Indiana University
Grand Challenges Program
Announcement
Wednesday, May 10, 2017
Indiana State Museum
New IU Grand Challenge initiative to tackle major environmental threats to Hoosier health, economy

$55 million research initiative to launch collaborative Environmental Resilience Institute and create a Hoosier Resiliency Index

FOR IMMEDIATE RELEASE

BLOOMINGTON, Ind. — Indiana University President Michael A. McRobbie has announced that IU will invest $55 million to help Indiana develop actionable solutions that prepare businesses, farmers, communities and individual Hoosiers for the effects of ongoing environmental change. The initiative — Prepared for Environmental Change — is the second project funded through IU’s $300 million Grand Challenges Program, which launched in 2015.

Indiana is already experiencing heavier spring flooding and hotter, drier summers, and the pace of change is expected to increase. The visible effects of changes in weather patterns also give rise to less obvious environmental changes that include altered growing seasons and migratory patterns, soil loss, and rapidly spreading diseases like Lyme disease, Zika virus and West Nile virus. Together, these complex changes threaten agricultural production, infrastructure stability, public health, and the diversity of plant and animal life.

The initiative will create an Environmental Resilience Institute to better predict the impact of these threats and facilitate collaboration between IU’s world-class faculty and Indiana residents, businesses, nonprofits and the public sector. Some of the partners include Cummins Inc., Citizens Energy Group, the Nature Conservancy and government officials from across Indiana. As soon as this summer, researchers will begin putting in place the infrastructure to collect data about the challenges Indiana faces from environmental change and to organize research activities to address them.

“Environmental change has been a constant through history,” McRobbie said. “Areas that were once fertile are now deserts. Areas that were once covered in huge glaciers are now home to major farming activity. Our state is not immune to changing environmental conditions, and these may cause major changes for some of the state’s most valuable assets and industries.

“The size and scope of these changes demand extensive collaboration between key public- and private-sector stakeholders. Great research universities like IU are uniquely positioned to help lead these partnerships and provide the intellectual talent, resources and expertise to develop and implement innovative and high-impact solutions to the most pressing needs of our local communities, our state and our world in the face of environmental change.”

To address and combat these increasingly complex threats, IU researchers — led by internationally acclaimed scientist Ellen Ketterson, IU Distinguished Professor of Biology — will build Indiana-specific projections of environmental change that equip governments, businesses and community groups to respond with the right investments in agriculture, industry, infrastructure, and public health and safety.

“Environmental challenges impact us all and present a threat to quality of life around the world,” said Karen Cecil, director of global environmental sustainability at Cummins Inc. “Developing solutions to these challenges is paramount to the long-term health of communities and our economy.

“The success of Indiana’s advanced manufacturing industry depends on natural resources and a complex global supply chain that’s put at risk by environmental change. That’s why initiatives like this one that help us adapt to these pressures are so crucial to our state, our business and our way of life.”

With community-based readiness, discussion and understanding as core goals, the initiative will look at new strategies for communicating findings and recommendations to Hoosiers in ways that are clear, precise and understandable. For example,
the team will inaugurate a Hoosier Resiliency Index to help Indiana communities track and enhance responsiveness to immediate and long-term challenges caused by environmental change.

“We aren’t here to debate partisan differences on climate change or what might happen years from now,” Ketterson said. “We’re here because we can already see the year-round effects of the changes in our environment.

“Making ourselves more resilient in the face of environmental change isn’t just about rising sea levels or droughts in some far away country. It’s about protecting Hoosier farmers from invasive species, stopping the spread of diseases with broad-reaching impacts for our children, conserving the plants and animals that sustain us, defending ourselves from serious weather disasters, and creating more livable towns and cities.

“We are facing very real threats to Hoosier livelihoods. If we’re going to be a ‘state that works,’ we need to be a state that’s prepared for what’s to come.”

Ketterson said her team’s research will lead to a wide variety of local partnerships across many industries. For example, the team will work with the Indianapolis Office of Sustainability, Keep Indianapolis Beautiful and Citizens Energy Group to apply environmental and social research to pioneer a new model for water re-use in Pleasant Run Creek. This project will provide resiliency to the fresh water supply as well as reduce flooding risk, enhance carbon sequestration, improve the wildlife corridor and provide for economic and neighborhood revitalization. The IU research team will also pilot a program that helps farmers and land owners forecast soil and water conditions.

“This IU team is going to tackle issues that affect every Hoosier,” said Fred H. Cate, vice president for research. “Working in partnership with industry, government and key community groups, this initiative will not only help institutions and individuals prepare for the complex and significant impact of our changing environment but also serve as a model for other states.”

Last year, IU announced the first initiative of the $300 million Grand Challenges Program — the Precision Health Initiative — designed to provide state-of-the art medical treatments tailored to individual Hoosiers based on their own unique genetic, environmental and behavioral factors.

The Prepared for Environmental Change initiative will enhance IU’s investment in the Precision Health Initiative by preparing Hoosiers to reduce growing public health risks that ultimately lead to a need for precision-medicine-based treatments. By design, each Grand Challenge initiative is an investment in research that will substantially and tangibly address some of the most critical issues facing Indiana and the world.
ABOUT THE GRAND CHALLENGES PROGRAM

At Indiana University, we are harnessing the power of research to solve the Grand Challenges facing Indiana and the world.

We define Grand Challenges as major, focused and large-scale problems facing humanity that can only be solved by the application of expert research findings in close collaboration with diverse teams of practitioners, policymakers and community leaders. The Grand Challenges Program is a bold $300 million commitment to address these issues. IU is pioneering the approach of pairing faculty and students from all disciplines with cross-sector teams of community and business leaders.

Together, we are tackling challenges that affect our state. Issues like cancer and degenerative disease, or unpredictable weather and dwindling natural resources. Our mission is to apply the combined power of IU researchers who have dedicated their lives to their fields of expertise to address the economic, social, and environmental problems negatively effecting our state and the world.

OUR FIRST TWO GRAND CHALLENGES

PRECISION HEALTH INITIATIVE

Our first Grand Challenge, the Precision Health Initiative (PHI), is a tremendous investment of new resources and personnel, and a broad collaboration with key businesses and community partners. Applying the results of extensive research, PHI aims to cure at least one cancer through the development of new cell, gene and immune therapies. PHI will also unlock preventative treatments for one neurodegenerative and one childhood disease.

PREPARED FOR ENVIRONMENTAL CHANGE

Our second Grand Challenge, Prepared for Environmental Change, will position Indiana to combat the growing threats caused by extreme and unpredictable weather patterns and environmental changes that result. IU will develop Indiana-specific projections and informed solutions. We will arm policymakers with the tools they need to protect agriculture, public health and our economy from the impacts of environmental change.
ABOUT PREPARED FOR ENVIRONMENTAL CHANGE

Indiana faces a unique set of challenges triggered by rapid environmental change. These challenges threaten the vitality of Hoosier businesses, agriculture, jobs and physical well-being.

We know our climate is warming, causing heavier spring flooding and hotter, drier summers. But these visible effects of climate change also give rise to less obvious environmental changes. Growing seasons are shifting. New migratory patterns are emerging. The topography of Indiana’s landscape is changing. The effects are cumulative, and wide-ranging. They alter local ecosystems and threaten our economy and health. And they put at risk key pillars of life in our state.

Our Challenge: By the Numbers

- In the last 5 years alone, extreme weather events have cost the state $6 billion
- Heavy rain events have increased **37 percent** over the last half century, adding considerable volatility to crop yields and overall production
- Temperatures across Indiana are projected to rise by about **4 degrees by mid-century**, jeopardizing the nearly $6 billion generated by corn and soybean production each year.
- Shorter, less intense winters have contributed to a startling **430% increase** in documented cases of Lyme disease since 2001
- The Great Lakes are projected to rise as much as **7 degrees by 2050 and 12 degrees by 2100**, reducing water quality, causing more algal blooms, and harming fish populations.

Results for Hoosiers

We will deliver on our promise to create actionable, sustainable solutions. Solutions that strengthen our state’s ability to prosper and compete while safeguarding our livelihood and public health.

COMMUNITY SPECIFIC PLANS

We will take our research out of the laboratory and into the field, pasture, office, factory, daycare, and backyard. Our findings will help government officials implement city-specific plans for environmental resilience. We can build greener, more prosperous communities that are more resilient to storms, heat waves, and other extreme weather events.

KEY POLICY RECOMMENDATIONS

IU researchers will develop future-focused policy recommendations to help Indiana lawmakers balance business goals, development and sustainability.

INVESTMENT STRATEGIES

Governments and local businesses need to make the right investments in areas like agriculture, industry, infrastructure and public safety. Indiana-specific data will help researchers identify practical, sustainable, and economically viable investment strategies with a net benefit for all Hoosiers.
First Key Steps

• Create forecast tools, such as the Hoosier Resiliency Index (HRI), to track the readiness of Indiana communities and regions to respond to the immediate and long-term elements of environmental change.

• Establish an Environmental Resilience Institute serving as a locally focused center for the study of social and ecological responses to environmental change.

• Execute pilot projects that apply our findings with a variety of cross-sector community partners. With the Indianapolis Office of Sustainability, Keep Indianapolis Beautiful, and Citizens Energy Group, we will pioneer a new model for water re-use in Pleasant Run Creek. And as part of the Lower Wabash Landscape Conservation Team, we will help farmers and land owners determine returns on crops and timber based on forecasts of soil and water conditions.

A Collaborative Team of Partners

To effectively target and combat these threats, IU is deploying an interdisciplinary team of world-class researchers led by Ellen Ketterson, distinguished professor of biology. The research team will engage all sectors—government, business, nonprofit and community leaders—to mitigate and prepare for the real-world impacts of environmental change. Our partners include Cummins, Citizens Energy Group, the Nature Conservancy, and government officials representing a cross-section of our Hoosier state.

We are facing very real threats to Hoosier livelihoods. If we’re going to be a ‘state that works,’ we need to be a state that’s prepared for what’s to come.

- ELLEN KETTERSON
Ellen D. Ketterson is Distinguished Professor of biology and gender studies at Indiana University Bloomington, and also holds her BA, MA, and Ph.D. from IU Bloomington. She pursued postdoctoral studies at Washington State University before joining the IU Bloomington College of Arts and Sciences as an associate professor in 1984. In 1990, she became the founding director of IU’s interdisciplinary Center for the Integrative Study of Animal Behavior, serving as director for the center’s first 12 years. She is also affiliated with the IU Center of Excellence for Women in Technology.

Ketterson’s research interests lie in animal behavior, population and behavioral ecology, and evolutionary biology as approached from genetic, epigenetic, and environmental perspectives. Most recently, she has focused on urban ecology and migration ecology in relation to the effects of climate change.

Her research has long received support from the National Science Foundation and the National Institutes of Health; she is currently PI or co-PI on five NSF- or NIH-funded research and training grants. A prolific author, she has published more than 130 papers and has served as editor or associate editor of all the major journals in evolutionary biology, behavioral ecology, and avian biology.

In 2004, she received a Guggenheim Fellowship, and in 2010, was named a Fellow of the American Association for the Advancement of Science. Ketterson is also a Fellow of the American Academy of Arts and Sciences. She has served as president of the American Society of Naturalists and an elective member of Section G (Biology) of the American Association for the Advancement of Science (AAAS).

Prepared for Environmental Change Steering Committee Members

• Keith Clay, Biology – Bloomington
• Gabriel Filippelli, Earth Sciences – Indianapolis
• David Polly, Geological Sciences and Director of the IU Center for Biological Research Collections – Bloomington
• Heather Reynolds, Biology – Bloomington
• Robert L. Fischman, Maurer School of Law – Bloomington
• Beth Gazley, School of Public and Environmental Affairs – Bloomington
• Eric Sandweiss, Chair, Department of History – Bloomington
• James Shanahan, Dean of The Media School – Bloomington
• Betsy Stirratt, Director of the Grunwald Gallery – Bloomington
• Jeffrey Wilson, Geography and Associate Dean for Research in the School for Liberal Arts – Indianapolis
Officials at Indiana University have engaged directly with the following organizations in the development of Prepared for Environmental Change. These organizations have voiced their support for the initiative, with many offering to collaborate directly with Indiana University as the research initiative gets underway.

Industry Partners

Community & Government Partners
Environmental & Conservation Partners

The Cornell Lab of Ornithology

Ducks Unlimited

Friends of Goose Pond

Eastern Tallgrass Prairie & Big Rivers

Mc IRIS

The Nature Conservancy

Indy Beautiful INC.

Central Indiana Land Trust

Smithsonian National Zoological Park Conservation Biology Institute

PARTNER ORGANIZATIONS
IN CASE YOU MISSED IT:

Bioinformatics researcher appointed leader of data sciences, informatics for IU Precision Health Grand Challenge

Friday, May 05, 2017

INDIANAPOLIS – Kun Huang, PhD, an internationally recognized scientific and academic leader in bioinformatics and computing, has been named the director of data sciences and informatics for Indiana University’s first Grand Challenge initiative, Precision Health.

Dr. Huang, whose research focuses on translational bioinformatics, is currently a professor of biomedical informatics at the Ohio State University, where he also serves as associate dean for genome informatics in the College of Medicine and director of the Division of Computational Biology and Bioinformatics.

At IU, Dr. Huang will lead the development of innovative informatics solutions as part of the university’s Precision Health Initiative, a five-year research initiative announced in June 2016 focused on patient-centered precision medicine therapies. The initiative, led by faculty at IU School of Medicine, IU Bloomington and IUPUI, and investigators at the Indiana Clinical and Translational Sciences Institute (CTSI) and the Regenstrief Institute, is the first recipient of the university’s $300 million investment in the Grand Challenges Program.

Precision health is aimed at understanding and optimizing the prevention, treatment, progression and health outcomes of human diseases through a more precise understanding of the genetic, developmental, behavioral and environmental factors that contribute to an individual’s health. Led by IU Associate Vice President of Research and Clinical Affairs and IU School of Medicine Executive Associate Dean for Research Affairs Anantha Shekhar, MD, PhD, the Precision Health Initiative will seek to cure at least one cancer and one childhood disease, as well as find ways to prevent one chronic illness and one neurodegenerative disease.

Data sciences and informatics represent one of the initiative’s five research clusters across the university, including genomic medicine; cell, gene and immune therapy; chemical biology and biotherapeutics; and precision to population health.

“The informatics research cluster is key to the success of our Precision Health Initiative, laying the foundation for a suite of technologies and strategies that will support and enhance medical research and define IU’s approach to precision health,” said Dr. Shekhar, who is also director of the Indiana CTSI. “I am delighted with being able to recruit a scientist like Kun Huang to lead this important effort, as we seek to transform health care for the people of Indiana.”

“I’m thrilled that Kun is joining our team,” said Peter Embi, MD, president and CEO of the Regenstrief Institute and director of informatics at the Indiana CTSI. “His leadership and vision will be critical to driving our informatics and data science agenda for precision health, building on the long history of informatics innovations at IU and Regenstrief.”

“I am keenly interested in translating informatics tools to improve clinical practice and accelerate scientific discovery,” Dr. Huang said. “And I strongly believe that Indiana University’s Precision Health Initiative provides an unprecedented opportunity to accomplish just that. I am very excited to help lead this ambitious effort to improve medical research and care.”

Dr. Huang received bachelor’s degrees in biology and computer science in 1996 from Tsinghua University in Beijing, China.
From 1996 to 2004, he studied at the University of Illinois at Urbana-Champaign, where he obtained Master of Science degrees in molecular and systems physiology, electrical engineering and mathematics, as well as a PhD in electrical and computer engineering. His research interests include translational bioinformatics and integrative genomics tools for precision health, algorithms and software for mining and visualizing large and complex biomedical data, computer vision, machine learning, medical imaging and computational biology.

Dr. Huang will join IU on July 17, 2017. In addition to his role as director of data sciences and informatics for the Precision Health Initiative, Dr. Huang will serve as chair in genomic data sciences for the Precision Health Initiative; assistant dean for data sciences, professor of medicine, and Center for Computational Biology and Bioinformatics' senior investigator at IU School of Medicine; and senior investigator at Regenstrief Institute.

Since launching in June of 2016, the Precision Health Initiative team has also reorganized research core services at the IU School of Medicine, as well as posted and filled other new job opportunities. Another key hire, made in 2016, is veteran Eli Lilly and Co. executive Carmel Egan, serving as associate dean of research affairs, including the role of project lead for the Precision Health Initiative and COO of the Indiana Clinical and Translational Sciences Institute.

In addition, as part of the Precision Health Initiative, IU began construction on a cell therapy manufacturing facility – one designed to meet the Food and Drug Administration’s good manufacturing practices requirements for operations producing products for human use.

Learn more at grandchallenges.iu.edu/precision-health