COLLABORATIVE RESEARCH AND EDUCATION INITIATIVE

EAST LANSING, MICHIGAN • MARCH 25 - 26, 2019

## Who will solve global problems related to Food, Agriculture, and Water Science while teaching others how to take the lead in the future?

Michigan State University's Canadian Studies Center is delighted to host this effort to spark or reinforce connections among MSU and Canadian scholars for collaborative teaching and problem solving.

Participation by MSU and Canadian institutions has drawn together those who are:

- Currently in a research or teaching partnership with MSU/Canada;
  *(This may be an opportunity to work on an existing project.)*
- Interested to engage with MSU/Canada for collaborative research or teaching;
  *(Please reach out with those you might with to connect with during this meeting to exchange ideas.)*
- Able to facilitate opportunities that engage cross border faculty and students.
  *(Take this time to introduce potential connections.)*

## Welcome to our Canadian University Partners

- Carleton University
- Dalhousie University
- Ryerson University
- University of Guelph
- University to Saskatchewan
- University of Toronto
- University of Waterloo

## Welcome to those joining us from Michigan State University

Alliance for African Partnership
Canadian Studies Center
Center for Global Change and Earth Observations
Center for Systems Integration and Sustainability
Chemical Engineering
Civil and Environmental Engineering
College of Agriculture and Natural Resources
College of Education
College of Natural Science
College of Osteopathic Medicine
College of Veterinary Medicine
Dept. of Plant, Soil and Microbial Sciences
Environmental Science and Policy Programs
Forestry
Fisheries and Wildlife
Geography, Environment, and Spatial Sciences
Global Center for Food Systems Innovation
Institute for Global Health
Institute for Public Policy and Social Research
Institute of Water Research
International Studies and Programs
Kinesiology
Large Animal Clinical Sciences
Packaging
Philosophy Department
The Writing Center

The Canadian Studies Center appreciates the support of leadership and attendees to help this meeting come together. Special thanks goes to Michael Jones, DeAndra Beck, Huiyun Wu, Camille McCall, Leah Owen, Pete Atkins, Kaishi Chhabra, and Jade Gerrard for advising this effort and for hands-on assistance. Added thanks goes to the Communications Team in International Studies and Programs, Environmental Science and Policy Programs and the College of Engineering.


# Agenda

The program is taking place at the Kellogg Conference Center in East Lansing, Michigan. Registration and the majority of the meeting will take place in the Big Ten C Room.

DAY ONE – Monday, March 25

Registration and Breakfast begin at 7:30 p.m.

*8:00 a.m. Welcoming Remarks, Big Ten C Room*

- *AnnMarie Schneider, Director. Canadian Studies Center*
  *Meeting Facilitator*

*8:30 A.M.* - Opening Key Address on Cross Border Research and Teaching Collaboration

- **DeAndra Beck**, Associate Dean for International Research, Michigan State University

*8:45 A.M. Collaborations in Food and Agriculture*

- **Ron Hendrick**, Dean, MSU College of Agriculture and Natural Resources

Panel presentations - Research projects/interests in food and agriculture

- **Linda Hanson**, Adjunct Associate Professor, Department of Plant, Soil and Microbial Sciences, MSU
- **Jane Howe**, Associate Professor, Material Sciences and Chemical Engineering, Applied Chemistry, University of Toronto
- **Eric Crawford**, Professor and Director, Global Center for Food Systems Innovation, MSU
- **Daniel Lynch**, Associate Professor and Director, Centre for International Trade & Transportation, Rowe School of Business at Dalhousie University
- **Wei Zhang**, Associate Professor, Department of Plant, Soil and Microbial Sciences, MSU

*10:15 A.M.* Break

*10:30 a.m. Education Collaboration in Food and Agriculture*
Key Remarks: **Douglas A. Freeman** DVM, PhD, Diplomat ACT, Dean, Western College of Veterinary Medicine, University of Saskatchewan

Panel presentations - Education projects/teaching interests

- **Melinda Wilkins**, DVM, MPH, PhD, Associate Professor, College of Veterinary Medicine, MSU
- **William Cunningham**, DO, MHA, Assistant Dean for West Michigan, Michigan State College of Osteopathic Medicine and Director, Director of the Institute for Global Health at MSU and **Rebecca Malouin**, PhD, MPH, MS, Assistant Professor, College of Osteopathic Medicine
- **Scott R.R. Haskell**, DVM, MPVM, PhD, MS Director of MSU's Online Food Safety Program, and Institute for Food Laws and Regulations
- **Julia Montgomery**, Med Vet, PhD, DACVIM (LAIM), Assistant Professor, Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine

Audience and Table Discussions

*12:00 P.M*. Networking Lunch – Centennial AB Room (Short distance down the hall)

*12:30 P.M.* Nexus of Water, Food and Agriculture
Key Remarks: **Vilma Yuzbasiyan-Gurkan, PhD,** Associate Dean for Research and Graduate Studies**,** College of Veterinary Medicine

- **James Cole,** Professor, Department of Plant, Soil and Microbial Sciences, Ribosomal Database Project Director, Michigan State University
- **Syed Hashsham**, Professor, Department of Civil and Environmental Engineering, Center for Microbial Ecology, Michigan State University

*1:30 P.M.* Break

*1:45 P.M. Collaborations in Water Science – Big Ten C Room*

Introduction: **Camille McCall,** PhD Student, Department of Civil and Environmental Engineering, Michigan State University

Key Remarks: **Joan Rose**, Professor and Homer Nowlin Chair in Water Research, 2016 Stockholm Water Prize Recipient

Panel presentations - Research projects/interests in water science

- **Abigail Bennett**, Assistant Professor, Center for Systems Integration & Sustainability, MSU
- **Patricia Hania**, Assistant Professor, Law & Business, Rogers School of Management, Ryerson University
- **Grant Gunn**, Assistant Professor, Geography, Environment and Spatial Sciences, MSU
- **Vlad Tarabara**, Associate Professor of Environmental Engineering, MSU

- **Dina Hamad**, Post-Doctoral Fellow, Chemical Engineering, Ryerson University

Audience and Table Discussions

*3:00 P.M. Break*

*3:15 P.M.* Panel Presentations - Education projects/interests in water science

- **Michael Jones**, Peter A. Larkin Professor of Quantitative Fisheries, Fisheries and Wildlife, MSU
- **Kevin Boehmer**, Managing Director, The Water Institute, University of Waterloo
- **Huiyun Wu**, PhD Candidate, Civil and Environmental Engineering, MSU
- **David Poulson**, Senior Associate Director of the Knight Center for Environmental Journalism
- **Ingmar Pack**, Assistant Program Coordinator, Visiting International Professional Program

Audience and Table Discussions – research/education interests, ideas for collaboration, follow up

*4:45 P.M. Closing Session* - Report on identified interests in research and teaching

- Opportunities and challenges
- Next steps for moving forward
- Tuesday morning plan/announcements

*5:15 -7:30 P.M. Evening Dinner Reception – Rotate Food Stations, Visit Poster Session – Red Cedar Room*

**DAY TWO –Tuesday, March 26 (To be arranged by faculty) – Red Cedar Room**

Faculty arrange small group meetings, class presentations, and faculty discussions. Meeting space available with continental breakfast, along with poster session discussion until 11:30 a.m. in the Red Cedar Room, Kellogg Center.

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# Speaker & Panelist Biographies

**DeAndra Beck, PhD is the Associate Dean for Research at International Studies and Programs at Michigan State University.**
Before joining MSU, Dr. Beck served as a Program Director in the National Science Foundation's Office of International and Integrative Activities, with responsibility for NSF's Developing Country initiatives and the Middle East and Africa portfolios. She worked closely with the U.S. Agency for International Development to bridge the interests of science and development, including the design and implementation of the Partnerships for Enhanced Engagement in Research (PEER Science) Initiative. Dr. Beck served as Co-Manager of the Science Across Virtual Institutes (SAVI), Managing Director for Environment and Social Assessment at the U.S. Millennium Challenge Corporation (MCC) and Assistant Director for Policy at the U.S. Forest Service International Programs. These positions flanked her foray into the private sector as Chief Executive Officer of a biotechnology start-up company. Dr. Beck held positions as an international research administrator at the USDA Foreign Agricultural Service and as an AAAS Fellow at the U.S. Agency for International Development. She earned a BS (cum laude) and PhD in biochemistry from Texas A&M University.

**Abigail Bennett, PhD is an Assistant Professor in the Center for Systems Integration and Sustainability at Michigan State University.**
Prior to joining MSU, Dr. Bennett earned a BS in environmental science and policy from the University of South Florida and a PhD in marine science and conservation from Duke University. Her research engages institutional analysis, political economy, and discourse analysis to study processes of institutional emergence and change and associated social and ecological outcomes in fisheries. In particular, she is interested in understanding how different governance arrangements - both formal and informal - shape intersections of fish trade, food security, and sustainable fisheries livelihoods. Dr. Bennett's research

also seeks to track the discursive representation of inland fisheries in policy and development spaces and the role of fisheries science in shaping those narratives.

**Kevin Boehmer, MA is the Managing Director of the Water Institute at the University of Waterloo.**

Mr. Boehmer is a Waterloo Region native and obtained his Bachelor of Environmental Studies in honors geography and his MA in regional planning and resource development from the University of Waterloo. He has completed research in Indonesia as part of the join Waterloo/York/Dalhousie Bali Sustainability Development Project and later worked as an independent consultant, managing several water resources and environmental management capacity-building projects. Mr. Boehmer served as director of the suitability standards program for the Canadian Standards Association (CSA) and was responsible for developing national and bi-national sustainability standards through multi-stakeholder technical committees involving government, industry, academia and civil society. He has served in his current position for almost eight years at The Water Institute, ranked among the top 10 water research institutions in the world.

**William Cunningham, DO, MHA is the Assistant Dean for West Michigan's College of Osteopathic Medicine and Director of the Institute for Global Health at Michigan State University.**

Dr. Cunningham oversees the clinical clerkships for six hospital sites in West Michigan in addition to his faculty responsibilities at Michigan State University. His role as the Director of IGH is to advocate on the behalf of the students and faculty of the health related colleges on global health issues. In addition, IGH sponsors study abroad undergraduate and medical student programs in eight countries on four continents. Dr. Cunningham serves as a representative for the College of Osteopathic Medicine on the University Curriculum Committee. He is also a member of the Osteopathic College curriculum committee and admissions committee.

**Douglas A. Freeman, DVM, PhD is Dean of the Western College of Veterinary Medicine at the University of Saskatchewan.**

Dr. Freeman established the annual One Health leadership conference for health science students and the development of Canada's first veterinary social work program with the University of Regina. He has supported the creation of a wellness program and a service-learning program that takes students, faculty and staff to remote Indigenous communities for veterinary services and outreach. Dr. Freeman is a member and past chair of the University of Saskatchewan, Council of Health Science Deans as well as a

board member for the Vaccine and Infectious Disease Organization-International Vaccine Centre (VIDO-InterVac).

**Grant Gunn, PhD is Assistant Professor in the Department of Geography, Environment, and Spatial Sciences at Michigan State University.**
Before joining MSU, Dr. Gunn earned his BS in geography with a Diploma in GIS Excellence and MS and PhD in Remote Sensing at the University of Waterloo. Dr. Gunn is currently the Principal Investigator researching microwave remote sensing of lake ice at Michigan State University while teaching geospatial technology courses. Dr. Gunn's current research interests aim to improve the retrievals of freshwater ice parameters in sub-Arctic and Arctic environments through the application of new and emerging technologies and novel methods, furthering the ability to predict how lake ice regimes may change in future climates.

**Dina Hamad is a Post-Doctoral Fellow in the Department of Chemical Engineering at Ryerson University.**
Dr. Hamad completed her PhD at Ryerson University. Her research interests lie in the general area of environmental protection and sustainability and water pollution control. Her main areas of expertise are wastewater treatment by advanced oxidation processes, process identification, photochemical reaction engineering, and advanced process control. Currently, Dr. Hamad is designing a model predictive control (MPC) for the degradation of polymeric wastewater to improve the treated wastewater quality to meet the limits set by the Ontario Water Resources Act. Dr. Hamad is an active member of the Canadian Association on Water Quality (CAWQ) and the Canadian Society for Chemical Engineering (CSChE).

**Patricia Hania is an Assistant Professor in the Law & Business Department at the Ted Rogers School of Management at Ryerson University.**
Dr. Hania holds a PhD from Osgoode Hall Law School at York University in Toronto. She also earned a LL.M. and LL.B. from Osgoode Hall Law School, Master of Environmental Sustainability, MBA Graduate Diploma and Bachelor of Applied Science from York University. As an interdisciplinary social-legal researcher, Dr. Hania is interested in the interaction of market actors in natural resource governance regimes – in particular, water governance in Canada. Her research considers the intersection of law and policy to understand how norms interact, regulate and become embedded in legal sites of contested and complex decision-making.

**Linda Hanson is a Research Plant Pathologist and Adjunct Associate Professor in the Department of Plant, Soil and Microbial Sciences with Guelph Counterparts.**

After completing her MS in plant pathology from MSU, Dr. Hanson earned her PhD in plant pathology with minors in mycology and genetics at Cornell University. Her research focuses on soil-borne pathogens, particularly fungi, sugar beet and rotation crops, and diversity and interaction with cropping systems. Dr. Hanson works closely with the US Department of Agriculture's Sugarbeet and Bean Research Unit on Michigan State's campus. Their research programs address priority issues in: 1) genetics, breeding, and diseases of sugarbeet; 2) genetics, breeding and quality and utilization of dry bean; and 3) engineering technologies for quality measurement and grading of fruits and vegetables.

**Syed Hashsham, PhD is a Professor in the Department of Civil and Environmental Engineering and the Center for Microbial Ecology at Michigan State University.**

Before his work at MSU, Dr. Hashsham earned his PhD in environmental engineering and science from the University of Illinois at Urbana-Champaign. His research focused on environmental molecular biology and mathematical tools to address environmental engineering issues. Dr. Hashsham's current research investigates the development of DNA biochips for parallel detection of microorganisms important to drinking water and wastewater. Dr. Hashsham is also interested in developing new tools to manage mixed microbial communities important to environmental biotechnology. He has received the Withrow Distinguished Scholar Award, Edwin Willits Associate Professor Award, and the Lilly Teaching Fellowship Award.

**Scott Haskell, DVM, PhD is an Adjunct Professor in the College of Law at Michigan State University.**

Dr. Haskell received his DVM and PhD in environmental microbiology from the University of California, Daivs. He was in large animal private veterinary practice for 17 years prior to entering academia. Dr. Haskell is currently the Director of the Veterinary Technology Program at Yuba College. His professional interests include global veterinary medicine, educational curricular design and implementation, development and implementation of distance education programs, animal health monitoring, environmental pathogen microbiology, antibiotic resistance monitoring, global veterinary training opportunities and pre- and post-harvest food safety. In 2011, Dr. Haskell was awarded the Hayward Award for Excellence in Education by the California State College Chancellor's Office. His international experience includes working with programs and consultancies in 29 countries.

**Ron Hendrick is Dean of the College of Agriculture and Natural Resources at Michigan State University.**

Dr. Hendrick earned his BS and PhD from MSU in forestry and forest ecology, respectively, and was a National Science Foundation Postdoctoral Fellow in the Institute of Arctic Biology at the University of Alaska-Fairbanks. His research has focused on forest ecosystem productivity and element cycling, especially below ground, and various aspects of ecosystem restoration and reclamation. Dr. Hendrick has taught a number of study abroad programs in the South Pacific, including New Zealand, Australia, Fiji and Antarctica. As dean of the MSU College of Agriculture and Natural Resources, he has been instrumental in increasing state support for food and agriculture and enhancing diversity, equity and inclusion in the college.

**Jane Howe, PhD is an Associate Professor jointly appointed in the Department of Materials Science and Engineering and the Department of Chemical Engineering and Applied Chemistry.**

Prior to her new position at the University of Toronto, Dr. Howe worked as a Senior Applications Scientist with Hitachi High-Technologies group in US and Canada. She received her PhD in ceramic science from Alfred University. After a postdoc at Oak Ridge National Laboratory, Dr. Howe stayed at ORNL as a Staff Scientist and Principal Investigator. She has over 100 publications on peer-reviewed journals and holds nine US patents on electron microscopy and materials characterization and development. She won two R&D 100 Awards in research and development of the lithium battery technology and nano-structured carbon materials. Dr. Howe's current research interest is *in situ* and correlative microscopy techniques.

**Michael Jones, PhD is the Co-Director and Peter A. Larkin Professor of Quantitative Fisheries in the Department of Fisheries and Wildlife and Michigan State University.**

Dr. Jones was born and raised in Vancouver and earned his BS and PhD in zoology from the University of British Colombia. His primary research interests center around understanding fish population dynamics and applying quantitative tools such as simulation modeling and decision analysis to practical fishery management problems. Dr. Jones's research has a strong applied flavor, and frequently involves working closely with fishery management agencies. He is especially interested in the challenge of determining critical uncertainties for fishery management, and the related question of assigning an appropriate value to reducing uncertainty. He likes his research program, and thus his students' projects, to comprise a mixture of empirical and theoretical work: field and experimental studies; modeling and analysis.

**Daniel Lynch, PhD is an Associate Professor and Director of the Centre for International Trade & Transportation in the Rowe School of Business at Dalhousie University.**

Prior to joining Dalhousie Univeristy, Dr. Lynch earned his BS from Fairleigh Dickerson University, MPA from the University of Colorado Boulder, and PhD from the University of Arkansas. He was awarded the Harold E. Fearon Best Paper of the Year Award by the Journal of Supply Chain Management for his paper entitled "Power Asymmetry, Adaptation and Collaboration in Dyadic Relationships Involving A Powerful Buyer." His key interest is in Buyer – Supplier relationships as well as the effective/ineffective supply chain's economic impact.

**Rebecca Malouin, PhD is an Assistant Professor in the Department of Pediatrics and Human Development in the College of Human Medicine at Michigan State University.**

Dr. Malouin received both her PhD and MPH at the Johns Hopkins University Bloomberg School of Public Health and completed postdoctoral training in epidemiology at Michigan State University. She also serves as an external evaluator for the Priority Health Patient-Centered Medical Home Initiative, the Children's Healthcare Access Program in Grand Rapids, Michigan, and the UnitedHealthcare PCMH pilot project in Arizona. She has written a monograph for the American Academy of Pediatrics, describing available tools to measure the pediatric medical home. Rebecca was awarded a K01 Mentored Research Scientist Award from the Agency for Healthcare Research and Quality in October 2009 for a project "Defining and Building a Patient-Centered Medical Home."

**Julia Montgomery, PhD is an Assistant Professor in the Western College of Veterinary Medicine at the University of Saskatchewan.**

Dr. Montgomery has a research background in equine immunology, pulmonary pathophysiology and nutrition. Her current research includes equine internal medicine (equine asthma; equine metabolic syndrome; use of capsule endoscopy in horses) and equine rehabilitation. Dr. Montgomery's teaching areas include large animal internal medicine as well as veterinary anatomy with a focus on large animal comparative anatomy. Dr. Montgomery has a special clinical interest in respiratory, gastrointestinal and metabolic diseases of horses and equine nutrition.

**Ingmar Pack is the Assistant Program Coordinator of the Visiting International Professional Program at Michigan State University.**
Prior to MSU, Mr. Pack earned a BA in American studies from the University of Groningen, MA in American studies from Radboud University Nijmegen, and MA in transnational and comparative history and higher education administration from Central Michigan University. His current work is in connecting international professionals and students to the expertise of world-class faculty and resources at MSU and in Michigan. Mr. Pack's professional experience allows him to be a strong ally to institutional efforts of integrating a global, international, and intercultural dimension into the curriculum and co-curriculum.

**David Poulson is the Senior Associate Director for the Knight Center for Environmental Journalism at Michigan State University.**
Mr. Poulson teaches environmental, investigative, computer-assisted and public affairs reporting. He organizes workshops for professional journalists in the U.S. and abroad. He is also the founder and editor of Great Lakes Echo, an award winning news service covering regional environmental issues. Mr. Poulson's research interests include con-traditional methods of gathering and delivering news, reader engagement, climate change communications, non-profit journalism, story-telling capacity of scientists and other researchers. Poulson also directs the translational scholars program at MSU's Global Center for Food Systems Innovation. In that role he develops workshops to help scientists better communicate their work to policy makers, funders, journalists and the public.

**Joan Rose, PhD is a Professor and Homer Nowlin Chair in Water Research at Michigan State University.**
Dr. Rose co-directs both MSU's Center for Advancing Microbial Risk Assessment (CAMRA) and its Center for Water Sciences (CWS). Her global activity includes investigation of waterborne disease outbreaks and the study of water supplies, treatment, and reclamation. Her applied research interests include study of microbial pathogens in recreational waters and climatic factors that impact water quality. She is a pioneer in the emerging science of viral metagenomics – sequencing virus DNA in water sources, discharges and shipping ballast using next-generation high-throughput technology. Such technology promises to significantly improve methods to protect water and food supplies, and she is applying it to assess the safety of fresh produce.

**Volodymyr (Vlad) Tarabara, PhD is an Associate Professor in the Department of Civil and Environmental Engineering at Michigan State University**.

Prior to joining MSU, Dr. Tarabara earned his PhD in environmental engineering from Rice University in Houston, Texas. Currently, he teaches courses on environmental transport and unit processes. Dr. Tarabara's research interests are at the junction of colloid and interface science and separation science. Most of his current work as a Co-Investigator focuses on membrane processes with projects on emulsion separation, virus removal by porous membranes, and catalytic membrane reactors. Dr. Tarabara was also awarded as a U.S. Fullbright Scholar in the Republic of Georgia in 2014.

**Melinda Wilkins, DVM, MPH, PhD is an Associate Professor in the College of Veterinary Medicine at Michigan State University.**

An alumna of the US Centers for Disease Control and Prevention's Epidemic Intelligence Service, Dr. Wilkins earned her DVM at MSU, her MPH from the University of Illinois Springfield, and then returned to earn her PhD from the MSU Department Large Animal Clinical Sciences with a focus in epidemiology. Her areas of expertise include disease surveillance among animals and humans, surveillance system evaluation, zoonotic disease, epidemiology, and outbreak investigation. At MSU, she was named the Program Director of the Online Master of Science in Food Safety Program in 2014 and continues to serve in the realms of One Health, Public Health and Global Health Education.

**Huiyun Wu is a PhD Candidate in the Department of Civil and Environmental Engineering at Michigan State University.**

She holds a BS in environmental science and MS in environmental engineering. Ms. Wu's research area includes environmental microbiology, microbial source tracking, pathogen detection through next generation sequencing, community-water based epidemiology, and the One Health approach to prevent water-borne diseases. As a critical part of the One Health initiative at MSU, she has attended the World Congress on One Health and the One Health Leadership Experience, both hosted at the University of Saskatchewan. Ms. Wu also serves on the team of staff at the Canadian Studies Center at MSU.

**Vilma Yuzbasiyan-Gurkan, PhD is a Professor and Associate Dean for Research and Graduate Studies in the College of Veterinary Medicine at Michigan State University.**

Prior to joining MSU, Dr. Yuzbasiyan-Gurkan earned a BA from Vassar University, PhD from the University of Istanbul Medical School and received postdoctoral training at the University of Michigan. Investigations in Dr. Yuzbasiyan-Gurkan's laboratory focus on 1) understanding the molecular genetics of cancer and cancer stem cells; 2) utilizing the isolated gene pools of purebred dogs to map and identify cancer susceptibility and other genetic disease loci and 3) translating the molecular findings to useful prognostic tools and therapeutic targets. She also serves as the Program Director for Comparative Medicine and Integrative Biology in the College of Veterinary Medicine at Michigan State University.

**Wei Zhang, PhD is an Associate Professor in the Department of Plant, Soil and Microbial Sciences at Michigan State University.**

Prior to joining MSU, Dr. Zhang earned his BS in environmental chemistry from Nanjing University, MS in bio systems engineering from Oklahoma State University and PhD in environmental engineering from Cornell University. His areas of expertise include, hydrology, soil physics, colloidal and interfacial science, environmental nanotechnology, contaminant fate and transport and antibiotic resistance. Dr. Zhang's current research focuses on the plant absorption of engineered nanoparticles (ENPs), performing risk assessments and gathering information to quantify potential risks. The long-term goals of this study are to determine an optimum wash water composition for the removal of ENPs and to make food processing recommendations.

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## Host, Canadian Studies Center Director

**AnnMarie Schneider, Director for Program Planning & Policy Education at the Institute for Public Policy and Social Research (IPPSR); Director of the Canadian Studies Center at MSU.**

AnnMarie bridges state and international policy in her university roles. The center's focus is on U.S. and Canada relations as well as Canada's cultural and economic profile. Additionally, the center supports active teaching and research faculty and their students who are interested to collaborate with Canadian counterparts to investigate and address real world problems. At IPPSR, she administers a grant program that incentivizes applied research and informs the public and decision makers of

timely issues. AnnMarie developed and now facilitates a long-standing, annual forum series providing a venue for faculty to talk about their work and its relevance to policy making. She helped to transition the Michigan Political Leadership Program to the university and served as an advisor to the program for nearly 15+ years. Addtionally, she was on the founding team to develop the Legislative Leadership Program, a policy orientation for Michigan's newly-elected officials, and served as its co-director for 12 years. In order to create an international cohort of early career professionals interested in combining interests in animal, human, and enviromental health, she co-created the One Health Challenge with Canadian counterparts and has recently developed the Arctic Research Platform with faculty and students who are interested to work on cold and changing climate issues. Her work reflects her interest in building networks of issue expertise, advancing civil discourse, and securing opportunities for faculty research, student learning, and community understanding.

**MSU's Canadian Studies Center – Meeting Host**

The center is one of seven global region centers operating under the direction of the Dean of International Studies and Programs at Michigan State University. At 60-plus years running, it is the longest serving Canadian Studies Center in the United States. The founder of the center also cofounded the Association for Canadian Studies in the United States (ACSUS) and directed MSU's Canadian Studies Center for 20 years. Continuing its leadership legacy, the center's Honorary Board Chair is former U.S. Ambassador James Blanchard. More than 70 faculty members serve its advisory council. Key areas of interest relate to the themes of Food and Agriculture, Environment and Energy, Health and Nutrition, and Education. Relatedly, the center often raises attention to issues connected to Trade and Supply Chain, the Arctic and Climate Change, One Health, and Indigenous Communities. Given its broad scope, the center is set on connecting with all colleges across campus to provide a historical and modern-day perspective on Canada and its interaction with the world, and to advance cross border partnerships focused on research activity and teaching models that help to address global problems.

**International Studies and Programs at MSU**

John Hannah, Michigan State University's 12th president, articulated a vision of MSU as a university not only for the people of Michigan but also for the world. His vision of a globally interdependent future in the wake of World War II led to the university's involvement in the creation of institutions of higher education in places such as Brazil, Colombia, and Okinawa in the 1950s, Nigeria and Pakistan in the early 1960s, and subsequently in more than 200 major development, research, and technical assistance projects in dozens of countries.

In 1956, President Hannah established International Programs, headed by a dean—the first such office among major universities in the United States. Later renamed International Studies and Programs (ISP), its purpose was to initiate, coordinate, and otherwise support internationally related activities throughout the institution. The office would eventually administer a number of area studies centers and support units, but its effectiveness as a university-level entity has resided in its "matrix" nature and ability to foster collaborative efforts across traditional college and departmental administrative boundaries.

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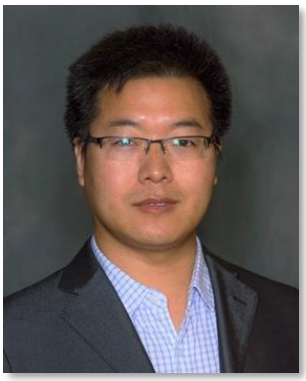
# Participants

**Sam Arcand is a Research Associate at Michigan State University.**
Mr. Arcand earned a BS in meteorology at St. Cloud State University in Minnesota and a MS in geography with an emphasis on weather and climate research at MSU. His research interests are focused on local-to regional-scale meteorology, climatology, and hydrology with a focus on modeling land-atmosphere interactions through the lens of a changing climate. Mr. Arcand is currently a research associate in the Hydrogeology lab at MSU, and has also worked on projects with the U.S. Forest Service and the State Climate Office.

**Douglas Bessette, PhD is an Assistant Professor in the Department of Community Sustainability at Michigan State University.**
Dr. Bessette earned his PhD in geography from the University of Calgary in Alberta, Canada and his MS from the Department of Community, Agriculture, Recreation and Resource Studies at MSU. Before completing his undergraduate degree, he served four years in the U.S. Army as an M1A1 tanker. At MSU, Dr. Bessette researches and teaches courses in sustainable energy, energy transitions and community energy development. In his applied work as a Co-Investigator, he develops and deploys structured decision-making frameworks that incorporate value-focused thinking and help stakeholders to identify objectives, generate alternatives, predict consequences and make explicit tradeoffs between values and strategies.

**Carl Boehlert, PhD is a Professor in the Department of Chemical Engineering and Materials Science at Michigan State University.**

Dr. Boehlert holds an MS and PhD in material science and engineering from the University of Dayton. His research focuses on materials engineering, materials sciences, metallurgy, electron backscatter diffraction, intermetallic electron microscopy, metal matrix composites, titanium alloys and composites and mechanical behavior. Dr. Boehlert has earned the Academic Keys Who's Who in Engineering Education (WWEE) Award, Who's Who of Emerging Leaders First Edition Award and Faculty Early Career Development Program (CAREER) Award, demonstrating his exemplary commitment to education.



**Changyong Cao, PhD is an Assistant Professor in the School of Packaging and Adjunct Professor in the Department of Mechanical Engineering and Department of Electrical and Computer Engineering at Michigan State University.**

He obtained his Ph.D. in Mechanical Engineering from the Australian National University (ANU) with an emphasis in engineering mechanics and composite materials. Then he moved to the United States for postdoctoral training at the Department of Mechanical Engineering and Materials Science and the Department of Electrical and Computer Engineering at Duke University. His current research interests are primarily in the areas of soft materials, nanomaterials and emerging electronics as well as additive manufacturing, including the mechanics and applications of soft materials and nanomaterials, the design, analysis and manufacturing of printable/flexible/stretchable electronics and medical devices, and the design and optimization of advanced materials.

**Darrell Donahue, PhD is the Director of the Institute of Water Research and Professor and Chair in the Department of Biosystems and Agricultural Engineering at Michigan State University.**

Dr. Donahue holds a BS in zoology and chemistry, MS in engineering and mathematics and PhD in operations research and engineering from North Carolina State University. Over the last several years, Dr. Donahue has developed a wide range of engineering and management skills which can be applied in many industrial and academic settings. These skills include quantitative skills: technology development; process optimizations for chemical and biological industries; systems level design and manufacturing; statistical process control of industrial systems; chemical and microbiological risk assessment; engineering economic modeling and qualitative skills: strategic plan development; team development focus on high performance and management strategies; governmental standards development.

**David Ferguson, PhD is an Assistant Professor in the Department of Kinesiology at Michigan State University.**

Dr. Ferguson has two distinct research interests. The first is how early life nutrition influences cardiovascular development as it relates to functional capacity in adulthood. It has been shown that children who are malnourished at birth have a higher incidence of cardiovascular disease in adulthood. The goal of his laboratory is to investigate the mechanistic changes that occur due to poor diet and propose therapeutic countermeasures to increase cardiovascular function and decrease mortality rates. The second area of research focuses on the physiological stress placed on automotive race car drivers and pit crews. He is working with NASCAR, Indy car, and Formula 1 teams to increase performance and safety of drivers and crew members.

**Shardula Gawankar is a PhD student majoring in Environmental Engineering at Michigan State University.**

Ms. Gawankar completed her BS at the University of Mumbai, India in civil engineering and MS in environmental engineering at Michigan State University. This is Ms. Gawankar's second year in the PhD program. Her research focuses on fate of cyanotoxins in drinking water treatment plants. She is currently working on observing the effect of UV/hydrogen peroxide advanced oxidation process on degradation of saxitoxin in water treatment. In the future, she aspires to work on modelling of cyanotoxins in the Great Lakes.

**Charles Hayes is a PhD student in the Department of Philosophy at Michigan State University.**

Mr. Hayes earned his MA in environmental philosophy from the University of Montana, along with a graduate certificate in natural resource conflict resolution. He then worked for a local ecological restoration company and with the National Forest Foundation's Conservation Connect initiative. Now pursuing a Doctoral degree in philosophy, with a graduate specialization in environmental science and policy, his research centers around environmental ethics. Mr. Hayes has specific interests in the ethics of collaborative public land management, the project of rewilding, and environmental virtue ethics. He often approaches these topics in conversation with the hope of illuminating how our technological age has shaped the way we understand and inhabit our environments.

**Charifa Hejase is a PhD Candidate and ESPP Fellow in the Department of Civil and Environmental Engineering at Michigan State University.**
Ms. Hejase holds a BS and MS in environmental engineering from Michigan State University. Born and raised in Lebanon, she has a heightened attention to the availability of protable and palatable drunking water. This has sparked her intestest in studying the water treatment process. During her Masters studies, she worked on a project related to oil-water separation which addresses the treatment of large volumes of oily wastewater generated by industries using membrane filtration. Her PhD work builds on the results obtained in her Master's degree. By pursuing an Environmental Science and Policy Program specialization, she excited to translate the science to policy makers and stakeholders. Her research areas are sustainability and surface coalescence of oil droplets and membrane-based separation of oil-water emulsion.

**Emily Huff, PhD is an Assistant Professor of Human Dimensions of Forest in the Department of Forestry at Michigan State University.**
Dr. Huff is interested in the effect of humans on natural resources availability and quality. Her research uses self-reported and observational data on human behavior, specifically on attitudes, values, preferences and intentions that may (or may not) lead to behavior. She also collected experimental data on a variety of natural resource management topics and use predictive and exploratory modeling techniques such as agent-based modeling to understand how behavior and human interaction leads to natural resource management outcomes. Dr. Huff's work focuses most on forested systems, both rural and urban and is meant to inform better management, stewardship and conservation of trees and other green spaces with the overall goal of improving human health and wellbeing while keeping the environment healthy and functional.

**David W. Hyndman, PhD is Professor and Chair of Hydrogeology, Environmental Geophysics in the College of Natural Science Department of Earth and Environmental Science.**
Our research explores the physical and chemical processes that influence groundwater flow and solute transport, and the factors that affect seismic and electromagnetic wave propagation. We combine multiple independent geophysical and hydrologic datasets through three-dimensional numerical simulations to estimate aquifer properties with high resolution. The influence of these properties on groundwater flow, solute transport, and bioremediation of organic contaminants is also an active area of research in our group. We also explore the influence of climate and land use changes on the flux of water and solutes through regional watersheds, and the influence of these factors on ecological health.

**José Jackson-Malete is the Co-Director of the Alliance for African Partnerships (AAP) at Michigan State University**.

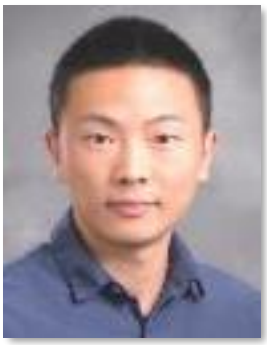
Dr. Johnson-Malete is a food scientist with an MS and PhD from Cornell University and Michigan State University, respectively. She has over 25 years of experience in research, teaching and working in industry in Africa, the Caribbean and the USA, particularly within the Agriculture sector. She maintains an active research program that focuses on processing and adding value to indigenous fruit and vegetable products, ensuring quality and safety, contributing to food and nutrition security, while improving livelihoods for communities. Dr. Jackson-Malete has responsibilities for establishing a robust network of innovative partnerships among MSU, African universities, and other international partners; ensuring that the AAP has a governance structure that reflects and promotes the model of co-creation; strengthening capacity at partner institutions, particularly in the area of research and innovation management; promoting programs for women in science as well as attracting a diversity of resources necessary to achieve its vision of impact.

**Kelly Kapsar is a PhD student in the Center for Systems Integration and Sustainability at Michigan State University.**

Ms. Kapsar's primary research goal is to better understand the relationship between humans and their environment, with a particular focus on the conservation of wildlife. In 2014, she graduated with a B.A. in biology from Carleton College and after two years working as a science educator, she is eager to continue her education at Michigan State University. Through interdisciplinary graduate research under Dr. Jianguo Liu at the Center for Systems Integration and Sustainability, she hopes to better understand the dynamic relationships between culture, ecosystems, science, and conservation policy in the Arctic. Her other research interests include coupled Human and Natural Systems, telecoupling, complexity, modeling and community-engaged research.

**Eric Leszczynski is a PhD student in the Department of Kinesiology at Michigan State University.**

Mr. Leszcynski earned a BS and MS from Michigan State Univeristy. His primary research interest is in the area of developmental neurcognitive kinesiology, examining the relation between health-oriented behaviors and higher-order cognitive function during preadolescence; and the application of these health-oriented behaviors as a means for improving cognitive health, academic performance and overall effective functioning during maturation.



**Yingjie Li is a PhD student in the Department of Fisheries and Wildlife and the Center for System Integration and Sustainability at Michigan State University.**

Before he joined MSU, he received a BS in land resource management and a MS in geography from Shaanxi Normal University. Mr. Li worked on environmental/landscape changes, trade-offs and synergies among ecosystem services programs supported by the Natural Science Foundation of China (NSFC) and the National Social Science Foundation of China (NSSFC). He currently works with Dr. Jianguo Liu pursuing his research interest in ecosystem services and telecoupled human and natural systems. Further research interest include landscape ecology, climate and land-use change, remote sensing, GIS, social-ecological system and sustainability.

**Chima Maduka is a Master of Science student in the College of Veterinary Medicine at Michigan State University.**

He obtained his Doctor of Veterinary Medicine (DVM) from University of Maiduguri, where he graduated with distinction and holds an adjunct lecturer position. He is the pioneer recipient of the prestigious Mastercard Foundation scholarship in the College of Veterinary Medicine at Michigan State University, where he majors comparative medicine and integrative biology. Chima is keen about advancing musculoskeletal health in humans and animals, and enjoys working with multi-disciplinary teams in a One Health approach. Chima believes in giving back to his community by providing mentorship to young Africans from several countries and volunteering for the American Red Cross.

**Saltanat Mambetova, PhD is a Research Associate in the Department of Plant, Soil and Microbial Sciences at Michigan State University.**

Dr. Mambetova earned a BS in agronomy and crop science from Kyrgyz National Agrarian University, MS in crop and soil science from MSU and PhD in plant pathology and phytopathology from MSU. During her time as a PhD student, she served as President of the Central Asian Student Association and President of Phytopathology Graduate Student Organization.

**Camille McCall is a PhD student in the Department of Civil and Environmental Engineering at Michigan State University.**
Ms. McCall holds a BS in mechanical engineering, MS in environmental engineering and is currently working towards a PhD in environmental engineering at Michigan State University. Her research interests include microbial diversity and antimicrobial gene discovery in sewage and natural waters using bioinformatics and whole-genome sequencing approaches. She is also a Graduate Teaching Assistant, teaching Introduction to Civil and Environmental Engineering, Introduction to Engineering Design, and Statics. Ms. McCall also serves on the team of staff at the Canadian Studies Center at MSU.

**Bill McConnell, PhD is an Adjunct Professor in the Center for Global Change and Earth Observations at Michigan State University.**
Dr. McConnell is a land change scientist who applies a mixed Cultural/Political Ecology- Geographic Information Sciences approach to questions of land use dynamics from local to global scales. He has spent the past 25 years in interdisciplinary research groups, including the George Perkins Marsh Institute at Clark University, the Anthropological Center for Training and Research on Global Environmental Change and the Center for the Study of Institutions, Population and Environmental Change at Indiana University, and the Center for Systems Integration and Sustainability at Michigan State University. He currently manages an international multi-institution research project supported through the Belmont Forum's Food Security and Land Use Call, based here at CGCEO.

**Raven Mitchell is a Master of Science student in the Department of Geography, Environmental, and Spatial Sciences at Michigan State University.**
Ms. Mitchell is studying geography with an emphasis on physical and environmental geography. Her main research interests lie in periglacial geomorphology and permafrost. For her thesis work, Ms. Mitchell is exploring the influence of fluvial processes on the development of sorted patterned ground in the Juneau Ice Field of British Colombia, CA. In addition to her thesis research, Ms. Mitchell is involved in the long-term monitoring of active layer thickness on the Alaskan North Slope.

**Brijen Miyani is a PhD student in the Department of Civil and Environmental Engineering and Environmental Science at Michigan State University.**
He completed a BS in civil engineering from Gujarat Technological University, Ahmedbabd and a MS in environmental health engineering from Michigan State University. Mr. Miyani's current research investigates the prevalence and diversity of human herpesviruses (HHV) in wastewater from a large urban area, Detroit. His results indicate high prevalence of multiple HHV species in the Detroit area population. This project was made possible through funding from the National Science Foundation.

**Frederick "Fritz" Nelson is an Adjunct Professor in Michigan State University's Department of Geography, Environment, and Spatial Sciences.**
Nelson's research group focuses on several themes: (1) the evolution of cold, non-glacial (periglacial) landscapes; (2) the impacts of climatic change in permafrost environments; (3) terrain-climate interactions (topoclimate); (4) the distribution and mapping of permafrost and periglacial features; and (5) the history of American geography and cold-regions science. He has supervised M.S. and Ph.D. research in each of these areas. He is currently a co-PI on the Circumpolar Active Layer Monitoring (CALM) program, an international global-change monitoring effort involving investigators from 15 countries and more than 200 permafrost observatories operating in Antarctica, the Arctic, the Tibetan Plateau, and several high-elevation regions in the mid-latitudes. Nelson also co-manages an extensive field-based climatology program in the Upper Peninsula's Huron Mountain Club, one of the largest areas of old-growth forest in the eastern United States.

**Kelsey Nyland is a PhD student in the Department of Geography, Environment, and Spatial Sciences at Michigan State University.**
She is an Arctic Geographer with a wide range of research interests with the common thread being all things frozen or once frozen. She has participated in research projects and publications focusing on mapping and remote sensing related to permafrost (perennially frozen ground), the impacts of climate change on permafrost, indigenous, and industrialized Arctic communities, and Arctic urban sustainability. Her dissertation focuses on the evolution of current and past periglacial (cold and unglaciated) landscapes, particularly those found in central and western Alaska, though she remains involved with permafrost monitoring on the Alaskan North Slope, and expeditions to central Siberia and the Polar Ural Mountains.

**Leah Owens is an Undergraduate Student in the Department of Kinesiology from Michigan State University.**

Ms. Owens is majoring in Kinesiology with minors in Global Public Health and Epidemiology and Health Promotion. She has served on the Future of Public Health Student Leadership Panel to advise new initiatives within the Division of Public Health at MSU. Ms. Owens has also worked as a communications assistant at the Institute for Public Policy and Research (IPPSR) to produce a series of public policy forums linking academic research to legislators. As a part of IPPSR, she has helped to edit policy briefs from the Michigan Applied Public Policy Research Grant. Upon graduation in Spring 2020, she will work towards a Master of Public Health degree.

**Lynn Paine, PhD is Associate Dean for International Studies in the College of Education and Professor of teacher education and sociology at Michigan State University.**

Dr. Paine's work focuses on comparative and international education and the sociology of education, with an emphasis on the relationship between educational policy and practice, the links between education and social change and issues of inequality and diversity. Dr. Paine's work on learning in and from practice draws on her ongoing comparative research of teacher education. Her participation on "Learning from Mentors," a comparative study of mentored learning to teach, and her more recent NSF-funded leadership of a comparative case study of policies and practices that support beginning teacher learning will contribute to shaping the program. Having been visiting professor at several universities in China, Hong Kong and Singapore, Dr. Paine brings extensive experience in working across language, cultural and policy differences to talk about teacher education.

**Olivia Porth is an Undergraduate Student in the Department of Food Science and Human Nutrition at Michigan State University.**

Ms. Porth is a senior studying nutritional sciences and is recognized as a Justin S. Morrill Leadership Fellow. She has public health work experience with both Dr. Tyler Becker, an MSU professor, and with the Michigan Department of Education. Ms. Porth participated in the One Health study abroad experience in Nepal during summer 2018. Upon graduation in spring 2020, she plans to prepare for medical school.

**Trixie Smith, PhD is the Director of the Writing Center and Red Cedar Writing Project at Michigan State University.**

After earning a BA in English and Elementary Education from Mobile College, Dr. Smith spent several years teaching middle and high school students in southern Alabama. She then headed to The University of South Carolina where she earned an MA in English (Renaissance Drama), an MLIS in Library and Information Science, and a PhD in Composition and Rhetoric, as well as a Graduate Certificate in Women's and Gender Studies. Her teaching and research are infused with issues of gender and activism even as they revolve around writing center theory and practice, writing across the curriculum, writing pedagogy, and teacher training. Likewise, these areas often intersect with her interests in pop culture, service learning, and the idea that we're just humans learning with/from other humans. Dr. Smith is also a member of the faculty in Rhetoric and Writing as well as the Center for Gender in Global Contexts at MSU.

**Samantha Steinke is a Master of Science Student in the Western College of Veterinary Medicine at the University of Saskatchewan.**

Ms. Steinke earned a BS Honours degree in physiology and pharmacology and is working towards a MS in biomedical engineering from the University of Saskatchewan. As part of a research group in WCVM, she worked to build a better rehabilitation harness for equatine patients. Teaming up with RMD Engineering Inc., a Saskatoon engineering firm, the project developed and installed a dynamic horse lift system (with a breastplate to prevent pressure sores during longterm use) at the WCVM. This work could greatly improve the survival rates of horses experiencing limb injuries. Ms. Steinke's time at the University of Saskatchewan has also included serving as a speakers co-ordinator for the Global Health Conference committee, volunteering as a team leader for U of S Orientation, and a trip overseas to Africa following her first year of studies to work as a humanitarian mission volunteer in Tanzania.

**Ramya Swayamprakash is a PhD student in the Department of History at Michigan State University.**

Prior to MSU, Ms. Swayamprakash earned a Bacholor of Mass Media from the University Mumbai, Master of Arts and Master of Philosophy in political science from Jawaharlal Nehru University, and Master of Urban Design from Lawrence Technological University. Her research is organized into inquiries about infrastructure and border history with a geographical focus on the U.S.-Canada border along the Detroit River. She is currently in the process of publishing scholarship on the role of dredging as a political and territorializing process in the Detroit River in the late nineteenth and early twentieth century. Ms. Swayamprakash is interested in movement, migration, and mobility along and across political borders, and how borders manifest themselves on the ground and on water. Her

dissertation, tentatively entitled “Freshwater Frontier: Island making, dredging, and infrastructure in the Detroit River 1865-1930” explores the origins, motivations, and effects of dredging to offer a new history of the Detroit River.

**Addie Thompson, PhD is an Assistant Professor in the Department of Plant, Soil and Microbial Sciences at Michigan State University.**
Dr. Thompson earned a BS from Iowa State University and PhD from the University of Minnesota and complete Postdoctoral work at the Univeristy of Minnesota and Purdue University. At the most broad level, her lab is interested in studying maize, and how different genotypes grow in different environments. Dr. Thompson uses many technologies and approaches to investigate this area, from quantitative genetics to phenomics to statistical and physiological modeling. Emphasis is placed on addressing biologically meaningful and agriculturally relevant questions, with both domestic and international potential applications. Her other research interests include plant morphology; drought stress; high-throughput phenotyping.

**Xinyi Tu is a PhD student in the Department of Plant, Soil and Microbial Sciences at Michigan State University.**
Prior to MSU, Ms. Tu earned a BS in environmental science, policy and management and a MS in land and atmospheric sciences from the Univeristy of Minnesota-Twin Cities. She is currently involved in an on-farm study with the objectives to 1) evaluate how soil health indicators from on-farm soybean study are linked to fall soil residual nitrogen, 2) model the soybean yield and fall residual nitrogen with Agricultural Production Systems Simulator, and 3) identify the soil health indicators and management practices that would soybean yield while reducing environmental costs. This project develops understanding of farm tillage and crop management effects on nitrogen loss.

**Chelsea Weiskerger is a PhD student in the Department of Civil and Environmental Engineering and Environmental Science and Policy Program at Michigan State University.**
After obtaining a Bachelor of Science degree in Wildlife Biology from Colorado State University, she found a passion for water resources research while working at the Indiana Dunes National Park. Field monitoring work at Chicago and northwest Indiana beaches led to graduate water resources research at Michigan State University. Ms. Weiskerger’s current research involves modeling and characterizing beach microbial dynamics and determining how sand and water at the beach interact to move bacteria, viruses, and other microorganisms throughout the nearshore system. Upon graduation, she aims to continue her research and modeling

of lake systems, while connecting that research to public outreach as well as clean water and public health policy.

**Qing Xia is the Assistant Director of the Office of China Programs in International Studies and Programs at Michigan State University.** Ms. Xia has been serving the MSU community for 19 years. She is as a faculty advisor for the Chinese Students and Scholars Association (CSSA) activities and plans to enrich their lives beyond class. She also advises other student organizations as well as individual student with their academic questions and their personal issues. Ms. Xia works with Office of International Students and Scholars to handle specific cases and tough situations crucial to the MSU campus. Being fluent in both English and Chinese, she plays a major role in helping visiting scholars and international students work through their visit and study at MSU. Beyond students and scholars' services, she contributes to MSU's education exchange programs with Chinese institutions by working with various MSU colleges and faculty members in a wide variety of fields.


# Poster Presentation Abstracts

**Effect of UV/H2O2 Advanced Oxidation process on degradation of saxitoxin in Drinking Water Treatment Plants**

Shardula Gawankar, Rebecca H. Lahr

Harmful algal blooms have affected Lake Erie for decades, causing tap water shutoffs in Toledo in 2014 when toxic cyanotoxins were found in treated drinking water. Such occurrences are becoming more common across the globe and are triggering a need for research in toxin removal from drinking water. Water treatment plants on Lake Erie are currently focused on microcystins, the most common form of cyanotoxin, but climate change is predicted to increase the occurrence of other types of

cyanotoxins, like saxitoxin. Saxitoxin, the paralytic shellfish toxin (PST), is a neurotoxin that is produced by marine dinoflagellates and freshwater cyanobacteria, typically in tropical regions. Climate change coupled with agricultural runoff makes Lake Erie a potential hub for saxitoxin production in the future. There is currently no oxidation process that a water treatment plant can implement to simultaneously remove all the cyanotoxins (microcystin, saxitoxin, cylindrospermopsin, and anatoxin) from drinking water. Conventional oxidation treatments like chlorination, use of ozone and potassium permanganate are not effective in removal of all cyanotoxins. Hydroxyl ion oxidation using the UV/H2O2 process breaks down microcystin, anatoxin, and cylindrospermopsin, but there is no research conducted to study its effect on saxitoxins. Therefore, we proposed to determine if UV/H2O2 can indeed be installed as defense against all the cyanotoxins.

**Deriving Coastal Lake Ice Phenology Using Sentinel-1 Acquisitions And Cloud-based Detection Algorithms**

Grant Gunn, Erin Bunting

The timing of freeze-up and break-up for small ponds and lakes in subarctic and Arctic environments are useful proxies for a changing climate, as the main drivers in ice development are air temperature and snow depth. Active microwave synthetic aperture radar (SAR) technology has been shown to be more effective at delivering reliable observations of the Earth's surface, as acquisitions can be made regardless of solar illumination or cloud-cover. Using SAR sensors to track ice phenology on small ponds and lakes of the Arctic was typically limited by the tradeoff between spatial and temporal resolution. With the launch of Sentinel-1 A/B, the constellation of sensors has reduced the revisit time of high-spatial resolution acquisition to days in northern environments, increasing the data volume exponentially. This study introduces the application of an automated approach to track the timing of ice freeze-up and melt-onset for several lowland regions of the Arctic, including the Alaskan North Slope, Old Crow Flats (Yukon), Hudson Bay Lowlands (Manitoba), and Lena Delta (Siberia), among others. The algorithm utilizes Google Earth Engine to reference and manipulate the catalogue of Sentinel-1 acquisition to flag shifts in thermodynamic regimes on a per-pixel basis, resulting in a) average inter-lake ice phenology, and b) intra-lake phenology with a spatial resolution of 40 x 40m. Derived freeze-up and melt onset dates are validated through in-situ weather observations, as well as a thermodynamic ice model. The development of cloud-based algorithms to process large volumes of satellite data is a burgeoning area of applied research development in remote sensing. The movement to launch satellite constellations (Sentinel 1 A/B, Radarsat Constellation Mission) will decrease revisit times, but also significantly increase the amount of data available to researchers, and will require high performance computational capacity. This presentation demonstrates a scaling of algorithms typically applied over individual or cluster of lakes, on a much larger scale, and completed in a fraction of the time.

**The Deepwater Horizon and Kalamazoo River oil spills: A comparison of causes and impacts**

C. A. Hejase and V. V. Tarabara

The increase in the exploration, production, and consumption of oil and other petroleum products has led to a higher threat of oil spills. In 2016, the United States consumed a total of 7.2 billion barrels

of petroleum products, which translates into the average of 19.7 million barrels per day. Large oil spills such as the 2010 Deepwater Horizon (DWH) oil spill in the Gulf of Mexico and the 2010 Dilbit spill into the Kalamazoo River in Michigan have raised a global awareness of the related risks and their environmental and socioeconomic impacts. In this project, the two spills are compared in terms of their causes, physical and chemical characteristics, the oil remediation techniques implemented, and the environmental and economic impacts associated with each event. The comparative analysis of the two spill events, which occurred within ~ 2 months one from another, can help determine the extent to which status quo technology, government policy, and corporate practices are adequate for meeting the challenge. In addition, the emerging technological solutions to cleanup future oil spills will be addressed. The similarities, as well as substantial differences (in-land vs offshore, crude vs dilbit oil, etc) offer useful contrasts and insights for different spill scenarios Based on this comparison, we conclude that existing regulations related to oil and gas industries are largely reactive rather than proactive; in other words, these policies are not designed to effectively prevent oil spills focusing, instead, on remediation once oil spills occur.

**Studying materials science and engineering at the University of Toronto**
Jane Howe, et. al.

This poster presents an overview of the programs offered by the Department of Materials Science and Engineering and Department of Chemical Engineering and Applied Chemistry. We will highlight two research centers: 1) Ontario Centre for the Characterization of Advanced Materials and 2) Bio-Zone. Ontario Centre for the Characterization of Advanced Materials is a unique facility providing enabling information for a wide array of applications covering the many disciplines involved with advanced materials. BioZone researchers work at the interface of biology and engineering and are capitalizing on the dramatic progress in biology, particularly in genome science and computational biology, to provide sound bioengineering solutions to real-world problems. BioZone unites researchers involved in all stages of taking an idea from the lab to commercial application so that viable technologies are in the context of technical, economic and public policy constraints.

**An overview of the materials and bioengineering programs at the University of Toronto**
Jane Howe and Susset Perez

This poster presents an overview of the programs offered by the Department of Materials Science and Engineering and Department of Chemical Engineering and Applied Chemistry at the University of Toronto. We will highlight two research centers: 1) Ontario Centre for the Characterization of Advanced Materials and 2) Bio-Zone. Ontario Centre for the Characterization of Advanced Materials is a unique facility providing enabling information for a wide array of applications covering the many disciplines involved with advanced materials. BioZone researchers work at the interface of biology and engineering and are capitalizing on the dramatic progress in biology, particularly in genome science and computational biology, to provide sound bioengineering solutions to real-world problems. BioZone unites researchers involved in all stages of taking an idea from the lab to commercial application so that viable technologies are in the context of technical, economic and public policy constraints.

**Identifying and Parameterizing Corn Leaf and Canopy Characteristics for Crop Modeling** Zhongjie Ji, Ruijuan Tan, Addie Thompson

Traditional breeding is based on observation of phenotypic traits to select superior genotypes. More recently, genomic selection has enabled selection based on genetic data alone, after training a model to relate genotypic to phenotypic variation. However, plant performance not only depends on the genotype, but is also affected by the environment and genotype-environment interactions, which decrease the accuracy of both phenotypic and genomic selection. Improving predictions of plant performance in diverse environments would be useful for selecting proper varieties, from both a breeding and production standpoint. One approach to improving these predictions is to leverage physiological crop growth models to incorporate environmental factors and their impact on complex traits. To make this useful for breeders, models will need to be parameterized on a genotype-specific basis. The objectives of the current study are to (i) identify heritable leaf and canopy characteristics that can be used as model parameters, (ii) measure and model these parameters across diverse maize lines, (iii) estimate the accuracy of prediction for the model parameters. The power function of leaf area distribution calculated from ear leaf area was used to calculate total leaf area, and the estimates for leaf 6 were compared to observed values. These traits will be used alongside canopy characteristics as the parameters for physiological crop growth models to accurately predict high-level complex traits. Future work will include analysis of multi-environment phenotypic data and genomic prediction to improve prediction of new genotypes in unobserved environments.

**Food-Water Nexus across Space**
Yingjie Li, Jianguo Liu

Sustaining ecosystem health and enhancing food security are among the world's Sustainable Development Goals. It is widely concluded that international food trade can enhance global food security; however, our study shows that excessive agrifood export not only deteriorates domestic water ecosystems but also harms domestic seafood security. We take the international trade between the U.S. and China as an illustration, and conclude that the U.S. may suffer both environmentally and economically from agricultural food trade while China benefits from both, and exporting excessive agricultural products can threaten domestic seafood security. These findings suggest the need to evaluate both environmental and economic consequences of international trade, and develop an integrated food-water nexus solution to optimize global ecosystems conservation and ensure food security.

**Genotypic and phenotypic analysis of Streptomyces spp. causing scab on potato and turnip**
Saltanat Mambetova, Ray Hammerschmidt, Noah Rosenzweig

Streptomyces spp. is soil-inhabiting filamentous bacteria that cause disease in a number of plants. There are over 500 species of Streptomyces, however only few of them are plant pathogenic. To date, at least 13 different species of Streptomyces can infect and cause disease on potato and other root crops. Streptomyces scabies is the most common and widely distributed pathogenic species among this bacteria. The objective of this study was to characterize plant-pathogenic Streptomyces spp. associated with common scab infected potato tubers and turnip roots harvested in Michigan. Over 100 Streptomyces isolates were recovered from pitted and surface scab lesions from potato tuber and turnip root. The isolates were identified by morphological and molecular methods. Preliminary results indicated that 50 isolates causing pitted and surface lesion have genes associated with

pathogenicity island such as thaxtomin synthase (txtA and txtAB), tomatinase (tomA) and a necrosis protein (nec1). Results of sequence analysis of the 16S rRNA gene indicated that 10 of the isolates were similar to S. scabies. Additionally, sequence analyses of the thaxtomin synthase, tomatinase, necrosis protein and three housekeeping genes (rpoB, recA and atpD) were performed.

**Early Detection of Potential Hepatitis A and Norovirus Outbreaks in Detroit, MI**
Camille McCall, Huiyun Wu, Irene Xagoraraki

Diseases associated with food- and water-related viruses, such as hepatitis A virus and norovirus, often result in large-scale epidemics. Viruses pose a major threat to human health because of their high mutation rates, low infectious dose, and lack of medications to treat viral infections. These agents can be especially difficult to manage in urban settings since high population density promotes the rapid spread of communicable diseases. Therefore, methods for early detection and surveillance of disease outbreaks are needed to protect public health. Water-related viruses excreted in human feces can remain stable and persist in wastewater systems. Thus, we propose a wastewater-based approach for early detection and surveillance of water-related viral disease outbreaks in urban communities. Untreated sewage samples (n=54) were collected from the wastewater treatment facility in Detroit, MI, from November 2017 to February 2018. Viruses were concentrated from large volumes of wastewater using a virus adsorption-elution method. Viral concentrations for hepatitis A virus and norovirus genogroup II in sewage samples were determined using real-time polymerase chain reaction assays. Next, we assessed correlations between these viral concentrations and clinical cases for their respective diseases in communities serviced by the Detroit WWTP. Virus concentrations for hepatitis A virus and norovirus were highest during November and December, respectively. Significant findings show temporal correlations between viral concentrations in sewage samples and the number of reported disease cases in service counties.

**Prevalence and Diversity of Human Herpesviruses (HHV) in Wastewater from a Large Urban Area**
Brijen Miyani, Camille Mccall, Irene Xagoraraki

Human Herpesviruses (HHV) are double stranded DNA viruses that belong to the family of Herpesviridae. All eight types of HHV are prevalent among the USA population. Most of them affect at least 70% of adults. HHV 5, 6 and 7 have been found in at least 30% of children by the time they reach age 5. All HHV establish lifelong latency and can reactivate, especially in immuno-compromised individuals. Due to their abundance, lifelong latency and lack of vaccines these viruses are ineradicable. HHV are shed in genital and ocular secretions, saliva, urine and stool, depending upon their mode of transmission, and ultimately end up in wastewater plants. To evaluate prevalence and diversity of HHV in a large urban center, samples were collected from the Detroit wastewater treatment plant between November 2017 and February 2018. All the three interceptors namely Oakwood, Jefferson and NIEA that feed wastewater into the utility, were sampled in triplicates.

**Testing of a rehabilitation harness and breastplate to aid in healing from musculoskeletal injuries in horses**
Samantha Steinke, Julia Montgomery

Limb injuries rarely result in death for humans, but for horses euthanasia is often necessary, which is a major welfare concern for equine sports. Limb injuries in horses can result in death, due to their large size and heavy reliance on limbs for support. The first objective was to design a harness through evaluation of anatomical, physiological and behavioral parameters. The second objective was to test an instrumented breastplate measuring pressure, temperature and humidity. The goal is development of a rehabilitation harness for use with a computer-controlled dynamic lift, supporting the weight of the horse around its load bearing structures. The harness prototype has been weight tested to 600kg and allowed for a 40% reduction of the horse's weight. Addition of an H-frame allowed for a 46% (140 of 301kg) reduction of weight on the forelimbs. An instrumented breastplate is currently under development to measure the amount and duration of pressure on underlying tissues to improve harness design. The breastplate has been weight tested to 620kg, assessing the safety of its use. This fiberglass prototype is lined with silicone air pockets to alter pressure distribution through an inflation and deflation cycle, allowing blood flow to return to the skin momentarily. The breastplate is equipped with pressure, temperature and humidity sensors to monitor skin surface temperature, humidity and the amount and duration of pressure. Material testing and modifications are ongoing. Once these are complete, testing will continue in live horses. Next steps include incorporation into the harness and ongoing prototype modifications.

**Incorporating Sand Dynamics into Beach Water Quality Science and Policy**
Chelsea Weiskerger, João Brandão

Water quality monitoring and science at nearshore/beach areas is largely limited to microbial/bacterial contamination of water. However, recent research has found that the sand at beaches can be more contaminated than the water itself. Given that most beachgoers spend more time in the sand than the water, they are potentially exposing themselves to higher concentrations of microbes than previously thought. Recreational water quality policy often does not account for the impacts of beach sand on microbial dynamics at the beach. This is not only a problem for the health of beachgoers themselves, but also for the animal visitors to the beach. Similarly, degraded sand quality at a beach can lead to ecosystem health problems as well. The addition of sand dynamics into recreational water quality science and policy under a One Health framework is expected to maximize the protection of beaches and those who use them. Argentina, though, is the only nation that has adopted sand management practices at beaches. This is an opportunity to bring together sand and water dynamics, to more fully protect beachgoers and preserve beach systems.

**Screening for Potential Livestock Disease using Shotgun Sequencing Analysis of Environmental Samples**
Huiyun Wu, Irene Xagoraraki

Early detection and prevention of livestock disease outbreaks is paramount to the animal agriculture industry. In agriculture-dominated watersheds it is impractical to test every animal for potential disease. Sampling runoff-impacted surface water from agricultural areas represents a community fecal and urine sample of the livestock population in the sub-watershed; therefore, it can serve as a screening tool for the presence of potential disease outbreaks in the corresponding livestock population. Whole genome shotgun sequencing analysis of the collected samples will provide a wide range of potential pathogens present in the sample. In this paper we characterized bacterial

contamination in Sloan Creek sub-watershed, located in the Great Lakes basin. In addition to E. coli, we quantified bovine-associated bacteroides indicating that pollution is partly originating from livestock sources. We conducted whole genome shotgun sequencing analysis of water samples collected in the mouth of the sub-watershed. The analysis of the genomic sequences was focused on the identification of potential cattle pathogens. We observed genomic sequences related to Mycobacterium, Brucella, and other species. The information serves as a screening tool for the identification and early detection of signals of potential livestock disease, including bovine tuberculosis. This proposed approach may only serve as a screening tool for the presence for potential disease. When signals of disease of interest are observed, further testing of manure and individual animals is required.

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