

ISF SEMESTER IN REVIEW

FALL 2024



MISSION

Purdue University's Institute for a Sustainable Future fosters and promotes research, partnerships, and engagement in areas including the environment, climate impacts and resilience, food-energy-water security, human and biosphere health, and sustainability as broadly defined by the Sustainable Development Goals. The complex, multi-factor, and pressing nature of the challenges and opportunities in these areas require a collaborative, transdisciplinary approach. This Institute supports the research and development needed to provide viable solutions by connecting faculty and researchers, and by forging linkages between disciplines and communities within Purdue and beyond. In this way, the Institute aligns with Purdue's Land Grant Mission of building human capital, advancing research focused on our world's most important problems and engaging deeply with our partners.

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A MESSAGE FROM ISF FOUNDING DIRECTOR

ISF Semester in Review, Fall 2024

MATTHEW HUBER

Professor, Earth, Atmospheric, and
Planetary Sciences

David E. Ross Director of the
Purdue Institute for a Sustainable
Future, 2022-2024



Dear Colleagues and friends of ISF-

I know it's hard to imagine the warm days of August when we kicked off our programming with two exciting conferences—one on climate change impacts on cyber-physical infrastructure that brought ISF to DC, and another on AI and sustainability, sponsored by NSF, which brought scholars from around the country to West Lafayette. That was just the beginning of what would be an exciting and accomplished semester full of events, research milestones, and numerous awards for research, teaching and service earned by our amazing faculty. The semester also highlighted the work of dozens of graduate students and undergraduates at our annual research expo and through ISF support for undergraduate sustainability research and graduate student travel awards.

The semester has also seen the advancement of the Campus Sustainability Working Group, composed of representatives from across campus who are working to undertake a first-of-its-kind look at a wide range of campus sustainability topics this academic year. By the close of the 2024 calendar year, the team was finalizing its first report on Purdue's performance in sustainability in comparison to our Big 10 peers and well on its way to furthering research on education and campus climate.

I'm also proud to note the many ways in which faculty science has reached hundreds of Hoosiers on topics including PFAS and disaster preparedness through several science and policy webinars. We have also welcomed several scholars and policy experts from around the country to our own campus.

This semester has also marked the end of my three years serving as the inaugural director of the Institute as I prepare for a year-long sabbatical away from campus at Yale University, where I will be working on heat stress as an integrating theme throughout the history of life, as a Yale Institute for Biospheric Studies Edward P. Bass Distinguished Visiting Environmental Scholars Program Fellow. I am happy to be leaving the running of the Institute in the capable hands of Dr. Margaret Gitau, Professor of Agricultural and Biological Engineering. I encourage you all to take a moment to review the semester's accomplishments in this bi-annual look back.

Take care for now!

-Matt Huber, Professor, Earth, Atmospheric and Planetary Sciences

ISF GROWTH AT A GLANCE



SERVING
THE
STATE

Consistent with Purdue's land-grant mission, ISF is committed to providing opportunities for connection and collaboration. Our [research communities](#), special initiatives, and strategic research teams offer opportunity for involvement across Purdue.

332

Since the inception of ISF in 2022, our affiliate ranks have grown from 182 to 332 faculty across Purdue. This growth trajectory is representative of our continuous outreach and affiliate support to engage in all areas of sustainability.

72

Our faculty and research affiliates come from 72 departments and areas across Purdue. This includes not only departments across almost all of the colleges, from Aeronautical Engineering to Visual and Performing Arts, but also Ag Extension, the John Martinson Honors College, and Research Computing.

STAFF GROWTH

In Fall of 2024, we also welcomed Senior Operations Administrator, Tara Greene, and Research Scientist, Valentia Negri to the ISF team.

ISF LEADERSHIP TEAM

FALL 2024 OVERVIEW

ISF functions in part with the support faculty team leaders in the following areas of research, organized as Research Communities, Strategic Research Teams, and Special Initiatives. Each area of focus is currently led by two cross disciplinary faculty members. These leadership team members work to engage across Purdue with outreach efforts, strategic events, and collaboration ideas, and are instrumental in bringing research experts and visiting speakers to campus with the support of ISF to further develop the depth of understanding across these research areas.

ISF leaders also work with other universities and stakeholder partners to further the mission of ISF in fostering and promoting research, partnerships, and engagement in areas including the environment, climate impacts and resilience, food-energy-water security, human and biosphere health, and sustainability as broadly defined by the Sustainable Development Goals.

BIODIVERSITY RESEARCH COMMUNITY



Brock Harpur
(ENTM)



Ximena Bernal
(BIO)

ENVIRONMENTAL STRESSORS RESEARCH COMMUNITY



Jonathan Shannahan
(HSCI)



Jason Hoverman
(FNR)

ENVIRONMENTAL JUSTICE RESEARCH COMMUNITY



Ellen Wells
(HSCI)



Aaron Thompson
(HLA)

PFAS STRATEGIC RESEARCH TEAM



Jennifer Freeman
(HSCI)



Marisol Sepulveda
(FNR)

GREAT LAKES SPECIAL INITIATIVE



Cary Troy
(CE/EEE)



Tomas Hook
(FNR)

RISK AND RESILIENCE RESEARCH COMMUNITY



Dan Chavas
(EAPS)



Hua Cai
(IE)

WATER CHALLENGES RESEARCH COMMUNITY



Keith Cherkauer
(ABE)



Lisa Welp
(EAPS)

SUSTAINABLE COMMUNITIES RESEARCH COMMUNITY



Chad Laux
(POLY/CIT)



Abby Engelberth
(ABE)



CYBER-PHYSICAL-SOCIAL INFRASTRUCTURE CLIMATE CHANGE (CPSICC) NEXUS NATO WORKSHOP

The CPSICC Nexus Workshop represented a collaborative effort to address the critical convergence of climate change, cybersecurity, and essential infrastructure, including social-economic-political institutions. As our global challenges grow in complexity, understanding the intricate interplay between these domains becomes paramount in order to prepare for the future. This highly interactive workshop brought together experts from various fields in academia, government, industry, and policy-making, from both NATO member and partner countries, to tackle these multifaceted threats.



Workshop directors and organizers

DIRECTORS & ORGANIZERS

The workshop was co-directed by Matthew Huber, Director of Purdue University's [Institute for a Sustainable Future](#), and Surya Nepal, Senior Principal Research Scientist at Australia's [Commonwealth Scientific and Industrial Research Organization](#). This invitation-only Advanced Research Workshop was supported by [NATO's Science for Peace and Security Programme](#) and co-funded by the [DHS Science & Technology Directorate](#). It convened in July-August 2024 in conjunction with [Sandia National Laboratories](#) and [Purdue's Center for Education and Research in Information Assurance and Security](#).

GOALS & OUTCOME

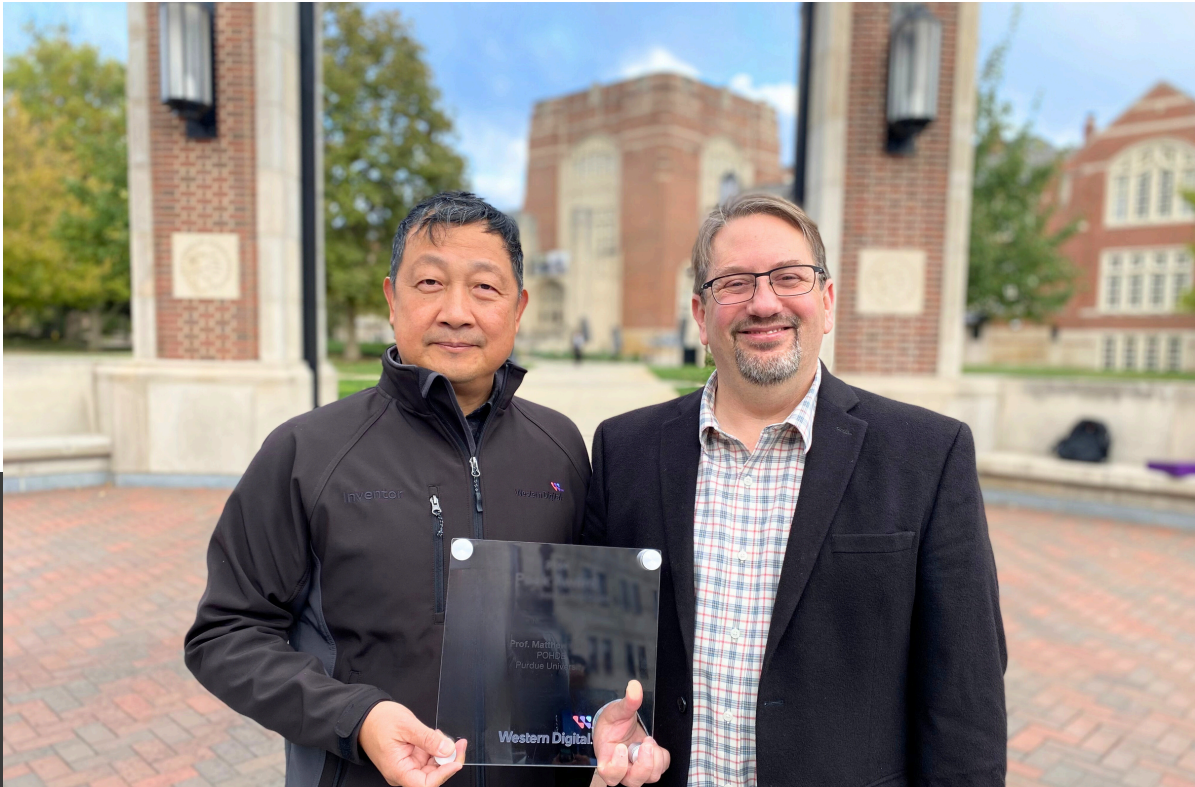
The goal of this workshop was to commence the process of developing a roadmap for securing the future and minimizing the compound risks posed by the interaction between these cyber-physical-social systems and climate change impacts on national security and defense. This NATO Advanced Research Workshop served to formulate recommendations in the CPSICC Nexus and foster partnerships among experts from different nations. By the end of the workshop, participants had identified key R&D gaps within this nexus and set an agenda for filling these gaps.

Visit the CPSICC Nexus Workshop [website](#) for further details.



David Johnson (IE) presenting

SUPPORT FOR ONE HEALTH INITIATIVES BY Western Digital®



Xiaodong Che (CTO, HDD Business Unit, Western Digital) and Mathew Huber

PURDUE ONE HEALTH DATA ENGINE (POHDE)

As a leader in sustainability collaborations, ISF, together with the Regenstrief Center for Healthcare Engineering (RCHE) proposed a joint initiative on “One Health” which would be critically enabled by partnering with Western Digital’s Petabyte Innovation Quest (PIQ “PEAK” Award) to create The Purdue One Health Data Engine (POHDE).

In the Fall of 2024, ISF was honored to be gifted this database from data storage giant, Western Digital. Our technical partner will be the RCAC, the research computing arm of PurdueIT - the University’s central IT organization.

ISF and project partners will place PODHE—a 1PB storage facility—at the heart of an ecosystem of data services and data-driven models spanning disciplines from weather and climate, to ecosystem health, to environmental toxicology, to plant and animal health, to personalized human health. With this best-in-class data capability, these highly successful transdisciplinary institutes will conduct cutting edge research at the intersection between the health of the environment and people, i.e. “One Health”.

Project Lead: Matthew Huber, Professor of Earth, Atmospheric, and Planetary Science and Director of ISF; co-leads include Pavlos Vlachos (RCHE Director), Betsy Hillery (RCHE Data Specialist), Carol Song (RCAC Chief Research Scientist)

CAMPUS SUSTAINABILITY PROJECT



OVERVIEW

Higher Education Institutions can play a critical role in advancing sustainability and climate goals by fostering awareness, education, discovery, and investment while providing professional development and career readiness opportunities for students. Purdue is well positioned to educate future leaders, conduct innovative research, and collaborate with governments, industries, and social groups to advance sustainability. In summer 2024, ISF worked with collaborators from the Office of Research, Office of the Provost, Administrative Operations, the University Faculty Senate, the Purdue Student Government Sustainability Committee and representatives from professional staff to launch a year-long study, the [Campus Sustainability Self-Study project](#) (CaSS). The overall goal of the study is to examine sustainability practices and initiatives on campus and identify ways to enhance progress.

We can see this progress as the implementation of a vision that involves “4 C’s” that can happen on individual, departmental and unit levels: “Commit, Collaborate, Communicate and Calculate.” Sustainability, in this vision, is not the responsibility of one unit, nor is it marked by the achievement of one target. Rather, anyone can commit to improving campus sustainability. Communicating efforts and opportunities can move us forward. Greater success can be reached by collaborating with others. And to demonstrate our progress, we must calculate using agreed upon standards such as those promoted through AASHE’s STARS. By supporting efforts large and small, every single member of the Purdue community can move us forward.

The efforts of this committee aligns with the [Sustainable Development Goals \(SDGs\)](#), central to ISF’s mission, and the [AASHE STARS](#) framework. AASHE developed its Sustainability Tracking, Assessment & Rating System™ (STARS) to provide a standardized “self-reporting framework for colleges and universities to measure their sustainability performance.” After an extensive accounting and submission to the organization, AASHE assigns rankings (Bronze, Silver, Gold, and Platinum) to participating institutions.

CURRENT PROGRESS

The following represents outputs and activities of the committee planned for spring 2025:

- Development of three surveys: “Faculty Survey on Sustainability Education,” Student Survey on “Sustainability Literacy and Culture,” and a staff and faculty version of this survey
- Three [events](#) related to sustainability education designed for faculty
- Developing an updated inventory of courses and modules offered on the West Lafayette campus relating to sustainability
- Publication of the “Purdue STARS Performance Assessment”
- Creation of a student “Sustainable Living Guide”

ADDITIONAL INFORMATION

Further details on this effort and members of the Campus Sustainability Working Group can be found under [Special Initiatives](#) on the ISF website.

ISF FALL OPEN HOUSE

STAYING CONNECTED

Every fall ISF welcomes faculty, graduate students, undergraduates, and staff to come learn about current goals and events happening at the institute and to meet both leadership and one another. The Burton Morgan Center for Entrepreneurship, the physical 'home' for ISF core staff, provides a wonderful atmosphere to welcome everyone, showcase accomplishments, and provide information about our various research teams and communities. In fall 2024, over 80 attendees joined to learn more from team leads from areas including water challenges, environmental stressors, PFAS, Great Lakes science, risk and resilience, biodiversity, environmental justice and sustainable communities.



OPEN HOUSE 2024

As ISF continued its growth as a leader in sustainability collaborations, ISF Director Matthew Huber and Senior Managing Director Lynne Dahmen presented an overview of the institute. Following the presentation, a reception was held in the Morgan Cafe to further engage in conversation and connect with attendees.



Open house attendees gather in the Morgan Cafe for a reception



Matthew Huber presenting the ISF overview



ISF Risk & Resilience Co-Lead Dan Chavas (EAPS), and Environmental Stressors Co-Lead Jason Hoverman (FNR) speak with attendees

SEMINAR GUEST SPEAKERS

Connecting and engaging across Purdue, ISF is proud to help bring distinguished guest speakers and research experts to campus. Look for further opportunities to attend engaging and transdisciplinary seminars and panel discussions in 2025. Here are a few highlights of our Fall 2024 Seminars:

THE PERILS OF PFAS: EVERYTHING, EVERYWHERE, ALL OF US

(CO-SPONSORED BY ISF)

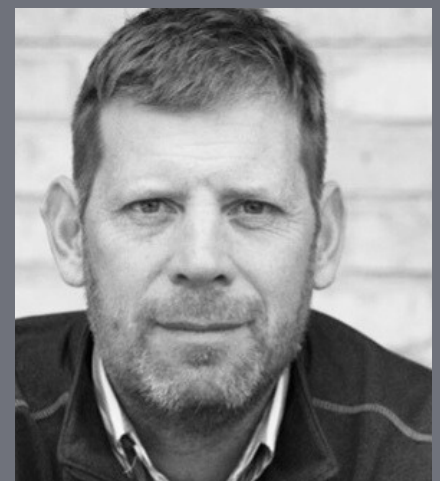


Dr. Linda Birnbaum

Linda S. Birnbaum, Ph.D., D.A.B.T., A.T.S., was director of the National Institute of Environmental Health Sciences (NIEHS) of the National Institutes of Health, and the National Toxicology Program (NTP) from 2009 to 2019. As NIEHS and NTP director, Birnbaum oversaw a budget of more than \$740 million that funds biomedical research to discover how the environment influences human health and disease. A board certified toxicologist, Birnbaum served as a federal scientist for 40 years. Prior to her appointment as NIEHS and NTP director in 2009, she spent 19 years at the U.S. Environmental Protection Agency (EPA), where she directed the largest division focusing on environmental health research.

2024 ESE SYMPOSIUM: THE FUTURE OF WATERS

In early October, grad students from the Ecological Sciences & Engineering program held their annual research symposium. This year, the topic was, “The Future of Waters,” and a panel discussion, a keynote dialogue and book signing with New York author and environmental journalist Dan Egan, and a poster competition fostered open dialogue on the multifaceted challenges facing the water sector and generate innovative solutions and strategies for a sustainable water future. This event was co-sponsored with contributions from ISF, the ESE program, the Indiana Water Resources Research Center, IL-IN Sea Grant, and multiple departments in the colleges of Agriculture, Education, Engineering, Health Sciences, Liberal Arts and Libraries.



Dan Egan

Sponsors of the ESE Symposium: The Future of Waters:

Institute for a Sustainable Future, Purdue Forestry and Natural Resources, School of Industrial Engineering, Agronomy, Davidson School of Chemical Engineering, Department of Curriculum and Instruction, Engineering Education, Environmental and Ecological Engineering, Food Science, School of Health Sciences, Horticulture and Landscape Architecture, Department of Political Science, and Department of Psychological Sciences

ISF FALL RESEARCH EXPO

Faculty, post-docs, graduate and undergraduate students are all welcome to present posters in any area of sustainability research, which broadly speaking, align with one or more of the [Sustainable Development Goals](#). This year also included a door prize drawing for a number of presenters.



Adebola Esther Adeniji, FNR graduate student, discussing her research

HIGHLIGHTS

Twenty of our research presenters were randomly drawn to receive a sustainable and renewably sourced bento-box to help with personal food container waste in their daily lives on campus.

70

Our Research Expo this year featured over 70 presenters with work in all areas of sustainability. ISF leaders were truly impressed with the ideas and work presented.

200+

More than 200 attendees were present at the Expo to engage with researchers. Fall 2024 was the largest ISF Research Expo to date.



Recipients of sustainable bento box drawing



Jung Hyun Lee, HHS graduate student research poster presenter

FACULTY RESEARCH AND FUNDING AWARDS

Excellence in research, teaching, and external recognition on the forefront of what comes next.



Jonathan Shannahan (HSCI), Cammie McBride (HHS Associate Dean for Research), Liping Cai (HTM)

ISF would like to congratulate the following affiliates on their achievements this fall. These awards are a testament to their dedication, expertise, and contributions to advancing knowledge in their respective fields. Their commitment to excellence in teaching, research, and/or service has not only enriched the academic community but also inspired their colleagues and students. The recognition they have received reflects the high regard in which they are held by their peers and the profound impact they have made at Purdue and beyond. ISF celebrates these milestones with them and look forward to their continued success.

TEACHING

Hua Cai (IE) - [Teaching for Tomorrow Fellowship Award \(Junior Fellow\)](#)

Hua Cai (IE) - [Thomas and Jane Schmidt Rising Star Associate Professor of Industrial Engineering](#)

David Johnson (IE/Pol Sci) - [Ravi and Eleanor Talwar Rising Star Associate Professor of Industrial Engineering](#)

Satish Ukkusuri (CCE) - [Hubert and Audrey Kleasen Professor of Civil Engineering](#)

Cliff Johnston (AGRY/EAPS) - [R&D 2024 100 Award](#)

Cary Mitchell (HLA) - [2024 Excellence in Multistate Award by the North Central Region](#)

Thivanka Muthumalage (HSCI) - [2024 Showalter Early Career Award](#)

Jonathan Shannahan (HSCI) - [Early Career Research Achievement Award](#)

Jonathan Shannahan (HSCI) - [2024 Showalter Faculty Scholar](#)

Yu She (IE) - [2024 Showalter Early Career Award](#)

Mohit Verma (ABE) - [2024 Showalter Faculty Scholar](#)

Melba Crawford (CCE) - [Distinguished Alumni Award from The Ohio State University](#)

Jeffrey Dick (CHEM) - [2025 Recipient of the American Chemical Society National Fresenius Award](#)

Letian Dou (Chem Eng) - [NSEF Young Investigator Award](#)

Songlin Fei (IDF/FNR) - [Society of American Foresters \(SAF\) Award in Forest Science](#)

David Johnson (IE/Pol Sci) - [NSF Early Career Award](#)

Chad Laux (CIT) - [International Book of the Year Award](#)

Venkatesh Merwade (CCE) - [INAFSM 2024 Education and Outreach Award](#)

Mirian Velay-Lizancos (CCE) - [Bowen Scholar of Excellence](#)

David Warsinger (ME) - [Early Career Award from the Universities Council on Water Resources](#)

RESEARCH

Andrew DeWoody (FNR) - [2024-2025 Fulbright U.S. Scholar](#)

Letian Dou (Chem Eng) - [Clarivate's 2024 list of Highly Cited Researchers](#)

Genell Ebbini (Liberal Arts) - [2024-2025 Fulbright U.S. Scholar](#)

Jason Hoverman (FNR) - [2024 Agricultural Research Award](#)

EXTERNAL

Rakesh Agrawal (Chem Eng) - [AIChE CAST Division Computing in Chemical Engineering Award](#)

Ximena Bernal (BIO) - [2024 Fellow of the Animal Behavior Society](#)

WEBINARS WITH REACH

OVERVIEW

Can't make it to campus? No problem! ISF collaborates with multiple organizations and state agencies to help fulfill our land grant mission of serving the state and nation by bringing topical experts addressing key sustainability challenges to the 'virtual table' through co-sponsored webinars. In fall 2024, topics included rapid response lessons learned from the East Palestine chemical spill and fires; state and regional water needs and best practices for industrial water reuse, and the first of a series of webinars on the impacts of PFAS contamination in Indiana. Partners and co-sponsors for fall included the National Science Foundation, the White River Alliance and the Hoosier Environmental Council while additional speakers came from numerous universities including Tufts University, Cleveland State University, University of Tennessee, Knoxville, Inter American University of Puerto Rico-Aguadilla, and the University of Notre Dame. Corporate collaborators included speakers from Envirospectives and Stantec. Additional speakers represented Lawrence Livermore National Lab, the Southern Environmental Law Center and the Hoosier Environmental Council.

LESSONS LEARNED FROM THE EAST PALESTINE CHEMICAL SPILL AND FIRES

Moderated by Dr. Andrew Whelton (CE, EEE) this webinar discussed lessons learned from the 2023 chemical disaster in East Palestine, Ohio, featuring various rapid response research teams. These included Purdue University, Tufts University, Cleveland State University, University of Tennessee, Knoxville, Inter American University of Puerto Rico-Aguadilla, University of Notre Dame, and Microbial Insights, Inc. The teams were funded by the U.S. National Science Foundation (nsf.gov) to provide scientific support.

Brief summaries of each grant can be found under grant numbers [2329409](#), [2327139](#), and [2325719](#). Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the U.S. National Science Foundation.

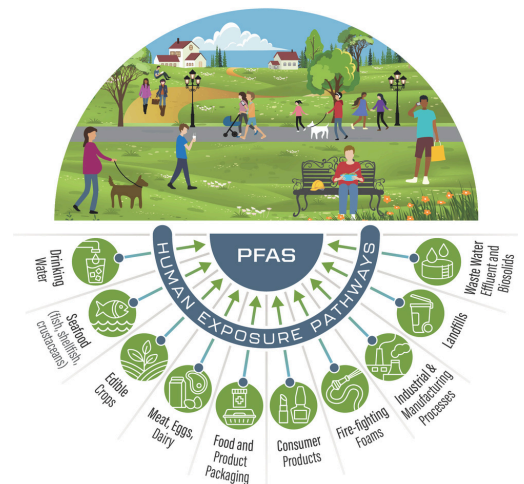
Webinars supported by ISF are available on our [YouTube™ channel](#).



PFAS--FOREVER CHEMICALS: EXAMINING RISKS, REGULATIONS AND RESILIENCE

This event, co-sponsored by the [Hoosier Environmental Council](#) and ISF, provided a general introduction to the group of manmade chemicals known as "PFAS" or "Forever Chemicals." In this first of a series, scientists from Purdue University provide current information on the sources, uses and impacts of PFAS on human health and the environment with particular emphasis on concerns for Hoosiers. Rounding out the event was a discussion of policy impacts of PFAS at both state and federal levels as well as an opportunity for Q&A.

View the complete recording [here](#).



ISF SUPPORT TO OUR FACULTY AFFILIATES

ISF supports the research and development needed to provide viable solutions by connecting faculty and researchers, and by forging linkages between disciplines and communities within Purdue and beyond. In this way, the Institute aligns with Purdue's land-grant Mission of building human capital, advancing research focused on our world's most important problems and engaging deeply with our partners.

Below are a few of the ways ISF provides ongoing efforts for connection and engagement to our faculty affiliates and research community teams.



DRIVING ENGAGEMENT

Research teaming support, sponsorship to conferences and summits, DUIRI and student research and travel support, graduate student engagement, workshop development, stakeholder outreach and engagement



EVENT SUPPORT

Co-sponsoring large scale events, top research talent visit organization, logistics planning and execution, growing event structure and support to create avenues for connection and collaboration



FACULTY PROMOTION

Creation of graphics, implementation of marketing outreach, promotion of faculty leadership related to ISF, acknowledgment in newsletter of affiliate accomplishments, communications assistance



Dr. Linda Birnbaum, director emeritus of the National Institute of Environmental Health Sciences (NIEHS) speaks to seminar attendees. ISF co-sponsored and provided logistics support.

NEWS, PUBLICATIONS AND RESEARCH FUNDING

Fall 2024 was full of excellence in research, funding, and recognition in publications for our ISF affiliates, working on important sustainability topics, ranging from severe weather to supporting renewable energy development in Indiana.



FALL HIGHLIGHTS

Outgoing director Matt Huber talked about today's extreme heat in [The Guardian](#) as well as the danger of future heat waves with [The New York Times](#). Discussing tornadoes in the United States, Dan Chavas (EAPS), co-lead of ISF's [Risk and Resilience](#) research community, teamed with MIT postdoc Funing Li on a PNAS [Science Sessions Podcast](#) in September. Several affiliates from the College of Agriculture, including head of Agronomy Laura Bowling, and Maria Marshall, Ag Econ chair and director of the North Central Regional Center for Rural Development, provided insight on how to prepare for the increasing number of strong storms in an article [published in November](#). Resilience in light of climate change was also the subject of an international ISF-led [conference](#) "Unraveling the Cyber-Physical Infrastructure Climate Change (CPSICC) Nexus," sponsored by NATO and the Department of Homeland Security organized and led by Matt Huber(EAPS), David Johnson(Poli Sci/IE) and ISF staff in August. This high-profile conference was in collaboration with Sandia National Labs and The Commonwealth Science and Industrial Research Organization in Australia.

Many affiliates were also in the news talking about health and impacts from environmental exposures. In August, Lisa Welp (EAPS), co-lead of ISF's water research community, discussed [health impacts of the drying up of the Great Salt Lake](#) on residents and visitors in Outside magazine. In a new short video, Jennifer Freeman (HSCI), co-lead of our SRT on PFAS, let us know what we should be concerned about when [reheating food in plastic containers](#), while several HHS affiliates recently published on lead exposure in both [mice](#) (Jason Cannon & Wei Zheng, HSCI) and [birds](#) (Aaron Specht, HSCI). Jonathan Shannahan (HSCI) also published on using [mass spectrometry approaches following environmental exposure](#), while several affiliates including Jeffrey Youngblood (ME), Amisha Shah and Andrew Whelton (EEE/CCE) published on the dangers of water [contamination coming from plastic water supply connectors](#).

Advances in uses and impacts of renewable energy were also in the news and in recent publications in the fall semester. First, Purdue Extension, under the leadership of Kara Salazar and Tamar Ogle, received a three-year, \$1.9 million award to lead an Indiana Renewable Energy Planning and Technical Engagement Collaborative. The collaborative will be a hub to help Indiana communities with [renewable energy planning, evaluation and decision-making](#). In addition, affiliates related to the large NSF INFEWS project on agrivoltaics, including Sylvie Brouder (AGRY), Peter Bermel (ECE), Mitchel Tuinstra (AGRY), Margaret Gitau (ABE), and Rakesh Agrawal (Chem Eng), published on [optimizing corn agrivoltaic farming](#). Two other projects are advancing sustainable agriculture, including a new tool from Ariana Torres (Ag Econ/Extension) called the [HortCalculator](#), that provides leafy green farmers with tailored financial information to help be profitable and adapt to evolving market trends. Through a third round of funding for her continuing project, Lori Hoagland (HLA) and her team are continuing to find success with the [Tomato Organic Management and Improvement \(TOMI\) project](#); this current funding will allow her to focus on sharing data and developing strategies so tomato farmers across the nation can maximize their possibility for success.

Another prominent area of research success for ISF affiliates included the areas of sustainable engineering and decarbonization that impact both physical and human aspects of constructed environments. First, Luna Lu (CCE) saw her work on concrete sensors, which provide information about the current state of a structure—where it needs maintenance or replacement has been [accepted as the national standard](#). Mechanical engineers David Warsinger and Davide Ziviani received funding to develop air systems for improving energy efficiency and indoor air quality. On the ecological side of urban living, a Purdue team led by Daniel Aliaga (CS) along with several ISF affiliates including Rajesh Kalyanam (RCAC), Brady Hardiman, Zhao Ma and Songlin Fei (FNR), Melba Crawford (CCE) and Panagiota Karava (CCE) and Matt Huber (EAPS), will be using AI to monitor trees in urban areas through a [recently funded NSF project](#).



These highlighted accomplishments provide only a glimpse of the research and results advanced by our over 325 ISF research affiliates. We encourage you to sign up for our weekly newsletters to [learn more](#) about our ground-breaking Purdue research in sustainability.

In addition, the Office of Research blog offers insight into the findings and significance of research from the university's Institutes and Centers at Discovery Park District, including ISF, Purdue Applied Research Institute, and Institute for Physical AI. ISF affiliates featured in the blog in Fall 2024 include Peter Bermel (ECE), David Warsinger (ME), Aaron Specht (HHS), Qixin He (BIO), Ziran Wang (CCE), Tyler Hoskins (FNR), Jiqin Ni (ABE), Alexander Laskin (CHEM), Jennifer Freeman (HSCI), and Jingjing Liang (FNR). [Learn more here.](#)

SEED FOR SUCCESS ACORN AWARDS FOR ISF AFFILIATES

- Aaron Bowman, Priyanka Baloni, Jyothi Thimmapuram. Mechanisms of Manganese Neurotoxicity. National Institute of Environmental Health Sciences. \$4,017,938.00.
- Jason Cannon, Uma Aryal, Jean-Christophe Rochet. Mechanisms of PhIP-Induced Dopaminergic Neurotoxicity. National Institute of Environmental Health Sciences. \$1,563,395.00.
- Jason Cannon, Daniel Foti, Julia Chester, Linda Lee, Ellen Wells. PFAS Induced Alterations in Reward Processing. National Institute of Environmental Health Sciences. \$2,694,050.00.
- Kerrie Douglas, Peter Bermel, Tamara Moore, Jason Morphew. Silicon Crossroads Workforce Development. U.S. Department of Defense. \$7,500,000.00.
- Brenna Ellison, The Center for Food Conservation and Waste Reduction: Designing Cocreated Solutions to Improve Nutrition Security, Health Equity, and Environmental Sustainability. National Institute of Food and Agriculture. \$1,500,000.00.
- Songlin Fei, Daniel Aliaga, Bedrich Benes, Yingjie Chen, Rado Gazo, Ayman Habib, Joseph Hupy, Jinha Jung, Ningning (Nicole) Kong, Michael Saunders, Guofan Shao, Song Zhang. Engaging Family Forests to Improve Climate-Smart Commodities (EFFICACI). Natural Resources Conservation Service. \$8,957,033.00.
- Jennifer Freeman, Linda Lee, Chongli Yuan. Comparative Neurotoxicity of PFAS. National Institute of Environmental Health Sciences. \$3,281,440.00.
- Lori Hoagland, Luiz Fernando Brito, G. Jonathon Day, Daniel Leon-Salas, Maria Bello Bravo, Gary Burniske, Rosa Cossio, Sarah Renkert, Jennifer Richardson, Adel Sayedahmed*, Jon Schoonmaker. UNSA NEXUS-PH III. Universidad Nacional de San Agustin. \$3,973,663.00.
- Panagiota Karava, Ilias Bilonis, Rebecca Ciez, Tianyi Li, Julia Rayz, Torsten Reimer. SCC-IRG Track 1: Smart Energy Assistants for Affordable Housing Communities. National Science Foundation. \$1,599,996.00.
- Shweta Singh, Vaneet Aggarwal, Kari Clase, Zoltan Nagy, Gintaras Reklaitis, Xiaohui Carol Song. FMRG: Eco: Cyber Enabled Transformation to Circular Supply Chains for Sustainable Pharmaceutical Manufacturing Networks. National Science Foundation. \$3,000,000.00.
- Haiyan Wang, Peter Bermel, R. Edwin Garcia, Minghao Qi. DMREF: Magneto-Electro-Optically Coupled Hybrid Metamaterial Thin Film Platform for Photonic Integrated Circuits. National Science Foundation. \$1,999,884.00.
- Yuehwern Yih. LASER Buy-in: Randomized Impact Evaluation of Citizen Security in Guatemala (Mod #26 7200AA18CA00009). Agency For International Development. 2,335,000.00.
- Chongli Yuan, Jennifer Freeman, Fang Huang, Yang Yang. Mechanisms of Gene-Environment Interaction in Developmental Lead Exposure Leading to Alzheimer's Disease Phenotypes. The National Institute of Neurological Disorders and Stroke. \$1,022,378.00.
- Davide Ziviani, Riley Barta, Rebecca Ciez, Eckhard Groll. CoolScrew: Holistic Optimization of a High Temperature Heat Pump System with Internally Cooled Screw Compressors. U.S. Department of Energy. \$2,038,100.00.
- Davide Ziviani, Eckhard Groll, Steven Son. Holistic Optimization of Air-Conditioning Systems for Military Use with Low-GWP Refrigerants. Strategic Environmental Research and Development Program. \$1,425,160.00.

CONGRATULATIONS TO ALL RECIPIENTS!

HOLISTIC AI COMPUTING FRAMEWORK: INCORPORATING WATER AND BIODIVERSITY DIMENSIONS OF SUSTAINABILITY

OVERVIEW

Early in the semester, two ISF affiliates, Inez Hua (CEE/EEE) and Yi Ding (ECE), with funding from an NSF conference grant, brought together speakers and participants from across the country to discuss implications of AI for environmental sustainability. The speakers and attendees explored important topics such as risks from increased energy demands, materials that have the possibility of contaminating the environment, and the challenges of increased water consumption driven by AI workloads. Overall, the conference focused on assessing environmental impacts of AI globally, encompassing water, biodiversity, and carbon emissions. This event was funded by NSF and co-sponsored by ISG and the College of Engineering.



Keynote speaker Chandra Krintz, University of California, Santa Barbara

TRAVEL & RESEARCH GRANTS

ISF travel and research grants provide financial support to graduate students and post-doctoral researchers, mentored by ISF faculty affiliates, to defray costs for small research projects for travel to present their research. ISF prioritizes grants in topics of interest to the Institute as represented by its research communities and special initiatives, as well as for students mentored by faculty affiliates actively engaged in the Institute.

RECIPIENTS

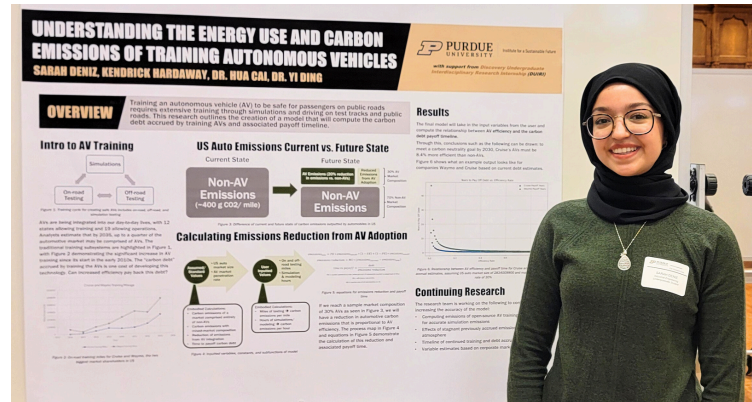
- Salam Akhter (OEHS)
- Adam Aleksinski (EAPS)
- Sara Catalina Botero Carrizosa (CHEM)
- Kathryn Dix (FNR)
- Spencer Garden (FNR)
- Marina Garcia Lopez-Arias (CCE)
- Yanjun Hu (EAPS)
- Jong Yoon Jeon (FNR)
- Pragathi Jha (IE)
- Mahendra Nimmakanti (EAPS)
- Steven Sharp (CHEM)
- Abhimanyu Raj Shekhar (ABE)
- Yu Wang (CCE)
- Zhuoli Yin (IE)



DUIRI PROJECT SUPPORT

DISCOVERY UNDERGRADUATE INTERDISCIPLINARY RESEARCH INTERNSHIP

This fall, ISF was happy to be able to support five DUIRI research projects. These students conducted 10 hours of research per week in preparation for their final posters.



Sarah Deniz, ISF supported DUIRI student, presenting at the ISF Fall Research Expo

ABOUT DUIRI

The Discovery Undergraduate Interdisciplinary Research Internship (DUIRI) program is designed to involve Purdue undergraduates in the interdisciplinary research environment of the Institutes and Centers at Discovery Park District. The program provides opportunities for students to work with researchers on cutting edge research projects that involve combining two or more disciplinary strengths. Working closely with researchers, students experience the excitement, challenge, and power of truly interdisciplinary research in the fast-paced, entrepreneurial environment that is Purdue's Institutes and Centers at Discovery Park District.

ISF partners with the DUIRI program to sponsor project proposals revolving around sustainability. These students work with faculty mentors to develop their research, and had the opportunity to present a research poster at both the ISF Fall Research Expo in October, and the Fall Undergraduate Research Expo in November.

FALL 2024 ISF DUIRI RESEARCH PROJECTS

- Harnessing City Conversations to Infer Public Opinion Towards Renewable Energy Deployment
Nihar Pushkar Atri, with support from Shan Zhou (POL)
- Uncertainty Quantification in Life Cycle Assessment for Sustainable Computing
Gavin Fortwendel, with support from Yi Ding (ECE) and Inez Hua (CE, EEE)
- Generating LoD3 Building Models for a Digital Twin
Akshath Raghav Ravikiran, with support from Jinha Jung (CE, CEM)
- Understanding the Energy Use and Carbon Emissions of Training Autonomous Vehicles
Sarah Deniz, with support from Hua Cai (EEE, IE) and Yi Ding (ECE)
- Examining Tropical Cyclone-Induced Compound Hazards to Inform Effective Adaptation and Mitigation Policies
Tanya Sophia Masnyk, with support from Quigchun Li (POLY) and Daniel R. Chavas (EAPS)

SPRING 2025 WELCOMES INCOMING DIRECTOR MARGARET GITAU

MARGARET GITAU

Professor, Agricultural &
Biological Engineering,
Incoming ISF Director
January 2025



“

I am very excited to be taking on the role of ISF director, to be guiding the institute in shaping its future. We have incredible talent in our staff, leadership team and faculty affiliates, which is inspiring to me. There is already a whole lot that has been accomplished by ISF through the communities, special initiatives, strategic research teams, and other internal endeavors. We will build upon these accomplishments and the foundation that has been set as we explore new horizons to elevate the status of ISF.

-Margaret Gitau

[Read full article here](#)

ON THE FOREFRONT OF WHAT COMES NEXT

LOOKING AHEAD TO 2025

ISF strives to deepen connections across Purdue, the State of Indiana, nationwide, and beyond. Our institute directors, research community leaders, special project and special initiative leaders, and core staff are continuously working to move the mission of ISF forward.

SEMINAR EVENTS

ISF works with multiple colleges to bring scholars working on key scientific challenges to campus to meet faculty and students and present research. In spring 2025, ISF will work with the Department of Forestry and Natural Resources to bring Dr. Relyea, the David M. Darrin '40 Senior Endowed Chair in Biological Sciences at Rensselaer Polytechnic Institute in Troy, NY. He will be presenting on "Human Impacts on Aquatics Ecosystems."

EXTERNAL OUTREACH & COLLABORATION

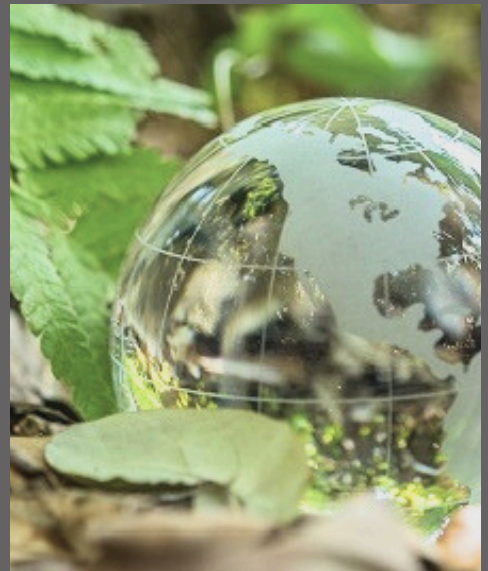
Working with state and regional partners, ISF will be collaborating with Indiana University and the City of Lafayette in an open presentation on building climate resilience in the state. ISF will continue its partnership with both the Hoosier Environmental Council and the White River Alliance, as well as state organizations and state legislators, to share out new research on topics including PFAS and water quality.

SUSTAINABILITY EDUCATION

As part of the campus-wide sustainability self-study, ISF has organized a series of events highlights opportunities to further develop teaching support for sustainability education. Events include a faculty-focused discussion on the topic, a faculty-focused survey, a lecture on K-12 sustainability education and a day-long workshop, co-sponsored with Indiana University Bloomington, focusing on innovation in teaching sustainability for faculty and instructors.

CELEBRATING THE EARTH

Several annual events take place in spring. These include ISF participation in Spring Fest, Earth Month, and campus events that both raise awareness and engage with students across campus.



CONNECT WITH ISF

CONTACT

Stay connected with ISF by [subscribing to our newsletter](#), visiting our website, or reaching out with questions or opportunities.

EMAIL:

isf@purdue.edu

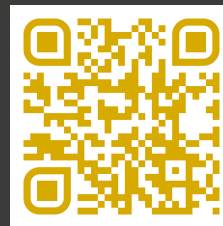
Lynne Dahmen, Senior Managing Director
ldahmen@purdue.edu

ADDRESS :

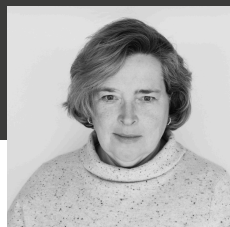
1201 Mitch Daniels Blvd, Suite 120
West Lafayette, IN 47906

WEBSITE :

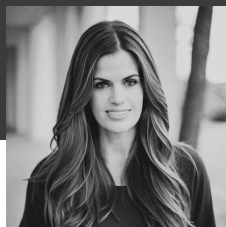
research.purdue.edu/isf



Margaret Gitau
Director



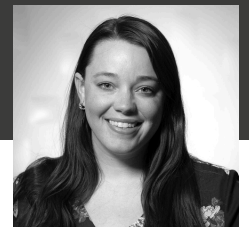
Lynne Dahmen
Senior Managing Director



Tara Greene
Senior Operations Administrator



Valentina Negri
Research Scientist



Kelli Dawson
Administrative Assistant



Tyler Hoskins
Research Assistant Professor



Kayla Gurganus
Graduate Research Assistant



Pragathi Jha
Graduate Student Liason



Cori Lollis
Communications Intern

Thank you for being involved!
Look for further opportunities to get engaged, connect,
and collaborate as we move the mission of ISF forward.