“Our developing partnership with MDNR is needed to get more data, interpret trends, and provide new information for fisheries managers. We’re still working on how to integrate this information into management actions.”

Brian M. Roth
Associate Professor
Department of Fisheries and Wildlife
College of Agriculture and Natural Resources

Michigan Department of Natural Resources Fisheries Biologist Troy Zorn (on left) and MSU Associate Professor in Fisheries and Wildlife Brian Roth on a data-gathering expedition. SEE PAGE 8.
FOREWORD

This issue of the *Engaged Scholar Magazine* looks at water. It’s a big topic—especially this year, and especially in Michigan—and we have approached it using a variety of lenses.

Geographically, our stories range from the very local (an initiative that uses place-based education to give youth, teachers, and communities along the Red Cedar River an opportunity to learn about and appreciate local natural resources) to the very global (a partnership that is building a knowledge value chain to ensure global water safety).

As one of our project partners points out (p. 10), Michigan is set in the middle of one-fifth of the world’s freshwater supply. The region is a unique environment for study, so it should not be surprising that the Great Lakes and local Michigan headwaters dominate the attention of many MSU researchers. The majority of our stories pay particular attention to statewide and regional issues as well, with several articles focused on how best to manage these critical resources.

Topics range from conservation strategies and motivation to conserve, to measuring groundwater contamination, to managing fisheries and food web ecology, to environmental justice. We also convened a panel of senior water scientists to discuss what they see as the major current and upcoming challenges in water resource management.

Finally, we note that MSU’s Cultural Engagement Council is creating a thematic Year of Water, similar to previous celebrations of the Year of Arts and Culture (2007-2008) and the China Experience (2015-2016), to highlight all the ways that water inspires, motivates, and affects our world. Watch for announcements about programs, discussions, arts offerings, and other events under the banner “Water Moves MSU,” coming soon.

*Linda Chapel Jackson*  
*Editor*
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Developing Sanitation Guidelines and Policies

Some people think big while others focus at a much more detailed level. Nicholas Kiulia’s research reflects both ends of the spectrum.

Nicholas Kiulia is a doctoral student and molecular virologist working on the United Nations Educational, Scientific, and Cultural Organization (UNESCO) Global Water Pathogen Project (GWPP). He grew up in Meru, Kenya, and later moved to Nairobi for his undergraduate degree. Kiulia has had a long collaboration (since 2005) with the University of Pretoria, South Africa, as a student and visiting researcher.

In 2014 Kiulia was awarded a fellowship by the Midland Research Institute for Value Chain Creation to pursue doctoral studies at MSU under the guidance and mentorship of Joan Rose, one of the world’s foremost experts on microbial risk to human health from contaminated water. Kiulia’s work with Rose and a team of MSU researchers contributes to a worldwide partnership composed of more than 150 renowned scientists working together to develop quantitative data about sanitation to help guide policies for global use.

Kiulia’s research, which focuses on human enteric viruses that affect public health, is addressing risk assessment of water sources and raw foods associated with viral disease transmission. He studies viruses in the water environment using new molecular tools and applies a modeling approach to trace where problems originate. His goal is to prevent waterborne disease outbreaks by providing scientists and communities with a better understanding of the contamination pathways that contribute to the spread of viral diseases.

MSU is a key partner working with the World Health Organization (WHO) and their development of a sanitation guideline and policy document applicable for worldwide use.
Dr. Rose’s leadership on the project encouraged Kiulia to join the team in developing research models that assess virus-travel pathways where no monitoring data are available.

Contaminated water creates unhealthy and dangerous public health conditions. Enteric viruses such as rotavirus are transmitted from fecal matter through oral ingestion. They can cause acute gastroenteritis and even death in infants, young children, and vulnerable adult populations. The 2014 WHO/UNICEF report, Progress on Drinking Water and Sanitation: Joint Monitoring Programme Update 2014, estimates that almost 85 percent of the world’s total wastewater is discharged without adequate treatment, if any treatment at all. It is estimated that two and a half billion people do not have access to improved sanitation, and that one billion people still practice open defecation.

The “Grand Challenge”

UNESCO supports world peace by building networks among nations to enable moral and intellectual solidarity. Clean water is one of the most widely agreed upon basic human rights. The Global Water Pathogen Project’s vision is to translate science on global water pathogens, sanitation, and health into practices that restore and protect water safety, thus contributing to the advancement of healthy, peaceful communities.

Dr. Rose and Dr. Blanca Jiménez-Cisneros, secretary of UNESCO’s International Hydrological Programme, are the principal leaders for the GWPP. Together, they are dedicated to building and enhancing the network by utilizing broad scientific expertise, balanced geographic representation, and gender equality.

“Safe water is a very complex challenge,” said Rose. “Water resource management and land use are intertwined, and we need involvement from higher education, industry, and public policy decision makers to participate in the challenges related to water security.”

Rose and Jiménez-Cisneros identify two major goals for the GWPP network. The first is to publish and disseminate a state-of-the-art reference work on water-related disease risks and intervention measures that updates the 1983 book, Sanitation and Disease: Health Aspects of Excreta and Wastewater Management.
Developing Sanitation Guidelines and Policies for the WORLD’S WATERWAYS

by Feachem, Bradley, Garelick, and Mara. This publication has long been the standard resource for waterborne pathogen information. The GWPP network has identified approximately 100 authors to contribute to an updated reference publication and online resource in English, French, and Spanish.

“The 1983 publication played a key role in addressing the incidence of water-related diseases and providing the most comprehensive overview of fecal indicators and pathogen occurrence in the environment. It is very important that we now update the content because of the profound increase in knowledge, data, and technology capabilities during the last 35-plus years,” said Rose.

Their second goal is to create an online open-access resource that will connect user communities in the professional, government, business, and civil sectors with data and information from leading scientists. The aim is to share information that will encourage public education and participation for safe, clean water in communities.

Support from the Midland Research Institute for Value Chain Creation

MSU’s Midland Research Institute for Value Chain Creation in the Eli Broad College of Business is funding Kiulia’s research.

“The work aligns with the Dow Company’s philanthropic goals for addressing safe water worldwide. It also supports other major international goals, particularly UNESCO’s goal to address education and exchange of knowledge,” said Kiulia.

As part of the GWPP, Kiulia’s project goal is to develop a knowledge supply chain for safe water, particularly regarding rotavirus, using advanced information technology. While Kiulia studies global viral water pollution and is involved in accessing and organizing the data, another piece of the project is working on social media tools for raising awareness and participation with the network.

This will create an accessible resource that can be utilized for educational opportunities anywhere in the world where water issues are addressed.

The project aims to supply information to scientific colleagues, engineers, non-governmental organizations, policy experts, government officials, and industry leaders. The work has attracted attention from the DOW Chemical Company, Proctor & Gamble, the American Chemistry Council, and the Bill and Melinda Gates Foundation. Acknowledging that more industry leaders need to be brought in, Rose and the GWPP team are working to expand involvement.

“We scheduled four user community meetings, England, North Carolina, Tanzania, and Australia, each on a different continent. They corresponded with other events; for example, the October meeting in Brisbane was scheduled because of the International World Water Congress and Exhibition 2016. The goal is to inform as many people as possible,” said Rose.

Mapping Rotaviruses and the Systemic Modeling Approach

In 2015, Kiulia, Rose, and a research team that included Nynke Hofstra, Lucie C. Vermeulen, Maureen A. Obara, and Gertjan Medema published “Global Occurrence and Emission of Rotaviruses to Surface Waters.”

Digital PCR viral concentration results can be used for quantitative microbial risk analysis (QMRA) to estimate the risk from exposure to viral pathogens and also for spatial predictive modeling to estimate the global emission of rotavirus from human wastewater to surface waters.

“UNESCO has a very broad perspective. You need to link it all together to present a holistic approach. We promote that holistic approach with international cooperation, capacity building, and research projects.”

BLANCA JIMÉNEZ-CISNEROS
SECRETARY OF THE INTERNATIONAL HYDROLOGICAL PROGRAMME
UNITED NATIONS EDUCATIONAL, SCIENTIFIC, AND CULTURAL ORGANIZATION (UNESCO)
Mapping by Kiulia illustrates total rotavirus emissions in viral particles, produced worldwide by the urban population during 2010. Based on the systems modeling approach, maps and data supplied to communities can be used to discuss decisions on risk mitigation and wastewater treatment.

Surface Waters” in the journal *Pathogens*. The authors noted that as far as they knew, their global waterborne pathogen model was the first attempt to estimate the global distribution of rotavirus emissions to surface water.

According to Rose, systems modeling provides global scope for assessing potential problem areas where the viruses originate, and where they can travel.

“The systems modeling approach provides valuable information about where ‘contamination hotspots’ are occurring, and where those pathogens can potentially travel along in the waterways,” said Rose.

“One of the most frequent questions asked by people experiencing contamination in their communities is ‘Where did this come from?’ As technology and science improves, we are able to provide more—and more reliable—data,” she said.

The collaborative piece of Kiulia’s project involves using advanced information technology to supply information to scientists, industry and government leaders, policy experts, and involved citizens.

“If we have a knowledge system for safe water, it can support global exposure assessments and enable evaluation of sanitation technologies for achieving health-based targets,” said Kiulia.

“Transparent and accessible data and information that is available to everyone can stimulate education and cooperation. If we have quantitative values from the scientific data it can be used for setting practical sanitation requirements,” Kiulia said.

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Developing Sanitation Guidelines and Policies for the WORLD’S WATERWAYS

“There is stress on global waters. We are working with UNESCO to build a global network where we can facilitate education and intercultural understanding,” said Rose.

Kiulia is committed to scientific discovery that contributes to society. “I will be translating the knowledge that I acquire over the years to help the Kenyan government develop water safety related policies. Kenya is prone to water-borne diseases due to flooding, and I want to participate in the scientific and community strategies for reduction of diseases such as cholera, rotavirus, and the others. I want to help show the importance of having a proper waste water treatment plan,” he said.

Because he deals with each end of the spectrum, a normal day finds Kiulia dividing his time between meetings, conference calls, and paperwork in an office at the Manley Miles Building, and studying viruses in a lab across campus at the Plant and Soil Sciences Building. How does he transition from thinking broadly about global water concerns to painstakingly detailed work with a microscope, sophisticated laboratory equipment and odious viruses? You can find Kiulia riding his bike.

“I like the fresh air,” he said, smiling.

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MIDLAND RESEARCH INSTITUTE FOR VALUE CHAIN CREATION

The idea of a value chain is based on the process view of organizations, seeing a manufacturing (or service) organization as a system, made up of subsystems each with inputs, transformation processes, and outputs. How value chain activities are carried out determines costs and affects profits.\(^1\)

The Midland Research Institute for Value Chain Creation was established by Michigan State University in 2013 to develop ways to improve all types of public and private value chains.

The institute builds on MSU’s strong interdisciplinary research capabilities by linking faculty from the Broad College of Business, the College of Engineering, the College of Agriculture and Natural Resources, and the College of Social Science in research on topics such as resource management, analytics, security, and sustainability. MSU’s top-ranked Department of Supply Chain Management provides comprehensive leadership to the initiative.

In addition to conducting research, the institute also offers graduate studies in supply chain management as well as non-degree courses and certificate programs, lectures, and seminars both online and at the Midland facility.

Initial support was provided through generous donations from Midland-based companies Dow Chemical and Dow Corning and local foundations, including the Dow Chemical Company Foundation, the Herbert H. and Grace A. Dow Foundation, the Rollin M. Gerstacker Foundation, and the Charles J. Strosacker Foundation.

A technical advisory board composed of MSU and corporate partners helps set the research agenda of the institute.

midlandvaluechain.broad.msu.edu

Aquifer: An underground layer of water-bearing permeable rock, rock fractures or unconsolidated materials (gravel, sand, or silt) from which groundwater can be extracted using a water well.

Cover crop: A crop planted primarily to manage soil erosion, soil fertility, soil quality, water, weeds, pests, diseases, biodiversity, and wildlife in an agroecosystem.

Enteric: Of, relating to, or affecting the human gastrointestinal tract.

Fracking: The injection of fluid into shale beds at high pressure in order to free up petroleum resources such as oil or natural gas. Definition adapted from Merriam-Webster.

Green infrastructure: A network for solving urban and climatic challenges by building with nature. The main components of this approach include stormwater management, climate adaptation, less heat stress, more biodiversity, food production, better air quality, sustainable energy production, clean water, and healthy soils.

Groundwater: The water present beneath Earth’s surface in soil pore spaces and in the fractures of rock formations. A unit of rock or an unconsolidated deposit is called an aquifer when it can yield a usable quantity of water. See also surface water.

Headwaters: The furthest place in a river or stream from its estuary (brackish transition zone between the river environment and the open sea) or confluence (meeting) with another river, as measured along the course of the river.

Hydrogeology: The area of geology that deals with the distribution and movement of groundwater in the soil and rocks of the Earth’s crust (commonly in aquifers).

Hydrology: The scientific study of the movement, distribution, and quality of water on Earth and other planets, including the hydrologic cycle, water resources, and environmental watershed sustainability.

Nutrient pollution: A form of water pollution referring to contamination by excessive inputs of nutrients, usually nitrogen or phosphorus, that stimulate algal growth. Sources of nutrient pollution include surface runoff from farm fields and pastures, discharges from septic tanks and feedlots, and emissions from combustion.

Pathogen: In the oldest and broadest sense, anything that can produce disease. Typically the term is used to describe an infectious agent such as a virus, bacterium, prion, fungus, or even another micro-organism.

Point/ nonpoint source: A point source of pollution is a single identifiable source of air, water, thermal, noise or light pollution (such as a smokestack or wastewater treatment plant). Non-point source pollution affects a water body from sources such as polluted runoff from agricultural areas draining into a river, or wind-borne debris blowing out to sea. Although these pollutants have originated from a point source, the long-range transport ability and multiple sources make them a non-point source of pollution.

Potable water: Water that is safe to drink or to use for food preparation.

Recharge: Groundwater recharge is a hydrologic process where water moves (i.e., is restored) to groundwater. Surface water recharge is a hydrologic process where water runs off to surface watercourses.

Riparian zone: The interface between land and a river or stream.

Rotavirus: The most common cause of diarrhoeal disease among infants and young children. Nearly every child in the world is infected with rotavirus at least once by the age of five. Immunity develops with each infection, so subsequent infections are less severe; adults are rarely affected.

Sediment: Any naturally occurring material that is broken down by processes of weathering and erosion, and is subsequently transported by the action of wind, water, or ice, and/or by the force of gravity acting on the particles. For example, sand and silt can be carried in suspension in river water and on reaching the sea be deposited by sedimentation and may eventually become sandstone and siltstone (sedimentary rocks).

Surface water: Surface water is water on the surface of the planet such as in a river, lake, wetland, or ocean. It can be contrasted with groundwater and atmospheric water.

Tile drainage: In agriculture, a type of drainage system that removes excess water from soil below the surface. Whereas irrigation is the practice of adding additional water when the soil is naturally too dry, tile drainage brings soil moisture levels down for optimal crop growth. Too much subsurface water can prevent root development and inhibit the growth of crops. Too much water also can limit access to the land, particularly by farm machinery.

Tillage: The agricultural preparation of soil for growing crops by mechanical agitation of various types, such as digging, stirring, and overturning.

Trophic: Describing the relationships between the feeding habits of organisms in a food chain.

Vernal pond: A temporary pool of water that provides habitat for distinctive plants and animals. Such ponds are considered to be a distinctive type of wetland usually devoid of fish, and thus allow the safe development of natal amphibian and insect species unable to withstand competition or predation by fish.

Watershed: Drainage divide; the line that separates neighboring drainage basins (areas of land where surface water converges).
Managing Fish Populations in the GREAT LAKES

By Linda Chapel Jackson

Brian Roth, associate professor in MSU’s Department of Fisheries and Wildlife, is a nonnative species, at least as far as the Great Lakes are concerned. However, he grew up in a watery place (Seattle), and has a lot of childhood memories of fishing excursions to Lake Washington, a large, deep lake that borders Seattle’s eastside.

Roth’s lifelong interest in lakes and fishing sparked his pursuit of an academic career in fish ecology and a new partnership with the Michigan Department of Natural Resources (MDNR) to study nearshore fish communities in the Great Lakes. The nearshore is a poorly understood component of the lakes.

“The Great Lakes, especially Huron, have undergone dramatic changes in the past 10 years,” said Roth. “We’ve seen the collapse of two species, alewife and salmon, that were major economic drivers for more than 30 years, from the establishment of invasive species.”

Roth explained that the alewife, a fish related to the herring family, invaded the upper Great Lakes back around the 1920s from Lake Ontario. “But they had so few predators they became a nuisance,” said Roth. “They were dying en masse on beaches.” So in the 1960s the MDNR stocked two species of Pacific salmon—Coho and Chinook—in the lakes, hoping that the salmon would keep the alewife population in line as well as offer a new option for recreational fishing.

This plan worked nicely until the 2000s. The salmon ate the alewives, and the fishing community loved the salmon. “Then zebra and quagga mussels came along,” said Roth. “We’re still trying to figure out why they had such a negative effect on the alewives.” The zebra and quagga mussels decreased the food available to the alewives, which was most likely a factor in the collapse of the alewife population in Lake Huron. The Chinook salmon, which depended on the alewives as their food source, soon followed.

With the decline of the offshore fish populations—the alewife and salmon—more attention is being focused on nearshore communities, which had not previously been studied intensively. “That’s where I come in,” said Roth. “The MDNR does routine fish monitoring across the Great Lakes, but they operate only four Great Lakes field stations, which work somewhat independently based on various practical and logistic issues. My role is to bring these field station datasets together. We don’t yet have a good idea how much fish communities differ across the lakes, or whether they are being affected in the same ways by stressors. Cross-lake comparisons will definitely improve our ability to prioritize management actions.”

Two of Roth’s colleagues at MDNR, Dave Clapp at the Charlevoix field station and Gary Whelan, program manager of the Fisheries Division, agreed that university/agency collaborations add significant value to existing long-term surveys. “Michigan State University researchers have been great partners with the Fisheries Division for many years, and Brian’s lab continues in that tradition,” said Clapp.

Nearshore data are becoming more important to recreational fisheries for walleye and bass as these populations increase and expand. These nearshore species are taking advantage of another species invasion, the round goby, which provides food for them. The same strategy that worked earlier for the alewife and salmon applies. The walleye and bass eat the gobies, and in turn are caught and consumed themselves—a solution that is fine for now, but as a major shipping area that sees all sorts of fishy “stowaways” arriving all the time, the lakes need constant monitoring for new invaders and constant rebalancing.

“My project is looking at the field station datasets over time and space,” said Roth. “We are beginning to see trends from the analysis. William Fetzer, my former research associate, went to the field stations to discuss their data. He and the MDNR partners did the data analyses. The field stations have a lot of expertise for what they do at their own station. What MSU is able to do is large holistic analyses on underused datasets, put them together quantitatively, and develop new insights for fisheries managers. It is a true joint effort.”

Over the past five years Roth’s team has found that most places in Lake Michigan are trending toward a suite of fish that are comfortable in warmer water. Fish that tolerate the higher temperatures better also
seem to manage pollution such as phosphates better. “It was a surprise,” said Roth.

Other lakes are showing more mixed communities of fish based on preferred temperature. “Even Lake Michigan is different between the east coast bays and the open water areas,” said Roth. “The lakes all have different fish communities, which is interesting given the pool of species. Yellow perch turns out to be a bay fish. We thought there would be more of them in open water, but they’re not.”

One bit of good news: The Great Lakes seem to be unique in terms of climate change. “There’s so much cold water!” said Roth. “Even with extensive warming there’s still a lot of cold water habitat offshore. But we’re not always seeing similar fish in similar climates—which raises more questions than it answers. Our developing partnership with MDNR is needed to get more data, interpret trends, and provide new information for fisheries managers. And we’re still working on how to integrate this information into management actions. There are a lot of unknowns.”

BRIAN M. ROTH
Associate Professor
Department of Fisheries and Wildlife
College of Agriculture and Natural Resources

The project with MDNR was a great opportunity. It helped me land my current position. I came from a traditional academic background. To be able to tap into DNR institutional knowledge and observe their discussions prepared me for some of the challenges I now face working for a management agency. In the academy that link is weak. With the MDNR project I learned how things work on the ground and the challenges of working on such a large scale, where multiple jurisdictions work together to manage one resource.

The project continues to help me, largely because of my continuing relationships with MDNR people. They have been helpful in transitioning to my new job. Whenever I need to ask questions I feel comfortable because I already know them. These connections are probably the most beneficial thing that came out of the project for me.

At the beginning of the project, MDNR didn’t have a very good sense of what was happening in the nearshore at the broad spatial scale since most analyses focused on a specific area. But it turned out they were actually getting pretty good coverage. MDNR’s coverage is amazing. We found very few major knowledge gaps in terms of assessing trends. They also do a great job of maintaining consistent sampling protocols across time. Through these continuous data sets, we can better assess the environmental drivers of fish community change, without the complications of inconsistent survey designs.

This work has great potential for future applications. We sent data from across the state to the UM/MDNR Institute for Fisheries Research in Ann Arbor. Our data will be integrated into data from across the basin. The next step is to look at how environmental conditions interact with ecological perturbations to drive fish productivity and resilience. It will be interesting to see what additional questions this effort can help answer.

WILLIAM W. FETZER
Former postdoctoral research associate in Brian Roth’s lab
Now a fisheries biologist at Wisconsin Department of Natural Resources
“We are not willing to just be researched and examined. We are wanting to be engaged.”

This statement by Monica Lewis-Patrick, co-founder, president, and CEO of the community activist organization, We the People of Detroit, expresses both challenge and hope. The challenge is around real and difficult issues, such as access to affordable, quality water in the city; the hope is expressed in the engagement that is happening around these issues. Jennifer Carrera, Jade Mitchell, and Lucero Radonic form a team of MSU researchers who are engaging with We the People of Detroit and communities in Detroit to address the issue of water quality as it relates to affordability in Detroit, where aging infrastructure, declining population, and rising costs have led to thousands of water shutoffs in the city.

“You've got aging infrastructure in the home; you've got aging infrastructure in the distribution system, and you have tens of thousands of water shutoffs every year in the City of Detroit—plus you have an infrastructure that's built for at least twice the population that's currently there,” said Carrera. “All of those factors together lead to the possibility that water quality at the point of use is not what we think it is. It doesn't mean that's what we're predicting. We're just asking the question: What is this relationship?”

According to Mitchell, this is a long-term problem and Detroit is not alone in it. “From a scientific perspective, this is an ongoing problem,” she said. “The EPA put out a request for proposals and announced it as a national priority. It's definitely bigger than Detroit, but in Detroit, because there were thousands of shutoffs, no one was really looking at what that is doing to the system. It's not designed for that. It doesn’t just affect the households where water is shut off; it affects the entire neighborhood, and really the entire system.”

Collaborating with Community Stakeholders

We the People of Detroit Community Research Collective (WTP-CRC) is a collaboration of community activists, academics, researchers, and designers, producing research with and for the citizens of Detroit around the social consequences of austerity policies in Detroit, including policies that impact equitable access to water. “We sit on one fifth of the world’s fresh water,” said Lewis-Patrick. “Twenty-three percent of the commerce that comes into this country comes in by way of Detroit. So Detroit is a pinnacle part of whether this country is going to move forward or continue to move backwards. Our group was created to use science to serve the community and to be able to counter the narrative that it’s OK to deny people access to water.”

Lewis-Patrick met Carrera through the People’s Water Board. Dr. Carrera began engaging with the People’s Water Board in 2010 through her work in Detroit with the Michigan Welfare Rights Organization. “Dr. Carrera spent a length of time in Detroit, working on issues like welfare rights,” said Lewis-Patrick. “That’s key to highlight, that engagement with the community is something that has to be built and fostered and nurtured over time.” This previous engagement facilitated the connection of Carrera’s research at MSU with WTP-CRC’s work on water affordability in Detroit.
Water Testing Through the Lenses of Science and Social Concern

WTP-CRC’s work has four focus areas: water testing, story-telling and videography, door-to-door research, and mapping. The MSU team is collaborating with the collective to implement the water testing piece, looking at it from two angles: (1) How does water affordability affect water quality? and (2) How do communities use data and research to promote their own public health or political objectives?

The two-year project has two phases. The first phase involved creating a Community Advisory Board, made up of residents of Detroit, including members of We the People of Detroit. Then the MSU team worked with the Community Advisory Board to design the project, sampling strategy, and survey.

The next phase will involve sampling residents’ water for substances such as heavy metals, microorganisms, and disinfection by-products. To preserve anonymity, the MSU team does not go into the homes themselves to take the samples. “We’re working with the Community Advisory Board to train field workers to help the residents take their own samples and do some preliminary analysis in their households,” said Mitchell. This process also works towards a true citizen science approach. “Community members, via the Community Advisory Board, are engaged in the entire process. So even with developing the training protocols and what things we’re going to sample with, all of that is being developed with our community partners.”

Ensuring residents’ privacy is a key concern. “Should we identify problems with water quality in people’s homes that could present residents with new problems such as the potential for reduced housing values? We want to be able to provide residents with as much information as possible while making their individual results anonymous to the MSU research team. This presents some unique challenges for us in how best to collect data,” said Carrera. “We have residents taking pictures of their plumbing and some pictures of what their experience with the water shutoff has been and then narrating that on an audio recorder, but we do not have any direct link between the water quality data and the individual participants in order to protect their privacy.”

“Jennifer and her team are lending their expertise, guiding and consulting with us on it,” said Lewis-Patrick, “but the concept and the implementation is a community project. And so the community will be testing their water and learning how to read the data, and the community will be presenting the data, not only to others in the community, but we hope, to legislators, to lawyers, and in whatever area we can re-garner power and take back control.”

The project is not without challenges, especially with timing and logistics. The sampling needs to happen in homes where the water is being restored after a previous shutoff. It also needs to happen in warm weather so that the pipes aren’t frozen, which would throw off the chemistry. “Logistically, this type of project is not easy because we have to time it perfectly,” explained Mitchell. “Somebody has to be engaged with the community all the time. So there’s a couple different layers of logistical planning.”

At a later stage, the MSU team will do follow-up engagement with community members and the Community Advisory Board to talk about what the results mean and how they can enhance their ability to present the data, not only to others in the community, but we hope, to legislators, to lawyers, and in whatever area we can re-garner power and take back control.”
Aging infrastructure in cities like Detroit can impact access to quality water.

Thinking about water

ACCESS TO QUALITY WATER IN DETROIT

Aging infrastructure in cities like Detroit can impact access to quality water.

One of Lewis-Patrick’s colleagues, Sharon (Shea) Howell, a faculty member at Oakland University, acknowledges how important this kind of engagement is for the University and appreciates MSU’s contribution to the effort. “I think one of the benefits of community engagement for the University is to recognize that people are smarter than they have thought, to recognize that there are questions that are important that they haven’t asked, and that there are ways of educating beyond the classroom. In my experience in Detroit, MSU has been a leader in helping solve community problems. I think that through this, the University has the opportunity to spearhead national policy around water, both in terms of the science of pure water, and the sociological aspect of water as a human right.”

Following her partners’ lead in this community-based participatory action research project has been rewarding for Carrera. “It’s a scary process for a researcher to really let go control of the project,” she said. “But it’s been really interesting to see how the Community Advisory Board is envisioning this as being something useful to them, and how they think that information can be applicable to the community as a whole. We would never be able to provide that as researchers. Just to see them excited about it and listen to them and listen to their direction has been a great process.”

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For We the People of Detroit, this knowledge is power. “The biggest objective is to educate the community,” said Lewis-Patrick, “and to work with the community to build collective power around affordable water.”

Important Benefits for the University and the Community

Carrera points out that the project is important, regardless of the findings. “I’m not hoping to find that the water’s contaminated,” she stressed. “That’s not a kind of thing you hope for. It could be that we end up finding nothing, and that’s good news. As researchers we will learn about the process of collecting water quality data in partnership with the community and the community will learn that their water quality is something they can have confidence in, which is really important right now given the uncertainty around water quality and official sources of information in the State of Michigan at this time. If we do find contaminants, then that’s really important too. It’s important for residents; it’s important for activists; it’s important for the water departments to know if there are problems that need to be addressed. So either way, I see good things coming out of the actual data that we find.”

For We the People of Detroit, this knowledge is power. “The biggest objective is to educate the community,” said Lewis-Patrick, “and to work with the community to build collective power around affordable water.”
Water Moves MSU

The Intersection of Science, Artistic Expression, and Community

Water impacts health, agriculture, weather, transportation, recreation, and economic sustainability. It shapes the physical world around us just as it shapes humanity. Now MSU’s Cultural Engagement Council (CEC) is creating a dynamic endeavor that highlights the ways that water—in all of its forms—inspires, motivates, and affects our world.

Water Moves MSU will encourage University-wide engagement in artistic expression, cultural awareness, and scientific discovery related to water during the 2016-2017 academic year and beyond. It will also offer opportunities for university-community connections that focus on education, empowerment, understanding, awareness, and civic involvement.

Beginning with an October reception, Water Moves MSU will offer an expansive selection of university-community centered opportunities for people of all ages. Join in to discover more about how the most vital liquid on Earth can inspire creativity, innovation, and imagination.

More information at watermoves.msu.edu

ABOUT THE CULTURAL ENGAGEMENT COUNCIL

The CEC aims to create an inclusive space for envisioning and critically discussing new ways in which MSU and its surrounding community can engage in arts and cultural programs on and off campus. Since its formation in 2007, the CEC has supported and encouraged connections that integrate MSU’s arts and cultural resources while broadening community awareness.

Water Moves MSU is the latest initiative undertaken by this collaborative group.

During the Year of Arts and Culture in 2007-2008, the newly formed CEC worked with deans, directors, faculty, staff, students, and local stakeholders to gather and share their activities with a wider audience.

In 2015-2016 the CEC supported the China Experience, an 18-month thematic period that focused on the arts and culture of the world’s most populous country. One signature event included a halftime show performed during the MSU versus Maryland football game in November 2015, where MSU students joined the Spartan Marching Band to unite art and entertainment with Chinese folk and classical traditions.

These projects serve as examples of how campus-based networks boost community access and involvement with the University’s cultural resources.
At 260 miles, the Grand River is Michigan’s longest river. Its major and minor tributaries, including the Red Cedar River, which flows through the MSU campus, offer ample opportunity for learning about Michigan’s watersheds. Shari Dann serves as principal investigator for the GRAND (Grand River And Nature Discovery) Learning Network, one of nine hubs supported by the Great Lakes Stewardship Initiative. The initiative uses place-based education to give youth, teachers, and communities in Michigan opportunities to learn about and appreciate local natural resources. The GRAND Learning Network focuses its stewardship on the middle Grand River watershed region surrounding greater Lansing.

"Through place-based stewardship education," said Dann, "we come together and do all sorts of professional development, and we support networks and teacher leadership development. These Teacher Leaders then carry out educational experiences for their students that partner their schools with various communities. It gives an opportunity to use assets that are already here—assets that can be rejuvenated, lifted up, and celebrated to develop a sense of place."

Working with Local Schools

Six school districts were selected to participate in the GRAND Learning Network (Lansing, Bath, Holt, Haslett, Dewitt, and Laingsburg), based on their location near headwater regions of the Grand River watershed and near the Middle Grand River.

Wexford Montessori Academy is a Lansing Public Schools K-8 magnet school located near the Grand River. Wexford’s property contains several natural areas, including a woodlot and a vernal pond, and teacher Kristan Small uses these natural areas to involve her students in nature-based stewardship projects and experiences.

To get some ideas for their projects, she and her students visited several natural places on MSU’s campus, such as the Baker Woodlot, the Landscape Arboretum, and the 4-H Children’s Garden. Students took notes in their nature journals, so they could begin planning and mapping their projects. Sixth grader Derek Miller really enjoyed the Children’s Garden. “It’s fun! There’s a lot of natural stuff for animals to live there and have a shelter,” he said.

Small is enthusiastic about the opportunity to expand her students’ appreciation for Michigan’s resources. Even little moments make lasting impressions.

“The ‘Oh my gosh! It’s so great!’ moment happens when all of a sudden a frog jumps, and they gasp and stare, and that’s their moment,” said Small. “They may act like they don’t remember or it’s no big deal. But later I find it in their writing, so I know it’s making an impression. As long as it’s planting those kinds of platforms for what they’ll seek later, we’ve done our work.”

Dann works closely with Mark Stephens, education program coordinator of MSU’s Project FISH (Friends Involved in Sportfishing Heritage), and Margaret Holtschlag, former K-12 educator and creator of the BIG Lesson Programs, to enlist, train, and support a cadre of community and educational partners throughout the Grand River Watershed area.

“The thing is, in order for kids to really appreciate nature, they have to experience it not just once but multiple times, and that’s what we focus on. We try to give teachers as many opportunities to get the
kids outdoors as possible,” said Stephens. “Wexford is one of those schools. We did ice fishing with them; they did a wildlife planting a couple of times in Lansing, they’ve gone to Annie’s BIG Nature Lesson for five years, and they have that backyard habitat that they’re working on. So they’re doing a lot of cool things over there.”

Providing Hands-On Experiences

The team does a lot of hands-on training with teachers, coordinating activities and connecting them with community partners. For example, during a recent professional development institute, they took teachers on a bicycle tour of the River Trail in Lansing in which teachers learned about unique geologic formations, plant and animal life, and improvements by the City of Lansing for the betterment of the community. “We also did a rafting experience to see what the river looks like from the river—for example, the Red Cedar, where it connects to the Grand River and then all the way downtown,” said Stephens. “Those are the kinds of things that give them a hands-on experience. The teachers take that back into the classroom and use that training. And if they’re really excited, then we’ll work with them to find people that will help them even more.”

Holtenschlag is the director of the BIG Lesson programs, an immersion learning experience that provides teachers and students with week-long, interdisciplinary study trips using community resources as their classroom. Formerly a K-12 educator in the Haslett School District, Holtenschlag was recognized as Michigan’s State Teacher of the Year in 1999 and was a finalist for National Teacher of the Year. Teachers in 13 cities across Michigan participate in her BIG Lesson programs, such as the BIG Zoo Lesson, BIG History Lesson, BIG Science Lesson, and Annie’s BIG Nature Lesson. Some of the lessons are taught by experts in the community, such as Dr. Dann, which has helped connect the GRAND Learning Network with many mid-Michigan teachers and community partners.

“With the GRAND Learning Network, we have the wonderful opportunity to work with teachers who are already out there thinking about what they can do that enhances the current curriculum and helps their kids with being productive citizens as well,” said Holtenschlag. “This really is joyful work, because when we get to work with teachers, we know that we’re making a difference with individual teachers who are already giving so much and who are so very dedicated to the field of education. But we also know that there’s this wonderful ripple effect that happens…the good work of this goes far beyond just the nature experience or the stewardship project. The good work really goes into the future.”

Scholarship and Training Enrich the Future of Watershed Education and Enjoyment

“Much of our foundational professional development now is taught by some of these Teacher Leaders,” said Dann. “So they will actually teach the lessons—for example, what is a vernal pond? And here’s how you can do stewardship around it. They desperately want to advance education, so this gives them a positive outlet to do that, that’s community engaged.”

The scholarship underpinning the work of the GRAND Learning Network has been shared in many research- and practice-oriented venues. According to Dann, presentations made at the North American Association for Environmental Education have focused on the use of reflection in stewardship and place-based education, as well as on the scholarship supporting the development of Teacher Leaders. In addition, Dr. Dann regularly describes the GRAND Learning Network as part of University Outreach and Engagement’s Graduate Certification in Community Engagement. Kristan Small and Cammie Jones, a colleague from DeWitt, have also authored scholarly case studies for publication highlighting the key tenets of engaged scholarship for watershed stewardship involving students.

“This work of the partnering co-leaders—myself, Margaret Holtenschlag, and Mark Stephens—and the diverse communities engaged in long-term meaningful partnerships that generate stewardship—all of this scholarly approach has greatly enriched place-based education in the watershed,” said Dann.

“Throughout all of the work that we do,” she said, “we use an assets-based approach to place-based education and community engagement. The big vision is about community appreciation, that there are these treasures right here that the students, neighbors, and neighboring partners can lift up as wonderful assets.”

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FOR MORE INFORMATION VISIT:

BIG Lesson Programs ........................................ biglesson.org
GRAND Learning Network .......................... grandlearningnetwork.org
Great Lakes Stewardship Initiative ... glstewardship.org
Project FISH (Friends Involved in Sportfishing Heritage) ......................... projectfish.org
Measuring Effects of Fracking

By Matt Forster

The mission of the Anglers of the Au Sable is to “preserve, protect, and enhance the Au Sable River System for future generations.” In 2008, the organization approached Dave Hyndman, professor and chair of MSU’s Department of Geological Sciences, to find a way to measure whether fracking in northern Michigan was having an effect on the Au Sable and Manistee rivers.

One of the group’s concerns was that fracking might introduce contaminants into these river systems. Michigan, however, has tougher fracking regulations than many states, and Hyndman thought fracking might be having a different kind of effect on the rivers.

“The biggest issue is likely associated with withdrawals, because fracking operations can pump over a million gallons of water for a particular frack,” he said. “They are often right in the headwaters of the watershed and are pulling the water from the groundwater, but it’s connected to surface water.”

So the Anglers of the Au Sable and Hyndman made the decision to install stream gauges to measure stream flow and gather a longer-term data set. Thirty-nine gauges were placed in the headwaters of the Au Sable and Manistee, rather than measuring the rivers more directly downstream. “Most of the existing gauges are placed by the U.S. Geological Survey in partnership with cities or other agencies, like the Department of Transportation, who care about large flows,” Hyndman said. “If you go far downstream, you’re less sensitive to changes associated with human activities.

There you have a lot of flow, and the change might be very small.” Collecting data from areas with less flow means researchers can record subtler changes.

Gathering this data fills a more general need for information about headwaters. According to Hyndman, there are very few stream gauges in headwaters across the country. “Having gauges up in headwater areas helps us understand the effects of climate change, land use change, and human modification of systems on streamflows,” he said.

Hyndman has been measuring stream flow since eighth grade, when a school science project had him out measuring a creek near his hometown of Missoula, Montana. “It was a good year to do it because there was a 100-year flood that year,” he said. “This tiny little stream turned into something 25 feet deep, allowing me to study all kinds of issues.” He continued to monitor water flow after that, and through that experience he was invited to the Intel Science Talent Search, which was an important step toward his eventual career path.

Tom Baird is president of the Anglers of the Au Sable. The group partnered with Hyndman because, in Baird’s words, “We needed a ‘high end’ hydrogeologist with university backing for this project, who had background in this type of work and experience in northwest Michigan.” When Hyndman analyzed stream gauge data from the Au Sable–Manistee headwaters, relative to when a fracking event occurred, he did find evidence that at least one particular event affected water flow. “I talked to the state about it,” he said. Hyndman believed that the state planned to pursue a conversation with the people involved with the fracking project.
Measuring Effects of Fracking in Northern Michigan Rivers

In addition to the water flow monitoring, Hyndman’s team has also done some limited monitoring of water quality in the system, just to be sure that fracking activities in the area aren’t having a significant impact. And, according to Hyndman, they’ve done a lot of work across Michigan’s Lower Peninsula looking at water quality, trying to tie that back to human activities, including septic systems.

Though the initial research stage of the project has concluded, the gauges are still generating data. For the Anglers of the Au Sable, this gives the organization a tool, a way to let corporations know that someone is monitoring the rivers, that data are being recorded.

Graduate and undergraduate students help monitor the stream gauges and collect the data. They also analyze the data and write it up. “Students get an understanding of how hydrologic systems work,” Hyndman said. “They get an understanding of how water flows through the system, and how humans impact those flows.”

For Hyndman, the data are helping answer those larger questions about climate change and human impacts. For example, the State of Michigan has a system for monitoring large water withdrawals. A permit is required for any withdrawal over two million gallons per day. The permit is intended to “manage, protect, and conserve the waters of the state for the public trust, interest, and riparian rights.”

“We’re collecting the data that can feed into their system,” Hyndman said. “The system that the state uses is a statistical method to estimate the impacts of pumping across the state, but it can’t do very well without streamflow data from headwaters.”

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A sampling site on the Manistee River.
WHAT MOTIVATES CONSERVATION in Areas of Abundance?

By Matt Forster

“When the well’s dry, we know the worth of water.” —Poor Richard’s Almanack, 1746

In the summer of 2015 the drought in California entered its fourth year. It’s not the state’s first drought—water has been scarce in California for decades—and, as a result, the average Californian is motivated to conserve water. But what motivates people to conserve in parts of the country where there is an abundance of water? Why do people in Michigan, let’s say, work toward lowering their water usage?

This is the question being asked by the Abundant Resources Research Group (ARRG) at Michigan State University. Coming from a range of disciplines, the ARRG’s four faculty researchers—Adam Zwickle, Joe Hamm, Sara Fingal, and Bruno Takahashi—are contributing their expertise to researching these motivations.

According to Adam Zwickle, “When it comes to resource management, all the focus has understandably been on areas of scarce resources.” With its focus on areas of abundance, the team’s research is exploring new territory.

“When you think about sustainability from a big picture—planetary or continental—perspective, this is a closed system. So conserving water in the Great Lakes is not directly impacting, let’s say, the Central Valley in California, but it’s still good.”

Pilot Study

The first step for the team was to develop a proof-of-concept study. For this, they interviewed facility managers on the campus of Michigan State University. Since water is a relatively cheap resource on campus and there is no shortage of supply, the team wanted to know what motivated these individuals to make decisions to conserve water. The interviews were conducted and analyzed by Media and Information doctoral student Kristen Lynch, who presented a poster on the research in 2015 at the annual Environmental Science and Policy Program Research Symposium.

The research identified four main areas of motivation. The first two areas were expected. Managers felt they had an economic responsibility to conserve as well as a mandate from the University. “The other two had nothing to do with Michigan State University, nothing to do with dollars and cents, nothing to do with job description,” Zwickle said. “It had to do with experiences they had on rivers and lakes as children in Michigan and thinking ahead and wanting their own children to have similar experiences with water in the future.”

The Office of the Great Lakes and the Water Heritage Project

Jon Allan is the director of the Michigan Department of Environmental Quality’s (MDEQ) Office of the Great Lakes. The office is releasing the final version of its comprehensive water strategy, which lays out a 30-year plan for managing this critical resource in Michigan. In creating the report, Sustaining Michigan’s Water Heritage: A Strategy for the Next Generation, the project team at the Office of the Great Lakes talked with residents around the state and asked them what they valued about the Great Lakes. These interviews were documented in the report, but the transcripts have not undergone close analysis.

“The MDEQ has a lot of data, all these transcripts,” said Zwickle, who got in touch with Allan after hearing the director speak on Michigan Radio. “We thought this would be a great way to expand the research. It is secondary data, so there are some issues—we didn’t write the questions—but we analyzed all that data and are already finding similarities with the pilot study conclusions.”

The interdisciplinary make-up of ARRG means that each member of the team not only brings specific expertise, but uniquely benefits from participation. Sara Fingal approaches this research as an environmental historian. She has been working with a graduate student on the Water Heritage project and had several meetings with members of the MDEQ. “These interviews revealed concerns about water diversion from the Great Lakes and the conservation of local and state resources for recreation and drinking water,” she said. “I’m getting critical insight into how ideas about water in the Great Lakes region have changed over time and the concerns that have persisted over multiple generations.”

Director Allan, for his part, is happy to have the team working with his office. “Their work is very complementary to our own,” Allan said. “By applying content analysis, they are identifying the language people use to talk about these issues, which tells us how they think about these issues as well.”

“We like the way they come at this, under the lens of abundance,” he said. “The solution sets you have in areas of scarcity—the politics of scarcity—don’t apply when you live in areas of abundance. The team is helping us develop different solution sets.”
Perception Is Everything

As the team looks at how people make decisions about resource allocation from a perspective of abundance or scarcity, how people perceive abundance and scarcity becomes important, explained Joe Hamm. “Some of that will be driven by whether the resource itself is abundant or scarce, but we also know that people can look at the same body of water and see it as relatively abundant or scarce as a function of, for example, the use they have in mind for the water or the metric by which they determine scarcity.”

With that in mind, ARRG is also working with water user groups. This work is being led by Brockton Feltman, a graduate student in MSU’s Community Sustainability program.

“The water user groups that I am studying are a product of Michigan’s adoption of the Great Lakes – St. Lawrence Compact,” Feltman said. “The Compact places minimum flow standards on Michigan waterbodies and recognizes the right for water permit holders and local government officials to collectively design allocation behaviors for satisfying demands while meeting environmental standards. This is basically collaborative governance within watersheds, introducing a degree of authority decentralization that helps ensure rules can be made more congruent with local realities while still meeting other Michigan water laws.”

Feltman is interviewing farmers. “My research centers on the question: What social-ecological variables do Michigan farmers believe to be indicators of water availability?” he said.

It’s an important question. As Feltman explained, “Literature on collaborative governance finds that the likelihood of participants cooperating is the degree to which members share similar beliefs about how water availability should be measured.”

A WaterCube Story

The ARRG team came together under the MSU WaterCube initiative, a unique funding model that promotes interdisciplinary research around water. Unlike grant-funded research, which requires a fully fleshed out proposal, the WaterCube gives its teams more autonomy, allowing them to take an idea and determine how they will approach it as they go.

The program works like this: Faculty members apply to their dean for a token, which represents $20,000 in research spending over two years. Half of each token is funded by the Environmental Science and Policy Program, the other half is funded through the colleges using a flexible funding mechanism. Three or more collaborators with tokens then come together to create a WaterCube team—they call this cubation. Each team must include members of at least two colleges, and one member of the team should be a new partner.

Each member of ARRG brings something unique to the work. Joe Hamm explained, “The reason we identified the team we have is that each of our areas is one we expect to be important for abundant resource management.” In Hamm’s case, he has spent time researching trust. “Trust tends to be predictive of voluntary behavior,” he said. “Historically, this has been done in the scarce resource context where institutions ask people to voluntarily act to prevent scarcity issues but there is good reason to believe that trust would be important in an abundant context.”

One of the four cube members, Bruno Takahashi, summed up the value that comes from the WaterCube approach: “I am a researcher of environmental communication, including the role of journalists. I was trained as an environmental social scientist, so I feel comfortable working with the other members of the cube. I am definitely learning more about the integration of multiple perspectives, especially from a humanities perspective, something that I haven’t been really exposed to in the past.”

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For this issue of The Engaged Scholar Magazine, MSU’s Institute of Water Research hosted a roundtable discussion. Five senior scholars and practitioners weighed in with their thoughts and ideas about where to go from here and what role Michigan State University might play, now and in the future.

PARTICIPANTS

Jon Allan
Director, Office of the Great Lakes
Michigan Department of Environmental Quality

Jeremiah Asher
Director, Information/Decision Support Technology
MSU Institute of Water Research

Tim Boring
Vice President, Michigan Agri-Business Association

Jon Allan has a background in fisheries, wildlife, and the aquatic sciences and has several decades of experience in environmental policy and law. He is working on the strategic plan for Michigan’s water resources for the next 30 years.

Jeremiah Asher has a background in project management, computer consulting, community information system development, natural resource management, and watershed analysis. He is responsible for IWR’s information systems and web based tools.

Tim Boring has worked with IWR and the Nature Conservancy on farm practices and modeling to calculate impacts of various solutions to agricultural runoff.

Moderator: What are the primary challenges of water management in Michigan today?

Brush: I would say source water protection in terms of drinking water, groundwater, and surface water. Those are certainly front and center. There’s also public education around those areas, and how we engage the larger community. It’s not just a role for institutions and governments. Certainly we can’t not talk about the Flint water crisis and the wealth divisions that are at play in that situation. In the work that I’m engaged in with ecosystem restoration, invasive species in the Great Lakes are a big concern as well.

Allan: First, nonpoint source nutrient enrichment is a huge issue, not just for the Great Lakes but everywhere across the country. Second, it’s more than just invasive species, it’s about biological pollution. It’s a systems level problem that’s ripping apart food webs and what we have historically held as our water resources. Third, the inexorable and increasing utilization of groundwater will also create tensions—ecological, social, cultural, economic—that we haven’t seen in this region of perceived abundance, ever.

Lusch: Another issue in the groundwater realm is the limitation of potable groundwater through natural contamination, such as arsenic, chlorides, and other dissolved solids that are not associated with anthropogenic impacts. In certain parts of Michigan, especially the lowland areas in southern Lower Michigan, communities are getting stressed from both sides. One limitation is how much water is available to be extracted and the other limitation is how potable that water is (i.e., its natural quality).

Asher: Some challenges come in the diverse use of water. Different groups value water in different ways and that poses difficult management issues.

Allan: Right. And a thoughtful, usable flow of information that supports those insights and decision making is lacking, especially on the groundwater side.

Moderator: Is there any one most pressing issue?

Boring: Within our organization it’s nutrient management for protection of surface waters. We’re also working on responsible use of groundwater for irrigation, but the overwhelming issue for us is nutrient management, specifically phosphorus but nitrogen as well, based on the importance of that nationally.

Allan: I’ll agree but broaden it a little bit and talk about hydrologic management. Nutrient management is a piece of managing water as it flows through and across the landscape. How do you do it in the urban environment, storm water, peak flow, green infrastructure, and rural environments? How do you reconnect streams for biological connectivity that not only protects them against invasives but helps maintain healthy populations?

Brush: We as humans on this planet have made decisions about and taken action on improving the quality of life for all of us. And we’ve also started to realize there are negative impacts to our environment as a result. So now how do we understand and mitigate that? How do we use green infrastructure and nature’s solutions for our urban areas? We need to understand how we put nutrients on the land and the impact it has on our streams, lakes, and oceans.

Asher: The movement of water is the driving factor of all of these other things, the nutrients and the stream temperatures, and everything that drives these factors is related to how we change the landscape either through tile drainage systems or urban impervious surfaces—that all impact the hydrology.
Five senior scholars and practitioners weighed in with their thoughts and ideas about where to go from here and what role Michigan State University might play, now and in the future.

For this issue of **ROUNDTABLE DISCUSSION** The Engaged Scholar Magazine, MSU’s Institute of Water Research hosted a roundtable discussion about the challenges of managing water systems in and around the Great Lakes region.

**Lusch**: For me the number one issue is ensuring safe drinking water. If you can’t drink the water, you can’t farm, you can’t recreate, you can’t do anything. People are under the opinion that if we contaminate one aquifer we’ll just go to the next one and the next one, and this can go on forever. And that’s simply not true. As the people of Toledo, and before that Cleveland, found out, even if you’re getting your drinking water from the Great Lakes we have now jerked the ecosystem around so much that we’re impacting surface water intakes in what had been perceived as the last great bastion of drinkable water on the planet.

**Allan**: We call it the culture of the disposability of water and we’ve lived in this culture—use it, throw it away, go get new—for centuries. That’s over, even in our abundant region. And people have got to get over it.

**Moderator**: **What role does the MSU Institute of Water Research play in helping your organization solve critical concerns?**

**Boring**: We work to position ourselves on the leading edge of issues and to offer support to our members to address those issues. Our crop adviser members inherently have limited capacity to address every issue, so how do you prioritize those things? And what are the steps we need to take today with an eye on how issues will evolve over the span of decades? But it’s also having specific action items that we can be working with and communicating today—developing computer tools for better informed decision making, networking with others to make sure that we’re plugged in to that broader community and are hearing all the things we need to be hearing. IWR has been a great partner with us in all of those steps.

**Brush**: It’s an amazing privilege to work with IWR. I think back to our two-decades-ago work on groundwater and drinking water protection, and IWR providing critical scientific information and a sounding board for all of the practices.
ROUNDTABLE DISCUSSION

that we put in place, to our current work in terms of nutrient management—how to reduce nutrient loads from agricultural practices in farm fields—and IWR providing the online tools, the information systems, to make that information readily accessible, and providing more than just what’s available off the shelf in terms of scientific information. Really diving deep into what is happening on the ground.

Allan: I’m reflecting on the same theme in a slightly different way. One is as a connecting node to a really big body of research here at the University and the ability to pull that into practical terms. It’s hard for a lot of our practitioners and departments to penetrate, so we need these transboundary organizations to do that. That’s critical. Number two is, IWR does its own original synthesis thinking—not just each piece, but helping us integrate it into a cogent whole. The third part is the ability to reflect that back into usable tools and practical solutions. IWR is well positioned to do all three of those things.

Moderator: In turn, what contribution does your organization or agency make to the University’s processes and products? What do you provide?

Brush: We provide real world applications for what you all do. You’re providing the tools, the resources, the scientific knowledge, and we provide a channel for those to be applied and used.

Asher: In the same way, we operate as a boundary for the University and its partners to help transfer information and research to applications. Without the partners that are doing these activities, our work would be very limited. What the partnerships bring to us is connections with groups and issues that we can help develop new problems. Solving the water problems of the 21st century will not be done using 20th-century tools. We don’t live in a point-source world anymore. We’re living in a very distributed problem world, the problems of invasives, nutrients, groundwater, recharge—these are all distributed problems much harder than the point-source world and we don’t have the tools invented yet.

Lusch: Having facets of state government as long-term integral partners gives a public sounding board that IWR and MSU would not otherwise have. Long ago, I was taught that leadership can be defined as taking people where they don’t want to go. MDEQ’s work and the whole state effort to come out with a water strategy was a collaborative co-creation because of the many road miles Jon and his staff put on doing the public meetings for that. If that effort hadn’t gone on, this would not be a bottom-up issue. The leadership the state can provide is critical to allowing us to see some of the larger macro issues that communities have vocalized, and then work with our partners to bring it down to the tools that we need to develop in order to move forward on a particular issue.

ABOUT THE INSTITUTE OF WATER RESEARCH

MSU’s Institute of Water Research (IWR) is one of 54 federally designated water institutes created under the Water Resources Research Act of 1964 and administered by the U.S. Geological Survey (USGS). It also receives ongoing support from MSU AgBioResearch and Extension.

IWR co-creates solutions with partners to address critical concerns around water resources in the Great Lakes, using technology, research, and outreach to develop sound and practical applications to address needs in the Great Lakes basin. The Institute has many federal, state, and nonprofit partnerships and 75 percent of its work is regionally based. A concept of asset integration is often used, which involves joint funding of personnel to work between organizations.
The Nature Conservancy

By Linda Chapel Jackson

The Nature Conservancy is a global organization with a mission to “conserve the lands and waters on which all life depends.” The organization employs more than 600 scientists, works in 69 countries, and is on the Forbes list of 50 largest U.S. charities. The Conservancy is working in five strategic priority areas around the world: water, climate, land conservation, cities, and oceans.

The Nature Conservancy

Protecting nature. Preserving life.

The Conservancy’s Michigan chapter, located in Lansing, has a long history of partnering with MSU, completing approximately 15 projects in recent years. Currently, the Institute of Water Research (IWR) is a primary, multi-project partner. The partnership is focused on applying research and developing tools that facilitate conservation action in the field.

“We rely on MSU for technical expertise,” said Rich Bowman, director of government relations for the Conservancy in Michigan. “We have our own scientists on staff—at least half a dozen in Michigan—but the University is an important complement to that.”

“Our relationship with IWR started about 12 years ago,” said Bowman. “I was serving on the Michigan Groundwater Conservation Advisory Council. IWR was building the Water Withdrawal Assessment Tool (www.deq.state.mi.us/wwat) that the state now uses to assess the impact of high capacity water withdrawals.

I talked to [IWR director] Jon Bartholic about other tools they had in development and the result was a partnership project between IWR, the Conservancy, and Coca-Cola in the Paw Paw River watershed. The Paw Paw Recharge Calculator, developed as part of that project, allowed us to say to a farmer, ‘If you change your conservation practices, here’s how much recharge will happen.’

The science and strategic modeling have paid off in terms of information that is highly valued for decision-making and long-term planning. For example, said Bowman, “One conservation practice that’s gaining in popularity is cover crops. Cover crops do a lot, including keeping soil in place, sequestering nutrients, even sometimes helping control weeds in subsequent crops, but in the Paw Paw River watershed we discovered that tillage without cover crops has more recharge than it does with them, because the cover crops themselves utilize and transpire water. So if recharge was your only concern, you’d advise against cover crops, but there are so many other benefits in terms of soil health and nutrient and sediment management that we still advocate for using them in most situations.”

The Nature Conservancy and IWR now have a much larger project in the Saginaw Bay watershed, in partnership with the Michigan Agri-Business Association. “It’s the same type of work with growers, using IWR’s Great Lakes Watershed Management System (GLWMS) to help them put the right conservation practices on fields where the ecological returns will be greatest,” said Bowman. “We’re not the only ones using the GLWMS; it covers Saginaw Bay, western Lake Erie, Green Bay, Wisconsin, and the Genesee County watershed in upstate New York.”

When asked what the Conservancy is learning from these projects, Bowman said, “We’re learning how to make science relevant to people; the University is very good at that.” In turn, when asked what he thinks the University values about the partnership, he laughed and said, “They say we bring them tough problems to figure out.”

(continued on page 24)
The Nature Conservancy

Kari Marciniak, director of strategic communications for the Conservancy’s Michigan chapter, noted, “There’s also the translational benefit. The academic realm generates the science, the Conservancy identifies issues to be addressed in the field, and together we figure out how to best apply knowledge. Developing tools is one of the most effective ways we have found to disseminate that knowledge.”

Jeremiah Asher, director of information/decision support technology at IWR, said, “I would describe our relationship with the Nature Conservancy as very fruitful. We bring different skill sets to the table that together provide more effective solutions to support planning and conservation efforts in the Great Lakes Basin. What I value most about the Conservancy is their ability to further connect our work with groups like Coca-Cola, Michigan Agri-Business Association, Keurig, and others. These expanded connections help generate new ideas and ways to apply our tools and technologies, continually moving our work into new frontiers.”

The Conservancy continually tries to maintain the balance between making something simple and making it comprehensive. “Good scientists—including ours—want to consider all the variables and scenarios. Folks in the field want to answer a question efficiently and effectively,” said Marciniak. “It is important that we focus on the elements of a tool that will allow us to meet both needs.” Bowman and Marciniak both agreed that MSU has been helpful in developing this sort of strategic thinking.

A successful project is never guaranteed at the outset of a partnership effort. All partners need to be clear about the resources they can provide, fully commit to achieving the outcomes, and communicate openly throughout the project. “We have been able to bring significant resources to the table—we have had multiple contracts with MSU over the past five years—but success requires constant communication between both entities on each project,” said Marciniak.

Bowman’s parting advice for faculty members who are interested in partnering outside the University: “It’s an adage from St. Francis—Seek first to understand, then to be understood. To be a good partner, understand what your partners want out of the interaction.”

RICHARD BOWMAN
Director, Government Relations

KARI MARCINIAK
Director, Strategic Communications

THE NATURE CONSERVANCY
101 East Grand River Avenue
Lansing, MI 48906
(517) 881-2761
nature.org/michigan (local)
nature.org/ (global)

The world is a coupled system which we in IWR are trying to understand and contribute to by sharing knowledge. In the natural resource and food production arena, coupling with multiple partners is critical. Rich Bowman of the Nature Conservancy discusses the important concept of coupling with the IWR and groups such as the Michigan Agri-Business Association, farm organizations, and federal programs like the Natural Resource Conservation Service. The success of the Nature Conservancy’s many efforts—for example with IWR—is indicative of our collective ability to establish strong partnerships for strengthening the enhancement and sustainability of the natural resource and food production system. The partnering process results in a win-win situation for the Conservancy, its partners, producers, and our vitally important natural resources. Progress happens when we all work together!

JON BARTHOLIC
DIRECTOR, MSU INSTITUTE OF WATER RESEARCH
The 2016 Community Engagement Scholarship Award honors Adesuwa Olomu, professor of medicine, MSU, and the Ingham County Health Department, represented by Linda S. Vail, health officer, in their efforts to bridge the medical care gap for minority and low-income populations in the Lansing community. The partnership aims to translate research into practice in cardiovascular care for these vulnerable populations, with the goal of decreasing the burden of cardiovascular disease and death.

The innovative Office Guidelines Applied to Practice (Office-GAP) program was designed to activate and engage patients and improve prevention of cardiovascular disease for vulnerable populations in outpatient settings through the use of evidence-based medication protocols and lifestyle changes. With funding from the Blue Cross Blue Shield of Michigan Foundation and the Agency for Healthcare Research and Quality, the partnership enrolled more than 800 patients in the program from 2010 to 2015; additionally, more than 595 patients attended the educational group visits and made follow-up appointments with their health care providers.

The partners developed and tested the Office-GAP program in three cohorts through a pretest-posttest quasi-experimental design over six months, followed by a 12-month follow-up. The Office-GAP program integrates health literacy, communication skills education for patients and physicians, decision support tools, and shared decision making into routine care.

The Office-GAP program led to improved medication usage, improved blood pressure control, and increased patient-provider shared decision making, along with better patient satisfaction with providers and more confidence in the health care decisions made. The program has provided an opportunity for student, physician, and faculty engagement in health disparity studies.

Visit engagedscholar.msu.edu/enewsletter/volume08/issue3/olomu.aspx for the full story.

ADESUWA OLOMU
Department of Family Medicine
College of Human Medicine

LINDA S. VAIL
Health Officer
Ingham County Health Department
Outreach and Engagement Snapshot • Michigan State University

Sponsored by MSU’s National Collaborative for the Study of University Engagement (NCSUE), the Outreach and Engagement Measurement Instrument (OEMI) gathers data about the outreach activities of MSU faculty and academic staff. The information is self-reported and participation in the annual survey is voluntary. Data for 2015 were collected between January and April 2016 and represent the 12th year of data collection. 837 faculty and academic staff responded to the survey. Since 2004, 3,935 distinct (non-duplicative) respondents have reported their outreach and engagement through the OEMI. For this snapshot, OEMI data are augmented with data from the service-learning and civic engagement student registration system.

* The year of data collection was reported incorrectly in The Engaged Scholar Magazine, Vol. 10. It should have been the 11th year.

**OEMI results for 2015 include the following:**

$12,751,263

Value of salary investment by MSU faculty and academic staff in addressing issues of public concern (data from those reporting outreach activities on the OEMI)

96.0%

Respondents whose outreach contributed to achieving Bolder by Design (BBD) imperatives:

76.0% Enhanced the student experience

79.3% Enriched community, economic, and family life

38.3% Expanded international reach

54.4% Increased research opportunities

52.6% Strengthened stewardship

62.8% Advanced our culture of high performance

547

Number of specific projects/activities reported

Of the respondents who described specific projects/activities:

79.8% Reported working with external partners

73.3% Reported having created intellectual property and scholarly outcomes

60.7% Reported that their outreach work impacted their scholarly or teaching practices

27,475

Number of students who participated in community-engaged learning and/or community service during the 2015-2016 academic year. Of those students, 39% (10,651) were registered in community engaged learning as part of an academic course or program and 61% (16,824) participated in co-curricular community service.

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**Forms of Engagement Reported by MSU Faculty and Academic Staff in 2015**

**PERCENTAGE OF RESPONSES**

- **Outreach Research and Creative Activity:** 33.3%
- **Clinical Service:** 6.3%
- **Experiential/Service-Learning:** 6%
- **Public Events and Understanding:** 16.5%
- **Non-credit Classes and Programs:** 10.2%
- **Credit Classes and Programs:** 3.6%
- **Technical or Expert Assistance:** 24.5%

**Forms of Outreach Cross-Tabulated with Societal Concerns for 2015**

The number of “responses” is greater than the number of “respondents.” Respondents were given the opportunity to describe their engagement activities for up to two areas of social concern; each description was counted as a separate response.

**Number of Student Registrations for Service-Learning Received and Accommodated (2002-2015)**

- 2002: 5,000
- 2003: 10,000
- 2004: 15,000
- 2005: 20,000
- 2006: 25,000
- 2007: 30,000
- 2008: 35,000
- 2009: 40,000
- 2010: 45,000
- 2011: 50,000
- 2012: 55,000
- 2013: 60,000
- 2014: 65,000
- 2015: 70,000

University Outreach and Engagement
National Collaborative for the Study of University Engagement
Awards and Honors

MSU President Lou Anna K. Simon was inducted into the Academy of Community Engagement Scholarship (ACES) on September 26, 2016. ACES provides expertise to policymakers, higher education institutions and organizations, community leaders, and national and international entities interested in addressing complex societal issues through the engagement of higher education with community members and organizations. Individuals who have worked to advance collaboration between educational institutions and communities may be nominated for membership.

Burton A. Bargerstock has been re-elected to the board of directors of the International Association for Research on Service Learning and Community Engagement. He chaired the board in 2015-2016. He also serves on the Executive Committee of the Association of Public and Land-grant Universities (APLU) Council on Engagement and Outreach, where he has been active since 2004. Bargerstock is director of UOE’s National Collaborative for the Study of University Engagement as well as its Communication and Information Technology department.

Marsha MacDowell, curator of folk arts at the MSU Museum, has been inducted as a Fellow of the American Folklore Society in recognition of scholarly achievements and outstanding contributions to the field. MacDowell’s work involving quilts is at the heart of much of her international reputation in the field of folklore scholarship.

Two MSU programs and 23 students have been awarded the national Presidential Volunteer Service Award (PVSA) for completing 100 or more hours of volunteer service during the 2014-2015 academic year. The two registered student organizations, Alternative Spartan Breaks and Volunteer Income Tax Assistance, received a “gold” group rating based on the high number of volunteer service hours each member contributed during 2014-2015. The 23 students awarded individual medals documented service performed ranging from 108 to 388 hours. MSU’s Center for Service-Learning and Civic Engagement became an official PVSA Certifying Organization in 2015.

Engagement Opportunity

Midtown Detroit, Inc., has called for approximately 10 MSU students from various majors to serve as community engagement interns each academic year, starting in Fall 2016. The organization is looking for students to make a one-year (two-semester) commitment to working on a variety of community and economic development projects with Midtown and their partners. The interns’ hours will be worked both on campus and with partners in Detroit, totaling 15 hours per student, per week. Midtown Detroit is a nonprofit planning and development organization that supports the physical maintenance and revitalization of the Midtown Detroit neighborhood, while working to enhance public awareness, appreciation, and use of the district. For more information contact Renee Zientek, director, MSU Center for Service-Learning and Civic Engagement, zientekr@msu.edu, or visit midtowndetroitinc.org.

(continued on page 28)
New Appointments

Lindsay Codispot has been appointed as the assistant director of MSU’s Gifted and Talented Education (GATE) office, a newly created position. Codispot joined GATE in 2012 and has assisted in developing new ideas for future GATE programs, serving as the dual enrollment liaison, and creating new and future partnerships.

Miles A. McNall has received an adjunct professional appointment in MSU’s Department of Human Development and Family Studies. McNall is director of UOE’s Community Evaluation and Research Collaborative.

Laurie A. Van Egeren, Assistant Provost for University-Community Partnerships, is now an adjunct professor in MSU’s Department of Human Development and Family Studies. This year she received an award for service to the Michigan Association for Evaluation, and was named to the National Alliance for Broader Impacts (NABI) steering committee. NABI is a society whose goal is to create a community of practice that fosters the development of sustainable and scalable institutional capacity and engagement. Van Egeren is also serving as acting director of the MSU Museum during the search for a new director.

Arnold Weinfeld has joined UOE as director of Urban Policy Initiatives. He will serve as a connector and boundary spanner for MSU faculty, community partners, and other agencies to develop partnerships focused on urban and systems change. Weinfeld is the former CEO of Prima Civitas (a community and economic development organization based in East Lansing), has served with the Michigan Municipal League, worked as a policy analyst with the Michigan Legislature, and served on the Waverly Community Schools Board of Education. He holds a bachelor of science degree from MSU.

New Ventures

A new facility in Detroit will become MSU’s first center for studying and developing urban food systems. The MSU Detroit Center for Urban Food Systems will facilitate best practices for food and non-food plant production and a variety of related community support activities. A proposed neighborhood site is under consideration and will be announced once land use review and community outreach are completed. The University has earmarked $300,000 to launch the project and anticipates ongoing support from state and federal sources.

Transitions

In Memoriam...

Former MSU president Gordon Guyer, who led the University from 1992 to 1993, died on March 30, 2016, at age 89. Guyer, a Kalamazoo native, joined the faculty in 1953 with the Department of Entomology and directed MSU Extension from 1973 until 1985. Associate Provost for University Outreach and Engagement Hiram E. Fitzgerald noted that “For many years Gordon maintained an office in Outreach and Engagement and many of us enjoyed his frequent visits and always warm and enthusiastic support for UOE’s mission.”

Lora Helou has left the MSU Museum after 17 years of service. From 1999 to 2013 Helou served as the Museum’s communication manager, and for the past 3 years she has held the dual positions of associate director and interim director. In addition to providing leadership for the Museum’s AAM reaccreditation application, Helou’s advocacy on behalf of improvements to the Museum infrastructure led to significant advances in technology support for security, exhibits, and staff. She also facilitated expanded connections with MSU faculty and programs in science and technology.
About University Outreach and Engagement

The Office of University Outreach and Engagement facilitates university-wide efforts to create an ecosystem of engagement by supporting the engaged activities of faculty, staff, and students; fostering public access to university expertise and resources; and by advocating for exemplary engaged scholarship, nationally and internationally. In all of its work, UOE emphasizes university-community partnerships that are collaborative, participatory, empowering, systemic, transformative, and anchored in scholarship.

Hiram E. Fitzgerald
Associate Provost, University Outreach and Engagement

Laurie A. Van Egeren
Assistant Provost for University-Community Partnerships

Contact University Outreach and Engagement to learn how you can become more active in the MSU engagement enterprise.

engage.msu.edu

Arts and Cultural Initiatives
C. Kurt Dewhurst, Director

UOE Arts and Cultural Initiatives facilitates research collaborations between MSU faculty and community-based partners using arts and culture to foster effective inclusive communities and cultural economic development.

Center for Community and Economic Development
Rex LaMore, Director

Located in central Lansing, CCED works to improve the quality of life for people in distressed Michigan communities through responsive engagement, strategic partnerships, and collaborative learning.

Center for Service-Learning and Civic Engagement
Renee Zientek, Director

CSLCE provides curricular and co-curricular service-learning and engagement opportunities for MSU students and helps faculty integrate service-learning into their courses.

Communication and Information Technology
Burton A. Bargerstock, Director

CIT provides public access to information about university-wide outreach initiatives through the Internet, as well as consulting and product development services for websites, databases, publications, graphic design, and event management.

Community Evaluation and Research Collaborative
Miles McNall, Director

CERC provides a hub for university-based evaluators and conducts participatory program evaluation in the areas of education, youth development, early childhood, health, and community development.

Gifted and Talented Education
Susan Sheth, Director

GATE promotes differentiated educational programs for students in grade school, middle school and high school in order to provide educational experiences that benefit academically able students intellectually, cultivate social relationships, and encourage a global understanding of their world.

Julian Samora Research Institute
Rubén Martinez, Director

Julian Samora Research Institute conducts research on social, economic, educational, and political issues of Latino communities.

MSU Detroit Center
Jena Baker-Calloway, Director

The Center is home to College of Education programs and Detroit internship headquarters; Community Music School Detroit classes, programs, and events; and offices for admissions, advancement, and governmental affairs.

MSU Museum
Laurie Van Egeren, Acting Director

The MSU Museum reaches a broad public audience through collections, field- and collections-based research, public service and education programs, traveling exhibits, and innovative partnerships.

National Collaborative for the Study of University Engagement
Burton A. Bargerstock, Director

NCSUE is a national innovator, conducting studies about faculty roles and rewards as well as facilitating conversations on benchmarking, engaged scholarship, and the scholarship of engagement.

Urban Policy Initiatives
Arnold Weinfeld, Director

Urban Policy Initiatives serves as a connector and boundary spanner for MSU faculty, community partners, and other agencies to develop community-university partnerships focused on urban and systems change.

Usability/Accessibility Research and Consulting
Sarah J. Swierenga, Director

UARC conducts research and evaluates new interface technologies to ensure that they are useful, usable, accessible, and appealing to a broad audience.

Wharton Center for Performing Arts
Michael J. Brand, Executive Director

Wharton Center educational programs connect students to the performing arts by offering a wide range of programs suited to a variety of learner needs.
Global Engagement Speaker Series
RAJESH TANDON
OCTOBER 20, 2016 | MSU Kellogg Center
gess.msu.edu

Global Engagement Speaker Series
BUDD HALL
NOVEMBER 9, 2016 | MSU International Center
gess.msu.edu

World Usability Day
NOVEMBER 10, 2016 | MSU Union
usability.msu.edu

Pre-College and Youth Outreach Conference
NOVEMBER 14, 2016 | MSU Kellogg Center
spartanyouth.msu.edu/precollege/conference/2016

Global Engagement Speaker Series
SHAWN WILSON
FEBRUARY 15, 2017 | MSU Kellogg Center
gess.msu.edu

UOE Awards Ceremony
FEBRUARY 21, 2017 | MSU Kellogg Center

Global Engagement Speaker Series
CATHERINE ODORA HOPPERS
MARCH 15, 2017 | MSU International Center
gess.msu.edu

MSU Science Festival
APRIL 4-23, 2017
sciencefestival.msu.edu

Michigan Science Olympiad State Tournament
APRIL 29, 2017 | MSU Campus
scienceolympiad.msu.edu

OTHER UPCOMING EVENTS
Summer Solstice Jazz Festival
HELD ANNUALLY IN JUNE | East Lansing, MI
eljazzfest.com

Great Lakes Folk Festival
HELD ANNUALLY IN AUGUST | East Lansing, MI
greatlakesfolkfest.net

Innovate Michigan! Summit
Sponsored by the University Center for Regional Economic Innovation
HELD ANNUALLY IN EARLY SEPTEMBER
MSU Kellogg Center
reicenter.org/events

Engagement Scholarship Consortium Conference
HELD ANNUALLY IN LATE SEPTEMBER/EARLY OCTOBER
engagementscholarship.org

International Association for Research on Service-Learning and Community Engagement (IARSLCE) Conference
HELD ANNUALLY IN THE FALL
researchslce.org

Global Engagement Speaker Series
RAJESH TANDON
OCTOBER 20, 2016
Founder-President, Participatory Research in Asia (India)
Co-Chair, UNESCO Community Based Research and Social Responsibility in Higher Education

BUDD HALL
NOVEMBER 9, 2016
Professor, Community Development, University of Victoria, Canada
Co-Chair, UNESCO Community Based Research and Social Responsibility in Higher Education

SHAWN WILSON
FEBRUARY 15, 2017
Director of Research, Gnibi College of Indigenous Australian Peoples, Southern Cross University

CATHERINE ODORA HOPPERS
MARCH 15, 2017
Professor, Department of Science and Technology, and National Research Foundation South African Research Chair in Development Education, University of South Africa

October 20, 2016
Rajesh Tandon
Founder-President, Participatory Research in Asia (India)
Co-Chair, UNESCO Community Based Research and Social Responsibility in Higher Education

November 9, 2016
Budd Hall
Professor, Community Development, University of Victoria, Canada
Co-Chair, UNESCO Community Based Research and Social Responsibility in Higher Education

February 15, 2017
Shawn Wilson
Director of Research, Gnibi College of Indigenous Australian Peoples, Southern Cross University

March 15, 2017
Catherine Odora Hoppers
Professor, Department of Science and Technology, and National Research Foundation South African Research Chair in Development Education, University of South Africa

Jointly Sponsored by International Studies and Programs and University Outreach and Engagement