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Community Engagement through an Environmental Studies Lens

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Situated within a state strongly identified with pristine nature, our central Maine campus provides a fabulous "laboratory" for both environmental science and civic engagement. To take full advantage of this fortunate situation, Bates College's Environmental Studies (ES) program includes community civic engagement in many, if not all, of our classes and major requirements. Questions about community, diversity, and civic life help our students grapple with the complexity of environmental challenges, pushing them to consider the many kinds of knowledge essential to addressing problems at both local and more global scales. We strongly believe that a liberal arts environmental education can richly inform our students' future lives, regardless of where our students wind up and whether they continue in a field that is directly related to the environment. Civic engagement is also integral to ES courses in the natural sciences. Central to how the Bates ES program "does" civic engagement is the question of the sciences' role in evaluating and improving the environmental health of human, plant, and animal communities, and how the discourses of science interact with other ways of considering the meanings and histories of place.

All our students, regardless of their concentration, complete a two-hundred-hour internship, write an independently conceived senior thesis, and take a capstone course (usually in their senior year) that involves intensive collaboration with a community partner.

Bates is situated in the Lewiston-Auburn community near the Androscoggin River, which was once cited as among the most polluted rivers in the country because of its upstream paper mills. American statesman Edmund Muskie, a champion of the environment and instrumental in the passage of the Clean Water Act, was a Bates graduate and native of Rumford, upriver from Lewiston-Auburn. Now a vibrant but economically struggling postindustrial city, Lewiston-Auburn's diversity has grown exponentially in the last two decades with the welcome arrival of many Somali and other African immigrants.

LEARNING THAT ENGAGES COMMUNITY PROBLEMS

All students in the Bates ES major take a combination of natural sciences, social sciences, and humanities, and in addition to these "core" courses they pursue a more focused group of courses within a concentration. Students most interested in the natural sciences may choose either an Ecology and Earth Systems track or an Ecology and Economics of the Environment track; the first allows students to pursue increasingly advanced work in both individual sciences and interdisciplinary topics (soils, watersheds, conservation ecology) that draw on multiple fields. The Ecology and Economics track is more focused on public policy but requires students to do advanced work in the natural sciences, on the assumption that well-crafted policy must be grounded in the understanding of ecological dynamics. All our students, regardless of their

concentration, complete a two-hundred-hour internship, write an independently conceived senior thesis, and take a capstone course (usually in their senior year) that involves intensive collaboration with a community partner. The ES major is one of the largest at Bates (where the total on-campus enrollment is approximately 1,700), with between thirty-five and forty students in an average graduating class.

Within the natural sciences, courses deal both with the physical, chemical, geological, and biological processes occurring in a wide variety of landscapes, and the ways in which all those processes intersect with cultural, social, and economic factors. Learning that engages the real problems or perspectives of the community is a great way to highlight the intersection of these spheres. Those problems have taken students into an examination of the toxicity of cyanobacteria in the local unfiltered drinking-water supply, and they have involved studying soil characteristics on poor agricultural land being farmed by recent immigrants. While these are examples of science driven by existing social and cultural realities, other classes might undertake something closer to a study of Lewiston itself as a physical-chemical-biological-social-cultural system.

Studies of Lewiston as a complex system happen both at introductory and advanced levels. In an introductory environmental science class, students collect data on Lewiston (housing stock, trees, neighborhood characteristics), look at the data relative to census data, and contextualize all the data in terms of urban ecology—social/political and biological. At the other end of our curriculum, in the capstone class, work like this is developed more extensively when a group of students works with a community partner on a project of the partner's definition. But, well before their senior year, our students are asked to think about a range of questions regarding civic life and structures, community values, diversity, and empowerment—and the modes and genres that one might use to communicate and invite broad participation.

In an introductory environmental science class, students examine data from the lake that supplies our drinking water and are expected both to be able to explain the physical, chemical, or biological processes at work behind the data and to consider the implications of the data and watershed management decisions for the public drinking-water supply.

In a conservation biology course taught by a member of the biology department (the Bates ES committee includes four faculty appointed in the environmental studies department and six faculty from other departments), students apply the skills they learn in class to carry out community-engaged learning projects, assisting several local organizations with conservation missions. Students work to provide information to gardeners interested in planting native species, they map invasive plant species on properties belonging to a local land trust, and they develop educational materials for a local nature sanctuary.

Natural science and humanities faculty periodically "merge" classes as a way of illuminating how different disciplinary perspectives can come into dialogue. Thus, students in two separate classes read different materials on fracking and climate change and then attended *either* class to prompt a discussion that drew on perspectives from scientific literature *and* histories and cultures of place. (See the Bates College Environmental Studies Learning Goals and Objectives in Figure1.)

APPLYING ACADEMIC SKILLS TO REAL-WORLD PROBLEMS

From its inception in the mid-1990s, the ES program has required a two-hundred-hour internship of all majors, fulfilled through work in a broad range of community organizations, NGOs, and field research settings. Some students do their internships in central Maine, others complete them in their home communities, while still others use the internship as an occasion to explore a setting that may be very different from what they're used to—in terms of physical environment or human community. Wherever they complete their internship, they are asked to reflect briefly in written form on its significance as part of their ES major (some students also do public presentations). These internships often provide direct experience of the role of science in public life, at

FIGURE 1. BATES COLLEGE ENVIRONMENTAL STUDIES LEARNING GOALS AND OBJECTIVES

Environmental Studies is by its very nature concerned with our lives in community—both human communities and community expanded (as Aldo Leopold put it) to include the more than human. We make this explicit in our statement of learning goals and objectives:

> Environmental Studies as an academic field is the product of efforts to understand and respond to the variety of changes humans have wrought in our world. Students in Environmental Studies are motivated by concern for the welfare of the many human and non-human communities that shape this planet. The Environmental Studies Program actively cultivates in our students both engagement with and informed reflection about those communities. To this end, the curriculum includes (1) an interdisciplinary core that encourages students to explore the social, aesthetic, ethical, scientific, and technical aspects of environmental questions; (2) concentrations that allow students to approach these questions with more focused knowledge and methodological tools; (3) a community-engaged research course; and (4) an internship with an environmentally focused organization or business. http://www.bates.edu/environment/learning-goals-and-objectives/

the community level, in the implementation of policy, or in environmental education settings where students become public science educators (see Figure 2).

FIGURE 2. BATES COLLEGE ENVIRONMENTAL STUDIES INTERNSHIP EXAMPLES

From student evaluations on completion of their internship:

> I worked as a technician at an environmental consulting company where my primary role was serving as the office manager for a grassland survey conducted on an Indian Reservation. . . . In addition to office work, I also spent days in the field surveying the prairie and using plant ID to classify areas into ecological states from which cattle stocking rates could be derived. . . . This internship pushed me harder than I had ever been before. . . . I grew emotionally, professionally, environmentally, and gained life skills that can only benefit me in the future.

> I worked with a small group of environmental consultants at various sites, conducting wetland delineations, forest stand delineations, wildlife surveying and control. The consultant I worked with is a bird breeding surveyor who works closely with companies, county/state government, and engineers to make sure sites are following environmental regulations.

> I worked in a laboratory setting investigating anomalies in chlorophyll-a concentration in the Southern Ocean and the Tasman Sea. I worked with two mentors, and used MATLAB to analyze satellite data. . . . I concluded the internship by creating a poster and giving a talk to explain my work. I learned a lot about conducting scientific research through discussing work with my mentors. . . . Thanks to the location of the lab, we can directly see the problems that the ocean is experiencing and brainstorm experiments and solutions.

The capstone course—team taught and now offered every semester—pairs groups of three to four students with community partners to work on a project. (Bates's Harward Center helps identify and develop potential community partners.) These projects have ranged widely—from working with a local museum to tell the history of our local river, to developing questionnaires about storm-water runoff, to helping a local farm evaluate the potential for renewable energy installations. This course stretches our students to apply academic skills in a real-world situation. All projects are publicly presented at the end of the semester, many involving presentations to local civic groups and boards. For some of our students, this is probably the first time they've gone to a city council meeting! The science involved in these projects can range from hands-on monitoring of local streams to complicated calculations of river flow and daylight intensity; many of the projects demand that students think about various kinds of legislation, from flood-zone restrictions to Federal Energy Regulatory Commission dam licensing. Among other things, students grapple with community expectations and just how high the stakes can be. In one recent project, a group of local architects and entrepreneurs were hoping to convert an abandoned mill building into a showcase of renewable energy and green agriculture. Just how much light would be coming through the windows and ceiling casements? How much light and water would different potential crops need if the old mill were to become a greenhouse? What was the potential for power generation from the river at different times of the year and at different water levels? Finding answers to these questions stretched the students' skills with calculus, botany, and physics, but it also confronted them with how to *communicate* what they found out to their community partners. Students learned to translate complicated calculations into lay terms while diplomatically letting community partners know that their exciting visions might not be feasible. The learning curve for everyone—students, faculty, and partners—was steep. Students don't always have "fun" doing a project like this, but they are making invaluable contributions to the community—and they are learning something about the interface between the academy, the community, and the dynamics of decision making that is invaluable. A list of capstone course projects relating to the Androscoggin River can be found at http://androscoggin.bates.edu/home/community-projects.

EMERGING TOPICS AND CAMPUS CHALLENGES

As Environmental Studies continues to think about bringing science and civic cultures into conversation, there are many things that still challenge us and emerging topics that call out for attention: How can we attract a more diverse group of students (in a discipline many people still associate with wilderness)? How can the efforts of faculty in community-engaged learning be better "counted" in tenure and promotion cases? How can we assess the impacts of community-engaged learning both for our students and for our community partners? A new colleague, hired last year, brings expertise in urban environmental issues and regional food systems, and other campus colleagues are in conversation about how to collaborate on an interdisciplinary course on climate change. Both of these topics challenge faculty and students to think about why and how the science of an issue "matters"—and how it can best be communicated in specific, culturally complex settings. We strongly believe that a liberal arts environmental education can richly inform our students' future lives, regardless of where our students wind up and whether they continue in a field that is directly related to the environment. ▪