



Graduate Programs  
in Environmental Science



**SCHOOL OF PUBLIC AND  
ENVIRONMENTAL AFFAIRS**

INDIANA UNIVERSITY



**Jay Benforado,**

**MSES '79, Applied Ecology**

Director of the National Center for Environmental Innovation, U.S. Environmental Protection Agency

“I was drawn to SPEA because it combines my two passions — protecting the environment and public service. The course work, professors, internships, and other students gave me a breadth of knowledge and experience that I have used throughout my career. I sharpened an array of skills related not only to environmental management, but also to managing people and organizations. I graduated from SPEA a generation ago, and the memories are still fresh.”

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# Environmental Science

Improving our planet through research and leadership



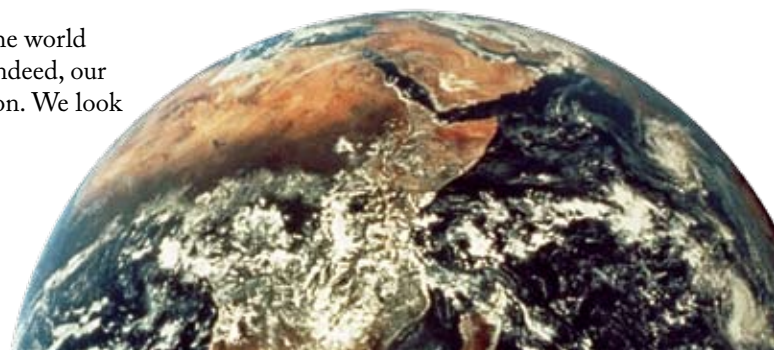
The School of Public and Environmental Affairs (SPEA) is the largest school of public affairs and environmental science in the country. Founded in 1972 on the premise that society's complex challenges require comprehensive and integrated responses, SPEA is known for its distinctive interdisciplinary approach. Our faculty of lawyers, ecologists, social and political scientists, chemists, and economists work alongside each other in classrooms, laboratories, and research centers.

This places SPEA's environmental science programs in a unique position to train students to solve complex environmental problems that are interdisciplinary in nature, including aspects of public policy and regulation. Our Master of Science in Environmental Science degree (MSES), one of the first in the nation, bridges the applied disciplines of chemistry, civil engineering, biology, and geology. With flexible degree requirements, it is easily adapted to each student's academic background and career objectives. Our unique joint degree option within the school combines the MSES with a Master of Public Affairs (MPA) degree, and prepares students with the training they need to address the complex relationship among people, businesses, governments, and ecosystems. And our Doctoral program in Environmental Science gives students a unique opportunity to conduct original cutting-edge research with faculty on current environmental issues that can influence national and international policy.

Our extensive network of alumni around the country and throughout the world sustains our students while they are here and well beyond graduation. Indeed, our alumni are a testament to the vitality and durability of a SPEA education. We look forward to welcoming you to the SPEA community.

A handwritten signature in black ink that reads "John D. Graham".

John D. Graham  
Dean



### On the front cover:

**Jeff Ehman, MPA/MSES '95, PhD '01**, specialized in GIS applications in natural resource management during his master's degree program. Here, Ehman, who completed his PhD in environmental science, measures the photosynthetic rates of leaves in the forest canopy in Morgan-Monroe State Forest just north of Bloomington. Today, he is Director of Midwest Operations, Image Matters, LLC, a software technology company that specializes in geographic information systems.



## Wes Ket

### MPA/MSES '10

Applied Ecology & Water Resources  
Biologist, Apache Ecological Service

“My undergraduate education at a small liberal arts college in biology helped me prepare for the rigors of SPEA’s graduate training. I chose SPEA’s distinctive joint MPA/MSES because it enabled me to build upon my science foundation and integrate policy training to offer the necessary context for my future work in Water Resources and Applied Ecology. I was able to customize my degree program so that I could choose the coursework and develop the skill set required for my career interests. I also had the opportunity to pursue assistantships that supported teaching, research and field work during my tenure in SPEA. These experiences helped me finance my education, but, more importantly, they helped me develop strong relationships with faculty who will continue to serve as mentors throughout my professional life. My SPEA education became much bigger than the classroom—offering me valued connections that will remain with me well into the future.”

# Why study at SPEA?

**It's a convenient truth:** The master's and doctoral programs in environmental science at Indiana University Bloomington are among the world's best. These programs are:

- **Interdisciplinary:** You will acquire substantial knowledge in your chosen concentration and also learn about related fields, making you extremely versatile and adaptable. We offer several joint degrees, including our popular and unique Master of Science in Environmental Science/Master of Public Affairs (MPA/MSES) joint degree program.
- **Flexible:** You will choose your courses based on your career goals and advisors' recommendations rather than a list of required courses. Master's students can satisfy their experiential component through a thesis, research project, internship, or prior professional experience, and can pursue their PhD concurrently.
- **Rigorous:** Our challenging curriculum is taught by faculty who are leaders in their fields. Our students are trained to be problem-solvers and, therefore, are very marketable.
- **Connected:** SPEA faculty and students participate in groundbreaking projects worldwide. With help from our in-house career center, our students get internships at—and get hired by—top employers, such as the U.S. Environmental Protection Agency, various state agencies, the World Bank, academia, and a variety of industries, utilities, and non-profit organizations.
- **Recognized for excellence:** *U.S. News and World Report, America's Best Colleges 2008* ranked us No. 1 in the nation for environmental policy and management.

## What is SPEA?

The School of Public and Environmental Affairs at Indiana University.

The largest school of its kind, known for a distinctive **interdisciplinary** approach.

Our lawyers, ecologists, political scientists, chemists, economists, scholars of philanthropy, and information systems **experts** work alongside each other in classrooms, laboratories, and research centers.

SPEA is acclaimed for **quality** programs, clearly defined core competencies, a wide **array** of concentrations and joint degrees.

SPEA is the only institution in its league with an **interdisciplinary** character where students can combine science and public affairs.

Our programs allow you to **customize** your degree. Combine your MSES with one of Indiana University's many other top schools and programs, such as Area Studies/Institutes, Geography, Geology, Journalism, Law, and Library Science. SPEA Bloomington offers 15 joint programs in social and natural sciences and in professional fields.

# Master of Science in Environmental Science (MSES)

The MSES program at SPEA attracts students who are devoted to critical issues in environmental protection and motivated to apply their knowledge and passion in a broader context.

## Identify, Assess, Remedy

SPEA offers master's programs in environmental science with a curricular emphasis on the intersection of science and public policy. Environmental problems require strong expertise in applied physical, chemical, and biological sciences. And they also require the ability to identify, assess, and remedy questions that involve law, health and financial risks, economic and political trade-offs, and other institutional and organizational concerns.

In just two years, our MSES students receive excellent preparation for continued academic study and research as well as a toolkit to effect significant environmental reform in a wide range of specializations and arenas.

## Practice, Specialize, Customize

Students who enter the MSES program typically know what they want to do and we know that experience is the best way to get there. Through capstone projects, internships, and applied research, you will gain invaluable expertise in developing practical, real-world solutions. And with four concentrations, several joint degree options, and SPEA's interdisciplinary focus, you can customize your course of study...working with SPEA's own faculty advisors.



### Hendrik Haitjema

• Professor of Public and Environmental Affairs  
• Professor (part-time) of Geological Sciences  
• Director, Master of Science in Environmental Science and  
• PhD in Environmental Science Programs  
• PhD, University of Minnesota, 1982

#### Expertise:

• Groundwater flow modeling, including regional groundwater flow systems, conjunctive surface water and groundwater flow modeling, three-dimensional groundwater flow, and saltwater intrusion problems.

### PhD Bound

Students who plan to complete a PhD in Environmental Science can enroll in both the master's and PhD programs concurrently. If you decide to pursue doctoral study after you have enrolled in the MSES degree program, your master's credit transfers to the PhD program.

## Experience Counts

You have been there, and we appreciate that. You can get course credit toward your MSES degree for significant management, scientific, or administrative work experience.

# Concentrations

## Applied Ecology

SPEA graduates apply ecological principles to wildlife management, invasive species, habitat restoration, and a host of other topics in applied ecology.

### SAMPLE COURSES

Applied Ecology  
Wetlands Biology and Regulation  
Forest Ecology and Management  
Fisheries and Wildlife Management  
Environmental Toxicology  
Lake and Watershed Management  
Conservation Biology  
Sustainable Forestry  
Restoration Ecology  
Statistics for Environmental Science

## Environmental Chemistry, Toxicology, and Risk Assessment

MSES students enjoy accelerated careers in environmental chemistry, environmental toxicology, waste site remediation, hazardous materials management, and risk assessment in public, private, and non-profit organizations throughout the world.

### SAMPLE COURSES

Environmental Chemistry  
Environmental Engineering  
Environmental Toxicology  
Fundamentals of Air Pollution  
Aquatic Chemistry  
Subsurface Microbiology and Bioremediation  
Solid and Hazardous Waste Management  
Applied Mathematics for Environmental Science

## Water Resources

Whether your dream is to reclaim wetlands or protect drinking water, our rigorous Water Resources concentration prepares you to address myriad environmental issues concerning water quality and resource management.

### SAMPLE COURSES

Groundwater Flow Modeling  
Wetlands Biology and Regulation  
Limnology  
Stream Ecology  
Lake and Watershed Management  
Environmental Soil Science  
Surface Water Hydrology  
Physical Meteorology/Climatology  
Water Supply and Wastewater Treatment  
Water Law

## Energy

The Energy concentration focuses on energy policies and technologies, exploring the socioeconomic and environmental consequences of both. You will learn the life cycle of energy resources and study the economics of energy production and consumption. You'll also explore the feasibility of various tools and techniques for mitigating carbon emissions, diversifying the energy sector, and developing innovative energy technologies.

### SAMPLE COURSES

Energy Resources, Technology and Analysis  
Energy Economics and Policy  
Fundamentals of Air Pollution  
Environmental Chemistry  
Environmental Physics  
International Environmental Policy  
Sustainable Development  
Environmental Law

## Jennifer Liljegen

**MPA/MSES '10; PhD, Environmental Science  
2014 (expected)**

BS, University of Kansas '05

“For me, it’s the people who make SPEA exciting. My colleagues are talented, energetic, compassionate individuals who go out of their way to help me become a better environmental scientist and a better person. These people come from a variety of backgrounds and possess a variety of niche interests pertaining to the environment. They constantly challenge themselves and me to go above and beyond. I am so thankful for the opportunity to study, learn, and live here in Bloomington with them.”







## Philanthropists wanted

SPEA actively recruits students who have completed service in the Peace Corps, AmeriCorps, and Teach for America. The skills and experiences gained in these programs are well-suited for MSES study and can earn you course credit toward your degree.

## Tool Skill Courses

Students acquire competency in analytical methods by focusing on tool skills appropriate to their concentration. These courses are selected in consultation with a faculty advisor.

- Risk Communication
- Vector-based Geographic Information Systems
- Applied Remote Sensing of the Environment
- Applications of Geographic Information Systems
- Environmental Risk Analysis
- Statistical Analysis for Effective Decision Making
- Data Analysis and Modeling for Public Affairs
- Management Science for Public Affairs
- Benefit-Cost Analysis of Public Environmental Policies
- Negotiation and Alternative Dispute Resolution
- Public Program Evaluation

## The Experiential Component

Each MSES student must obtain professionally relevant experience through one of the following options:

- *An approved internship.* Our Office of Career Services (OCS) can help you find an appropriate internship with a variety of organizations (see p. 12).
- *Prior Professional Experience.* Appropriate work experience before enrolling in the program may be used to fulfill its requirement.
- *A research thesis.* Students interested in pursuing research can satisfy this requirement through a thesis project with a faculty member (see p. 14).

## Joint Degrees

Studying at a top American research university has its advantages. You can combine your MSES degree with top-ranked IU degree programs in public affairs, law, natural sciences, and journalism.

- MSES/Master of Public Affairs (MPA)
- MSES/Doctor of Jurisprudence (JD)
- MSES/MS Chemistry
- MSES/MS Geology
- MSES/MS Physics
- MSES/MA Biology
- MSES/MA Geography
- MSES/MA Journalism

### Doubling your impact

SPEA offers a one-of-a-kind degree program that provides both a Master of Public Affairs (MPA) and a Master of Science in Environmental Science (MSES). The outstanding professional success of SPEA's joint degree graduates is one reason SPEA's environmental policy and natural resource management concentration has ranked #1 in the US in the last two *U.S. News and World Report* surveys.



### World wise

Hungary, Columbia, Brazil, Mongolia, India, Venezuela, Ukraine, Jamaica, England. SPEA graduate programs draw students from all over the world who broaden our world view and the scope of our environmental research and projects.

# PhD in Environmental Science

SPEA doctoral students in environmental science see the forest *and* the trees. Our PhD program emphasizes depth of study in a specialized area as well as breadth of study in related fields in environmental science and interdisciplinary research.

A broader, more applied approach to environmental science is the hallmark of the PhD program. Our graduate students and faculty learn, teach, and work at the nexus of science and public affairs—where scientific publications influence policy-makers and laboratory discoveries shape legislation.

## A Great Degree of Latitude

It does not matter where you are on the map—you can chart your doctoral course according to your interests. Other than participating in our Seminar in Environmental Science and Policy, there are no required courses for fulfilling the requirements of this PhD program. Our students design their programs and select four or five faculty members—from SPEA, other IU schools and departments, and sometimes from other universities—who comprise their advisory committees.

## Exploration and Application

Our PhD students develop highly integrated, original research, and there are opportunities for unique approaches and large interdisciplinary projects. Through centers, in-house academic journals, conferences, and symposia, SPEA is a hub of collaborative exploration.

Developing a strong research portfolio is a key focus of the doctoral program. At least 30 percent of your course credit will be devoted to research, which culminates in a research-focused dissertation.



## Philip S. Stevens

Environmental Science Faculty Chair  
Professor of Public and Environmental Affairs  
PhD, Harvard University, 1990

### Expertise:

Atmospheric chemistry, focusing on the characterization of the chemical mechanisms in the atmosphere that influence regional air quality and global climate change.



### MSES option

A doctoral student may be awarded the MSES degree while completing the requirements for the PhD. Completing the MSES degree is not a requirement of the PhD program.

### Sarah Mincey

#### PhD Student in Environmental Science

BA, Moorehead State University  
MPA/MSES '07, Indiana University

“I came to SPEA because of its excellent reputation and national rankings in both environmental science and policy; I came because of its interdisciplinary approach exemplified through the joint degree programs such as the MPA/MSES track; I came because of its commitment to service-learning and finding solutions to real-world problems; and I came for the setting – the beautiful woodland campus of Indiana University, its proximity to state and national forests and recreation areas, and because of its distinguished research and teaching preserve.

“Environmental scientists and policymakers from SPEA are empowered through the knowledge that complex problems faced in public affairs, such as environmental dilemmas, require interdisciplinary collaboration to find effective solutions.”



## Ronald Hites

Distinguished Professor

PhD, Massachusetts Institute of Technology, 1968

### Expertise:

Applying organic analytical chemistry techniques to the analysis of trace levels of toxic pollutants, such as polychlorinated biphenyls and pesticides, with a focus on understanding the behavior of these compounds in the atmosphere and in the Great Lakes.

## In Every Field

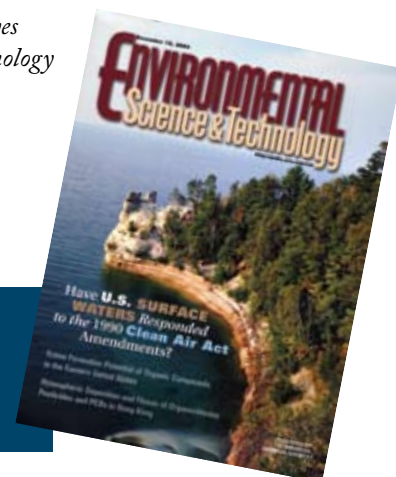
Environmental science faculty at SPEA leave no stone unturned. We conduct leading research and influence national and international policy in every aspect of environmental protection.

- Applied ecology
- Atmospheric chemistry
- Biogeochemistry
- Bioremediation and environmental microbiology
- Conservation biology
- Contaminant fate and transport
- Forest ecology
- Environmental chemistry
- GIS applications
- Global climate change
- Groundwater flow modeling
- Limnology and aquatic ecology
- Meteorology and climatology
- Toxicology and developmental neurobiology
- Urban forestry

## Journals

Our doctoral students and faculty edit and contribute to top academic journals in environmental science, such as:

*Applied and Environmental Microbiology*  
*Atmospheric Environment*  
*Ecological Applications*  
*Environmental Health Perspectives*  
*Environmental Science and Technology*  
*Environmental Toxicology and Chemistry*  
*Global Change Biology*  
*Journal of Geophysical Research*  
*Journal of Hydrology*  
*Science*



## Top shelf

*Environmental Science and Technology* is one of the leading journals in the field and is edited at SPEA.



## **Marta Venier**

**PhD, Environmental Science '08**  
Laurea (BA), University of Trieste, Italy

“Being a SPEA graduate student is a thrilling experience for me. One of the main privileges of being a SPEA graduate student is the strong interdisciplinary environment.

“In the three years that I have been in the program, I have had the opportunity to meet other students from different parts of the world, making this experience even more exciting. The School is very well integrated in the local community and Bloomington itself is a wonderful place to live.”

# Career Services



## Vicky J. Meretsky

Associate Professor of Public and Environmental Affairs  
PhD, University of Arizona, 1995

### Expertise:

Ecology and management of rare species, biocomplexity, landscape-level species and community conservation, temporal patterns in biodiversity, and integrating ecosystem research and endangered species management within adaptive management.

## Focusing and Supporting Your Career Search

Our graduate programs will prepare you for a variety of careers, and our Office of Career Services (OSC) will help you identify job opportunities.

Our counselors will meet with you to discuss your goals, plot your career timeline, and help you take advantage of our many services, such as:

- Assistance with your job or internship search
- Résumé and cover letter critiquing
- On-campus interviews and career fairs
- Networking opportunities, including trips to Chicago, Indianapolis, and Washington, DC, to meet with employers
- SPEACareers.com, where you can post your résumé and view job postings
- Career development workshops
- Interview coaching, including mock interviews and salary negotiation tips
- Access to skills and personality assessment tools, such as the MBTI (Myers-Briggs Type Indicator)
- Continuing career service assistance after you graduate

## Intern for leading employers

Internships both satisfy the experiential component of our MSES program and enable you to make a good impression on a potential employer. Our students have interned for a variety of organizations, including the National Park Service, Sierra Club, New York City Department of Parks and Recreation, and Indiana Clean Lakes Program.

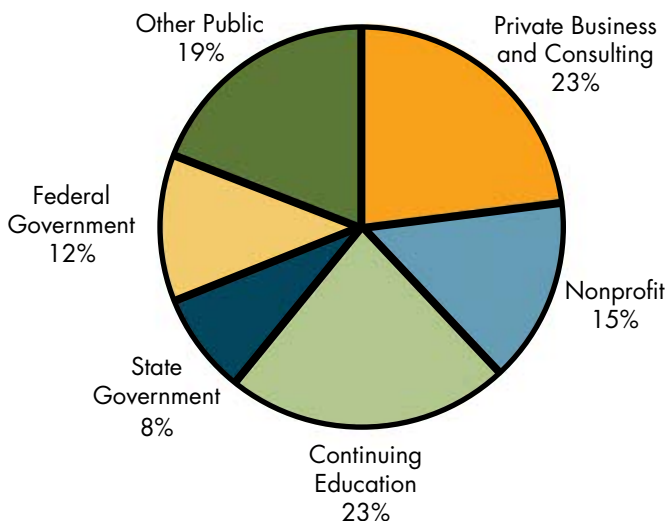
## SPEA and the EPA

It is no wonder that so many SPEA alumni work for the U.S. Environmental Protection Agency. William Ruckelshaus, an Indiana public servant and a member of the School's first advisory board, was the agency's first and fifth administrator.

### Employers of our Master of Science and joint degree alumni include:

- Chicago Park District
- Ecology and Environment, Inc.
- Eli Lilly and Company
- Federal Energy Regulatory Commission
- Florida Fish and Wildlife Conservation Commission
- Food and Agriculture Organization of the United Nations
- Indiana Department of Environmental Management
- Los Alamos National Laboratory
- Marine Conservation Biology Institute
- National Oceanic and Atmospheric Administration
- The Nature Conservancy
- National Park Service
- New York City Department of Environmental Protection
- New York City Urban Forestry Program
- Oregon Department of Fish and Wildlife
- Resources for the Future
- Starr Ranch Sanctuary
- Tetra Tech
- U.S. Embassies in Mexico City and Addis Ababa, Ethiopia
- U.S. Environmental Protection Agency
- U.S. Geological Survey
- U.S.D.A. Forest Service
- Utah Department of Natural Resources
- Wisconsin Department of Natural Resources

### SPEA MSES Employment by Category 2007-2010



### Employers of our PhD alumni include:

- Air Quality Sciences
- Battelle Laboratories
- Indiana University
- Kluwer Academic Publishers
- Miami University
- National Oceanic and Atmospheric Administration
- Oak Ridge National Laboratory
- Penn State University
- Santa Clara University
- SRI International
- Universidad del Valle de Guatemala
- University of California, Irvine
- University of Florida
- University of Michigan
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- U.S.D.A. Forest Service
- Wittman Hydro Planning Associates
- World Bank, Brazil and Washington, DC

## The SPEA network

Your SPEA education will be a powerful link to alumni working all over the world, in an amazing variety of careers. Our alumni receptions are great opportunities to make professional connections, and we can put you in touch with alumni whose backgrounds match your interests and goals, so you can ask questions and get career advice. We will also help you leverage the faculty's many and varied professional connections to assist in your career exploration.

# Faculty and Research



Imagine an area of environmental science, and there is probably an expert in it at SPEA. Our faculty members' research interests include air pollution, biocomplexity, land use, environmental chemistry, tropical ecosystem ecology, ecohydrology, environmental risk assessment, natural resource conservation, biogeochemistry, public lands management, and much more.

Students have access to over 30 faculty members in various fields of environmental science, half of whom are housed in SPEA. In addition, our students take courses and do research with faculty members from across campus whose areas of expertise is also in the environmental sciences. Our faculty members are tremendously accomplished—they are cutting-edge researchers, authors who contribute to prominent journals, and members of professional organizations such as the Ecological Society of America, Society of Environmental Toxicology and Chemistry, American Chemical Society, and the American Geophysical Union.

Above all, they are dedicated educators whose passion for the environment and love of teaching—in the classroom, lab, and field—create an exceptional atmosphere for learning.

Read about some of our research projects below, and go to [www.spea.indiana.edu](http://www.spea.indiana.edu) to learn more about our faculty members. Our faculty members invite you to call or e-mail them with questions about SPEA or your program of interest.

## Christopher B. Craft

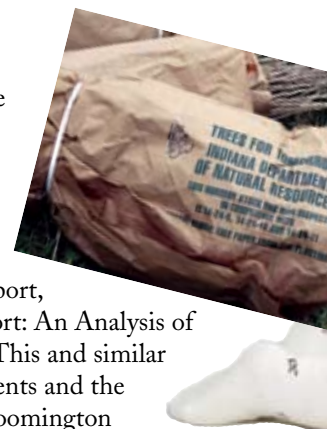
Professor of Public and Environmental Affairs  
PhD, North Carolina State University, 1987

### Expertise:

Terrestrial and wetland ecosystem restoration, wetlands ecology, soil resources, biogeochemistry, nutrient cycling and carbon sequestration of soils and sediments.

## Sustainable Urban Forests

The City of Bloomington and SPEA have developed a cooperative arrangement to inventory and analyze the city's urban forest. Former State Forester and Clinical Professor Burney Fischer and his students conducted a street tree inventory for Bloomington resulting in the technical report, "The 2007 Bloomington Street Tree Report: An Analysis of Demographics and Ecosystem Services." This and similar working relationships between SPEA students and the City promote a healthy urban forest in Bloomington and offer invaluable experience to students in both





### Felines and Flame Retardants

A cause of feline hyperthyroidism might be right under your cat's nose, according to a study by Distinguished Professor Ron Hites, doctoral student Marta Venier, and other researchers that was published in the online journal *Environmental Science & Technology*.

The study found high levels of popular flame retardants in house cats, 20 to 100 times higher than the levels typically found in humans. The chemicals—polybrominated diphenyl ethers, or PBDEs—are used in upholstered furniture, carpet pads, and other products. The study also found surprisingly high levels of PBDEs in some cat food.

The link between PBDEs and feline hyperthyroidism isn't conclusive, but it raises another question: Because of their crawling and eagerness to put things in their mouths, are young children also at risk from PBDEs?

### Understanding Nitrogen Pollution

Each summer, a large region of the Gulf of Mexico becomes hypoxic, meaning dissolved oxygen levels are too low to support animal life such as fish and shellfish. The cause of the hypoxia is decaying algae that reach problematic densities because of excessive nitrogen inputs from the Mississippi River. A major source of that excess nitrogen is fertilizer applied to the agricultural regions of the upper Midwest.

Assistant Professor Todd Royer studies the interacting hydrological and biological processes in streams that determine nitrogen delivery to the Mississippi River and ultimately the Gulf of Mexico. A primary focus of his research is denitrification, a process performed by certain bacteria that naturally removes nitrogen from aquatic ecosystems. Professor Royer's research on denitrification is supported by funding from the National Science Foundation.

### Climate in Flux

A short drive from Bloomington, SPEA faculty and students are contributing to a large-scale, interdisciplinary study of forest carbon dynamics and its role in global climate change.

Around 100 graduate students have worked at the flux tower in Morgan-Monroe State Forest with SPEA Professor J.C. Randolph and Geography Professor Hans Peter Schmid. This site is part of AmeriFlux network in the United States and FLUXNET, a worldwide network of more than 400 sites that measure the exchanges of carbon dioxide, water vapor, and energy between the terrestrial biosphere and the atmosphere. The project brings together researchers from a variety of fields, including ecology, meteorology, and environmental chemistry.





### Megacity Atmospheric Study

More than 300 investigators, more than 60 institutions, and one very large, very polluted city: MILAGRO (Megacity Initiative: Local and Global Research Observations) was a coordinated field campaign to measure the impact of megacities on regional air pollution and global climate change.

Professor Phil Stevens, doctoral student Deepali Vimal, and postdoctoral fellow Sebastien Dusanter participated in MILAGRO's Mexico City Metropolitan Area campaign using a custom-built laser system to measure the concentrations of important atmospheric oxidants.

### Troubled Waters

Degradation of lakes and streams due to widespread loading of pollutants, such as metals, is a significant environmental problem. At low levels, these may have little visible effect on the resident species, but the tipping point, where continued inputs result in species loss, is difficult yet critical to anticipate. One crucial issue is how long resident species can persist in



their native lakes and streams in the face of these inputs. The answer to this question depends in part on their ability to acquire tolerance, which can manifest in individuals as physiological modifications (acclimation) and over time restructure natural populations via genetic adaptation.

Assistant Professor Joe Shaw, research associate Chip Glaholt, and colleagues in The Center for Genomics and Bioinformatics are characterizing the genome of the tiny crustacean, *Daphnia*, which plays a pivotal role in maintaining the health of freshwater systems.

### Learning from a Vast Landscape

The vast boreal landscapes of the northern hemisphere contain more than one-third of earth's soil organic matter—and they are particularly vulnerable to changes in climate. SPEA Professor Jeff White has been working with other climate scientists to determine how changing climate in boreal wetlands may cause a cascade of changes in plant communities, soil microbes, and, ultimately, in greenhouse gas emissions from these landscapes.

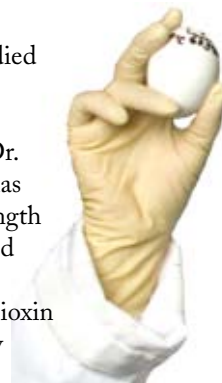
Using controlled field plots in northern Minnesota, White's investigations on the effects of soil warming and water-table fluctuation on greenhouse gas release, suggest these feedbacks are critically important components of the climate system on earth and must be incorporated into the next-generation climate models if modeling efforts are to improve.

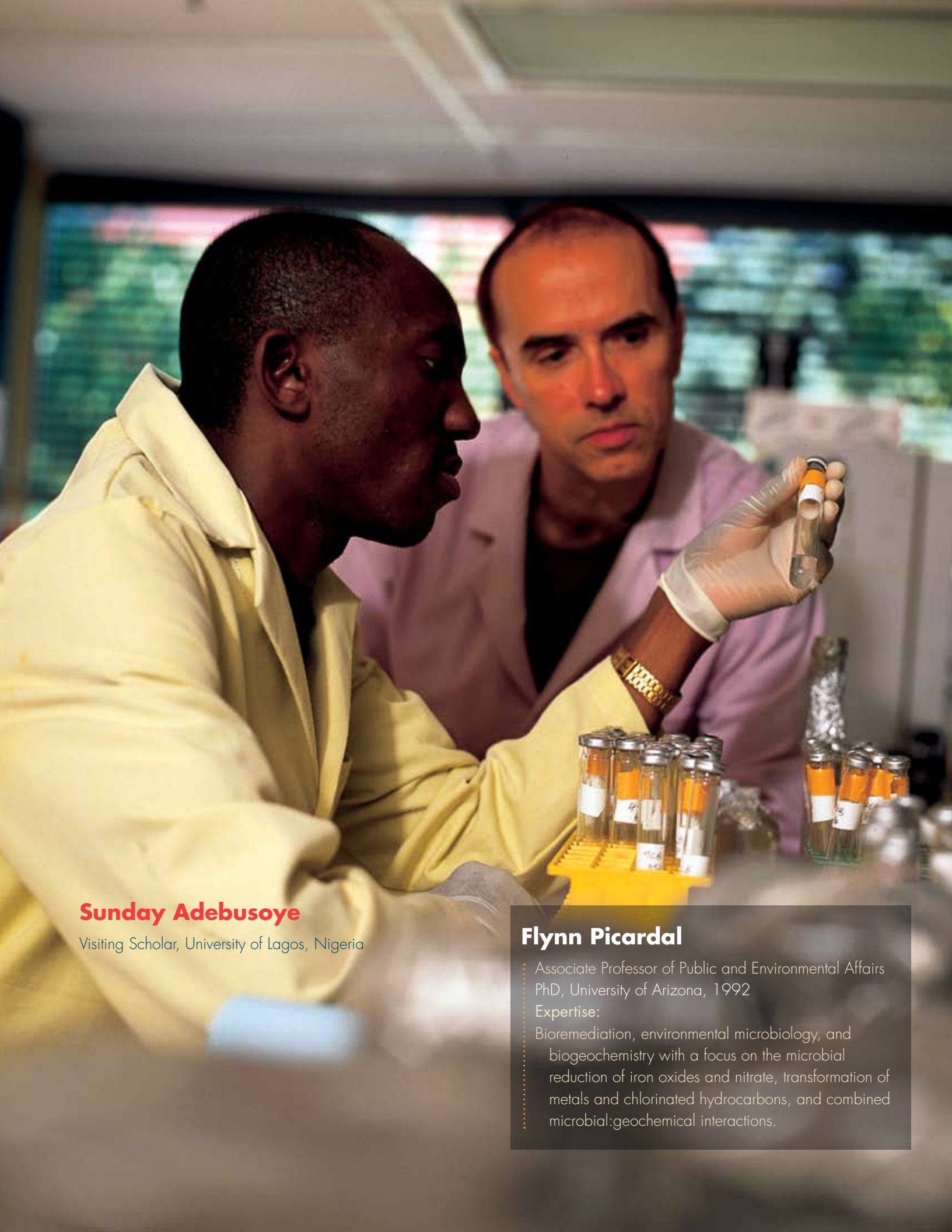
### Monitoring Indiana's Lakes

During the past 20 years, under the direction of Clinical Professor Bill Jones, 81 MSES students have been trained and funded by the Indiana Clean Lakes Program program, a comprehensive, state-wide public lake management program that provides public information and education, technical assistance, citizen volunteer lake monitoring, lake water quality assessment, and coordination with other state and federal lake programs. Since its inception in 1989, over 1,500 comprehensive lake water quality assessments have been conducted on 600 Indiana lakes and reservoirs, and citizen volunteers have collected 7,500 sets of data from their lakes.

### The Magic of Light

The effects of light on health has been studied for centuries. Recent evidence from the laboratory of Associate Professor Diane Henshel and her collaborators, including Dr. John Watkins in the School of Medicine, has shown that a near infra-red narrow wavelength LED-based light can reverse damage caused by dioxin, one of the most toxic chemicals known to contaminate our environment. Dioxin causes oxidative stress and decreases energy in cells, and increases embryo mortality in chicken embryos. Red light treatment can reduce these effects, making dioxin-treated chickens healthier, and dramatically decreasing dioxin-induced chicken embryo mortality.





## Sunday Adebuseye

Visiting Scholar, University of Lagos, Nigeria

## Flynn Picardal

Associate Professor of Public and Environmental Affairs  
PhD, University of Arizona, 1992

Expertise:

Bioremediation, environmental microbiology, and biogeochemistry with a focus on the microbial reduction of iron oxides and nitrate, transformation of metals and chlorinated hydrocarbons, and combined microbial:geochemical interactions.

# Facilities and Centers

## Space: The New Frontier

SPEA research has space to grow. The second phase of IU's multidisciplinary science building construction, a 65,000-square-foot, five-story building has been completed, bringing together IU researchers in environmental science, biogeochemistry, and other life sciences that cross disciplinary boundaries.



Amidst the Jordan River, Dunn Woods, and this lush green campus, you will find our students and faculty at work in thriving laboratories and centers—at SPEA and across IUB. The interdisciplinary nature of our environmental science curriculum facilitates discoveries in geology, geography, chemistry, ecology, biology, and atmospheric science.

## Center for Research in Environmental Science (CRES)

Seminars, discussion groups, proposal preparation workshops, and academic collaboration keep SPEA and Indiana University faculty and graduate students in touch with emerging research and current topics in environmental science. The Center for Research in Environmental Science is a university-wide center designed to enhance multidisciplinary research in environmental science across campus.

Several other centers focused upon various aspects of environmental science interact collaboratively with the facilitation of CRES, such as:

## Indiana University Research and Teaching Preserve (IURTP)

Our graduate study is enhanced by nature's laboratory—450 acres of heavily forested landscape located minutes from the heart of our campus. The IU Research and Teaching Preserve (RTP) is adjacent to two lakes, offering outstanding access to aquatic habitats as well as extensive field-research opportunities in environmental science.

## Center for the Study of Institutions, Population, and Environmental Change (CIPEC)

This center focuses on how institutional arrangements influence the nature and magnitude of human impacts, such as the impact of population density and transportation networks on forest ecosystems and global change.

## One for the Books

The Business/SPEA Information Commons provides convenient access to rich library resources, individual and group workstations, and customer-focused services that support individual and collaborative learning and research.

# Admission to the Program

## How to Apply

Complete and submit the application online available at

[speaapplication.com](http://speaapplication.com)

Questions about the application process?

For the PhD program, call 1.877.630.0023.

For the Master's program, call 1.800.765.7755 or e-mail [speaapps@indiana.edu](mailto:speaapps@indiana.edu).

## Application Deadlines

*For International Applications*  
December 1

*For Domestic PhD Applications*  
January 15

*For Domestic Master's Applications*  
May 1 (February 1 to be considered for SPEA-based merit aid)

## Financial Support

SPEA and Indiana University believe in providing financial support for our graduate students, and offer teaching/research assistantships as well as a variety of merit-based fellowships.

Indiana University's Office of Student Financial Assistance (OSFA, [www.indiana.edu/~sfa](http://www.indiana.edu/~sfa)) administers all need-based aid, including federal and state scholarships and grants, federal student loans, and federal work-study funds.

## Study overseas, or start your career in Washington

Master's students can apply for the SPEA Scholarship for International Internship-Study-Research, an award of up to \$2,500. For example, you can study a semester at the renowned Delft Technical University in The Netherlands (SPEA Semester in Delft). And when you are about to complete your graduate degree you can apply to the prestigious Presidential Management Fellows (PMF) Program, a two-year paid fellowship working with federal agencies. We will help you prepare for your PMF evaluation—one reason so many SPEA students are chosen as Fellows.



**You can get there  
from here**  
**Mileage from Bloomington**



# Life in Bloomington



Bloomington Farmers' Market

Ask its residents to describe Bloomington and you're likely to hear words like "progressive," "cultural," "lively," "diverse," "beautiful," and "family-friendly." In brief, we're a town with a big-city atmosphere.

National polls and media consistently rate Bloomington in the top ten U.S. cities for quality of life. *Men's Journal* rated Bloomington number five on its list of the 50 Best (Healthiest, Safest, Sexiest) Places to Live; and according to *Psychology Today*, it is one of the least stressful cities in the United States. *Bicycling* magazine agrees, having recently named Bloomington the seventh-best place to cycle. With its modest cost of living and spectacular cultural amenities, Bloomington was listed as the eighth-best place to retire by Rand McNally's *Retirement Places*. Bloomington is an affordable place to live, with a cost of living significantly lower than many cities with research universities.

## Cultural Amenities and Diversity

A quick glance at a Bloomington events calendar reveals that there is something happening every day and night of the week. Whether it's a rock concert at the Buskirk-Chumley Theater, the Bloomington Playwrights Project's latest play, a folk concert in Bryan Park, an art exhibit at the John Waldron Arts Center, a ballet or opera at the Musical Arts Center, a Saturday morning at the City Market, or a free lecture at the IU Auditorium by such luminaries as the Dalai Lama of Tibet, Bill Gates, or Gloria Steinem, Bloomington truly has something for everyone.

An international community in the heart of the Midwest, Bloomington is home to world music and cuisine. Every autumn the Lotus World Music and Arts Festival features music by artists from around the world in venues throughout the downtown area. A wide array of international restaurants—Afghan, Chinese, French, Greek, Indian, Irish, Italian, Japanese, Mexican, Middle Eastern, Tibetan, and Thai, to name just a few—as well as international and specialty grocery stores, are within easy walking distance of the university.



Main Stage, Indiana University Auditorium

## Natural Beauty

The natural and aesthetic splendor of Bloomington extends beyond the city limits. Bloomington is surrounded by rolling hills and is minutes away from an abundance of state parks, forests, and lakes (including the state's largest man-made lake)—all of which offer a wide array of outdoor recreational activities year-round. When you plan your campus visit, make time to enjoy one of these natural treasures:

- Brown County State Park
- McCormick's Creek State Park
- Lake Monroe
- Hoosier National Forest
- Morgan-Monroe State Forest
- Yellowwood State Forest
- Charles C. Deam Wilderness Area

A short drive through the hilly terrain can take you to neighboring towns such as Nashville, a lively arts colony, and Columbus, known internationally for its modern architecture—many of the town's buildings were designed by award-winning architects such as I.M. Pei, Kevin Roche, and Robert Venturi.

Bloomington is less than a day's drive from a half-dozen metropolitan areas. Just an hour to the north, Indianapolis offers countless recreational and cultural options as well as employment opportunities.



Yellowwood State Forest



Brown County State Park



Lake Monroe



Sample Gates, Indiana University

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