College of Agricultural, Consumer & Environmental Sciences
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

What we do & Why it matters

Natural Resources and Environmental Sciences | nres.illinois.edu

The Department of Natural Resources and Environmental Sciences brings biological, physical, and social scientists together to identify, teach, and publicize solutions for the sustainability of urban, managed, and natural ecosystems from the local to the global scale.

ROBERT SCHOOLEY (professor and interim department head)
Dr. Schooley investigates how wildlife species and communities respond to human land-uses in a rapidly changing world. He investigates the effects of habitat fragmentation and landscape connectivity on mammals and applies insights to effective conservation. He also assesses the outcomes of large-scale restoration projects intended to benefit biodiversity.

YUJI ARAI (associate professor)
Dr. Arai employs a broad range of traditional and cutting-edge molecular approaches and tools at various temporal scales to better understand the complex chemical processes in soils and at the mineral-water interface. This understanding allows him to predict the biogeochemical fate/cycles of nutrients and contaminants and to assess risk in the aquatic and terrestrial environment.

JEFFREY BRAWN (professor)
Dr. Brawn investigates how climate change and land use affect biodiversity. With an emphasis on birds in Illinois and tropical ecosystems, he advances understanding of wildlife conservation at the population and community levels. He also studies the role of wildlife in the dynamics of infectious diseases such as West Nile Virus.

RICHARD J. BRAZEE (associate professor)
Dr. Brazee mathematically models the optimal use of natural resources, including forests, land, and fishery stocks over time. His research is adopted by financial institutions to evaluate long-term projects, serves as a basis for public policy and management debates, and provides an extensive foundation for other scholars' research efforts.

JENNIFER FRATERRIGO (associate professor)
Dr. Fraterrigo advances the mechanistic understanding of how ecosystems and the services they provide respond to environmental change. By integrating processes that operate at different spatial scales, she supports decision-making that promotes ecosystem and landscape resilience.

KAIYU GUAN (assistant professor, Blue Waters professor)
Dr. Guan provides solutions for real-life problems, such as large-scale crop monitoring and forecasting, water management and sustainability, and global food security. He uses satellite data, computational models, field work, and machine learning approaches to address how climate and human practices affect crop productivity, water resource availability, and ecosystem functioning.

ROBERT J.M. HUDSON (associate professor)
Dr. Hudson advances methods for simulating soil carbon dynamics and the reactivity of trace metals in natural waters. His group developed a novel technique for measuring methylmercury that has been applied to quantify mercury pollution in muscle tissues of wildlife, waters of wetlands, rivers, and denitrifying bioreactors, and sediments of wetlands and coastal oceans.

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McKENZIE JOHNSON (assistant professor)
Dr. Johnson explores how our approach to governing natural resources and the environment shapes local opportunities to achieve social and environmental justice. She draws mostly on qualitative research approaches, including in-depth fieldwork. Her research findings help policymakers think more deeply about social justice and human security in environmental decision-making processes, which she views as central to enhancing environmental sustainability.

ANGELA D. KENT (professor)
Dr. Kent studies microbial communities that help sustain healthy ecosystems. Her work predicts impacts of global change and other human forces on the functions of microbial ecosystems, and enhances environmental quality by harnessing microbial processes.

MING KUO (associate professor)
Dr. Kuo's work helps cities provide a healthy human habitat for their residents by showing the benefits of urban greening. Her research shows that urban greening reduces aggression and crime in inner cities, reduces ADHD symptoms in communities of all sizes, promotes self-discipline and academic achievement in children, and promotes health across the lifespan by boosting the human immune system. She also defines sustainable landscape practices for all federal lands in the United States and internationally.

ERIC LARSON (assistant professor)
Dr. Larson focuses on protecting and managing freshwater species and ecosystems. He improves conservation decision-making by taking advantage of modern tools like environmental DNA (eDNA), stable isotope analysis, and species distribution modeling. This approach allows him to forecast which species are at risk of extinction and which species are likely to become invasive before those patterns are detectable using classical tools.

JEFFREY MATTHEWS (associate professor)
Dr. Matthews contributes to the conservation and restoration of wetland ecosystems. He conducts field research on the ecology of freshwater wetlands, ecological restoration, and ecosystem services. He also studies U.S. and international environmental policies that affect wetlands.

KEVIN McSWEENEY (clinical professor)
Dr. McSweeney focuses on reclamation of disturbed land. He improves handling and transport of soil material and use of specially selected plants to reduce soil compaction. He conducts research in Illinois and China on active and abandoned mine sites, but his work applies to other disturbed lands in rural, industrial, and urban areas.

DANIEL C. MILLER (associate professor)
Dr. Miller identifies solutions to one of the most pressing challenges of our time: conserving the earth's rich biological diversity while enhancing the well-being of some of the world's poorest people. He focuses on understanding the effectiveness of funding for conservation and development programs around the world, especially relating to forests in tropical countries. His findings inform policy, funding decisions, and new research directions.

JAMES MILLER (professor)
Dr. Miller focuses on strategies for conserving biodiversity in working landscapes, comprising both private agricultural holdings and protected areas. He collaborates with social and natural scientists at several universities, as well as land managers in the private and public sectors to address this crucial issue.

RICHARD MULVANEY (professor)
Dr. Mulvaney improves nitrogen fertilizer uptake in crops, with the goal of increasing profits while reducing negative environmental impacts of excessive nitrogen inputs. This has led to partnerships with the private sector directed toward improving application techniques and exploiting the potential of the Illinois Soil Nitrogen Test for site-specific nitrogen management.

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JOY O'KEEFE (assistant professor and wildlife extension specialist)
Dr. O'Keefe studies endangered bats in landscapes where bats intersect with human activity, deriving new information about bat biology and ecology, and identifying strategies to facilitate coexistence of bats and humans. She collaborates with resource managers to conduct large-scale and long-term field projects that highlight conservation concerns for bats. She regularly communicates with stakeholders to share practical management solutions from effective bat house deployments to best practices for protecting bats and their habitat during prescribed burns.

CORY SUSKI (professor)
Dr. Suski integrates tools in animal behavior, animal physiology, and ecology to protect aquatic resources. He designs novel conservation strategies for stressors that include climate change, angling, and invasive species. His research spans everything from genes to watersheds, and involves both field and laboratory work.

CARMEN MARLENE UGARTE (research assistant professor)
Dr. Ugarte seeks to understand the effects of soil management practices on soil quality and function in order to ensure the sustainability of our natural resources. She is especially interested in studying the dynamics of soil food webs and their influence on soil ecosystem services, such as nutrient cycling, carbon storage, and the regulation of population densities of deleterious soil organisms. She uses basic and applied research at different scales (e.g., experimental and replicated trials, on-farm research) at the regional and national levels in agronomic and natural systems.

CARENA VAN RIPER (associate professor)
Dr. van Riper studies how human values and attitudes influence behavior that impacts the environment. Drawing from theory informing conservation psychology, she models decision-making to develop new strategies for incorporating public viewpoints into policy outcomes. She also specializes in survey research and design to solve problems facing the sustainability of social-ecological systems, particularly around parks and protected areas.

MICHELLE WANDER (professor)
Dr. Wander works with farmers, educators, and policymakers to quantify the influence of diversified and organic production, precision conservation, land use change, and woody perennial polycultures on soil health and soil services such as carbon sequestration, plant production, and water filtration. She also studies system resistance and resilience to stress and puts this information to work through standards, voluntary marketing, and decision support tools that encourage soil stewardship and sustainable land use practices.

MICHAEL WARD (associate professor)
Dr. Ward focuses on species of conservation concern and has developed novel approaches to species conservation. He uses telemetry to radio-monitor the behavior and migration of birds. He works with a broad spectrum of people from farmers in central Illinois to the U.S. Army to the Cuban and Mexican governments.

ANTHONY YANNARELL (associate professor)
Dr. Yannarell uses microorganisms to control weeds and harmful invasive plants. His research sheds new light on the microorganisms that help these pest plants to succeed and the ones that can be used to fight them. By understanding the many different ways that plants and microbes interact, he seeks to improve agricultural productivity and to protect natural areas that are threatened by invasive pests.

ZHONGJIE YU (associate professor)
Dr. Yu seeks to gain a mechanistic understanding of the biogeochemical nitrogen cycle by investigating how biological, ecological, and hydrological drivers of the nitrogen cycle are recorded and reflected in their natural abundances and stable isotope composition. He then uses these isotopic imprints to effectively infer and model the source, transport, and transformation of reactive nitrogen in the environment.