Colby Magazine

Volume 100
Issue 3 *Fall 2011*

Article 7

September 2011

Boots on the Ground: At 40, growing Environmental Studies Program equips students to tackle real-world problems

Kirsten Weir

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Ground

At 40, growing Environmental Studies Program equips students to tackle real-world problems

Story **Kirsten Weir**
Photography **Bridget Besaw**

The calm, shallow waters of Pattee Pond, in Winslow, are popular among waterfowl and human vacationers. But beneath the gently lapping waves, there are problems. In years past residents interested in improving the lake's water quality had reached out for help from the Maine Department of Environmental Protection (DEP). But without hard data, the request went nowhere—until 2008, when students from Colby's Environmental Studies (ES) Program assessed the health of Pattee Pond in a course called Problems in Environmental Science.

The students' detailed findings helped the community earn a $110,000 federal grant to clean up the lake, said Russ Cole, Oak Professor of Biological Sciences and director of the ES Program. "Students are engaging with the community and helping to solve problems."

The success at Pattee Pond is remarkable precisely because it's not unusual. ES students at Colby have been getting their hands wet in the nearby Belgrade Lakes region for some 25 years. The roots of environmental studies at Colby reach even deeper. This year the ES Program celebrates its 40th anniversary. Today it serves as a model for other colleges' ES programs and is one of Colby's most popular interdisciplinary majors. And ES students and grads are making a difference in lakes, forests, and coastlines in Maine—and all over the world.

From widely respected lakes research to training for a myriad of environmental scientists and policymakers to a new partnership with Bigelow Laboratory for Ocean Sciences on the Maine coast—Colby's work over the past 40 years in the area of the environment continues to gain prominence. "Colby College has led the way in considering environmental studies a key component of a modern bachelor's degree," said Graham Shimmield, executive director of Bigelow Laboratory.

This year the College brought on three new ES professors, and the administration and board have been very supportive of the program, faculty members say. "I think it's really come a long way, from a very small, interdisciplinary program to becoming an obvious strategic initiative," said Catherine Bevier, an associate professor of biology who sits on the ES advisory committee. "I think that shows the commitment from the administration."

Colby President William D. Adams notes that the College has been growing the program incrementally over the last decade. The benefits of that investment, he says, are evident. "We have lots of different ways in which the curriculum has become extremely rich and broad," Adams said. "As Colby evolves and develops over the next decade, environmental studies and sustainability will be principal components. 'Peerless' is a strong word, but we believe strategically that we can be close to peerless in the liberal arts world with respect to the ES Program."

For Robert E. Diamond '73, chief executive of Barclays and chair of Colby's Board of Trustees, investing in ES on campus makes good sense. "One of the things the Board of Trustees has focused on is, 'Are there areas where Colby can be truly distinctive?'" Diamond said. "One of those areas, we believe, is environmental science."

"The interns we've had have all been top-notch. I think there's pretty broad recognition that Colby has one of the strongest environmental studies programs in its class of liberal arts colleges in the Northeast, and maybe nationally."

Pete Didisheim, senior director for advocacy for the Natural Resources Council of Maine

He's backed up that belief too. A generous gift in 2003 from the Diamond Family Foundation supported construction of the Diamond Building, which houses the ES Program; a second gift, in 2008, supported interdisciplinary study of the environment, energy policy, climate change, and sustainability on campus.

Created in 1971, Colby's ES Program is among the oldest in the nation. The program was born of the efforts of a few passionate faculty members, says David Firmage, Clara C. Piper Professor of Environmental Studies, emeritus, who retired in 2010. From the beginning it was a truly interdisciplinary effort, drawing from biology, political science, economics, and other departments.

While ES has earned its reputation, the program initially got off to a somewhat rocky start. "I think in general, interdisciplinary programs always have to go through a trial by fire. At the time, ES didn't fit easily into the department structure that colleges had," said Tom Tietenberg, Mitchell Family Professor of Economics, emeritus, who retired in 2008. Even most interdisciplinary programs stay within one or occasionally two broad areas of inquiry, he added. "ES is unique in that it crosses three divisions: science, social science, and humanities."

About five years after the program was founded, faculty members expressed concern that the ES major wasn't robust enough to stand on its own. They decided to replace the major with ES concentrations in biology, geology, and chemistry, according to Firmage. The concentrations quickly blossomed and turned out graduates who went on to make significant contributions in various environmental fields.

One such graduate is Ted Wolff '86, who majored in biology with a concentration in ES. After graduation he landed what he calls "a dream job" as a contractor for the U.S. Environmental Protection Agency investigating abandoned waste sites as part of the national Superfund program to clean up toxic dumps. After three years in the field, he enrolled in law school with the encouragement of his former professor Russ Cole.

Twenty years later he's a successful environmental attorney with the New York office of the national law firm Manatt, Phelps, & Phillips, LLP. And he still draws on lessons learned back at

Colby, he said. Recently he's been assisting a client in the remediation and transfer of the single largest undeveloped industrial tract of land in New York City. Overseeing the project requires more than just legal know-how, Wolff says. "Because of Colby, I have hands-on experience doing environmental studies from a science standpoint. I've not only been able to coordinate the legal issues involved, but also to assist in negotiating and explaining the ongoing remediation activities."

Wolff cites excellent faculty and great opportunities for practical experience as strengths of the Colby program. The ES concentrations in biology, geology, and chemistry evolved over the years, and eventually a stand-alone ES minor was created. "It was really the demand by incoming students that got the College's attention," Firmage said.

Students continued to express interest in the field. In 1995 the program began to offer an environmental policy major. Then in 2002 the College added an environmental science major. Today ES offers three majors: environmental policy, environmental science, and interdisciplinary computation.

The ES Program may have evolved in fits and starts, but it gained respect early on. In 1984 Colby became a founding member of the Northeast Environmental Studies (NEES) group, an association of collegiate ES programs that meets annually to discuss issues related to environmental studies curriculua. Over the years the program received prestigious grants from external agencies such as the National Science Foundation and the Andrew W. Mellon Foundation. And all along, ES faculty introduced a number of pioneering courses.

First among them: an introductory course, Environment and Society, that's taught jointly by faculty from social and natural

At left, Professor Russell Cole and Environmental Studies Teaching Assistant Abby Pearson, and student assistant Corey Reichler '13, discuss vegetation patterns at the Colby-Marston Preserve with students in Introduction to Ecology. Below, Omari Matthew '14 and Sarah Madronal '14 collect aquatic insects.

"You're constantly thinking about issues such as sociology, science, culture, and ethics. Your mind is always thinking about change."
Lucy O'Keeffe '14

"The reason I like it is that I like the patterns I see—the way things fit together in nature. I knew Colby had a great program. We're in a great place for it."
Sylvia Doyle '12

sciences and contains a research component. It's relatively easy for ES students to rack up research experience in the sciences, said Tietenberg. But, while researching environmental programs at other colleges, he discovered that students were often short on policy-based research experience, even as upperclassmen. Tietenberg and his colleagues decided to address that need in developing Colby's ES intro class. "We introduce students to policy-related research at the very first course," he said.

In the intro course students form small teams that each choose an environmental issue to investigate, said Philip Nyhus, associate professor of environmental studies. Each student independently researches two case studies within that topic, developing research questions, gathering data, and testing hypotheses. Then the team members come together to integrate their case studies for a comparative look at the bigger picture.

"The partnership brings two institutions with highly respected individual reputations ... together to create a unique experience for undergraduates."

Graham Shimmield, executive director of Bigelow Laboratory

The course's research-based format has been so successful that it now serves as a model for other top colleges, Cole said. In recent years students have tackled issues ranging from why some cities are more bike-friendly than others to what factors influence how much nuclear energy a nation uses. "It's a tough assignment for first-year students, because you don't know what the answer is. Probably nobody has ever looked at [these issues] before," Nyhus said. But finding those answers, he adds, "is really fulfilling."

Peter Countway, senior research scientist at Bigelow Laboratory for Ocean Sciences, and Louisa Walker '13 examine marine photoplankton cultures.

Many courses in the ES Program offer similar experience. Nyhus teaches a course in geographic information system (GIS), a computer system that can capture, store, analyze, and display geographically referenced information. "It's a really valuable way for students to gain technical expertise in software that has wide application," Nyhus said. His students have used the software to chart Maine's wilderness trails, model potential new bus routes, and help assess where in the state a future biomass energy facility could be located. "It's a great way to enable students to collaborate with community partners," he said. "Everyone can see themselves in a map."

The program also offers courses in global public health and in human health and the environment, and it has helped train student activists in both areas. Students in environmental health classes taught by Visiting Assistant Professor of Environmental Studies Gail Carlson helped get a BPA ban passed in Maine, outlawing use of the chemical in some plastic containers.

Students also work with local communities and gain experience in advanced independent research in a final capstone course in ES. For students on the science track, that course is Problems in Environmental Science, which investigates a different lake each year. Students research and analyze the impacts of land use on the lake's water quality. They also work closely with citizens and local agencies like the Maine DEP and local lake associations to help recommend changes to improve the lakes under investigation. (See sidebar, opposite page.)

As in the case of Pattee Pond, those recommendations frequently result in concrete action. "Our students really enjoy being able to do something to help rather than just doing an academic exercise," Cole said.

Students aren't the only ones to benefit. Local communities have been well-served by Colby students' work, said Peter Kallin, executive director of the Belgrade Regional Conservation Alliance, an organization that works to conserve and protect the Belgrade Lakes watershed. "Colby folks have used our lakes as a living lab for a long time. They do a great job, and they build on previous years' work," he said. "I use the results of their studies to go to the DEP and apply for grants to fix the problems they identify. That's been very successful."

Charlie Baeder '76, a member of the board of the Belgrade Region Conservation Alliance, said assistance from Colby made possible photo documentation of the lakes' shoreline, for use in enforcing land-use regulations and for targeting areas of shoreline for improvement. "It really hadn't been done before in any real comprehensive way," Baeder said. "Colby was very instrumental in implementing that project."

In a policy-oriented capstone course taught by Nyhus that focuses on the state of Maine's environment, students research topics

Research Assistant William Supple IV '12 uses a glass-bottomed bucket to view the shallow-water substrate of Great Pond. Supple and five other students worked this summer with professors Russell Cole, Catherine Bevier, and Herbert Wilson to investigate the impacts of shoreland development on the lake's shallow-water ecosystem.

Real Problems, Real Solutions

Colby has focused its environmental resources on Maine's Belgrade Lakes for decades. Now there's an expanded and long-term study, and Colby's environmental resources are more considerable than ever.

A research project funded by the National Science Foundation brings together local and state conservation organizations—and an interdisciplinary group of Colby scholars, both faculty and students. The data they provide has helped the state better direct resources at lake quality problems in Maine.

"I think their work is equal to or better than the work you'd get from a paid professional consultant," said Roy Bouchard, head of the Maine DEP Lakes Assessment Program. "And I think it's a real model for involvement between a college and its community."

The result of the NSF grant has been an intensive and broad study of the past, present, and future of a watershed that comprises seven major lakes that serve as fishery, water supply, recreation center, and economic engine in central Maine. The project, recently funded for a third year, has involved more than 50 students in hands-on research encompassing chemistry, biology, environmental studies, spatial analysis, geology, economics, and science and technology.

"The fundamental science is cool," said Whitney King, Miselis Professor of Chemistry, project leader for the second year of the study. "But it's also the collaboration we've established between departments."

That collaboration has focused on the problem—the actual and potential effects of increased development on the watershed—from several different angles, from chemical changes in water quality to shoreline erosion to historical land use to biodiversity to socioeconomics.

"The economic drivers that run that watershed are quite complex," King said.

The problem is complex, not only for the Belgrade Lakes watershed but for all Maine lakes, which are both crucial to the state and suffering the effects of development pressures.

Last June, for the second year in a row, Colby hosted of the annual meeting of the Maine Lakes Conference, cosponsored by the Goldfarb Center for Public Affairs and Civic Engagement and the Maine Congress of Lake Associations. The day-long conference drew collaborators from local, county, and state organizations, and the Colby team of scientists. And, like the Belgrade study itself, the conference drew on Colby's expertise in watershed research and civic engagement.

Said King, "This is a win-win situation."

such as the role of Maine's state parks system, the emergence of offshore wind energy, and coastal and marine management in Maine. This year a new addition to the department, Assistant Professor Travis Reynolds, has added an international dimension to the course.

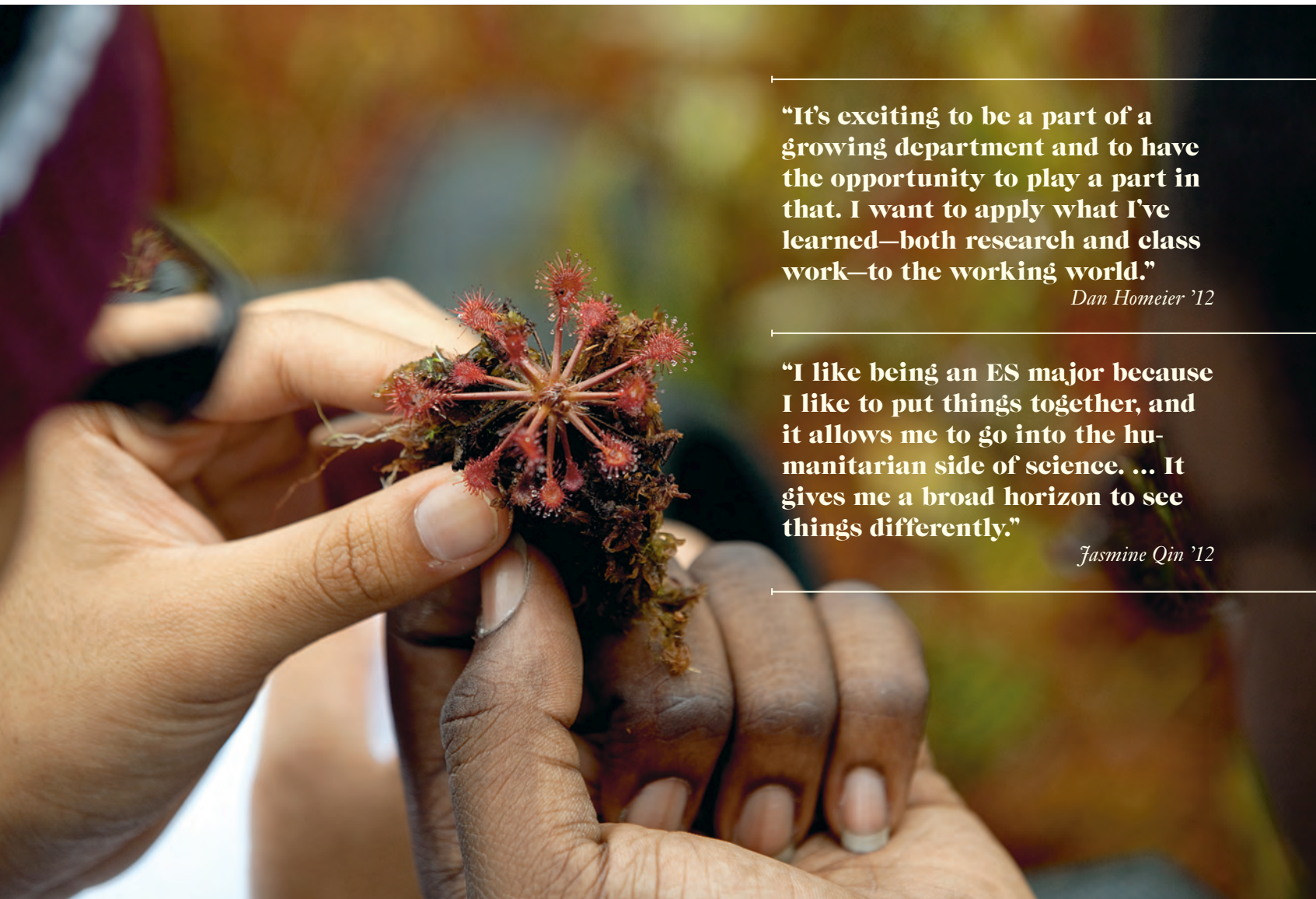
Focusing on Maine isn't just convenient—it's strategic. "Colby is in the ideal location for environmental studies and environmental science," said Stephanie Schmidt, one of the new ES professors who started at Colby this year. In 2010 Colby formed an official partnership with Bigelow Laboratory for Ocean Sciences, a nonprofit research institution in West Boothbay Harbor. The partnership will increase marine science courses at Colby, provide opportunities for faculty exchange, and allow students to immerse themselves in semester-long study at Bigelow.

The alliance made perfect sense given Colby's reputation—both as a top college and as a leader in environmental studies, said Shimmield, Bigelow's executive director. "The partnership brings two institutions with highly respected individual reputations … together to create a unique experience for undergraduates."

All together, opportunities like those presented by the Belgrade Lakes and Bigelow Laboratory partnerships "provide great opportunities for students to really tackle environmental issues," Schmidt said.

They're not just tackling those issues in class but in a variety of impressive internships. Last summer students worked at the U.S. Department of Justice, on Maine land trusts, and restoring habitat in Louisiana, among many other internship projects. Adrienne Bowles '12 spent several weeks in Punta Gorda Town, Belize, working with the Sarstoon-Temash Institute for Indigenous Management, a nongovernmental organization that supervises the Sarstoon-Temash National Park. The internship was invaluable in helping her see the intricacies of applying the principles she'd learned in class to a real-world situation. "The experience gave me an appreciation for the ways a nonprofit can really work with local indigenous people directly," she said.

Pete Didisheim, senior director for advocacy for the Natural Resources Council of Maine, has supervised a number of interns from Colby's ES Program. "The interns we've had have all been top-notch," he said. "I think there's pretty broad recognition that Colby has one of the strongest environmental studies programs in its class



"It's exciting to be a part of a growing department and to have the opportunity to play a part in that. I want to apply what I've learned—both research and class work—to the working world."

Dan Homeier '12

"I like being an ES major because I like to put things together, and it allows me to go into the humanitarian side of science. … It gives me a broad horizon to see things differently."

Jasmine Qin '12

of liberal arts colleges in the Northeast, and maybe nationally."

Students never know quite where an internship might take them. Stephen Erario '10, a Udall Scholar, took on an internship with the city of Waterville during his freshman year. He helped put together a greenhouse gas inventory and climate action plan for the city, and he started a committee to follow up on his recommendations. With Erario's help, the towns of Waterville and Winslow received a $170,000 Energy Efficiency and Conservation Block Grant from the state to fund community energy conservation and study alternative energy sources.

Louisa Walker '13 loads DNA onto an electrophoresis gel for genetic analysis.

While he was still a student, Erario's work resulted in the creation of a nonprofit organization, Sustain Mid-Maine, that works on local issues of energy, transportation, reuse and recycling, environmental education, and local food. The organization has been great for the state, Erario says. The experience also launched his career. He's currently working with the Maine State Housing Authority to sell carbon offsets from energy-efficiency upgrades. "Maine Housing helps weatherize a few thousand homes a year. We track that energy savings, calculate the carbon savings, and sell it on the private market," he explained.

The program is the first of its kind in the world, Erario says. But he wasn't surprised to find an amazing job right in his own backyard. "There's a lot of cutting-edge things happening in Maine, like wind power, carbon offsets, and energy efficiency." Thanks to Colby's reputation, he added, "there's often a good chance for Colby grads to find jobs in Maine."

Certainly the growth of the ES Program has been paralleled by increased environmental awareness and interest. As the media and the public tune in to issues like global warming and water shortages, students, parents, faculty, and the administration are becoming more keenly aware of the importance of environmental education.

As the ES Program has blossomed, so too has interest in making the campus environmentally sustainable. Colby purchases all of its electricity from renewable sources and has committed to becoming carbon-neutral by 2015 and to reducing greenhouse gas emissions 41 percent from 1990 levels by the same year. To help meet those goals, the College is building a biomass boiler plant on campus that will go on line this year. "It's not enough to preach sustainability in the classroom," said Adams. "You have to be walking the talk."

Many ES students have gotten involved in environmental initiatives on campus: conducting the first audits of Colby's carbon footprint, planting an organic garden, planning a "green graduation," and doing away with disposable water bottles at campus events. A number of ES students have testified before the state legislature. "Our students have become more active," Cole said. And that makes him proud. "That's what we strive to do—to train future leaders in policy and in science."

"There's a lot of cutting-edge things happening in Maine—wind power, carbon offsets, and energy efficiency." Thanks to Colby's reputation, "there's often a good chance for Colby grads to find jobs in Maine."

Stephen Erario '10, an ES major who now works for the state of Maine selling carbon offsets

With issues like climate change, overfishing, water shortages, and sustainable agriculture, many would argue that environmental education is more important today than it ever has been. "We've ignored a number of problems—global warming in particular—for a long time. I think we have to step up and address these issues," Cole said.

Luckily for the planet, the field of environmental studies and Colby's ES Program have only gotten more sophisticated. Today's graduates are well positioned to make a difference. "We're moving beyond introducing problems. We're working now on understanding complexities and subtleties and solutions," Nyhus said, "and giving students the skills that can help them solve these problems."