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Research in Water Science

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Dear Colleagues:

With nearly 30 Kent State faculty members working across multiple colleges and departments, Kent State has considerable strength in a broad range of aquatic sciences and related disciplines including ecology, hydrology and urban studies.

In this directory you will find research profiles of Kent State faculty who work in the areas of biogeochemistry, microbiology, public health policy, geography, geology, chemical physics and liquid crystals, environmental design, ecology and environmental science. All have a strong connection to water research.

Please consider this directory as a valuable resource for current information about Kent State University’s water research initiatives. I encourage you to contact the researchers profiled here directly for further details on their important work.

If you would like additional information about other research programs or for partnering opportunities with us, please contact me at research@kent.edu or 330-672-0717, and visit: http://www.kent.edu/research.

Grant McGimpsey, Ph.D.
Vice President for Research
Kent State University
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Andrew Curtis, Ph.D.
ASSOCIATE PROFESSOR, GEOGRAPHY

Education: Ph.D., State University of New York, Buffalo

Research Keywords: Geographic Information Systems; Field Mapping; Health, Hazards

Research Area: Dr. Curtis, director of the GIS, Health and Hazards Laboratory at Kent State, is a former director of the World Health Organization’s Collaborating Center for Remote Sensing and GIS for Public Health. His work uses geospatial technologies and geographic information system (GIS) analysis to support neighborhood-scale intervention strategies designed to reduce public and environmental health disparities. Example research topics include: spatial video to support neighborhood recovery after disasters (including hurricanes and flooding), and mapping safe water access in challenging environments, such as cholera-impacted Haiti and the informal settlements of Bangladesh.

Research Publications:

John Hoornbeek, Ph.D.
ASSOCIATE PROFESSOR, HEALTH POLICY AND MANAGEMENT

Education: Ph.D., University of Pittsburgh

Research Keywords: Environmental Policy; Public Health Policy; Water Policy; Total Maximum Daily Loads (TMDLs); Intergovernmental Relations and Collaboration; Environmental Federalism; Comparative Environmental Policy; Public Sector Reform

Research Area: Dr. Hoornbeek’s research focuses on water policy, the environment and health, public management, and public sector reform. He focuses particularly on the influence of institutional arrangements on water and environmental health policy implementation, as well as public sector performance and reform. His recent work has focused on the implementation of TMDLs, federal influence on state and local policies and the structures and systems for administering environmental and public health programs at the state and local levels.

Research Publications:
Joseph D. Ortiz, Ph.D.
PROFESSOR, GEOLOGY

Education: Ph.D., Oregon State University

Research Keywords: Paleoclimate; Marine Sedimentology; Water Quality

Research Area: With training in aquatic biology and oceanography, Dr. Ortiz works at the interface between sciences unraveling climate mysteries, exploring the relationship between sedimentary strata, and helping to improve water quality using electromagnetic sensing techniques. His primary research interest is in the area of paleoclimate. He studies sedimentary records to extract climate-related information on seasonal to glacial-interglacial time scales and employs diverse methods ranging from marine micropaleontology to light isotope geochemistry and core and well logging to decipher Earth’s climate record.

Research Publications:


Donald Palmer, Ph.D.
EMERITUS PROFESSOR, GEOLOGY

Education: Ph.D., Princeton University

Research Keywords: Evaluation and Analysis of Water-related Environmental Issues; Environmental Applications of Geophysics

Research Area: Dr. Palmer’s research is primarily on the environmental applications and characterization of water supply and water quality in aquifers, springs, and surface waters.

Research Publications:

Scott Sheridan, Ph.D.
PROFESSOR, GEOGRAPHY

**Education:** Ph.D., University of Delaware

**Research Keywords:** Synoptic Climatology; Climate Change; Bioclimatology

**Research Area:** Dr. Sheridan works in applied climatology, with a continued focus across environmental outcomes. He has worked extensively on examining human vulnerability to extreme weather conditions, and is currently the lead investigator on a NASA-funded project that examines the impact of weather conditions on water clarity across the US Gulf Coast.

**Research Publications:**
- Ballinger, T.J.; Sheridan, S.C. “Associations between circulation pattern frequencies and sea ice minima in the western Arctic.” *International Journal of Climatology.* (In press.)

Sarah Smiley, Ph.D.
ASSISTANT PROFESSOR, GEOGRAPHY

**Education:** Ph.D., University of Kansas

**Research Keywords:** Water Access; Sanitation Access

**Research Area:** Dr. Smiley examines how colonial legacies of segregation, housing and development policy, and amenity provision affect life in contemporary Dar es Salaam, Tanzania. Her current work explores access to water in Dar es Salaam. Specifically it highlights the need to consider the price, quality, and availability of water alongside its location when measuring access. Her household surveys show that water prices are extremely fluid and parts of the city lack consistent water provision.

**Research Publications:**
Alison Smith, Ph.D.  
PROFESSOR, GEOLOGY  

Education: Ph.D., Brown University  

Research Keywords: Groundwater-Surface Water Interaction; Paleolimnology; Climate Change  

Research Area: Dr. Smith's research program is centered on the development of the modern and fossil non-marine ostracode record as a tool in determining changes in water quality and climate through late Cenozoic time (Pliocene through Holocene Epochs). Her focus is on the role of ground water-surface water interactions in mediating the terrestrial climate record, and in identifying paleohydrologic changes using the ostracode ecology and ostracode shell geochemistry.  

Research Publications:  

Mandy Munro-Stasiuk, Ph.D.  
PROFESSOR, GEOGRAPHY  

Education: Ph.D., University of Alberta  

Research Keywords: Karst Groundwater; Glacial Meltwater Processes  

Research Area: Mandy Munro-Stasiuk explores the nature of storage and release of water in and under glacial ice and in karst environments. She has most recently worked in Iceland, on Skeidararjökull Glacier where over 50 outburst floods have been recorded in the last 100 years. Her second line of research is in karst environments in Yucatan, Mexico, where cavities in limestone bedrock greatly influence the nature of groundwater flow. She is working with archaeology colleagues to understand how the Ancient Maya exploited that groundwater.  

Research Publications:  
Qi-Huo Wei, Ph.D.
ASSOCIATE PROFESSOR, CHEMICAL PHYSICS AND THE LIQUID CRYSTAL INSTITUTE

Education: Ph.D., Nanjing University

Research Keywords: Plasmonics; Nanophotonics; Soft Matter Physics; Micro/nanofluidics; Nano-sensors; Micro/nanofabrication

Research Area: Dr. Wei's research in the Liquid Crystal Institute and Chemical Physics is relevant to confinement and manipulation of materials and fields in micro/nanoscales, aiming at both fundamental physics and novel device applications. His recent focus is on diffusion and transport of molecule-shaped colloids, plasmonic nanoantennas and nanocavities, liquid crystals in confined geometries, liquid crystal polymers and their bioapplications.

Research Publications:

Xinyue Ye, Ph.D.
ASSISTANT PROFESSOR, GEOGRAPHY

Education: Ph.D., University of California, Santa Barbara

Research Keywords: GIS; Economic impact Analysis of Water Pollution and Coastal Flooding

Research Area: Dr. Ye's research focuses on open source geocomputation, spatial econometrics, GIS modeling and urban/regional analysis. Through these methods he has undertaken economic impact analysis of water pollution and coastal flooding.

Research Publications:
Reid Coffman, Ph.D.
ASSOCIATE PROFESSOR, ARCHITECTURE AND ENVIRONMENTAL DESIGN

Education: Ph.D., The Ohio State University; MLA, University of Colorado

Research Keywords: Bioretention; Vegetative Roof Systems; Rain Gardens; Ecosystem Services; Novel Ecologies; Landscape Machines; Living Architecture

Research Area: Dr. Coffman studies the conceptualization, visualization, and execution of site-based green infrastructure and novel ecological design projects. Working within the urban context, he studies water's potential to maximize ecological benefits within constructed landscapes, buildings envelopes, parks, and gardens. He frequently examines the performance of vegetation and its interactions of with soils, water and people.

Research Publications:

Anne Jefferson, Ph.D.
ASSISTANT PROFESSOR, GEOLOGY

Education: Ph.D., Oregon State University

Research Keywords: Watershed Hydrology; Urban Hydrology; Hydrogeomorphology

Research Area: Dr. Jefferson’s research focuses on watershed hydrology, groundwater-surface water interactions, hydrogeomorphology, and the effects of disturbances (climatic and land-use change) on hydrologic systems. Jefferson’s current projects are focused on hydrologic and geomorphic impacts of urbanization, stormwater management, stream restoration, and dam removal. Much of her research is field-based; she also makes use of stable isotope analyses, geographic information systems (GIS) and modeling.

Research Publications:
Terry Schwarz, M.A.
DIRECTOR, URBAN DESIGN CENTER

Education: M.A., Cornell University

Research Keywords: Shrinking Cities; Vacant Land Reclamation; Green Infrastructure

Research Area: Terry Schwarz is a planning and urban design practitioner who conducts applied research in the areas of neighborhood regeneration, ecological urbanism, and urban resilience. As director of the Cleveland Urban Design Collaborative, she works with communities throughout Northeast Ohio on community master plans, commercial corridor studies, and ecological approaches to vacant land reuse. She launched the CUDC’s Shrinking Cities Institute in 2005 in an effort to understand and address the implications of population decline and large-scale urban vacancy in Northeast Ohio.

Research Publications:


Abdul Shakoor, Ph.D.
PROFESSOR, GEOLOGY

Education: Ph.D., Purdue University

Research Keywords: Slope Stability and Erosion; Dam Failure; Development, Protection, and Remediation of Groundwater and Surface Water Resources

Research Area: Dr. Shakoor’s research in Engineering Geology is relevant to the planning, design, construction, operation, and maintenance of engineering structures as well as to the development, protection, and remediation of groundwater and surface water resources. His focus is on studies related to the engineering behavior of soils and rocks, slope stability, water resources development projects, evaluation of construction materials and engineering applications of waste materials.

Research Publications:

- Admassu, Y.; Shakoor, A. “Cut slope design recommendations for sub-horizontal hard sedimentary rock units in Ohio, USA.” Geotech. and Geol. Eng. 2013, v. 31, no. 4, pp. 1207-1219.
V. Kelly Turner, Ph.D.
ASSISTANT PROFESSOR, GEOGRAPHY

Education: Ph.D., Arizona State University

Research Keywords: Sustainable Urban Planning; Human-Environment Interactions; Institutions; Decision-making, Management

Research Area: Dr. Turner’s research focuses on the role of social institutions in urban environmental decision-making and resource management. Her work on water resources has explored such themes as the impact of homeowners’ associations in residential water demand management and the use of uncertainty discourses in regional water policy negotiations.

Research Publications:

David M. Costello, Ph.D.
ASSISTANT PROFESSOR, BIOLOGICAL SCIENCES

Education: Ph.D., University of Notre Dame

Research Keywords: Biogeochemistry; Ecotoxicology of Metals; Aquatic Invasive Species; Remediation and Regulation of Polluted Sediments; Experimental Ecology

Research Area: Dr. Costello’s research explores how chemical contaminants and invasive species affect the functioning of freshwater ecosystems. He uses field and lab experiments to explore the mechanisms that control ecosystem response and resilience to anthropogenic stressors. His aim is to produce better models of ecosystem response for regulators and restoration experts in an effort to protect freshwater resources.

Research Publications:


Lauren E. Kinsman-Costello, Ph.D.
SENIOR RESEARCH SCIENTIST, BIOLOGICAL SCIENCES

Education: Ph.D., Michigan State University

Research Keywords: Freshwater Ecosystems, Biogeochemistry, Ecosystem Ecology

Research Area: Dr. Kinsman-Costello is an ecosystem ecologist interested in the effects of altered hydrology on aquatic nutrient biogeochemistry and ecosystem function. Her research aims to inform larger questions about (1) the resilience of ecosystems faced with environmental change and (2) the ability of humans to restore and recreate ecosystem services through restoration and, at times, de novo construction.

Research Publications:

Brian D. Lutz, Ph.D.
ASSISTANT PROFESSOR, BIOLOGICAL SCIENCES

Education: Ph.D., Duke University

Research Keywords: Biogeochemistry; Energy Extraction and the Environment; Ecosystem Ecology; Carbon and Nutrient Cycling

Research Area: Dr. Lutz's research focuses on the movement of energy and elements through a wide variety of natural and human altered landscapes, with particular focus on understanding the environmental impacts of energy extraction practices at regional scales. His work on mountaintop-removal coal mining and hydraulic fracturing has been central to ongoing policy discussions surrounding energy security, climate change and the environment. He has testified on these issues before the Ohio Senate and the National Governors Association, and his research has been featured on several national news and media outlets, including NBC News, NPR and Bloomberg.

Research Publications:


David Singer, Ph.D.
ASSISTANT PROFESSOR, GEOLOGY

Education: Ph.D., Stanford University

Research Keywords: Environmental Mineralogy; Environmental Geochemistry; Acid-Mine Drainage

Research Area: Dr. Singer's research is in the field of environmental mineralogy and geochemistry, focusing on the fate and transport of metals and radionuclides in the environment. In particular, he is interested in the geochemical and biogeochemical processes that occur at mineral surfaces which can limit or promote contaminant transport in a range of surface environments. His research has ranged from applied characterization studies of uranium and copper speciation at the U.S. Department of Energy’s Hanford Site, to fundamental studies of the processes by which uranium and strontium are sequestered at mineral surfaces.

Research Publications:

- Singer, D.M.; Fox, P.M.; Guo, H.; Marcus, M.A.; Davis, J.A. “Sorption and redox reactions of As(III) and As(V) within secondary mineral coatings on aquifer sediment grains.” Environmental Science & Technology. 2013, 47, 11569-11576.
Darren L. Bade, Ph.D.
ASSISTANT PROFESSOR, BIOLOGICAL SCIENCES

Education: Ph.D., University of Wisconsin – Madison

Research Keywords: Limnology; Nutrient Biogeochemistry; Nitrogen Cycling; Lake Metabolism

Research Area: Dr. Bade’s research has two primary foci: 1) dynamics of major macronutrients in lakes (C,N,P) and 2) their relationship to lake ecosystem metabolism. Lake Erie has been the study site for nutrient dynamics and small lakes of Ohio and Wisconsin have been the site for metabolism studies. In Lake Erie, he has been investigating the role the nitrogen cycle plays in major water quality issues in the lake, including the dead zone and re-eutrophication. To study the productivity and respiration (metabolism) of whole-lake ecosystems he employs autonomous sensors and sensor platforms to collect high frequency water quality information.

Research Publications:
• Chaffin, J.D.; Bridgman, T.B.; Bade, D.L. “Nitrogen constrains the growth of late-summer cyanobacterial blooms in Lake Erie.” Advances in Microbiology, Special Issue - Cyanobacteria (In press).

Christopher Blackwood, Ph.D.
ASSOCIATE PROFESSOR, BIOLOGICAL SCIENCES

Education: Ph.D., Michigan State University

Research Keywords: Soil Microbiology; Community Ecology; Soil Organic Matter; Ecosystem Ecology; Microbial Ecology; Tree Roots; Forest Ecology; Plant-Microbe Interactions

Research Area: Dr. Blackwood studies two groups of organisms important in keeping forests healthy and friendly to the environment: 1) trees, the conspicuous engineers of the forest, and 2) normally unseen microorganisms, such as bacteria and fungi. One area of research looks at why the distributions of species and communities are more predictable in some places compared to others. Specific examples include projects examining microbial and tree diversity near ecosystem edges, how tree roots respond to soil and aboveground tree adaptations, and the groups of fungi on decomposing leaves.

Research Publications:
Robert Hamilton IV, Ph.D.  
ASSISTANT PROFESSOR, BIOLOGICAL SCIENCES

Education: Ph.D., Rutgers University

Research Keywords: Aquatic Ecology; Benthic Macroinvertebrates; Water Quality; Vernal Pools; Pitcher Plants; Watersheds; Environmental Media

Research Area: Dr. Hamilton's research in aquatic ecology focuses on invertebrate community structure and response to environmental conditions. His research is conducted in several freshwater aquatic systems including pitcher plant wetlands, temporary surface waters and permanent streams. He also studies how scientific information is presented to the community through environmental media.

Research Publications:

Walter R. Hoeh, Ph.D.  
ASSOCIATE PROFESSOR, BIOLOGICAL SCIENCES

Education: Ph.D., University of Michigan

Research Keywords: Evolution of Bivalved Mollusk Morphology; Evolution of Bivalved Mollusk Mating Systems; Evolution of Bivalved Mollusk Gender-associated Mitochondrial DNA Genomes

Research Area: Dr. Hoeh's research interests are centered on the evolution of bivalved mollusk morphology, mating systems, and gender-associated mitochondrial DNA genomes. The evolution of these systems is studied in the context of phylogenetic hypotheses generated from analyses of morphological and molecular data sets and by the use of population genetic and morphometric tools to evaluate within- and among-population mating system variation.

Research Publications:
Laura Leff, Ph.D.
PROFESSOR, BIOLOGICAL SCIENCES

Education: Ph.D., University of Georgia

Research Keywords: Microbial Ecology, Stream Biology, Freshwater

Research Area: Dr. Leff’s research centers around interactions between the carbon and nitrogen cycles as well as critical components of the carbon cycle, such as decomposition. Regardless of whether we are studying an applied issue or basic phenomenon, we use molecular methods in combination with culture-based studies, microscopy, and chemical analyses to test hypotheses. One current research topic involves examining factors that affect denitrification rates in several types of environments; here we seek to determine if the rate of the process is dependent on the nature of the organisms (their taxonomic affiliation, function genes they carry) responsible for the emergent property.

Research Publications:


Mark Kershner, Ph.D.
ASSOCIATE PROFESSOR, BIOLOGICAL SCIENCES

Education: Ph.D., The Ohio State University

Research Keywords: Community Ecology, Food Web Interactions, Detritivory, Crayfish, Terrestrial-Aquatic Linkages

Research Area: Dr. Kershner’s research in community ecology focuses on how communities form, are maintained, and what factors influence their structure and function. He is interested in the movement of organisms, energy, and nutrients across ecosystem boundaries, particularly at the interface of aquatic and terrestrial systems. Crayfish play a significant role in other research foci in his lab – investigating the role they play in resource homogenization, organic matter processing and food web structure in aquatic ecosystems.

Research Publications:

Ferenc de Szalay, Ph.D.
ASSOCIATE PROFESSOR, BIOLOGICAL SCIENCES

Education: Ph.D., University of California, Berkeley

Research Keywords: Wetlands; Population and Community Ecology; Aquatic Invertebrates; Hydrophytes; Ecological Management and Restoration Techniques; Mosquito Control; Unionid Mussels

Research Area: Dr. de Szalay's research in community ecology provides information to understand factors that control invertebrate and plant communities in wetland ecosystems. His focus is on testing how abiotic factors such as wetland hydrology and biotic factors such as trophic interactions and insect colonization affect ecological processes in freshwater marshes and swamps and Lake Erie coastal wetlands.

Research Publications:


Christopher J. Woolverton, Ph.D.
PROFESSOR, BIOSTATISTICS, ENVIRONMENTAL HEALTH SCIENCE, AND EPIDEMIOLOGY

**Education:** Ph.D., West Virginia University

**Research Keywords:** Microbiology; Bacteria; Sensors; Liquid Crystals; Proteins; Toxins; Detection; Decontamination

**Research Area:** Dr. Woolverton’s research is focused on the detection and control of human pathogens. His lab has developed whole cell and protein-based biosensors using liquid crystals as optical amplifiers of molecular reactions, detecting bacteria and virus in real time. They also evaluate the natural liquid crystalline phases of biomolecules to create novel sensing materials. Woolverton’s lab partners with industry to evaluate chemical and physical methods to destroy bacterial and their biofilms.

**Research Publications:**


Jean Engohang-Ndong, Ph.D.
ASSISTANT PROFESSOR, BIOLOGICAL SCIENCES

**Education:** Ph.D., Lille University of Science and Technology, France

**Research Keywords:** Infectious Disease, Bacterial Pathogenesis, Antimicrobial Discovery; Environmental Microbiology

**Research Area:** Dr. Engohang-Ndong’s research focuses on Mycobacterium ulcerans infection. M. ulcerans causes Buruli ulcer which is a skin ulcer that occurs mainly in tropical countries. M. ulcerans produces a unique toxin that is responsible for the extensive necrosis of skin tissues observed in Buruli ulcer patients. In his laboratory, he is mainly interested in looking for good potential M. ulcerans drug targets and also in finding existing drugs that would be effective at controlling growth of M. ulcerans both in vitro and in vivo. In addition to his research on infectious diseases, he is also interested in elucidating the possible impact of chemicals released by Wastewater Treatment Plants on wildlife in the Tinkers Creek in Northeast Ohio.

**Research Publications:**

Microbiology

Xiaozhen Mou, Ph.D.
ASSISTANT PROFESSOR, BIOLOGICAL SCIENCES

Education: Ph.D., University of Georgia

Research Keywords: Molecular Microbial Ecology; Dissolved Organic Matter; Cyanobacterial Harmful Algal Bloom; Polyamine Degradation; Microbial Loop

Research Area: Research in Dr. Mou's lab focuses on linking bacterial phylogeny with their metabolic functions in natural aquatic environments. This direct linkage is important to understand fundamental questions in an ecological/environmental context, such as the role of bacteria in biogeochemical cycling of essential nutrients, e.g., carbon, nitrogen and sulfur. Experimental metagenomics and metatranscriptomics coupled with bioinformatics are employed as the core approach to simultaneously identify the taxonomic diversity, genetic capability and metabolic activity of selected taxonomic and functional groups of aquatic bacteria.

Research Publications:


Partnering with Kent State Research

For more information on ways to partner with Kent State University’s Division of Research and Sponsored Programs, please contact:

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