) helped create a mobile app called Yosemite Butterflies, an interactive field guide to the park's unique butterfly fauna. Photos courtesy of Sean Schoville (4)



One of Schoville's current lab projects is studying the Colorado potato beetle's rapid evolution of insecticide resistance.

I'm grateful for the opportunity to reintroduce myself as the director of the Center for Ecology and the Environment (CEE), the newest research center in the Nelson Institute. CEE provides a welcoming community that acts as a nexus for faculty, staff, and students to share ideas, enhance scholarship, and promote ecology at the University of Wisconsin–Madison. Our priorities include:

- Organizing research, instruction, and outreach activities to support ecology at the UW and beyond
- Fostering a sense of “connectedness” within the community of UW ecologists (representing 23 academic units and more than 80 faculty members on campus)
- Advancing the initiatives and concerns of the community of UW ecologists
- Providing a gateway to information about UW ecology to people both within and outside the university

It has been an exciting two years since the inception of the Center for Ecology and the Environment (CEE)! We have held a wonderful series of symposia (fall and spring annually) that were well attended, and we provided a broad range of events for undergraduate and graduate student engagement in the ecological research community. Highlights of our work include the inception of a new undergraduate club (“WILD-SEEDS,” or Wisconsin Idea Leadership Development in Ecology Education, Diversity and Sustainability)

## Meet Sean Schoville

### Among the Grasshoppers

When Schoville was a kid, he used to run around chasing grasshoppers. Now, they're part of his research. "The goal of my research is to understand how organisms adapt and respond to environmental change," Schoville says. One of his lab's projects is studying how grasshoppers adapt to climate change. To do this, they headed to the Rocky Mountains. "We're interested in this very sharp environmental gradient: it's very steep, but it's a very short distance. How does the same species of grasshoppers solve problems at different elevations?"

### Step Aside, Cockroach

You may have heard that cockroaches are resilient enough to survive a nuclear bomb. Turns out, that may be a bit exaggerated. The most resilient extremophile (an organism that can survive in extreme, harsh conditions) is the teeny-tiny midge. "They've developed strategies to survive extremes by basically desiccating themselves," explains Schoville. "They slow down essential processes to where they're almost ceasing all cellular functions, but then they can recover from that." Because of this strategy, midges can be found from arctic to desert environments. "That general strategy makes them highly resistant to extreme cold, extreme desiccation, extreme UV exposure, extreme gamma radiation from nuclear bombs, and so forth." Better luck next time, cockroach.

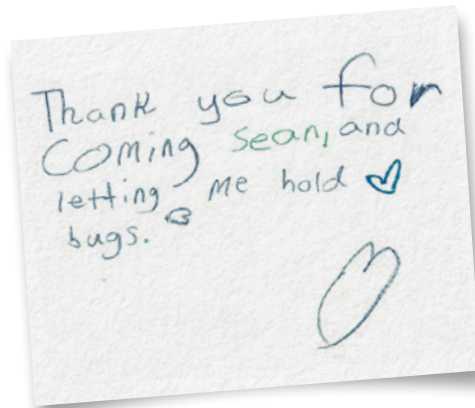


Schoville (seated) leads a butterfly survey in Yosemite National Park.

that promotes professional development of the next generation of ecologists; an undergraduate job fair for ecological research on and off campus; graduate student recruitment and cohort-building events; leadership opportunities for graduate students, including a graduate student symposium in the spring that showcases recent grads; and events that highlight new faculty members and help build collaborations across campus.

As we move into the next few years, we hope to continue strengthening our community by broadening our interaction with interdisciplinary units across campus and increasing community engagement outside of the UW, with government, tribal, and non-profit stakeholders. We also want to ensure that the best graduate students in ecology choose UW-Madison, and so we are exploring the development of a new PhD degree program in ecology and evolutionary biology.

**Sean Schoville**  
Director, Center for Ecology and the Environment



Schoville shares his knowledge with local grade-school students, teaching everyone that bugs are friends.

### Please Don't Squash

"Western culture has very negative perceptions of insects. They're seen as disgusting, annoying, maybe disease-causing," Schoville says. "Around the world, they're not seen that way. And in some cultures, they're actually valued as important resources." Before you grab the swatter, consider the profound impact insects have on our planet. "They're the most diverse animal group on the planet, and that means that any

ecosystem that includes them is entirely dependent on them." From breaking down decaying matter to providing pollination to crops, our many-legged friends are critical. "And then I would just say, lastly, aesthetically, they're just gorgeous!"



## The Resilience of Mallards, and Us

*Allyson Mills, an environmental studies certificate student, was one of three winners of the Office of Sustainability's inaugural Sustainability Writing Awards.*

Photo by Bryce Richter / UW-Madison (2)

By Allyson Mills

Thrashing waves greet the concrete steps along Lake Mendota as I push through the windy terrace, careful not to walk in the splash zone. Near the marina, a mallard sits in the water, unperturbed by the foot-high waves. She stays still, bobbing up and down over the water's turbulence. I am very much not still, wriggling my arms further into my too-thin sweater in an attempt to warm up again. Despite this, I don't scare the duck, who appears peaceful. She continues bobbing for a while. Grateful for the trees' shield from the wind, I continue along Lakeshore Path. After a few hundred feet, the mallard flies past, water flicking off her mottled brown feathers beating wildly against the wind. I assume she finally got sick of the choppy water.

At the [Porter Boathouse](#), dozens of mallards congregate on the right-hand pier, peacefully sitting in the brunt of the storm. Rain pelts down and the wind ruffles their feathers, but they seem perfectly calm, a sharp contrast to the gulls' loud social on the left-hand pier. The mallards maintain their

peaceful resolve, and I suspect that all of them had endured wind, rain, and waves similar to the female mallard from the terrace. Yet she and the rest of the sord found each other. Sitting on the pier, each duck seemed content in the presence of one another, even through the storm and squawking of the gulls.

***How much more influential would our efforts to combat the climate crisis be if we worked in a "V" formation rather than working alone?***

We can learn a lot from mallards' strength in community. When mallards migrate south, which the sord on the pier will begin soon, they fly in a typical "V." In this formation, no single mallard is the leader. Rather, they alternate, each



taking a turn when the previous leader tires. Like geese, ducks fly in this formation to conserve energy. Each duck's wings reduce wind resistance for the following duck. This is pivotal in determining whether a flock makes it through migration; a 1970 study found that "a group of 25 birds has 71 percent more range than a lone bird, and the vee position is optimal" ("Formation Flight of Birds"). By creating updraft for the following duck in this formation, each bird increases the flock's resiliency as a whole. The distance mallards must travel during fall migration is astounding: more than 700 miles ("Do Ducks Migrate (All You Need to Know)"). Throughout their lives and especially during migration, mallards depend on their communities for survival. The

collective becomes greater than the sum of its individual parts. Without flocks to fly with, the difficulty of migration would be immeasurable for these ducks, and many would fail to make the journey.

Humans can take inspiration from the resiliency of mallards when it comes to how our own communities cope with the climate crisis. Alone, the task feels hopeless and daunting. We doomscroll on our phones alone in our beds, anticipating the next disaster; we isolate ourselves by thinking "this will never happen to me ..." until it does. One positive outcome of disaster is its power to bring communities together. Most people who care about climate change are invested in working to do something about it, through lobbying, joining climate action organizations, educational programs, and other community engagement efforts. Combined with the collective grief we carry about humanity's negative impacts on the environment, burnout is almost inevitable for those working on the front lines to confront the climate crisis. The magnitude of the issue can make our efforts seem inefficient or even hopeless: How can one person do anything? I've questioned this myself and found that one person can't do anything — not by themselves, at least. Like ducks, our resiliency and capacity for coping with the climate crisis is strengthened in community (perhaps by 70 percent).



Photo by Jeff Miller / UW-Madison

The emotional strain of the climate crisis is intense for anyone who cares, particularly among young adults and college students. We inherited a global crisis we never asked for. We carry the psychological burden of a world undone by pollution and global warming: in addition to classes, this can cause an immense amount of stress. Young adults, including millennials and Generation Z, are among the first groups of people to have grown up in a society where climate change was unavoidable. With the invention of social media, the climate crisis became apparent as we saw our world suffer at the hands of capitalism. The greed rampant in our consumerist society inflicts wounds on the earth and by extension, ourselves. To heal from these wounds, we have to acknowledge the grief and pain caused by these environmental injustices. Our grief and anger motivate us to fight for change. When we fail to acknowledge these emotions, we are less equipped to

deal with the ongoing challenges the climate crisis will present throughout our lives. However, while grieving is helpful in processing the earth's and humanity's collective loss, it will not heal it alone. As Robin Kimmerer writes in her book *Braiding Sweetgrass*, "it is not enough to weep for our lost landscapes; we have to put our hands in the earth to make ourselves whole again."

Rather than asking "what I can do," we instead should be asking what we can do. How much more influential would our efforts to combat the climate crisis be if we worked in a "V" formation rather than working alone? Like ducks, humans increase our resiliency and capacity for improvement when in community with each other. We each have skills and knowledge with the potential to create an updraft for the generation following us. Our generation is working hard to help ensure humanity's future through climate and sustainability initiatives. Social media has aided in increasing global awareness on climate issues. Greta Thunberg became the face of [youth climate action](#), increasing visibility of young activists, and young adults continue to create their own organizations and activism projects within their schools and communities.

***"Just as ducks migrate, we too are in a process of migration, our communities continuously flapping our wings towards a more sustainable future."***

— Allyson Mills

This commitment to enacting positive change can be witnessed in abundance within UW–Madison. In our individualist society, student organizations on campus help provide social support and allow for students to embrace solidarity with each other and the environment. Despite possessing increased awareness of climate disasters through media since childhood, we are also among the first generations to be educated on issues related to sustainability at all levels. With the knowledge college students possess and continue to learn regarding the climate crisis, we are now tasked with doing the best we can with what we have.

There are countless examples of student-led groups on campus spearheading these efforts. For example, [F. H. King](#) educates the community on sustainable agriculture and provides students with sustainably grown food. The [Food Recovery Network](#) combats food insecurity while reducing food waste. The [Environmental Law Society](#) exposes the student community to people and careers related to environmental

policy, law, and science. Helios works to increase clean energy use on campus through community outreach, project development, and project implementation. Madison Lakes Alliance helps educate students on limnology and conservation of Madison's bodies of water. [Re-Wear It Wisconsin](#) engages students in topics on sustainable fashion and conscious consumerism. Our student chapter of the [Wisconsin Society for Conservation Biology](#) educates and engages students with conservation initiatives throughout the state. [Campus Leaders for Energy Action Now](#) is working to commit UW–Madison to 100-percent clean energy by 2035. The Audubon Society works to provide students with opportunities to engage in the observation and conservation of birds, including mallards. These are just a handful of the nearly 60 student organizations on campus committed to sustainability and conservation. All of these organizations provide social support for students to discuss and process the effects of the climate crisis. The nature of these student groups is that they inherently follow the mallard-favored "V" formation. Students graduate, and leadership is passed down to the next class of students to ensure each organization can continue its mission. Students in these groups form extracurricular communities to address

the climate crisis and enact positive change within their local and global communities.



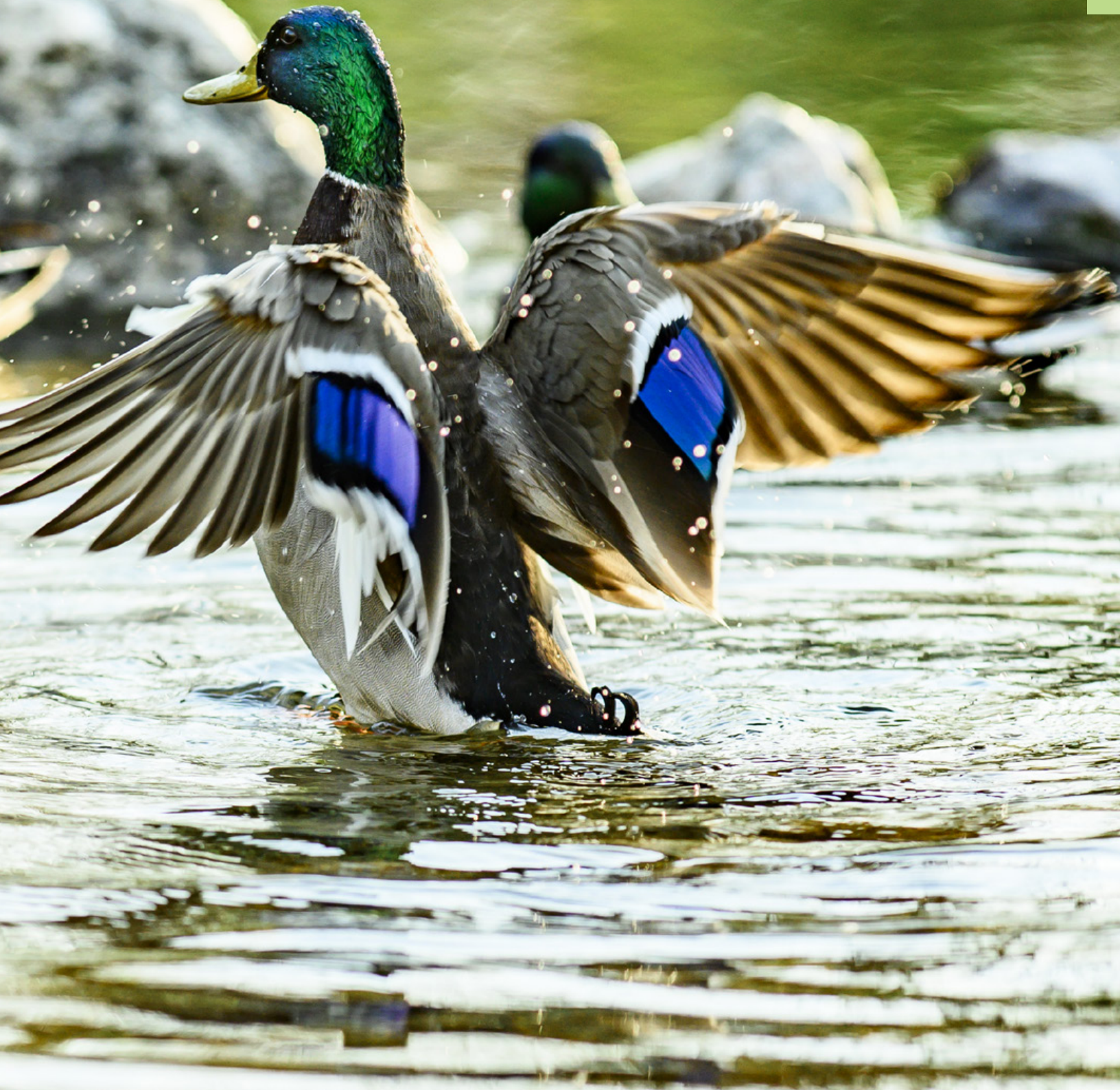
Just as ducks migrate, we too are in a process of migration, our communities continuously flapping our wings towards a more sustainable future. Individually, we can

do the best we can to learn about the environment and how to ensure our shared future in the ways most meaningful to us. However, like mallards, we are strongest in community. If our communities make the commitment to work with and for the earth, the work we do now will create an updraft for the generations to come. Our work today will reduce the resistance caused by unsustainable practices and climate deniers for those who follow us. We have knowledge, motivation, and each other. These give us immeasurable power in addressing the climate crisis throughout our lifetimes.

The task is daunting. However, we can look to the mallards who braved the storm on the pier of the Porter Boathouse. In community we can address our collective grief, protect one another, and work to save our future.

*This was originally published by the Office of Sustainability. Read the other awardees' essays.*





## When the River Runs Dry in Lusitu, Zambia

*Their parents were forcibly displaced by a colonial dam project in 1958. Now, the residents of Lusitu, Zambia, rely on traditional knowledge to grow food in the face of climate change.*

Flood recession farming in the Lusitu River. The owners of these garden plots live along the river, expanding their gardens toward the water during the dry season and harvesting their crops as the waters return in the rainy season. Photos by Colleen Henegan, Zambia, 2022 (8)



By Colleen Henegan

*In May 2022, environment and resources PhD student Colleen Henegan was awarded the Pulitzer Center Reporting Fellowship to support her research on the climate-change impacts on Southern Zambia's agriculture. As a reporting fellow, Henegan is publishing [three pieces](#) — a reported article, a reflective “field note,” and an audio/visual piece — that explore both new and traditional strategies of Zambian farmers who have to adapt to a rapidly changing climate. “I wanted to write something worthy of institutions like UW-Madison and the Pulitzer Center,” Henegan says, “but I struggled with imposter syndrome. Once I was back in Zambia, my anxieties melted away. I simply let the people I spoke with guide the story.” In this piece, Henegan ventures into the village of Lusitu, Zambia, where farmers combine ancestral techniques with new solutions.*

Twenty years ago, the village of Lusitu was much like other towns in southern Zambia. It baked in the bright, cloudless skies that dominate the dry summer months from August to October and found relief in the rains that consistently fell between late November and early April. The Lusitu River flowed year-round and served as a lifeline for agriculturalists and pastoralists alike.

Now, Lusitu is transforming into a desert. Cacti and other succulents are replacing the shrubby woodlands, many of which were cut down to meet the growing demand for charcoal in nearby urban areas. In the fields that overlook the Lusitu River, wispy stalks of maize from the last growing season rattle in the unseasonably warm breezes that now arrive in late July. The river no longer flows from August to November. The only evidence of its presence are a few isolated, algae-filled puddles that dot the bottom of the river basin. These small pools are a refuge for both humans and their livestock, which travel there daily in search for water, leaving footprints behind in the soft clay.

Eneless Chipenzi, a 62-year-old farmer and lifelong resident of Lusitu, is concerned with the climatic changes she has witnessed throughout her life. “The two biggest challenges here are soil and water,” she says. “The ground has become dry and rocky. When the river is not here, we must dig pits, sometimes seven to eight steps deep, to find water underground,” she says, pointing to the tomb-like well carved from dirt and stone at the end of her garden plot, which is demarcated with acacia branches and topped with inch-long white thorns to discourage scavengers.

“I am getting too old to carry much water from the pit to my garden,” she explains, while smiling and gently shaking her head. “I am blessed with grandchildren who help me with my garden,” she says as she gestures to a small band of boys and girls playing on the other side of the fence in the next field, “even if it does not look like it!” She says this last line just loud enough to jolt the children out of their game. They run to her garden, shimmying through the fence as they giggle and fall to the ground to catch their breath.



Eneless Chipenzi, a lifelong farmer and resident of Lusitu, stands in her garden plot on the dry basin of the Lusitu River.

Chipenzi and her family are members of the Tonga tribe. Their ancestors lived along the middle portion of the Zambezi River for centuries. This area, known locally as the Gwembwe River Valley, remained relatively isolated from the British colonial forces until the mid-1900s, due to its allegedly “harsh and inhospitable climate,” as described by Jesuit missionary J. Torrend in a letter sent to his monastery in November 1931. Since that time, average temperatures in the region have increased about 1°C, and now range from 92°F (33°C) to 95°F (35°C) from September to November, sometimes even reaching 110°F (43°C).

Despite the challenging climate, people once thrived in the Gwembwe River Valley by relying on traditional ecological knowledge accumulated over generations. According to Given Kwapu, the Council Chairman for the nearby city of Siavonga and a member of the Tonga tribe, life along the Zambezi River was idyllic. “The Tonga in the valley had many animals because grazing areas were abundant,”

Kwapu explains, while leaning back on a leather chair in his sunlit office that overlooks Lake Kariba, “Even today people remember that place because it was so bountiful.”

Although Kwapu never lived along the Zambezi, his mother often shared stories about what it was like to grow up with the river. She told him that “[the Tonga] paid attention to the signs nature provided to prepare for the changing seasons,” like the movements of birds and the calls of insects. Certain plants responded to shifts in rainfall, including the musiiika, or tamarind tree, which would “produce more fruit right before a drought ... as a gift from God or the ancestors.” While describing these traditions, Kwapu takes out his phone to enthusiastically show images of these native plants. He recounts that “the leaves of the chibase plant fall right before the rains arrive ... so the Tonga only plant seeds after the tree has lost all signs of life.”

***“We were one people — not separated by the river, but connected to each other through it.”***

— Given Kwapu

The people of the valley also built strong social and familial networks on both sides of the Zambezi River. “We were one people,” Kwapu describes, “not separated by the river, but connected to each other through it.” The Tonga seasonally migrated in and out of the alluvial floodplain, which allowed them to grow food year-round. When one family in the community ran out of food for the season, their neigh-



Given Kwapu, Siavonga City Council Chairman, sits in his office that overlooks the valley where his mother was evicted from when she was eight years old. Now, Lake Kariba, the largest reservoir in the world by volume, covers his family’s ancestral home.

bors who fared better provided for them, regardless of which side of the river they were on.

The traditional way of life for the Tonga changed dramatically in the late 1950s, when the Federation of Rhodesia and Nyasaland (the colonial governments of present-day Zambia, Zimbabwe, and Malawi) started to build the Kariba Dam in the Zambezi River. Although construction began in 1956, most residents of the river valley were not told that their homes would soon be underwater. According to Dr. Christopher H. D. Magadza, a researcher with the University of Zimbabwe, there was an international outcry when the world realized how the dam would impact wildlife in the valley, but there was little concern or fundraising over the plight of local people. Operation Noah, a nonprofit created using international donations, spent approximately £968 to rescue each animal from the flood zone, while the Federation spent approximately £50 relocating each person.

***Over the course of a few years, the Tonga went from an isolated, self-sufficient ethnic group to a “food-deficit people,” living on two sides of the largest reservoir in the world.***

In 1958, the year before the dam was completed, British colonial forces evicted approximately 80,000 people from their homes. “Most people objected to the move, and for many reasons,” Kwapu explains. “Their ancestors lived there for thousands of years. Although the Chiefs took what ceremonial tools they could carry, the people had to leave the shrines for their dead, or malende, which were used in rituals to pray for rain.”

Armed conflicts broke out during the relocation. Several people were killed. Their bodies were quickly buried in mass graves within the abandoned villages. Homes were burnt to the ground. The survivors were forced to walk to small villages in present-day Zambia and Zimbabwe, some of which were over 45 miles (73 kilometers) away. The tight-knit social structure of their community began to unravel. “The Tongas across the river were forced to belong to a different country, even if they didn’t want to be,” Kwapu recounts, “The British brought a sea between our people, separating our families as they fled from the rising water.”

Ecologically, these new villages were a different world. Most relocated Tonga found



Construction on the outflow gates at the top of the Kariba Dam began over a decade ago. These gates allow water to be released quickly if the reservoir is filled to capacity. The Kariba reservoir has been below capacity since 2011, which is problematic for energy production but beneficial for repairs.

themselves in semi-arid regions with no surface water, marginal soil, and a high risk of crop failure. The vegetation was unfamiliar. They did not know how to forage for food in the shrubby forests of their new homes. The wildlife was protected for conservation and tourism, so they could not hunt wild game. Over the course of a few years, the Tonga went from an isolated, self-sufficient ethnic group to a “food-deficit people,” living on two sides of the largest reservoir in the world.

Lusitu was one of the relocation sites for the displaced Tonga. Chipenzi’s parents arrived there in 1959 and gave birth to her a year later. Their family was luckier than most, as their new village had access to the Lusitu River. “I grew up with dirt on my hands,” Chipenzi explains, “Our family was always farming. In the dry season we farmed along the riverbed. When the rains came and the river rose, we would farm above it. We grew food all year round. My parents taught me all I know.”

The agricultural technique that Chipenzi refers to is known as flood recession farming. Kwapu’s mother, whose family was evicted from the valley when she was eight years old, also taught her children this style

of farming. According to Kwapu, “The Tonga would grow crops throughout the year by planting twice along the banks of the Zambezi River. As the water moved outward in the rainy season, people planted on higher ground and relied on rainfall to sustain their crops. When the rains stopped, water in the river retreated, leaving rich soil behind for people to grow food in again.”

Flood recession farming is common in semi-arid regions around the world, but free-flowing water sources are necessary to continue the practice. The presence of the Lusitu River allowed Chipenzi’s parents to pass on this small piece of ancestral knowledge to their children, despite their forced relocation. But now climate change threatens the continuation of this tradition for future generations.

According to Geoffrey Siulemba, a senior research scientist at the Zambia Agricultural Research Institute, “Lusitu is a climate change hotspot...many trees in the area were cut down for charcoal, which has allowed the topsoil to erode.”



A dug-out well on Eneless Chipenzi’s garden plot allows her to access groundwater beneath the riverbed. Throughout the dry season, the well is dug deeper and more steps are added to allow better water access.

Without the trees, the remaining soil is hit with direct sunlight. This, paired with the increase in local temperatures, creates a feedback loop that ends in desertification. Siulemba notes that “the groundwater in Lusitu is very deep—often too expensive for local people to access—and is sometimes too salty to be used for irrigation or human consumption.”

In addition, the Lusitu River has less water than it used to. The river flowed year-round when Oscar Mulamfu, an agricultural supervisor for the Zambian Ministry of Agriculture, first moved to Lusitu 22 years ago. According to Mulamfu, “The volume of water flowing through the river began to decrease in 2006. This trend continued through 2016, which is the first year that the river ran completely dry. It has now become a seasonal river.” How could such a big change happen so quickly? “Climate change has led to more erratic rainfall in areas that feed into the Lusitu River. This is happening across Zambia, leading to the decline of our larger rivers, including the Zambezi and Lake Kariba.”

***“The rains and the river are changing. We can only learn from it, help each other, and adapt where we can.”***

— Eneless Chipenzi

The decline of water volume in Lake Kariba is a major concern. The dam provides 60 percent of the electricity needed for both Zambia and Zimbabwe, and the reservoir has not been at full capacity since 2011. According to the Zambezi River Authority, the lake was at 23 percent of its capacity as of August 31, 2022, a decline of 20 percent from the same date in 2021. In the drought of 2019, that number fell to the single digits, leading to blackouts across both nations. Many of these lasted up to 18 hours, increasing the demand for charcoal and leading to deforestation in places like Lusitu. Also, the dam is 60 years old. Its overflow gates and plunge pool have been under repair for 10 years and are far from complete.

This change in rainfall is reflected in the lived experiences of farmers in Lusitu. In Chipenzi’s words, “The rain pattern has changed. It delays more often and doesn’t come when we expect it to come. This change affects everyone, even those that do not farm. When I was young, we needed to plant our [rainy season] crops the first week of December or earlier, but now we need to plant after Christmas. If we plant too early, the rains come and go, and we lose our crops.”

In addition, the native plants that the Tonga use to interpret seasonal rainfall patterns are acting strangely. “The chibase tree still loses its leaves before the first rainfall, but now it regrows them after a week or so without rain...almost as if it thinks the rains are done,” Kwapu explains, “then it sheds the leaves again when the rains restart.” Some Tonga have noticed this phenological shift in the chibase tree, but other pieces of ecological knowledge have likely been lost in the aftermath of their forced relocation.

The ancestral knowledge that was passed on from her parents helped Chipenzi provide for her family in Lusitu, but many other relocated families were not as lucky. “I rent this land from the descendants of the original settlers here,” Chipenzi explains, “but others cannot afford the monthly fees and must find work elsewhere until the rains return.” But what will happen if the rains don’t come when they are expected? Can people continue to live in these climate change hotspots, or will more forced migrations be necessary?

While farmers, researchers, and government officials are far from having answers to these questions, the open exchange of knowledge among these groups is essential. According to Helen Shelin, a Ministry of Agriculture official based in Siavonga, agricultural extension agents are “being trained in semi-arid farming techniques, which are sometimes gathered from local communities.” It is difficult for these agents to be effective, however, as they are each responsible for about 1,000 farmers. Shelin overcame this challenge by purchasing a motorbike, which helps her travel efficiently between farms. “People know me as ‘that woman on a motorbike,’” she explains with a laugh, “but it helps me reach our farm leaders quickly, since most roads here are bumpy and unpaved...they then share advice and instructions with their neighbors and other community members.”

Despite the challenges she faces, Chipenzi hopes to continue farming in Lusitu. “This is my home. It is where I raised my children ... the bones of my parents are here,” she explains while packing up her belongings to walk home with her grandchildren in the setting sun. “The rains and the river are changing. We can only learn from it, help each other, and adapt where we can.”



The outflow basin of the Kariba Dam leads to the Zambezi River. The small semi-circle wall was added to facilitate repairs on the plunge pool, which has eroded throughout the last 60 years and currently threatens the stability of the dam.



Top: Eneless Chipenzi harvests leaves from the rapeseed plant, a member of the brassica family. These greens, which taste similar to kale, are often cooked with onions and tomatoes and served as a common side dish for a Zambian dinner. Climate change is expected to decrease the range where rapeseed can be effectively cultivated. Below: This traditional style of farming is known as *mivundu* in Tonga or *gampani* in Chewa. Both words roughly translate to “digging hills.” This practice involves planting seeds in a small basin, which holds water and reduces evaporation.

## Coming Soon: 2023 Alumni Awards

Each year, the Nelson Institute shines a spotlight on alumni who are truly living the Wisconsin Idea and making a difference in the world.

Take note! The nomination process for this year's awards will be different: nominations will be accepted starting on Wednesday, Jan. 18, through the end of February.

Award winners are selected by members of the Nelson Institute alumni awards committee and approved by the Nelson Institute senior leadership team. Awards are presented at the Nelson Institute's annual Rendezvous on the Terrace gathering for alumni and friends.

[Learn more](#) about the process and read about past awardees.



Keefe Keeley, a 2022 Rising Star Alumni Award recipient, speaks at the Rendezvous on the Terrace event. Photo by Ingrid Laas



Mark your calendars for Friday, Sept. 29, 2023,  
for the Nelson Institute's annual Rendezvous on the Terrace.

*Stay tuned for more information!*





## Remembering Lewis Hanson

*Hanson led the way in supporting sustainability research at the Nelson Institute.*

By Chelsea Rademacher

Lewis “Lew” Hanson, UW–Madison alumnus and devoted supporter of the Nelson Institute, passed away on November 23, 2022, at the age of 90. Alongside his multigenerational Badger family, Hanson helped pave the way for critical work in sustainability at the Nelson Institute through the Hanson Family Fund for Sustainability Research.

A born-and-raised Wisconsinite, Hanson graduated from Baraboo High School before earning both his bachelor’s and MBA from UW–Madison. He followed his father’s footsteps to the UW, continuing what went on to be a long line of Badgers. His sons, John and Jim, as well as his daughters-in-law, Bobbie and Nazli, all earned UW degrees, and one of Hanson’s granddaughters, Gwen Kelley, just graduated from the College of Agricultural and Life Sciences.

Hanson’s passion for the UW, combined with his family’s interdisciplinary areas of study, led the family to house the Hanson Family Fund within Nelson. “The Nelson Institute was a good point for opening the fund to the entire university while ensuring that it supports

sustainability efforts,” said Jim Hanson in 2020 when the gift was finalized.

The Hanson Family Fund for Sustainability Research was established to support faculty and student sustainability-related research, as well as an annual sustainability-related public lecture. By creating an endowed gift, the Hanson family can support sustainability work in perpetuity, opening doors for future generations of Badgers. The family is proud to continue this legacy.

“The University of Wisconsin–Madison makes good use of their gifts,” Lew Hanson said in 2021. “I think UW is one of the outstanding institutions of higher education that has generated a lot of giving, and they do a good job with it.”

In 2021, the Hanson Family Fund created a faculty fellowship opportunity: the Hanson Family Fellowship in Sustainability, currently held by Andrea Hicks. Hicks is the director of sustainability education and research at the Office

of Sustainability and a professor of civil and environmental engineering.

“I am grateful to be the inaugural Hanson Family Fellow in Sustainability,” Hicks says. “The support from this fellowship allows me to do high-risk, high-reward sustainability research and teaching, which pushes the envelope of the field of sustainability and industrial ecology. The world needs new ideas and practices in sustainability now more than ever. Although I never met Lew Hanson in person, I am honored to have been able to attend his funeral. His family shared wonderful stories of him, and it was abundantly clear that he was well loved and will be missed.”

In addition to his support of the university, Hanson was also a proud U.S. Air Force veteran and member of the American Legion, Peter Wollner Post #288. When he wasn’t cheering on the Badgers at Camp Randall Stadium, he enjoyed biking, fishing, and treating his family to fun and exotic vacations.



With members of the Hanson family there to celebrate, Andrea Hicks was honored as the Hanson Family Fellow in Sustainability. L-R: Hicks, Julie Hanson-Kelley, Gwen Kelley, Paul Robbins. Photos by Ingrid Laas (2)



## Introducing the Stephen Born Scholarship

*A new scholarship has been established for students to intern with Henrys Fork Foundation in Idaho.*

By Chelsea Rademacher

***“It’s a chance to really expand one’s vision, from the Great Lakes and streams of Wisconsin and the Midwest to a very different perspective on water management.”***

— Stephen Born



When it comes to Wisconsin conservation and water management, few names are more synonymous than Stephen Born. One of the earliest graduates of the Nelson Institute’s Water Resources Management (WRM) program, Born went on to live out the Wisconsin Idea across sectors, from academia to government to nonprofit. A UW alumnus, faculty emeritus, and former program chair of the WRM program, Born’s Badger legacy continues today: new this year, students have a scholarship opportunity to pair their UW studies with an in-the-field internship experience at [Henrys Fork](#) on the Upper Snake River system: the Stephen M. Born – Henry’s Fork Foundation Internship Scholarship Fund.

After earning his master’s in 1968, Born joined the UW faculty, teaching in the [Department of Planning and Landscape Architecture](#) and the WRM program. Born took a short leave from academia to serve the State of Wisconsin, first as director of the state planning agency then as the state energy director. As the energy director, he had a hand in creating the Nelson Institute’s [Energy Analysis and Policy program](#).

Although Born returned to the UW after serving his term with the state, he continued to be a conservation and environmental planning leader in Wisconsin’s public, private, and non-profit sectors, serving on leadership boards, co-chairing initiatives, and advising policymakers. In 2020, he was inducted into the [Wisconsin Conservation Hall of Fame](#).

An avid fisherman and trout enthusiast, Born finds opportunities to work with organizations that focus on stream health and watershed management. One such

group is the nonprofit [Henry's Fork Foundation \(HFF\)](#), one of the premier non-governmental watershed organizations in the U.S., where Born serves as a board member. Based in Idaho, HFF works with stakeholders to address environmental and fishery health in the Henrys Fork and South Fork Snake River watersheds. "There are few pictures of me in the world that don't show me holding one stupid fish or another!" Born laughs. "The Henrys Fork is sort of the PhD of trout fishing. People come from all over the world."

For three decades, HFF has offered a robust internship program for both graduate and undergraduate students. "Interns not only contribute to ongoing research and projects," reads the HFF website, "but make crucial work possible in fisheries, hydrology, social science, statistics, computer science, communications, education and outreach." The program is unique: each internship tied to a university and fully funded by a donor. And thanks to Born, UW students now have a chance to participate.

"If I were a 21-year-old graduate student interested in water, environment, and management, going out there would be

the absolute best internship in the country," says Born. "It's a chance to really expand one's vision, from the Great Lakes and streams of Wisconsin and the Midwest to a very different perspective on water management."

Not only do HFF interns gain immeasurable knowledge of water resource management in a new landscape, but they're poised to return home with a new swath of information and perspective — which, as Born frames it, exemplifies the Wisconsin Idea. "The most powerful aspect of the Wisconsin Idea is extending knowledge. Our students are the best emissaries of this. The gaining of knowledge happens within the institution, but the extending of it and bringing back perceptions that shape research and shape peoples career paths, that's the other end. It's a two-way street, the Wisconsin Idea."

Applications will open through the Wisconsin Scholarship Hub on February 1, 2023, to full-time Nelson Institute students in the WRM and Environment and Resources graduate programs, as well as undergrads earning an environmental studies major or certificate. Graduate students in the Department of Planning and Landscape Architecture can also apply.



"A taste of the Henrys Fork country!" wrote Stephen Born when sharing these photos. Located along the eastern edge of lower Idaho, Henrys Fork — a tributary of the Snake River — is perhaps best known for its fishing scene: "The PhD of trout fishing," says Born. Photos courtesy of Stephen Born (4)

## *Support* NELSON

Interested in supporting the Nelson Institute? There are many ways to contribute to the Nelson Institute — participating in our events, mentoring our students, providing connections to your personal networks, and making financial gifts.

All of these are necessary and important to us, and we invite you to invest in our community in the way that makes the most sense to you. [Learn more](#) about all of the great academic programs, research centers, and public programs we offer.

*Gifts in any amount are needed and appreciated!*

# Save the Date(s)!

Mark your calendar for these upcoming Nelson events, and watch [nelson.wisc.edu/events](https://nelson.wisc.edu/events) for more details to come.



**Center for Culture,  
History, and Environment**  
NELSON INSTITUTE FOR ENVIRONMENTAL STUDIES  
UNIVERSITY OF WISCONSIN-MADISON

## February 17

Lecture and Q & A: Historians and the Sixth Extinction with Kyle Harper  
*Hosted by the Center for Culture, History, and the Environment*



Chazen Museum of Art

## February 22

Re-Storying the Landscape: A Conversation about Ecological Transformation through the Arts  
*Hosted by the Chazen Museum of Art, in partnership with the Nelson Institute*



## March 7

Tales from Planet Earth: *Breaking Trail* and *A Voice for the Wild* double-feature film with Emily Ford



## March 23

Batteries and Electrification : Is It Sustainable?  
*A Sustainable Success Lecture*

Missed any previous events? Head to the Nelson Institute's [video library](#) to view recordings of past events on topics ranging from climate change to environmental justice. The library includes videos from Nelson Institute signature events such as Earth Day, as well as seminars hosted by our research centers.

## CPEP Series

Each semester the [Climate, People, and the Environment Program \(CPEP\)](#) hosts a [weekly seminar](#) featuring lectures by visiting speakers as well as presentations by CPEP faculty, scientists, and students. CPEP seminars take place from 4–5 p.m. on Tuesdays at 811 Atmospheric, Oceanic, and Space Sciences Building. The presentations are held in conjunction with the Department of Atmospheric and Oceanic Sciences and are open to the public.



CLIMATE, PEOPLE AND THE ENVIRONMENT PROGRAM

CPEP seminars will resume when the semester starts. Until then, catch up on [past lecture recordings](#).

## Weston Roundtable Series

The Weston Roundtable Series promotes a robust understanding of sustainability science, engineering, and policy through weekly lectures co-sponsored by the Center for Sustainability and the Global Environment (SAGE), the Department of Civil and Environmental Engineering, and the Office of Sustainability. Lectures are on Thursdays from 4:15–5:15 p.m. at 1163 Mechanical Engineering.



Weston Roundtables will resume when the semester starts. Until then, catch up on [past lecture recordings](#).

## Center for Culture, History, and Environment: Environmental Colloquia

The Center for [Culture, History, and Environment \(CHE\)](#) invites you to attend the Spring 2023 CHE Environmental Colloquia series on Wednesdays from 12–1 p.m. in 140 Science Hall.

### Featured Colloquium:

Wednesday, Feb. 8

Interdisciplinary Education in the Garden

Reba Luiken, Allen Centennial Garden director,

UW-Madison





# EARTH DAY 2023 SPECIES ON THE MOVE

***SAVE THE DATE!* | April 18-19**

Join the Nelson Institute for Environmental Studies for Earth Day 2023: Species on the Move. You won't want to miss this chance to get back to campus and reconnect with fellow environmentally conscious learners.