Nelson Institute for Environmental Studies
UNIVERSITY OF WISCONSIN–MADISON

July 2024

THE COMMONS

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

Lake Life

UW students dive into policy analysis for Dane County's lakes.

A landmark study in carbon capture. Page 4

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

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From the Dean

Greetings, Nelson community,

I hope your summer has been filled with exploration, whether you've ventured to far-flung destinations or cherished the biodiversity of your own community. I hope to get to the Mendenhall Glacier in July, see some whales, and take in Sitka. I've done less traveling, like most of you, since 2020, but this seemed somehow … urgent.

A bit closer to home, much of what makes Nelson a fascinating place to work is everything that local communities and ecologies hold, and how deeply we're invested in the things around us. Recently, the Nelson Institute team had the privilege of spending a beautiful day at Troy Farm, Madison's historic urban farm. Amidst the fields of garlic and compost, we found joy in giving back to our land and community. This volunteer effort is part of our journey towards achieving a Platinum Green Office designation — a testament to our commitment to sustainability, driven by our shared desire to continually improve.

You can see these themes of improvement, of boundary pushing, of progress, throughout this month's issue. Our partnerships with UniverCity Alliance and the Wisconsin Initiative on Climate Change Impacts are pushing our state forward, from improving local water recreation to uncovering new opportunities to reduce our carbon footprint.

On the faculty front, affiliates Greg Nemet and Morgan Edwards, along with PhD candidate Zachary Thomas, led catalytic research that contributed to the 2024 *State of Carbon Dioxide Removal*. Taking things back to the ground, faculty affiliate and director of the Sustainability Research Hub, Matt Ginder-Vogel, tells us how and where geogenic contamination — or toxins leached from bedrock into groundwater — occur across the state.

And when it comes to leading the way for innovation, perhaps there's no group better than our students. Learn about the rusty patched bumble bee in an essay from undergraduate Madelyn Anderson, then find the critical connections between the environment and reproductive justice from PhD candidate Morgan Robinson. Their work inspires us all to strive for excellence every day.

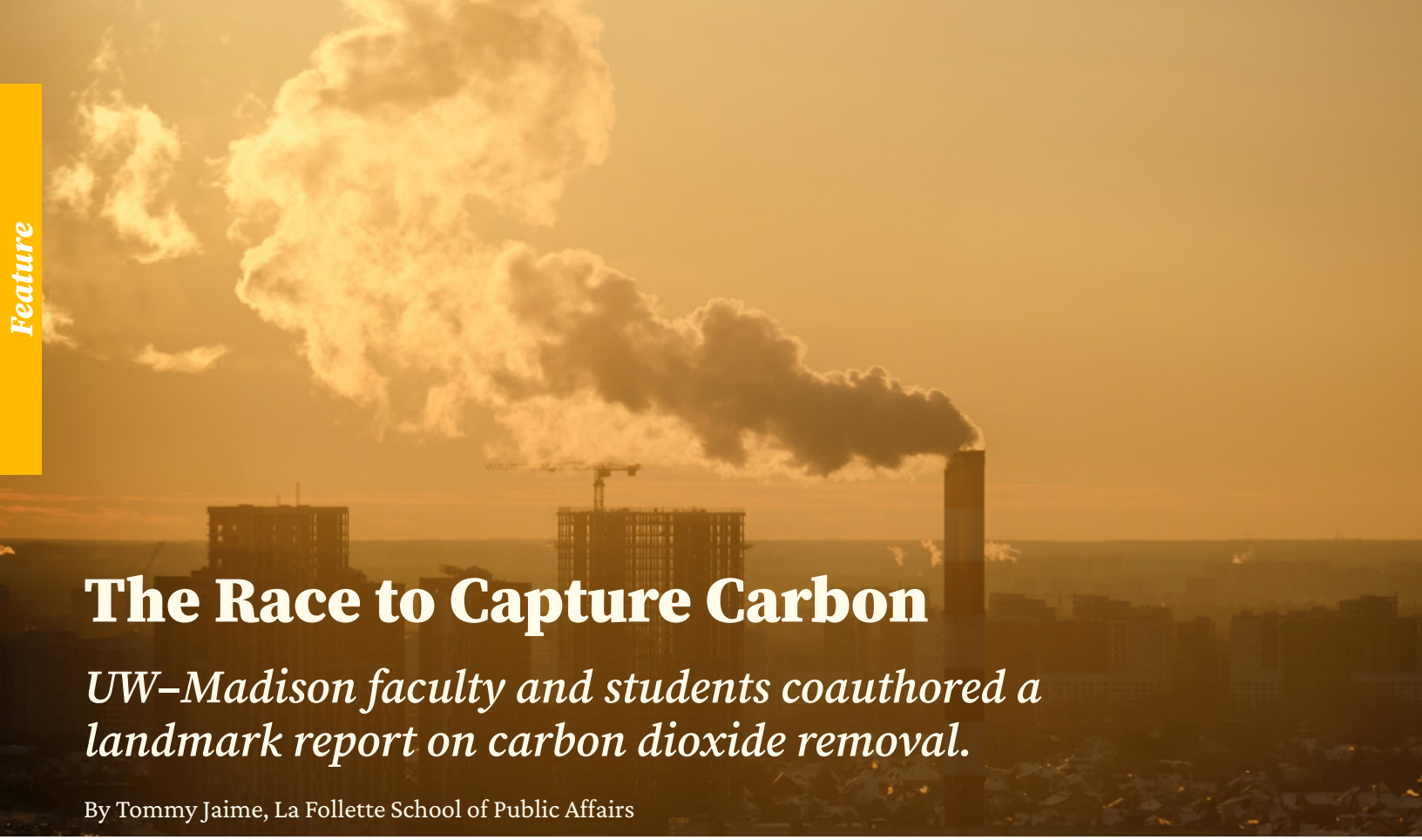
Together, we are not just envisioning a better future; we are actively creating it. Let's continue to innovate, collaborate, and lead by example, inspiring positive change within our institute and beyond.

Paul Robbins
Dean, Nelson Institute

Wisconsin Welcome

In early June, the newest cohort of master's students in the Nelson Institute's environmental professional programs arrived on campus — and were quickly whisked slightly *off* campus for a group field trip to Sauk Prairie Recreation Area, the former home of the Badger Army Ammunition Plant. Here, current students and program staff visit the recently installed Ho-Chunk art installation, *Earth, Sky, Water*. Photo by Rob Beattie

Feature



The Race to Capture Carbon

UW–Madison faculty and students coauthored a landmark report on carbon dioxide removal.

By Tommy Jaime, La Follette School of Public Affairs

Photo by iStock / Andrey Zhuravlev

Researchers affiliated with the La Follette School of Public Affairs and the Nelson Institute for Environmental Studies helped author the 2024 *State of Carbon Dioxide Removal* report that finds that around 7–9 billion tonnes of CO2 per year will need to be removed by mid-century from the atmosphere if the world is to meet the 1.5 degrees Celsius Paris Agreement target.

The new edition of the annual report acknowledges that reducing emissions is the primary way to achieve net-zero, but also emphasizes that carbon dioxide removal (CDR) has a critical role to play in the global efforts to limit warming.

Professor Gregory Nemet and Assistant Professor Morgan Edwards from Nelson and La Follette served as lead authors on the report. La Follette alumni Jenna Greene and Andrew Zaiser contributed to the report as coauthors along with Zachary Thomas, a PhD student with the Nelson Institute.

According to the report, CDR techniques must increase four-fold by 2050. They currently remove just 2 billion tons per year, mostly through conventional methods like tree planting. Novel methods currently remove 1.3 million tonnes per year, less than 0.1 percent of the total. These include technologies such as direct air carbon capture and storage, which uses chemicals to capture the heat-trapping gas

Top to bottom: Greg Nemet, Morgan Edwards, Zachary Thomas

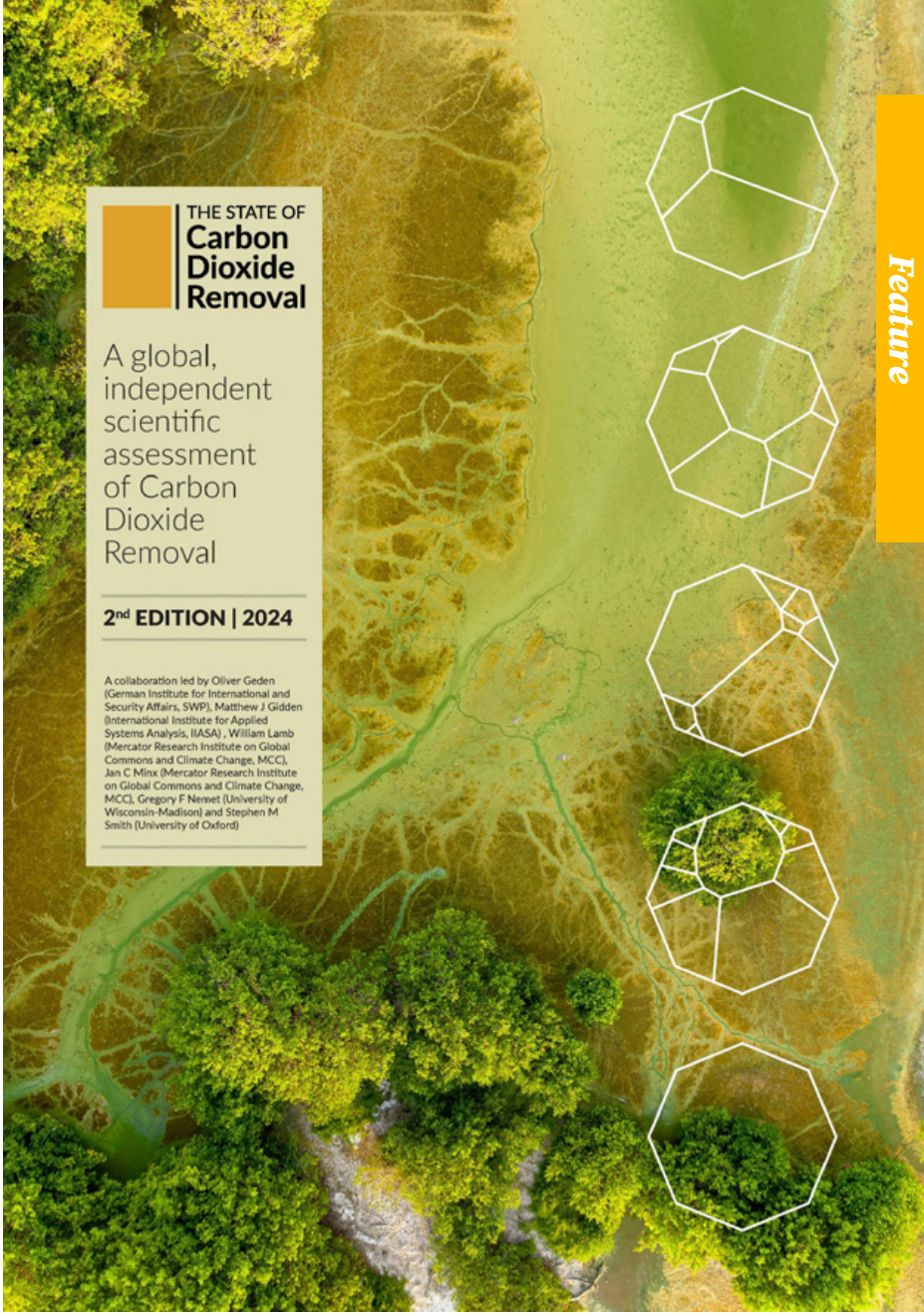
directly from the air, and bioenergy with carbon capture and storage, which captures and stores CO2 from processes where biomass is converted into energy.

"Regardless of how much carbon removal we deploy, we still need to make rapid and deep reductions in emissions," Nemet says. "But we can only avoid dangerous global temperatures if we scale up carbon removal to very large scale over the next two decades—and meeting that level requires active policymaking in the near term."

"Regardless of how much carbon removal we deploy, we still need to make rapid and deep reductions in emissions."

— Greg Nemet

The report indicates that a diverse range of CDR methods must be rapidly scaled up to address climate change in line with the Paris Agreement, which recommends that the world limit the temperature increase to 1.5°C above preindustrial levels. Although the CDR industry has grown quickly in research, public awareness and start-up companies, there are now signs of a slowdown in development.



The cover of the most recent edition of the 2024 *State of Carbon Dioxide Removal* report.

This slowdown is aided, in part, by a lack of governmental commitment to CDR technologies, according to the report. Government policies are almost exclusively focused on reducing emissions and currently lag on the carbon dioxide removal needs that are becoming increasingly clear as emissions continue to outpace net-zero efforts. Meanwhile, government funding accounts for just 1.1 percent of investment in climate-tech start-ups.

"There are many highly innovative CDR companies that are committed to scaling up CO2 removal capacity to meet the Paris Agreement goal," Edwards says. "However, their ability to make a dent depends on governments sending a strong demand signal going forward."

Much of today's demand for CDR comes from voluntary commitments by companies to buy carbon removal credits. Instead, the report urges that governments should implement policies to increase demand for carbon removal strategies and standardize the emergent industry.

The annual *State of Carbon Dioxide Removal* report is the world's leading scientific assessment of how much carbon dioxide removal will be needed to limit climate change, and whether the world is on track to deliver. It is a combined effort of more than 50 leading experts from around the world and in multiple disciplines.

This story was originally published by the La Follette School of Public Affairs.

Research and Recreation

UW–Madison students can engage in applied research as policy analysis interns through a collaboration between UniverCity Alliance, the Department of Political Science, and Dane County.

By Abigail Becker, UniverCity Alliance

Photo by Jeff Miller / UW–Madison

"Students are always looking for hands-on opportunities and research, and this was applied research where you actually can feel like you are making a difference."

— Amy Gangl

As Dane County prepares to update a water recreation study, two University of Wisconsin–Madison students are supporting the effort by creating a survey of county residents while gaining valuable policy and research experiences.

Vanessa Gardner and Samantha Givich worked for Dane County as policy analysis interns during the spring 2023 semester through UniverCity Alliance — a network of community and campus partners working to improve local governments and foster innovation in local communities — and the Department of Political Science.

Gardner, who graduated in May with degrees in community and environmental sociology and a certificate in gender and women's studies, said the experience aligned with the focus of her major: how people interact with their environment. "With the waterways here, we're focusing on creating a survey to find out how people are using lakes — when and why and if anything stops them — so that the county can get some feedback about water recreation resources," Gardner said.

Givich, who plans to graduate in December with degrees in political science and environmental studies and certificates in public policy and gender and women's studies, pursued this opportunity because she hopes the policy and research experience will support her future goal of attending law school.

The students are putting together the beginning pieces of a survey that will ask county residents about their water recreation use. Their work will provide the first steps in future analysis and inform the update of the existing water recreation plan from 2012.

Dane County board chair Patrick Miles said the board has made "community engagement a cornerstone in policy development."

"Resident input is important on a wide variety of topics, including the use of the county's water recreation resources," Miles said. "The input received from county residents who use our water recreation resources will be collected over the next year. Once analyzed, this resident data will help county board supervisors gauge resident concerns and potential opportunities."

The Dane County Board of Supervisors was a UniverCity partner from 2017 to 2019, and starting in 2022, UniverCity has supported the county by pairing two students each semester to work on policy analysis projects. Miles said the partnership provides an opportunity for the county and UW–Madison to learn from and support one another. "The county board uses innovative ideas in policymaking, and the partnership with UniverCity Alliance supports this effort while also providing a chance for students to learn from experienced public policy analysts and understand the impact of local county government," Miles said.

Amy Gangl, director of undergraduate studies in the Department of Political Science, emphasized the value in students engaging in applied research and on-the-ground policy problems. "Students are always looking for hands-on opportunities and research, and this was applied research where you actually can feel like you are making a difference," Gangl said.

Givich and Gardner described feeling more confident creating surveys after this experience and being excited to work with real dataset and not sample information for coursework. Additionally, Gardner said the experience connected her more to her local community. "As a transfer student, it was hard to get involved," Gardner said. "It's been really nice to find something that I can get involved in and feel really at home and really welcomed by (Dane County and UW–Madison staff). It's been really fun."

The partnership will continue into the 2024–25 academic year with two additional policy analysis projects slated for fall 2024. If you are interested in inquiring about the projects available, you can contact Gavin Luter at luter@wisc.edu.

Windsurfers with the Hoofers Sailing Club sail their longboards on Lake Mendota. Photo by Jeff Miller / UW-Madison

A man and his dog canoeing in front of Memorial Union Terrace. Photo by Bryce Richter / UW–Madison

Members of the public enjoy a Lakefront Live summer concert at the Memorial Union Terrace. Photo by Bryce Richter / UW–Madison

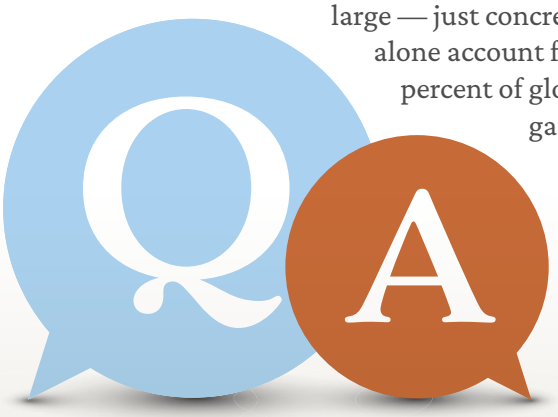
Carbon Content in Construction Materials

WICCI infrastructure working group cochairs discuss the lesser known culprits of greenhouse gas emissions: the making of construction materials.

By Dea Larsen Converse, Wisconsin Initiative on Climate Change Impacts

Construction on the Chemistry Building addition at the University of Wisconsin-Madison. Photo By Bryce Richter / UW-Madison

Many Wisconsin municipalities have embarked on climate action plans, looking for ways to reduce (mitigate) greenhouse gas emissions to diminish their carbon footprint. Actions like switching to solar or electrifying fleets could be enhanced by planning to reduce these infrastructure projects' carbon footprints — the majority of which comes from embodied carbon emissions of construction materials. These emissions are produced from mining of raw materials, manufacturing, transportation, and the construction process itself. The emissions embodied in construction materials are surprisingly large — just concrete and steel alone account for more than 20 percent of global greenhouse gas emissions.



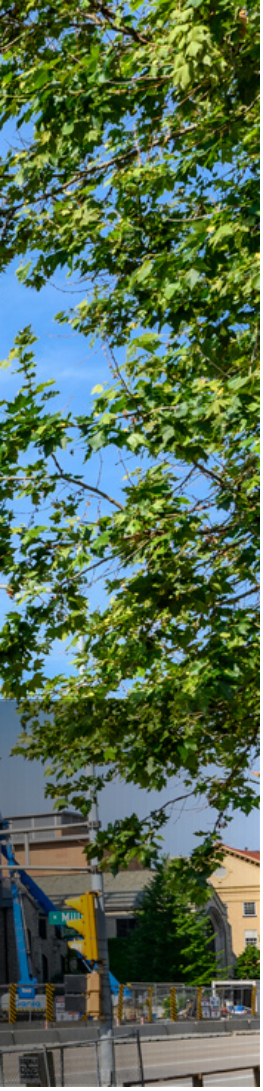
To be informed about and eventually reduce this impact, the first step is to properly quantify the emissions embodied by materials like concrete, steel and asphalt. This is a complex process, and will involve collaboration between owners, designers, contractors and material suppliers.

Here, Bu Wang and Rob Montgomery — both faculty in the UW–Madison Department of Civil and Environmental Engineering and cochairs of the Wisconsin Initiative on Climate Change Impacts infrastructure working group — share the group's findings.

What led you to begin looking at embodied emissions in Wisconsin construction materials?

Montgomery: There are a lot of greenhouse gas emissions produced in manufacture of construction materials such as concrete and in the construction industry. This project identified ideas and approaches to incorporate a measurement of those emissions in a contract bidding process.

Wang: The emissions we are talking about are the emissions produced during the production of each material. For example, when we make concrete, we have to quarry the aggregate and crush it, which requires energy. Man-



ufacturing cement and steel requires high temperatures, which is a very high energy process. Manufacturing concrete and steel alone accounts for about 20 percent of our global carbon emissions. These emissions are termed *embodied carbon*. In order to get down to carbon neutral, we must deal with the emissions generated in the production of these materials.

"In order to get down to carbon neutral, we must deal with the emissions generated in the production of materials."

– Bu Wang

What did you learn?
Montgomery: It is a very complicated process. There is a big learning curve for both construction contractors and facility owners.
Wang: We realized that before you can consider embodied emissions in a bidding process, you must be able to calculate them in the first place. This step is not straightforward. You need to account for how and where these materials are produced and how far they are transported.

Are there any environmental justice issues?
Wang: We need to be aware of who will produce and manufacture materials using new technologies and where these investments will go. Smaller states and smaller contractors may not be ready and may be unable to participate in this low carbon construction industry.

Rob Montgomery

Bu Wang

Construction equipment awaits use behind Lathrop Hall. Photo by Althea Dotzour / UW–Madison

Do you have hope for the future?
Montgomery: Broadly speaking, yes. The manufacturers of construction materials are aware of the need to lower the embodied carbon content of their materials, and know that those issues will be brought into contracting for construction projects.
Wang: I have to say I'm not as optimistic as Rob. Globally, we aren't meeting our goals. I feel like we are going in the right direction, but we are not moving fast enough.

This *condensed interview* is part of a series highlighting interviews done for the 2021 WICCI Assessment Report.

Climate Summary

from the State Climatology Office

A Wisconsin Weather Recap
People say Wisconsin has only two seasons: winter and road construction. The Wisconsin State Climatology Office says otherwise — and they have the data to prove it. See the most recent climate summary and subscribe to regular updates at climatology.nelson.wisc.edu.

Groundwater on the Rocks

New research will map naturally occurring contaminants in public wells across Wisconsin.

By Jenna Mertz, University of Wisconsin Water Resources Institute

Photo by iStock / SafakOguz

Pumped from the vast layers of bedrock beneath our feet, groundwater is the source of drinking water for two-thirds of people living in Wisconsin. According to geochemist Matt Ginder-Vogel, what's in that water is largely influenced by what's in the rock.

"Groundwater is not a lake underneath the ground. It's water that's in tiny pore spaces in the rock," said Ginder-Vogel, an associate professor in the UW–Madison Department of Civil and Environmental Engineering, Nelson Institute faculty affiliate, and director of the Sustainability Research Hub. "So, it really interacts with the rocks around it."

Under the right conditions, this interaction can cause naturally occurring or "geogenic" contaminants — like radium, arsenic, uranium and manganese — to leach from bedrock into groundwater.

Just where geogenic contamination is occurring in the state and how are the questions Ginder-Vogel and his team of graduate students are hoping to answer in new research funded by the University of Wisconsin Water Resources Institute.

Savannah Finley and Juliet Ramey-Lariviere are both graduate students working on the project. They're digging through drinking water quality data from the Wisconsin Department of Natural Resources to identify municipal wells with high levels of contaminants. The goal is to provide a snapshot of geogenic contamination across the state so that folks know what's in their water.

"We want to give a health progress report of our overall aquifer and say—here's what we have. Here are the contaminants that we're looking at," said Finley.

She and Ramey-Lariviere are working on a map that will show contaminant hotspots and the underlying bedrock in those locations to determine if there is a relationship between the two.

"The hope is, once we have this data, to lay it all out on top of one another and look at the different bedrock formations and hopefully try to tie in the bedrock formation with the different contaminants that we're seeing," said Finley.

The team is focused on public wells in the Midwestern Cambrian Ordovician Aquifer System, a horseshoe-shaped region that roughly occupies the southern two-thirds of Wisconsin. Once wells are identified, they'll collect both water and rock samples and begin experiments in the lab, which will reveal the amount of

contamination leaching from the samples and how fast it's occurring.

"We'll be taking rock sections and grinding them up and looking to see what comes off the rocks," said Ginder-Vogel. "You expose them to water and see what partitions into the water. Then you can manipulate the conditions of the water to release other contaminants."

The team will then use these findings to create a model that identifies hotspots around the state prone to geogenic contamination. Ginder-Vogel hopes the model will raise awareness of the problem even if water utilities aren't currently experiencing issues. Concentrations of naturally occurring contaminants can change over time. Take, for example, the city of Waukesha.

"People who think about groundwater often think about it being this unchanging pool beneath the ground, but ... there's the possibility for lots of change."

— Matt Ginder-Vogel

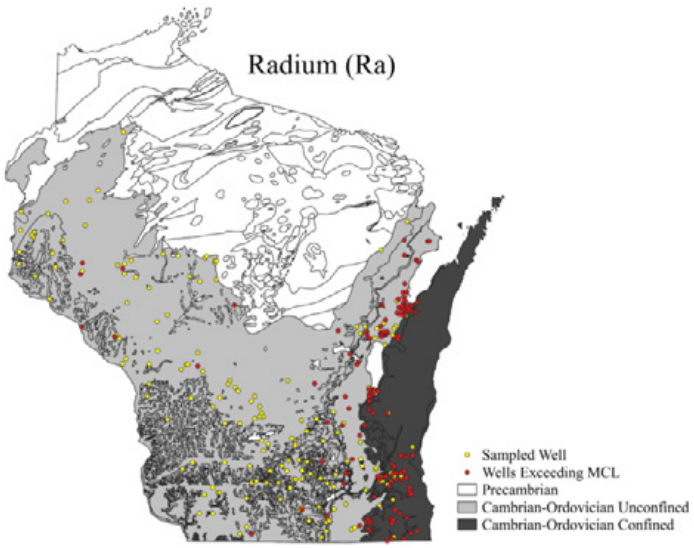
"[Waukesha] didn't always have troubles with radium. But when they started pumping more groundwater — and the Chicago suburbs were also pumping more groundwater and were changing the flow path of the water — [Waukesha] started to have more and more trouble with radium," said Ginder-Vogel. "Once you've seen that, you can't help but ask, is it happening with other things, other naturally occurring contaminants like arsenic?"

Ginder-Vogel said increased water use is what's driving the changing concentrations. Pumping more water pulls groundwater through the aquifer in different ways and allows water to interact with bedrock it hadn't before, picking up new contaminants.

Matt Ginder-Vogel

Savannah Finley

Juliet Ramey-Lariviere



A map of Wisconsin showing wells tested for radium and those with drinking water that exceeds the Maximum Contaminant Level (MCL) standard set by the EPA. Wells exceeding MCL are concentrated in eastern Wisconsin. Image credit: Savannah Finley and Juliet Ramey-Lariviere

"People who think about groundwater often think about it being this unchanging pool beneath the ground, but with all the water that we use and the way we move water around right now, there's the possibility for lots of change," he said.

Unfortunately for water utilities dealing with high levels of geogenic contaminants, the solution isn't an easy or cheap one. Geogenic contaminants don't biodegrade or go away. "They're metals," said Ginder-Vogel. "You can't destroy them and remediate them. You can only move them from one place to another."

One solution is to install treatment systems that remove contaminants from drinking water. It's an expensive option, however, and small municipalities may not have the resources to support such an endeavor. Water utilities may also choose to rebuild a well in such a way that it avoids rock formations with high amounts of contaminants.

Ginder-Vogel's hope is that the team's research helps municipalities develop a plan before geogenic contamination becomes a problem. While they can't change the bedrock, they can be strategic about how they pump water.

Said Ginder-Vogel, "We're trying to be smart about our water resources."

This story was originally published by the University of Wisconsin Water Resources Institute.

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 Tim Lindstrom, Audrey Stanton, and Will Erikson.

Office of Sustainability intern staff. L-R: Tim Lindstrom, Audrey Stanton, Will Erikson

Summer is here and three undergraduate internship programs at the Office of Sustainability are underway. From sophomores to seniors, more than 30 students are working on sustainability around campus and in the community. Read on to learn about the programs, and stay tuned to hear more about the interns' successes and collaborations.

Office of Sustainability Intern Program

Offered annually since 2012, the Office of Sustainability Intern Program recently welcomed a new cohort of 16 undergraduates from an array of majors. Their summer opportunities include developing sustainability knowledge, learning about campus systems, growing professionally, and building community with their cohort and full-time OS staff. Interns spend the early portion of their 10-week summer session training before being placed into smaller teams with specific focus areas: sustainability certification and consultancy, student outreach and education, communications and digital content production, and academic research and writing. These teams inform the balance of the interns' work for the remainder of the summer and into the school year.

Corporate Sustainability Internship Program

Launched in 2023, these internships provide students with sustainability experiences in a corporate environment. Meanwhile, corporate partners gain access to a broad talent pool of excellent UW–Madison students curated to meet their needs. Eight student interns will work with corporate sustainability leaders across the state on projects ranging from Scope 3 emissions reporting, solar farm siting, permitting and construction, to obtaining LEED certification and retrofitting battery charger designs.

Scholars in Science, Technology, Engineering, and Mathematics (S-STEM) Program

The inaugural cohort of S-STEM interns began their summer internship with the Office of Sustainability in June. These undergraduate students (STEM majors completing a sustainability certificate) are conducting campus sustainability research projects, including assessing the impacts of new technologies implemented at University Housing Dining and the Charter Street Heating and Cooling Plant. The students will utilize quantitative and technical skills such as data analysis, life cycle assessment, and systems thinking with the goal of publishing their work both internally for campus and externally for the broader academic community.

Director's Cut

A quarterly update from Ben Zuckerberg, director of the Center for Ecology and the Environment.

It's been an exciting first year as the new director for the Center for Ecology and the Environment (CEE)! I must admit, I started this role with some nervousness about the new responsibilities and initiatives ahead. However, my worries quickly dissipated once I began working with our wonderful community of students, postdoctoral scientists, and faculty on campus.

The mission of the CEE is to provide a nexus for faculty and students to share ideas, enhance scholarship, and promote ecology on campus and beyond. This past semester was a busy one for CEE! Here are some of the highlights:

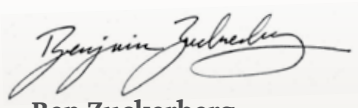
- The start of our annual two-day spring symposium perfectly coincided with the solar eclipse (this took a lot planning). Although the eclipse led to a slight delay as we all marveled at the celestial event, we enjoyed a marvelous set of graduate student speakers. Our keynote speaker, Michael Dillon from the University of Wyoming, gave an insightful talk on the thermal ecology of bees and the challenges of diversity initiatives on campuses.

- We were thrilled to present our first-ever set of graduate student Aldo Leopold Graduate Research awardees, Sarah Tolbert and Erica Shoenberger, after receiving more than two dozen applications from across campus. This research award, made possible by the generous support of Steven Lawry, will support graduate students whose research focuses on the intersection of ecological and societal systems challenges. We look forward to continuing this annual competition in the coming years.

- Our undergraduate student chapter of WILD SEEDS (Strategies for Ecology, Education, Diversity, and Sustainability) continues to impress us with their passion and enthusiasm for environmental work. They have been active with native planting initiatives on campus, visiting research sites, and organizing camping trips.

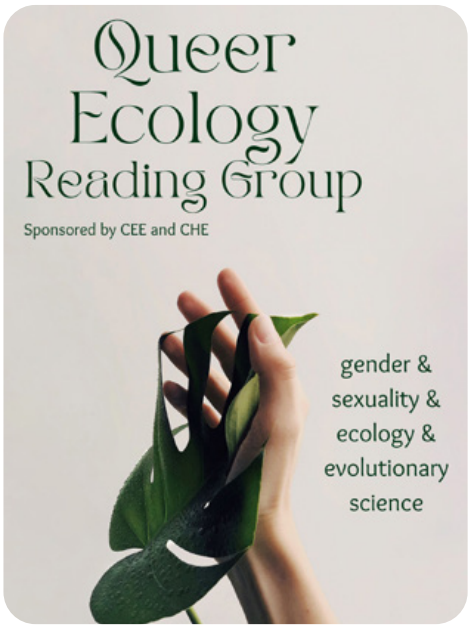
- The Queer Ecology reading group, cosponsored with the Center for Culture, History, and Environment, completed its first successful year and plans to continue their efforts. This reading group explores the intersection of queer and feminist theory, posthumanism, ecology, and evolutionary science.

None of this would have been possible without the generous support from the College of Agricultural and Life Sciences, the College of Letters & Science, and the Nelson Institute for Environmental Studies. Wrapping up my first year as director, I am deeply impressed and optimistic about our exceptional group of students, postdocs, and faculty members who make our center excel. I extend a heartfelt acknowledgment to our tireless executive committee for their support: Kyle Webert, James Crall, Zac Freedman, Sara Hotchkiss, Sean Schoville, Wendy Turner, Jesse Weber, Olivia Bernauer, Cooper Rosin, Min Chen, Alyson Fleming, Aldo Arellano, Roberto Carrera-Martinez, Anupreksha Jain, Emily Adler, Audrey Rollo, and Carson Keller. Thank you all for an incredible year, and I look forward to many more exciting accomplishments together!



Ben Zuckerberg

Photo by iStock / Liliia Bila

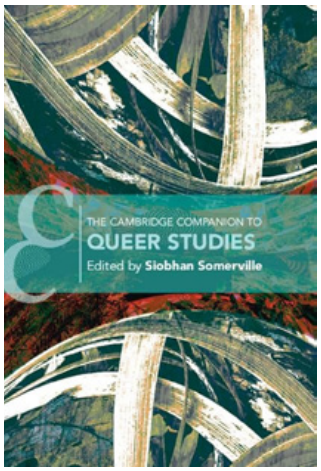


In the fall semester, two distinct Nelson Institute research centers came together over books. The scientists in the Center for Ecology and the Environment (CEE) joined with the humanists in the Center for Culture, History, and Environment (CHE) to discuss how their respective fields interact, particularly around the ideas of queerness in ecological and evolutionary science. "I've never liked how non-reproductive individuals often get totally ignored in evolutionary and ecological narratives, and I wanted to learn more about queer perspectives on nature and kinship," said Kyle Webert, a CEE administrator. He, alongside English professor and CHE faculty associate Sarah Ensor and botany graduate student Tabitha Faber, started the group, which has since met 10-plus times and discussed nearly 20 works. Here is a sampling of the reading group's list to add to your bookshelf.

Your Summer Reading List

Selections from the Queer Ecology Reading Group to add to your bookshelf.

By Chelsea Rademacher



***The Cambridge Companion to Queer Studies*, Chapter 7: Queer Ecologies and Queer Environmentalisms**
Book edited by Siobhan B. Somerville, chapter by Nicole Seymour

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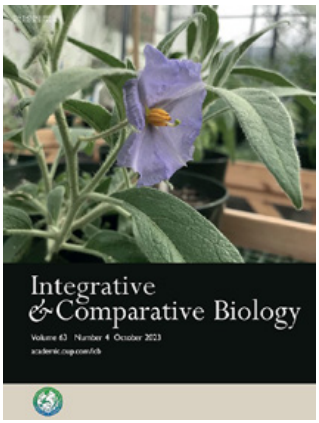
***Queer for Fear*, Episode 3**
Written and directed by Tom Maroney

WATCH



"Re-imagining Reproduction: The Queer Possibilities of Plants" from *Integrative and Comparative Biology*, Vol. 63, Issue 4, October 2023
By Banu Subramaniam and Madelaine Bartlett

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"Land as pedagogy: Nishnaabeg intelligence and rebellious transformation" from *Decolonization: Indigeneity, Education & Society*, Vol. 3, No. 3, 2014
By Leanne Betasamosake Simpson

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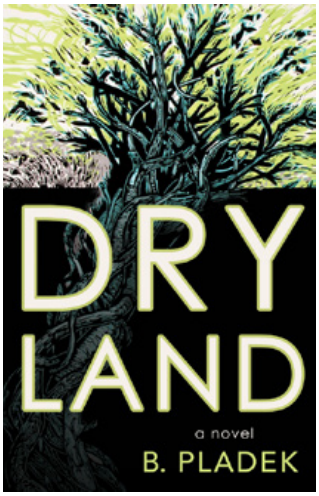

Dry Land
By B. Pladek

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"Men, Masculinities and Climate Change: A Discussion Paper"

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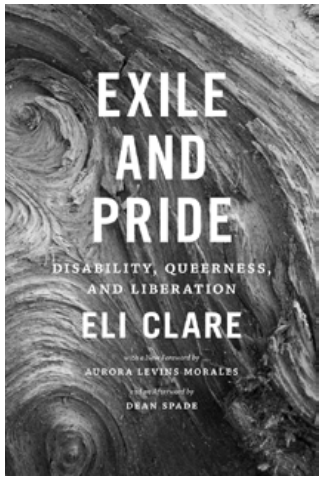

***Exile and Pride: Disability, Queerness, and Liberation*, "Freaks and Queers" chapter**
By Eli Claire

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"The Science Underground: Mycology as a Queer Discipline" from *Catalyst: Feminism, Theory, and Technoscience* Vol. 6 No. 2, 2020
By Patricia Kaishian and Hasmik Djoulakian

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Evolution's Rainbow: Diversity, Gender, and Sexuality in Nature and People, Tenth Anniversary Edition
By Joan Roughgarden

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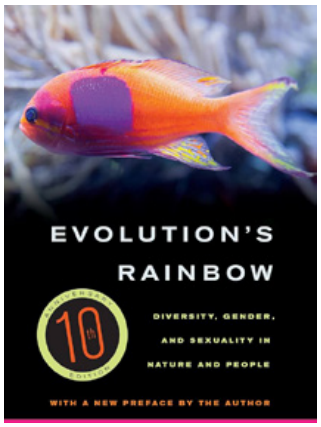

A Rusty Resolution

A winning essay from the 2023 Sustainability Writing Awards, hosted by the Office of Sustainability.

By Madelyn Anderson

Madelyn Anderson (they/she) is a second-year undergraduate double majoring in life sciences communication and environmental studies. They combine these passions outside of the classroom by serving as science editor at the Daily Cardinal*, volunteering at local farms, and working towards environmental equity at the Climate Solutions for Health Lab. In their free time, they enjoy creating eco-art, and they hope to continue communicating about environmental issues through multiple mediums after graduation.*

Where were you on August 18, 2023? Did you feel the air shift? Did you hear your heart still? Did you let your hands cease to shake? I did not. I was lying under the Minnesota sun, not close enough to sense the resolution. But somewhere in Wisconsin, tucked away in a quaint backyard along the river, a rusty patched bumble bee let out a sigh of relief.

If you are not yet acquainted with our invertebrate friends, let me introduce you. The rusty patched bumble bee, scientifically known as Bombus affinis, is a special species. They are identified by their trademark rusty patch on the second segment of their abdomen, as seen in workers and males. These bees also display a unique "thumbtack" pattern, with yellow thorax hair and a T-shaped, black-haired back. Rusty patched bumble bees once roamed a large range in the United States, cross-fertilizing from the East to the Upper Midwest.

Due to climate change, since their prime pollination days in the 1990s, their population has declined by a devastating 87%. Now they live an elusive life in fewer than ten states, joining thousands of other creatures on the endangered species list. However, there is hope. Scientists everywhere are fighting for this species

to be seen. The most crucial conservation efforts for the rusty patched bumble bee include removing invasive species and introducing ideal habitat conditions. Scientists advocate for people to avoid insecticides, overgrown invasive plants, and mowing or raking their entire yards. Instead, they recommend leaving some areas untouched and full of native vegetation. And, perhaps most importantly, conservationists participate in public communication to ensure citizens know the rusty patched bumble bee's story and name.

Despite the citizens and ecologists working tirelessly to employ these tactics, there have been few signs of rehabilitation. Breaths have been held, hearts have raced, and climate anxiety has run rampant. While some Wisconsin species like the karner blue butterfly have rebounded, in the last twenty years only four rusty patched bumble bee nests have been spotted. Scientists struggled to find hope in the fight for these invertebrates as sightings were slim.

Until this summer, on August 18, that fateful day when scientists came running. Thanks to a Kenosha County resident who was tending their yard and recognized the sweet

The rusty-patched bumble bee (Bombus affinis) is officially listed as endangered under the Endangered Species Act in 2017. Citizen science projects, including one coordinated by the UW Arboretum, contributed high quality data to the species status assessment, and their continued efforts can help the bee recover. Photos by Hyunsoo Leo Kim / University Communications (3)

sounds of bumble bees, a fifth rusty patched nest was found.

While this is inspiring, you may be wondering, "Where is the resolution?" Does this one nest matter in scale to the thousands of lives lost? To answer that, I encourage you to look at your own biology. Sit and stare at your hands. While you might not see a rusty patch, there are colors and lines marking who you are. These hands hold, they help, and they create.

It's tempting to fall into self-deprecation, to contest that our existence means nothing in the sea of populations. Sometimes, this train of thought can be observed in the current environmental movement, where countless voices are being lost. Overgrown garlic mustard leaves take the form of green tainted dollar bills, insecticides disguise themselves as systemic privileges, and the uniqueness of species is lost under blanket answers.

Would it matter if there were a thousand rusty patched bumble bee nests if we didn't know their name? Could they thrive if the walls were made of mass-produced plants versus pieces of their native community? As nature teaches us, no. Solution is not synonymous with resolution.

No, a resolution is something different. It's an answer, yes, but it's also intent and introspection. Resolution means returning—to the earth, to ourselves, and our connection. For the rusty patched bumble bees living in that backyard, resolution meant having space. And when we create that for others, beautiful things happen. The spirit of resolution grows.

You see, all the events that led to the discovery of the fifth nest are not necessarily solutions. They are not the same, they are not mutually exclusive, and they are not direct. Like the ethos of basic science, these events were born out of curiosity. They involved individual actions, one after the other, each placing a piece in the story. There is no doubt that the climate crisis demands prompt answers and action. But in addition to this applied approach, we must consider the idea of resolution as medicine. There is no reducing carbon without understanding its makeup and the places it presents itself in our everyday lives. There is no saving endangered species without naming the ones living in your own backyard.

"Solution is not synonymous with resolution."

— Madelyn Anderson

Looking back on that day now, do you see the resolution? Can you feel the sigh of relief? Maybe not. Maybe insects aren't your area of expertise. But if you take the time to call your community by name, I guarantee you something will strike you. You will spend a moment seeking other life in the garden and look down to notice the rust on your hands. And you will feel so excited that you plant a bush, which becomes a home, and then a news article, and then a feature story for a campus sustainability submission, and suddenly that one natural moment has spanned ecosystems.

Where were you on August 18, 2023? Did you feel the air shift? Did you hear your heart still? Did you let your hands cease to shake? I did not. I was lying under the Minnesota sun. And the nest was existing. And the landowner was listening. And the insect ecologist was running.
And the rusty patched bumble bee was letting out a sigh of relief.

Hear an interview with Anderson and the other awardees on the SustainUW Podcast.

Healthy World, Healthy Womb

Nelson Institute graduate student Morgan Robinson studies the intersection between women's health, social justice, and the environment.

By Laila Smith

"We often talk about the woman, or pregnant person, as a fetus' first environment — but we don't talk about the environment of the pregnant person."

— Morgan Robinson

Would you choose to have kids if you knew they would be born into an environment riddled with toxic pollution, subjecting them to poor health throughout their lives? This is a struggle that many future parents are currently grappling with — and one that's a guiding question for Nelson Institute PhD student Morgan Robinson. For years, Robinson has studied the relationship between a woman's reproductive health and her access to a healthy environment, but the connection may not be as obvious to everyone. "It makes so much sense to me, but sometimes it's hard to convince people that women's health is an environmental issue," she says.

Robinson has a bachelor's degree in women's studies with a minor in sociology from Metropolitan State University in Denver. Growing up, she was aware of the discourse surrounding women's health and women's rights, but it wasn't something she sought out to study. However, when taking a gender and women's studies course for a general requirement, something "clicked" for Robinson.

"I remember feeling transformed from all of the information I was taking in. I started learning about everyone's individual

experiences and how many were different from my own. It made me realize that I have so many privileges that I hadn't considered before," says Robinson. After discovering her passion for women's rights, she focused her efforts on examining the relationship between environmental pollution and women's health.

As her undergraduate degree drew to a close, Robinson decided her next step was to pursue a graduate degree where she could continue to learn about the intricacies of women's health issues. "As an undergraduate I had a lot of male anthropology and environmental studies professors who didn't understand the connection between women's reproductive health and pollution, so I knew I needed to be in a place where I could really dive into the relationship," says Robinson. "When I found the Nelson Institute, it seemed like the perfect place to study these things with an interdisciplinary approach."

How exactly does pollution and our environment affect women's pregnancies and reproductive health? "The environment a pregnant woman is in can impact the environment of her womb, which may negatively impact a developing fetus," Robinson says. This field of study is referred to as environmental epigenetics, where environmental factors — such as someone's exposure to pollutants or other toxins — affects how their genes function. If a pregnant woman is surrounded by a harmful environment, it could lead to health issues or birth defects in her child.

"Environmental justice and reproductive justice are very intertwined, because people should be able to birth and raise children in a safe, healthy, and sustainable environment," says Robinson. "We often talk about the woman, or pregnant person, as a fetus' first environment — but we don't talk about the environment of the pregnant person."

Social justice also comes into play when examining women's health issues. "There are a lot of Black, Latina, Asian, and Native American women who have been talking about these issues for a long time," Robinson says. "Environmental health issues often affect communities of color before they affect white communities. A lot of people live in certain areas because of their race — which stems from legacies of slavery and discriminatory housing practices throughout U.S. history — and often don't have the opportunity to move out of these areas." For example, communities in Madison that have been historically redlined overlap with areas zoned for industrial use — leading to much higher levels of air and water pollution in those communities.

While Robinson isn't sure exactly where the future will take her, she knows her passion lies in reproductive health and environmental justice. In a constantly changing climate, her commitment to women's health issues will undoubtedly help shed light on the intersection between reproductive health, social justice, and the environment. "Reproductive health is intimately connected to environmental health, and I feel like a lot of people don't connect the dots between the two," Robinson says. "Everything about our physical environment — the streets we live on, the places we go, and the food we have access to — affects our reproductive health. Reproductive health is so intertwined with environmental health."

Neighborhood next to an oil refinery in Baton Rouge, Louisiana. Photo by iStock / donvictorio

Nelson Institute Announces 2024 Alumni Award Winners

Meet this year's honorees, whose expertise spans aquatic restoration to carnivore conservation.

More than 6,000 Nelson Institute alumni work in government, business, and nonprofit organizations, applying their knowledge and skills to make the world a better and more sustainable place. Many also volunteer with environmental or humanitarian causes, extending the community-based philosophy that is cultivated within the institute. Each year, the Nelson Institute honors several standout alumni whose work embodies the Wisconsin Idea. Since the first awards in 2014, 40-plus Nelson alumni have been recognized in two categories: the Rising Star Alumni Award, which honors recent graduates, and the Distinguished Alumni Award, which recognizes graduates with long-term success or impact in their field.

Awardees are honored at the annual Rendezvous on the Terrace event, held this year on September 27. We hope you can join us in celebrating this year's cohort of honorees!

Rising Star Alumni Award Winners

Gloria Castillo Posada
Environment and Resources MS, 2015

Naomi Louchouarn
Environment and Resources PhD, 2023

Laura Miller
Environmental Studies, 2019

Anna Weinberg
Environmental Studies Certificate, 2018

Distinguished Alumni Award Winners

Arlyne Johnson
Conservation Biology and Sustainable Development MS, 1989
Land Resources PhD, 2007

Curt Meine
Land Resources PhD, 1983

Jeff Rudd
Environment and Resources PhD, 2009

Read more about this year's honorees.

tales from planet earth

Embark on a journey into Waubesa Wetlands as Calvin DeWitt, a wetland scientist and Nelson Institute faculty emeritus, shares the knowledge and wisdom he has found from living on the marsh for over 50 years. Taking these lessons, his grandson, a 20-year-old filmmaker, sets out to gain a deeper understanding of the marsh and his grandfather's unique connection with it.

Screenings

Sunday, Sept. 29, 2024 | 4–8 p.m.
Lussier Family Heritage Center

Monday, Sept. 30, 2024 | 6–8 p.m.
Marquee Cinema at Union South

More information and registration at **nelson.wisc.edu/waubesa**

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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!

2024 Rendezvous on the Terrace

Friday, Sept. 27, 2024 | Tripp Commons, Memorial Union

Don't miss this chance to reconnect with your fellow Nelson Institute alumni, meet current students and faculty, and of course, enjoy a sunset over Lake Mendota.

Register today!

Rendezvous ON THE TERRACE