Mitchell Center for Sustainability Solutions

solutions

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Building the Road to Solutions:

Successful Initiative Becomes Permanent Center for Sustainability

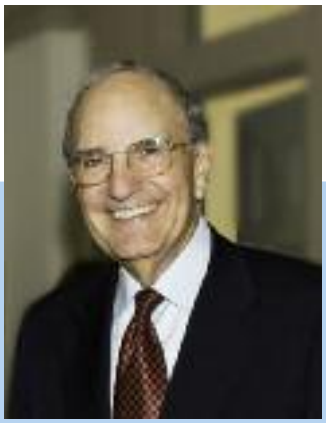
In 2006, a handful of researchers from across the University of Maine began meeting in a conference room newly converted from an old garage attached to the Senator George J. Mitchell Center. Little did they know how appropriate the setting would be: they were about to launch an innovative project from modest beginnings. Unlike garage start-ups such as Google, Apple and Harley-Davidson, however, this new endeavor focused not on making profits, but on solving real-world problems.

Shellfish contamination is just one real-world problem researchers are investigating

That might sound idealistic, but this unlikely mix of biologists and economists, engineers and anthropologists, foresters, legal scholars, and other researchers landed a 5-year, $20 million grant from the National Science Foundation's EPSCoR program to launch Maine's Sustainability Solutions Initiative (SSI) at the Mitchell Center in 2009. They rounded up colleagues from diverse disciplines—and engaged stakeholders from all sectors of society to join them—to create more than fifteen research teams collaborating with Maine communities to tackle some of the state's most urgent sustainability challenges.

Six years later, these teams have helped communities around the State begin creating a more sustainable future. For example, they have played key roles in developing new renewable energy technologies, improving town-planning processes to better balance economic development and wetlands protection, and passing legislation to slow the spread of the invasive emerald ash borer.

Based on these and other accomplishments, SSI recently "graduated" from the NSF grant to become the Mitchell Center for Sustainability Solutions. With more than 100 faculty from 11 Maine colleges and universities, 300-plus students and nearly 300 stakeholder organizations participating during the grant period, it created one of the largest research networks in the nation dedicated to advancing the emerging field of sustainability science, which seeks to improve human well-being while protecting the environment. This new statewide center aims to connect knowledge with action to create a sustainable future in and beyond Maine.
(Cont. page 2)



"The many faculty and students involved in the Mitchell Center have committed themselves to a goal larger than their individual lives: the goal of helping to build a better world starting right here in our own communities in our own state."

- Senator George J. Mitchell

Building the Road to Solutions cont.

"Our research teams focus on messy problems with intersecting economic, social, and environmental challenges, because we think these are the problems universities should be trying to solve," says David Hart, Mitchell Center Director.

At a time when recognition is growing that colleges and universities must become more responsive to society's needs, the Mitchell Center is mapping a way. The Center's unique approach builds on three key lessons that emerged from SSI: it's essential to commit to solving problems rather than just studying them, stakeholders are crucial team members during the research process, and collaboration between university researchers from different fields is critical in solving sustainability challenges.

The Mitchell Center's approach might sound obvious, but it's surprisingly uncommon in academia. William Clark, Co-Director of the Sustainability Science Program at Harvard University's John F. Kennedy School of Government, uses the analogy of automobile manufacturing. Clark, who delivered the 2014 Senator George J. Mitchell Lecture on Sustainability at UMaine, observed that had it been up to academia rather than business to invent the first car, the result might well have been a pile of sophisticated parts that couldn't be assembled into a functional vehicle.

"As techies, we're often fragmenters," Clark said. He said that universities typically reward individual innovation rather than collaboration and "connectivity," the more mundane tasks of putting the pieces together.

"Our research teams focus on messy problems with intersecting economic, social, and environmental challenges, because we think these are the problems universities should be trying to solve."

- David Hart, Director

"The prescription for universities is what business…would call project management," Clark said. "You organize people to build a car, and you'll know when it's delivered because someone can drive from Point A to Point B in an affordable way. This is not commonly the way universities are organized, which is why it is interesting to see Maine so far out front in introducing a solutions center." (*cont. page 7*)

Student Spotlight: Brianne Du Clos

Helping Growers Identify Native Pollinators

When most of us think of bees, we think of a buzzing hive of yellow-black striped bodies. We think of the big, winged queen pumping out eggs in the heart of the action. But while honeybees may live this way, most of Maine's native bees do not.

In fact, their lifestyles are a mystery to most of us, including many blueberry growers who depend on bee pollinators to fertilize their crops. Sweat bees, for instance, burrow into soil and rotted wood, often living solitary lives. Leafcutter bees live in small groups and construct nests from leaves, pebbles and mud.

As part of a Mitchell Center research project, Ph.D. student Brianne Du Clos is developing a high tech tool that will tell blueberry growers what kind of native bee habitat they have around their fields and what species it attracts.

The handheld, computerized tools are part of a geographical information system (GIS) platform that uses meticulous research data and satellite information.

"My role is to unite this expertise into a tool that will be useful to wild blueberry growers. Most importantly, I am working with wild blueberry growers throughout the development process to get their input, which is crucial to the creation of the tool," Du Clos said.

The tool is of special importance these days as honeybees, the imported pollinator workhorse, are in a population decline. Du Clos's tool is poised to help growers learn how to maximize the pollinating heft of Maine's own bees.

Du Clos, a student in Ecology and Environmental Sciences, is working closely with Sam Hanes, Assistant Professor in UMaine's Dept. of Anthropology and web designers at the Faculty Development Center to finish the project.

She said she's learned much from working with a team of varied expertise: "I have enjoyed working collaboratively with an interdisciplinary team to get this tool off the ground. I am excited to see where we will be able to take the tool in the near future," Du Clos said.

Connecting Science and Decision-Making for Safer Beaches and Shellfish

The Mitchell Center recently led the development of a new partnership – the New England Sustainability Consortium (NEST) – that builds on the Mitchell Center's innovative approach to problem-solving. NEST's initial focus is on reducing risks of harmful bacteria and other microbial pathogens in coastal waters along the Gulf of Maine.

Shellfish beds are vulnerable to fecal bacteria washed in from the land and naturally occurring Vibrio bacteria that thrive in warming ocean waters. These organisms pose a looming public health threat with significant economic consequences. In the Piscataqua River estuary, for instance, every clam flat on the Maine side was closed last year due to bacterial contamination. As a result, livelihoods disappear and the economy suffers.

Harmful bacteria also affect beaches which is a major problem during the summer months. Keri Kaczor, coordinator of the Maine Healthy Beaches program, works with 28 local managers to help protect public health at 55 Maine beaches. When unsafe conditions are detected, advisories are posted to prevent human exposure. During 2012 alone, 151 swimming advisory days occurred at these beaches. Posting beach advisories can have dire consequences for local businesses and managers are asking for improved decision-making tools.

"Harvesters are out on the intertidal mud flats far more than a scientist could ever be… They know a lot about these systems and can help scientists understand them, too."

- Bridie McGreavy, Researcher

Shellfish landings and beach visitors are also important economic drivers for Maine and New Hampshire, bringing in between $150-$270 million annually to coastal economies.

To find solutions, Mitchell Center researchers are teaming up with colleagues at the University of New Hampshire, College of the Atlantic, and other institutions with support from a $6 million NSF EPSCoR grant. The researchers are collaborating with key stakeholders including shellfish harvesters, non-governmental organizations, and state regulators to determine how these public health risks are perceived and how they can be reduced. Based on their findings, the researchers aim to strengthen the scientific basis for making decisions regarding the management of shellfish harvesting and recreational beaches. Collaboration is important as it brings a broader range of knowledge to the decision-making process and creates a shared commitment to solutions.

Beach visitors enjoy sun, sand and clean water at a Maine beach

"There is more than one kind of knowledge," says Bridie McGreavy, a NEST postdoctoral fellow who is working with shellfishing communities. "Harvesters are out on the intertidal mud flats far more than a scientist could ever be. They are attuned to the tides and the changing environment. They notice patterns and see changes first because they are out there every day. Harvesters know a lot about these systems and can help scientists understand them, too."

NEST researcher Bridie McGreavy digs clams near Frenchman Bay

Supported by National Science Foundation award EPS-0904155 to Maine EPSCoR at the University of Maine

Road-Testing New Solutions with Maine's Municipalities

One of the biggest problems facing cities and towns around Maine and the nation is figuring out how to grow in ways that don't harm the environment or the very things people cherish about their communities. A Mitchell Center team led by Aram Calhoun, Professor of Wetland Ecology, is using local vernal pool conservation as a model to help communities find ways to balance economic development with natural resource conservation on private land.

The project builds on years of research on vernal pool ecology and a partnership among UMaine, Maine Audubon, and the Maine State Planning Office. Calhoun's team is now working with two Maine towns and state and federal regulatory agencies to create ways that would relax vernal pool protection in growth zones in exchange for greater protection of pools and associated habitat in rural areas. Their findings will give communities more flexibility in balancing development and conservation, help municipal officials tailor vernal pool regulations to better meet local needs, and provide a model for other communities seeking solutions to similar challenges.

Participating in the project has already benefitted the planning process in Topsham, according to Rod Melanson, Topsham director of planning, development and codes.

Working within this collaborative is rewarding on many levels," Melanson says. First, he says, collaborators have created a new, high-quality database of significant vernal pools and related resources that the planning office now uses for all significant project reviews. Created primarily by Calhoun's team and the community volunteers they trained, the database also will allow the town to prioritize the most important vernal pools and land for conservation.

"Most community members now agree that how and where development occurs within a town matters."

- Rod Melanson, Director of Planning Topsham, ME

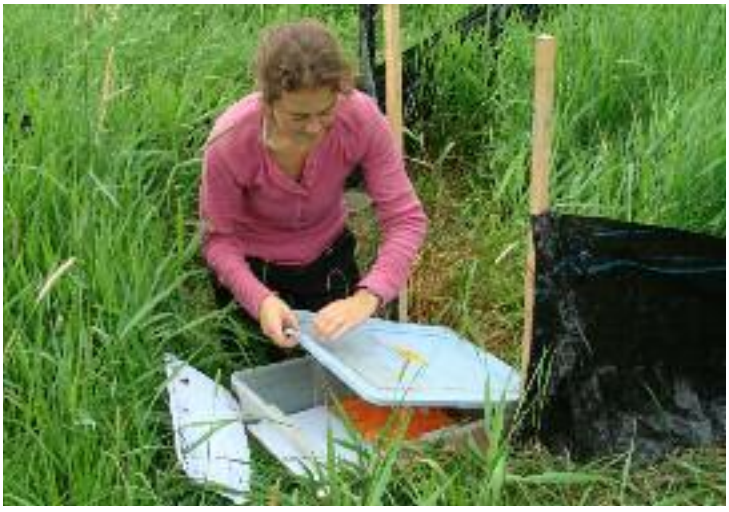
The collaborative also has provided a wealth of relevant information in response to the needs of local landowners and policymakers alike. Melanson says this information has raised community awareness about both the ecological value of vernal pools and the economic constraints to development within designated growth areas—and helped diverse interests find common ground. "Most community members now agree that how and where development occurs within a town matters," Melanson says.

Topsham and Orono are now testing the tools that Calhoun's team has developed to improve strategies for balancing economic development with conserving vernal pools in urbanizing landscapes. This ongoing work is part of a four-year, $1.49 million grant from the National Science Foundation in which the researchers are exploring the economic, environmental and social components of vernal pool ecology and management.

"Our work shows that time, patience, open-mindedness, and the willingness to assume a bit of risk are key to successful collaborations on difficult sustainability issues"

- Aram Calhoun, Researcher

"Our work shows that time, patience, open-mindedness, and the willingness to assume a bit of risk are key to successful collaborations on difficult sustainability issues," Calhoun says. "We have found that the time invested is well worth the effort. The exchange and synthesis of diverse ideas lead to outcomes that are more widely embraced and enduring."



Research by graduate Britt Cline provided important information on how amphibians move across different landscapes

When Science Meets Politics: Symphony or Slugfest?

Keynote speaker Roger Pielke, Jr. from the University of Colorado will address this intriguing question during his address at the 2015 Senator George J. Mitchell Lecture on Sustainability. The lecture will take place at 1pm on Thursday, October 15 at the University of Maine, Orono. Senator Mitchell will also share his thoughts on this important topic.

Pielke is Director of the Center for Science and Technology Policy Research at the University of Colorado. His research focuses on science, innovation and politics. He received the Eduard Brückner Prize in Munich, Germany in 2006 for outstanding achievement in interdisciplinary climate research. He is author, co-author or co-editor of seven books, including T*he Honest Broker: Making Sense of Science in Policy and Politics* and T*he Climate Fix: What Scientists and Politicians Won't Tell you About Global Warming.*

The lecture is free and open to the public. To reserve tickets, please call 207-581-3244 or email umgmc@maine.edu.

Training The Next Generation of Leaders and Problem-Solvers

Bridie McGreavy, a postdoctoral researcher on the NEST Safe Beaches and Shellfish team (*see pg. 3*) and a Mitchell Scholar, is among a growing number of Mitchell Center graduates. "A highlight of my work with the Mitchell Center has been the development of multiple partnerships across disciplines and with different types of stakeholders," McGreavy says. "I did not realize that my academic experience would result in so many deep and productive relationships on which I will continue to build for the remainder of my career."

McGreavy and other recent Mitchell Center graduates already have helped develop on-the-ground sustainability solutions as key members of research teams. For example, as members of the "Alternative Futures" team, Spencer Meyer and Michelle Johnson, in close collaboration with stakeholders, played key roles in creating the award-winning Maine Futures Community Mapper (MFCM) (available at http://www.mainelandusefutures.org/). This groundbreaking, web-based tool allows cities and towns to identify which lands are most suitable for development, conservation, forestry or agriculture, as well as identify potential conflicting and compatible land uses.

Now that they have completed their Ph.D.s, these graduates are contributing their expertise in a range of settings. Meyer, who won UMaine's 2014 President's Research Impact Award for leading the development of the MCFM, is now a fellow at both Yale University's School of Forestry and Environmental Studies and The Nature Conservancy. Johnson joined the U.S. Forest Service's New York City Urban Field Station as an interdisciplinary scientist this fall. Other graduates have landed positions at the University of Washington, the University of Rhode Island, Cornell, Dartmouth, the World Agroforestry Centre in Nairobi, and other leading academic institutions and organizations.

Mitchell Center graduates Michelle Johnson and Spencer Meyer played key roles in the development of the Maine Futures Community Mapper

The work of Mitchell Center faculty and students is rippling out beyond Maine's borders, generating real-world solutions and advancing the field of sustainability science with nearly 250 research papers published to date. This growing body of knowledge will help to educate a new generation of more nimble problem-solvers—and help universities better align research with the resources and information society needs to move toward a sustainable future.

Drawing on Local Knowledge to Build Better Solutions

Stakeholders continue to meet to share knowledge and lessons learned

Mitchell Center researchers are tackling diverse problems, but all of them are committed to close collaboration with stakeholders throughout the research process. Every project is rooted in the understanding that the people, agencies, and organizations dealing with sustainability challenges have expertise and insights that researchers lack—information that is key to finding effective and sustainable solutions.

The process begins with listening, says Darren Ranco, Chair of Native American Programs, Director of Native American Research at UMaine and a member of the Penobscot Indian Nation, who is leading a team to help Maine prepare for a likely invasion of the emerald ash borer (EAB). This insect threatens to decimate the state's ash trees, which are at the center of culture, art, and livelihood for Maine's renowned Indian basketmakers.

"Linking knowledge with action is about listening to people and where they're at and what they're concerned about," Ranco says. "We're mutual learners. We have some knowledge and expertise, but everyone else does as well—basketmakers, ash harvesters and other tribal members, along with foresters and tribal, state and federal agencies. Our question is: how do we mobilize all these different forms of knowledge to actually solve a problem? No one community or group can do that alone. It takes all of us working together."

The emerald ash borer team and their partners are creating an innovative "safety net" to help protect the State's ash trees from the destructive insect, which in 2014 was found within 35 miles of the Maine border in Loudon and Salem, NH, and North Andover, MA. Ranco's team has established guidelines to help tribal and state agencies develop coordinated emergency response plans, which outline steps for fighting a borer invasion, from monitoring and control to communication and quarantines. These plans are the first in the U.S. to be developed in collaboration with tribes before the borer arrives.

The team's work continues with a new research project focused on adapting to an EAB invasion. "With EAB's imminent arrival in Maine, we are continuing our project so that all of our partners work together in a collaborative manner to respond to the potential devastation, and we will also seek ways in which we can all work together to adapt to its arrival," Ranco says.

"Linking knowledge with action is about listening to people and where they're at and what they're concerned about."

- Darren Ranco, Researcher

To that end, the EAB team will launch pilot projects to evaluate ways to store brown ash materials, locate and secure access for harvesting ash trees in new locations, and document traditional methods of identifying and harvesting basket-quality ash trees to ensure that these techniques are available for future generations. "Throughout the process, we will continue to meet and share lessons learned," Ranco says.

Funding to support new research on adaptation to an EAB invasion has been provided by the Elmina B. Sewall Foundation and the Northeastern States Research Cooperative.

Graduate student Kara Costanza helped map the location of high quality ash stands in Maine

Building the Road to Solutions cont.

Sustainability Science: The Road Ahead

The innovative sustainability science research that is a hallmark of the Mitchell Center also is informing the new Sustainable Ecological Aquaculture Network (SEANET). Launched with a $20 million National Science Foundation grant to Maine EPSCoR last fall, the five-year program will establish a research network focused on understanding the role of sustainable ecological aquaculture in coastal communities and ecosystems.

"This project builds on what SSI has done," says Paul Anderson, director of Maine Sea Grant and the Aquaculture Research Institute at UMaine, who also directs SEANET. "We'll be using similar approaches to sustainability science to study how Maine's $120 million aquaculture industry can grow in ways that are socially acceptable and don't harm the environment." Anderson adds that SEANET also will grow interdisciplinary research networks and continue to build on SSI's findings to educate the problem solvers of the future. "SSI studied itself," Anderson says. "We can use this knowledge to teach faculty and graduate students how to do science better—in ways that continue to break down barriers and better serve the community."

Ultimately, the Mitchell Center aims to help grow the capacity for solving sustainability problems by convening and supporting partnerships of researchers and stakeholders and facilitating the dissemination and exchange of new knowledge. This, in turn, can illuminate increasingly relevant and important roles for universities, including that of "honest brokers," who don't take sides in complex and contentious issues, but rather bring together all sides to create lasting solutions. "Universities can offer tremendous value to society by listening to all sides without taking sides, and by creating neutral ground where diverse perspectives and forms of knowledge provide the raw material for crafting innovative solutions to a wide range of sustainability challenges," Hart says.

Such endeavors require a long-term vision, patience, and a passion for making a difference. This commitment is also at the center of Senator George Mitchell's vision.

"The road to solutions is often long and winding. Persistence is essential to success," Mitchell observed at his namesake lecture last fall. "In a larger sense, the ethos of [the Mitchell Center's] work reflects one of my deepest beliefs: the importance of public service. The many faculty and students involved in the Mitchell Center have committed themselves to a goal larger than their individual lives: the goal of helping to build a better world starting right here in our own communities in our own state."

Student Spotlight: Brett Gerard

Looking for Warning Signs Beneath the Surface

The Sebago Lake watershed supplies water to 15 percent of Maine's population, but projections indicate continued development over the next few decades could have a negative effect on water quality.

Brett Gerard, a Ph.D. student in the School of Earth and Climate Sciences, decided to look where early signs of change within the watershed might be detected: below the surface. Working with the Mitchell Center, Gerard's research examines the characteristics and dynamics of channel beds in the Sebago Lake watershed. The condition of sediment on the channel beds, Gerard explains, is one of the primary factors controlling the exchange of water between the river environment and the groundwater system. The exchange plays an important role in maintaining water quality.

"I am particularly interested in the role of climate and human activities on channel bottom conditions" said Gerard who works on the "Safeguarding a Vulnerable Watershed" project. "I believe it might be an excellent location to detect changes from residential and commercial development. And changes to channel beds and the dynamics of river/groundwater exchange might be an indicator of future degradation in water quality."

Gerard is still analyzing data from the project and continues his studies working with advisor Sean Smith, Assistant Professor in the School of Earth and Climate Sciences. His research is currently funded by the Mitchell Center's Water Resources Research Institute (WRRI) grant program.

Gerard considers his experience with the Mitchell Center especially valuable because the center brings together scientists and researchers from the social sciences, biophysical sciences, environmental science, economics and many other disciplines.

"The program really strives to bring together researchers from all disciplines to work on problems together. This breeds a completely different energy and really opens perspectives from the more narrow focus of our home departments," Gerard said.

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Highlights

- 2015 Maine Water Resources Research Institute Grants:
  - A More Efficient UV Disinfection System for Drinking Water
    Team leader: Aria Amirbahman, UMaine
  - Understanding Cyanobacterial Blooms in Maine Lakes
    Team leader: Denise Bruesewitz, Colby College
  - Creating Water Budgets for Maine Vernal Pools
    Team leader: Andrew Reeve, UMaine
- Sign-up for our E-News & Events. Get the latest updates on Mitchell Center research, upcoming events and seminars, and other sustainability news delivered straight to your inbox.
- 2015-16 Sustainability Research Projects:
  - Community-based Sustainable Energy Solutions
    Team leader: Sharon Klein, Economics, UMaine
  - The Future of Solid Waste in Maine
    Team leader: Cindy Isenhour, Anthropology, ` UMaine
  - Engaging Citizen Scientists to Evaluate Water Quality Design
    Team leader: Aria Amirbahman, Civil & Environmental Engineering, UMaine
  - Forest Sustainability and the Maine Forest Practices Act
    Team leader: Erin Simons-Legaard, Forest Resources, UMaine