



**Environmental Science and Policy
Program**

Student Research Symposium

Fall 2025

October 24, 2025
Kellogg Hotel and Conference Center
East Lansing, MI

Agenda

Time	Activities
8:00 - 8:45 AM	Registration and breakfast (Lincoln Room)
8:45 - 9:00 AM	Opening Remarks
	Keynote Talk: Dr. Rafael Auras, School of Packaging, MSU
9:00 - 9:50 AM	Title: Packaging Design for End-of-Life Focusing on Biodegradability and Compostability
9:50 - 10:00 AM	Group photo and coffee break (Lincoln Room)
	Concurrent Oral Sessions
10:00 - 11:50 AM	• Oral Session #1 (Lincoln Room) • Oral Session #2 (Room 103A) • Oral Session #3 (Room 103B)
11:50 - 12:00 PM	Break
12:00 - 1:30 PM	Poster Session (Lincoln Room)
12:00 PM	Lunch (Lincoln Room)
12:30 - 13:00 PM	Lightning talks by poster presenters, 2 min each.
1:40 - 1:55 PM	Closing Ceremony (Lincoln Room)

Welcome and Opening Remarks



Dr. Carole Gibbs, Associate Dean for Graduate Studies, College of Social Science

Dr. Carole Gibbs is an Associate Professor in the School of Criminal Justice at Michigan State University. Her research interests include understanding street and elite crime from a systems perspective and advancing access and opportunity in higher education. She is currently serving as Associate Dean for Graduate Studies in the College of Social Science, overseeing the graduate programs in the college, including ESPP's Dual Major Doctoral Program. Recent publications have appeared in *Crime and Delinquency*, *Criminology*, and *Regulation and Governance*.

Keynote Speakers



Dr. Rafael Auras, School of Packaging, College of Agriculture and Natural Resources

Dr. Auras is Professor and the Amcor Endowed Chair in Packaging Sustainability at the School of Packaging at Michigan State University. He leads a research group of graduate and undergraduate students, postdoctoral fellows, and visiting scholars interested in developing novel biobased and biodegradable polymers, tailoring polymer biodegradability, and designing sustainable packaging systems.

Title: Packaging Design for End-of-Life Focusing on Biodegradability and Compostability

Abstract

As global plastic production and consumption continue to rise, managing the resulting waste has become a growing environmental challenge. A significant portion of this waste is still incinerated, landfilled, or released into the environment, underscoring the need for sustainable material alternatives and improved end-of-life solutions. This presentation examines the potential of biobased and compostable polymers, particularly poly(lactic acid) (PLA), the most widely used commercial biobased polymer, in addressing this issue. Drawing on recent research from our group, we will examine how material design, environmental conditions, and process optimization impact polymer biodegradation under industrial and mesophilic composting conditions. The presentation will also discuss strategies such as reactive blending, biostimulation, bioaugmentation, and enzymatic pretreatment to accelerate polymer breakdown. Ultimately, this talk bridges material and packaging science, composting technology, and sustainability goals to demonstrate how thoughtful packaging design can advance circularity by ensuring effective biodegradability and compostability at the end of life.

Oral Sessions

Requirements

- Each oral presentation should be kept strictly **within 15 minutes**, including 12 minutes talk and 3 minutes for Q&A.
- Session chairs will reminder the speakers when they approach the 12-min mark.

Oral Session #1 (Lincoln Room, Session Chair: Nudrat Fatima)

Time	Presenter	Title
10:00 AM	Zhouyuan Wang	SARS-CoV-2 Detection in the Air of University Lecture Rooms Using Heating, Ventilation, and Air Conditioning Filters
10:15 AM	Sehwan Cheon	Fiber-Based Packaging: A Sustainable Alternative to Plastic in the Fruit Industry
10:30 AM	Henry Gonzalez	Two-stage woodchip bioreactors remove agrochemicals from recycled irrigation water
10:45 AM	Jincheng Hunag	The Impacts of the COVID-19 Pandemic on Global Land Use Change and Biodiversity
11:00 AM	Miyeon Kim	When Do Changing Norms Persuade? An Experimental Test of Dynamic Norms, Financial Benefits, and Individual Differences
11:15 AM	Iris Margetis	The Effects of a Mandatory Flood Risk Disclosure Law on Rent Prices and Residential Sorting in Texas
11:30 AM	Latifa Salangi	Building Community Trust in Public Health Institutions

Oral Session #2 (Room 103A, Session Chair: Yousef Khajavigodellou)

Time	Presenter	Title
10:00 AM	Leo Baldiga	Visions of Progress and Precarious Realities: The Politics of Cambodia's Funan Techo Canal
10:15 AM	Ahmed Elkouk	Projections of streamflow and water availability in the southwestern U.S.

10:30 AM	Jaewon Han	Finding green solvents for PET chemical recycling back to PPD monomer in the life cycle assessment framework
10:45 AM	Jae-Yu Jung	Do EV Charging Stations Care about Electricity Rates?
11:00 AM	Xin Lan	Beyond the Surface: Improving Subsurface Lake Temperature Prediction via Simulation-Based Pre-training and Adaptive Ensembling
11:15 AM	Johnny Musumbu	Localizing Sustainable Development at Natural World Heritage Sites in Africa: A Case Study of Lake Malawi National Park World Heritage in the Republic of Malawi Heritage.
11:30 AM	Aman Shreshta	Bridging Models and Practice: Agricultural Water Use in the Mississippi River Basin

Oral Session #3 (Room 103B, Session Chair: Tasha Siame)

Time	Presenter	Title
10:00 AM	Miyeon Kim	A Formative Evaluation of Water Conservation Behaviors Among College Students
10:15 AM	Alexandra Benitez Gonzalez	Evaluating Risk Communication Strategies for Harmful Algal Blooms in Vulnerable Populations
10:30 AM	Andrew Huang	Enhanced Sorption of Per- and Polyfluoroalkyl substances (PFAS) by Cation Bridging Interaction in Homoionic Soils
10:45 AM	Qinyuan Cao	Carrot Metallome Is Primarily Controlled By Growth Stage Rather Than Soil Water Conditions
11:00 AM	Ye-Rim Lee	Wildfire and Hurricane Disruptions: Evidence on Short-Term Gasoline Price Dynamics
11:15 AM	Jeremy Rapp	Pipe Dreams: Mapping Irrigation Technologies and Consumptive Use Across Scales

11:30 AM

Tasha Siame

A Protocol for Studying Disparities in Park Access and Use in Flint, Michigan

Poster Session

Requirements

- All posters should be **in portrait mode with a maximum dimension of 72 in (H) x 48 in (W)**. A typical poster can be 54 in x 42 in.
- The poster session will be in the Lincoln Room. Hang your posters on the designated spot on the poster board with push pins before the poster session starts at 12 PM. We strongly encourage you to put up your posters during registration and breakfast.
- As a backup plan in case that our invited speaker cannot attend the symposium due to the government shutdown, **poster presenters are asked to prepare a 2-min lightning talk to introduce their posters to the audience during the poster session. You may want to prepare 1 or 2 slides to highlight your work!**
- Please stand by your poster during the poster session to talk about your work with viewers.
- After the symposium, make sure you take down your poster.

Poster Number	Presenter	Title
#1	Saugat Aryal	Unprecedented Hydrological Transformation of the Asian Water Tower
#2	Caroline Baidoon	Tumorigenic potential of triclosan, a household antimicrobial ingredient, and chemoprevention by resveratrol and quebecol.
#3	Julia Belden	VISIBILIZING ENVIRONMENTAL COMMUNICATION AT THE MARGINS: A BIBLIOMETRIC ANALYSIS OF LATIN AMERICAN SCHOLARSHIP
#4	Maria Guzman	Deep-Sea Nanowires for Recovery of Strategic Metals
#5	Rachel Isbey	Shocks to Aviation and Recovery - Evidence from the US
#6	Gustavo De la Cruz Montalvo	Record 2022–2024 Hydrological Drought, Long-Term Trends (1981–2024), and Water-Storage Losses
#7	Sanjita Pulgam	Connecting US Air Freight to International Trade

#8	Mohammad uzair Rahil	Integrated Hydrology-Crop Modeling in the Lower Michigan Using the Community Land Model (CLM)
#9	Angelique Willis	Ethno-racial and Class Dimensions of Drinking Water Contamination in the Detroit, Michigan Region
#10	Dian Xu	Effect of Concentration and Temperature-dependent Poly(lactic acid) Crystallization on the Migration of Alcohol–Water Mixtures
#11	Tanjila Akhter	Assessing Irrigation and Pumping-Induced Hydrologic Impacts in South Asia Using CLM5
#12	Xiang Yu	Impacts of losses in Ukraine’s grain production on global trade due to the Russia-Ukraine war
#13	Jonathan Vivas	Dynamics of Human Well-Being in U.S. Cow–Calf Systems

Our Sponsors

The Student Research Symposium is proudly sponsored by:

- Environmental Science and Policy Program
- College of Social Science
- College of Natural Science
- College of Agriculture and Natural Resources
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Organizing Committee

Sarah Buelow (School of Packaging)

Nudrat Fatima (Earth and Environmental Science)

Yousef Khajavigodellou (Geography, Environment, and Spatial Sciences)

Tasha Siame (Forestry)

Dr. Joseph Hamm

Ms. Tina Bird

Dr. Lifeng Luo

List of Abstracts

*Abstracts are listed in the order they were submitted.

Oral Presentations: (21 Presentations)

A Protocol for Studying Disparities in Park Access and Use in Flint, Michigan

Authors: Tasha Siame, Samantha Gailey, Richard Casey Sadler, Alan Harris,

Abstract: Green spaces such as parks reduce stress, improve mental health, and promote physical activity that lowers chronic disease risk. Yet access is not equally distributed. This study examines social and structural determinants of park access in Flint, Michigan, and how they shape use prior to the development of the new Flint State Park. Guided by the Theory of Access, we conceptualize access through availability, accessibility, affordability, accommodation, and acceptability. With Michigan State University ethical approval (Exemption No. 00012129), we will survey Flint residents enrolled in the Flint Registry who were impacted by the water crisis. We test whether proximity and quality encourage use, whether safety concerns, transportation limits, and affordability restrict use among marginalized groups, and whether disparities in access are associated with health and well-being. Findings will guide equitable park planning and policy in Flint and beyond, ensuring investments deliver safe, inclusive, and accessible spaces for all residents.

Keywords: Park Access, Equity, Policy, Health and Well-being

Bridging Models and Practice: Agricultural Water Use in the Mississippi River Basin

Authors: Aman Shrestha, Yadu Pokhrel

Abstract: Agriculture in the Mississippi River Basin relies on a delicate balance between rainfall, rivers, and groundwater. Yet, many models struggle to capture how farmers use these water sources, limiting their usefulness for planning and sustainability. In this work, we improved the Community Land Model by introducing a data-driven approach to divide irrigation water between surface water and groundwater. This change greatly improved agreement with U.S. Geological Survey estimates, especially in heavily irrigated regions like the High Plains Aquifer and the Mississippi Alluvial Plain, where correlations rose to ~0.9. By more accurately reflecting how water is used, the model provides a stronger foundation for understanding agricultural water demands and their impacts on rivers and aquifers. Importantly, this framework can be adapted to other land surface models, offering a pathway toward more realistic and transferable tools for managing water and agriculture in a changing world.

Keywords: modeling, irrigation, hydrology, agriculture

Building Community Trust in Public Health Institutions

Authors: Latifa Salangi, Adam Zwickle, Joseph Hamm, Tiffany Williams

Abstract: Trust, one's willingness to be vulnerable based on the expectation that this vulnerability will not be exploited, is crucial to effectively managing public health and improving health outcomes for all. In the context of public health institutions, building trust through a focus on community vulnerability becomes particularly important. Public health departments often deal with sensitive information and make decisions that directly impact community well-being. The COVID-19 pandemic highlighted the critical role of trust in public health initiatives. Public health agencies have a long history of being mistrusted by vulnerable communities in the United States. We conducted a qualitative study to understand the health concerns of three communities and their perceptions of the Michigan Department of Health and Human Services

(MDHHS) as a trustworthy or untrustworthy agency, and how the agency could better serve these communities. Through three focus groups with community leaders and eight individual interviews with residents, we collected the participants' experiences with and perspectives on MDHHS, gaining valuable insights into community health initiatives and how trust varies across these communities. Focus group participants indicated that individuals-built trust in the public health agency through regular, personal interactions with the agency's workers. The agency proves its trustworthiness by being present in the community and by understanding the unique issues and vulnerabilities that the community faces. They provided examples of trusting relationships that exist between the county health department and community members, doctors and their patients, and any understanding advocate who helps vulnerable individuals navigate government systems. These advocates, who often exist within local government agencies and NGOs, can be supported through the understanding of the benefits and programs available in their community, which enables these advocates to better support and inform those they serve. In contrast, interviews revealed similar patterns, while there is a general acknowledgment of MDHHS' expertise and the crucial role it plays, there are also varying levels of trust across the three communities. Interviewees believed that MDHHS possesses the necessary knowledge and skills to effectively address public health issues. Furthermore, knowing the individuals behind the organization and forming personal connections with staff contributed to a sense of familiarity, reliability, and trust in MDHHS. Both the focus group and interview findings highlight the importance of personal interactions and relationships in building trust, with an emphasis on how effective engagement can mitigate vulnerability among residents. themes like effective communication, reliable information dissemination, and mutual understanding emerged from both sets of data, emphasizing how trust can be fostered through ongoing efforts and genuine community involvement. Overall, this research uncovered crucial insights about the significance of personal interactions and relationships in building trust. It was identified as a crucial element for establishing trusted relationships. As residents engaged more with MDHHS, their level of trust in the agency increased, and their vulnerability decreased. Conversely, those who had not engaged with MDHHS exhibited lower levels of trust and heightened vulnerability. Furthermore, this research highlighted how ineffective communication, such as outdated information, misunderstanding what people are saying, or misinterpreting their needs, can damage trust. Providing reliable, science-based information could enhance the credibility of that information and enhance trust. Ultimately, trust emerged as a fundamental component of successful community engagement, fostered through consistent effort and genuine interest.

Carrot Metallome Is Primarily Controlled By Growth Stage Rather Than Soil Water Conditions

Authors: Qinyuan Cao , Hui Li , Kurt Steinke , Zachary D. Hayden , Chenxi Li and Wei Zhang

Abstract: Metal(loid) contamination in food crops has raised serious food safety concerns. Further, both toxic and essential metal(loid)s are taken up by food crops and collectively determine the quality and safety of food crops. Thus, plant metallome (the full composition of metal(loid)s) should be considered when evaluating metal accumulation in crops. However, little is known about how crop uptake of metal(loid)s and plant metallome change with variable soil wetting-drying periods and plant growth stages. This study examined the uptake and translocation of 16 metal(loid)s across five growth stages of carrot (*Daucus carota* subsp. *sativus*) under three soil wetting-drying regimes in greenhouse microcosms. The five stages of carrot growth were organized into three phases, each maintained at either 35% or 80% of soil water holding capacity (i.e., dry period [D] or wet period [W]), resulting in three treatments (i.e., DDW, WDD, and WWW). At the end of each growth stage, carrot lateral root, storage root, shoot, and soil samples (in triplicates) were collected for each treatment and analyzed using inductively coupled plasma – mass spectrometry (ICP-MS) after microwave assisted acid digestion. Hierarchical clustering analysis indicated that metal(loid) accumulation in shoots, storage roots and lateral roots was primarily dependent on growth stage. ANOSIM and PCA analyses confirmed significant metallome differences across growth stages, with minimal effects from soil water conditions. Community analysis further showed increasing diversity and evenness over time and distinct metal(loid) co-occurrence networks in different tissues. Translocation factors of nine most correlated metal(loid)s in carrot storage roots increased with plant growth, while bioconcentration factors decreased, indicating early-stage uptake and late-stage dilution in carrots. This study revealed that growth stage is the primary determinant to metallome in carrots rather than soil water conditions under tested conditions. Future studies should continue to explore more diverse soil water conditions and crop species.

Keywords: Metallome, heavy metal, plant uptake

Evaluating Risk Communication Strategies for Harmful Algal Blooms in Vulnerable Populations

Authors: Alexandra Benitez Gonzalez, Dr. Heather Triezenberg, Dr. Abigail Bennett, Diane Doberneck, Mark Rey

Abstract: Harmful algal blooms (HABs) in the Great Lakes, particularly in small inland lakes, pose significant public health, environmental, and socio-economic risks. Communicating these risks effectively is critical, especially for vulnerable populations such as individuals with underlying health conditions, pregnant women, the elderly, and pet owners, who may face heightened exposure. This study examines how risk communication strategies can be optimized to increase awareness, perception of risk, and encourage protective behaviors among vulnerable populations in two small inland lakes within the Detroit River Watershed and Lake Erie. Using a mixed-methods approach grounded in community-based participatory research (CBPR), the project combined semi-structured interviews, focus groups, and an online survey to assess participants' understanding of HAB risks, communication preferences, and perceptions of message credibility. Experimental testing compared cognitive (informational) and emotional (risk-oriented) message frames, with emotional framing incorporating imagery and narratives depicting vulnerable groups and emphasizing relatable experiences and trustworthy information sources. Results indicate that while both cognitive and emotional frames improve risk perception, emotional framing more effectively increases awareness and engagement, particularly among those most at risk. These findings underscore the importance of integrating CBPR and mixed methods approaches in environmental risk communication, providing actionable insights for agencies and practitioners seeking to design tailored, socially and culturally informed strategies. This research highlights the potential for bridging science and society by transforming complex environmental hazards into clear, actionable messages for communities.

Keywords: harmful algal blooms, risk communication, trust, risk perception

Localizing Sustainable Development at Natural World Heritage Sites in Africa: A Case Study of Lake Malawi National Park World Heritage in the Republic of Malawi Heritage.

Authors: Johnny Musumbu

The results of this study will lead to a much richer understanding of how the 2015 United Nations World Heritage Policy on Sustainable Development has empirically been applied at country level in African region by State Parties across political institutions and processes. This study intends to contribute to the scholarship devoted to the empirical study of the integration of the 2015 World Heritage Policy on Sustainable Development into the processes of the World Heritage Convention. To this end, the study endeavors to conduct a diagnostic inquiry to determine whether and how the policy process has been operating in World Heritage sites in Africa south-Sahara region taking Malawi as a case study. Thus, this research will be done on a World Heritage site in a region that might be considered representative of challenges highlighted for their importance as a test case for resolving conservation-development conflicts in an inhabited World Heritage site. The proposed research will provide a diverse array of insights that will lead to a holistic understanding that will inform World Heritage governance in this region. This study will highlight the fundamental importance of focusing on aspects of law and institutions that directly support both adaptation and social-ecological resilience, by descriptively identifying important areas for refinement and addition to the legal and institutional arrangements of World Heritage sites in Africa crucial to trigger novel changes. Another important contribution from this study will concern with how to configure and engage a social network of stakeholders from diverse areas in World Heritage sites to work together to solve most pressing problem, while simultaneously securing life-support natural resources on which human communities depend. Furthermore, this study will underscore the importance of identifying how power and privilege embedded in institutions, organizations, and people involved in environmental governance define “what matters, what is known, what is negotiable, and what has been ignored” to improve improvised problem solving in complex social-ecological contexts, such as World Heritage sites. Finally, the results of this study will be directly

communicated to Lake Malawi National Park World Heritage managing agency, different actors and stakeholders involved in, affected by, or interested in environmental governance of the Lake Malawi National Park World Heritage site, as well as to a wider scientific community through direct restitutions and publication in national and international journals.

Projections of streamflow and water availability in the southwestern U.S.

Authors: Ahmed Elkouk, Yadu Pokhrel, Lifeng Luo, Elizabeth Payton, Ben Livneh

Abstract: Anthropogenic climate change is depleting streamflow and water availability in the southwestern U.S. Here, we develop an ensemble of streamflow projections under five emission scenarios to support adaptation. This ensemble is unprecedented in terms of its size (72 members) and spatial resolution (4 km grid spacing). Changes in streamflow are quantified in annual flow volume, flow timing, and low-flow metrics relevant to human and ecosystem water supply. Under high-risk (e.g., dry-warm) future climate conditions, the ensemble depicts a widespread decrease in annual natural flow volume, a shift in natural flow toward earlier timings, and a decrease in natural low flows across most rivers in the Southwest. The full ensemble projections show a large spread, which highlights the need to reflect uncertainties in climate and non-climate drivers to develop defensible storylines for specific end-user applications.

Keywords: streamflow, water availability, climate change

SARS-CoV-2 Detection in the Air of University Lecture Rooms Using Heating, Ventilation, and Air Conditioning Filters

Authors: Zhouyuan Wang, Peidro Guzman Heidy, Yangyang Zou, Irene Xagorarakis, Kaisen Lin

Abstract: As COVID-19 transitions from a pandemic to an endemic disease, monitoring its presence in public spaces remains crucial for effective public health management. Traditional surveillance methods face mounting challenges: clinical testing rates have declined due to reduced public testing and underreporting from home testing, while wastewater monitoring cannot reveal the transmission risks in indoor environments. These challenges underscore the need for complementary surveillance tools, particularly in high-occupancy indoor settings like university buildings. This study evaluated the potential of building ventilation systems, specifically HVAC filters, as a practical tool for SARS-CoV-2 detection and monitoring. Pre-filters and final filters from three air handling units (AHUs) serving separate university lecture rooms were collected between November 2022 and February 2024. Initially, a 4-month runtime was employed, later optimized to 1-month intervals for enhanced temporal resolution. Using a vacuum-based filter dust collection technique followed by RT-ddPCR analysis, SARS-CoV-2 was detected with positive rates of 28-86% in pre-filter and 17-50% in final filter samples across different AHUs. The fine dust samples consistently exhibited higher viral RNA concentrations compared to coarse dust samples. Significant variation was observed among AHUs, with two units yielding positive results in six out of seven sampling batches, whereas the third unit was positive in only two batches. The presence and levels of SARS-CoV-2 in different sampling periods were impacted by occupancy dynamics. These findings demonstrate the feasibility of HVAC filter-based surveillance for SARS-CoV-2 detection in non-healthcare settings. This approach leverages the existing building infrastructure to provide a non-invasive and continuous monitoring solution with monthly temporal resolution. Current research focuses on: (1) implementing weekly sampling during Spring 2025 to further enhance temporal resolution and establish correlations between viral prevalence, occupancy patterns, and other influencing factors; (2) expanding detection capabilities to include other respiratory viruses, such as Influenza A virus; and (3) developing a comprehensive framework to estimate airborne respiratory virus concentrations in indoor environments and assess associated human health risks.

Keywords: SARS-CoV-2, HVAC filters, University lecture room, Virus detection

The Effects of a Mandatory Flood Risk Disclosure Law on Rent Prices and Residential Sorting in Texas

Authors: Iris Margetis

Keywords: Flood Risk Disclosure, Rental Housing Market, Climate Risk Salience, Information Asymmetry, Environmental Justice, Household Sorting

Abstract: Seven U.S. states have enacted mandatory flood risk disclosure laws requiring landlords to inform prospective tenants when properties lie within high-risk flood zones. These policies aim to improve market efficiency and protect vulnerable renters by correcting information asymmetries that obscure environmental risk. This paper provides the first empirical evaluation of such a law in the rental housing market, focusing on Texas's statewide disclosure mandate, which took effect on January 1, 2022. The law requires landlords to disclose (i) whether a property is in a Federal Emergency Management Agency (FEMA) 100-year floodplain and (ii) whether it has flooded in the past five years. Leveraging a novel dataset linking over 350,000 geocoded rental listings (2019–2024) to detailed flood hazard maps and neighborhood demographics, I examine how rents and local sociodemographic composition changed after the law took effect. Across all specifications, the law did not reprice flood risk into rents, but complementary analyses reveal systematic demographic shifts: high-risk areas saw slower growth in educational attainment and renter concentration at the ZIP level and became older, less Hispanic, and less residentially stable at the county level. These patterns suggest that the law reshaped who bears flood risk rather than how it is priced, concentrating exposure among households with fewer resources to adapt or relocate and potentially reinforcing the very inequities it was intended to reduce.

Two-stage woodchip bioreactors remove agrochemicals from recycled irrigation water

Authors: Henry A. Gonzalez, Silvia Valles, James S. Owen Jr., Gemma Reguera, Christopher M. Ranger, R. Thomas Fernandez

Abstract: Recycled irrigation water transports agrochemicals (pesticides, nutrients, and plant growth regulators) that reside on impermeable production surfaces, are loosely sorbed to the container, substrate, or recycling system surfaces, or are leached from the substrate pore water. Agrochemicals at concentrations found in recycled water can be phytotoxic when reapplied to sensitive crops or can impair water resources when released to the surrounding ecosystem. Woodchip bioreactors are a cost-effective, sustainable solution for the remediation of agrochemicals from recycled water. Woodchip bioreactors provide a growth matrix and carbon source for the establishment of a diverse microbial community and associated biofilm. Typical anaerobic conditions facilitate denitrification, and the biofilm further increases the reactive surface area, allowing pesticides to interact with degrading enzymes and enhance pesticide remediation. Integrating aerobic bioreactor stages can further improve nutrient and pesticide removal. Aerobic conditions promote dissolved organic carbon release and enhance degradation of certain pesticides. We evaluated the performance of sequential two-stage anaerobic (stage 1)-aerobic (stage 2) (AN/AE) and aerobic (stage 1)-anaerobic (stage 2) (AE/AN) bioreactor configurations in reducing effluent agrochemical concentrations and load under different hydraulic retention times (HRTs). Eighteen bioreactor systems, each consisting of two stages (36 stages in total), were operated for 190 days at HRTs of 12, 24, and 48 hours. Simulated runoff having nitrate, phosphate, and eight pesticides (acephate, atrazine, bifenthrin, chlorpyrifos, cyazofamid, oxyfluorfen, sulfoxaflor, and thiophanate-methyl) were used to evaluate their ability to reduce agrochemical concentration and load. Preliminary results indicate the highest total nitrogen (TN) load removal was in 12AE/AN (removed 83% of inlet concentration, 19,523 mg day⁻¹). Conversely, high TN concentration but lower TN load removals were reported in the 48AE/AN (87% of inlet concentration, 5,088 mg day⁻¹) and 48AN/AE (89% of inlet concentration, 5,201 mg day⁻¹). The highest phosphate load removal was observed in 12AE/AN (25% of inlet concentration, 2,984 mg day⁻¹). The highest phosphate concentration removal was reported in the 48AN/AE (54% of inlet concentration, 1,086 mg day⁻¹). 12AE/AN removed 3,088 mg day⁻¹ (99% of inlet concentration) of chlorpyrifos and 1,986 mg day⁻¹ (96% of inlet concentration) of cyazofamid. Sulfoxaflor removal was significant only in 24AE/AN (45% of inlet concentration, 443 mg day⁻¹), 48AE/AN (78% of inlet concentration, 383 mg day⁻¹) and 48AN/AE (76% of inlet concentration, 373 mg day⁻¹). 48AE/AN and 48AN/AE systems significantly removed acephate (59%-61%, 515-531 mg day⁻¹), atrazine (83%-87%, 85-89 mg day⁻¹), and thiophanate-methyl (89%-97%, 23-25 mg day⁻¹).

Keywords: Water quality, water reuse, biodegradation, bioremediation, runoff management.

Wildfire and Hurricane Disruptions: Evidence on Short-Term Gasoline Price Dynamics

Authors: Dusan Paredes, Mark Skidmore, Scott Loveridge

Abstract: As wildfires become increasingly frequent and intense due to climate change and the accumulation of dry vegetation, understanding their economic effects on critical commodities is essential. This study examines the short-term impact of the 2024 Park Fire on retail gasoline prices in Northern California using high-frequency, station-level data. A generalized difference-in-differences approach and event study reveal that stations within 20 miles of the wildfire experienced an average 9-cent-per-gallon price drop compared to more distant controls—an outcome that contrasts with the price spikes typically observed after hurricanes and floods. These findings highlight how wildfires can reduce local demand and influence fuel markets in unexpected ways, underscoring the importance of monitoring post-disaster price adjustments. As part of a broader dissertation agenda, related work will extend this framework to hurricanes, which disrupt fuel markets through supply chain interruptions and spatial spillovers.

Keywords: wildfire; hurricane; retail gasoline prices; natural disasters

A Formative Evaluation of Water Conservation Behaviors Among College Students

Authors: Yoon, H., Kim, M., Heo, R., Iyer, S., Lapinski, M., Moore, N., Tracey, K., & Waller, J.

Abstract: Showering accounts for a substantial portion of residential water and energy use, yet relatively little research has examined communication strategies to promote shorter showers, especially among university students. This study employs formative evaluation to assess students' showering behaviors, attitudes, and social norms, informing the design of water-conservation messages. Guided by social norm theories and strategic communication research, the study aims to (1) describe existing water-use and conservation practices among students, (2) identify predictors of showering behaviors, and (3) establish an evidence base for message concepts encouraging shorter showers. By situating water use within the broader context of pro-environmental behaviors, this study highlights showering as a consequential, high-frequency behavior that is amenable to normative and efficacy-based appeals. Findings will provide a foundation for targeted, scalable communication strategies that leverage social influence and contextual cues to promote sustainable water use in university settings and beyond.

Keywords: formative evaluation, water conservation, shorter showers

Beyond the Surface: Improving Subsurface Lake Temperature Prediction via Simulation-Based Pre-training and Adaptive Ensembling

Authors: Xin Lan (1), Lifeng Luo (1), Yue Deng (2), Pang-Ning Tan (2), Zhihao Xu (3), Nan Jia (4), Zhimeng Jiang (5) and Zihan Zheng (6), (1) Michigan State University, Department of Geography, Environment, and Spatial Sciences, East Lansing, United States, (2) Michigan State University, Department of Computer Science and Engineering, East Lansing, United States, (3) Guangdong University of Technology, Institute of Environmental and Ecological Engineering, Guangzhou, China, (4) Michigan State University, Department of Fisheries and Wildlife, East Lansing, United States, (5) The University of Hong Kong, Department of Geography, Hong Kong, Hong Kong, (6) University of Illinois Urbana-Champaign, Department of Civil and Environmental Engineering, Urbana, United States

Abstract: Freshwater lakes are sensitive indicators of climate change. Rising global air temperatures have led to widespread surface water warming, confirmed by in-situ and satellite observations. However, sparse deep-water measurements leave substantial uncertainty about subsurface thermal regimes and vertical structure dynamics. These changes are critical for aquatic ecosystems, influencing organismal physiology and biogeochemical processes such as vertical nutrient and oxygen exchange. To address this observational gap, we develop and evaluate an ensemble deep learning framework to simulate full lake temperature profiles and enable long-term analysis. We assess four sequential model architectures: Long Short-Term Memory (LSTM), Transformer, Convolutional Neural Network-LSTM (CNN-LSTM), and attention-LSTM. Each model is trained to predict vertical temperature profiles using 30 days of meteorological forcing. To mitigate sparse observational data, we first pre-train the models on temperature simulations from the process-based General Lake Model (GLM), leveraging physical knowledge to initialize learning. Predictions are then combined via a novel depth-wise adaptive ensemble that dynamically weights each model's contribution based on depth-specific performance. A physics-guided loss enforcing energy conservation is also incorporated. Our findings indicate that attention-LSTM outperforms standard architectures under limited-data conditions. Pre-training with GLM simulations consistently improves prediction accuracy, even when

the simulations are imperfect. The depth-wise ensemble further enhances robustness, particularly when paired with pre-training. In contrast, the energy-conserving loss yields marginal gains, suggesting that simplified physical constraints may not capture the complexity of real-world lake energy fluxes. Collectively, these findings demonstrate that coupling pre-training with adaptive ensembling offers a robust solution for subsurface thermal prediction in data-scarce freshwater systems.

Keywords: Lake water temperature, physics-informed deep learning

Do EV Charging Stations Care about Electricity Rates?

Authors: Jae-Yu Jung

Abstract: This paper examines how electricity rate plans affect EV charging station installations, using a novel dataset I construct that combines commercial electricity rates and charging stations in U.S. zip codes from 2015 to 2022. I aggregate the intricate pricing information into a single, comparable cost metric by simulating monthly electricity bills for a hypothetical charging station. Using the synthetic control and local projection difference-in-differences methods, I estimate the impact of new electricity rate schedules aimed at charging station operators—designed to alleviate high demand charges—on their electricity bills and entries. These rate schedules led to lower electricity demand charges and 1-2 additional charging ports per zip code, highlighting the effectiveness of targeted rate design in promoting EV infrastructure development.

Keywords: Energy, Transportation, Environment, Electric Vehicles, EVSE

Enhanced Sorption of Per- and Polyfluoroalkyl substances (PFAS) by Cation Bridging Interaction in Homoionic Soils

Authors: Andrew Huang, Wei Zhang, Brian J. Teppen, and Hui Li

Abstract: Per- and polyfluoroalkyl substances (PFAS) are a diverse group of widespread contaminants, and their potential threat can be evaluated by studying their sorption in soils. Research has shown that the sorption of PFAS is affected by the cations in soil and water, which may be enhanced through cation-bridging interactions with multivalent cations on soil surfaces. In this study, sorption experiments of various PFAS were conducted to examine the effects of (1) hydrophilic head groups (carboxylic vs. sulfonic, e.g., PFNA and PFOS), (2) different electric charges (anionic vs. neutral, e.g., PFOS, PFOSA, and N-EtFOSA), and (3) perfluorinated chain length (C6–C13; PFHxA, PFOA, PFNA, PFDA, PFUnA, PFDoA, and PFTTrA). To evaluate the role of cation-bridging interactions, all sorption isotherms were measured in K^+ - and Ca^{2+} -saturated soils with KCl and $CaCl_2$ background solutions, respectively. The isotherms of all PFAS were linear with respect to aqueous concentrations, and the distribution coefficients (K_d) increased exponentially with chain length. The K_d values of PFAS isotherms in Ca^{2+} -saturated soils increased by a factor of 8.9–16.8 compared to their K^+ -saturated counterparts. PFAS with sulfonic groups exhibited stronger interactions with soils than those with carboxylic groups. For anionic PFAS, sorption was consistently higher in Ca^{2+} -saturated soils than in K^+ -saturated soils, whereas neutral PFAS showed no difference between the two conditions. These results indicate that anionic PFAS interact with Ca^{2+} through forming cation-bridging species with negatively charged soil surfaces, thereby enhancing sorption, while neutral PFAS cannot form such species. This study proves the interaction of cation bridging and provides new insights into the role of cations as a key factor in PFAS distribution in the environment.

Keywords: Per- and polyfluoroalkyl substances (PFAS), Sorption isotherm, Soils, Cation-bridging, Distribution coefficient (K_d)

Fiber-Based Packaging: A Sustainable Alternative to Plastic in the Fruit Industry

Authors: Sehwan Cheon, Argus Rocha, Eva Almenar

Abstract: Fiberboard-based packaging has been emerging as a sustainable alternative to conventional plastic containers. This topic is pertinent as the fruit industry is dominated using plastics (clamshells, trays, pouches, etc.). Unlike plastic containers made from synthetic polymers, fiberboard packages are constructed from cellulose fibers, which are renewable and far more friendly to the environment. Methods of modifying atmospheres through manipulating air flow within the container using new developments to create optimal storage conditions for cherries have further supplemented the fiberboard-based option. Using a combination of both fiber-based packaging and manipulating atmospheres, we can create environmentally friendly

packages that perform better than conventional plastic packages used to commercialize fruit. This study explores the capabilities of novel fiberboard-based packaging through identifying key markers in cherry shelf life such as color, texture, pH, brix, fungal growth, and headspace. Ultimately, this study aims to compare the performance of both conventional plastic packaging and fiberboard-based packaging on cherry shelf life. **Keywords:** Cherry, Shelf-Life, Packaging, Atmosphere Manipulation

Finding green solvents for PET chemical recycling back to PPD monomer in the life cycle assessment framework

Authors: Jaewon Han, Richard-Joseph Peterson, Annick Anctil

Abstract: Depolymerization of poly(ethylene terephthalate) (PET) is a promising chemical recycling method for valuable monomers from waste. This study integrates green chemistry principles with a sustainability matrix to evaluate alternative green solvents for PET chemical recycling with lower cost, chemical hazard, and environmental impact. The system boundary starts with plastic waste collection at the MRF and ends with PPD extraction from the reaction mixture. In this study, we employ a process-based life cycle assessment to estimate the environmental footprint of PET chemical recycling. In the laboratory work, methanol and ethylene glycol are compared for the depolymerization process. For monomer extraction, aprotic solvents are screened and grouped by polarity, and 10 alternatives are selected and grouped by polarity for the monomer extraction test. The test narrows these down to five solvents with the highest extraction efficiency. These five solvents are then assessed using life cycle assessment (LCA) to quantify environmental impacts, combined with cost and chemical hazard analysis to evaluate overall sustainability. Results show that ethylene glycol offers lower impacts than methanol in the depolymerization step. Among the extraction solvents, ethyl acetate demonstrates the lowest overall impact, reducing GWP by 29.5% compared to the baseline solvent, chloroform. This work highlights the necessity of combining LCA with green chemistry metrics to guide solvent selection for sustainable PET chemical recycling, offering insights that are useful for policymakers aiming at advancing circular economy goals.

Keywords: Green Chemistry, Life Cycle Assessment, PET Recycling, Green Solvents

Pipe Dreams: Mapping Irrigation Technologies and Consumptive Use Across Scales

Authors: Jeremy Rapp, Anthony D. Kendall, and Jacob T. Stid

Abstract: Within the United States irrigation is the primary consumptive form of water use, representing ~90% of the consumptive losses between 2010 and 2020. ‘Consumptive use’ refers to water that is withdrawn but not returned to its source, typically because of evapotranspiration, making it unavailable for downstream use. Irrigation, and the decision to irrigate, represents an interesting intersection of scales. While the decision to use water, and how much, is ultimately made at the farm level and influenced by economic, climatic, and technological factors, the cumulative effect is felt across aquifers, rivers, and entire regions. This inherent scaling highlights the need for high fidelity spatially explicit, field-level projections of irrigation extent and water use. My research integrates multi-decade satellite observations with the USDA conus wide Cropland Sequence Boundaries to produce annual irrigation technology maps (surface, sprinkler, drip) which put us one step closer to estimated consumptive use. These datasets enable cross-scale comparisons with the record of data from the USDA Census and Irrigation Surveys as well as USGS water-use statistics, revealing where local irrigation practices may be diverging or misrepresented in official reports. These types of products and maps are essential for environmental policy and sustainability, especially in regard to Agricultural and Water Security. They offer opportunities to connect or discover individual management decisions with basin-scale water availability, can support future analyses of trade-offs among food production, ecosystem health & services, as well as long-term resource sustainability.

Keywords: Irrigation, remote sensing, water use

The Impacts of the COVID-19 Pandemic on Global Land Use Change and Biodiversity

Authors: Jincheng Huang; Jianguo Liu

Abstract: The coronavirus disease 2019 (COVID-19) has triggered a global health crisis and significantly impacted ecosystems in various ways. However, existing research has not quantified how changes in land use during the pandemic have affected biodiversity at a global scale. In this study, we introduce a machine learning-based, spatially explicit counterfactual scenario simulation under the metacoupling framework to assess how distant global market food price surges driven by COVID-19, local pandemic restrictions, and neighboring factors have influenced each country's cropland utilization and terrestrial biodiversity intactness. Our results indicate that if global market food prices and local pandemic restrictions had followed pre-COVID trends, the cropland area in 2022 might have decreased by 0.86% and increased by 0.10%, respectively, with a net reduction of 0.80% due to their combined effects. This indicates that the observed cropland expansion in 2022—approximately three times the annual increase observed before the pandemic—leading to a decline in global biodiversity intactness. Notably, developing countries and biodiversity hotspots have been disproportionately affected. This study underscores the challenges of conserving biodiversity during global public health crises and emphasizes the need to align environmental governance with social and economic resilience to better prepare for future pandemics and global crises.

Keywords: COVID-19 Pandemic; Land Use Change; Biodiversity

Visions of Progress and Precarious Realities: The Politics of Cambodia's Funan Techo Canal

Authors: Leo Baldiga, Soksamphoas Im, Kaley Clements, Junyi Yu, Veasna Ky

Abstract: This paper interrogates the promises and precarities of Cambodia's Funan Techo Canal megaproject. While officially celebrated as an engine of national prestige and economic autonomy, ongoing delays, contested financing, and lack of transparent planning have sowed uncertainty among affected populations and regional neighbors. Preliminary analysis incorporates descriptive narratives from social and traditional media regarding the canal and Cambodia's geostrategic position within the region, and triangulates them with ethnographic data collected from interviews with affected populations to trace how nationalism, undisclosed information, shifting media narratives, and ambiguity around the scope, scale, and impacts of the project are shaping disputes over water rights, border reconfigurations, compensation, and potential dispossession. Preliminary findings are revealing of uncertainty as a central feature of infrastructure-led geopolitical and economic transformations in the Mekong Basin – ultimately, the new canal project canal highlights the contradictions between grand visions of progress and the realities of forced displacement and contested sovereignty in contemporary Southeast Asia.

Keywords: Geopolitics, Water, Infrastructure, Southeast Asia

When Do Changing Norms Persuade? An Experimental Test of Dynamic Norms, Financial Benefits, and Individual Differences

Authors: Miyeon Kim

Abstract: This study examined how dynamic norm messages compared to static norm messages in shaping behavioral intentions. It also examines whether incorporating financial benefits enhances the persuasiveness of norm-based appeals, and how these effects vary based on individuals' adopter characteristics. Drawing on social norms theory and the diffusion of innovations framework, this study used a 2 (norm type: static vs. dynamic) $\times$ 2 (prevalence: low vs. high) $\times$ 2 (financial messaging: present vs. absent) between-subjects experimental design. Participants were exposed to one of eight message conditions of two pro-environmental behaviors: taking shorter showers and shopping at secondhand stores. The results did not show the main effects of dynamic norms and financial conditions on behavioral intentions in both topics. However, in the shower context, a significant interaction showed that the effectiveness of the norm condition (dynamic vs. static) varied depending on the consumer's adopter group. In the shopping context, the interaction was more complex; a significant difference between adopter groups only emerged under a specific combination of dynamic norms, financial benefits, and messaging style. These findings indicate that the success of norm-based messaging is not universal but is highly dependent on the interplay between the message frame, the behavioral context, and the individuals' characteristics.

Keywords: dynamic norms, financial benefits, adopter characteristics, shorter shower, secondhand shopping

Posters (13)

Connecting US Air Freight to International Trade

Authors: Sanjita Pulgam

Abstract: The rise of e-commerce means that a greater share of US goods reaches consumers after taking a flight. This project explores the connection between domestic air freight and flights into and out of the US. The US economy, and personal consumption in the US is increasingly linked to international trade. This increasing linkage is a strong of the rash of protectionist policies in the US in 2025. The study is interested in the impact of the long and short-run changes to air freight on GhG emissions, and on changes to domestic air freight flows.

Keywords: Aviation, GhGs, International Trade

Deep-Sea Nanowires for Recovery of Strategic Metals

Authors: Maria Guzman, Gemma Reguera

Abstract: Microbiology offers numerous innovative ways to approach complex environmental challenges and address national economic and security needs. Particularly important are strategies to enhance the resilience of supply chains of minerals critical to energy and defense applications. The concentration of economically important metals such as rare earths (REEs) in the sediments surrounding deep-sea hydrothermal vents prompted us to investigate the contribution of heat-loving bacterial residents to their biomineralization. These studies led to the identification of conductive appendages (nanowires) with specialized REE traps in *Geothermobacter ehrlichii*, a thermophilic bacterium isolated from the “Bag City” hydrothermal vent that grows on the abundant iron oxide mineral phases where REEs such as cerium accumulate. Here, I describe this and other unique adaptations of this bacterium to REE exposure that can be harnessed for the strategic recovery of these metals from e-waste and industrial residues. I also describe synthetic biology approaches for developing bacterial catalysts with the efficiency and specificity needed to reclaim REEs. Natural and synthetically enhanced bacteria and their nanowires afford opportunities to strengthen domestic supply chains for critical metals in processes that both support clean energy technologies and reduce environmental harm. These approaches directly address national needs in sustainability, economic resilience, and strategic autonomy.

Keywords: Microbiology, Synthetic biology, Nanowires, Critical minerals, Sustainability

Effect of Concentration and Temperature-dependent Poly(lactic acid) Crystallization on the Migration of Alcohol–Water Mixtures

Authors: Dian XU; Rafael AURAS

Abstract: Poster: Poly(lactic acid) [PLA] is a biodegradable semi-crystalline polymer derived from crops such as sugar beets, sugarcane, and corn, and was recognized by the FDA as GRAS in 1995. With a lower environmental footprint than fossil-based polymers, PLA is increasingly used in food packaging, where it frequently contacts liquid mixtures. However, exposure to alcohol or alcohol–water mixtures can plasticize and swell PLA films, altering properties, such as crystallinity. These solvent-induced changes depend on temperature, immersion time, and the in-situ glass transition temperature (T_g -in situ), yet little is known about how alcohol immersion affects PLA. In this study, quantitative nuclear magnetic resonance (qNMR), standard differential scanning calorimetry (DSC), and liquid chromatography–mass spectrometry (LC–MS) were used to evaluate alcohol sorption in PLA films, corresponding crystallinity, and the oligomers release. Results show that alcohols promote higher crystallinity and faster crystallization rates at temperatures above the T_g -in situ. Additionally, more long-chain oligomers were released when PLA was immersed in high concentration alcohol-water mixture above the T_g -in situ. These findings improve understanding of how time and temperature affect crystallization and oligomer transport in PLA when in contact with alcohol–water mixtures, offering insights for enhancing PLA and other polyester-based food packaging applications.

Keywords: Sorption; In-situ glass transition temperature; Bio-degradable polymer; Oligomer; Diffusion

Ethno-racial and Class Dimensions of Drinking Water Contamination in the Detroit, Michigan Region

Authors: Angelique B. Willis, Igor Vojnovic, Sue C. Grady, Courtney Carignan, and Ashton Shortridge

Abstract: Drinking water in the Detroit region reflects a legacy of industrial contamination and uneven environmental protections that continue to burden racially diverse and low-income communities. We investigated how ethno-racial identity and class shape exposure to chemical contaminants in the Detroit region's drinking water, using spatial analysis, archival records, and environmental monitoring data. Our analysis revealed that neighborhoods historically subjected to redlining and disinvestment were more likely to be situated near industrial dischargers and in service areas tied to elevated contaminant risks. The findings emphasize the importance of recognizing how social, historical, and spatial processes intersect to shape exposure pathways and environmental risk. Patterns emerging from this research highlight the ways in which vulnerability is unevenly distributed and perpetuated across time, reflecting broader systems of inequality. While contaminants provide one entry point into these dynamics, the results speak to more expansive questions of environmental health, governance, and the reproduction of urban disparities. Rather than focusing narrowly on technical fixes, this work underscores the need to understand drinking water quality as both a scientific and societal issue, situated at the intersection of policy, history, geography, and convergence research.

Keywords: Drinking water contamination, Environmental health, Detroit, Michigan, Convergence research

Integrated Hydrology-Crop Modeling in the Lower Michigan Using the Community Land Model (CLM)

Authors: Mohammad Uzair Rahil, Yadu Pokhrel, Amar Deep Tiwari, Aman Shrestha, Ahmed Elkouk

Abstract: Integrated Hydrology-Crop Modeling in the Lower Michigan Using the Community Land Model (CLM) Authors: Mohammad Uzair Rahil, Yadu Pokhrel, Amar Deep Tiwari, Aman Shrestha, Ahmed Elkouk, Global agriculture faces increasing pressure from climate variability and water scarcity. Agricultural production in Michigan's Lower Peninsula is tightly coupled to regional water availability and year-to-year climate variability, yet integrated, process-based assessments at management-relevant scales remain limited. We apply the Community Land Model version 5 (CLM5) with its prognostic crop module to jointly simulate fluxes and storages—evapotranspiration, groundwater recharge, routed streamflow, and terrestrial water storage—alongside county-level yields of rainfed corn and soybean across Lower Michigan. The framework incorporates dynamic land-use and crop fractions, county-scale aggregation of crop outputs, and a consistent water–carbon balance across soil–vegetation–atmosphere processes. Model outputs are evaluated against in-situ streamflow, satellite-derived water storage, and USDA crop yield data. To diagnose model behavior and reduce structural and parameter uncertainty, we perform one-at-a-time sensitivity experiments and targeted calibration of photosynthesis, phenology, and stomatal conductance parameters. Results reveal spatial heterogeneity and interannual variability in ET, recharge, and streamflow alongside yield dynamics, and underscore trade-offs between sustaining crop production and conserving water resources. Sensitivity analysis highlights the strong influence of the base temperature parameter, with the default CLM configuration underestimating crop yields. By delivering a harmonized, county-scale picture of hydrology and crop performance within a single process-based model, this study provides actionable insight for agricultural water management and climate-resilience planning in Lower Michigan. Keywords: CLM5; Evapotranspiration; Streamflow; TWS; Michigan; Crops.

Keywords: CLM5; Evapotranspiration; Streamflow; TWS; Michigan; Crops.

Record 2022–2024 Hydrological Drought, Long-Term Trends (1981–2024), and Water-Storage Losses

Authors: Gustavo De la Cruz, Renato Collado, Eduardo Chávarri-Velarde, Waldo Lavado-Casimiro, Jhan-Carlo Espinoza.

Abstract: Western Amazonia experienced an unprecedented, multi-year hydrological drought from 2022–2024. Using daily river discharge from Peruvian stations near the Marañón–Ucayali confluence, basin-averaged CHIRPS precipitation, and GRACE/GLDAS terrestrial water-storage fields, we (i) quantify 1981–2024 trends in precipitation, runoff, and the timing of the high-runoff season, and (ii) diagnose the intensity and duration of the 2022–2024 event. Six-month Standardized Runoff Index values fell below -2.5 and remained in drought for 24 consecutive months, while discharge at Tamshiyacu dropped below $10,000 \text{ m}^3 \text{ s}^{-1}$, establishing a new low. The high-runoff season onset has shifted later by ~ 12 days per decade, and GRACE/GLDAS show concurrent depletion of total and groundwater storage. We discuss management and policy implications for water security, hydropower reliability, fluvial navigation, and community resilience, outlining near-term actions (e.g., drought early-warning using SRI and precipitation anomalies, seasonal allocation triggers, and groundwater-recharge protections) and partnerships with agencies and communities. By connecting observation-driven diagnostics to actionable strategies, this work demonstrates how hydrologic science can inform equitable, adaptive responses to a changing Amazon.

Keywords: Hydrological drought; Western Amazon; terrestrial water storage; runoff season timing; climate adaptation.

Shocks to Aviation and Recovery - Evidence from the US

Authors: Rachel Isbey

Abstract: Two major shocks disrupted US aviation in the past quarter-century: The 9/11 attacks of 2001, and the COVID-pandemic lockdown of 2020. While passenger numbers are poised to mark a full recovery this year, five years after the most recent shock, this paper is interested in the GHG emission impact of each shock, as well as the pathways to recovery for passenger numbers after these two shocks. Understanding the recovery process can provide insights for risk management in aviation, as well as for understanding how airlines and airports contribute to emissions.

Keywords: Aviation, GHGs, Pandemic Recovery

Tumorigenic potential of triclosan, a household antimicrobial ingredient, and chemoprevention by resveratrol and quebecol.

Authors: Caroline Baidoon, Jaden Reji, Anna A. Heath, Jamie E. Liebold, Anthony B. Ketner, Bailey DelCamp, Brad L. Upham

Abstract: Triclosan is an antimicrobial agent that was a common ingredient in many household products, such as antibacterial soaps, body washes, toothpastes, and some cosmetic products. Recently, triclosan has been implicated in adverse health effects such as immune suppression and liver cancer and has since been banned by the Food and Drug Administration in 2016. However, it remains in a multitude of household items and is a widespread environmental toxicant posing significant public health concerns. Considering that triclosan has been linked to liver cancer, there is a need to understand the underlying mechanisms of action. Cancer cells have long been characterized as cells that lose their ability to regulate growth through contact inhibition and cannot terminally differentiate, which implies a breakdown in one of the communicating mechanisms. In particular, the dysregulation of gap junctional intercellular communication (GJIC) is one hallmark characteristic of cancer. Thus, we determined the effects of triclosan on GJIC in a bipotent epithelial stem cell line derived from F344 rats using the scalpel load dye transfer assay. Triclosan inhibited GJIC in a dose and time-dependent manner, implicating that triclosan can contribute to the cancer process by dysregulating GJIC. Triclosan dysregulated GJIC through a phosphatidylcholine-specific phospholipase C-dependent mechanism. The natural products resveratrol and quebecol completely mitigated the adverse effects of triclosan on GJIC. In conclusion, our in vitro results indicate that triclosan is a potential tumor promoter, and resveratrol and quebecol can potentially prevent the adverse health effects of triclosan. Funding: NIEHS R21ES031345. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH-NIEHS.”

Keywords: Triclosan, Cell Signaling, Gap Junctions, Tumor Promoter, Chemoprevention

Unprecedented Hydrological Transformation of the Asian Water Tower

Authors: Saugat Aryal, Yadu Pokhrel, Huy Dang

Abstract: The Asian Water Tower (AWT)—the world’s largest non-polar cryosphere—supports nearly two billion people and regulates the hydrology of eleven major transboundary river basins across Asia. Yet, the region is warming at nearly twice the global average, driving profound changes in water availability and extremes. Using an ensemble framework that couples five CMIP6 general circulation models with four global hydrological models and the CaMa-Flood hydrodynamic model, we quantify basin-scale transformations in discharge, storage, and flood dynamics from 2025–2099 under three Shared Socioeconomic Pathways (SSP1-2.6, SSP3-7.0, SSP5-8.5). Results reveal consistent increases in discharge and storage across Central and South Asian basins, contrasted with non-linear and scenario-dependent trajectories in Southeast Asia. By the late 21st century, 20–73% of basin areas are projected to exceed 160+ years of historical variability, with >90% of unprecedented changes reflecting intensified wetting regimes. Compound extremes emerge, as higher peak flows coincide with elevated low-flow baselines, while flood timing reorganizes by up to 39 days in snow-fed basins and delays up to nine days in monsoon-fed systems. These findings demonstrate that the AWT is undergoing an unprecedented hydrological reorganization with direct consequences for food security, disaster preparedness, and transboundary water governance. The results underscore the urgent need for adaptive management strategies that account for non-stationary and emission-dependent hydrological regimes.

Keywords: Asian Water Tower; climate change; hydrological transformation; non-stationary regimes; ensemble projections; flood timing; discharge and storage; hydrological extremes; transboundary rivers; water security

VISIBILIZING ENVIRONMENTAL COMMUNICATION AT THE MARGINS: A BIBLIOMETRIC ANALYSIS OF LATIN AMERICAN SCHOLARSHIP

Authors: Julia Belden, Bruno Takahashi, Iasmim Amiden dos Santos

Abstract: Environmental communication as a field of inquiry has quickly expanded in the last two decades. The expansion in international journals has been driven by scholars in the US and other Global North countries. However, a rich scholarship from the Global South, published in journals typically not indexed in commercial academic databases, is available and can contribute to the development of the field. This article presents a bibliometric analysis of Latin American environmental communication scholarship published in English, Spanish, and Portuguese. Employing a search strategy that included Latin America-based databases, we manually constructed a dataset of 928 scholarly works published between 1967 and 2024. Preliminary analyses show prolific scholarship in a small handful of Latin American countries, with Brazilian articles accounting for just over 50% of our dataset. Even so, scholarship authored by Global North-based first authors made up approximately 30% of the database. Further analyses will include keyword co-occurrence and author co-occurrence. In addition to the illustrating the dominance of Global North-based scholarship, the challenges we encountered collecting and analyzing bibliometric metadata for this research illustrate an urgent need for discussion and action targeting bibliometric coloniality.

Keywords: Latin America, bibliometric analysis, environmental communication, Global South

Assessing Irrigation and Pumping-Induced Hydrologic Impacts in South Asia Using CLM5

Authors: Tanjila Akhter and Yadu Pokhrel

Abstract: Irrigation and groundwater pumping are essential for sustaining agricultural productivity across South Asia yet growing concerns over overextraction and climate variability raise questions about long-term water security. This study applies a high-resolution, process-based land surface modeling approach to investigate the hydrologic impacts of irrigation and groundwater use in this highly stressed region. Using the Community Land Model version 5 (CLM5), enhanced with modules for lateral groundwater flow, pumping, and updated crop phenology, we conduct transient simulations spanning 1979–2020 over South Asia under three experimental setups: (1) no irrigation, (2) surface-water-only irrigation, and (3) combined surface and groundwater irrigation. Preliminary results demonstrate that simulated evapotranspiration and soil moisture patterns align well with observational datasets such as GLEAM, particularly across the Indo-Gangetic Basin and southern India. The model captures groundwater depletion signals in terrestrial water storage anomalies (TWSA) that are consistent with GRACE satellite data, especially in northwestern India. National-scale irrigation water withdrawal estimates from simulations agree well with FAO-reported values for Pakistan,

Bangladesh, and Nepal, with modest overestimation in India. These findings suggest that CLM5 can effectively diagnose groundwater irrigation hotspots and simulate regional hydrologic change under human influence. Ongoing efforts focus on validating streamflow and groundwater depth outputs against available in-situ data, refining crop parameterizations, and exploring links between irrigation, heat stress, and land-atmosphere feedback. This modeling framework serves as a valuable tool for understanding groundwater sustainability in South Asia and offers a basis for evaluating future water management and climate adaptation strategies.

Keywords: Irrigation, Groundwater pumping, Agriculture, South Asia, CLM5

Dynamics of Human Well-Being in U.S. Cow-Calf Systems

Authors: Jonathan Vivas

Abstract: Wellbeing is increasingly discussed in sustainability research, yet its connection to land management in working landscapes like grasslands remains underexplored. In U.S. beef production systems, essential to both environmental health and rural economies, producers continue raising cattle despite growing ecological and economic pressures. This persistence can place both livelihoods and ecosystems at greater risk. While management outcomes are typically assessed by productivity or profitability, subjective factors are rarely included despite their potential to influence long-term management decisions. This study addresses that gap by examining how producers' perception of their wellbeing across five domains relates to grazing decisions in U.S. cow-calf operations. Drawing on the idea of stability and variability of wellbeing (homeostasis theory; Cummins et al., 2003; Cummins & Wooden, 2014), we ask: How does grazing management support producers' ability to maintain their wellbeing? Our study uses a mixed-method explanatory design, analyzing survey data collected from 75 cow-calf producers in three ecologically distinct U.S. regions, between 2022 and 2025 and in-depth interviews (2023–2024) that explore grazing philosophies, adaptive strategies, and social-ecological feedbacks relevant to land stewardship. Preliminary results show that wellbeing is actively maintained among producers, thus, we argue management choices primarily serve to maintain a desired level of wellbeing, rather than significantly alter it. Thus, wellbeing “homeostasis” might be an important lens through which to understand why producers embrace or resist grazing strategies in the face of social, economic, or environmental strains.

Keywords: Wellbeing, Sustainable Agriculture, Grazing Management

Impacts of losses in Ukraine's grain production on global trade due to the Russia-Ukraine war

Authors: Xiang Yu

Abstract: Ukraine plays a critical role in the global grain supply; however, the Russian invasion starting on February 2022 significantly disrupted Ukraine's agricultural sector, leading to substantial reductions in grain production. These disruptions have had severe consequences for low- and middle-income countries heavily dependent on Ukrainian grain exports. Traditional trade analysis approaches, such as gravity models relying on linear regression, often struggle to capture the complex interactions inherent in international trade dynamics. To address this limitation, our study examines the impacts of reduced Ukrainian grain output on the global grain market in 2022 by comparing results from a traditional gravity model with three machine learning approaches: Random Forest, XGBoost, and Long Short-Term Memory (LSTM). The analysis focuses on wheat, corn, and barley—major crops within Ukraine's export profile. To assess potential impacts, we developed a counterfactual “no-war” scenario for 2022 and projected trade patterns using the best-performance model. Subsequently, we analyzed these projections using the metacoupling framework to better understand interregional trade dynamics. Among the evaluated models, XGBoost demonstrated the strongest performance in projecting the Ukrainian grain exports of all three crops, with R^2 values of 0.8270 for wheat, 0.7531 for corn, and 0.7104 for barley in the test sets. Under the no-war scenario, grain imports from Ukraine by most pericoupling countries would significantly increase, particularly for nations in the Middle East and Southeast Asia. However, the grain importing of most pericoupling countries sourcing from Ukraine would notably decrease. This may be due to the importing and re-exporting of grain in these countries caused by maritime transport blockages during the conflict. These findings underscore the critical impacts of regional geopolitical conflicts on global food systems.

Keywords: Russia-Ukraine War; Food Trade; Machine Learning