News from

EMPOWER

SPRING 2018

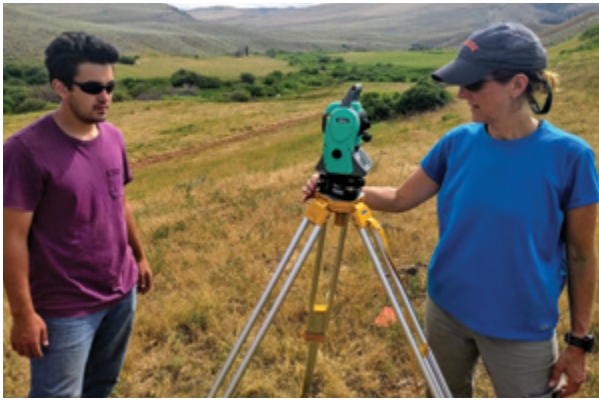
EMPOWER:

Fostering Experiential Learning and Interdisciplinary Engagement

From The Director

"It's not that I don't know what I want to do. It's that I don't know what I can do."

I recently heard this from an EMPOWER student and was struck by how succinctly this captures the mission of our program.



Laura Lautz and EMPOWER student Nathan Chien doing field work with The Nature Conservancy, a nonprofit conservation organization.

We know that most scientists and engineers with doctoral degrees work outside academia, and do not engage in research as their primary work activity. But despite this trend, graduate programs in STEM have traditionally maintained an apprenticeship approach, where students learn how to become professors at research universities through the student-supervisor relationship. This begs the question-do current graduate programs meet our students' needs?

In EMPOWER, more than half our students plan to seek careers in government or business (e.g., energy companies, environmental consulting). The rest intend to pursue careers in nonprofit organizations or in academia, but only 20 percent are planning for careers at research universities. For this reason, our goal is to prepare students with the technical knowledge and professional skills they need to compete for careers in energy, environmental consulting, government, nonprofits, academia, and beyond.

To meet this goal, it is critical for us to expose students to the full spectrum of career possibilities early in their program-to let them know what they can do. To this end, during the past year we have organized an environmental consulting career panel of local professionals; hosted visiting speakers from non-academic sectors, such as the National Park Service; and hosted a workshop by STEM Career Services, a career coaching company supporting graduate students seeking careers outside of academia. You can read about student engagement with our advisory committee-comprised of Ph.D. scientists working in non-academic sectors-elsewhere in the newsletter.

Now that our first cohort of students is graduating, we are seeing their success in securing positions in the private sector at environmental consulting firms, with the government through the U.S. Geological Survey, and as tenure-track faculty at undergraduate colleges. We'll continue to see what the future holds as students take lessons learned during their time at Syracuse, in the EMPOWER program, and pursue a diverse range of careers in STEM.

—LAURA LAUTZ, *Director, EMPOWER*

ON THE COVER: Professor Chris Junium and EMPOWER students measure water quality during the domestic field course, August 2017. Photo courtesy of Deanna McCay.

External Advisors Review Program Progress

EMPOWER's External Advisory Committee visited campus during the fall semester to check in on progress of the program, and provide feedback to the leadership team. During the visit, advisors engaged with student panels to discuss professional development training, career pathway experiences, and research. Advisors were impressed with the students, particularly with their communication and soft skills, adding, "... they are mixing different schools and they are creating skills they can use outside of academia, and you can't teach that; you have to practice it, and that's what this program does."

EMPOWER students participated in roundtable discussions with the advisors to hear about their career trajectories as Ph.D. scientists working outside of academia. EMPOWER's external advisors include:

>> Kevin Bohacs, senior research scientist at ExxonMobil
>> Gillian Dunlop, environmental scientist at Stantec
>> Steven Hamburg, chief scientist at the Environmental Defense Fund
>> William Kappel, hydrogeologist with the U.S. Geological Survey

Steven Hamburg engages with students during the external advisors meeting.

>> Aisha Morris, director of the RESESS Internship Program at UNAVCO

Advisors were pleased with progress to date, finding the program is realizing its original vision, and truly offering an interdisciplinary approach to graduate education. Advisors recognized the benefits to the University of strong collaborations across schools. The program design has set the stage for a unique training experience, and serves as a "hotbed" for innovation in STEM graduate education. But, to develop into a model that is replicated by other STEM programs, advisors pushed the program to continue to develop cultural norms and institutionalize its training elements, challenging the program to "aspire to be even more."

Students Travel to Rwanda for Field Program

Field research conducted by an interdisciplinary team under challenging conditions is a unifying capstone experience, and especially useful preparation for careers requiring intensive collaboration. EMPOWER has developed a two-course integrated field program in the northeastern U.S. and Rwanda that cross-cuts the EMPOWER research themes at the water-energy nexus. The 3-credit international field course will take twelve students and four faculty members to Rwanda for two weeks in early June of this year.

This course will engage EMPOWER students in field research as part of an interdisciplinary team working in challenging conditions. Students will travel to Lake Kivu, Rwanda, in the African Great Rift Valley, to study processes of hydrocarbon source rock formation, unique methods of fossil fuel extraction, and energy solutions used in the developing world. The course is designed to prepare students technically in their fields of study, but also to provide preparation for careers requiring intensive collaboration.

Faculty Spotlight

PETER WILCOXEN

Professor of Public Administration and International Affairs in the Maxwell School

A gift from Maxwell School alumnus James Ajello '76 MPA has created a new professorship in energy and environmental policy, while supporting interdisciplinary research projects in that field. Peter Wilcoxen, professor of public administration and international affairs, Laura J. and L. Douglas Meredith Professor for Teaching Excellence, and director of Maxwell's Center for Environmental Policy and Administration (CEPA), will serve as the inaugural Ajello Professor in Energy and Environmental Policy. Wilcoxen, also a nonresident senior fellow at the Brookings Institution and senior investigator for EMPOWER, studies the effect of environmental and energy policies on economic growth, international trade, and the performance of individual industries. He has published more than 70 papers and has co-authored books on the design of an international policy to control climate change, on the design and construction of large-scale economic models, and on using environmental taxes as part of fiscal reform in the United States.

As Ajello Professor, Wilcoxen will oversee an ambitious array of research projects and opportunities for student involvement in CEPA. Funded initiatives will include interdisciplinary pilot projects connecting Maxwell School faculty with colleagues from across Syracuse University, thus linking Maxwell-based expertise in energy and environmental economics, environmental policy and sustainability, climate science, behavioral economics, data integration and analytics, geographic information systems, and other areas with University-based expertise in such fields as electricity generation and distribution, renewable energy, cybersecurity, information technology, and regulatory law, among many others.

The Ajello Professor will also train graduate and advanced undergraduate students in research methods and involve those students in interdisciplinary projects sponsored by the professorship. Via research apprenticeships for graduate students and undergraduate internships geared to experiential learning, students will play a role in developing solutions to real-world energy and environmental problems.

According to Wilcoxen, the new funding will contribute directly to the strategic plans of Maxwell and the University, which emphasize interdisciplinary research. Wilcoxen sees this approach as particularly important for environmental and energy issues which are "deeply interdisciplinary, because they occur where social and natural systems meet. It's impossible to address these issues without understanding them from multiple perspectives."

The Rwanda course is focused on water and energy issues associated with Lake Kivu, one the Great Lakes of Africa and extant analogue of a "shale basin" in an active rift system. Lake Kivu's unique water column stratification is a source of methane for the Rwandan power grid (*www.lake-kivu.org/monitoring_programme*), and a colossal natural hazard to the riparian population, due to the extraordinarily high concentrations of carbon dioxide dissolved in its deep waters. The class will consist of on-site lectures and practical exercises in the fields of limnology, limnogeology, tectonics, aqueous chemistry, and energy.

Sunrise over Lake Kivu, Bethany Hotel, Kibuye Rwanda

Q&A with the EMPOWER Program Manager, Annie Pennella

Q What might readers not know about your background?

A I attended graduate school here at SU, was a TA during that time and did a research internship at Johns Hopkins before graduating. I have done medical research at SUNY Upstate Medical University since that time. I've coordinated studies for orthopedic surgery, cardiology, and neuroscience. Within the last five years, I have moved to doing project management rather than hands-on bench or clinical research. While I miss working directly with patients, I really enjoy managing the broader aspects of a project, and it feels like a natural progression after so many years in the trenches.

Q What sparked your interest in working on the EMPOWER NRT team?

A I loved attending college here. I was very fortunate to have had a fantastic faculty mentor to guide me, and that experience makes me feel very lucky to have graduated from this institution. The caliber of the Earth Science and EMPOWER faculty—their commitment to the student experience—impressed me. I am excited to be part of a program that will round out our participants' graduate training and give them that "something special" as they move forward in their careers after graduate school. EMPOWER provides participants with the insight, experiences and networking opportunities that make the difference between a good graduate education and an exceptional one.

Q How do you think your experience as a program manager in the medical field at SUNY Upstate will inform your role as the program manager for EMPOWER?

A Being a great program manager in any field is about three things: keeping a lot of disparate activities all going at the same time, meeting the needs of your team, and delivering on what you promise. That sums up the duties of the EMPOWER program manager quite well!

Q How do you feel about returning to the Syracuse campus in your new role?

A I'm having fun applying my skills in a new way managing EMPOWER. Working on campus feels like returning home after a long time away and I'm delighted to be back.

Q What do you do for fun?

A I'm on the board of directors for HumaneCNY, a local animal shelter. I love to cook and work in the garden and am an avid yogi!

As Program Manager, Annie oversees program communication, budget administration and academic program administration. She can be reached at apennell@syr.edu

Student Spotlight

NATHANIEL CHIEN

M.S. Student, Earth Sciences

Beyond all the professional development perks of EMPOWER like resume-building workshops, science-writing webinars, job panels, etc., the single greatest opportunity I have been afforded from EMPOWER is a research internship in Wyoming with The Nature Conservancy (TNC). This nonprofit organization, whose mission is to "conserve the lands and waters on which all life depends," was interested in collaborating with Syracuse University to study the effects that a unique stream restoration project may have on one of its managed watersheds. Through some combination of fortuitous events and laborious grant writing, I was awarded the chance to spearhead this collaboration and supplement my thesis with a rather unique study into manmade beaver dams.

Yes, that is right, TNC was interested in the feasibility of using manmade beaver dams to

EMPOWER trainee, Nathan Chien, patiently waiting on the installation of beaver dam analogues at Red Canyon Creek.

restore incised stream channels and better regulate annual streamflow from the beautiful Red Canyon Creek watershed. While research into the effects of beaver dams on local stream morphology is numerous, there is currently a dearth of research on their influence on watershed hydrology. Additionally, there have been few long-term quantitative studies of whether individual restoration projects using manmade beaver dams accomplish their

EMPOWER trainee, Nathan Chien, installing a water level logger in Red Canyon Creek.

objectives. This provided my advisor (Dr. Lautz) and myself with a perfect opportunity to fill a knowledge gap in the scientific literature.

With a growing interest in beaver dam hydrology, I headed out to Red Canyon this past August. While there, I learned more about TNC, their research objectives in Wyoming, and their goals for this beaver dam restoration project. My work included hydrologic data collection, land surveying, and natural beaver dam counting. Other benefits unrelated to research included being chased by grasshopper swarms, seeing my first pronghorn, and driving to Riverton, Wyoming, to witness the midday disappearance of the sun (coincidentally, this trip coincided with the solar eclipse).

Since returning, I have continued the work I began in Wyoming. I am modeling annual floodplain inundation related to beaver dams and learning useful new research approaches to apply to my future hydrology-related career. I am incredibly grateful to the EMPOWER program for providing me this career pathway experience. I know that it made my own graduate career uniquely rewarding and I hope it will provide a blueprint for other trainees to make the most of their time in EMPOWER.

DARCI PAUSER

Ph.D. student, Political Science

My work sits at the intersection of water resources management and political science. Through my involvement with the EMPOWER program, I am seeing just how critical this intersection is for solving some of the world's most difficult problems.

The EMPOWER professional development specialization area course in hydrogeology introduced me to this complex field, and prepared me to be a conscientious consumer of hydrological data. As a social scientist, environmental policy is my specialty, but until EMPOWER, I had very limited knowledge of hydrological processes. Now, when I interview scientists involved in water management during my fieldwork, I will be able to speak their language and understand the costs and benefits of various measures, methods, and interpretations of hydrological data.

I am also learning how best to convey these data to the public through a course in science communication taught by science journalist Dr. Erica Goode and through my involvement with the American Association for the Advancement of Science (AAAS) Center for Science Diplomacy.

With an EMPOWER seed grant, I was able to attend the Center for Science Diplomacy's annual workshop led by Dr. Marga Gual Soler. This workshop elucidated how science can buttress diplomacy and, conversely, how diplomacy can increase opportunities for international scientific communication and collaboration.

Participation in the workshop allowed me to begin a professional relationship with AAAS—one which I hope will last throughout my career. As my first contribution to the Center for Science Diplomacy's blog, I authored a post entitled, "The Science Behind Science Diplomacy" *(https://medium.com/sciencediplomacy)*. Through these experiences, I have come to believe that it is not through isolating, but a merging of disciplines that will allow the larger picture of sustainable natural resource management to become clearer.

Darci was presented a certificate of attendance at the AAAS workshop by Tom Wang, PhD, Director, AAAS Center for Science Diplomacy (left) and Marga Gual Soler, PhD, Senior Project Director, AAAS Center for Science Diplomacy (right).

Syracuse University
EMPOWER
Education Model Program on Water-Energy Research

204 Heroy Geology Laboratory
Syracuse University
Syracuse, NY 13244

LEADERSHIP TEAM

Earth Sciences
Christopher Junium, Organic Geochemistry
Laura Lautz, Hydrology
Christopher Scholz, Sedimentary Basin Analysis
Donald Siegel, Hydrogeology

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

Chemistry
Tara Kahan, Environmental & 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

Follow us on twitter: @SU_EMPOWER