fall2013

M | SNRE

Stewards

A magazine for alumni and friends of the School of Natural Resources & Environment

GOING GREEN, STAYING BLUE

PRESIDENT COLEMAN REFLECTS ON SUSTAINABILITY, SNRE, AND

features:

A WORK OF ART

PASSION DEFINED BETH DIAMOND'S WORK

BUILDING CAPACITY

MASTER'S PROJECT HELPS ASSESS CLIMATE READINESS

ADAPTATION JOURNEY

TWO ALUMNAE TRAVEL THE NATION TO CHRONICLE CLIMATE RESILIENCE

UNIVERSITY OF MICHIGAN

Of trash, triumphs, and tribe

In my last column, I issued a challenge to all comers: Who knows more digits of pi than I? I am still waiting on a taker. Fueled by this victory, I issue my second challenge to the SNRE community: an "I Love Lucy" trivia throwdown. One of my favorite episodes is the one where Lucy and Ethel secure a job at a candy factory, where they wrap chocolates moving toward them on a conveyer belt. We all know what happened next. It is among my favorites because it is Lucy at her zany and indomitable best. Also, she got to eat a lot of chocolate, which always seems like a good idea to me.

That episode came to mind this fall as part of an experiment in sustainability at The Big House. The experiment's goal: harvest higher-end reusable plates and cups from the waste stream and experiment with their re-usability at SNRE events. In the Regents' Guest Area, SNRE students pulled material from trash as fast as it arrived, all the while smiling, laughing, and explaining the project to the Regents' guests. Lucy would have been proud. In our first week, we rescued almost 400 plates and cups otherwise destined for the landfill. The story provides yet another example of our students' ingenuity, perseverance, and charm.

Equally impressive, our faculty continue to provide many opportunities for additional student engagement. Through their own curiosity and drive, faculty serve as professional role models. Among the more recent and notable examples of faculty triumphs:

- Inés Ibáñez received a $750,000 award from the National Science Foundation under its CAREERS program to study forest dynamics under global change. The highly competitive program recognizes early-career scientists for their abilities to advance the causes of science (see page 7 for details).
- Bradley Cardinale is part of a team that received a $2 million National Science Foundation grant to identify and test diverse groups of green algae toward the idea of creating high-yield, environmentally sustainable, and cost-effective biofuels (see page 14 for details).
- Don Zak received a $1.5 million Department of Energy grant to continue his work on global carbon cycles, climate warming, and the role of northern forests in carbon deposition.

… all of which include substantial student involvement. A sense of duty and shared purpose bind our students and faculty together. Our size and cross-disciplinary ethos make us a naturally close and collaborative community. But the SNRE experience goes beyond community; for me, the word "tribe" best describes us.

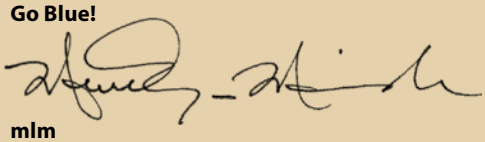
IAN MAKOWSKE (LEFT) AND DAN MITLER WERE AMONG THE SNREDS VOLUNTEERING TO HARVEST REUSABLE ITEMS.

One of the first times I used the term publicly as dean was at the prospective student visit day in March. At that time, hundreds of applicants were deciding where to pursue their graduate education. I used the term to describe SNRE's approach to community and what students would gain by coming here. We were looking for others to join our tribe, where together we would support our individual and collective goals.

Since the spring issue of *Stewards*, our community's response to tragedies best demonstrates the strength of our tribe. In May, we gathered to mourn the loss of Beth Diamond, one of our Landscape Architecture faculty; and again in September, for Courtney Wilson, a doctoral student and 2013 master's program graduate.

I want you to know that SNRE is unlike any other environmental school—and unlike any other place I know. We blend natural, social, engineering, and design sciences; we embrace working across disciplines; we are committed to justice and sustainability. We work relentlessly on problems of daunting complexity—and we do that as a community. Our tribe fights the good fight together.

Go Blue!



mlm

Mission:

The School of Natural Resources & Environment's overarching objective is to contribute to the protection of the Earth's resources and the achievement of a sustainable society.

Stewards

A magazine for alumni and friends of the School of Natural Resources & Environment

18 Going Green, Staying Blue

President Coleman discusses her legacy on sustainability and what challenges U-M will conquer next.

22 A Work of Art

The memory of Beth Diamond and her passion for community art are helping to advance the dream of an open-air art environment on Detroit's east side.

30 Adaptation Journey

Before the ink on their diplomas was dry, Kirsten Howard and Allie Goldstein set out on an excellent adventure: mapping responses to climate adaptation, SNRE style.

Stewards

Dean
Marie Lynn Miranda

Associate Dean for Academic Affairs
Don Zak

Associate Dean for Research
Michael Moore

Writers
Jillian Bogatar, Jim Erickson, Angela Fichera, Allie Goldstein, Kirsten Howard, Kevin Merrill, Nicole Moore

Photographers
Dave Brenner, Eric Bronson, Scott Soderberg

Design CDM Communications

Printer University Lithoprinters, Ann Arbor. Printed using soy-based inks on paper that contains post-consumer waste fiber

Cover photo: Scott Soderberg of Michigan Photo

Contact Information
School of Natural Resources & Environment
University of Michigan
440 Church Street
Ann Arbor, MI 48109
734.764.2550
snre.umich.edu

CALL OF THE WILD

Incoming students explore nature, case study, Biostation

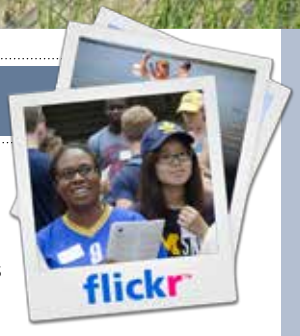
This fall's annual pilgrimage of incoming master's students to the University of Michigan Biological Station had a wild side. After a morning gathering at the Dana Building and boarding buses for the 260-mile journey to the shores of Douglas Lake, the incoming class got down to serious business: exploring the question of whether to allow a public wolf hunt in Michigan.

So, in addition to participating in traditional orientation activities such as swimming and kayaking (not to mention the group picture!), they became the first to return to their cabins each night with homework.

But extra credit was given to those teams who howled together at the moon. (Students received their own SNRE-branded flashlight to assist with all things nocturnal.)

Photo by Dave Brenner

MORE IMAGES OF THE STUDENTS AT ORIENTATION:
flickr.com/photos/snre/



The case study presented a challenge faced regularly by SNRE graduates: being in the position of a key decision maker who must consider the thoughts and perspectives of stakeholders, scientific evidence, and political and economic considerations.

Students also explored aspects of the case in teams, which is a hallmark of the SNRE curriculum and graduate experience. Current students David Wang and Sheena VanLeuven led the case development effort. Professors Steve Yaffee (B.S. '72, M.S. '73) and Julia Wondolleck contributed considerable insight and feedback.

And in terms of who got on those buses, Sustainable Systems was the most popular field of study, followed by Conservation Ecology and Environmental Policy and Planning. Combined, in-state and international (from 11 nations) students represented nearly half of all students.

BY THE NUMBERS

Incoming class:

145 GRADUATE STUDENTS

degrees / majors:

9 PHD **14** MLA **122** MS

- More than 100 undergraduate majors, from agriculture and anthropology to physics and water supply and drainage engineering
- 11 Returned Peace Corps Volunteers
- 2 veterans of America's armed forces

Latest works from SNRE faculty

BOOKS

Constructing Green: The Social Structures of Sustainability

SNRE Professor Andrew Hoffman and Rebecca Henn (Ph.D. '13)
MIT Press (2013)

Buildings are the nation's greatest energy consumers. Forty percent of energy is used for heating, cooling, lighting, and powering machines and devices in buildings. Despite decades of investment in green construction technologies, residential and commercial buildings remain stubbornly energy inefficient. This book looks beyond the technological and material aspects of green construction to examine the cultural, social, and organizational shifts that sustainable building requires, examining the fundamental challenge to centuries-long traditions in design and construction that green building represents. Contributors consider the changes associated with green building through a sociological and organizational lens and offer multidisciplinary insights into the transformative potential of green building and the obstacles that must be overcome.

(Co-author Henn is an assistant professor of architecture at Pennsylvania State University.)

Third Century program supports SNRE researchers

Seven researchers at SNRE have received funding under the U-M Third Century program, which promotes interdisciplinary work. The projects broadly examine issues of sustainability and resource-constrained environments. SNRE Professors Andy Hoffman and Don Scavia and Associate Professor Shelie Miller are members of the "Researching Fresh Solutions to the Energy/Water/Food Challenge in Resource-Constrained Environments" project; Assistant Research Scientist Jarod Kelly and Professor Greg Keoleian are part of the "Sustainable Transportation for a 3rd Century: An Interdisciplinary Approach to Addressing the Last Mile Problem for Enhanced Accessibility" project; Professor Ivette Perfecto is part of the "Student engagement with the local and the global food system" project; and Professor Paul Webb leads the "Integrating Internships into Undergraduate Education" project.

3 new Dow Fellows posted to SNRE for next 2 years

Three of six postdoctoral scholars selected for the Dow Sustainability Fellows program this fall have been posted to SNRE. The fellows serve for two years and work with mentors at each school. The SNRE-posted scholars and research topics are: Lianne Lefsrud joins the Erb Institute for Global Sustainable Enterprise and SNRE to examine climate change regulation and policy, and the role ambiguity plays in defining climate change, its effects, and responses by responsible parties; Sai Liang joins SNRE to explore how the economies of the global trade network are likely to be impacted by future environmental challenges, specifically a country's energy resources or availability of freshwater; and Ethan Schoolman joins the Erb Institute and SNRE to examine the relationship between local food systems, the environment, and quality of life of diverse social groups.

A Salute to Kaplan

Photo by Dave Brenner

Current and former students of Professor Rachel Kaplan (above, second from right), as well as colleagues across campus saluted her this spring as she began to wind down her SNRE career. Kaplan joined SNR in 1972 and is known for her environmental psychology research and teaching the "Research Paradigms" course to first-year doctoral students. She no longer is teaching, but is working on a new book co-edited with Avik Basu tentatively titled "Fostering Reasonableness." In addition to foundational chapters on the underlying framework of the Reasonable Person Model, the book includes 15 chapters that highlight its wide applicability (12 of which were authored by SNRE alumni). Her official retirement is set for 2015.

A Career Move

Ibáñez receives NSF award to study forest dynamics

Forest ecologist Inés Ibáñez has received a prestigious and competitive $750,000 award from the National Science Foundation to study how forests are responding to global climate change. Ibáñez, an assistant professor at SNRE, is one of 500 scientists nationally whose accomplishments and future research ideas were recognized. The NSF bestows its Faculty Early Career Development (CAREER) Program awards annually to junior faculty (those who are not yet tenured) for outstanding research, excellent education, and the integration of education and research within their organizations.

Results of Ibáñez's five-year study of forests in northern and southern Michigan may help land managers and policy makers maintain stable tree populations as they adapt to environmental changes, from invasive species to climate change.

Ibáñez earned her doctoral degree in 2006, and joined SNRE two years later. She teaches in the school's Conservation Ecology field of study and has a dual appointment with the Department of Ecology and Evolutionary Biology within the U-M College of Literature, Science, and the Arts.

SNRE GRADUATE STUDENTS ELAN MARGULIES (LEFT) AND ESTHER D'MELLO ARE WORKING ON THE NSF RESEARCH; HERE, THEY MEASURE AND CATALOG TREES AND NOTE THEIR HEALTH WITHIN THE RESEARCH PERIMETER.

Forests are the natural vegetation for about half of the eastern United States, and a current goal within ecology is to understand how changes in climate, landscape configuration, and species assemblages affect the structure and composition of forests, Ibáñez said. To manage forests sustainably, policy makers and land users need to be able to plan for the likely complicating effects of global change, she added. "In the case of forests, one of the main reasons why our knowledge is limited is because we still lack critical information about the recruitment dynamics of tree species under those novel conditions," she said.

Her project studies this challenge by focusing on one aspect of forest dynamics: the recruitment of new trees into the forest as seedlings. The research seeks to measure the individual and collective influence of a range of forces, from climate change and landscape fragmentation to invasive species. These interconnected influences form the novel environment under which plants are growing, Ibáñez said. "The fact that forest communities are highly dependent on recruitment dynamics makes the study of early demographic stages critical for understanding the impact of global change on the forest ecosystems around us," she said.

IN A FURTHER APPLICATION OF HER RESEARCH, THE TOOLS AND METHODS SHE USES WILL BE ADAPTED FOR USE AS CURRICULUM BY STUDENTS, FROM K-12 CLASSROOMS TO UNIVERSITIES.

Photos by Dave Brenner

"quotables"

"The scientific community has an obligation to families of children with autism to see if we can prevent cases in the future."

Professor and Dean Marie Lynn Miranda in an interview with *The Ann Arbor News* about her research showing pregnant women whose labors are induced or augmented may have an increased risk of bearing children with autism, especially if the baby is male.

"I think we could take carp control more seriously by disconnecting the Chicago waterway. In absence of that, we'll have all these kinds of temporary solutions that *might* work."

Professor Jim Diana (and director of Michigan Sea Grant) in an interview with *The Detroit Free Press* regarding the Obama administration's $50 million plan to keep the invasive Asian carp out of the Great Lakes.

"The missing link for really cleaning up cars is not about the car at all. It's about limiting net carbon impacts in the energy and natural resource sectors that supply motor fuel, whatever form that fuel may take."

Professor of Practice John DeCicco in an interview with *USA Today* about the fuel costs of electric cars.

"It's quite striking how much is going on at the municipal level. Communities have to operate in real time. Everybody is struggling with a climate that is no longer the climate of the past."

Professor Rosina M. Bierbaum in an interview with the Associated Press after the City of New York announced its plan to address climate change.

"I ultimately want to work for a company or organization that recognizes that to survive in the future, all three bottom lines must be equally weighed: people, planet, and profit."

Kate Drummond, SNRE and Ross School of Business student, in an interview with *BloombergBusinessweek* about students' interest in careers in sustainability.

"The size of the Gulf dead zone goes up and down depending on that particular year's weather patterns. But the bottom line is that we will never reach the action plan's goal of 1,950 square miles until more serious actions are taken to reduce the loss of Midwest fertilizers to the Mississippi River system."

Professor Don Scavia (and director of the Graham Institute) in an interview with the Associated Press shortly after he and other scientists released their annual "dead zone" predictions for the Gulf of Mexico and Chesapeake Bay.

relive THE MOMENTS

Missing the smell and feel of Saginaw Forest? Relive those memories with the help of a photo essay created by Michigan Photo's Eric Bronson. The slideshow's 30 images capture the research site in its full summer splendor. (Bronson's wife is Katie Davis, a second-year master's student in the Conservation Ecology Program.)

MORE SLIDESHOW IMAGES:
michigantoday.umich.edu/2013/07/slideshow/index.html#21

FACULTY ACCOLADES

Professor **Rosina M. Bierbaum** was named chair of the Global Environment Facility's Scientific and Technical Advisory Panel (STAP). Administered by the United Nations Environment Programme, STAP is an independent seven-member advisory body to the GEF, providing expertise in the environmental areas that GEF finances through grants totaling about $1 billion a year across the developing world.

Professor **Paul Mohai** received one of the university's 2013 Harold R. Johnson Diversity Service Awards. The award honors faculty who have shown dedication to developing cultural and ethnic diversity at U-M. Mohai was cited for being a leader in environmental justice over a 21-year career.

Associate Professor **Bradley Cardinale** has been elected to serve on the Science Committee for a new international research initiative called Future Earth. The group is a partnership between seven international organizations that includes the International Council for Science, the International Social Science Council, the United Nations Environment Programme, and the United Nations Educational, Scientific and Cultural Organisation.

Two SNRE professors have roles with Elementa: Science of the Anthropocene, a new online journal exploring issues of sustainability. Professor **Don Zak**, the Burton V. Barnes Collegiate Professor of Ecology, will edit the Ecology domain. Assistant Professor **Ming Xu** is an associate editor for its Sustainable Engineering domain.

Professor **Tom Lyon** was named associate director for research at the Erb Institute and associate director for social science and policy at the Michigan Energy Institute. Lyon is the Dow Professor of Sustainable Science, Technology and Commerce.

Channeling Carson

BY **ANGELA FICHERA**

Princen earns fellowship to produce new books on transition, long-term ethic

After authoring award-winning books on consumerism and the pursuit of sustainable organizations, SNRE's Tom Princen gets a chance next year to write two more. And, he will do it in an environmental think tank named for one of the greatest environmental writers of all time.

Princen, an SNRE associate professor, will become a resident fellow in 2014 at the Rachel Carson Center (RCC) in Munich, Germany. There, he will work to complete two books already under way: *An Ethic of the Long Term* and *The Politics of Urgent Transition*. Princen's previous books include *Treading Softly: Paths to Ecological Order*, *The Logic of Sufficiency*, and *Confronting Consumption*. Carson, of course, is famous for her 1962 book *Silent Spring*, which helped usher in an era of environmental journalism and advocacy. The center was named in her honor in 2009, 45 years after her death.

The RCC supports and convenes an interdisciplinary and international group of fellows and researchers who produce research on the relationship between nature and culture. "Professor Princen was chosen from a very competitive pool of applicants. The Rachel Carson Center received more applications this year than in the last two years combined and we were drawn to him because we were convinced that his research projects not only clearly fit the mission of our center, but are very important for the environmental humanities," said RCC spokeswoman Rachel Shindelar. "His work on a social theory of ecological and economic sustainability offers an important perspective on the interaction between human beings and the natural world."

As a recipient of the RCC writing fellowship, Princen will spend six months in Germany where he will receive the support of the center's team of research assistants and associates. According to Shindelar, not only will he have the opportunity to concentrate on his writing, but to work with fellows from a range of disciplines and contribute to the center's programs.

His work hones in on issues of social and ecological sustainability with a primary focus on principles for sustainability; overconsumption and sufficiency; the language and ethics of resource use; and localization and the transition out of fossil fuels. His work has received other recognition: An Aldo Leopold Leadership Fellowship in 2004 and the Pew Faculty Fellowship in International Affairs from Harvard University. He earned his Ph.D. in Political Economy and Government in 1988 from Harvard University.

Q&A

Stewards: What drew you to the Rachel Carson Center and this fellowship?

Princen: Much of my current work comes under the rubric of what Professor Ray De Young and I call "urgent transition." The premise is that society is beginning a process of fundamental change, like it or not, ready or not. Proximate causes may be economic or political but ultimate causes are biophysical and ethical. A key insight is that fundamental change, positive or negative or both, is unavoidable. Declining cheap available energy and increasing defensive expenditures requires rethinking how society is organized. Curiously, very little of such rethinking is happening in North America. But it is happening in Europe, especially, it seems, in Germany. So this fellowship offers me a special opportunity to engage urgent transition, both in theory and in practice, and rethinking what I call "an ethic of the long term."

Q: How do you feel the experience will help with the writing of your next two books?

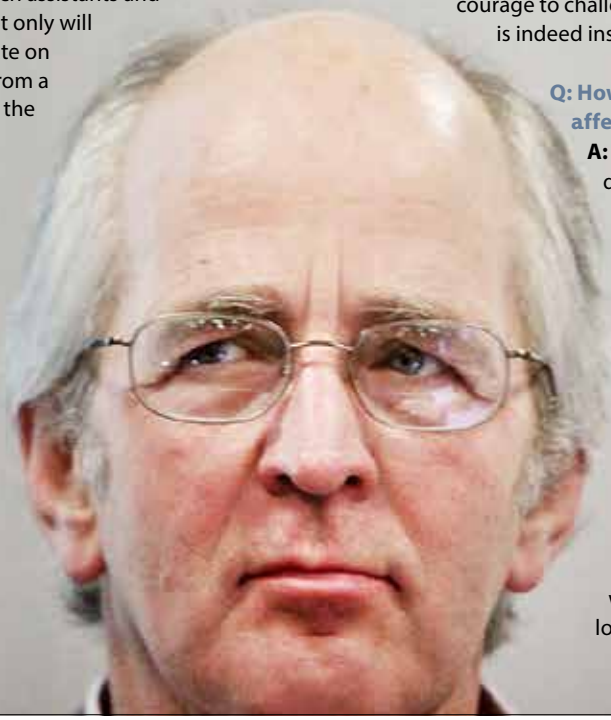
A: Focused writing and thinking in an intellectually rich environment with few distractions is an academic gift and I'm extremely grateful for the opportunity.

Q: Carson was a pioneer in environmental writing. How does her work inspire you?

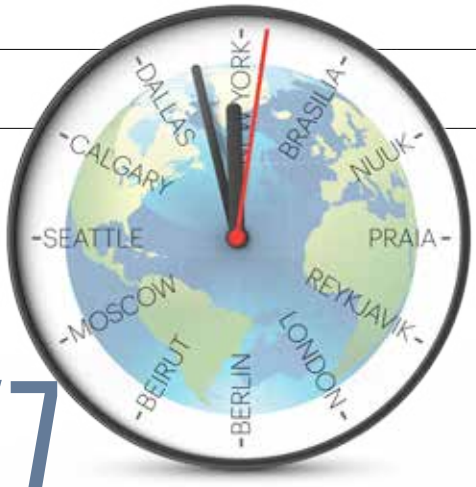
A: The combination of scientific rigor, clear thinking, and the courage to challenge mainstream thought and practice is indeed inspiring.

Q: How will the Carson Center experience affect your SNRE teaching?

A: It is an opportunity for which I am deeply grateful, both to the center for the fellowship and to SNRE for granting the leave. I fully expect the understanding of transition developed there to feed back on my teaching and research here, likely in ways I can't begin to predict. And because a major reason people come back to graduate school is to "stretch their horizons" or "think outside the box," I expect this work will do that for others. It will certainly enforce what Ray and I are doing in our ongoing "Workshop on Transition," which involves students in the themes of localization and fossil fuel exit.



Photos by Pedro Elias/Cofina (used with permission)



ERB GLOBAL 24/7

FOR ERB'S NEW DIRECTOR, IT'S

BY **KEVIN MERRILL**

Even though "Global" is part of the Erb Institute for Global Sustainable Enterprise's name, its new managing director says it must become part of the DNA of its teaching, research, and business engagement.

Terry Nelidov knows something about global. He speaks four languages (English, Spanish, Portuguese, and Guarani from Paraguay) and has worked for companies and organizations in North America, Latin America, Europe, and Asia. In his new job, a primary focus will be on strengthening the Erb Institute's already strong international reputation. "The institute is already global in its mission and perspective. I think the challenge is to drive that global mission into action in the areas of research and teaching, and then to business partnerships," Nelidov said. "It's not easy to do."

To do so means even more focus on how business is taking place in emerging economies such as China, Indonesia, and Brazil, and on the issues that companies and industry organizations are struggling with in all markets, such as access to water or clean energy. Of course, there is another challenge: convincing even more companies about the value of sustainable business practices in the first place.

"Out in the field, we sit down with executives and we're still making the basic business case 'Why?' Why social impact matters and why environmental stewardship; what climate change is and how to develop a climate change strategy; issues like governance and human rights," Nelidov said. "In joining Erb, I'm excited to have the opportunity to step back, so to speak, in the value chain—from businesses back to management education—and to introduce these core environmental and social issues early on, before students graduate and join companies."

He joined the University of Michigan from Business for Social Responsibility, a 250-member network of companies focused on business sustainability. Before that, he spent nearly two decades in business and human development in Latin America. He was Country Representative for Catholic Relief Services in Peru (the overseas development agency of the U.S. Catholic community), where he worked on development issues, including corporate social responsibility and mining issues.

His Latin America experience began with the U.S. Peace Corps, where he was assigned to Paraguay. He later worked at the INCAE Business School in Costa Rica; facilitated startup of a land development company in El Salvador; and consulted on assignments in Ecuador, Honduras, and Dominican Republic. He has an undergraduate degree in industrial engineering from Stanford University and an M.B.A. from IESE Business School in Barcelona, Spain.

Founded in 1996, the Erb Institute operates its own research and outreach programs. It also provides services to, and enriches the educational experience of, students from SNRE and the Ross School of Business who are dually enrolled in the joint M.S./M.B.A. program. These students, including 72 currently enrolled and another 330 alumni around the world, are often referred to as "Erb-ers".

Photo by Dave Brenner

Nelidov spoke to* Stewards *about his new role, the Erb Institute's place in global business, and opportunities ahead.

Stewards: What are some new ways to advance the idea of 'global' in the operations of the institute?

Nelidov: It means infusing a global perspective into the teaching materials, the student project work, and the dialogue taking place every day at Erb. It's not just about doing business outside the U.S. in one or two other countries; it's about a global approach to the unique contribution that business can make to sustainability—both to contribute to society, and to improve both short-term profitability and long-term competitiveness.

Q: What contribution does SNRE make to that effort, and in general to the Ross-SNRE partnership?

A: When you think about really complex social, environmental, governance, and economic problems, you have to think in terms of systems thinking. It's not just one company acting alone, or even an industry as a whole. It's not through just one or two business variables. Sustainability is really about understanding the interrelationships between all these variables, and many more. And I think SNRE thinks a lot about that in terms of earth systems and complex systems thinking. So when you ask what value does SNRE bring, for me that's what it brings. SNRE brings earth systems to the discussion and I think Ross brings management systems.

FULL INTERVIEW:
snre.umich.edu/erb

PitE

NEW DIRECTOR FOR PitE ENVISIONS
BROAD HORIZONS

BY **KEVIN MERRILL**

He is a lawyer, English literature professor, former cab driver, and construction worker at an artists' commune who grew up dreaming of being a wildlife biologist. Yep, Gregg Crane knows a thing or two about viewing life through multiple lenses.

Those experiences, plus his enthusiasm for undergraduate environmental learning, drew him to accept the director position at the Program in the Environment (PitE). Since its founding 12 years ago, PitE and its interdisciplinary curriculum has exposed U-M students to a broad understanding of the complexity of environmental problems while teaching specific social and natural science skills to solve them.

"I think it's indisputable that what PitE adds, or why PitE exists, is because it offers an interdisciplinary epistemology, a comparative epistemology," said Crane. "What you get when you 'do' PitE is you get to move from one vantage to another. You learn methods and different perspectives. Being able to move across such perspectives gives our students a more complete sense of the problems being considered and possible solutions."

During his three-year appointment, Crane remains a professor in the Department of English Language and Literature in the College of Literature, Science, and the Arts. LSA and SNRE have co-managed the undergraduate program since its founding. Today, more than 350 students are enrolled in PitE degree programs. Crane replaces SNRE Professor Paul Webb. It marks the second time that an English professor has led the program. (John Knott was PitE's first director.)

For seven years, Crane has taught a summer PitE course at U-M's Camp Davis in Wyoming. Doing so might be a distant echo of his childhood ambition: being the next Frank and John Craighead, U-M-trained wildlife biologists whose work with grizzly bears in Yellowstone was documented in a National Geographic special. Crane saw the show as a youth and remembers saying to his parents "That's what I want to do."

Crane is a specialist in American literary and intellectual history. His research focuses on the importance of intuition to a collection of literary, philosophical, legal, and environmental writers. His litigation experience includes work on several major environmental cases in California and the State of Washington.

He joined U-M in 2004 as an associate professor. He served as director of graduate programs in English from 2005-08. He previously worked at Miami University of Ohio and the University of Washington, where in addition to being an assistant professor, he was director of undergraduate programs. He earned his Ph.D. from the University of California, Berkeley and his law degree from the University of California, San Francisco. His books are *The Cambridge Introduction to the Nineteenth-Century American Novel* and *Race, Citizenship, and Law in American Literature*, also published by Cambridge.

Photo by Dave Brenner

Crane spoke to* Stewards *about his first few months on the job and the future of PitE. Here are excerpts of that interview.

Stewards: What's your definition of 'interdisciplinary'?

Crane: In my view and in my experience as a lawyer, it's important being able to move across different methods and ways of formulating a problem, describing facts, or thinking about evidence. And if you want a jury to do what you want a jury to do, you've got to actually have some confidence in each one of these ways of thinking. And I believe that the fluency across those lines of inquiry amounts to a different and enhanced way of thinking as opposed to the way I think when I'm solely within my own more narrow academic specialization, which also is a hugely powerful intellectual tool.

Q: Is environmental thinking a part of the new book you are working on, titled "The Art of Intuition."

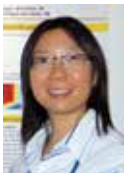
A: The book's going to start off with the importance of intuitional thinking to a much more cautious and humble approach to the environment. It's going to start off on a philosophical register, but the stakes of the whole book are going to be set up in environmental terms. I'm going to argue at the beginning that a kind of overconfidence in rational self interest as the guiding paradigm for individual behavior but social behavior is insufficient. We see that in our failure to be stewards of the natural environment that we live in. The argument of the book, in part, will be for a kind of a more receptive mode of awareness.

FULL INTERVIEW:
snre.umich.edu/pite

briefs

Beep-beep! Taxi research honored

Hua Cai, an SNRE doctoral student, has won three awards for a poster presentation on research using travel patterns of taxis in Beijing, China. Her work examined the real-time trajectories of 10,375 taxis for one week to study the impacts of individual travel patterns on plug-in hybrid electric vehicle acceptance, electrification rate, and associated implications on greenhouse gas emissions.



Meerow named Weinberg Fellow

Sara Meerow, an SNRE doctoral student, received the 2013 Marshall Weinberg Population, Development, and Climate Change Fellowship. The fellowship provides support to a U-M student conducting research on a topic that combines research into population, development, and climate issues. It is co-managed by SNRE and the Population Studies Center within U-M's Institute for Social Research. Meerow studied how to improve urban resilience to climate change. She chose the Philippines, and Manila in particular, to conduct her work. The nation has been identified by multiple studies as one of the world's most vulnerable areas to climate change, Meerow said.

U-M seventh for Peace Corps Fellows

The University of Michigan ranks seventh nationally as a Peace Corps Paul D. Coverdell Fellows university, according to 2013 rankings. U-M has 20 enrolled returned Peace Corps volunteers, including six studying at SNRE: Katy Hintzen, Nolan Sandberg, Stephen Ahn, Geoffrey Burmeister, Cate Wytychuk, and Katherine Browne. U-M's Coverdell program has been in place since 2007. In addition, U-M offers four Peace Corps Master's International programs, including one at SNRE.

Photo by Dave Brenner

FEEDING FRENZY

SNRE students organized the inaugural Ann Arbor Sharing Summit this summer at the site of a new U-M Campus Farm, itself the brainchild of SNRE students. The August event allowed the public to learn about local opportunities for sharing and sustainable community building. Event supporters included Matthaei Botancial Gardens and the U-M Sustainable Food Program, which operates the Campus Farm on Matthaei grounds. Hosting the Summit at the Farm gave people interested in "solidarity economies" the chance to see how sustainable food is a crucial component, said Ryan Gourley, event organizer, SNRE master's student, and founding director of A^{2}Share, an online clearinghouse for the local sharing economy. SNRE students Sara Cole and Mariel Borgman assisted with event planning. Twenty-five organizations were represented, drawing more than 75 participants, including several SNRE faculty, students, and alumni.

LA students lead charge in rebuilding Detroit playground

Photo courtesy of Robert Primeau

SNRE Landscape Architecture students helped to lead an effort this summer to rebuild a school playground at New Paradigm Glazer Elementary in Detroit. Students in the first-year LA Studio Course under Professor Bob Grese interviewed students and teachers for a design project: re-imagining the school's landscape based on what students and teachers wanted. Later, the school found a funding partner in Christ Church Cranbrook in Bloomfield Hills, Mich., to bring the improvements to life. LA student Robert Primeau became the project's intern. "Project management can, depending on where you work, be a big component of a landscape architect's job, but it's not something you learn about in an L.A. academic program, so I wanted to get that experience," Primeau said. Besides the playground, volunteer teams planted flowers and shrubs, removed weeds and a large grape vine, repaired a fence gate, and regraded the activity field. In all, about 25 SNRE students volunteered and the work continues this fall. New Paradigm Glazer Elementary is a Detroit charter school and is located within the Hope Village Initiative, which is a 100-block area surrounding Focus:HOPE headquarters.

Photo courtesy of Kinsey Brock

Summer delight: Greek isles ... and lizards

Kinsey Brock spent the summer in Greece. On islands. *With lizards*. The Conservation Ecology master's student trekked to the Mediterranean for a second straight summer to conduct research on understanding the evolution of antipredator behavior in an insular lizard species (*Podarcis erhardii*). Her study takes place in the Cyclades islands of Greece, where she often has to hitch rides with local fishermen to explore and measure the characteristics of island environments. Her research also requires her to catch lizards from more than 35 sites. Determining which island characteristics influence the retention or erosion of antipredator behavior is important for conservation because many native island species have evolved over thousands of years in the absence of predators. Without an understanding of antipredator defenses, the sudden introduction of an invasive predator could be devastating.

Crops, rain, and insurance in Ethopia

Bristol Mann, a master's student studying Environmental Informatics, spent part of her summer in Ethiopia conducting field work focused on villages in Tigray that participate in a weather-based crop insurance program. She is collaborating with Columbia University researchers who have helped develop microinsurance policies. Those policies are based on weather indices that use satellite-derived rainfall estimates and vegetation indices to trigger payouts when a drought occurs. She hopes her research will help validate those rainfall estimates to improve the accuracy of the insurance payout system. Part of her work involves the study of vegetation cover through satellite-remote sensing. The work compares imagery at different spatial resolutions and land cover and land use categories. She collected land cover and land use information, especially crop-type information if the land was cultivated, as well as geographic coordinates and reference photographs across several villages in Tigray, Ethiopia. Part of her work also took her to the village of Mechare in the Raya Azebo district of Tigray, where she took time for a photo op with local residents.

Photo courtesy of Brieland Jones

AMONG THE SNRE STUDENTS WORKING IN LIBERIA THIS SUMMER WERE RYAN STOCK (FAR LEFT), BRIELAND JONES (SECOND FROM RIGHT) AND ENGINEERING STUDENT TOM JUBERT (FAR RIGHT).

All Charged Up

For a third straight year, SNRE students spent part of their summer in Liberia on Africa's west coast. And for a third straight year, they harnessed renewable energy and innovation to create electricity *and* friends. This year's project was a solar-powered phone charging station. Using locally available components, students built a prototype from scratch in Ann Arbor. Working through the U-M student group Sustainability Without Borders, they were able to recreate the device using local parts found in Monrovia, Liberia's capital. The charging station then went to work for More than Me, a local nonprofit.

That group helps Liberian girls get off the streets and into schools. Its leaders work with community leaders to identify girls at the highest risk of being sexually exploited. The solar-battery charging booth is intended to serve as a small business to create revenue for More than Me as well as a marketing and educational tool. Cell phone and battery charging are big business in Liberia. Liberians spend an estimated 30 percent of their income on charging such devices. Most of this charging is with gas or diesel generators; only 1 percent of its residents have access to grid electricity. The solar charging booth is a proven business model tried by Engineers Without Borders, another nonprofit organization, in other areas of Africa.

READ MORE, WATCH VIDEO:
Read more about Sustainability Without Borders and see Liberian residents test the charging station at snre.umich.edu/news

inquiry

BIODIVERSITY AND BIOFUELS

UNDERGRADUATE RESEARCH ASSISTANT CHARLES ZHOU CHECKS THE TUBING USED TO DELIVER NUTRIENTS TO THE ALGAL BIOFUEL AQUARIUMS. BELOW: SNRE ASSOCIATE PROFESSOR BRADLEY CARDINALE, WHOSE LAB IS CENTRAL TO THE RESEARCH EFFORTS.

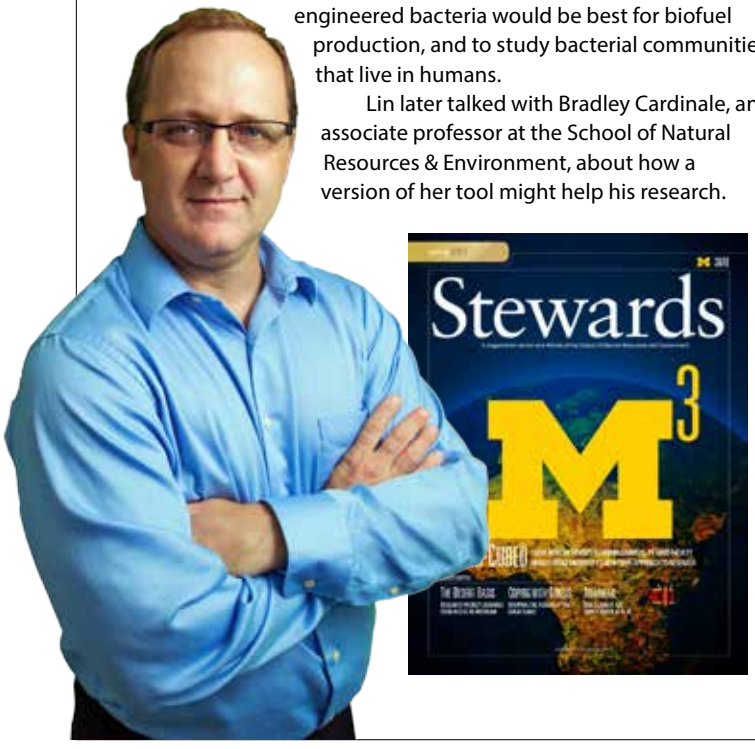
A team of U-M researchers is exploring the question of whether it takes a village—*of algae*—to produce the best biofuels.

Using a $2 million National Science Foundation grant and Dana Building laboratories, the team is identifying and testing naturally diverse groups of green algae. They want to know whether the algal groups can be grown together to produce a higher-yielding, more environmentally sustainable, and cost-effective biofuel. The research builds in part on data generated under an MCubed project.

"MCubed was instrumental in bringing us together to start a collaboration we had been discussing for some time. That made a difference, a huge difference. It showed NSF that we were already working together," said Nina Lin, an assistant professor of chemical engineering and biomedical engineering at the U-M College of Engineering and co-principal investigator of the MCubed project titled "Algal biofuel and biodiversity."

Lin previously had designed a specially etched glass slide, known as a microfluidic reactor, which enabled her to grow tens of thousands of different microorganisms simultaneously. Before MCubed, she had been using the device to see which strains of engineered bacteria would be best for biofuel production, and to study bacterial communities that live in humans.

Lin later talked with Bradley Cardinale, an associate professor at the School of Natural Resources & Environment, about how a version of her tool might help his research.



Cardinale studies natural communities of algae, and he is looking for communities that can produce more biofuel than current genetically engineered super-strains. Super-strains, he said, threaten to take over diverse natural lakes and harm ecosystems.

Cardinale has gathered 55 algae species that represent the most common species in more than 1,000 lakes across the country. To figure out which communities might outperform genetically modified strains, he has to grow and test species together in different combinations. A version of Lin's device could help him more quickly hone in on the most promising algae communities for biofuel production.

The MCubed program moved the two scientists into action. To form a "cube," they joined forces with Vincent Denef, an assistant professor in ecology and evolutionary biology in the College of Literature, Science, and the Arts, who studied how bacteria and algae interact to influence biofuel production. The cube was registered, selected, and funded last fall. The team then set to work.

"Nina was developing the technology as I was writing the NSF proposal," Cardinale said. "It truly was in real time."

Lin and her lab were not able to revamp their experimental set-up in time for the NSF proposal. But that didn't matter. "They knew we hadn't developed it," Cardinale said, "but thanks to MCubed, we had generated enough preliminary data to suggest that we could pull it off."

The NSF grant is for a broader project, but reviewers told the team they liked Lin's high-risk/high-reward portion. NSF funding began Sept. 1 and continues for four years. The effort involves growing combinations of lake algae in 180 aquariums at Cardinale's

Austin Thomason, Michigan Photo

Flume Room, then field-testing the most promising candidates inside 80 fiberglass cattle tanks at U-M's E.S. George Reserve, a 1,300-acre biological research station near Pinckney, Mich.

The goal is to test the idea that certain naturally diverse groups of algae have complementary traits that enhance the efficiency and stability of biofuel yield beyond what any single species can do alone. The project involves an unusual collaboration among ecologists, evolutionary biologists, and engineers from four labs that will include about 20 researchers and students.

"People have suggested that species diversity might increase the efficiency of algal biofuel systems, but nobody has set up the experiments to test it directly. These will be the first experiments to systematically manipulate the number and types of species in the system to determine how to maximize the yield and stability of algal biofuel," Cardinale said.

Researchers have been trying to make affordable transportation fuels, such as biodiesel and jet fuel, from algae for decades. Most of the work has focused on finding single algal strains that are highly productive, as well as identifying the ideal mix of nutrients and environmental conditions. Genetically engineered "super-species" have even been created in an effort to boost yields so that algae-based biofuels can compete with fossil fuels. But that dream has not been realized, due to multiple problems that arise when single-species, or monoculture, algal system are moved from the laboratory to a pond. The U-M-led project aims to increase the productivity and stability while reducing environmental impacts.

(Nicole Moore and Jim Erickson of the University of Michigan News Service contributed to this story.)

MCubed +2

Two more SNRE faculty have joined 19 other colleagues in being part of MCubed research teams. Announced in May 2012, MCubed is a seed-grant program that encourages U-M faculty to create three-member, multi-disciplinary teams. Teams receive $60,000 to carry out research ideas and test new theories.

Since its launch, 213 of a planned 225 projects have been funded; nearly 10 percent (18) involve at least one SNRE faculty member. In all, 21 faculty (nearly half of all SNRE faculty) are participating. In the spring 2013 issue of *Stewards*, we profiled one project (the Q-Fever team) and summarized 15 others. Since that story, two other faculty joined teams that received funding (summarized below):

Faculty: Ming Xu (member), assistant professor, Sustainable Systems

Title: Influence of global trade on the human health impacts of particulate matter induced by consumption

Summary: Particulate Matter (PM) is related to cardiopulmonary mortality and about 1 million premature deaths (mostly in Asia). Identifying causes and remedies needs to be done globally: Trade distances the consumer from the negative health impacts of PM and displaces them on to other populations. PM atmospheric transport further spreads the risk. Therefore, a need exists to quantify the PM impacts of consumed goods, accounting for international trade, and to study the shift in PM impacts from developed countries to developing economies. The project seeks to develop a model that covers the continuum of impact, from consumption, production, and particulate emission to pollutant fate and exposure, combining at a global scale an environmentally extended multi-regional economic input-output analysis with a multi-regional assessment of pollutant fate, exposure, and human health impacts.

Faculty: Maria Carmen Lemos (member), professor, Environmental Policy and Planning

Title: Bio-inspired large scale structural material

Summary: Concrete is the most-used engineering material for civil infrastructure. However, lacking tensile strength and ductility, concrete infrastructure has limited durability and resiliency. The iridescent material of abalone shells, nacre, is composed mostly of similarly brittle calcium carbonate, yet exhibits strength and ductility superior to concrete. Nacre's properties have spurred research on its structural organization; several successful attempts to mimic its composite design have yielded only materials that share the millimeter-size scale and slow-growth characteristics of natural nacre. This project seeks to overcome size and processing limitations to produce a civil infrastructure material that improves concrete's performance. The development of such material uses biochemistry, materials science, and civil engineering practices and is expected to create safer, more durable, and sustainable structures. The project's social focus is on understanding how such innovations are disseminated among potential users, especially in the context of mitigating and responding to climate change.

inquiry

CONSERVATION

Photos courtesy of Daniel Miller

Study identifies priorities for global conservation funding

A University of Michigan researcher and colleagues at several other universities and elsewhere have identified the most underfunded countries in the world for biodiversity conservation. They found that 40 of the most poorly funded countries harbor 32 percent of all threatened mammalian biodiversity.

Most of the countries, although not all, in greatest need of more funding are developing nations, so important gains could be made at relatively low cost, the researchers concluded.

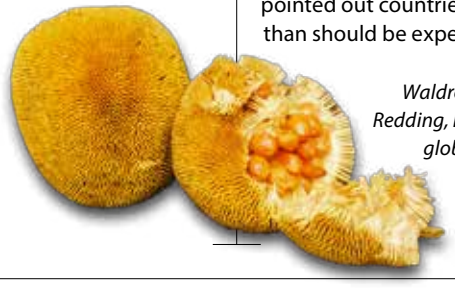
"Knowing where the need is greatest could help aid donors to direct their funding for immediate impact," said study co-author Daniel Miller, a doctoral fellow at the U-M Graham Sustainability Institute and a doctoral candidate at SNRE.

The study, published online July 1 in the *Proceedings of the National Academy of Sciences*, suggests how funding should change to help achieve the United Nations 2020 goals on reducing extinction. "It seems likely that the worse the funding, the less chance we have of saving biodiversity," said the study's leader, Anthony Waldron of the Universidade Estadual de Santa Cruz in Brazil. "However, there was extremely limited global information on where funding levels were poorest. We urgently wanted to fill that information gap as best as possible, with the next United Nations deadline only seven years away."

ABOVE: ELEPHANTS COOL THEMSELVES AT A NAZINGA GAME RANCH IN THE WEST AFRICAN NATION OF BURKINA FASO. THE ELEPHANT SANCTUARY PROJECT HAS BEEN SUPPORTED BY A VARIETY OF INTERNATIONAL AID DONORS OVER THE YEARS. **BELOW**: FOREST FRUIT FROM A COMMUNITY-BASED CONSERVATION PROJECT IN INDONESIAN BORNEO, WHICH SEEKS TO MITIGATE FOREST FIRES THROUGH INNOVATIVE AGROFORESTRY TECHNIQUES.

The researchers compiled two databases. They first collated all traceable conservation funding across the world from 1990 to 2008. They found that about $22 billion a year was spent on biodiversity conservation between 2001 and 2008; they were able to track $17 billion of it to specific countries.

The second database showed how stewardship of the world's mammal biodiversity is divided between countries. The researchers then combined four existing global databases—on extinction risk, economic costs, political governance, and protected areas—with the two new ones to create a model that explains how conservation finance is allocated globally. The model pointed out countries where biodiversity funding is clearly lower than should be expected.



Waldron, A., Mooers, A. O., Miller, D. C., Nibbelink, N., Redding, D., Kuhn, T. S., . . . Gittleman, J. L. (2013). Targeting global conservation funding to limit immediate biodiversity declines. Proceedings of the National Academy of Sciences, *110(29), 12144-12148.*

Aquaculture: food for thought

As aquaculture production expands globally, societies must avoid past mistakes to ensure safe and healthy food supplies. And to do that, understanding environmental impacts (and the measures to mitigate them) is important when designing responsible systems. So conclude authors, led by SNRE Professor and Michigan Sea Grant Director Jim Diana, in a *Bioscience* article titled "Responsible Aquaculture in 2050: Valuing Local Conditions and Human Innovations Will Be Key to Success."

The authors cite four goals in making aquaculture operations more sustainable and productive: improved management practices to create more efficient and diverse systems at every production level; an emphasis on local decision making, human capacity development, and collective action to generate systems that fit a society's requirements and demands; development of risk-management efforts to reduce disease problems, eliminate antibiotic and drug abuse, and prevent exotic organisms from being introduced into local waters; and better systems to identify more sustainably grown aquaculture products in the market and promote them to consumers.

By 2050, seafood will be predominantly sourced through aquaculture, including not only finfish and invertebrates but seaweeds, the authors write. For the ever-growing human population to be able to secure its food, it has no alternative but to change its business models and develop efficient food production systems consumers will trust as being sustainable and providing healthy products. Aquaculture can provide such products, but human consumption patterns will have to change in order to take advantage of seaweed and other seafood products.

Diana, J. S., Egna, H. S., Chopin, T., Peterson, M. S., Cao, L., Pomeroy, R., et al. (2013). Responsible Aquaculture in 2050: Valuing Local Conditions and Human Innovations Will Be Key to Success. BioScience, *63(4), 255-262.*

SALMO SALAR, ATLANTIC SALMON

Examining labor and autism

Pregnant women whose labors are induced or augmented may have an increased risk of bearing children with autism, especially if the baby is male, according to a large, retrospective analysis by researchers at the University of Michigan and Duke Medicine.

The findings, published in *JAMA Pediatrics* Aug. 12, do not prove cause and effect, but suggest the need for more research, particularly as labor induction and augmentation have been used more frequently in recent years.

Expediting deliveries has benefitted women with health conditions that pose a risk to them and their unborn children. Inducing labor (stimulating contractions before the onset of spontaneous labor) and augmenting labor (increasing the strength, duration or frequency of contractions during labor) have been shown to prevent complications, including stillbirth.

"The scientific community has long looked for environmental contributors to the rising rates of autism in the United States," said Marie Lynn Miranda, senior author of the paper and a professor in both Environmental Informatics and Pediatrics at the University of Michigan. She also serves as dean of the School of Natural Resources & Environment. "This study provides preliminary evidence of an association between autism and labor induction/augmentation, especially among male children."

Gregory S., Anthopolos R., Osgood, C., Grotegut, C., and Miranda, M. Association of Autism With Induced or Augmented Childbirth in North Carolina Birth Record (1990-1998) and Education Research (1997-2007) Databases. JAMA Pediatrics. *2013; 167(10), 959-966.*

Erie's eerie future

In 2011, Lake Erie experienced the largest harmful algal bloom in its recorded history, with a peak intensity over three times greater than any previously observed bloom. In an April article published in the *Proceedings of the National Academy of Sciences*, researchers—including many affiliated with SNRE—showed that long-term trends in agricultural practices are consistent with increasing phosphorus loading to the lake's western basin, and that these trends, coupled with meteorological conditions in spring 2011, produced record-breaking nutrient loads.

An extended period of weak lake circulation then led to abnormally long residence times that incubated the bloom, and warm and quiescent conditions after bloom onset allowed algae to remain near the top of the water column and prevented flushing of nutrients from the system. Researchers further found that these factors are consistent with expected future conditions. Lacking policy intervention, many of the socioeconomic forces driving the trends in agriculture and nutrient management practices found to have exacerbated the 2011 bloom are likely to continue, increasing the likelihood of such massive blooms in the future. If a scientifically guided management plan to mitigate these impacts is not implemented, this bloom can be a harbinger of future blooms in Lake Erie.

Michalak, A. M., Anderson, E. J., Beletsky, D., Boland, S., Bosch, N. S., Bridgeman, T. B., . . . Zagorski, M. A. (2013). Record-setting algal bloom in Lake Erie caused by agricultural and meteorological trends consistent with expected future conditions. Proceedings of the National Academy of Sciences, *110(16), 6448.*

A SATELLITE IMAGE OF LAKE ERIE SEPT. 3, 2011, OVERLAID ON A MAP OF ITS TRIBUTARIES. THE IMAGE SHOWS THE BLOOM ABOUT SIX WEEKS AFTER ITS INITIATION IN THE WESTERN BASIN.

Image courtesy of University of Wisconsin-Madison Space Science and Engineering Center

Going Green, Staying Blué

To hear Mary Sue Coleman speak about sustainability, you would think the University of Michigan's school color was green. But there is no doubt about it: Maize and Blue are the colors that imbue the university's sustainability efforts and define her legacy on the topic.

BY **KEVIN MERRILL**

In the past four years, U-M has radically advanced its sustainability thinking and investment across research, teaching, and operations. Starting in the fall of 2009 with the creation of an Office of Campus Sustainability and through the harvesting this month of food grown at a new student-run farm on campus property, the changes have been aggressive and relentless.

"As a campus, a community, and a planet, there is no other approach to take. I want the message to be clear: Sustainability defines the University of Michigan," President Coleman said in 2011 in announcing significant new investments in education, research, and operations. "Combine maize and blue, and you get green. A great university such as ours does not blink when presented with difficult challenges."

In April, President Coleman announced plans to retire in July 2014 and end her 12-year tenure, the fourth-longest of any president in U-M's nearly 200-year history. Her commitment to sustainability is especially well known and appreciated by the SNRE community. From helping to cut the ribbon in 2003 when the Dana Building reopened after an extensive green renovation to introducing the speaker each year at the Peter M. Wege Lecture on Sustainability, President Coleman has advocated for the same goals embodied in the school's mission: creation of a sustainable and just society.

President Coleman acknowledged the contributions of current and past generations of students in giving the university's environmental efforts a special energy and authenticity. "Students are the story of environmental awareness and sustainability at Michigan. They exemplify our belief that a great public university continually strives to make the world a better place," she said.

As she began to wind down her presidency, *Stewards* invited her to the Dana Building for a photo op and to talk about sustainability past, present, and future at the University of Michigan. Her responses begin on Page 20.

"COMBINE MAIZE AND BLUE, AND YOU GET GREEN. A GREAT UNIVERSITY SUCH AS OURS DOES NOT BLINK WHEN PRESENTED WITH DIFFICULT CHALLENGES."

Photo by Scott Soderberg, Michigan Photo

COLEMAN Q&A

Stewards: What 'green' accomplishments under your presidency have had the biggest impact on sustainability?

President Coleman: At the University of Michigan, we believe that a great public university such as ours must continually strive to make the world a better place, and that sentiment is palpable with our sustainability initiatives. While I'm proud of what we've accomplished during my tenure, U-M's sustainability leadership has been evident since almost the very beginnings of the institution. So what we've achieved in the time I've been president is built on a solid foundation created over many years.

Sustainability presents the university and, in fact, the world with some of the most complex problems we face—challenges that no single discipline will solve. We've come to deeply understand that truth, and to embrace a very broad approach. That includes engaging in key research activities and teaching students how to apply sustainability to all fields for the greatest impact on the future of our planet. And in our efforts to 'walk the walk,' we've also improved campus operations.

The realization of these three pillars—education, research, and operations—as our best strategy to improve planet in enduring ways is a huge accomplishment.

I've described our commitments as 'meaningful and measurable' and that's what we've done. I'll give some specifics:

We created the **Graham Sustainability Institute** to coordinate the efforts of students, faculty, and staff across the full range of sustainability activities. I also appointed Graham Director Don Scavia to serve as my Special Counsel for Sustainability. These actions were enormously important because Michigan is a large, complex place, and to take full advantage of our diverse strengths, we needed to knit together work that was occurring.

We created the **Office of Campus Sustainability** to serve as a focal point for campus operations. As I noted, we were already doing some progressive work in operations, but this structure furthered our efforts and demonstrated a commitment to our work in this area. The Graham Institute's leadership on the campus sustainability integrated assessment was particularly important in helping to establish goals for campus operations in partnership with the Office of Campus Sustainability.

We deepened our long-standing commitment to sustainability with the announcement of the **University's 2025 Goals**. We set a charge for this campus community to work toward goals in climate action, waste prevention, healthy environments, and community awareness. They are ambitious, 'stretch' goals, but we made a strong, public commitment and I'm proud of that. And we track those goals in a public way as well, through an annual progress report.

There are so many other successes: the number of **sustainability-related courses** we offer, the **Dow Fellows Program** we established, the **STARS** rating we received. We created a **U-M Water Center** with the support of generous donors in the Erb Family Foundation. We have several hundred faculty working on sustainability research clustered around themes—and U-M's research efforts are exploding with success. I could go on and on.

Stewards: Can you give us more detail on the pillars (education, research, and operations) and expand on the successes you mentioned?

EDUCATION

President Coleman: With about 600 sustainability-related courses, we've expanded U-M's educational programing with cutting-edge opportunities such as the **Graham Undergraduate Sustainability Scholars**, **Dow Sustainability Fellows** (master's, doctoral, and postdoc) and the **Erb-WEC Fellows** (World Environment Center), along with a new minor in sustainability. This helps ensure that students gain the experiences here that will position them at the forefront for tackling our planet's sustainability challenges after they graduate.

These newer programs complement our existing programs, including the Program in the Environment, which has graduated more than 1,500 students with a bachelor's degree since it was first offered in 2002. **The Frederick A. and Barbara M. Erb Institute** represents a powerful dual-degree granting partnership between the Ross School of Business and the School of Natural Resources & Environment. And we were the first university to offer a dual-master's degree in environmental science and engineering.

We continue to offer our students world-class opportunities to develop tomorrow's leaders who understand the importance and necessity to incorporate sustainability into their lives and careers.

Since 2003, funding for sustainability-related research at Michigan has increased threefold and is currently more than $60 million per year. And the university has more than 660 faculty conducting research to address sustainability issues involving climate, water, and communities.

RESEARCH

Since 2003, funding for sustainability-related research at Michigan has increased threefold and is currently more than $60 million per year. And the university has more than 660 faculty conducting research to address sustainability issues involving climate, water, and communities.

One example of this important research is the U-M Water Center. Established just last fall with funds from the Erb Family Foundation and the university, the center already has teams of researchers from across the nation working to improve Great Lakes' restoration outcomes. This work is vital to the region for many reasons, including the 40 million Americans and Canadians who depend on the Great Lakes for drinking water.

On campus, the Graham Institute and the **Institute for Social Research** just published results from our first Sustainability Cultural Indicators survey, which measures sustainability knowledge, dispositions, and behaviors across the entire population of U-M faculty, staff, and students. The survey has received interest from other universities throughout the world that are looking to model similar studies.

PRESIDENT COLEMAN GAVE REMARKS AND HELPED TO CUT THE RIBBON OCT. 17, 2003, WHEN THE DANA BUILDING REOPENED AS THE GREENEST BUILDING ON CAMPUS.

OPERATIONS

Not only is the campus transforming physically, from trayless dining in residence halls and LEED-certified buildings to sustainable transportation options like hybrid buses and Blue Bikes, there's also a shift in the behavior of our community toward living more sustainably. It's rewarding to see students, faculty, and staff become more engaged in creating this culture and knowing their efforts are creating a better future.

Our community of **Planet Blue Ambassadors** has nearly 1,300 students, faculty, and staff who are committed to creating a more sustainable community. And we are still growing. These are the individuals who will continue to bring outstanding ideas to our attention, and help shape future initiatives.

As a university, we are working hard today to make the changes that will have positive influence on the planet and future campus communities for generations to come. I anticipate much more to come from U-M in the world of sustainability.

A WORK OF ART

BY **JILLIAN BOGATER**

The first time I visited the Heidelberg Project, its creator and renowned artist Tyree Guyton emerged from one of the colorfully decorated Detroit houses and offered me a paint brush. "Go ahead, paint a dot in the street," he said of the trademark spots associated with his project.

Years later, I brought my future boyfriend to Heidelberg on one of our first dates. A framed photograph from that day is prominently displayed in my home; in it, Matt stands smiling before a stuffed animal/boat sculpture set in the heart of the art installation, located in the McDougall-Hunt neighborhood on Detroit's east side.

There's no denying the place is magical.

So when I heard that Beth Diamond had partnered with her students to be part of the project, I wanted to find out more and cover the story. I conducted an initial interview with Beth and others involved but I never got to finish the story, at least not in the current tense. Beth, who died April 29 after a brief battle with cancer, left a legacy that is carried on through her Landscape Architecture students and others involved in the project.

.....

My first meeting with Beth took place in her Dana Building office. The lights were off, but the office buzzed with Beth's enthusiasm. She met me with a Monster Energy Drink in her hand, and quickly jumped into the topic before us. Within minutes, she popped open another Monster, and I breathed a sigh of relief that I brought a tape recorder. In my 20-plus years of reporting, this marked the first time I couldn't keep up taking notes by hand.

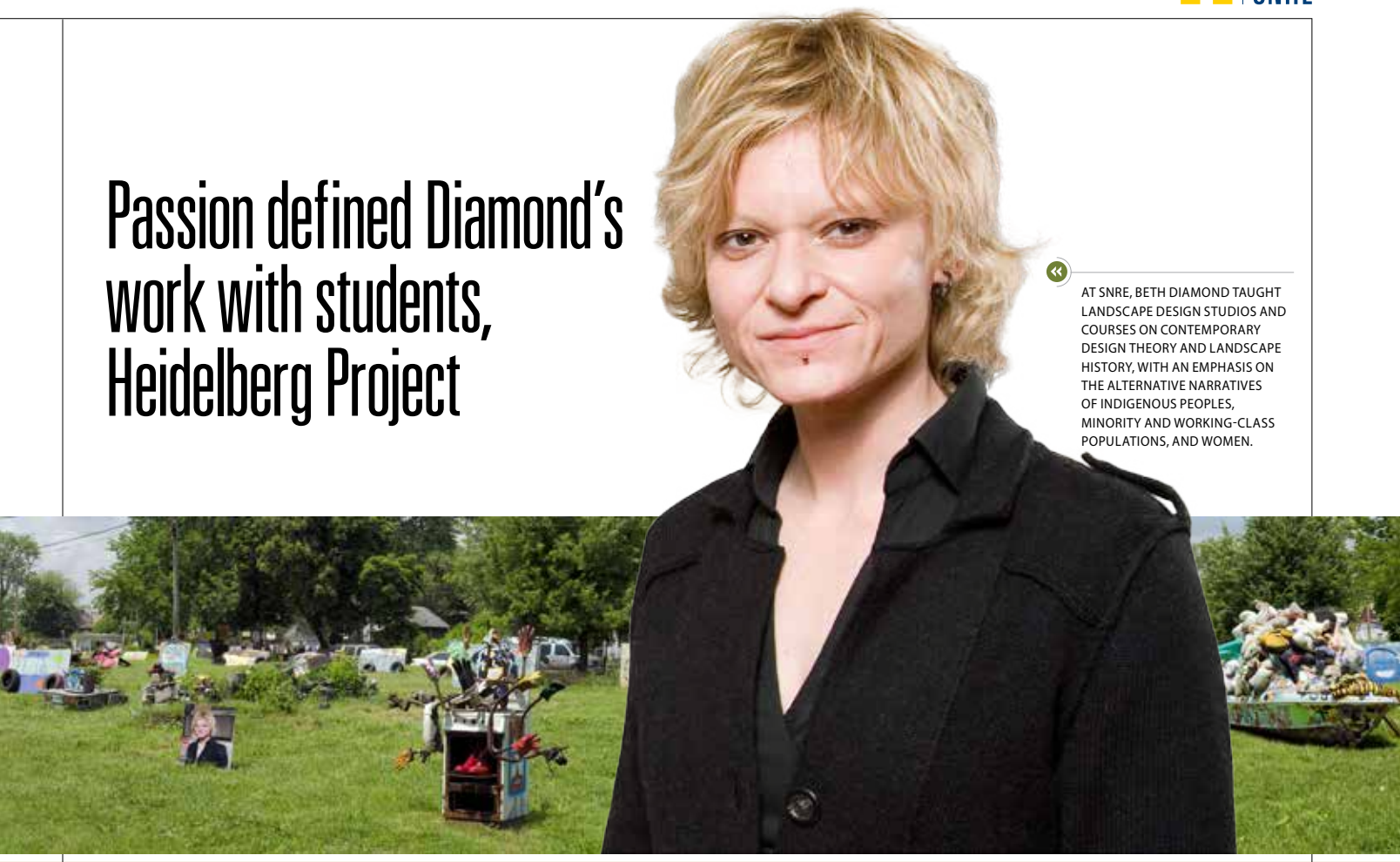
Beth moved her hands quickly as she described the projects her master's students had envisioned, ranging from a welcome center to a community garden at the Heidelberg Project. Much of that work is chronicled in a book published shortly before her death, *The Heidelberg Cultural Village: Art into Urbanism*. Out of their visionary work came several suggestions to anchor the two-block cultural village: The House that Makes Sense Community Arts Center; the Heidelberg Art Farm, an art-based urban farm; the Black Bottom Healing and Memorial Garden; the Heidelberg Assemblage Art Park; and a commercial corridor.

.....

On a recent 90-degree afternoon, Jenenne Whitfield, the project's executive director, sits outside the information booth on Heidelberg Street and reflects upon Beth's involvement with the project. "I met Beth in 2009 and the relationship kind of grew. We liked each other, and she loved the Heidelberg Project," says Jenenne, as she stops to greet a visitor who has pulled up in a car. "Our work together went way beyond just work. We we're friends. We were very close in age and I think she would say that she became part of our family."

Beth made a commitment to the Heidelberg Project over and above her formal relationship through the university, Jenenne says. "She wanted to see something through. So we worked

Passion defined Diamond's work with students, Heidelberg Project



AT SNRE, BETH DIAMOND TAUGHT LANDSCAPE DESIGN STUDIOS AND COURSES ON CONTEMPORARY DESIGN THEORY AND LANDSCAPE HISTORY, WITH AN EMPHASIS ON THE ALTERNATIVE NARRATIVES OF INDIGENOUS PEOPLES, MINORITY AND WORKING-CLASS POPULATIONS, AND WOMEN.

Photo by Dave Brenner

together on a community art center, then focused on the whole Heidelberg two-block area from the perspective of a creative or cultural village. We were imagining and discussing what would the Heidelberg Project be like at its full point of operation. And that imaginary process is what resulted in the book."

Beth was a landscape theorist, designer, and self-proclaimed cultural instigator. She came to U-M in 2005 as an assistant professor of Landscape Architecture at the School of Natural Resources & Environment and assistant professor of art and design at U-M's Penny W. Stamps School of Art & Design.

She viewed landscape architecture as an art form as well as a visionary medium for social change and evolution. This perspective evolved from a fascination with the qualities and expressions of the built world as a mirror of human civilization. Heidelberg became a perfect medium for her to pursue these theories and her own artisitic passions.

Beth's accomplishments will live on in the Heidelberg Cultural Village, Jenenne says. "We never finished our work. Prior to Beth becoming sick, we started to realize that our work is always going to be evolving," she added. Some projects were not realistic and they had to rethink others. Still, projects that did not get the go-ahead eventually became models for Heidelberg.

Beth was her most energetic when working with students. Nick Lavelle, who graduated in 2012 with a master of Landscape Architecture degree, first met her as his first-year studio professor. He eventually collaborated with her on the Heidelberg Project by designing The House that Makes Sense, a community arts center that, if built, would be located on 16 vacant lots along Mount Elliott Street.

"I had a degree in architecture before I came to U-M," Nick recalls. "That being said, I had a meeting one day asking Beth to push me harder than everyone else so I could improve further. So, she indeed pushed me, and out on the other end came some great ideas."

"The next semester I had her for history and she approached me one day and asked me if I wanted to work for and with her on a project that could use my architectural background. So that's how I became involved with the Heidelberg Project."

Collaborating with Beth was "an amazing experience; it was truly a collaboration. She wasn't someone who dictated but someone who would tell you if you're completely missing the ball, which happened at first."

His first round of brainstorming for The House that Makes Sense was a bit conservative, and Beth, instead of saying it was a failure, told him it was merely a jumping off point. "Then she proceeded to tell me how to view and approach the design of the building," Nick said. "So the next time I met with Beth, I had the breakthrough idea, the backbone of the whole design that carried through all the way to the final design."

Nick describes his work with the Heidelberg Project as the most fulfilling of

A Work of Art

his life. "Even though the House that Makes Sense has not been built, I keep the faith that it will," he says of the project that he worked on for three years. "Beth was a major part of that reason because she had spent over a year, before I came into the picture, to build a trust with Jenenne, (Heidelberg Development Director) Sharon (Luckerman), and Tyree. Without that trust in her, I may not have been taken at much value."

The project also became the focus of other SNRE student work, including a four-student master's project team in 2011. They presented research and designs calling for expanding Heidelberg into a long-term vision for neighborhood redevelopment and laid the groundwork for the Cultural Village.

Beth's death took the SNRE community by surprise, and a May 2 memorial service in the Dana Building was filled with friends and colleagues. Students took a page from Beth's "guerilla art" playbook and remade the building as a living piece of art.

"I am myself amazed by the creativity that has evolved from our desire to comfort and care for Beth these last difficult weeks," said Dean Marie Lynn Miranda in a message to the SNRE community in announcing the passing. "But the notion that Beth once again unleashed creativity seems completely right. It's what she has always done."

The University of Michigan Board of Regents recognized her passing and scholarly and teaching contributions at its May 16 meeting. "She sought to critically examine the role of public space design in democratic societies, human social relations, and cross-cultural communications," the Regents' memorial statement read. "A gifted teacher and dedicated mentor, Professor Diamond challenged her students to discover and practice the aesthetic, environmental, and societal elements of landscape design."

Erik Powers, a born-and-raised Detroiter, works as a merchandiser for Heidelberg. An urban planning student at the University of Michigan-Dearborn, he covets his role with the project. "I always wanted to be involved with an artistic organization," he says, stopping to point a family toward a home recently transformed into a welcome center. "I wanted something more close knit. I wanted more of a family, something grassroots. This seems more personal."

That same sense of community drew in Beth as well.

"There were many, many things we did as we were preparing for this project that caused Beth to really dig her fingers into the roots of what we were doing," Jenenne says.

"So much of what we are doing has absolutely nothing to do with building, and nothing to do with recycled materials, and nothing to do with art," added Jenenne. "It has everything to do with resurrecting the human spirit and looking at what new possibilities exist, not only for the Heidelberg Project but people in general. That's critical and still the most important part of our work."

Coming from a business world, Jenenne is used to navigating between creative artists and the so-called world of big business. So when it came to forging a relationship with the University of Michigan, she didn't hesitate. "I thought they would have a lot of resources they could share with an organization like Heidelberg, and they did, right down to helping us write a grant. And having students come out and volunteer and do things that would help move us further along.

"It's broadened our reach in terms of understanding that it's possible for a

HEIDELBERG PROJECT

The Heidelberg Project

Where:
About 45 miles east of Ann Arbor, on Detroit's east side.

What:
An open-air art environment using everyday, discarded objects to create a two-block area full of color, symbolism, and intrigue.

Who:
Tyree Guyton started the work 1986 as a creative response to blight and decay in the neighborhood where he grew up.

Why:
To develop the area into a "funky" artistic cultural village by transforming and renovating vacant houses into stimulating works of art. Each structure will host art and educational classes.

Details:
313.974.6894

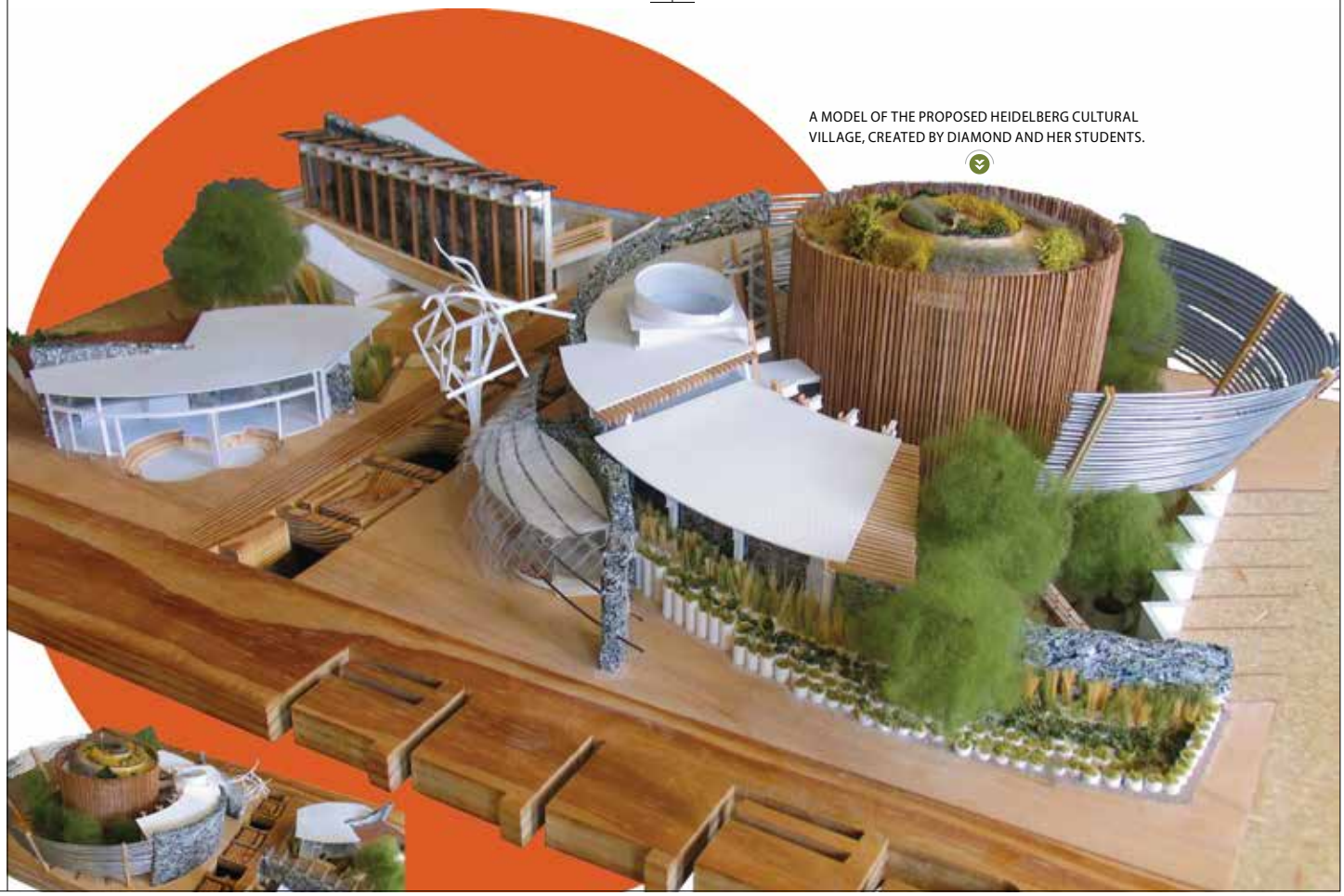
information@heidelberg.org

OPPOSITE PAGE, FROM LEFT: SNRE STUDENTS TURNED THE DANA BUILDING INTO A GUERILLA ART INSTALLATION IN THE DAYS LEADING UP TO BETH DIAMOND'S MAY 2 MEMORIAL SERVICE; DIAMOND BY ONE OF THE ICONIC HOMES ON HEIDELBERG STREET; EVEN CARS ARE AMONG THE EVERYDAY OBJECTS USED TO CONVEY THE TRANSFORMATIVE POWER OF ART. **THIS PAGE, FROM LEFT:** KATIE PETHAN WAS ONE OF MANY LANDSCAPE ARCHITECTURE STUDENTS WHO SET UP THE GUERILLA ART INSTALLATION. THE ART ON DISPLAY AT HEIDELBERG (CENTER AND RIGHT) RANGE FROM INDIVIDUAL WORKS TO MORE COLLABORATIVE COMMUNITY ENDEAVORS. IN HER BOOK AND IN THE CULTURAL VILLAGE MODEL (BELOW), DIAMOND SOUGHT A WAY TO MAKE THE ARTISTIC EXPRESSIONS MORE ACCESSIBLE TO PEOPLE AND PART OF A LARGER EXPERIENCE.

nonprofit community arts organization to work effectively with a university," she added. "I felt whatever I needed from the university I was able to get, and I think that our relationship on many levels is still ongoing."

As Jenenne surveys the colorful Heidelberg landscape and we return our wooden chairs to the information booth, she says her time with Beth permanently changed her. "I truly enjoyed my relationship with Beth Diamond. And if I could be so bold to say, it's not over."

(Bogater is editor of the University Record*, the weekly newspaper for U-M staff and faculty. Prior to joining U-M, she was a Detroit-area journalist for nearly 20 years.)*



A MODEL OF THE PROPOSED HEIDELBERG CULTURAL VILLAGE, CREATED BY DIAMOND AND HER STUDENTS.

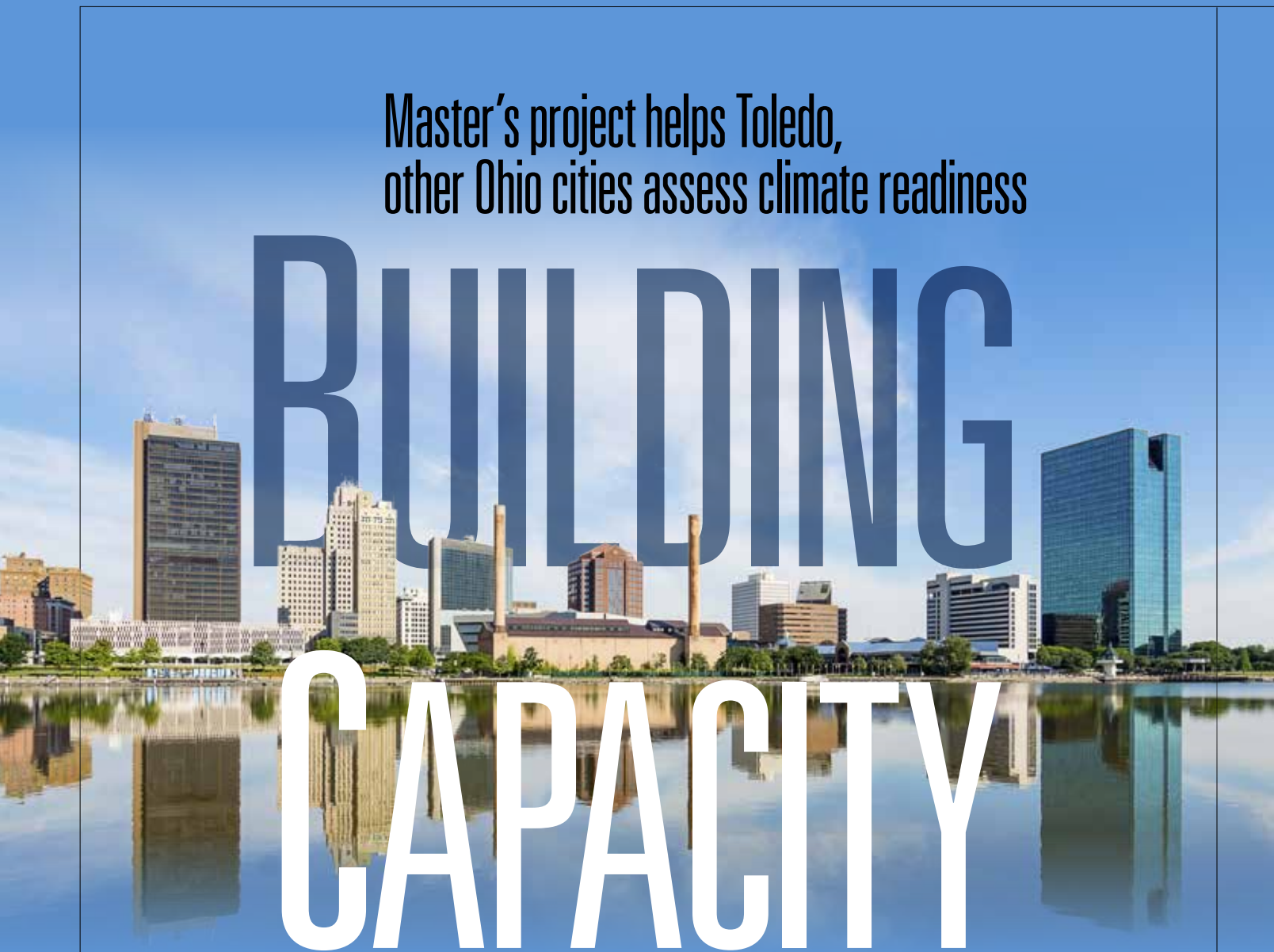
Master's project helps Toledo, other Ohio cities assess climate readiness

BUILDING CAPACITY

BY **KEVIN MERRILL**

Toledo is perhaps best known nationally as the Ohio hometown of the Jeep, the Mud Hens baseball team, and Tony Packos, the Hungarian restaurant made famous by native son Jamie Farr in his role as Max Klinger in the 1970s TV sitcom "M*A*S*H."

But with the help of eight SNRE master's students, it may be on its way to becoming an urban innovator in climate adaptation among Great Lakes' cities. The research, the by-product of a year-long team project, is helping this city of 279,000 on Lake Erie assess what it was doing right, where to do better, and how to get more people within government and the community on the same page when it comes to climate adaptation.



ABOVE: THE DOWNTOWN TOLEDO SKYLINE

EDITOR'S NOTE: This story is part of an ongoing series examining the people, the research process, and effects on clients of the SNRE master's project experience.

"We're at the ground floor and starting to put plans together and become more progressive in our thinking on sustainability," said Patekka Bannister, an industrial waste control specialist in Toledo's Division of Environmental Services, and the students' main contact on the project. "To have the students come in and assist, helping us with the basic things we needed to have in place, was just phenomenal."

The report, presented in April at the SNRE Capstone Conference, researched the adaptation capacity of Toledo and three other Ohio cities: Avon Lake, Dayton, and Elyria. Through more than 60 interviews and hundreds of hours of data collection and synthesis, the students produced an integrated assessment of each city's then-capacity to address future changes in climate. The study examined everything from leadership buy-in to population distribution, vacant housing, and floodplains; some of that data was later captured visually through geographic information system mapping. The results described the capacities and constraints each city faced, as well as identified best practices each could implement.

The study found cities already were confronting issues related to excessive storm water, such as soil erosion, combined-sewage overflows, and reoccurring flooding. Responses varied, but included stakeholder engagement, private-public partnerships, and regional networks. However, limited financial resources, limited access to scientific knowledge, and unclear strategies were limiting their abilities to respond.

Underscoring the urgency of the report's conclusions are climate models showing warmer temperatures, shifting precipitation patterns, and increased extreme weather events by the end of the century. The Great Lakes region is likely to experience increased temperatures, severe heat events, flooding, freeze-thaw events, and invasive species as well as decreases in lake levels and ice cover. Needless to say, city planners and engineers in these cities and across the region face a challenge.

THE PROCESS

The student team arrived in Toledo and began asking questions and seeking data just as other sustainability initiatives were gaining steam across the city and its home county, Lucas. "The timing was perfect," Bannister said. For example, the Toledo-Lucas County Sustainability Commission was organizing GreenTown, a two-day conference promoting green sustainability ideas and projects. Building on momentum from that event, the city and county decided to hire a consultant to develop a region-wide sustainability plan due this fall.

THE ADAPTERS: MEMBERS OF THE MASTER'S PROJECT TEAM WORKING WITH THE FOUR OHIO CITIES WERE (FROM LEFT) CARA BASTONI, PAMELA BARCLAY, SUNDEEP RAMACHANDRAN, RYAN STOCK, DAVID EISENHAUER, MASOOMA HASSAN, LEILA MEKIAS, AND MELODY LOPEZ.

Photo courtesy of Sundeep Ramachandran

Toledo had never conducted a review of its services and programs framed in the context of climate adaptation. Somewhat naturally, the students' work produced surprises. For example, if snowfall is expected to decrease because of future climate changes, how does that affect the amount of salt purchased and stored? "Do I need to start looking at increasing our capacity for infrastructure if we're going to have more severe storms?" Bannister said. "That's one of the things students did: set the stage, or plant the seed, for us to start to having these conversations."

And while the city runs a program to encourage businesses to conserve water and reduce surface water runoff to sewers through infrastructure improvements, it wasn't seen as part of a larger climate adaptation strategy. Now, it will be, Bannister said. "They brought to light things we were already doing, but placed them in the context of adaptation, especially things we don't have to go out and get additional funding for. We can just look at the strategies we currently have and we can bridge that in with climate."

The students also created an inventory of Toledo's efforts in rain gardens, other green infrastructure programs, and business-incentive programs and wove it into a narrative. Because the city's Division of Environmental Services is responsible for environmental issues from air quality and brownfields to sewer, water, and projects typically identified as "green infrastructure," the students were assigned to that division with Bannister as their contact.

When Toledo and Lucas County announced plans in February 2013 to produce a sustainability plan, the Division of Environmental Services said it had secured two technical assistance grants. Those grants later funded a summer workshop and work with GLAA-C on producing webinars on adaptation. (The Great Lakes Adaptation Assessment for Cities, or GLAA-C, is housed within U-M's Graham Sustainability Institute and was the student team's client on the master's project.)

"We have so many things going on so quickly right now that if the students came back, they might have a different outcome," Bannister said. "They came at the very beginning when we were just starting to build. We're really getting some things done, looking at our strategies and creating plans. We're definitely at a different stage now than we were 12, 13 months ago."

Building Capacity

"Yes, I think that that's the key," added Regina Collins, a senior environmental specialist focused on the city's storm water programs under its discharge permit with the Ohio Environmental Protection Agency. "We have momentum and I think more people on board."

CONNECTING SCIENCE TO LOCAL NEEDS

For team members, the project boiled down to a simple assignment: connecting science to the local needs and perceptions of communities. "The question was how do we take this large, complex body of information and make it so that it's in a form that people can utilize. They can use it to promote their plans and their schedules and determine what they need to do to make sure their communities are viable moving forward," said Pamela Barclay (M.S. '13, M.P.H '13), a dual-degree student who studied in SNRE's Behavior, Education and Communication field of study.

Other team members (and their fields of study) were: Cara Bastoni (Environmental Policy and Planning and Sustainable Systems); David Eisenhauer (Environmental Policy and Planning); Masooma Hassan (Environmental Policy and Planning); Melody Lopez (Conservation Ecology); Leila Mekias (Environmental Justice); Sundeep Ramachandran (Sustainable Systems and Mechanical Engineering through the College of Engineering); and Ryan Stock (Environmental Policy and Planning and Environmental Justice). The team's diversity was such that five of the school's seven fields of study were represented.

The group's interdisciplinary breadth was an advantage, Ramachandran said. "None of us felt like we were competing with each other. Everyone had their own expertise within the domain," he said. "Everyone felt responsible for whatever expertise they had. And I think that played a very crucial role in reducing the amount of conflicts within the team."

As with interdisciplinary projects of this scope, the learning that occurred can be measured not only in the solutions created but in how each researcher's intellectual boundaries were stretched.

"One of the big things for me was the whole point of thinking differently. As an engineer, I wouldn't normally think about what kind of social or economic impacts does a project have," Ramachandran said. "Before coming to SNRE, if you asked me would putting windmills in these regions make sense, I would have said, 'Yes, of course it makes sense. We have all this wind potential. I can do optimization maps and show you.' But now, I would think about how it affects the ecology, how it affects local species. Through this master's project, the way I approach problems has changed. It's a permanent change. I'll definitely be looking at it from multiple angles."

The students' work, available through the University of Michigan's Deep Blue online research database, has drawn international interest. Not only did they present the research at the International Association for Great Lakes Research annual conference in June at Purdue University in Indiana, they also presented it at the National Adaptation Conference later that month in Sydney, Australia.

The team's client wasn't actually any of the cities, but the Great Lakes Adaptation Assessment for Cities, or GLAA-C. It brings together researchers and practitioners to develop climate adaptation programs for U.S. and Canadian cities with populations between 25,000 and 300,000 across eight states and two provinces. It started in 2011 with $600,000 each from the Graham Institute and Kresge Foundation. SNRE Professor Don Scavia, who also directs the Graham Institute, and SNRE Professors Arun Agrawal and Maria Carmen Lemos are among six principal investigators for GLAA-C.

"What GLAA-C focuses on, especially in the Great Lakes region, is this notion that climate change isn't a catastrophic threat, the way that sea-level rise or Super Storm Sandy perhaps are. But it's exacerbating existing vulnerabilities, and so we spend a lot of time trying to learn from the local contexts of individual cities," said Beth Gibbons, GLAA-C project manager and the students' main client.

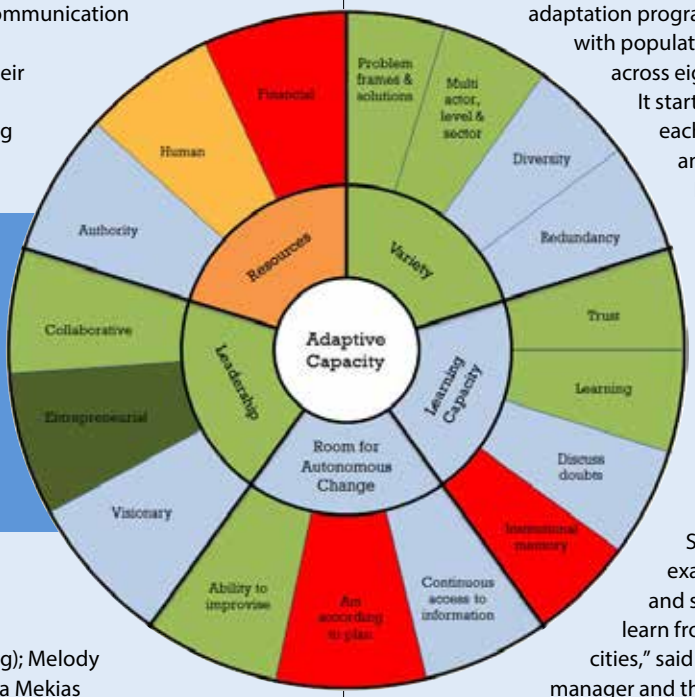
In addition to the information collected from participating researchers, a significant amount of GLAA-C's data and its usefulness to cities comes from the Great Lakes Integrated Sciences and Assessments Center (GLISA), a collaboration between U-M and Michigan State University and supported by the National Oceanic and Atmospheric Administration. (GLISA is administered by the Graham Institute.)

"Taking the climate data from GLISA, we can help cities find where to put their efforts to be more resilient. A lot of the research, like these students' research, is an attempt for us to better understand what are the limitations and capacities, what are their resources and the barriers," Gibbons said. "We can then overlay that with climactic changes, impacts, and opportunities. It's a way of saying that everything that's going to happen is highly localized, and packaged for the local experience." (See Page 29 for a related story on GLAA-C's role in funding other student adaptation research.)

Some of that data can be seen in an online tool launched this summer. The Socioeconomic and Climate Change in the Great Lakes Region Map provides social, economic, and demographic statistics

Adaptive Capacity

ONCE DATA WAS COLLECTED, THE STUDENTS PRESENTED IT THROUGH A FRAMEWORK CALLED THE 'ADAPTIVE CAPACITY WHEEL.' INTRODUCED BY JOYEETA GUPTA AND OTHER RESEARCHERS IN 2010, THE WHEEL ASSESSES CERTAIN CHARACTERISTICS TO MEASURE TO WHAT DEGREE (OR CAPACITY) AN INSTITUTION IS READY TO ADAPT TO CLIMATE CHANGE. THE WHEEL HAS SIX DIMENSIONS AND 22 CRITERIA, AND MEASURES INSTITUTIONAL READINESS AT A MOMENT IN TIME.



on 225 counties in the Great Lakes region, overlaid with detailed data about municipal spending, land-use change, and climate-change characteristics. The Graham Institute, as part of its support of GLAA-C, and Headwaters Economics, an independent, nonprofit research group, co-developed the tool.

"We spend a lot of time getting cities to be cross-departmental. That's the biggest challenge that the cities have right now. They're stretched so thin and they've had so little attention," said Gibbons. "Over the last 15 years, there's been a tremendous change in the way that systems, organizations, and agencies and private organization companies are organized. It's no longer departmental, but it's programmatic. We're focused on helping cities look at what they're doing programmatically when it comes to climate, efforts that cross multiple departments, and how they can more effectively leverage the resources to work together."

WHEELS AND TOOLBOXES

The four Ohio cities were selected after responding positively to a letter sent by the master's project team to officials at U.S. and Canadian municipalities. Each city had to express a willingness to share information with the team, be active in the process, and dedicate someone to the project. The Ohio cities not only expressed interest early, they were appealing as a package: they varied by population and shared resources and challenges at the state level.

The students' final report included sections on each city and an overall summary. City officials received a custom 30-minute presentation and a GIS mapping tool that presented a comprehensive view of population, vacant land, and floodplains. That tool can be added to and updated as a future resource. In addition, the students assessed each city's individual readiness as measured by the use of the "Adaptive Capacity Wheel." The wheel is a diagnostic research tool that measures certain characteristics of an organization (see graphic, page 28) and how those characteristics measure an organization's ability to respond to climate change.

"It's a tool to get people to do a diagnostic of where they fair in their ability to make decisions about climate change," said Lemos, the project's faculty adviser. "It's not software; it's an organizing visual map of their capacities. It's a way of organizing ideas that gives you a visual representation of that idea." Added Gibbons: "I think that the Adaptive Capacity Wheel will be helpful for the cities. I think it's a good way of synthesizing what they gathered."

To Barclay and Ramachandran, the value of the team's research came not in its inventiveness, but in which tools were selected and how they were packaged into a single "toolbox." Their approach found a receptive audience among city officials.

"This was not something new we invented, but we combined it and made our own recipe. We used different tools, like the wheel, in combination with SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis and GIS maps to paint a clearer picture of the problem and logically support our recommendations," said Ramachandran. "So adding those elements gave different aspects of the same problem. This was more relevant than making a new framework."

"The cities that we spoke with were saying, 'We have people giving us information all the time, but very few people are telling us how we can actually utilize that information,'" Barclay said.

The Glass City & U-M: Together on Climate

The City of Toledo, nicknamed the "Glass City" for its history of glassmaking and housing glass manufacturers, is an important partner in GLAA-C's efforts to help Great Lakes' cities adapt to climate change. Toledo officials have participated in workshops, master's projects, and other research efforts. The city volunteered to be one of six case studies for how Great Lakes cities are adapting to future climate impacts. It also is a member of GLAA-C's Urban Council on Sustainability and Adaptation.

Spring 2012: Toledo signs on as participant for SNRE master's project team research.

Fall 2012: Attends GLAA-C's "Forwarding Adaptation in the Great Lakes Region" workshop. The event brought together teams from 13 U.S. and Canadian municipalities to learn about and discuss climate change adaptation.

Spring 2013: Attends a design charette that brought city and government officials from Michigan and Ohio to provide input on the development of an interactive online climate map for cities.

Spring 2013: With assistance from GLAA-C, organizes its own workshop examining coastal climate adaptation and resilience along western Lake Erie.

Fall 2013: Works with GLAA-C to identify a student team from Taubman College's Department of Urban Planning to assess its storm water management plan and utility credits program.

Fall 2013: Works with GLAA-C to identify a student team to further develop education outreach regarding its sustainability plans and services available to residents and businesses.

Other student research projects with GLAA-C connections:

April 2013: An eight-member SNRE master's project publishes "Climate Change Adaptation in Great Lakes Cities."

December 2012: A seven-member team of master of urban and regional planning students from Taubman College publishes "Foundations for Community Climate Action: Defining Climate Change Vulnerability in Detroit."

April 2012: A five-member SNRE master's project publishes "Urban Climate Change Adaptation: Case studies in Ann Arbor and Grand Rapids, Michigan." It presents climate adaptation case studies for Ann Arbor and Grand Rapids, Mich. It also proposes a framework for analyzing adaptive capacity in other Great Lakes cities.

April 2011: A nine-member team of master of urban and regional planning students from Taubman College publishes "Climate Adaptation Planning in Great Lakes Cities." The study's purpose: identify the anticipated climate impacts for cities within the Great Lakes region and recommend appropriate adaptation strategies for two Michigan cities in particular: Marquette and Benton Harbor.

Climate Resilience On the Road: Adaptation Jo

BY **ALLIE GOLDSTEIN** AND **KIRSTEN HOWARD**

After applying on Craigslist to live in the same house in Kerrytown, we—Kirsten Howard and Allie Goldstein—began the adventure that is earning a master's degree at SNRE. And it was somewhere in between classes and internships and master's project meetings that an idea started percolating.

The idea was to change the tired conversation on climate change—the conversation that seems to be sputtering like a scratched record between those who accept the science on climate change and those who deny it. With the impacts of climate change already being felt around the globe and in our own backyards, that conversation no longer seemed interesting or relevant. What was attention-arresting—to us—was how people are already responding to impacts such as bigger floods, hotter heat waves, drier drought, "mega" forest fires, rising seas, and more frequent and intense storms by developing technologies, implementing policy, engaging in social processes, and generally using their wits and resources to adapt to the new climate reality.

Through our project, the "Great American Adaptation Road Trip," we traveled around the United States uncovering stories about people and places enhancing their resilience to the climate change impacts they are currently feeling or anticipating. On our blog at www.adaptationstories.com, we took a visual storytelling approach to make the often abstract idea of "climate change adaptation" a little more concrete and personal.

So, the week after graduating from SNRE in May 2013, we packed up Allie's mom's 2000 Toyota minivan and hit the road, traveling roughly clockwise around the United States. Our plan—to document resilience—brought us from our backyard in Ann Arbor to the dunes of Cape Cod to the cornfields of southwest Georgia to the sinking bayou of Louisiana to the scorched forests of New Mexico to the few remaining glaciers in Glacier National Park. The people we met along our journey are living testaments to the vitality of the human spirit in the face of what we believe is a defining challenge of our time.

Editor's note: *When we discovered that Kirsten Howard (left) and Allie Goldstein were planning a national adaptation tour, we signed on. In exchange for some financial and moral support, they agreed to meet alumni along the way. Their assignment: come back with stories about how SNRE alumni are helping their organizations and communities adapt to the impacts of climate change.*

In Louisville, Kentucky, we met Mike Hayman, a self-taught arborist who has planted more than 13,000 trees in his neighborhood, helping to combat the growing urban heat island in the city. On Saint Helena Island in South Carolina, we spent the day with Queen Quet, the head-of-state of the Gullah/Geechee nation and learned how cultural zoning laws have kept coastal development low on the island, thus making it more resilient to sea-level rise and storms. In Tucson, Arizona, we met with rainwater harvester Brad Lancaster and learned about community efforts to reap sustenance from the desert, even as precipitation patterns change. The list goes on.

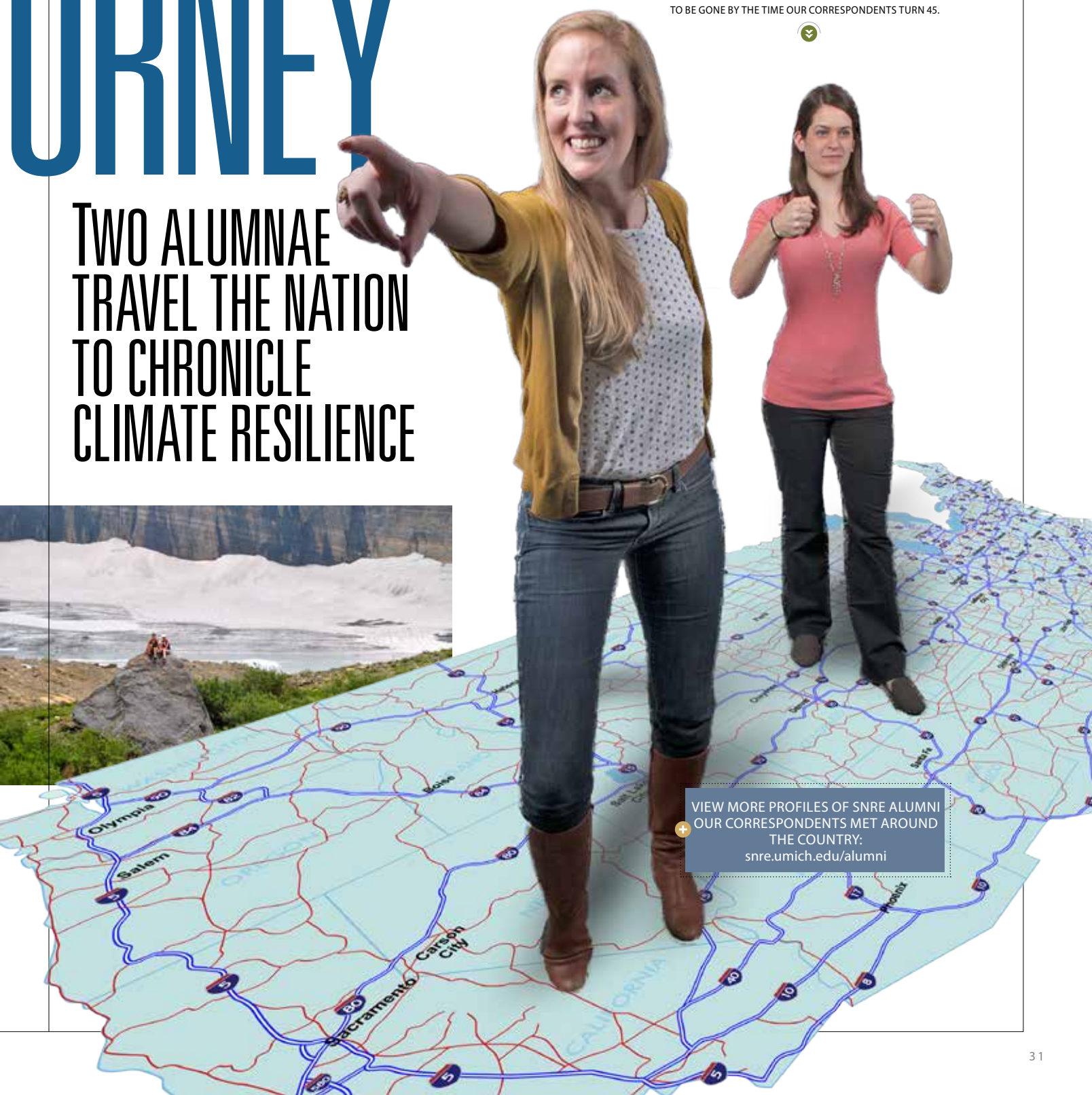
Over the course of three months, we met dozens of SNRE alumni working on different angles of the climate problem. Here, we tell the stories of four alumni—Kristin Baja, Morgan Crutcher, Bill Armstrong, and Jason Mulvihill-Kuntz—who in particular embody the answer to the question we posed at the beginning of our trip:

What does climate change adaptation look like?

URNEY

TWO ALUMNAE TRAVEL THE NATION TO CHRONICLE CLIMATE RESILIENCE

HAVE CAR (AND BLOG), WILL TRAVEL: KIRSTEN HOWARD POINTS THE WAY WHILE ALLIE GOLDSTEIN DOES THE 'DRIVING.' **BELOW LEFT**: THE GLACIERS IN GLACIER NATIONAL PARK ARE PROJECTED TO BE GONE BY THE TIME OUR CORRESPONDENTS TURN 45.

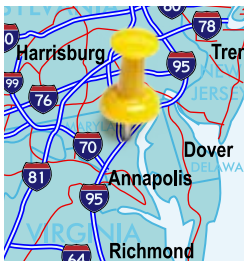


VIEW MORE PROFILES OF SNRE ALUMNI OUR CORRESPONDENTS MET AROUND THE COUNTRY:
snre.umich.edu/alumni

Adaptation Journey

Keeping Baltimore Neighborhoods Cool

Kristin Baja (M.S. '11, M.U.P. '11)



As we drove over the steamy summer asphalt in Baltimore, Maryland, it became clear that Kristin Baja has her work cut out for her. As the new Hazard Mitigation and Adaptation Planner for Baltimore—a job title that makes her the first of her kind in any U.S. city—Baja is tasked with integrating climate change adaptation planning into ongoing hazard mitigation efforts. One of the major existing hazards exacerbated by climate change is heat.

Baltimore, like many U.S. cities, suffers from the urban heat island effect, a phenomenon that occurs because built-up, paved areas absorb more heat than nearby rural areas. A 2008 NASA analysis showed that Baltimore's land surface temperature can be as much as 50 degrees Fahrenheit hotter in the city compared to surrounding forests. Baltimore's Climate Action Plan projects between 15 and 35 days over 100 degrees Fahrenheit by 2100, as compared to the average five days per year at the end of the 20th century. These estimates are especially concerning for vulnerable elderly, poor, and homeless residents.

One of Baja's roles is figuring out how to mitigate the expanding urban heat island and keep people safe during extreme heat events. Because an urban tree canopy can lower direct temperatures up to 9 degrees Fahrenheit, she has focused long-term planning on the areas of the city most in need of shade. Driving through Baltimore with Baja, we found neighborhoods that are completely devoid of tree canopy. Other than the slim shadows cast by buildings, there's no hiding from the sun.

"We're conducting a vulnerability assessment to inform our planning process; however, it's pretty obvious which neighborhoods are in need of trees just by walking through them," said Baja, who attributes her working knowledge of climate science and adaptation strategies to her time at SNRE.

With the current tree canopy at 27.4 percent and a city goal to get to 40 percent by 2037, both planting new trees and maintaining existing ones are challenges. Of the 2.6 million trees in Baltimore, more than 25 percent are distressed, dead, or dying, according to the U.S. Forest Service. As we drove through one neighborhood, Baja pointed to a few trees that were in rough shape. The Baltimore Treekeepers, a group of about 40 volunteers, is working to change that with trainings and tree maintenance around the city.

"We are focusing on continued outreach in urban heat island neighborhoods, collaborating with community leaders to educate people about the long-term benefits of trees," Baja said.

Aside from cooling streets, trees absorb air pollutants and stormwater, plus they cool buildings and thereby reduce energy bills. Canopy also can make neighborhoods safer. A 2012 study showed that a 10 percent increase in Baltimore's tree canopy reduced the neighborhood crime rate by 12 percent. A young resident of North Luzerne Avenue told Baja that the trees recently planted on the block had changed the way people in her community were talking to each other, and that she felt safer.

Though growing an urban forest is a kind of endurance sport, with Baja planning and planting, we're hopeful Baltimore's trees will grow tall and shady for the long haul: "We're taking the requirement from the federal government for an all-hazards mitigation plan and we're going above and beyond, beginning to be proactive rather than reactive," she said.

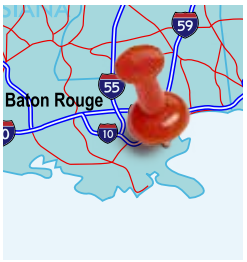
With a heightened appreciation of trees as tools for building community resilience, we left Baltimore to continue our own long haul around the country.

TOP: ONE OF THE MANY TREE-LESS STREETS FOUND IN BALTIMORE. **ABOVE**: A NEW TREE IS PART OF A LARGER PLAN TO COMBAT HEAT SINKS THROUGH CREATION OF TREE CANOPIES. **AT RIGHT:** KRISTIN BAJA OVERSEES THE EFFORTS TO PLAN AND PLANT A NEW FUTURE FOR THE CITY.

"WE FEEL STRONGLY THAT DIVERSIONS THAT USE NATURAL PROCESSES TO CREATE LAND GIVE US THE MOST BANG FOR OUR BUCK," MORGAN CRUTCHER SAID.

RESTORING THE LOUISIANA GULF

Morgan Crutcher (M.S. '11)



THE ROAD TRIP OFTEN TOOK OUR CORRESPONDENTS OFF THE ROAD: ALLIE GOLDSTEIN PADDLES THROUGH THE (QUICKLY DISAPPEARING) WETLANDS IN COCODRIE, LOUISIANA.

We met Morgan Crutcher on the Bayou Bienvenue Platform by the train tracks in the Lower Ninth Ward in New Orleans, an area devastated in 2005 by Hurricane Katrina. During the interview, we looked out over the open water—once a wetland and coastal forest—that now serves as a graveyard for cypress trees.

Due to a confluence of factors including subsidence (land sinking), sea-level rise, and storm damage, Louisiana's coast is losing land at the astonishing rate of one football field every 38 minutes. The wetlands that serve as the first line of defense against hurricanes by breaking waves and absorbing storm surge are disappearing quickly. With models projecting that a Katrina-sized storm could occur once every generation with climate change, reversing Louisiana's wetland loss is an urgent task—and one that Crutcher is ready to take on.

Originally a "coal miner's daughter, granddaughter, and great granddaughter" from Kentucky, Crutcher fell in love with coastal Louisiana when she came to New Orleans for college. She earned her master's degree at SNRE in 2011 and balanced a busy schedule of internships and field work, sometimes coming straight from the office to Fluvial Ecology class, quickly trading her high heels in for waders. But Crutcher is actually most comfortable working at intersections.

"I wanted a degree that bridged science and policy. I really believe that to have good policy, it has to be science-based," Crutcher said.

After graduation, Crutcher joined the Coalition to Restore Coastal Louisiana as a Technical and Policy Analyst. She works with stakeholders on strategies to restore healthy ecosystems in the Gulf. One major strategy for coastal restoration redirects the flow of Mississippi River water and the sediment it carries back to the marshes it originally created. Diversions help reverse the damage done by the channelization of the Mississippi River over the years, which has led to 50 percent less sediment reaching the Gulf and slowing the only process that naturally builds land. The Coalition to Restore Coastal Louisiana advocates for science-based operation and quick implementation of diversons in the state's 2012 Coastal Master Plan.

"We feel strongly that diversions that use natural processes to create land give us the most bang for our buck. Though no silver bullet, in the face of climate change, they're essential to any comprehensive restoration strategy," Crutcher said.

Existing sediment diversions in West Bay, Wax Lake Outlet, and Atchafalaya Bay are all forming deltas in the midst of great land loss. Diversions could bring the equivalent of two Hudson Rivers worth of freshwater into the Gulf, carrying sediment to create new wetlands and recharging the long-abused ecology of the coastline. When operated strategically, diversions can build land where it is most needed for storm protection. They give Crutcher hope, even in a city that is known as "ground zero" for climate change impacts.

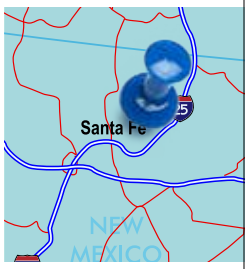
MORE INTENSE STORMS AND HURRICANES AS WELL AS SEA-LEVEL RISE AND SUBSIDENCE ARE PRODUCING MORE 'GRAVEYARDS' LIKE THESE WHERE CYPRESS TREES ONCE FLOURISHED.

Adaptation Journey

Fighting for Fire in New Mexico

Bill Armstrong (B.S. '72)

BILL ARMSTRONG WALKS ALLIE GOLDSTEIN THROUGH THE FOREST AND THE CHANGES WROUGHT BY FIRE.



Driving through the Santa Fe National Forest, it is hard to believe that this landscape was once savannah-like, with grassy clearings opening up among the ponderosa pine. Now, there are about 900 trees crowded in each acre where there used to be 40.

"What you're seeing here is 100 years of bad decisions," Bill Armstrong, a fuels specialist with the U.S. Forest Service, told us. "And now, we're losing the forests."

Armstrong spent his childhood in the forests around Guadalajara, Mexico, before enrolling at the University of Michigan. Between the junior and senior years of his undergraduate education, he and his friends bid on a 40-acre timber tract in northern Michigan and spent the spring harvesting. After graduation, he moved around Central America before landing in New Mexico, where he has worked for the Forest Service for more than 25 years.

Fire is the keystone process that has been artificially removed from the Southwest's forests. Low-intensity "ground fires" used to visit tree stands every seven to 11 years. But as more people moved to the area in the late 19th century, an era of fire suppression began. The result is a forest's worth of kindling ready to ignite at the next lightning strike or downed electrical wire.

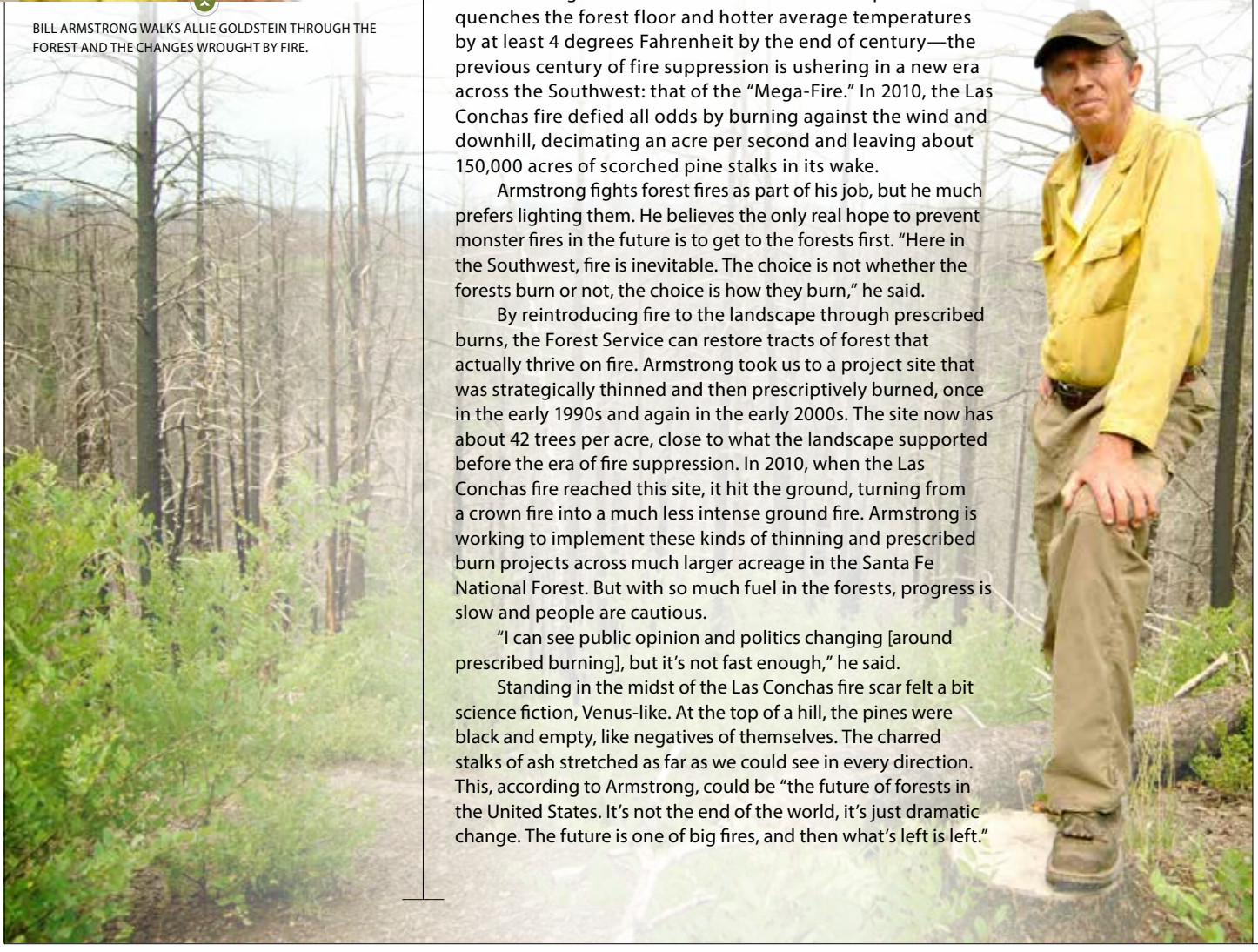
When compounded with anticipated impacts from climate change—a reduction in mountain snowpack that quenches the forest floor and hotter average temperatures by at least 4 degrees Fahrenheit by the end of century—the previous century of fire suppression is ushering in a new era across the Southwest: that of the "Mega-Fire." In 2010, the Las Conchas fire defied all odds by burning against the wind and downhill, decimating an acre per second and leaving about 150,000 acres of scorched pine stalks in its wake.

Armstrong fights forest fires as part of his job, but he much prefers lighting them. He believes the only real hope to prevent monster fires in the future is to get to the forests first. "Here in the Southwest, fire is inevitable. The choice is not whether the forests burn or not, the choice is how they burn," he said.

By reintroducing fire to the landscape through prescribed burns, the Forest Service can restore tracts of forest that actually thrive on fire. Armstrong took us to a project site that was strategically thinned and then prescriptively burned, once in the early 1990s and again in the early 2000s. The site now has about 42 trees per acre, close to what the landscape supported before the era of fire suppression. In 2010, when the Las Conchas fire reached this site, it hit the ground, turning from a crown fire into a much less intense ground fire. Armstrong is working to implement these kinds of thinning and prescribed burn projects across much larger acreage in the Santa Fe National Forest. But with so much fuel in the forests, progress is slow and people are cautious.

"I can see public opinion and politics changing [around prescribed burning], but it's not fast enough," he said.

Standing in the midst of the Las Conchas fire scar felt a bit science fiction, Venus-like. At the top of a hill, the pines were black and empty, like negatives of themselves. The charred stalks of ash stretched as far as we could see in every direction. This, according to Armstrong, could be "the future of forests in the United States. It's not the end of the world, it's just dramatic change. The future is one of big fires, and then what's left is left."



EVIDENCE SHOWS THAT UPWELLINGS OF MORE ACIDIC WATER ARE CORRODING THE CALCIUM CARBONATE SHELLS OF CRUSTACEANS, WHICH MAKE UP A SIGNIFICANT PART OF THE CHINOOK SALMON'S DIET.

Giving Salmon the Run of Washington Watersheds

Jason Mulvihill-Kuntz (M.S. '04)

We depended heavily on coffee shops on our road trip. They offered Wi-Fi to research and post on the blog, caffeine to invigorate long drives, and meeting spots. We met Jason Mulvihill-Kuntz in a bustling coffee shop in downtown Seattle. Though Mulvihill-Kuntz works on salmon recovery, the crowded setting was actually quite appropriate.

"I work on ecosystem recovery, taking care of the watershed for salmon. But my job is actually all about people and relationships. That's what's really interesting about it—coordinating and communicating effectively with people who have different interests," Mulvihill-Kuntz told us, gesturing to the patrons who make up part of the Lake Washington/Cedar River/Sammamish Watershed where he works.

He credits his coordination and communication skills to his work as a research fellow with Professors Steve Yaffee and Julia Wondolleck at the Ecosystem Management Initiative. He now works as a Watershed Coordinator to implement the local Salmon Recovery Plan. It's a 10-year plan with 50-year goals to restore the health of the threatened Chinook salmon. Lake Washington is the most urban of the 14 watersheds involved in salmon recovery for Puget Sound, compounding the task's challenge and complexity.

Climate change is overlaid on spawning barriers already faced by salmon, including dams, development, and poor water quality. In Washington's freshwater ecosystems, one of the biggest impacts from climate change is intensifying rainstorms that lead to more extreme flooding and higher peak flows in local rivers and streams. "It's not so much about abating climate change at this point; it's about how can we make sure the watershed is as resilient as possible so salmon have the conditions they need regardless of how the climate changes," he said.


MULVIHILL-KUNTZ

To expand salmon and human resilience, the watershed is using floodplain management and riparian-area and shoreline restoration. Functional floodplains provide more habitat for juvenile salmon to take refuge in a flood. Mulvihill-Kuntz and his team have been acquiring property to set back existing flood-control structures like levees and dikes and protect or restore riparian buffers in streams. They have helped purchase and restore hundreds of acres. In more developed areas, the watershed runs the Trees for Streams program to educate streamside property owners about restoring buffers and setting structures back to improve salmon habitat along rivers and streams. On lakeshore properties along Lake Washington and Lake Sammamish where property is especially expensive, the watershed has a Green Shorelines programs to educate owners about setbacks, soft shoreline alternatives to hard bulkheads, and other options to improve shoreline conditions that help juvenile salmon survive as they migrate from local rivers and streams to the ocean.

"I worry that there's a negative feedback loop. Salmon aren't getting the food they need, so fewer salmon are making it back to spawn, and we've made spawning hard enough," Mulvihill-Kuntz said. He and others are working on the next iteration of the 10-year plan. The key to its success will be increased public awareness, maintaining political will, and finding goals shared by state and local government programs to maximize limited resources, he said.

Carbon Footprint

Driving around the country in a 2000 Toyota Sienna minivan, our correspondents emitted carbon dioxide and other pollutants. They hope that it is someday possible to travel to all of the nooks and crannies of the United States (and the world) via low- or no-carbon transportation. But until then, they purchased offsets from TerraPass to mitigate their carbon emissions from the road trip.

Based on driving miles and energy used in buildings, Allie and Kirsten estimated their trip's carbon footprint to be 10.43 metric tons (or 23,000 pounds) of CO_2e (or carbon dioxide equivalent). The offsets purchased are verified under the Verified Carbon Standard or the Climate Action Reserve and will support greenhouse gas-reduction projects in the United States, such as methane capture from an abandoned coal mine in Pennsylvania and gas capture from a landfill in Minnesota.

Final Note:

The "Great American Adaptation Road Trip" was supported by the SNRE Office of Alumni Relations; an anonymous benefactor interested in scientific storytelling; and dozens of friends, family members, and strangers who contributed to Kirsten and Allie's online crowdfunding campaign. They are grateful to these donors for an experience of a lifetime. Contact them at adaptationstories@gmail.com.

Alumni Road Show

The School of Natural Resources & Environment took its alumni outreach on the road this summer, touching down from Seattle to Boston. Among other cities visited: San Francisco, Portland, Ore., Washington, D.C., Boulder, Col., Denver, New York, and Chicago. Hundreds of alumni gathered at these events, which included both informal happy hours and official alumni receptions. For more pictures, visit snre.umich.edu/alumni.

Ann Arbor

LEFT: Amanda Edmonds (B.A. '00, M.S. '05), Ellen Brody (B.S. '83, M.S. '86) and Stephen Kunselman (B.S. '86, M.L.A. '90) joined hundreds of fellow alumni April 12 for the Second Annual Ann Arbor Area Alumni Reception.

Chicago

San Francisco

Denver

Washington, D.C.

classnotes

Boston

LEFT: Tao Zhang (M.S. '88) and Chuck Kozlowski (M.S. '88) were part of the patriotic show of alumni support in Boston July 8 (ABOVE).

Seattle

ABOVE: Alumni, including new Visiting Committee Chairman Steve Simmons (B.S. '67, B.S.F. '69, far right, front) meet in Seattle May 16. RIGHT: John Gissberg (B.S. '72) and Bruce Mateer (B.S. '60, M.F. '63) take in the food and fun.

Haines Memorial Award

William (Bill) Banzhaf (B.S.F. '67) received the Dr. Sharon Haines Memorial Award for Innovation and Leadership in Sustainability for his dedication and diplomacy on issues of sustainable forest management. The award recognizes individuals or teams who promote sustainable forestry concepts and achievements. Banzhaf, who is retired and lives in Manistique and Marquette, Mich., began his career in Milwaukee. He was executive vice-president of the Society of American Foresters in 1995 when he was invited to join an expert review panel offering advice during the early development of the Sustainable Forestry Initiative (SFI), a third-party forest certification program. He served on the panel until 2000, when he was elected to a governing board set up to control the SFI standard and certification procedures. The board selected Banzhaf as president and CEO of the new Sustainable Forestry Board when it became a nonprofit in 2002. He retired in 2007, shortly after SFI Inc. was created to maintain, oversee, and improve all aspects of the internationally recognized SFI program. Today, he serves on the SNRE Visiting Committee.

BANZHAF

Geri Eileen Unger (B.S. '77) has been named executive director of the Society for Conservation Biology (SCB) in Washington, D.C. SCB, founded at the University of Michigan in 1985, is an international professional organization that promotes the scientific study of phenomena affecting the maintenance, loss, and restoration of biological diversity. She previously served as director of education and research at the Cleveland Botanical Garden. Before joining the Botanical Garden, she was with the Chicago Zoological Society and New England Aquarium, TerrAqua Environmental Science and Policy, and the Funder's Forum on Environment and Education, where she served in a variety of positions, including regional conservation initiatives, program development and evaluation, staff mentoring, ecological footprint assessment for institutions, exhibit design and interpretation, and development of healthy, high-performance school standards. She also serves on the SNRE Visiting Committee.

UNGER

Laura Rubin (M.S. '95, M.B.A. '95) was named a 2013 River Hero by River Network, a national coalition of more than 2,000 state, regional, and local grassroots organizations whose mission is to protect rivers and watersheds. Rubin is executive director of the Huron River Watershed Council (HRWC). The award recognizes her leadership in growing HRWC as an organization known for its citizen scientist programs such as Adopt-A-Stream and the Bioreserve Project.

Jeff Citrin (M.S. '94) has been named chief compliance and regulatory affairs officer at TOMI Environmental Solutions, Inc., a global bacteria decontamination and infectious disease control company.

Oliver Kiley (B.S. '03, M.L.A. '08) isn't the first of his family to choose landscape architecture as his passion. His grandfather, Dan Kiley, began working in the field at the start of the modernist movement in architecture in the early to mid 1940s. "He worked with many well-known architects at the time including Eero Saarinen (of St. Louis Gateway Arch fame) and got his practice established through big architectural collaborations and it took off from there," said Kiley, who works at SmithGroupJJR in its Ann Arbor office. He's back in the Dana Building this fall, teaching "Landscape Analysis and Planning." Read the full profile at snre.umich.edu/la


KILEY

OfficeMates

Dana Building officemates between 1988 and 1995 reunited to lead a panel discussion on integrated graduate education and research at the June ISSRM (International Symposium on Society and Resource Management) conference. From left, **Kristen Nelson (Ph.D. '94), Martha Monroe (Ph.D. '91), Clare Ryan (Ph.D. '96)**, and **Clare Ginger (SNR M.S. '92; UTEP Ph.D. '95)** are integrating social science with natural resource issues at the University of Minnesota, University of Florida, University of Washington, and University of Vermont respectively.

Diana Copeland (M.S. '04) served this fall as a Visiting Social Activist for the U-M Center for the Education of Women. The program provides female social activists with financial support to work on a project that would not be possible under normal working conditions. Copeland is creating a film and an eco-feminist curricula for youth that addresses urban environmental issues. She is co-director of the East Michigan Environmental Action Council.

Nicole Fernandes (M.S. '08, M.P.P. '08) received a five-year Teaching Fellowship from the Knowles Science Teaching Foundation. The fellowships address the recruitment, training, and retention of science, technology, engineering and mathematics (STEM) teacher candidates, with the aim of improving STEM education by building a corps of STEM teacher leaders. She is one of 35 members of the new cohort.


FERNANDES

Cynthia Koenig (M.S. '11, M.B.A. '11) is featured in the new public service announcement created by the University of Michigan. Koenig founded Wello WaterWheel as a social venture. By reframing the water crisis as an opportunity, Wello reinvented the wheel and developed a business model that encourages individuals to use the WaterWheel as an income-generating tool.


KOENIG

Ryan Stock (M.S. '13) helped contribute data and analysis to a recent report by the Michigan Chapter of the Sierra Club that studied the health of Detroit's environment. The report examined the connections among pollution, climate change, poverty, and negative public health outcomes. Stock produced the work while serving an internship with the organization.

Phel Meyer and **Rich Grousset (M.S. '13, M.B.A. '13)** want to bring their new reusable takeout container service to life by raising $30,000 through the crowdfunding site indiegogo.com. BizeeBox, the startup launched by the two recent graduates, will provide Ann Arbor restaurant customers with an environmentally friendly alternative to disposable containers used for takeout or leftover food. Meyer and Grousset plan to offer the service in early 2014. The reusable takeout containers are made to last for more than 350 uses and are environmentally and economically preferable to other alternatives on the market.


MEYER


GROUSSETT

Rebecca Henn (Ph.D. '13) joined the architecture department at Pennsylvania State University as an assistant professor. She recently co-authored "Constructing Green" with SNRE Professor Andy Hoffman (see page 6). The book was the result of a conference hosted by the Erb Institute in 2010.

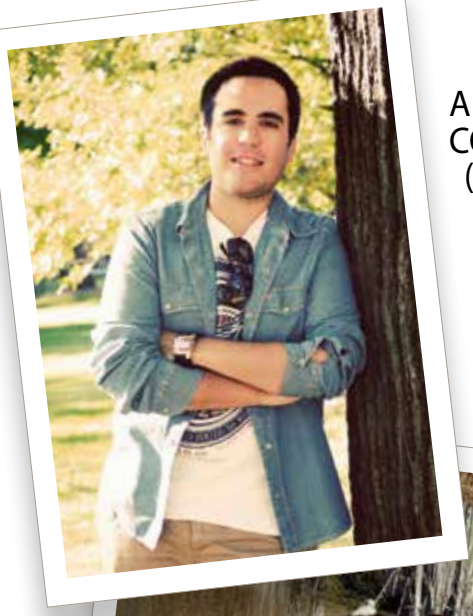
In Memoriam

Jane Bishop, who graduated from SNR in 1972 with a master's degree in conservation, died in October 2012. She taught science at Greenhills School in Ann Arbor for many years and was the environmentalist's environmentalist. Family and friends said her cause was music and doing good works for the environment and all humankind.


WILSON

Courtney Wilson, a 2013 master's program graduate and current doctoral student, died Sept. 9. She was 27. The SNRE community led a campus-wide event Sept. 11 in the Ford Commons to celebrate her life. Courtney's parents, Dick and Bonnie Wilson, joined the SNRE community for the event. To view the video of the ceremony and a picture gallery, visit snre.umich.edu/Courtney.

BECAUSE YOU GAVE...



ALEJANDRO COLSA PEREZ (M.S. '14)

FULBRIGHT PROJECT: REMOVING INVASIVE SPECIES IN PHOENIX

WITH FRIENDS AT THE BIG HOUSE

I can ADVANCE...

the cause of Environmental Justice in the United States and in Europe. My master's project team is identifying 40 case studies to represent the movement in the United States, building on work of the Environment Justice Organizations, Liability and Trade project in Europe. Because of support from SNRE alumni and through my Fulbright Scholarship, I am pursuing my academic goals.

M | SNRE THE SNRE ANNUAL FUND
Support tomorrow's leaders

Learn more: snre.umich.edu/giving

GIVE NOW

University of Michigan School of Natural Resources & Environment
440 Church Street
Ann Arbor, MI 48109-1041

Nonprofit Org.
U.S. Postage
Paid
Ann Arbor, MI
Permit No. 144

Upcoming Events

NOV 7: Program in the Environment hosts Rolling Stone contributing editor and novelist Mark Binelli, a U-M alumnus. He will discuss his new book, *Detroit City is the Place to be*. 5:10 p.m., Hatcher Graduate Library

Nov. 11: Monica Ellis, chief executive of the Global Water Challenge, headlines a lecture, panel discussion, and Q&A session. The event examines links between clean water, sanitation, and growth in emerging markets. 4 p.m., Room 1040, Dana Building.

Nov. 14: Washington, D.C. Annual SNRE Alumni Reception. Details: snre.umich.edu/alumni

Nov. 22: Premiere of "**Detroit Women Speak: A Community Film on Race, Environmental Justice, Leadership & Gender in Detroit**." Produced by Diana Copeland (M.S. '04). 2 p.m., Room 1040, Dana Building.

DEC 3: Bob Grese delivers Theodore Roosevelt Lecture. Grese, a Landscape Architecture professor, is being installed as the new TR Professor. 5 p.m., Room 1040, Dana Building.

JAN 14: SNRE Career Fair. Come recruit from the Leaders & Best (and visit your old stomping grounds.) 1-4 p.m., Ford Commons. Email snre.careers@umich.edu to get your organization involved.

Jan 20: SNRE Dean's Speaker Series presents MLK Lecture by Richard Cizik. The Rev. Cizik is president of the New Evangelical Partnership for the Common Good. 4 p.m., Room 1040, Dana Building.

Jan. 23: Program in the Environment presents a lecture by noted architect Doug Farr titled "Sustainable Urbanism." Farr will be recognized as the 2013-14 Goldring Family Distinguished Visiting Lecturer. 5:10 p.m., Alumni Center.

CURRENT SHOW: NATURAL PATTERNS BY DAVE BRENNER

enviro art gallery

Art & Environment Gallery

John Gutoskey: Exhibit opening Nov. 7
Upcoming 2013-2014 exhibits: Francesc Burgos, Work by students, and Susan Moran. **Details: snre.umich.edu/gallery**

Got Gmail?

Can't get enough of SNRE events? If you have Gmail, you can add our open calendar to your list. **Details at snre.umich.edu/events**

#snretalks
snre.umich.edu/events
snre-events@umich.edu