

# **Center for the Environment, Ecological Design, and Sustainability**

## **Smith College**

Annual Report

1 August 2015

Submitted by     Andrew J. Guswa, Director (outgoing)  
                       Robert Newton, Director (incoming)



## Executive Summary

The Center for the Environment, Ecological Design, and Sustainability (CEEDS) prepares all Smith students to lead on issues of environment and sustainability. In 2014-15, Smith College received \$3.5 million in endowment support for CEEDS, solidifying its role in the education of our students. Heading into the 2015-16 academic year, we will welcome and welcome back students who have never known a Smith without the Environmental Concentrations or the Bechtel Environmental Classroom. All of the CEEDS programs continue to grow and develop, engaging more and more students from across disciplines. 2014-15 saw the launch of a second Environmental Concentration on Climate Change, the opening of a low-ropes challenge course at the MacLeish Field Station, updated environmental monitoring, innovative curricular enhancements across campus, numerous field trips for students and faculty, and opportunities to engage with environmental leaders through a range of workshops and colloquia. We also welcomed to Smith Dano Weisbord, Director of Campus Sustainability, and Camille Washington-Ottombre, assistant professor in Environmental Science and Policy, and we look forward to the arrival of Alex Barron, assistant professor in Environmental Science and Policy this summer. On 1 July, Prof. Robert Newton began his term as director, and this summer he has worked with six students, state regulators, and staff from Facilities Management to develop innovative and sustainable ways of managing the sediment accumulation in Paradise Pond.

Regular operating expenses (including all salaries and compensation) during 2014-2015, totaled \$337,776 and CEEDS had an additional expenditure of \$146,052 of one-time funds.

## 1 Mission and Outcomes

Building on a strong tradition of women's leadership at Smith, the Center for the Environment, Ecological Design, and Sustainability (CEEDS) brings together faculty, staff, and students from the natural sciences, social sciences and history, humanities, and engineering to address environmental questions and challenges. Our mission is *to graduate women who excel at integrating knowledge to support environmental decisions and actions*. This mission, and CEEDS itself, is intended to complement and enhance the wide range of curricular pathways that students can choose to study the environment at Smith. CEEDS is about linking knowledge across the liberal arts and critically applying this knowledge to real-world solutions.

In pursuit of these goals, the activities of the Center are directed toward

- Enhancing the curriculum
- Sponsoring integrative environmental projects
- Using our campus as a model of sustainability
- Integrating environmental resources and information

Sections 3 through 6 of this report are organized according to these categories with details on specific activities.

Cover photo: View of the MacLeish Field Station from a kite (photo credit: Reid Bertone-Johnson).

CEEDS is driven by educational outcomes rather than activities; that is, we choose to focus on the impact of the Center. Through the programs, activities, and collaborations facilitated and supported by the Center, we intend that Smith students who engage with CEEDS will

### **Make Connections**

Students bring together knowledge and data from different fields within the unifying context of the environment.

### **See Multiple Perspectives**

Students learn to see environmental issues from multiple perspectives by interacting with faculty, staff, alumnae, other students, and community members with different backgrounds, experiences, and knowledge.

### **Get Outside**

Students learn from the communities and built and natural landscapes in which they live and study.

### **Take Action**

Students take on environmental projects inside and outside of the curriculum and draw upon their liberal arts education in pursuit of these projects.

### **Communicate Effectively**

Students develop skills in listening to and communicating with others to facilitate decisions and action.

### **Build Meaningful Careers**

Students find meaningful internships and employment in environmental fields over a range of sectors (graduate school, business, non-profit, government).

Additionally, as a result of the Center's existence

### **Faculty are Supported**

Members of the faculty use CEEDS as a resource to support and enhance their teaching and scholarship.

### **Alumnae Connect**

Smith alumnae connect with the college, current students, and each other to share knowledge, experiences and expertise related to the environment and sustainability.

### **Smith Gains Recognition**

Smith enhances its reputation as a model of environmental sustainability, as a place for students to live sustainably, and as one of the best places to study the environment.

### **Smith Evolves**

Innovative ideas that prove successful within CEEDS are adopted and implemented throughout the college.

## 2 Growth and Development

The role of CEEDS in the education of Smith students continues to grow and develop. During the 2014-2015 year, CEEDS interacted with thousands of people – from students and faculty to community members and local leaders. Our energies were directed towards increasing our visibility and connections on campus and within the greater Five College area. To this end, the year saw collaborations deepen with a number of Smith offices and programs, several local non-profit organizations, and members of the Five College consortium – Amherst, Hampshire, Mount Holyoke, and UMASS-Amherst.



Image 2: CEEDS collaborated with Dining Services at this year's annual Cider Pressing to offer tastings of local cheeses and heirloom apples.

### 2.1 Personnel

As of 1 July 2015, the CEEDS staff comprises the Director, Assistant Director, Field Station Manager, Environmental Research Coordinator, and Administrative Assistant. Environmental Fellows, appointed from the Smith College faculty, provide strategic guidance

to the director and staff and actively advance CEEDS programs. Separate advisory boards exist to set policy and make decisions related to the MacLeish Field Station and the Environmental Concentrations. Table 1 provides a list of CEEDS staff and affiliated faculty. During 2014-15, CEEDS also supported 7 student interns who engaged in a variety of projects both on and off campus. With the closing of the 2014 fiscal year, Andrew Guswa's term as Director of the Center came to an end. Robert Newton began as the new Director of CEEDS on July 1, 2015.

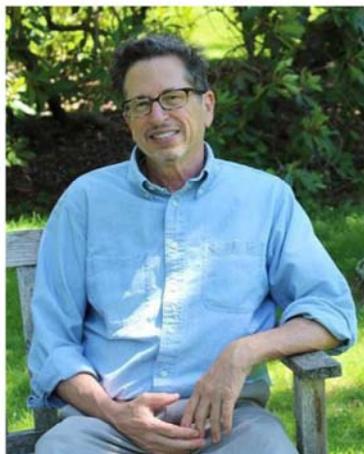
Table 1: CEEDS staff and affiliated faculty, 2014-15.

<p><b>Staff</b>          Director          Assistant Director          Field Station Manager          Env. Research Coordinator          Administrative Assistant</p>	<p>Andrew Guswa          Joanne Benkley          Reid Bertone-Johnson          Paul Wetzel          Sara Kirk</p>
<p><b>Environmental Fellows</b></p>	<p>Jesse Bellemare, Biological Sciences, Environmental Science and Policy (ES&amp;P)          Daniel Gardner, History          Ann Leone, French and Landscape Studies (LSS)          James Lowenthal, Astronomy          Amy Rhodes, Geosciences, ES&amp;P          L. David Smith, Biological Sciences , ES&amp;P</p>
<p><b>MacLeish Advisory Board</b></p>	<p>Amy Rhodes (Chair), Geosciences, ES&amp;P          Jesse Bellemare, Biological Sciences, ES&amp;P, LSS          Reid Bertone-Johnson, CEEDS, LSS          Scott Johnson, Athletics          Andrew Guswa, <i>ex officio</i></p>
<p><b>Advisory Board for Environmental Concentration: Sustainable Food</b></p>	<p>Elisabeth Armstrong, Study of Women and Gender          Joanne Benkley, CEEDS          Barbara Brehm-Curtis, Exercise and Sport Studies          Michelle Joffroy, Spanish and Portuguese          Ann Leone, French, LSS          Nancy Sternbach, Spanish and Portuguese          Paul Wetzel, CEEDS          Andrew Guswa, Engineering, ES&amp;P, LSS</p>

**Advisory Board for  
Environmental Concentration:  
Climate Change**

Jesse Bellemare, Biological Sciences, ES&P, LSS  
Joanne Benkley, CEEDS  
Elliot Fratkin, Anthropology, ES&P  
Nathanael Fortune, Physics  
Daniel Gardner, History  
Andrew Guswa, Engineering, ES&P, LSS  
Alice Hearst, Government  
Danielle Ignace, Biological Sciences, ES&P  
James Lowenthal, Astronomy  
Denise McKahn, Engineering  
Robert Newton, Geosciences, ES&P  
Amy Rhodes, Geosciences, ES&P  
Susan Sayre, Economics, ES&P  
Elizabeth Spelman, Philosophy  
Gregory White, Government, ES&P

**Faculty Spotlight**



This year, Daniel Gardner, Dwight W. Morrow professor of history, joined CEEDS as an Environmental Fellow. Gardner, a member of the Smith faculty since 1978, is a historian who specializes in Chinese culture and society from the Neolithic era to the early 20th century. In 2010, Gardner became fascinated with environmental issues, and realized that no one was really writing about the complexity of shared global environmental issues and China. As he says, "... people who study China seemed scared of the science, and scientists seemed scared of the immensity and foreignness of China."

That year, with a curricular enhancement grant from CEEDS and support from the Provost, Gardner went to Beijing, China to work with colleagues at the Natural Resources Defense Council (NRDC) and get a sense of what the important environmental issues were and how they were being addressed on the ground. In the spring of 2011, Gardner offered the first iteration of EAS 220, Colloquium: Environment and Society in Contemporary China. The course generated great interest from students at Smith and within the Five Colleges eager to close the gap between their interests in China and the environment. He has taught it each year since. "I love teaching this course because of the students. You never know who you are going to get. There may be a student who wants to talk about isotopes, or about pollution, or about state policy in China, or global climate change, or international affairs. It is great fun, and I always learn from the students as much as they learn from me." Over the years, students in EAS 220 have been inspired to connect with others and share what they've learned –both on campus and beyond.

This spring, two of Gardner's students, Leslie Hillsamer '16 and Caitlyn Vincent '17, presented papers on their work at the Bard College Asia/Environment Student Research Conference.

Gardner has also become a sought after expert on the topic and continues to publish pieces regularly, because, as he says "it is essential that Americans understand something about China's environment, about pollution. It is not just their (China's) problem. It's our problem, too, since much of it comes from the manufacturing of exports, many of which come to the U.S. We need to recognize that we are contributing to smog and pollution in China by our own consumption of goods. We cannot remain parochial in our views, and we cannot compartmentalize the air we breathe." Gardner writes in lay terms about the environment in China as a way to inform others and, in the process, learn more himself. He has written op-eds for publications like the Los Angeles Times, the New York Times, The Guardian, the Christian Science Monitor, and the International Herald Tribune. He has been interviewed by news outlets like The Guardian, Foreign Policy, the National Bureau of Asian Research, Radio Free Asia and Voice of America. He is now in the process of writing a book for Oxford University Press on environmental pollution in China.

## 2.2 Alumnae Advisory Board

The CEEDS alumnae advisory board shares their professional expertise and insights with CEEDS staff and Environmental Fellows and in turn shares our mission and successes with alumnae and external audiences. Membership comprises:

Donna Attanasio '81, Senior Advisor for Energy Law Programs at The George Washington University Law School

Katherine Borgen '64, Board Chair of Rachel's Network; Trustee, The Nature Conservancy (CO); Director, Borgen Family Foundation

Leslie Carothers '64, Visiting Scholar at the Environmental Law Institute; member, Board of Directors of the Center for Climate and Energy Solutions

Aimée Christensen '91, Founder and CEO of Christensen Global Strategies

Deborah Duncan '77, Director and Senior Advisor of Fremont Group; Trustee, Smith College

Iлона Johnson '06, Associate Lilker EMO Energy Solutions

Erinn McGurn '94, Co-founder and Executive Director of SCALEAfrica; Owner/Principal of SCALEStudio; member, Board of Directors of the Alumnae Association of Smith College; member, STEM Advisory Board for the Partnership for After School Education (PASE)

Jan Van der Voort Portman '78, Trustee, The Nature Conservancy of Montana; Honorary Life Trustee, The Nature Conservancy of Ohio; Member of the Board, Rare

The Advisory Board met this year via a Skype conference call to discuss the ongoing work and goals of CEEDS. The next in-person meeting with the Board is scheduled for October 2015.

### 2.3 Grant Proposals, Gifts, and Fundraising

In 2014-2015, CEEDS staff, in conjunction with Smith’s Office of Development and Sponsored Research Office, submitted two grant proposals in support of our programs.

Title:	Community Centered Environmental Problem Solving: A Pilot Project
Agency:	Thoreau Foundation
Amount:	\$35,000
Summary:	The ultimate goal of this project is to change the focus of environmental education at Smith College towards more experiential, inquiry-oriented, community-based studies. Eight students from Smith College will work with regulators and nonprofit environmental groups to develop innovative methods for managing the sediments that accumulate behind small dams. During an intensive 10-week program over the summer of 2015, these students will monitor and analyze a range of controlled experiments that attempt to flush sediment through the dam that creates Paradise Pond on the Mill River.
Status:	Not Funded

Title:	Center for the Environment, Ecological Design and Sustainability
Agency:	Name withheld upon request
Amount:	\$200,000
Summary:	Support for operational and programmatic expenses of the Center for the Environment, Ecological Design, and Sustainability.
Status:	Funded; 1 July 2015 – 30 June 2016

In addition to the grant proposals, the Center for the Environment, Ecological Design, and Sustainability also received a number of gifts and commitments from alumnae and friends. Gifts greater than \$1000 include

Pledge/Gift amount	Donor	Intent
\$2.5 million	Anne (Attfield) Hubbard '55 and Tom Hubbard	Endowment
\$1 million	Marcia MacHarg '70	Endowment
\$25,000	Lynn Donaldson '70	Current use
\$25,000	Cameron Scott Avery	Current use
\$20,000	Katherine Sharpe Borgen '64	Current use
\$10,000	Lois Perelson-Gross '83	Current use
\$6,500	Maureen Ogden '50	Current use
\$2,000	Wym and Jan Portman Fund	Current use

\$2,000	Donna Attanasio '81	Current use
\$1,000	Erinn McGurn '94	Current use

### 3 Enhance the Curriculum

#### 3.1 Environmental Concentrations

CEEDS offers two Environmental Concentrations that provide a framework for students to integrate their academic and experiential learning around cross-disciplinary environmental topics: Climate Change and Sustainable Food. Each concentration comprises four components: a gateway course, core courses selected from across the five colleges in consultation with a faculty advisor, two practical experiences, and a project-based capstone course. In 2014-15, 24 students were affiliated with our Environmental Concentrations in Sustainable Food and Climate Change.

##### 3.1.1 Gateway Courses

Students choose between two gateway courses that present environmental issues from a range of perspectives: LSS 100, Landscape, Environment, and Design, and ENV 100, Environment and Sustainability: Notes from the Field. ENV 100 is a course organized by CEEDS staff that exposes students to real-world practitioners in a broad range of environmental fields.

This year, speakers in ENV 100 ranged from local farmers giving a tour of their farm to the senior attorney and Director of the China Program for the National Resource Defense Council. The 2014 line-up also included one alumna, Rouwenna Lamm '08, who spoke about her work as the National Program Director for Alliance for Climate Education, a non-profit organization focused on educating high school students about climate change. Appendix A provides a complete list of the 2014-2015 ENV 100 and LSS 100 speakers and their lecture titles.

##### 3.1.2 Capstone Project: Sustainable Food

The goal of the Sustainable Food capstone class is to provide students with the experience of working together on a real project. As a team, the class works with a “client” gathering information, conducting surveys, creating maps, and eventually making recommendations. Throughout the semester students apply the knowledge and skills they have learned during their time at Smith toward their particular project. Invariably, they also learn a tremendous amount about teamwork, communication, project management, and meeting a common goal.

This year, in light of the new Massachusetts Department of Environmental Protection ban on disposal of commercial organic wastes by institutions that dispose of more than one ton of these materials per week, students in the capstone class investigated the College’s system for disposing of food waste. This included a review of the actual material flow as well as ways to increase student participation in composting programs. The capstone class tried to re-envision “waste” at Smith. They collected data on the size of the organic waste stream and looked at all aspects of the organic waste system from food display and serving, packaging from condiments, and bulk purchasing. Students also considered high waste-producing eating options such as Grab-n-Go dining rooms and the Campus Center Café.

The students made several important conclusions from their investigations. One was the possible campus purchase and operation of an in-vessel aerobic digester. Such a digester would reduce disposal fees and allow the composting of soy utensils and paper products, while recovering the capital costs of the digester in four years.

The students also felt that one of the primary goals of the College should be to educate students in sustainable life practices. The class suggested that sustainable-living education begin as soon as new students arrive during orientation week. Students could be trained then to use the composting system and other resource saving programs on campus. They reasoned that Smith's legacy could only be enhanced by using the campus as a classroom and teaching students how to steward the resources that sustain them, thus making it more possible for graduates to fulfill their responsibilities to the local, national and global communities in which they live.



Image 3: Students went on a mini-retreat with staff from CEEDS and the Wurtele Center for Work and Life to reflect on their work and experiences within the Environmental Concentrations.

### 3.1.3 Linking Academics and Action

An integral part of the concentrations are the practical experiences that the students take on. This year our students took part in internships with seven different organizations, from Book and Plow Farm in Amherst, MA to Cornell University's McKnight Foundation Collaborative Crop research Program in Ithaca, New York to the Third Millennium Alliance in Ecuador. Their work encompassed everything from maintaining a healthy aquaponics system to taking on the logistics of high-volume farm production to testing soil samples to developing and maintaining an online resource for researchers and development practitioners to helping create an agricultural and artisanal marketplace. See the boxes below for more about the experiences of two of our students.

## Taking Action: Siiri Bigalke '16J

Siiri Bigalke '16J worked as an intern at the Interfaith Center for Sustainable Development (ICSD) in Jerusalem. While there, Siiri worked on a host of projects with the diverse communities in the Jerusalem area to promote environmental sustainability. Her primary project was to help lead a monthly women's interfaith (Muslim, Christian, Jewish) meeting with the goal of empowering women to become community leaders and find common ground through a shared sense of environmental awareness and stewardship in their respective faiths.

“Climate change is a very complex issue. For me it is often difficult to know which avenue I can take in order to promote the most effective change. While my work at ICSD did not involve technical research about the impacts of climate change on the Jerusalem community, it was nonetheless a growing experience because I was able to experience sustainability through different religious and cultural lenses. I discovered that trying to build mutual understanding between Jerusalemites also builds respect for the environment.

This experience taught me the importance of using “place” as a tool in order to promote understanding. In Jerusalem, “place” is the source of all contention in this city. Yet it also has huge potential to bring Israelis and Palestinians together – through their mutual reverence of this Holy Land. When using the land and the environment as a springboard for understanding, it becomes evident that religious and cultural barriers do not exist when it comes to environmental respect.”



Image 4: Siiri, third from left, with some of her ICSD colleagues in Jerusalem.

### **Taking Action: Isabel Cochran '15**

Isabel Cochran '15 worked as an intern at Essex Farm in Essex, New York. While there, Isabel and her fellow interns experienced all of what is involved with running a diversified organic farm. Her daily work of animal/dairy chores and vegetable-related tasks included moving animals, planting, weeding, harvesting, washing, slaughtering and more.

“This experience was life changing for me. I learned more than I ever thought possible at a farm, was exposed to so many different ideas, met so many different people who are passionate about agriculture and think and discuss critically how agriculture fits into addressing our current environmental problems. I learned to value the work that goes into producing my own food and to value good food. I no longer want to eat food that has been mass produced, severely adulterated, pumped full of chemicals and disrespected, because I know the pleasure I feel when I eat food that has been produced with thought, care, and respect. I know the toil that was required for the food to reach my plate, and I know the joy that food can bring to people. Overall, I have great respect for the food I eat, a critical eye for choosing the food I eat, a respect for hard physical work, and an understanding that farming is not a job for those who are not willing to work hard while thinking even harder. Farming requires a lot of knowledge, attention to detail, critical thinking, and ability to research.”



Image 5: The onion harvest in the barn after a long, hard day's work.

## 3.2 Events and Workshops

### 3.2.1 Concentration Events

To complement our Environmental Concentrations, CEEDS hosts or co-sponsors events related to the topics of sustainable food and climate change, and also helps support and promote such events within the Five College Consortium. Examples from this academic year include:

- A workshop: “Re-Storying the Land: Race, Place and Voice in America” on Otelia Cromwell Day that engaged students, faculty and staff in a conversation about the relationship between people, land, and place. Organized in partnership with the Otelia Cromwell Day Committee.
- A field trip for CEEDS staff and students in the SWG 230 Gender, Land and Food Movement class to participate in the Racial Equity in the Food System gathering in Holyoke, sponsored by local organization PVGrows.
- A gleaning field trip in collaboration with local organization Rachel’s Table for the second year in a row.
- A lecture: “Climate Justice and Indigenous Peoples: Moral, Cultural and Environmental Issues,” by Kyle White, assistant professor of philosophy at Michigan State University, in collaboration with the philosophy department.
- A lunchtime conversation: “Equal Exchange and Working for Sustainable Food Systems with alumna Gabriella della Croce, ’12. Gabriella, who has been working in the sustainable food field primarily in Central America, returned to campus in an event co-sponsored with the Center for Community Collaboration.
- A lecture: “Methane Emissions Make a Natural Gas Bridge to Nowhere,” by Bob Howarth, a biogeochemist at Cornell University who has written several papers about greenhouse gas emissions associated with natural gas extraction by hydraulic fracturing. CEEDS collaborated with the geology department (as part of the 5-College geoscience lecture series) and ES&P.
- A hydroponics workshop and lecture by Dr. Martin Schreiber, in collaboration with the Smith student chapter of Engineers for a Sustainable World.
- Performances of “Vang” and “ Map of My Kingdom”, two one-act plays by Mary Swander, Poet Laureate of Iowa, in collaboration with UMASS Arts Council, UMASS Student Farming Enterprise, and the UMASS departments of English, resource economics, and communications.

## The 2014 People's Climate March

Some 60 Smith students, staff, and faculty joined with over 400,000 others in the People's Climate March in New York City on September 21st. That day, two days before the scheduled United Nations Climate Summit, millions of people around the world gathered at more than 2,000 rallies in 162 countries to demand action from their leaders on climate change. The Smith students who participated were a diverse group: they came from across the college, and included students from every class year and from majors across all the divisions. With the support of CEEDS, students took the lead on the planning and organizing for this effort, which included coordinating with community and national organizations. As a direct result of this work and the event itself, students made connections- between the varied individual issues that they cared about (e.g. sustainable agriculture, food access, tribal rights, fracking) and the larger issue of climate change; students took action and had to communicate effectively in so many ways- being present and speaking up, and on such a scale and with so many others energized and recharged everyone so they felt they could come back to Smith and continue to learn and work on solutions to environmental issues without feeling overwhelmed and hopeless about the future. See the [CEEDS] blog post about this: <http://smithceeds.wordpress.com/2014/09/23/from-apple-orchards-to-the-big-apple-smith-students-take-to-the-streets/>



Image 6: Some of the many Smithies at the People's Climate March.

### 3.2.2 Other Events, Lectures, and Field Trips

CEEDS also hosts or co-hosts numerous engaging speakers and events during the year. Some examples from 2014-15 include:

- A panel: Uniting the Planet: Bringing Faith, Science and Community Organizing Leaders Together to Promote Environmental Justice
- A lunch bag conversation with Barbara Finamore, senior attorney and Asia Director, China Program, Natural Resources Defense Council.

- A nature writing workshop with poet and writer Allison Deming at the MacLeish Field Station, co-sponsored with the Poetry Center.
- A lecture: “The End of Night,” by Paul Bogard, professor of English from James Madison University, in collaboration with the astronomy department and the City of Northampton, with support from the College’s endowed lecture funds.
- A lecture: “Radical Listening: A Doctor’s Experience Saving Lives and Rain Forest in Indonesian Borneo” by Dr. Kinari Webb, in collaboration with ES&P and the pre-health program.
- A conversation between students and Jeffrey Sachs, economist, director of The Earth Institute, Quetelet Professor of Sustainable Development, and Professor of Health Policy and Management at Columbia University while he was on campus for his lecture “The Age of Sustainable Development,” as part of the Presidential Colloquium Series.
- A series of events during Earth Week related to the theme “Paradise at Smith: Celebrating our Waterfront; Embracing our Watershed.”
- A staff and faculty development field trip to the Deer Island wastewater treatment facility in Boston Harbor.

### **3.2.3 Interterm Workshops**

Reid Bertone-Johnson and Carol Berner (from Education and Child Study) taught LSS 110J: Interpreting the New England Landscape for one week of Interterm. This course, which started as a non-credit course in January of 2014, was approved for credit this year by the Committee on Academic Priorities. Sixteen students enrolled in the January 2015 course.

Students took a natural history walk guided by Paul Wetzel, and learned about the cultural history of the site and region from biological sciences professor, Jesse Bellemare. Students also learned about the process and policies of Living Building Challenge (LBC) and worked with Reid Bertone-Johnson to understand the nuances of the LBC and the ways in which it continues to influence work at Smith College. The class then engaged in visual thinking strategies with Maggie Lind from the Smith College Museum of Art, to learn new ways to help visitors interpret what they see in the landscape, and they worked with Carol Berner to practice and prepare activities for visitors to experience as part of learning about the field station.

On the last day of the course, 40 sixth graders from the Smith College Campus School participated in activities created by the Smith students, introducing them to the natural and cultural history of the field station and to the Living Building Challenge. They tracked animals, used visual thinking strategies to interpret their environment, and explored one of the most sustainably built buildings in the world.



Image 7: Students from LSS 110J experiencing the landscape in a new way.

### **3.3 Curricular Enhancement Grants**

Each year CEEDS invites proposals from faculty for modifications and enhancements of existing courses that are congruent with the CEEDS mission. Over the past five academic years CEEDS has supported twenty-five faculty members from across all academic divisions as they have enhanced their courses to enable their students to engage with the environment in new and innovative ways. For 2015-16, we are sponsoring four projects by faculty in chemistry, engineering, geosciences, and Spanish and Portuguese. Appendix B provides descriptions of all of the projects funded thus far.

### **Students Get Outside: Curricular Enhancement Grants in Action**

Professors Amy Rhodes and Michael Barresi worked together to develop research-based courses that addressed water quality issues related to extraction of natural gas by hydraulic fracturing methods, also known as “fracking.” Their goals were to characterize the chemistry and potential biological toxicity of surface waters (streams and a lake) located proximal to fracking activities. GEO 301 measured the inorganic geochemistry and stable isotopic composition of the sampled waters. BIO 159Y isolated all organics from the sampled waters and used the zebrafish model system to assess whether these purified compounds could affect embryonic development as well as activate estrogenic signaling in the embryo.

The study site for the classes was a rural location in northeastern Pennsylvania (Fiddle Lake, Ararat Township, Susquehanna County) where natural gas development of the Marcellus Shale is at preliminary stages of development. The classes sampled both within watersheds where shale gas extraction pads were constructed (but with no drilling activity), and within watersheds where development for shale gas extraction had not occurred. Following the field trip, the students analyzed their samples in the Center for Aqueous Biogeochemical Research (CABR) and the Zebrafish Research Center. The results helped characterize the baseline water quality and environmental toxicity conditions for the streams outside of drilling areas, which included identification of nonpoint source pollution already present and its effects on embryonic zebrafish development and endocrine disruption. In addition, they aimed to see if water quality conditions of streams proximal to fracking differed from the baseline conditions. Students in each course were invested and interested in learning the results and interpretation generated by both classes and subsequently presented posters of their results at the Life Sciences Symposium for Course-Based Research.

## Connections Are Made: Curricular Enhancement Grants in Action

Laboratory instructor Jan Vriezen modified his biology course, BIO 205: Introduction to Microbiology, to include data from the MacLeish Field Station. Traditionally, this is a course in which students characterize bacteria that are unknown to them but known to the instructor. While a positive learning experience, the educational value is limited due to the constraints of the approach itself: the unknowns are not really unknown. This conundrum is easily solved by allowing students to characterize bacteria they discover themselves. In the modified course, students isolated soil bacteria from MacLeish for characterization in the lab. Relevancy was added by implementing the Small World Initiative, a national attempt to find and characterize antibiotic producing bacteria. This meant that students did not just characterize a bacterial isolate, they got to characterize bacterial strains that inhibit indicator lawns, indicative for the production of a toxin. For their indicator lawn, students could choose between several bacteria that are harmless relatives of pathogens. Using soil from the Field Station provided a wonderful opportunity to do hypothesis testing and predict that: (1) the microbial load is higher in rich rather than in poor soil, (2) the number of bacteria that inhibit an indicator lawn is higher in poor soils where it is more beneficial to produce antibiotics, and (3) due to the absence of predominant groups, the diversity is higher in those poor soils.



Image 8: Students from BIO 205 collecting samples through layers of snow at MacLeish.

The experience testing the hypothesis was astonishingly positive. As hypothesized, preliminary data shows that the bacterial load is higher in grassland than in forest land. The number of antibiotic producing bacteria depends on the indicator lawn pointing at niche specificity of certain antibiotic producers. It also appears that at any specific site, the pattern “top” vs “deep” is reversed for *Escherichia coli* and *Staphylococcus epidermidis*. For *E. coli*, sampling deeper will increase the frequency of antibiotic producers, while for *S. epidermidis* this is reversed. Interestingly, this pattern is seen in forest as well as grassland samples. Those results were unexpected. Some isolates were further

characterized, first using 16S rDNA sequencing, and later employing bacteriological techniques. This indicated that the diversity of antibiotic producers was highest in grassland topsoil, and lowest in deep forest soil, different from our hypotheses.

Pedagogically the approach taken was also very satisfying. First, being a research based course, assignments such as keeping a lab-notebook are very important. In addition, the fact that a-priori set hypotheses may not be correct and that intellectual re-adjustment is required is foreign to many students. With the correct hypothesis there is no failing, just learning. Also, because all isolates were unknown, students could not explain their “unexplainables” as incorrect testing. Many students had not had these experiences in the past. Most importantly, because the students discovered their strains themselves, and the project was open-ended, project ownership increased and the students delivered much higher quality work in the form of very good reports and presentations.

### **3.4 Environmental Monitoring**

To support research and understanding in the environmental sciences and improve quantitative literacy among all students at Smith College, the Center supports an environmental monitoring program. Quantitative data on the environments around Smith are made available to faculty and students for use in courses and projects. At the MacLeish Field Station, we continuously measure precipitation, temperature, atmospheric pressure, relative humidity, wind speed and direction, solar radiation, and soil temperature. The instrumentation and data collection at both weather stations were upgraded this year. The Center also published the first Annual Weather Reports from the MacLeish Field Station for 2013 and 2014 (see story below).

CEEDS also supported several field projects with our Distributed Temperature Systems (DTS). These instruments use fiber-optic cables to measure temperature every 25 cm every minute for up to 8 km. The cables can be put in streams, buried in the ground, placed in tree canopies, located in buildings, or towed through the ocean. DTS instruments were used to measure groundwater inflow along a kilometer of Avery Brook in support of a project overseen by Robert Newton (geosciences). A second DTS deployment was used to measure forest floor temperatures prior to leaf out and just after leaf out in a study of the effects of climate change on *Bazzania* species of moss (overseen by Jesse Bellemare, biological sciences). Each of these projects involved Smith students in some aspect of the data collection or analyses, providing them with hands-on experience to this novel monitoring technology.

## Communicating Effectively: Annual Weather Reports

The weather stations at MacLeish measure the weather every second, average that information every 10 minutes and record it. That's a lot of numbers and not everyone needs so much information. For those who want to know the highs and lows and general trends, CEEDS produced annual weather reports for 2013 and 2014. Think of them as weather picture books. Environmental Monitoring Intern, Isabel Cochran '15, calculated the report statistics and created the monthly summaries. A few weather highlights are listed below; to view or download the full weather reports, please visit our website: [http://www.smith.edu/ceeds/macleish\\_monitoring.php](http://www.smith.edu/ceeds/macleish_monitoring.php).

	2013	2014
Highest Temperature (°C)	34.9 (July 17 <sup>th</sup> )	31.6 (July 23 <sup>rd</sup> )
Lowest Temperature (°C)	-20.2 (Jan. 24 <sup>th</sup> )	-21.4 (Jan. 6 <sup>th</sup> )
Greatest Maximum Rain Event (mm)	85.1 (July 23 <sup>rd</sup> )	92.7 (Aug. 13 <sup>th</sup> )
Annual Precipitation (mm)	1305.2	1348.1
Growing Season (days)	188	184
First Autumn Freeze Date	October 26 <sup>th</sup>	October 19 <sup>th</sup>
Last Spring Freeze Date	April 21 <sup>st</sup>	April 18 <sup>th</sup>



Image 9: Environmental Monitoring Intern Isabel Cochran '15 in the field.

## 4 Supporting Projects

One of the key activities for the Center is the sponsorship of integrative environmental projects in which students, faculty and staff work together toward solutions to environmental challenges. Currently, students are working on local projects related to the American chestnut restoration, sustainable watersheds and waterways, and the invasive hemlock woolly adelgid.

### 4.1 Sustainable Watersheds and Waterways

With generous support from the Stephen Bechtel Fund, CEEDS supported a range of projects related to Sustainable Watersheds and Waterways in 2014-15. Prof. Robert Newton (geosciences) worked with five students and Mr. Gary Hartwell from Facilities Management from May through July to investigate the potential for flushing sediments from Paradise Pond. All dams disrupt the flow of rivers causing sediment to accumulate in their impoundments, and, unless this sediment is removed, they will eventually become filled. In contrast to dredging the pond during low flows, the Smith team is working with state regulators to determine the feasibility of flushing sediment through the dam and downstream during high flows – a process that more closely matches sediment movement in a natural channel.



Image 10: Aerial view of sediment accumulation in Paradise Pond taken by a Spatial Analysis Lab drone.

Professors Carol Berner and Al Rudnitsky from the Education and Child Study department, working with one graduate and three undergraduate Smith students, are leading a year-long series of workshops to engage local elementary school teachers in learning about how to incorporate watersheds and waterways into their regular classroom teaching. The teachers will come together to learn from each other, develop curricula and share materials.

On May 6, CEEDS sponsored a field trip to the Deer Island wastewater treatment facility in Boston. Sixteen faculty and staff engaged with Charlie Tyler, Program Manager for the MWRA, and Peter Shelley, President of the Conservation Law Foundation, gaining insight to the legal actions, politics, economics, history and engineering of the successful clean-up of Boston Harbor in the late 1990s.

## 4.2 American Chestnut Restoration

To engage students with concepts of conservation and restoration, CEEDS has collaborated with The American Chestnut Foundation (TACF) for the past three years to establish an American chestnut seed orchard at the MacLeish Field Station. The purpose of the seed orchard is to grow up the last (5th) generation of cross-bred chestnuts to produce blight-resistant hybrid nuts. The resulting 6th-generation hybrid trees will have 94% American chestnut genes and 6% Chinese chestnut genes. This year, approximately 600 American chestnut hybrid nuts were planted in the seed orchard to replace nuts that did not survive last year's planting. Twelve students spent a total of 40 hours assisting Paul Wetzel and two members of The American Chestnut Foundation, Brian Clark and Denis Melican. Additional nuts will be planted next year as they become available from the breeding orchards in the region. The nuts that were planted will be allowed to grow for three years before they are intentionally exposed to the fungal blight. Of the 1200 total trees planted, approximately 20 are expected to show resistance and grow to maturity. The nuts from those blight-resistant trees produce will then be distributed throughout the Northeast.



Image 11: Paul with the educational sign near the snow-covered American Chestnut seed orchard.

### 4.3 Hemlock Woolly Adelgid

Research on the hemlock forest ecosystems at MacLeish Field Station continued in 2014-15, with members of the Bellemare (BIO), Rhodes (GEO), and Ignace (BIO) labs participating in field research exploring a range of ecological, biogeochemical, and ecosystem-level questions. The hemlock forests at MacLeish and in the surrounding landscape are currently under threat from two exotic insect species, the hemlock woolly adelgid and the elongate hemlock scale. Both insects were accidentally introduced from East Asia to Eastern U.S. forests during the 20th century. In their native ranges, these insects co-exist with Asian hemlock species, but the Eastern hemlock native to New England and the Eastern U.S. does not have resistance to their feeding, and large insect populations rapidly build up on the needles and small twigs of infested hemlock trees. This causes needle loss and, eventually, tree decline and death. Although relatively few trees at MacLeish have died from the invasive insects to-date, areas further south in New England and in other parts of the Eastern U.S. have seen high hemlock mortality in the last 1-2 decades.

With the decline of hemlock, the forest ecosystem is expected to change dramatically - hemlock is a slow-growing, evergreen coniferous species that creates cool, shady conditions under its canopies, while it is typically replaced by fast-growing deciduous trees, like birches, when it dies. This shift in forest composition has been linked to changes in ecosystem processes, such as how nutrients cycle through forests, and alteration of plant and animal communities in the forest understory. The ongoing research at MacLeish seeks to document how our hemlock forests are currently functioning and what biodiversity they sustain in advance of the expected loss of hemlock trees in coming years.

Student research in the lab of Jesse Bellemare, led by Elizabeth Besozzi '16, has compared forest floor animal communities between adjacent patches of hemlock and birch-dominated forest at MacLeish to explore how animal communities might change with the loss of hemlock. This work has documented higher abundances of red backed salamanders, an important "keystone species" in forest floor food chains, in the hemlock forests. In a parallel project, Michelle Jackson '15 has experimentally tested how a small-statured understory plant species linked to hemlock forests, the liverwort *Bazzania trilobata*, might fare if the forest overhead shifts to deciduous trees with more light and drier conditions on the ground. Results to date suggest that the liverwort might decline alongside hemlock, as the unique cool and low-light environmental conditions created by the evergreen canopy of hemlock appear to be necessary for the plants' survival. More broadly, Aliza Fassler '17, has led work surveying how organic material accumulates on the forest floor under hemlock versus deciduous forest canopies, with results to-date suggesting a much greater quantity of organic material and carbon stored in the forest floors of hemlock ecosystems. This indicates that the loss of hemlock from these ecosystems might trigger a release of carbon from the forests as well, as the organic material appears likely to decompose and release carbon dioxide as conditions change in the understory with loss of evergreen canopy.

New work by students in Danielle Ignace's lab in the department of biology is seeking to better document how this decomposition takes place and under what conditions, using LiCor technology to directly measure carbon dioxide release from the forest floor. Elizabeth, Michelle, and Aliza, along with a number of their student collaborators and coauthors, presented the results of their MacLeish-based work at Smith College's Celebrating Collaborations science poster session, and also brought their posters to a broader regional audience at the Northeast Natural History Conference in Springfield, MA in April.



Image 12: Hemlock branch with cones at the MacLeish Field Station.

## **5 Campus as a Model**

### **5.1 Ada and Archibald MacLeish Field Station**

The Ada and Archibald MacLeish Field Station is a 240-acre patchwork of forest and farmland located in West Whately, MA that provides opportunities for faculty and students to pursue environmental research, outdoor education, and low-impact recreation. [See 6.4 for more information on outdoor education]. The field station now includes a student-designed fruit orchard, a restoration chestnut orchard affiliated with the American Chestnut Foundation, a low-ropes challenge course, and four miles of student-designed and built trails.

More than 1,600 total visits to the field station by students, faculty, staff, and non-Smith affiliated community members were recorded in 2014-15. Twenty-four classes from Smith visited as a part of their course work, totaling close to 500 students. Among these visitors were 30 environmental professionals from Central and South America visiting UMass, a collection of eight campus sustainability folks on a conference field trip, and more than 400 people using the new challenge course. Additionally, hundreds of students have engaged in research, used the site as inspiration, participated in site-specific design, gone on guided tours, and used the recreational trails. Appendix C lists all of the courses at Smith that used the Field Station this year.

### **5.2 Campus Sustainability**

The Office of Campus Sustainability (OCS) went through a transition this past year with a change in leadership and expansion in staffing. Dano Weisbord was hired as the Director of Campus Sustainability and Space Planning and Emma Kerr was hired to fill a new Campus Sustainability Coordinator position. OCS staff spent the year strengthening the House Eco-Reps program, working with students on special studies to integrate their research into

campus operations, and building partnerships with Facilities Management and the operational side of the campus. Throughout this time, CEEDS staff continued to work with the office to develop programs and projects that link the Center with Smith's operations and to facilitate faculty and student research collaborations that further the mission of the OCS.

For example, this fall Paul Wetzel and students in the environmental concentration capstone class worked closely with Dano on their project to evaluate the quantity of Smith's organic waste and technology to manage that waste. In collaboration with the OCS, this project will continue with students in the 2015 capstone working to expand the analysis, look at potential community partners, explore different technologies, and answer questions about Smith's climate footprint.

In addition, Paul advised two sustainable food concentration students, Lily Carlisle-Reske '17 and Claire Westa '17, in a special studies that investigated the possibility of the College committing to the Real Food Challenge. The Real Food Challenge is a campaign to shift \$1 billion of existing university budgets away from industrial farms and junk food and towards local/community-based, fair, ecologically sound and humane sources- what they call "real food"- by 2020. During the fall semester, Lily and Claire worked closely with Franny Krushinsky, the new Sustainability and Culinary Manager in Dining Services, to comprehensively evaluate how much "real food" Dining Services currently uses. Their work directly supports the ongoing efforts of Smith College Dining Services to develop sustainable, local and healthy food practices, efforts that this year have been funded by a two-year grant from the Henry P. Kendall Foundation.

Eating food always involves leftover valuable organic resources. This spring, Paul advised Eleanor Adachi '17 in a special studies project to conduct a system analysis of composting in student houses. Eleanor gathered data through surveys and "trash" audits. She estimated that a composting program in the houses would divert 26-39 tons of organic matter annually from the landfill.

CEEDS has continued to lead conversations with Facilities Management regarding the efficient and effective use of College vehicles. CEEDS offsets its carbon emissions for travel each year, and this year CEEDS purchased offsets equivalent to five metric tons from Terra Pass.

## **6 Communication and Collaboration**

CEEDS is recognized as an important resource for collaboration and the place to come for information about the environment at Smith. CEEDS staff members connect students, faculty, and visitors to environmental organizations in our community and resources related to the curriculum, projects, operations and facilities at Smith. This centralization is of great value to our community and helps to reinforce Smith's commitment to the environment and sustainability.

### **6.1 CEEDS Blog and Other Media**

CEEDS has approximately 390 fans on Facebook ([www.facebook.com/pages/Smith-College-Center-for-the-Environment-CEEDS/](http://www.facebook.com/pages/Smith-College-Center-for-the-Environment-CEEDS/)) and our posts regularly reach as many as 2,000 people. We now have 184 followers on Twitter (@SmithCEEDS), and we continue to tweet about our accomplishments, our events, and related news items. Approximately 500 people regularly read our blog [CEEDS] ([smithceeds.wordpress.com](http://smithceeds.wordpress.com)), which has become an increasingly collaborative endeavor. We continue to encourage students and faculty engaged

in environmental work of all sorts, both on and off campus, to use our social media connections as a means of sharing their experiences with the larger Smith community. With the help of student interns, CEEDS manages an email ListServ [ENVIRO], which provides current students (570+), alumnae (330+), and interested faculty/staff (80+) with information about events, internships, job opportunities, graduate schools, funding and more. This year Odessa Aguirre '15 and Lily Carlisle-Reske '17 worked as CEEDS interns to support our outreach and communication efforts.

## **6.2 Supporting Students and Student Organizations**

This year, CEEDS worked with individual students and student organizations to co-host and support a variety of events. CEEDS continued to provide support and/or a meeting and event space for the Community Garden, Eco-Reps, Green Team, Divest Smith College, and Engineers for a Sustainable World.

CEEDS supported Madeleine Lifsey '15 in her special studies "Animal Agriculture and the Philosophy of Sustainability" with the philosophy department. During the fall semester, Madeleine interrogated the ways in which current environmental ethics and environmental sustainability discourse can work with and against various forms of animal agriculture.

CEEDS facilitated student participation in the Women's Clean Energy Intern Social hosted by the Massachusetts Clean Energy Center (MassCEC), a night of networking with leading women in the clean energy industry, including MassCEC's CEO, Alicia Barton. Student participants included Alison Grady '15, Nicole DeChello '15, Maya Kutz '15, Isabella Casini '17, Youngjoo Ahn '18, Hattie Schapiro '18, and Izzy Owen '18.

CEEDS supported Alexandra Davis '18 and Jessica Tran '18 in attending the Net Impact Conference in Minneapolis, MN. Alexandra and Jessica are currently exploring whether there is enough interest to launch a Smith Net Impact chapter.

CEEDS is again supporting a summer intern to work in the Smith Community Garden as Summer Manager. In addition to blogging for CEEDS, student Danielle Jacques '16 will host weed walks and work parties, work to re-configure the garden composting system, improve signage, work with Dining Services staff to provide fresh produce for the Campus Center and engaged students, faculty and staff on campus for the summer in the work of the garden.

## **6.3 Alumnae Outreach**

Throughout 2014-2015, CEEDS staff and Environmental Faculty Fellows worked closely with Environmental Science and Policy, Landscape Studies, and the Alumnae Association to share the mission and potential of environmental programs at Smith with alumnae, friends, and potential donors.

Specific events for 2014-15 include:

January 2015 Dinner, breakfast, and conversations with Marcia MacHarg '70.

March 2015, "Iceland's Volcanoes: A Hotspot of Volcanic Activity", presentation by Amy Rhodes during a Smith Alumnae trip to Iceland.

May 2015, "Water, Food, and Climate – Leadership for a Sustainable World," presentation by Andrew Guswa during Reunion weekends (1<sup>st</sup> and 2<sup>nd</sup>).

May 2015, Walking tour of the historic Mill River, led by Andrew Guswa during 2<sup>nd</sup> Reunion weekend.

May 2015, Andrew Guswa was the dinner speaker for the Class of 1970 reunion.



Image 13: Alumna on campus for reunion fill CEEDS to learn more about issues of water, food and climate from director Andrew Guswa.

#### **6.4 Spatial Analysis Lab**

The Spatial Analysis Lab is a campus-wide resource that supports the use of geographic information systems (GIS) and various forms of spatial analysis in research and courses. As nearly all environmental issues involve a geographic component, the resources of the SAL are integral to the work of CEEDS. The SAL curates and disseminates GIS data and teaches GPS and GIS skills to Smith faculty, staff, and students. For example, students have used Trimble GPS units to map data on the American chestnut and fruit tree groves at MacLeish, to map the movement of local invasive plant species, and to continue work on ongoing projects along the Mill River. Availability of Geospatial Positioning Systems (GPS) and the support and expertise that the SAL provides for collecting and managing data remains invaluable to the work of CEEDS and its community partners.

In 2014-15, CEEDS financially supported the post-baccalaureate position in the SAL. This staff position benefits faculty and students across the divisions, and, in addition to class and research support, allows the SAL to offer workshops and timely opportunities for the Smith community to engage with real-world issues, like the Ebola crisis in Africa or the earthquake in Nepal.

#### **6.5 Outdoor Education**

High 5 Adventure completed construction of Smith's low-ropes challenge course in late July of 2014. Two weeks later, thirteen Smith faculty and staff participated in a workshop led by High 5 Adventure Learning Center staff to learn to be facilitators on the challenge course.

Within only a few weeks of that training, more than 200 students (primarily Residence Life staff) experienced the challenge course first hand, and they were quickly followed by the Student Government Association, house councils, several athletic teams, the Outdoor Adventure Programs, and other classes. Seventy students participated in activities on the challenge course on Mountain Day alone.



Image 14: Students from Emerson House work together on the Around-the-World element.

Additional students and staff have just completed another round of facilitator training on the challenge course and look forward to providing opportunities for even more students to benefit from the leadership development, team bonding, and general fun that the course can provide. CEEDS anticipates increased use by Summer Programs at Smith as well as the incorporation of the challenge course into orientation and leadership programs offered by the Outdoor Adventure Program.

## 6.6 Five-College Collaboration

With a two-year grant from the Mellon Foundation, administered through Five Colleges, Inc., CEEDS collaborated with environmental programs from Amherst, Hampshire, Mount Holyoke and the University of Massachusetts to award faculty grants in support of bridging the liberal arts and professional programs in environmental fields. Projects ranged from co-teaching of courses to embedding professional master's students in classes at the liberal arts colleges. In 2014-15, the grant supported four collaborations.

Robert Ryan, Professor in the Department of Landscape Architecture and Regional Planning at UMass partnered with Michele Wick, lecturer in the Psychology Department at Smith College, on a course on green infrastructure. Twenty-one undergraduates and three graduate

students drew on literature and research from the behavioral sciences to inform their designs for a sustainable campus.

Graduate student Suzanne Cox joined Professor Kate Ballantine to teach Restoration Ecology at Mount Holyoke. Suzanne's experience with large-scale construction projects (contractors, permits, inspectors) contributed an application-oriented perspective to the course.

Profs. Christine Hatch (UMass) and Kate Ballantine (Mount Holyoke) brought together their classes on Ecohydrology and Wetlands Ecology and Management, respectively, to connect undergraduate and professional students in similar fields. Interactions throughout the semester culminated in a joint weekend fieldtrip to Tidmarsh Living Observatory, a cranberry bog restoration project near Plymouth, MA. Students carried out ecosystem assessments of the site and shared ideas, stories, and experiences.

Prof. Dan Gardner at Smith College collaborated with Kate Bentsen, a graduate student from UMass, on his course, Environment and Society in Contemporary China. Bentsen helped revise the syllabus to include pertinent, effective readings. The course focused on China's environmental challenges in the context of the rapid social, economic, and political changes of the past 30 years. Bentsen brought a detailed understanding of the science behind many of the country's environmental developments which helped students better understand the environmental issues China faces today.

## **6.7 Research at the Field Station**

Smith College researchers continue to study the long-term potential impact of the decline in health of the Eastern hemlock forest at the field station. Amy Rhodes and her lab have on-going geoscience research studies monitoring groundwater chemistry differences and changes over time within different plots with specific vegetative diversity. Jesse Bellemare and his lab are using dendrochronology (tree-core dating) to help piece together the connections between landscape/land use change and the cultural history of the site. Meg Thacher and James Lowenthal from the astronomy department use the site regularly with their classes and have begun to record the brightness/darkness of the night sky for long-term monitoring. Paul Wetzel from CEEDS is working with The American Chestnut Foundation in their Restoration Chestnut Seed Orchard and on a study of blight-resistant chestnuts naturalized in 15 canopy-gap plots dispersed throughout the forest at MacLeish.

Researchers from the UMass department of geosciences also continue to monitor two United States Geological Survey (USGS) wells and maintain several different research projects connected to the wells. David Bout and his doctoral student, Amy Hudson, assist Steve Mabee, State Geologist and Director of the Massachusetts Geological Survey, in recording temperature, water level, and specific ion and isotope concentrations in both wells as part of a long-term regional climate change study.

In addition to these on-going projects, new research is on the horizon. Adam Rosenblatt, a Postdoctoral Associate at Yale University's Climate and Energy Institute, will soon be installing cages around some of our site's goldenrod as part of a regional experiment that he is conducting. Evan Grant, from the U.S. Geological Survey, Patuxent Wildlife Research Center, S. O. Conte Anadromous Fish Laboratory, in Turners Falls, MA, is also about to begin a study of the effects of freezing soil on salamander populations at the MacLeish Field Station.

## Appendix A

### ENV 100 Speakers and LSS 100 Speakers

#### ENV 100

<b>September 8</b>	<b>Dano Weisbord</b> , Director of Sustainability & Space Planning, Smith College, Northampton, MA <i>Introduction to class; Sustainable development from campus to the globe: Oh, it's ducks</i>
<b>September 15</b>	<b>Nate Frigard and Jen Smith</b> , Farmers, Crimson & Clover Farm, Florence, MA <i>Tour of Farm. Rain or shine, wear appropriate clothing</i>
<b>September 22</b>	<b>Lynne Pledger</b> , Waste Policy Consultant, Hardwick, MA <i>Trashing the climate: Waste policy solutions</i>
<b>September 29</b>	<b>Andy Pressman</b> , Agricultural Specialist, National Center for Appropriate Technology, Jaffrey, NH <i>Why Local Food Matters</i>
<b>October 6</b>	<b>Andrew Fisk</b> , Executive Director, Connecticut River Watershed Council, Greenfield, MA <i>Hydropower, Climate Change, and the Public Interest – what's the deal?</i>
<b>October 13</b>	Fall Break
<b>October 20</b>	<b>Jonah Keane</b> , Director, Mass Audubon Connecticut River Valley Sanctuaries, Easthampton, MA <i>Mass Audubon: Conservation, education, and advocacy in the Pioneer Valley</i>
<b>October 27</b>	<b>Robert DeConto</b> , Professor of Geosciences, University of Massachusetts, Amherst, MA <i>Probing Climate Change in the Arctic</i>
<b>November 3</b>	<b>Rouwenna Lamm</b> ,* National Program Director, Alliance for Climate Education, Somerville, MA <i>A New Generation of Leaders: High school students in the climate movement</i>
<b>November 10</b>	<b>Paul Wetzel</b> , Environmental Research Coordinator, CEEDS, Smith College, Northampton, MA <i>Wading Birds, Sugar, and Climate Change, Oh My! Will the Everglades be restored?</i>
<b>November 17</b>	<b>Ted Ames</b> , Visiting Research Scientist, Bowdoin, Stonington, ME <i>Insights into the cod debacle in the Gulf of Maine</i>

<b>November 24</b>	<b>Barbara Finamore</b> , Senior Attorney & Asia Director, China Program, National Resources Defense Council, New York, NY <i>NRDC Environmental Policy Development in China: the role of an NGO</i>
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\*Smith alumna

## LSS 100

<b>January 26</b>	<b>Reid Bertone-Johnson</b> , Landscape Studies; MacLeish Field Station Manager, Smith College, Northampton, MA <i>New Perspectives and Dynamic Landscapes</i>
<b>February 16</b>	<b>Brian Donahue</b> , American Environmental Studies, Brandeis University, Waltham, MA <i>Mending Wall: Wildlands, Woodlands, Farmlands and a Vision for New England Conservation</i>
<b>February 23</b>	<b>Peter Del Tredici</b> , Harvard Graduate School of Design, Cambridge, MA <i>Immigrant Ecology</i>
<b>March 2</b>	<b>Leigh Graham</b> , Urban Studies and Planning, John Jay College of Criminal Justice, CUNY <i>To play or protect? Competing meanings of Rockaway Beach after Superstorm Sandy</i>
<b>March 9</b>	<b>James Wescoat</b> , Department of Architecture, M.I.T, Cambridge, MA <i>Rurban and Peri-Urban Water Planning in India: A Landscape Approach</i>
<b>March 23</b>	<b>Jack Ahern</b> , Landscape Architecture, UMass-Amherst <i>Cultivating Novel Urban Ecosystems to Build Resilience Capacity</i>
<b>March 30</b>	<b>Mark Hamin</b> , Director, Master of Regional Planning Program, Outreach Coordinator, Landscape Architecture and Regional Planning, UMass-Amherst <i>Erotechnics and Civilization: Theories and Practices Concerning Social Relationships among the Sexes in mid-20<sup>th</sup> Century Urban Landscapes</i>
<b>April 6</b>	<b>Jesse Bellemare</b> , Biological Sciences, Smith College <i>A Natural and Cultural History of the MacLeish Field Station</i>
<b>April 13</b>	<b>Gabriel Arboleda</b> , Environmental Design, Hampshire and Amherst Colleges <i>Beyond Participation: Indigenous Peoples and Housing Agency in Guyana</i>
<b>April 20</b>	<b>Steven Moga</b> , Landscape Studies Program, Smith College, Northampton, MA <i>Down in the Bottoms: Lowland Names and Landscape Change in the Nineteenth Century American City</i>
<b>April 27</b>	<b>Carolina Aragon</b> , Visiting Lecturer, Smith College Landscape Studies Program; Visiting Lecturer, UMass-Amherst, Landscape Architecture and Regional Planning Program <i>Sparking our Imagination</i>

\*Smith alumna

## **Appendix B**

### **Curricular Enhancement Grants: Awardees and Projects to-date**

#### **2015-2016 Curricular Enhancement Grants: Awardees and Projects**

**Andrew Guswa (EGR): EGR 100**

Adapt the curriculum and materials in EGR 100: Engineering for Everyone to center on water. Develop a course in which students can engage in critical analysis of historical and contemporary water issues and infrastructure in California and western Massachusetts in order to gain an understanding of the technical, environmental, economic, political, legal, and cultural influences and constraints on engineering works.

**Reyes Lázaro (SPP), Denise McKahn (EGR), and Cristina Suárez (CHM): CHM 346, EGR 388, EGR 390 and CLT 204/SPN 356**

Develop curriculum and materials for their respective courses that will provide a framework for formal dialogue in which chemists and engineers can engage literary scholars on the impact of technology on the environment and society and vice versa.

**Jack Loveless (GEO): GEO/ENV 150**

Transition the application topics in the course to have a geoscience, environmental science, and/or policy focus with a real-world application. Change the structure of the final project to emphasize the practical nature of GIS and spatial analysis in a service learning setting with a local partner.

**Malcolm McNee (SPP): POR 220**

Modify the course by developing two multi-modal components- on drought conditions and the water crisis in São Paulo and infrastructure development in Rio de Janeiro in preparation for its hosting of the 2016 Olympic Games- that would then be explored through a number of themes.

#### **2014-2015 Curricular Enhancement Grants: Awardees and Projects**

**Michael J.F. Barresi (BIO) and Amy L. Rhodes (GEO): BIO 159Y and GEO 301**

Cooperatively develop curriculum and materials for BIO 159Y-From Environment to Embryo: An Interdisciplinary Research Course and GEO 301- Aqueous geochemistry that are designed to investigate the potential environmental impacts of hydraulic fracturing (fracking) of the Marcellus Shale for natural gas extraction, an environmental research question that has high relevance to the scientific community and society.

**Judith Keyler-Mayer (GER): GER 250: The Environmental Culture of Germany**

Redesign GER 250 – Advanced Intermediate German into GER 250 – The Environmental Culture of Germany in order to foreground Germany’s deep-rooted engagement with environmental issues. Develop student understanding of German environmental discourse by examining and discussing literary and journalistic texts in German, while also developing a basis for comparative studies through trips to the MacLeish Field Station.

**(Chris) Jan Vriezen (BIO) and Chris White-Ziegler (BIO): BIO 205**

Modify BIO 205 – Microbiology lab curriculum and materials. Instead of teaching a testable environmental microbiological hypothesis using a standard set of lab-strains, use “real unknown” isolates from soils obtained by students at a variety of MacLeish Field Station sites, which will allow for the study of different biotopes and comparison of bacteriocin producing bacteria.

### **2013-14 Curricular Enhancement Grants: Awardees and Projects**

**Jesse Bellemare (BIO): BIO 115: Biodiversity, Ecology, and Conservation Lab**

Develop a formal manual that will 1) increase focus on applied conservation issues with an eye towards integrating science and policy 2) make extensive use of the MacLeish Field Station and the Bechtel classroom, and 3) enhance the emphasis on original, student-led research.

**Naila Moreira (ENG): ENG 118: Water: Science and Politics**

Develop a unit on sustainable water infrastructure to enhance science writing by introducing experiential information through physical interaction and observation. Encourage a project-based learning approach through engaging with the environment within a unit on flooding.

**Paulette Peckol (BIO): BIO 268/269: Marine Ecology and Lab**

Modify the course to include a unit that engages students in thinking about complex fisheries considerations through direct experience with different types of mariculture facilities in Maine. Develop internship partnership with the facilities to enable Smith students to continue to learn about environmentally sound, sustainable practices of small-scale, open and closed mariculture facilities.

**Gregory White (GOV): GOV 242: International Political Economy**

Significantly modify the course to incorporate environmental issues and analysis directly and systematically with a focus on five issue areas: development, oil, food, consumption, and climate change.

### **2012-13 Curricular Enhancement Grants: Awardees and Projects**

**Carole Learned-Miller (EDC): EDC 345: Elementary Science & Math Teaching Methods**

Develop curriculum to teach students science and math through outdoor experiments and projects. Encourage a project-based learning approach through engaging with the environment.

**L. David Smith (BIO) & Katherine Schneider (ART): BIO 261 Invertebrate Diversity**

Laboratory, ARS 163 Drawing I, ARS 362 Painting II

Create an interdisciplinary study of invertebrates by bringing students and faculty together to share their perspectives and knowledge. Collaborate to paint and develop informational signage to place near the Burton lobby aquarium.

**Annaliese Beery (PSY): NSC 315: Neuroendocrinology Laboratory, PSY192: Research Methods in Psychology**

Bring students to the MacLeish field station to study and sample animal behavior. Engage students in thinking about how environment and life-history affect hormones.

**Justin Cammy (JUD):** JUD 125/REL 225: Jewish Civilization: Topic: Environmentalism  
Teach a course on Judaism and environmentalism which explores environmental ideas, imperatives, and philosophical problems posed by the Torah, Talmud, medieval philosophers and mystics connecting these problems to present day.

**Justin Cammy (JUD):** GES 103: Global Engagement Seminar: Jerusalem  
Bring students in Jerusalem to connect with Professor Laster, who will give a tour through areas from urban centers through desert wilderness and across political boundaries of conflict, studying water.

### **2011-12 Curricular Enhancement Grants: Awardees and Projects**

**James Middlebrook (ART):** ARS 386: Topics in Architecture  
Develop interpretive signage about sustainable systems to be used at MacLeish Field Station and the Bechtel Environmental Classroom. Organize a field trip, open to all Smith faculty and students, to a certified "Living Building."

**Michelle Joffroy (SPP):** SPN 372: Women, Environmental Justice and Social Action  
Connect students to community-based projects in Worcester, Holyoke, and Boston where they will utilize case studies from on-going gender-based, environmental justice campaigns.

**Reid Bertone-Johnson (LSS/CEEDS):** LSS 250: Landscape and Narrative  
Design projects in Ward 3 building on the previously conducted Rapid Ethnographic Assessment Procedure (REAP). Develop interpretative signs for the Bechtel Environmental Classroom.

**Sara Pruss (GEO):** GEO 108: Oceanography Discussion sections/Lab  
Develop curriculum and materials related to the earthquake and Tsunami in Japan. Organize an oceanographic cruise class trip which is open to all Smith faculty and students.

### **2010-11 Curricular Enhancement Grants: Awardees and Projects**

**Jesse Bellemare (BIO) and Katherine Halvorsen (MTH):** BIO 364/365: Plant Ecology and Lab, MTH 245: Practice of Statistics  
Reciprocal learning: connecting real life ecology-based research design and analysis for biology and statistics students.

**Daniel Gardner (HST/EAS):** EAS 220: Environment and Society in Contemporary China  
Develop a course that will enable students to view the society, politics, and economy of today's China through the lens of environmental concerns.

**Virginia Hayssen (BIO) and Jon Caris (ENV):** BIO 272/273: Vertebrate Biology and Lab, BIO 362/363: Animal Behavior: Methods  
Ecological literacy and GIS: mapping the vertebrate ecology of the MacLeish Field Station.

**Virginia Hayssen** (BIO) and **James Middlebrook** (ARH): ARS 283 Introduction to Architecture: Site and Space, BIO 272/273: Vertebrate Biology and Lab  
Collaborative project between a vertebrate biology class and an architecture studio designing and constructing viable birdhouse houses for MacLeish Field Station.

**Reid Bertone-Johnson** (LSS): LSS 250/255/389: All Landscape Studies studios  
Engage students in a community participation design/planning scenario in Northampton.

**Denise McKahn** (EGR): EGR 388: Photovoltaic and Fuel Cell System Design  
Engage students in designing a photovoltaic system for the MacLeish Field Station.

**Paul Newlin** (PPL): PPL 222: US Environmental History & Policy  
Enhance understanding of the power structure at play in environmental case studies through the use of power maps.

**Paulette Peckol** (BIO): BIO 268/269: Marine Ecology and Lab  
Foster educational skills and marine environmental literacy through project collaboration with an Easthampton High School class.

**Candice Salyers** (DAN): DAN 252: Intermediate Dance Composition  
Incorporate interdisciplinary perspectives on the meaning of 'ecology' and the space, design, movement, and living components of MacLeish Field Station into a substantial site-specific performance project.

## **Appendix C**

### **Smith courses that visited the field station in 2014-15**

ARS 173: Cross-disciplinary Foundations  
ARS 390: FC Advanced Seminar - Art & Social Practice  
ARS 400: Special Studies in Studio Art  
AST 100: A survey of the Universe  
AST 102: Sky & Time  
AST 103: Sky & Telescopes  
AST 111: Introduction to Astronomy  
AST 113: Telescopes and Techniques  
AST 224: FC24 Stellar Astronomy  
BIO 154/155: Conservation Biology  
BIO 205: Micro Biology  
BIO 364: Plant Ecology  
DAN 216: Contemporary IV/Improvisation  
DAN 553: Choreography by Design  
EGR 110: Fundamental Engineering Principles  
ENG 118: Water, Science & Politics  
ENG 118: Writing about Place & Travel  
ENV 201/202: Collecting and Analyzing Information  
ESS 940: Outdoor Sampler  
ESS 940: Wilderness Skills

FYS 133: Reading the Landscape

Interterm:

LSS 110J: Interpreting the New England Landscape

503: Writing Words, Building Stories

701: Animal Tracking