News from

EMPOWER

SPRING 2019

EMPOWER:

Excellence in Training and Research Across Disciplines

From the Director

Every December, more than 25,000 scientists from across the world come together to share their scholarship at the Fall Meeting of the American Geophysical Union (AGU). This year, over 20 members of the EMPOWER team headed to this international conference in Washington, D.C., to present their research and network with colleagues. A record-breaking 11 EMPOWER students presented this year, and three of those students (Emily Baker, Crystal Burgess, and Amanda Campbell) received Outstanding Student Presentation Awards, which are only given to 2-5% of student presenters. This year, several EMPOWER trainees also co-authored presentations with faculty and students from Syracuse and University of Rwanda on the outcomes of our international summer field course. The students found that research and teaching collaborations with the University of Rwanda have emerged from the field class experience, and class survey results show that the course supported development of cross-cultural and cross-disciplinary communication.

Juliette Confiance Kabatesi and Nawally Umutoniwase, from University of Rwanda, exploring Washington, DC with EMPOWER trainee Geoff Millard during the American Geophysical Union meeting. Photo credit: Geoff Millard

Perhaps most notably, our students went above and beyond to mentor two University of Rwanda students they met during the field class. This enabled the Rwandan students to fully participate in the AGU meeting. Amanda Campbell (Ph.D. student, Earth Sciences) and Geoff Millard (Ph.D. student, Environmental Engineering) advised two students from University of Rwanda, Juliette Confiance Kabatesi and Nawally Umutoniwase, on how to prepare and submit an abstract for the meeting. Amanda and Geoff worked with Juliette and Nawally to plan travel to Washington, D.C., which was their first visit to the United States. Throughout the meeting, EMPOWER students invited Juliette and Nawally to attend sessions, share a meal, and see one another's presentations. In addition to presenting their work at one of the largest international conferences in the world, our colleagues from Rwanda were able to develop new friendships, tour local museums and visit national monuments during their weeklong stay in Washington, D.C.

EMPOWER supports student cross-cultural experiences, preparing them to be global citizens with appreciation of water-energy concerns throughout the world, including in developing countries. The research collaborations and mentorship opportunities that have emerged show that international experiences have very real and tangible impacts on our students, and those we engage with abroad. They also show that our students are putting their own stamp on our program through their extraordinary efforts to collaborate with one another and new colleagues from all over the world.

—LAURA LAUTZ, *Director, EMPOWER*

ON THE COVER: Trainees debate the best strategies for implementing an urban agriculture system during Water-Energy Seminar in the EMPOWER suite. Photo credit: Laura Lautz

Science Communication Workshop

For 11 years, Alan Alda hosted PBS's *Scientific American Frontiers*, where he talked to hundreds of scientists about their research. The conversational style he used during these interviews helped generate relatable and lively explanations of science topics. The PBS show spawned a science communication training program called the Alan Alda Center for Communicating Science, housed within the journalism school at SUNY Stony Brook in Long Island, New York.

EMPOWER team and Alan Alda trainers Nicole Levy and Celia Schaefer after a full day of science communication training. Photo credit: Annie Pennella

The Center, founded by Alda in 2009, "empowers science and health professionals to communicate complex topics in clear, vivid and engaging ways," according to the program's website, *www.aldacenter.org*. These hard-won skills allow scientists to convey their knowledge more effectively to both scientists and non-scientists alike. Howard Schneider, the dean of Stony Brook's journalism school, said science departments were initially skeptical, with many thinking Alda's improv-style science communication training would be a distraction. In the years since the school began at Stony Brook, however, the culture has shifted. Now, two graduate programs require students to take the center's classes and all SUNY Stony Brook medical school students receive 10 hours of training.

EMPOWER trainees attended a full-day Alan Alda workshop on February 8, 2019, at the Syracuse University Sheraton. In total, 19 trainees worked through a series of improvisation and communication exercises to test their skills and challenge their understanding of how to best convey their science.

"Science can't have an impact without effective communication," said program director Laura Lautz. "The Alan Alda workshop gave our students the chance to refine their research message and practice their communication skills, while also having a bit of fun."

Welcome professors Christa Kelleher and Teng Zeng to the EMPOWER team!

EMPOWER's faculty leadership group meets regularly for progress review, programming discussions and to make admission and seed grant funding decisions. We are pleased to welcome our two newest team members, professors Christa Kelleher and Teng Zeng.

Dr. Christa Kelleher is an assistant professor and holds a joint appointment with Earth Sciences and Civil and Environmental Engineering. She studies the relationship between landscape context (in terms of geology, vegetation, soils, and climate)

and hydrologic behavior across multiple scales. Her work uses hydrologic models to understand how hydrologic systems function and how water quality and quantity may be altered under future scenarios of climate or land use change.

Faculty Spotlight

CHRISTOPHER JOHNSON

Empower Leadership faculty member Professor Christopher Johnson started his career at Syracuse in 1989 as a postdoctoral research associate. He joined the civil and environmental engineering faculty the following year and chaired the department from 2010 to 2014 after serving one year as interim chair. He also served as interim director of the Renée Crown University Honors Program from July 2016 until June of this year. He has served on many committees and task forces within the College of Engineering and Computer Science and across the University.

In addition to serving on the engineering faculty at Syracuse, Johnson has served as a visiting faculty member at Charles University in Prague and Griffith University in Brisbane, Australia. He is involved in a number of research projects in the broad area of environmental chemistry, including work on the fate of trace metals in forest soils and landscapes; the effects of clear-cut logging on soils and drainage waters; and the changing acid-base chemistry of soils historically affected by acid rain. Johnson has served on advisory panels for the U.S. Environmental Protection Agency, the National Academies, the National Science Foundation and the Swedish Research Council.

Dr. Johnson is known as a skilled collaborator across disciplines. Anne Mosher, associate professor of geography and chair of the Maxwell School's Citizenship and Civic Engagement Program, cites Johnson's skill as a collaborator. As a member of an interdisciplinary research team at Syracuse that brought together engineers, natural scientists and social scientists, she says, "Chris operated as a skilled translator between these constituents, who often operate in silos. Because of him, we found common bonds faster and were able to start doing real work together."

Johnson earned a B.S. in civil engineering, an M.S. in statistics and a Ph.D. in geology, all from the University of Pennsylvania. He is a member of Phi Beta Kappa and Tau Beta Pi, and was a Fulbright Scholar in the Czech Republic in 1994. He was recently named associate provost for Academic Affairs.

Broadly, Dr. Kelleher's work also aims to improve how scientists and engineers utilize models, to improve how models may be carefully applied to a range of different problems. Beyond hydrology, Dr. Kelleher is particularly interested in scientific visualization, and how scientists can more effectively communicate their work through graphs, maps, and figures.

Dr. Zeng is an Assistant Professor in Civil and Environmental Engineering. His research combines controlled laboratory experiments with field work to study chemical processes occurring across diverse natural and engineered aquatic environments. Recent work includes assessing transformation processes of organic contaminants and their interactions with dissolved and particulate constituents in natural waters, and characterizing sources of harmful byproducts to minimize their formation during drinking water purification and wastewater recycling. The goal of this important work is to promote water sustainability while protecting public health.

Trainee Update: Where are they now?

YASKIRA MOTA

Yaskira Mota graduated from both Syracuse University and EMPOWER in 2017. She obtained a CASSE (Certificate of Advanced Study in Sustainable Enterprise) as part of her professional development coursework. For her Career Pathways Experience, she interned at O'Brien & Gere, the firm where she is now employed full time as an engineer.

"I am currently working in the Syracuse office of O'Brien & Gere (now OBG, Part of Ramboll), but in May 2019 I will be transferring to the Chicago office. I do a lot of work on remediation projects and sometimes stormwater projects. My day-to-day activities vary based on the project, but generally include a lot of GIS work, data management, field work (for now mostly sampling, in Chicago it will be to help manage a remediation site), stormwater models and report writing. Once I am in Chicago my work will be almost entirely on-site remediation.

"Outside of work I am the treasurer for the Syracuse Professional Chapter of Engineers without Borders. We are currently working on a water distribution project for Las Majadas in Guatemala."

SAMUEL CALDWELL

Samuel Caldwell graduated from Syracuse University and EMPOWER in 2018 and promptly moved to Richmond, Virginia, to begin work as a hydrologist for the U.S. Geological Survey. As a trainee Sam completed thermal infrared certification and just recently published his M.S. work highlighting the applications of drone thermal imaging to understand stream hydrology in *Science of the Total Environment*.

"I began work in July 2018 and hit the ground running. Two weeks in I was helping to conduct a small drone survey over Ashville Bridge Creek in the northwestern part of the Back Bay National Wildlife Refuge. Most of my responsibilities concern analyzing and maintaining a groundwater monitoring network in Virginia Beach, Virginia. Additionally, I conduct an annual electromagnetic induction logging survey in Virginia Beach and the Eastern Shore of Virginia, and annual water quality sampling in Suffolk and Virginia Beach.

"Richmond is a wonderful city. I live right on the James River with my twin brother living a stone's throw away. There's a lot of history here, as well as great restaurants and some excellent museums! I have recently applied to become a member of the Emerging Leaders Council at the Science Museum of Virginia."

Student Spotlight

EMILY BAKER

When I applied for EMPOWER, my goal was to obtain exposure to careers outside of academia. This past summer I spent 8 weeks working as an environmental consulting intern for Geosyntec Consulting in Seattle, Washington. During this internship, I was able to learn about the field of environmental consulting and gain firsthand experience assisting with various real-world projects. I was put in charge of portions of certain projects, such as conducting slug tests at a contaminated field site and then analyzing the data. This internship allowed me to participate in various aspects of consulting work, from field work to assisting with client reports. It also enabled me to make connections with scientists in the field of consulting, which may be useful as I pursue a non-academic career. Through a seed grant, EMPOWER supported my travel to this internship and my HAZWOPER safety training. By supporting me in this endeavor, EMPOWER enabled me to explore an area that was beyond my area of research expertise and outside of academia.

Trainee Emily Baker testing water quality while helping to develop a well during her environmental consulting internship.

EMPOWER has supported my exploration of fields beyond academia as well as the research for my dissertation. A seed grant I received from EMPOWER supported my participation in a short course on thermal infrared imaging and camera technology through FLIR, a company that produces thermal infrared cameras. This short course provided me with a better understanding of the physics involved in thermal infrared science and the limitations of the technology. This helped me complete my research on using thermal infrared imagery to measure stream temperatures and the best practices for correcting and analyzing such data. I presented this research at the American Geophysical Union annual meeting this past December, where I received an Outstanding Student Presentation Award. This past February, my paper on this topic titled "Improving the accuracy of time-lapse thermal infrared imaging for hydrologic applications" was published in *Journal of Hydrology*. Without the support from EMPOWER to attend the infrared short course, my expertise in this area of research would not be as strong as it is today.

JOSEPH WASSWA

EMPOWER trainees come from diverse backgrounds and varied research areas. We attend class and training programs together and develop a deeper understanding of how professionals can work together in the real world. Through friends I have made in the program, I have been able to organize small social events and meetings outside the classroom and our laboratories. This not only creates new friendships, but has also fostered potential research collaborations. For example, my doctoral research focuses on understanding the effect of biogeochemical processes like acidification, water and soil liming, photo and biodegradation on the chemical and optical composition and photoreactivity of dissolved organic matter (DOM) in the lakes found in New York's Adirondack Mountains. Initially, my research was aimed at understanding biogeochemical and biological processes. However, I have come to understand that hydrogeology and hydrology play a very big role in the chemical process of these lakes. Because of the large pool of expertise in the EMPOWER program from other programs like Geology and Earth sciences, I am already looking at collaborating with some of my friends from EMPOWER to more deeply understand how the hydrology and hydrogeology affects the water chemistry and biological process of my research sites.

Trainee Joseph Wasswa performing water sample collection in Uganda.

I am also collaborating with some of my fellow trainees in EMPOWER to understand the hydrology and geology of urban streams. Using the preliminary results from the first phase of my study (which I conducted thanks to an EMPOWER seed grant), I won a 2018 Pathfinder Fellowship from Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) to carry out the second phase of this study.

Every graduate student deserves an opportunity to explore additional career pathways. As a trainee who has had an opportunity to participate in all EMPOWER has to offer, I will tell you that participation in EMPOWER has great value for student scientists, no matter what their future careers may be.

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LEADERSHIP TEAM

Earth Sciences
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Christa Kelleher, Hydrology
Laura Lautz, Hydrology
Christopher Scholz, Sedimentary Basin Analysis
Donald Siegel, Hydrogeology

Civil and Environmental Engineering
Charles Driscoll, Environmental Engineering
Chris Johnson, Environmental Chemistry
Teng Zeng, Environmental Engineering

Chemistry
Tara Kahan, Environmental and Atmospheric Chemistry

Maxwell School of Citizenship and Public Affairs
Peter Wilcoxen, Energy Economics

S.I. Newhouse School of Public Communications
Donald Torrance, Science Communication

CONTACT

Visit ***empower.syr.edu*** for our calendar of events, full news stories, and the latest program information.

For more information about the program, contact Annie Pennella, EMPOWER Program Manager, *apennell@syr.edu*

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