ISEE

The Institute for Sustainability, Energy, and Environment presents iSEE Congress 2015 ...

Water Planet, Water Crises?

Meeting the World's Water-Food-Energy Needs Sustainably

Sept. 14-16, 2015
Alice Campbell Alumni Center
University of Illinois at Urbana-Champaign

Welcome

Water resources are under stress globally due to population growth, increased demand for human consumption, food and energy production, and climate change. More than 10 percent of world's population does not have access to clean drinking water — and about one-third lacks access to safe sanitation systems. An estimated 2 million to 5 million people, mainly children, die annually because of preventable water-related diseases.

All around us, the water systems on this planet are changing in response to human actions. Unsustainable agricultural practices, salinization of groundwater aquifers, acidification of oceans, and contamination of surface and groundwater used to extract energy from unconventional sources are degrading water quality and raising concern about its consequences for human health and ecosystem services. In addition, the effects of human demand are being exacerbated by climate change — from accelerated glacier melt to altered global distribution of precipitation leading to extreme droughts and floods.

The linkages between water, food, and energy production call for a systems approach to managing the feedbacks and repercussions of stresses in the availability of clean water to meet human and ecosystem needs sustainably. Additionally, sound governance of water resources is critical.

Water scholars from multiple disciplines have a key role to play in identifying technologies, methods, incentives and policies for meeting the competing demands for water sustainably. Cross-cutting innovative research in science and engineering together with decision and social sciences is needed for creating the computational tools, methodological advances and technological solutions required to address these complex issues. Public/private information exchange and partnerships are key to converting this science to solutions in practice.

The Institute for Sustainability, Energy, and Environment is proud to host iSEE Congress 2015 "Water Planet, Water Crises? Meeting the World's Water-Food-Energy Needs Sustainably" to spur a dialogue on the current science about the causes and consequences of the global water crisis — and to identify areas for actionable research in the future to properly manage this precious resource. We welcome you to join the conversation.

Madhu Khanna
Associate Director for Education and Outreach
Institute for Sustainability, Energy, and Environment (iSEE)
University of Illinois at Urbana-Champaign

Congress Schedule

Conference attendees, please note: You are all invited to join us for coffee breaks. However, breakfast, lunch, and dinner are by invitation only.

SEPTEMBER 14

5 p.m. — Welcome & Introduction
- Evan DeLucia, Director, Institute for Sustainability, Energy, and Environment (iSEE)

5:15-6:15 p.m. — Keynote Address
- Robert Glennon, Udall Professor of Law and Public Policy, University of Arizona: http://rglennon.com.

6:15-7:15 p.m. — Reception & Student Poster Presentations

7:30-9 p.m. — Dinner for speakers (invitation only)

SEPTEMBER 15

7:30-8 a.m. — Breakfast for speakers (invitation only)

8-8:15 a.m. — Registration

8:15-8:30 a.m. — Opening Remarks
- Peter Schiffer, Vice Chancellor for Research, University of Illinois at Urbana-Champaign

8:30-10 a.m. — Session I: Vulnerability of Water Resources to Climate Change
Moderator: Atul Jain, Professor of Atmospheric Sciences at the University of Illinois (https://www.atmos.illinois.edu/cms/One.aspx?siteId=127458&pageId=151962)
- Praveen Kumar, Lovell Professor of Civil and Environmental Engineering, University of Illinois: http://cee.illinois.edu/faculty/praveenkumar
- Rong Fu, Professor of Atmospheric Sciences, University of Texas: http://www.jsg.utexas.edu/researcher/rong_fu/
- Pradeep Mujumdar, KSIIDC Chair Professor of Civil Engineering, Indian Institute of Science: http://ow.ly/Fb6Ty

10-10:30 a.m. — Coffee Break

10:30 a.m.-noon — Session II: The Nexus Between Water, Food, and Energy: A Systems Perspective
Moderator: Carl Bernacchi, Associate Professor of Plant Biology at the University of Illinois (http://www.life.illinois.edu/plantbio/People/Faculty/Bernacchi.htm)
- Mark David, Professor of Natural Resources and Environmental Sciences, University of Illinois: http://nres.illinois.edu/directory/mbdavid
- James Shortle, Distinguished Professor of Agricultural and Environmental Economics, Penn State University: http://aese.psu.edu/directory/jss15/vitae
- Ashlynn Stillwell, Assistant Professor of Civil and Environmental Engineering, University of Illinois: http://cee.illinois.edu/faculty/ashlynnstillwell

Noon-1 p.m. — Lunch Break (lunch with speakers by invitation only)

1-2:30 p.m. — Session III: Coupled Natural and Human Systems for Sustainable Water, Food, and Energy
Moderator: Prasanta Kalita, Professor of Agricultural and Biological Engineering at the University of Illinois (http://abe.illinois.edu/faculty/P_Kalita)
- Ximing Cai, Professor of Civil and Environmental Engineering, University of Illinois: http://cee.illinois.edu/faculty/ximingcai
- George Hornberger, Distinguished Professor of Civil and Environmental Engineering and Earth and Environmental Sciences, Vanderbilt University: http://engineering.vanderbilt.edu/bio/george-hornberger
- Patrick Reed, Professor of Civil and Environmental Engineering, Cornell University http://www.cee.cornell.edu/people/profile.cfm?netid=pmr82

2:30-2:45 p.m. — Coffee Break

Congress Schedule

SEPTEMBER 15, CONTINUED

2:45-4:45 p.m. — Session IV: Water, Human Health, and Ecosystem Services

Moderator: Amy Ando, Professor of Agriculture and Consumer Economics at the University of Illinois (http://ace.illinois.edu/directory/amyando)

- Ali Akanda, Assistant Professor of Civil and Environmental Engineering, University of Rhode Island: http://egr.uri.edu/cve/meet/aakanda/
- Jeffrey Brawn, Professor and Head of Natural Resources and Environmental Sciences, University of Illinois: http://nres.illinois.edu/directory/jbrawn
- Alan Knapp, Professor of Biology and Ecology, Colorado State University: http://www.biology.colostate.edu/people/aknapp/
- Marilyn O'Hara Ruiz, Clinical Associate Professor of Pathobiology, University of Illinois: http://ow.ly/ESidp

4:45-5 p.m. — Coffee Break

5-6 p.m. — Keynote Address

- James Famiglietti, Professor of Earth System Science and of Civil and Environmental Engineering, University of California, Irvine, and Senior Water Scientist NASA Jet Propulsion Laboratory: http://jayfamiglietti.com/. (*Introduction by Madhu Khanna, Associate Director, iSEE*)

6-7 p.m. — Reception & Student Poster Presentations

7-8:30 p.m. — Dinner for speakers (invitation only)

SEPTEMBER 16

7:30-8 a.m. — Breakfast for speakers (invitation only)

8-8:15 a.m. — Registration

8:15-9:45 a.m. — Session V: Water Crisis or Governance Crisis?

Moderator: Trevor Birkenholtz, Associate Professor of Geography and Geographic Information Science at the University of Illinois (http://www.geog.illinois.edu/people/trevbirk)

- Murugesu Sivapalan, Seiss Professor of Civil and Environmental Engineering, University of Illinois: http://cee.illinois.edu/faculty/murugesusivapalan
- Jody Endres, Assistant Professor of Law in Natural Resources and Environmental Sciences, University of Illinois: http://nres.illinois.edu/directory/jendres2
- Madhu Khanna, ACES Distinguished Professor of Environmental Economics, University of Illinois: http://ace.illinois.edu/directory/khanna1

9:45-10 a.m. — Coffee Break

10 a.m.-noon — Session VI: Water Conservation, Safety and Supply: Innovative Solutions

Moderator: Kevin O'Brien, Director of the Illinois Sustainable Technology Center, a Division of the Prairie Research Institute at Illinois (http://www.istc.illinois.edu/about/staff_Kevin_OBrien.cfm)

- Benito Mariñas, Racheff Professor and Head of Civil and Environmental Engineering, University of Illinois: http://cee.illinois.edu/faculty/benitomarinas
- Ralph Moshage, Corporate Engineering Manager, Carus Corp.: http://www.caruscorporation.com
- Ed Rightor, Director of Strategic Products, Environmental Tech Center, The Dow Chemical Co.: http://www.dow.com/en-us/science-and-sustainability/global-challenges/global-challenges-water
- Julio Vasquez, Product Manager for Production Enhancement Product Service Line, Halliburton: http://www.halliburton.com

Noon-12:30 p.m. — Rapporteur Summary

12:30-1:30 p.m. — Closing Remarks & Lunch Break (lunch with speakers by invitation only)

- Evan DeLucia, Director, iSEE

1:30-3 p.m. — Networking Event & Student Poster Presentations

Our Expert Speakers

Ali Akanda

Session IV, Sept. 15, 2:45-4:45 p.m.

Presentation Title: "Climate-Water-Health Nexus in World's Largest Cholera Endemic Megacity: Rising Disease Burden, Hydroclimatic and Urbanization Trends, and Policy Efforts"

Abstract: Dhaka, the largest cholera endemic megacity in the world, has seen a dramatic rise in patients seeking treatment for cholera and other diarrheal infections since 1980. While mortality has been checked to acceptable levels, disease burden has seen a continuous rise. However, there has neither been any systematic study on linking the long-term disease trends with changes in climatic, environmental or societal variables, nor dedicated efforts in collaborative decision-making between water management and disease prevention. In focusing on the past 30-year dynamics of urban cholera prevalence in Dhaka with changes in climatic or anthropogenic forcings and evolution of water management and health policy efforts, it appears that the pre-monsoon season is becoming a dominant cholera season of the year, followed by monsoon flood-related propagation. While an endemic trend is stronger in the dry season, the post-monsoon season shows increased variability and is epidemic in nature. We also study how water management influenced disease prevention efforts, the coverage of WASH efforts in the rapidly growing slums, and collaboration between the decision-making processes of the water and health sectors in the Dhaka region.

Bio: Ali Shafqat Akanda is an Assistant Professor of Civil and Environmental Engineering at the University of Rhode Island. He obtained his Ph.D. in 2011 in Environmental and Water Resources Engineering from Tufts University in Massachusetts. His primary expertise and research interests are at the intersections of Water Resources, Climate Change and Global Health — focusing on early warning systems to benefit emerging water security and public health issues in the developing world. Current research projects focus on providing a large-scale understanding of hydroclimatic forces affecting water security and water-related disease outbreaks, developing a remote-sensing based cholera prediction system for Bangladesh, and understanding impacts of climatic and anthropogenic changes on water and health conditions in emerging megacities. Akanda was the recipient of the NIH Ruth Kirschstein Predoctoral Fellowship during his doctoral work at Tufts. He obtained his M.S. from the University of Oklahoma and B.Tech. from the Indian Institute of Technology, Kharagpur, both in Civil Engineering. He also worked as a Research Scientist at the University of Washington and as a Software QA Engineer at Autodesk, a leading software developer.

More about Akanda: http://egr.uri.edu/cve/meet/aakanda/

Our Expert Speakers

Jeffrey Brawn

Session IV, Sept. 15, 2:45-4:45 p.m.

Presentation Title: "Climate Change, Precipitation Regimes, and the Integrity of Tropical Ecosystems"

Abstract: Evidence is emerging that global climate change will affect precipitation regimes over large areas of the Neotropics and Paleotropics. Many regions are expected to experience a drying trend owing to some combination of less annual rainfall or more intense seasonal drought after longer dry seasons. Precipitation determines the distribution of tropical ecosystems such as wet forest and savanna and the life histories of constituent animal populations are typically modulated by rainfall patterns. Thus, changes in precipitation regimes may have sweeping effects on tropical biota ranging from biogeography to the viability of their populations. Given the concentration of biodiversity at tropical latitudes, the plausible role of tropical forests in global carbon budgets, and the importance of tropical regions to agriculture, the implications of this scenario are critical. This talk will review current understanding of how altered precipitation regimes may affect tropical ecosystems. Predictive models about rainfall in the tropics are complex and undergoing refinement; nonetheless, it's likely that the integrity of tropical systems will be fundamentally challenged in many regions.

Bio: Jeffrey D. Brawn is a Professor and Head of the Department of Natural Resources and Environment Sciences at the University of Illinois. After receiving his Ph.D. in Ecology from Northern Arizona University, Brawn held post-doctoral fellow appointments with the Smithsonian Tropical Research Institute in Panama and Virginia Tech. His initial appointment at Illinois in 1991 was with the Illinois Natural History Survey. Brawn's research interests are in tropical ecology and conservation with an emphasis on birds, the ecology of infectious disease, and the interplay of agricultural practices with the conservation of biodiversity. He has published more than 125 papers and is a Fellow of the American Association for the Advancement of Science and the American Ornithologists' Union.

More about Brawn: http://nres.illinois.edu/directory/jbrawn

Our Expert Speakers

Ximing Cai

Session III, Sept. 15, 1-2:30 p.m.

Presentation Title: "Implications of Postharvest Food Loss/Waste Prevention to Energy and Resources Conservation"

Abstract: The world's growing demand for food is driven by population and income growth, dietary changes, and the ever-increasing competition between food, feed, bioenergy challenges, and food security; meanwhile, agricultural expansion and intensification threaten the environment with various detrimental impacts. Researchers have been trying to explore strategies to overcome this grand challenge. One of the promising solutions that has attracted considerable attention recently is to increase the efficiency of food supply chain by reducing food loss and waste (FLW). According to recent studies conducted by the Food and Agriculture Organization (FAO) of the United Nations, almost one-third of the food produced for human consumption globally is lost or wasted along the supply chain. This amount of discarded food manifests a missing, yet potential, opportunity to sustainably enhance both food security and environmental sustainability. However, implementing the strategies and technologies for tackling FLW is not easy because it requires economic incentives, benefit and cost analysis, infrastructure development, and appropriate market mechanisms. Cai will provide a synthesis of knowledge on the implications of postharvest food loss/waste prevention to energy and resource conservation, as well as food security. He will also discuss how classic civil and environmental engineering can contribute to the reduction of postharvest food loss, an important issue in sustainable agriculture.

Bio: Ximing Cai is the Col. Harry F. and Frankie M. Lovell Endowed Professor in Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign. His current research areas include coupled human-natural system analysis with an emphasis on human interferences in hydrological processes, water-energy-food system modeling especially in dry areas, and sustainable water resources management particularly in developing countries. He has worked as a consultant to the World Bank, the U.N. and other international agencies. Before joining the faculty at Illinois in 2002, Cai served as a Postdoctoral Fellow and Research Fellow at the International Food Policy Research Institute in Washington, D.C. He is the Ven Te Chow Faculty Scholar in Water Resources and the Donald Biggar Willett Faculty Scholar. He holds a B.S. in Water Resources Engineering (1990), an M.S. in Hydrology (1994) from Tsinghua University, Beijing, and a Ph.D. in Environmental and Water Resources Engineering (1999) from the University of Texas at Austin.

More about Cai: http://cee.illinois.edu/faculty/ximingcai

Our Expert Speakers

Mark David

Session II, Sept. 15, 10:30 a.m.-noon

Presentation Title: "Biofuel and Agricultural Production: Impacts on Water Quality and Strategies to Reduce Them"

Abstract: Agricultural production in much of the world has negative impacts on water quality due to losses of sediment and nutrients from agricultural fields to streams and rivers. Losses can be from both surface runoff and tile drainage, the latter found on millions of hectares in the upper Midwest of the United States where it greatly improves crop production. Phosphorus losses lead to freshwater impacts through algal production, and nitrate causes drinking water quality issues and coastal hypoxia. Biofuel production with perennial plants such as miscanthus and switchgrass can greatly reduce or eliminate these impacts, even with fertilization and tile drainage. However, biofuels from conventional annual crops (e.g., corn stover) have none of these benefits. For annual agricultural production systems, practices such as cover crops, more diverse rotations, better fertilizer management, and edge-of-field techniques such as wetlands and wood chip bioreactors are needed to reduce sediment and nutrient losses.

Bio: Mark B. David is a Professor in the Department of Natural Resources and Environmental Sciences at the University of Illinois and has been on the faculty since 1985. He studies nitrogen and phosphorus biogeochemistry in agricultural fields, losses to streams and rivers, and methods to reduce these losses such as fertilizer application timing, cover crops, drainage water management, constructed wetlands, biofuels, and bioreactors. His research team conducts long-term monitoring of water quality in several tile-drained watersheds in east-central Illinois to better understand the mechanisms of nutrient loss and to evaluate the effectiveness of nutrient loss reduction methods. He is an elected Fellow in the Soil Science Society of America, the American Society of Agronomy, and the American Association for the Advancement of Science. David earned his B.S. from Pennsylvania State University, his M.S. from the University of Maine, and his Ph.D. from the State University of New York, College of Environmental Science and Forestry.

More about David: http://nres.illinois.edu/directory/mbdavid

Our Expert Speakers

Jody Endres

Session V, Sept. 16, 8:15-9:45 a.m.

Presentation Title: "Legal Leverage: Nudging U.S. Water Policy Forward"

Abstract: Widespread hypoxia in the Gulf of Mexico, impaired waterways in Florida, and a declining fishing industry in the Chesapeake Bay illustrate the failings of public policies such as the Clean Water Act to control nutrient pollution. The nutrient pollution problem in U.S. waterways exposes the complex system of legal levers policymakers at federal and state levels, and private parties, can maneuver. To solve pervasive environmental problems, legal scholars postulate that these levers can "nudge" otherwise discretionary action at one government level to push action by another. The Clean Water Act and administrative law also provide for private parties to nudge recourse from government for environmental harms through litigation. Looming legal decisions prompted by environmental groups have provided the EPA cover to pursue more aggressive stances with states to put more concrete programs in place, such as numeric water quality standards and management planning. At the same time, municipalities are starting to use Clean Water litigation to force sources of agricultural nutrients to stop pollution that increases costs of drinking water. Ultimately — at least in the case of nutrient pollution — litigation (or the threat thereof) that deploys progressive interpretation of environmental laws, in combination with increasing scientific knowledge and public awareness through electronic media, likely has been the most powerful tool in nudging more timely and effective action, whether by governments or private actors seeking to avoid otherwise unpalatable, publicized fights.

Bio: Jody Endres is an Assistant Professor of Law in the Department of Natural Resources and Environmental Sciences at Illinois. She received her J.D. from the University of Illinois College of Law in 2000. Her research centers on how to develop integrated sustainability policy at the nexus of agricultural, environmental, and energy systems — including U.S. nutrient pollution policy, operationalizing agricultural sustainability standards from technology and legitimacy perspectives, the pressing need to incorporate improved land use classifications into laws, sustainable contracting theories, the importance of law as a discipline in scientific modeling and scenario building, and model forestry codes that protect forests in an era of increasing demand for resources. Her work includes approaches for building green development metrics in law and policy that integrate accounting of economic, environmental and social impacts. She has taught courses on Renewable Energy Law, Natural Resources Law, Environmental Law, and Science and Regulatory Policy.

More about Endres: http://nres.illinois.edu/directory/jendres2

Our Expert Speakers

James Famiglietti

Keynote Address, Sept. 15, 5-6 p.m.

Presentation Title: "Water and Sustainability: 21st Century Realities"

Abstract: We now recognize that Earth's water cycle is changing. Freshwater is constantly being exchanged among the atmosphere, ocean, land and ice reservoirs, while on land, patterns of precipitation, evapotranspiration, flooding and drought are shifting. The evolving water cycle of the 21st century will likely be stronger, more variable, and will result in broad swaths of mid-latitude drying, accelerated by the depletion of the world's major groundwater aquifers. What does water sustainability mean under such dynamic climate and hydrologic conditions, in particular when coupled with future projections of population growth? How will water managers cope with these new normals, and how will food and energy production be impacted? Famiglietti will review what our latest research suggests, as well as personal experiences with communicating our findings.

Bio: Jay Famiglietti is a Hydrologist, a Professor of Earth System Science at the University of California, Irvine, and the Senior Water Scientist at the NASA Jet Propulsion Laboratory. His research team uses satellites and develops computer models to track how freshwater availability is changing around the world. Famiglietti is a regular adviser to the U.S. Congress and the California Governor's Office on water availability and water security issues. He has testified before Congress, and he has participated in numerous White House, State Department, Congressional, Pentagon and California State Legislature briefings. He is the past Chair of the Board of the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), a past Editor-in-Chief of Geophysical Research Letters, and he is a Fellow of the American Geophysical Union and of the Geological Society of America. He and his research group have published over 100 papers in the peer-reviewed literature. He has a B.S. in Geology from Tufts University (1982), an M.S. in Hydrology from the University of Arizona (1986), and an M.A. (1988) and Ph.D. (1992) in Civil Engineering (Water Resources Program) from Princeton.

More about Famiglietti: http://jayfamiglietti.com/

Our Expert Speakers

Rong Fu

Session I, Sept. 15, 8:30-10 a.m.

Presentation Title: "A Seamless Approach to Reduce Vulnerability of Water Resource to Climate Change over the U.S. Southern Great Plains"

Abstract: Decisions on water resource infrastructure to reduce regional vulnerability to droughts requires short-term climate projection (e.g., 20-50 years). However, CMIP5 climate models and projections have large uncertainty over the U.S. Southern Great Plains (SGP), making them inadequate for regional drought mitigation and adaptation planning. In addition, the low prediction skill for droughts in current climate over the Great Plains has made it difficult, if not impossible, to convince policy makers and voters to approve substantial resources to address future climate change and its impact. To address this challenge, we have evaluated the strengths and the major sources of the models' biases in representing summer rainfall and droughts over the SGP, and partially correct the biases using the observed statistical relationship between the anomalous large-scale circulation and land surface conditions in spring and summer rainfall anomalies over this region. The creditability of the statistical model has been tested through seasonal hindcasts of past droughts and forecasts for summer rainfall anomalies with three to six months of lead time. The latter has been used by the Texas Water Development Board (TWDB) to brief the state drought preparedness council and stake holders.

Bio: Rong Fu received her Bachelor's degree in Geophysics from Peking University in 1984, and Ph.D. in Atmospheric Sciences from Columbia University in New York City in 1991. She is currently a Professor and Associate Chair in the Department of Geological Sciences at the University of Texas at Austin. Her research in recent decades has been focused on the mechanisms that control droughts, rainfall seasonality and variability over Amazonian and North American regions, and how changes of global climate, local vegetation and biomass burning, and oceanic decadal variability have influenced these processes in the recent past and will influence rainfall seasonality and droughts in the future. She has also developed a drought early warning for U.S. Great Plains, working with regional water resource managers. Her research is among the earliest to observationally uncover significant roles of tropical rainforests in determining rainfall seasonality over Amazonia and the Tibetan Plateau in determining water vapor transport to global stratosphere. She is the President of the Global Environmental Change Focus Group and is on the Leadership Team of the American Geophysical Union Council. She has served on many national and international panels as well.

More about Fu: http://www.jsg.utexas.edu/researcher/rong_fu/

Our Expert Speakers

Robert Glennon

Keynote Address, Sept. 14, 5:15-6:15 p.m.

Presentation Title: "Unquenchable: America's Water Crisis and What to Do about It"

Abstract: America's self-inflicted water crisis is coming. Throughout the United States, even in places that are not particularly dry or hot, communities, farmers, and factories are struggling to find water, and even running out altogether. Our water woes will get worse before they get better because we are slow to change our ways, and because water is the overlooked resource. From the Vegas Strip to faux snow in Atlanta, from mega-farms to Washington's love affair with biofuels, heady extravagances and everyday waste are sucking the nation dry. This presentation will illustrate the urgency of this problem and the need for action on multiple fronts to solve it. We cannot engineer our way out of the problem with the usual fixes or zany schemes. America must make hard choices, and Professor Glennon's answer is a provocative market-based system that values water as a commodity and a fundamental human right.

Bio: Robert Glennon is one of the nation's preeminent experts on water policy and law. The recipient of two National Science Foundation grants, Glennon serves as an adviser to governments, corporations, think tanks, law firms, and NGOs looking to solve serious challenges around water sustainability and planning. Glennon is the author of *Unquenchable: America's Water Crisis and What To Do About It*, and *Water Follies: Groundwater Pumping and the Fate of America's Fresh Waters*. In 2014, Glennon and two co-authors collaborated with the Hamilton Project at the Brookings Institution to explore solutions to broken federal and state laws that are contributing to worsening water shortages in California and other Western states. Their groundbreaking report, *Shopping for Water: How the Market Can Mitigate Water Shortages in the American West*, received widespread national attention and is viewed by many as a game-changer for water policy moving forward. Glennon contributes regularly to national print media and has been a guest on *The Daily Show* with Jon Stewart, *Talk of the Nation* with Neal Conan, *The Diane Rehm Show*, C-SPAN2's *Book TV*, and numerous National Public Radio shows. He has been a commentator for American Public Media's Marketplace, and he was featured in the 2011 feature-length documentary Last Call at the Oasis. Glennon is a Regents' Professor and Morris K. Udall Professor of Law and Public Policy in the Rogers College of Law at the University of Arizona. He received a J.D. from Boston College Law School and an M.A. and Ph.D. in American History from Brandeis University. He is a member of the bars of Arizona and Massachusetts.

More about Glennon: http://rglennon.com/

Our Expert Speakers

George Hornberger

Session III, Sept. 15, 1-2:30 p.m.

Presentation Title: "Frontiers of the Food-Energy-Water Trilemma: Sri Lanka as a Microcosm of Tradeoffs"

Abstract: Food-energy-water interactions are becoming increasingly important as resource constraints emerge. We have argued previously that water scarcity is the proximate cause that often promotes the interactions and tradeoffs among food, energy, and water. Decisions about allocation of water resources for food and energy have technical, social, cultural, and political constraints. When water is insufficient to maximize food and energy objectives, tradeoffs are made. Sri Lanka is a microcosm for a study of water-food and water-energy tradeoffs by constructing production possibilities frontiers to show the tradeoffs between food production and energy production as a function of water availability and allocation. Addressing scarcity in water resources cannot be achieved without tradeoffs between food and energy and deconstructing the technically efficient production possibilities frontier to identify underlying cultural, social, and political constraints on water allocation. In times of low flow, priority to water resources in Sri Lanka is given to paddy production in flagship paddy systems — at the expense of production of hydroelectric power, despite the much higher economic value of the latter. The cultural connections associated with water complicate the management of water resources, as well as the evolution of governing institutions.

Bio: George M. Hornberger is a Distinguished University Professor at Vanderbilt University, where he is the Director of the Vanderbilt Institute for Energy and the Environment. He has a shared appointment as the Craig E. Philip Professor of Engineering and as Professor of Earth and Environmental Sciences. Previously he was Ernest H. Ern Professor of Environmental Sciences at the University of Virginia. He also has been a visiting scholar at the Australian National University, Lancaster University, Stanford University, the United States Geological Survey (USGS), the University of Colorado, and the University of California at Berkeley. His work focuses on coupled natural-human systems and aims to understand how climate, groundwater, surface water, energy production, food production, and human abstraction of water interact in complex ways. Current research projects include work in Sri Lanka on adaptation to drought, in Bangladesh on the controls on freshwater availability, and in the United States on how cities evolve water conservation practices. Hornberger received his B.S. and M.S. from Drexel University and his Ph.D. in Hydrology from Stanford.

More about Hornberger: http://engineering.vanderbilt.edu/bio/george-hornberger

Our Expert Speakers

Madhu Khanna

Session V, Sept. 16, 8:15-9:45 a.m.

Presentation Title: "Understanding the Nexus Between Food, Energy, and Water Quality: Challenges and Policy Implications"

Abstract: Production of nitrogen-intensive food crops accompanied by food crop-based biofuels has led to significant deterioration in water quality in the U.S. Food, feed, and biofuel production have complex and multidimensional impacts on land use, water quality, and greenhouse gas emissions. Technological innovations such as precision agriculture and cellulosic biofuels can enable sustainable agricultural and bioenergy production while protecting water quality. This presentation discusses the challenges of designing a multifunctional agricultural system and the policy incentives needed to induce innovative approaches to meet diverse demands for food, energy and water quality sustainably.

Bio: Madhu Khanna is the ACES Distinguished Professor of Environmental Economics at the University of Illinois at Urbana-Champaign. She is the Associate Director for Education and Outreach at the Institute for Sustainability, Energy, and Environment (iSEE). Khanna received her Ph.D. in 1995 from the University of California-Berkeley. Her research focuses on environmental policy analysis and incentives for adoption of environmentally friendly technologies. She has examined the effectiveness of alternative market-based instruments for inducing the adoption of best management practices in agriculture such as precision farming and improved irrigation methods and the targeting of green payment policies for reducing nitrogen runoff and sediment from cropland. She also analyzes the motivations and effectiveness of voluntary approaches to environmental protection in developed and developing countries. Her current work is examining the economics, land use, and environmental implications of biofuel production, and she has co-edited the *Handbook of Bioenergy Economics and Policy*. She serves on the Science Advisory Board of the U.S. EPA and is currently the editor of the *American Journal of Agricultural Economics*.

More about Khanna: http://ace.illinois.edu/directory/khanna1

Our Expert Speakers

Alan Knapp

Session IV, Sept. 15, 2:45-4:45 p.m.

Presentation Title: "Water, Terrestrial Ecosystems and Global Change: Consequences of an Intensified Hydrological Cycle"

Abstract: Water availability strongly limits the functioning of more than half the world's terrestrial ecosystems. Increases in atmospheric trace gases, warming air temperatures and an intensified global hydrological cycle have altered precipitation inputs (amount, patterns and extremes) and thus the water balance of virtually all terrestrial ecosystems globally. But the ecological consequences of such hydrological changes, as well as their impacts on key ecosystem services, are poorly resolved. Through analyses of long-term climatic and ecological data combined with results from decades-long and regionally extensive field experiments, it is now apparent that ecosystems can be remarkably resilient to some forms of altered water availability, but quite responsive to others, often in surprising ways. A coordinated approach for assessing how ecosystems differ in their vulnerability to changes in water availability — which includes shifting patterns of variability as well as increases in hydrologic extremes — is needed to forecast how our remaining natural ecosystems will function in the future.

Bio: Alan K. Knapp is a Senior Ecologist in the Graduate Degree Program in Ecology and a Professor of Biology at Colorado State University. He has been involved in large-scale ecosystem research through the National Science Foundation's Long-Term Ecological Research (LTER) program for more than two decades. His current research is focused on understanding how forecasted climate change, particularly alterations in precipitation amounts and patterns, will impact ecosystem structure and function. His research approach is strongly collaborative and interdisciplinary with the goal of identifying key ecological mechanisms through experiments conducted across broad spatial and temporal scales. Grasslands and savannas, from arid to mesic, are the primary habitats in which field research is conducted.

More about Knapp: http://www.biology.colostate.edu/people/aknapp/

Our Expert Speakers

Praveen Kumar

Session I, Sept. 15, 8:30-10 a.m.

Presentation Title: "Structuring a Blue Revolution for Water Security"

Abstract: Water security is a scientific, technological, socio-economic, and policy and governance challenge that needs to be urgently addressed through approaches that integrate across several levels ranging from global, regional, national, local, and individual scales. At the individual scale, water security guarantees affordable access to sufficient safe water to lead a clean, healthy and productive life. At the local level, it ensures protection of vulnerable water systems from overuse and hazards of floods and drought, production of economic goods and ecological services, and prevention of environmental degradation through sustainable practices. At the national level, it ensures economic growth and social well-being including food security, while at the regional scale it ensures equitable negotiated agreements for water rights to avoid conflicts. At the global level, it provides price stability of products and services. Therefore, ensuring water security is a social imperative — and a national and international policy imperative. Among many things, a water security policy will provide impetus for emerging technologies for water recycle and reuse, and system-scale integration of these technologies in ongoing and future developments. In essence, a "Blue Revolution" is desired to achieve the same societal impact for water that the Green Revolution has done for food security.

Bio: Praveen Kumar holds a B.Tech. (Indian Institute of Technology, Bombay, India 1987), M.S. (Iowa State University 1989), and Ph.D. (University of Minnesota 1993), all in civil engineering, and has been on the Illinois faculty since 1995. He is also an Affiliate Faculty in the Department of Atmospheric Science. His research focus is on complex hydrologic systems bridging across theory, modeling, and informatics. He presently serves as the Director of the National Science Foundation-funded Critical Zone Observatory for Intensively Managed Landscapes, part of a national and international network. He is a co-lead on two large NSF-supported SEAD and Brown Dog projects for the development of cyberinfrastructure for structured and unstructured long-tail data, respectively. From 2002 to '08, he served as a founding Board member for CUAHSI, a consortium of over 110 universities for the advancement of hydrologic science. From 2009 to '13 he served as the Editor-in-Chief of Water Resources Research, the leading journal in the field. He currently serves as the intellectual leader and Program Adviser for a large effort in India aimed at capacity building through research and international collaboration to address the most vexing water problems.

More about Kumar: http://cee.illinois.edu/faculty/praveenkumar

Our Expert Speakers

Benito Mariñas

Session VI, Sept. 16, 10 a.m.-noon

Presentation Title: "Science and Technology Advances for Safe Global Water"

Abstract: The Millennium Development Goal Target of reducing by half the portion of people without sustainable access to safe water supply and effective sanitation by 2015 will not be achieved at the current rate of progress. More than 1.8 billion people will not have access to "safe" water, and 2.5 billion people will lack adequate sanitation. Lack of access to "safe" water is a global challenge requiring the development of revolutionary technologies — and the creation of human resources capacity to scale-up and operate the technologies sustainably. This challenge can be addressed with revolutionary advances in water quality technology and related fundamental science, and the development of sustainable, systems capable of producing affordable, robust and reliable supply of safe drinking water to impoverished people worldwide. Such systems could integrate novel sensors that detect infective pathogens (this presentation will have special focus on viral pathogens) — and robust treatment processes that destruct and/or remove these contaminants without producing toxic byproducts. These developments should be paralleled by building the capacity of human resources, developing microeconomic infrastructure, and facilitating acceptance by society.

Bio: Benito J. Mariñas, Head of the Department of Civil and Environmental Engineering at the University of Illinois, is the Ivan Racheff Professor of the Environmental Engineering and Science Program as well as the Director of the Safe Global Water Institute (SGWI) on the Illinois campus. His research is in various mechanistic aspects of chemical and ultraviolet light disinfection processes and membrane technologies for controlling waterborne pathogens. He is also developing hybrid adsorption/membrane processes for the control of pesticides, taste-and-odor-causing compounds, and other water contaminants. He also is working on research projects aimed at elucidating the mechanisms responsible for the formation of disinfection by-products of health concern in drinking water, including an iSEE-funded Smart Water Disinfection Project. Mariñas holds a B.S. degree (Universidad Politecnica de Madrid, Spain, 1982) in Civil Engineering, and M.S. (University of California at Berkeley, 1985) and Ph.D. (University of California at Berkeley, 1989) degrees in Sanitary and Environmental Engineering.

More about Mariñas: http://cee.illinois.edu/faculty/benitomarinas

Our Expert Speakers

Ralph Moshage

Session VI, Sept. 16, 10 a.m.-noon

Presentation Title: "Industrial Process Non-Contact Cooling Water Usage Reduction"

Abstract: The Carus Corp. LaSalle site used 1.9 million gallons of water per day in 2014.The bulk of this water was used as non-contact cooling water. This clean, "used" cooling water is discharged to the Little Vermillion River via a cooling water pond after passing through a monitoring station. In 2014, the LaSalle site developed a multiyear, multiproject, plantwide plan to reduce usage by 50 percent, potentially reducing annual water consumption by over 675 million gallons. Technologies proposed include water recycling, implementation of advanced control technologies, implementation of mechanical cooling via cooling towers or chillers, and process technology changes to reduce the need for cooling. A key element in the success of this plan involves an ongoing public/private partnership with the City of LaSalle and the Illinois Sustainability Technology Center (ISTC). The first project was completed in late 2014 and has resulted in an annual water savings of 61 million gallons and an annual utility cost reduction of $92,000. Moshage will review the development of the water use reduction plan, present significant elements of the plan, and discuss the challenges and benefits Carus has encountered in implementing the plan.

Bio: Ralph Moshage is the Engineering Manager for Carus Corp. in Peru, Ill. He is responsible for developing and implementing capital projects for Carus, providing technical support to all Carus manufacturing sites, developing and managing the corporate capital budget, and directly supervising Carus' LaSalle Site Engineering and Headquarters Building Maintenance staff. Moshage has served as Operations Manager for the Carus Nalon Potassium Permanganate manufacturing facility in Oviedo, Spain, and has designed and built two small manufacturing facilities in China. Prior to joining Carus, he worked for the U.S. Army Corps of Engineers' Construction Engineering Research Laboratory (CERL) in Champaign as Acting Chief of the Industrial Operations Division, focused on the development and implementation of advanced manufacturing and environmental technologies. He was also a Principal Investigator for a team responsible for development and implementation of advanced military installation energy system technologies. Moshage is a Returned Peace Corps Volunteer, serving in Kumasi, Ghana, West Africa, with the Technology Consultancy Center (TCC) in the early 1980s — developing small-scale ferrous foundry operations technology in Kumasi. He holds a B.S. in Mechanical Engineering from Illinois and resides in Utica, Ill.

More about Carus Corp.: http://www.caruscorporation.com/

Our Expert Speakers

Pradeep Mujumdar

Session I, Sept. 15, 8:30-10 a.m.

Presentation Title: "Regional Impacts of Climate Change: Implications for Water Management in India"

Abstract: India and several other developing countries are facing an impending water crisis. Indications of the crisis are already visible: inaccessibility of safe drinking water to sizable sections of population; unsustainable exploitation of ground water; pollution of large stretches of rivers; frequent floods and droughts; contaminated groundwater; transport of water to cities over large distances; and severe water shortages. Increasing temperatures are likely to change precipitation patterns — resulting in alterations of regional water availability, evapotranspirative water demand of crops, extremes of floods and droughts and water quality. A comprehensive assessment of regional hydrological impacts of climate change is therefore necessary. This presentation summarizes recent research on assessment of climate change impacts on regional hydrology, with emphasis on likely changes in water availability, irrigation demands and water quality. The uncertainties in the projections result from incomplete knowledge about future emissions of greenhouse gases and from use of multiple climate models. Illustrations of the methods are demonstrated with case studies of water management in India. Implications of land use and demographic change superimposed on climate change will also be discussed.

Bio: P.P. Mujumdar is the KSIIDC Chair Professor in the Department of Civil Engineering at the Indian Institute of Science. He earlier served as Chairman of the Department from November 2006 to December 2010. He holds Associate Faculty positions in the Divecha Center for Climate Change and Center for Earth Sciences at IISc Bangalore. He specializes in water resources with a focus on climate change impacts on hydrology/water resources, statistical downscaling of GCM outputs, urban flooding, planning and operation of large-scale water resources systems, and uncertainty modeling. Recent research contributions include detection and attribution of hydrologic change, development of downscaling models, uncertainty combination in climate change impacts and reservoir operation for adaptation to climate change. He served until recently as the Chairman of the Water Resources Management Committee of the International Association for Hydro-Environment Engineering and Research (IAHR), and was a reviewer for the Assessment Report 5 (AR5) of the IPCC. He is a recipient of the Alexander von Humboldt Medal of the European Geosciences Union (EGU) and the Distinguished Visiting Fellowship of the Royal Academy of Engineering, UK.

More about Mujumdar: http://civil.iisc.ernet.in/~pradeep/

Our Expert Speakers

Marilyn O'Hara Ruiz

Session IV, Sept. 15, 2:45-4:45 p.m.

Presentation Title: "Water Resources and Mosquito-Borne Diseases"

Abstract: Water resources play an important role in the distribution of mosquito-borne pathogens due, especially, to the interactions between the aquatic stages of the mosquito and the availability of water in which those stages can be completed. Many mosquito-borne diseases have increased in range and in numbers of cases during the past decades, including dengue, West Nile virus, chikungunya and Rift Valley fever. With worldwide shifts made in management decisions around the use of water for agriculture and an emphasis on sustainable storm water management, the ability to identify and quantify suitable aquatic environments is especially important. This presentation reviews the implications for changes in important global mosquito-borne diseases in the context of water resources, climate change, urbanization and the specific transmission dynamics of the various pathogens and vectors.

Bio: Marilyn O'Hara Ruiz is a Medical Geographer in the Epidemiology Division of the College of Veterinary Medicine at Illinois. Her research focuses on the spatial epidemiology of infectious diseases, and especially on the spatial and temporal differences in risk from vector-borne pathogens due to local characteristics related to weather, vegetation and socio-economic factors. Her contributions to science have been interdisciplinary, extending across the fields of public and veterinary health, geography, and vector ecology. Recent work has focused on West Nile virus transmission in suburban Illinois, the spread of Chronic Wasting Disease in white-tailed deer, and the adoption of geographic information science for improving public health in India. O'Hara Ruiz has a Ph.D. in Geography from the University of Florida. Prior to her position at Illinois, she was a Research Scientist with the Construction Engineering Research Laboratory in Champaign, Ill., and was on the faculty in the Department of Geography at Florida State University. In 2012, she was a Fulbright Nehru Senior Scholar at the University of Delhi, India. To help translate science into action, O'Hara Ruiz assists local health departments and mosquito abatement districts in adoption of geospatial technologies and provides training and support for using predictive models to improve public health decision-making. She teaches classes and workshops in the use of Geographic Information Science for public health and Spatial Epidemiology.

More about O'Hara Ruiz: http://illinois.edu/ds/search?search_type=userid&search=moruiz&skinId=333

Our Expert Speakers

Patrick Reed

Session III, Sept. 15, 1-2:30 p.m.

Presentation Title: "Are We Sustaining the Information Needed to Manage Global Food-Energy-Water Systems?"

Abstract: Food-Energy-Water (FEW) systems are evolving globally across a complex mixture of economic, climate, hydrologic, and institutional contexts. An important and very basic question when contemplating the sustainability of these systems is whether we are currently maintaining and ideally growing the critical information resources needed to characterize and manage these systems globally. Operationally, our current understanding and predictive skill in managing floods and droughts globally provides an informative baseline. This baseline provides a lens by which we can expose the potential information gaps as well as losses that will shape the risk tradeoffs confronting local decision-making processes. One major aspect in addressing these information challenges is to shift to a more active design and evaluation of global information systems from a holistic systems perspective — jointly documenting emerging natural dynamics, their socio-economic contexts, and key scientific insights. Sustained and holistic monitoring of evolving FEW systems is fundamentally important for clarifying their risks as well as documenting the ex post validity of science informed policies aimed at improving their sustainability.

Bio: Patrick M. Reed's research focuses on sustainable water management given conflicting demands from renewable energy systems, ecosystem services, expanding populations, and climate change. He is investigating how to effectively combine a wide range of knowledge sources with simulation, optimization, and information technologies to capture impacted systems' governing processes, elucidate human and ecologic risks, limit management costs, and satisfy stakeholders' conflicting objectives. The management modeling tools developed by Reed's research group combine multiobjective optimization, high-performance computing, and advanced spatiotemporal visualization and uncertainty modeling techniques to facilitate improved stakeholder decisions. Reed received his B.S. in Geological Engineering from the University of Missouri at Rolla in 1997. He continued his graduate studies at the University of Illinois at Urbana-Champaign. After graduating with his Ph.D. from Illinois in 2002, he was on the faculty in the Department of Civil and Environmental Engineering at Penn State University from 2002 to '13. Reed joined Cornell University as a Professor of Civil and Environmental Engineering in 2013.

More about Reed: http://reed.cee.cornell.edu/

Our Expert Speakers

Ed Rightor

Session VI, Sept. 16, 10 a.m.-noon

Presentation Title: "Business Solutions to Bridge the Water Gap"

Abstract: Water is one of the greatest treasures and defining features of this blue planet. Population growth, urbanization, climate change, pollution, and other factors are stressing this life-enabling resource — making the need for enhanced supply ubiquitous. Technological advances, efficiency gains, and partnerships can open the door to additional water resources while complementing societal changes in the use of water. Technologies that more effectively remove salt and impurities, transform low-quality water into high-quality water, and allow water to be reused over and over are crucial to meeting societal needs as well as providing sustainable growth. Industry has the ability to provide game-changing solutions to these challenges while also leading water efficiency. As a leading water purification technology provider, Dow technologies today are providing 15 million gallons/minute of clean water globally. Technology advances and partnerships are also changing the way we use — and reuse/recycle — water at manufacturing sites around the globe. It is part of our sustainability goals to redefine the role of business in society.

Bio: Ed Rightor is the Director of Strategic Projects in Dow Chemical's Environmental Technology Center. In this role, he works with Dow businesses and Corporate programs to reduce emissions, waste, freshwater intake, and energy use. He serves as the facilitator of Dow's Corporate Water Strategy Team (CWST). He holds a Ph.D. in Chemistry from Michigan State University and a B.S. in Chemistry from Marietta College.

More about Dow: http://www.dow.com/en-us/water-and-process-solutions

Our Expert Speakers

James Shortle

Session II, Sept. 15, 10:30 a.m.-noon

Presentation Title: "Water Quality and Agriculture: Policies to Harmonize Food Production with Protection of Aquatic Ecosystems and Ecosystem Services"

Abstract: Water resource constraints on agricultural production are most commonly framed as the result of scarce water for plant and animal production. But aquatic ecosystems are widely degraded by sediment, nutrients, and other pollutants from agricultural production, creating tradeoffs between food supply and costs, and highly valued aquatic ecosystem services. Just as water management institutions and polices are crucial to coping with water scarcity, well-designed water quality policies are crucial to harmonizing food production with aquatic ecosystem protection. Drawing on lessons from across the U.S., but especially the high-priority Chesapeake Bay watershed, this presentation will describe essential elements of water quality policies for agriculture. It will also discuss co-dependencies between food and energy policies, and water quality policies.

Bio: Jim Shortle is a Distinguished Professor of Agricultural and Environmental Economics, and Director of the Environment and Natural Resources Institute in the College of Agricultural Sciences at Penn State University. His work focuses on economic and policy issues in the management of water pollution and other environmental externalities from agriculture, and the impacts of climate change on agriculture and water. His research has been supported by the U.S. Department of Agriculture, U.S. Department of Defense, U.S. Environmental Protection Agency, National Science Foundation, state agencies, international organizations, and nonprofits. He was recently a member of the Environmental Economics Advisory Committee to the EPA Science Advisory Board, and served on the recent National Research Council Committee on Science for the EPA's Future. He is a member of the editorial boards of the European Review of Agricultural Economics and the Agricultural and Resource Economics Review. Shortle received a Ph.D. in Economics (1981) from Iowa State University.

More about Shortle: http://aese.psu.edu/directory/jss15/vitae

Our Expert Speakers

Murugesu Sivapalan

Session V, Sept. 16, 8:15-9:45 a.m.

Presentation Title: "Time Scale Interactions and the Co-evolution of Humans and Water: Socio-hydrology"

Abstract: A co-evolutionary view of hydrologic systems shows that every part of the system including human systems, co-evolves, albeit at different rates. The resulting coupled human-nature system is framed as a dynamic system, characterized by time scale interactions of fast and slow processes and feedbacks between environmental and social processes. This gives rise to emergent phenomena such as the levee effect, adaptation to change and system collapse due to resource depletion. Changing human values play a key role in the emergence of these phenomena and should therefore be considered as internal to the system in a dynamic way. The co-evolutionary approach proposed by socio-hydrology differs from the traditional optimization view of water resource systems analysis as it allows for path dependence, multiple equilibria and emergent phenomena. The approach may assist strategic water management for long time scales through facilitating stakeholder participation, exploring the possibility space of alternative futures, and helping to synthesize the observed dynamics of different case studies. Future research opportunities include the study of how changes in human values are connected to human-water interactions, historical analyses of trajectories of system co-evolution in individual places and comparative analyses of contrasting human-water systems in different climate and socio-economic settings.

Bio: Murugesu Sivapalan is the Chester and Helen Siess Professor of Civil and Environmental Engineering, and Professor of Geography and Geographic Information Science, at the University of Illinois. Trained as a Civil Engineer at the University of Ceylon, he obtained an M.Eng. degree in Water Resources Engineering from the Asian Institute of Technology, Thailand, and M.A. and Ph.D. degrees in Civil Engineering from Princeton University. Between 1978 and 1981, Sivapalan worked as a consulting civil engineer in Nigeria, West Africa. Between 1988 and 2005 he taught at the Centre for Water Research, University of Western Australia, reaching the position of Professor of Environmental Engineering in 1999. He was founding chair of the International Association of Hydrological Sciences (IAHS) "Predictions in Ungauged Basins" decadal initiative. He has been Executive Editor of the Hydrology and Earth System Sciences journal and has received the European Geosciences Union's John Dalton Medal, the International Hydrology Prize of the IAHS, and the Hydrological Sciences Award and the Robert E. Horton Medal of the American Geophysical Union.

More about Sivapalan: http://cee.illinois.edu/faculty/murugesusivapalan

Our Expert Speakers

Ashlynn Stillwell

Session II, Sept. 15, 10:30 a.m.-noon

Presentation Title: "Multi-Scale Systems Analyses and the Energy-Water Nexus"

Abstract: The energy-water nexus is a complex relationship between different energy and water resources. In the energy sector, thermoelectric power plants are especially dependent on water resources for cooling during electricity generation. Consequently, power generation infrastructure can be vulnerable to natural and economic water constraints, such as droughts, heat waves, and changing water prices. These constraints can be further exacerbated in urban areas, such that a need exists for interdisciplinary systems analysis applied to energy-water nexus situations. This talk will present examples of such systems analysis with possible approaches for sustainable water and energy management.

Bio: Ashlynn Stillwell is an Assistant Professor in Civil and Environmental Engineering at the University of Illinois. She earned a B.S. in Chemical Engineering from the University of Missouri (2006) and an M.S. in Environmental and Water Resources Engineering (2010), an M.P.Aff in Public Affairs (2010), and a Ph.D. in Civil Engineering (2013) from The University of Texas at Austin. Her previous work experience includes consulting engineering at Burns & McDonnell (2006-07) and policy research at the Congressional Research Service (2009). Stillwell received the 2015 Girl Scouts of Central Illinois Woman of Distinction Award in Science, Technology, Engineering, and Mathematics, and has been among the List of Teachers Ranked as Excellent by their Students. Her research interests include the water impacts of thermoelectric power generation and the energy-water nexus pertaining to urban metabolism and public policy.

More about Stillwell: http://stillwell.cee.illinois.edu/

Our Expert Speakers

Julio Vasquez

Session VI, Sept. 16, 10 a.m.-noon

Presentation Title: "The Use of Produced Water for Hydraulic Fracturing in the Oil and Gas Industry"

Abstract: Hydraulic fracturing in unconventional reservoirs continues to require large amounts of fresh water for oilfield operations, in some cases in the range of 4 to 6 million gallons per well. With increased restrictions on water availability from subsurface or surface sources, fresh water is becoming more difficult to obtain. Therefore, the use of produced water is receiving great attention in the oil and gas industry. This presentation will focus on describing different efforts in the industry to use produced and flowback water during hydraulic fracturing treatments and the challenges ahead. Produced water usually comprises the formation water and the injected fluids from previous treatments. It can potentially contain hydrocarbons, high levels of TDS, suspended solids, and residual production chemicals, which affects the performance of conventional chemicals. The use of produced water for hydraulic fracturing has many advantages, such as reduction in disposal of produced water, reduction of freshwater consumption during completion and production operations, and realization of economic benefits by the operator. If produced water is gathered at or near the production site and a minimal treatment is applied in hydraulic fracturing fluids, recycling and reuse programs may become economically and environmentally beneficial. Reclaiming produced water as the base fluid for hydraulic fracturing not only helps to alleviate the industry's dependence on fresh water, but also lowers the overall cost of the fracturing treatment.

Bio: Julio Vasquez is a Petroleum Engineer working as a Product Manager for the Production Enhancement product service line at Halliburton in Houston, Texas. Vasquez is responsible for identifying, coordinating the development of, and commercializing new products and services, mainly focused on sand control, acidizing, and conformance technologies. He has been with Halliburton for 10 years. Prior to this position, Vasquez worked as a Global Product Champion for Conformance applications. He also worked at Halliburton's Technology Center, where he mainly focused on new product development for Production Enhancement. Vasquez holds more than 15 U.S. patents, and his writing has appeared in more than 50 SPE publications. Vasquez holds B.S. and M.S. degrees in Petroleum Engineering from the University of Oklahoma.

More about Halliburton: http://www.halliburton.com/

For the Record

Congress Rapporteurs

A look at the students who will help summarize the Congress conversation

Zachary A. Barker (*Session V – Sept. 16, 8:30-10:30 a.m.)*
Barker is an M.S. student in the Environmental Hydrology and Hydraulics program in the department of Civil and Environmental Engineering. Working with Professor Ashlynn Stillwell, Barker aims to answer questions pertaining to the interactions between energy, water, and society. Specifically, he is exploring the feasibility for using reclaimed water to provide the cooling requirements for thermoelectric power generation. As a member of the IWRA and IAHR student chapters, he is passionate about Engineering Open House and Illinois Water Day. Barker is from North Carolina and is a proud alumni of N.C. State University. After graduation, he plans to return to the Raleigh-Durham area and seek employment as a water resources engineer.

Allison Gardner (*Session IV – Sept. 15, 3:30-5 p.m.)*
Gardner is a Ph.D. candidate in the Department of Entomology, under the direction of Professors Brian Allan and Ephantus Muturi. Her research in medical entomology examines the effects of displacement of native terrestrial plants by invasive species on habitat attractiveness and quality for mosquitoes, and she explores avenues to apply these results for environmentally safe and sustainable strategies to reduce risk of exposure to mosquito-borne pathogens. She received her M.S. in Pathobiology from Illinois under the direction of Dr. Marilyn O'Hara Ruiz, her M.S. in Statistics from Illinois, and her B.A. in History and Biology from Williams College.

Allison E. Goodwell *(Session I – Sept. 15, 8:45-10:45 a.m.)*
Goodwell is a Ph.D. student in the Environmental Hydrology and Hydraulics program in the department of Civil and Environmental Engineering, working with Professor Praveen Kumar. She received her B.S. in Civil Engineering from Purdue University in 2010 and her M.S. in Civil and Environmental Engineering at Illinois in 2013. Her research interests include eco-hydrology, information theory, and remote sensing. Specifically, the research involves using information theory and process networks to characterize how ecosystems respond to extreme events, climate change, or other perturbations. Goodwell is a former president of the student chapter of the International Water Resources Association (IWRA) and remains active in the student organizations of the hydrosystems laboratory.

For the Record

Congress Rapporteurs, continued

A look at the students who will help summarize the Congress conversation

Lauren H. Logan (*Session II – Sept. 15, 10:45 a.m.-12:15 p.m.)*
Logan is a Ph.D. candidate in the Energy-Water-Environment Sustainability program through Civil and Environmental Engineering. She is working with Professor Ashlynn Stillwell to develop novel assessment methodologies for aquatic ecosystem changes as a result of thermoelectric power plant effluent, with a complementary policy and regulation component. She earned a B.S. in Electrical Engineering and a B.S. in Geological Sciences from Ohio University, and an M.S. in Biological Sciences from Purdue University through the Ecological Sciences and Engineering program. Logan is the president of the Central Illinois Alumni Chapter of Tau Beta Pi, and the treasurer (and past chair) of the UIUC Engineering Graduate Student Advisory Committee. She is a National Science Foundation fellow.

Majid Shafiee-Jood (*Session III – Sept. 15, 1:15-3:15 p.m.)*
Shafiee-Jood is a Ph.D. candidate in the Environmental Hydrology and Hydraulics program in the department of Civil and Environmental Engineering. He holds B.Sc. degree in Civil Engineering and M.Sc. degree in Water Resources Engineering both from Sharif University of Technology in Iran. His core research interests include integrated water resources engineering, planning and management. Specifically, his research focuses on integrating hydroclimatic information in agricultural and water resources decision making. Shafiee-Jood is a former President of the International Water Resources Association (IWRA) student chapter at the University of Illinois and one of the founders and organizers of Illinois Water Day.

Lauren Valentino *(Session VI – Sept. 16, 10:45 a.m.-12:15 p.m.)*
Valentino is a Ph.D. student in the Environmental Engineering and Science program in the Department of Civil and Environmental Engineering at the University of Illinois. She is working with Professor Benito Mariñas to develop novel membrane materials for water treatment applications. She earned a B.S. in Civil and Environmental Engineering with a minor in Chemistry in 2011 and an M.S. in Environmental Engineering in 2013, both from Illinois. Valentino also works with the Safe Global Water Institute, participating in projects that aim to provide safe drinking water and sanitation solutions in Ethiopia, Kenya, Tanzania, and Uganda, where there is little or no access to safe water and sanitation.

Poster Sessions

Student Presenters

A quick glance at the students who will present posters on their research during the Congress

Drew Ahern
Graduate student, Department of Aerospace Engineering
Poster Title: "Water Reduction and Reuse Demonstration for Department of Defense Facilities"

Valerie Bauza
Ph.D. student, Department of Civil and Environmental Engineering (CEE)
Poster Title: "Quantifying how Water, Sanitation, and Hygiene Practices Affect Child Health in Urban Slum Communities of Nairobi, Kenya"

Maria Bohri
Undergraduate student, Department of Learning in Community (LINC)
Poster Title: "Tale of Three Villages: Factors Influencing the Success of Community-Led Sanitation Intervention Programs"

Wan-Ting Chen
Graduate student, Department of Bioenvironmental Engineering
Poster Title: "Integrated Bio-Refineries of Biocrude Oil Converted from Wet Bio-Waste via Hydrothermal Liquefaction into Drop-in Fuel and Value-Added Chemical"

Enrique Daza & Santosh Misra
Graduate student & postdoctoral research associate, Department of Bioengineering
Poster Title: "Sustainable and Benign Crude Oil Spill Treatment Via Entrapment and Dispersion Using Eco-friendly Nano-CarboScavenger"

Allison Gardner
Ph.D. student, Department of Entomology
Poster Title: "Exploitation of Ecological Traps for Mosquito Control"

Diana Kapanzhi
Graduate student, Department of Civil and Environmental Engineering (CEE)
Poster Title: "Life Cycle Assessment of Multifunctional Woody Polyculture: Meeting the World's Food Needs Sustainably through Perennial Agriculture"

Poster Sessions

Student Presenters, continued

A quick glance at the students who will present posters on their research during the Congress

Zachary Mazur
Graduate student, Department of Agricultural and Biological Engineering (ABE)
Poster Title: "The Co-Cultivation of Rice and Algae to Improve Process Economics for Algal Biofuel Production"

Kevin Milla
Undergraduate student, Department of Learning in Community (LINC)
Poster Title: "Fluoride in Groundwater: Education and Prevention of Fluorosis in Rural Indian Communities"

Nora Sadik
Graduate student, Department of Environmental Engineering and Microbiology
Poster Title: "Water Ecology, Public Health, and Climate Change in Urban Uganda and Nepal"

Laura Schweizer
Graduate student, Department of Natural Resources and Environmental Sciences (NRES)
Poster Title: "Illinois Agriculture and Water Conservation on a Spatial Scale: Perceived Responsibilities and Geographical Influences on Attitudes and Behaviors"

Laura Southworth
Graduate student, Department of Civil and Environmental Engineering (CEE)
Poster Title: "Organic Fouling in Membrane Capacitive Deionization Systems"

Ryan Stock
Graduate student, Department of Geography
Poster Title: "Participatory Vulnerability and Adaptive Capacity Assessment among Agriculturalists in Gujarat, India"

Saskia Versteeg
Graduate student, Department of Civil and Environmental Engineering (CEE)
Poster Title: "Evaluating Climate-Robust Energy and Nutrient Impacts in an Urban Water System Model"

Poster Sessions

Student Presenters, continued

A quick glance at the students who will present posters on their research during the Congress

Andrea Vozar
Graduate student, Department of Civil and Environmental Engineering (CEE)
Poster Title: "Adsorption of Organics onto State-of-the-Art Water Filtration Membranes"

Matt Walker
J.D./M.S. student, College of Law, Department of Natural Resources and Environmental Sciences
Poster Title: "Nudging Norms of Environmental Federalism in the Anthropocene: Evolving Non-point Source Strategies under the Clean Water Act"

Hanting Wang
Graduate student, Department of Civil and Environmental Engineering (CEE)
Poster Title: "Quantification of Rotavirus Removal in Biosand Filters using an Integrated Cell Culture and qPCR Method"

Minhong Xu
Graduate student, Department of Agricultural and Consumer Economics (ACE)
Poster Title: "The Effects of the Natural Gas and Oil Boom on U.S. Counties' Water Use"

ALSO PRESENTING POSTERS AT THE CONGRESS ...

The Illinois Sustainable Technology Center (ISTC), a division of the Prairie Research Institute, will present three posters. The titles:

• "Fluorescence Spectroscopy for Characterizing Hydraulic Fracturing Fluids," by John W. Scott, ISTC; Thomas Holm, Illinois State Water Survey (ISWS); and Peter Berger and Lois Yoksoulian, Illinois State Geological Survey (ISGS)

• "Pharmaceuticals and Personal Care Products: Extending Knowledge and Mitigation Strategies," by Wei Zeng, Nancy Holm, and Laurel Dodgen, ISTC; Laura Kammin, Illinois Indiana Sea Grant College Program (IISGCP); and Michael Plewa, Professor, Department of Crop Sciences

• "One Billion Gallon Water Challenge — Promoting Water Conservation," by Nancy Holm and Beth Meschewski, ISTC

Acknowledgments

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- the Center for Global Studies (CGS)
- the College of Agricultural, Consumer and Environmental Sciences (ACES)
- the Department of Civil and Environmental Engineering (CEE)
- the School of Integrative Biology (SIB)
- the Department of Natural Resources and Environmental Sciences (NRES)

CONGRESS ORGANIZING COMMITTEE

- Madhu Khanna, Professor of Agricultural and Consumer Economics and iSEE Associate Director
- Jim Best, Professor of Geology
- Trevor Birkenholtz, Associate Professor of Geography and Geographic Information Science
- John Braden, Professor Emeritus of Agricultural and Consumer Economics
- Jeff Brawn, Professor and Head, Natural Resources and Environmental Sciences
- Ximing Cai, Professor of Civil and Environmental Engineering
- Brian Miller, Director of Illinois-Indiana Sea Grant College Program
- Praveen Kumar, Professor of Civil and Environmental Engineering
- Murugesu Sivapalan, Professor of Civil and Environmental Engineering

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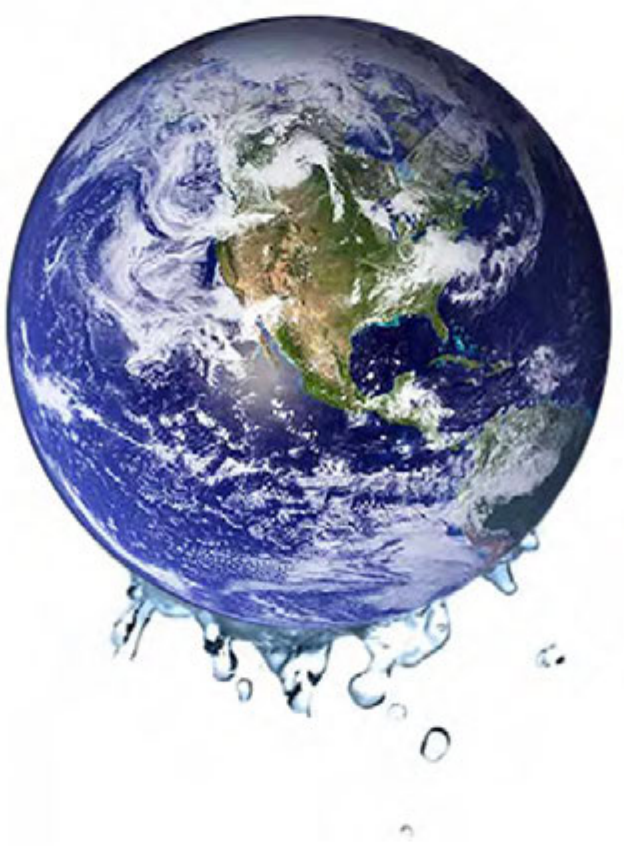
- Stephanie Lage, Assistant Director
- Morgan Johnston, Associate Director of Sustainability, Facilities & Services
- Micah Kenfield, Student Sustainability Committee Coordinator
- Tony Mancuso, Communications and Public Affairs Coordinator
- Amy Rosenbery, Office Administrator
- Nishant Makhijani, Sustainability Engagement Specialist
- Olivia Harris, Communications Assistant
- **Student Interns:** Katie Pollman, Noah Feingold, Catherine Kemp

Notes: The Ideas to Take Away from Here



Updates on Twitter at #iSEECongress2015