Outward -Facing Course Activities and Projects in the Department of Environmental Science and Sustainability

A Report Submitted to the President and Provost of Allegheny College

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Executive Summary

- The ESS Department has conducted an average of six outward-facing, course-community collaborative projects annually during the period 2007-2024
- 83% of current ESS faculty have conducted outward-facing, course-community collaborative projects
- Twelve different courses taught by ESS faculty have included outward-facing, course-community collaborative projects
- ESS projects have included 28 community collaborators from businesses, non-profit organizations, state/local/federal agencies, and an additional 8 offices on the Allegheny campus
- Projects have resulted in 68 presentations, 43 reports, and 29 professional presentations or publications, averaging 4.0, 2.5, and 1.7 presentations, reports, and professional outputs, respectively, each year
- 46% of all ESS Senior Projects were outward-facing or developed outcomes that were directly relevant to environmental partners
- ESS faculty are involved in community organizations in various partnership and leadership roles, and those collaborations have enabled additional student-community engagement
- Community-facing projects and outcomes show students the links between classroom learning and environmental problem-solving, and provide tangible resume-building and career-enhancing opportunities
- ESS will continue to collaborate with Allegheny and the community in outward-facing projects that enhance student learning and provide tangible benefits to community partners
- ESS welcomes suggestions and guidance from the offices of the President, Provost, Economic, Civic and Community Engagement Office, the Allegheny College Community Impact Hub, Marketing and Communications, relevant members of the Strategic Pathways Teams, and all others on ways in which ESS can engage more and in greater depth in meaningful and appropriate outwardly-facing course-community collaborations

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Background

In Fall, 2023, President Ron Cole and Associate Provost Jen Dearden visited the Department of Environmental Science and Sustainability (ESS) to share ideas and seek input regarding the College Strategic Pathways Initiative. President Cole voiced his support for ESS, commended the department for its numerous accomplishments, and offered suggestions for continued success of the department. One of President Cole's recommendations for the department was that it be outward-facing in its courses, interacting with community partners in a manner that links classroom learning with real-life partnerships and issues. He suggested that there are numerous organizations, businesses, and environmental consultants with which ESS courses could partner to enhance learning by students and to increase college-community partnerships. This suggestion led to an engaging dialogue whereby department members shared partnerships that have been occurring in classes, and some discussion of advantages and limitations of additional collaborations. In light of this discussion and charge to the department, ESS undertook an effort to gather information on current and previous college-community partnerships within ESS courses to assess the vibrancy and momentum of these efforts. Furthermore, upon learning that the department was undertaking this effort, (then) Associate Provost Jennifer Dearden requested that this information be shared with her office as well as with those charged with enhancing outward-facing efforts by the college.

Methods

We collected data for the period from 2007-2024. The beginning date seems somewhat arbitrary, however it was a date where ESS faculty members could most accurately recall and assign collaborations between a community partner and ESS courses. As a department, ESS has not been systematically collecting these data prior to this year. Each faculty member sifted through their own individual records of courses and projects and added those data to a common database. Information collected included course names and numbers, projects, community partners, and course deliverables, including presentations, data-sharing, reports, and professional outcomes (conference presentations, publications). We point out that we included courses taught by ESS faculty members, even if those courses are not strictly departmental courses. Hence, we included information from FS101, FS201, and ENERG485. We have not included independent or group study courses (ESS590) or internships because the content of those courses is driven more by student interest and need than by faculty-initiated design. For senior theses, we do not include the courses

themselves (ES600/610) in the identification of courses with outward-facing projects because students, not faculty members, choose the topics. However, for theses, we did determine the proportion of projects that dealt directly with a community partner or worked on an issue relevant to a community partner. Note that for theses, the study period ends at 2021, the most recent year for which thesis data are available on the ESS website. Community partners include relevant entities on campus (e.g. Office of Sustainability) as well as governmental, non-profit, and corporate entities, agencies, and organizations.

By the Numbers

Over the 17-year period of observation, we identified 101 course-based projects (Table 1, Appendix 1), or nearly six per year. Most projects were conducted in collaboration with community-based partners. We also note that course-based projects have been increasing over the observation period (Figure 1), increasing from an average of 3.4 projects per year in the first five years, to 7.4 projects per year, an increase of 118% in the most recent five years. There is interannual variability in the number of projects each year, driven by faculty interests, project availability, and course offerings.

We think it likely that we are underestimating total participation in outward-facing collaborations; we are not sure if our memories and records have captured all the projects that we have undertaken. Importantly, we are well aware that numerous independent study courses (ES590) have involved meaningful community partnerships. For example, students in ES590 courses have conducted energy audits for community partners and developed geographic information databases for a local forest preservation organization.

Table 1. Total ESS course-based projects with Allegheny College and community partners.

	Number	%
Total course-based projects (2007-2024)	101	100
Course-based projects per year	5.9	NA
Course-based projects with AC partners	23	23
Course-based projects with community partners	78	77

Faculty Participation

Participation in community-based projects has received strong buy-in from faculty members, with 10 of the 12 faculty members in the department having been involved in at least one project. Of the two faculty members who have not yet been involved in outward-facing collaborations, one is a non-tenure track professor who has recently become an ESS faculty member with cancellation of the Geology Department, and the other was recently transferred to ESS upon cancellation of the Philosophy and Religious Studies Department.

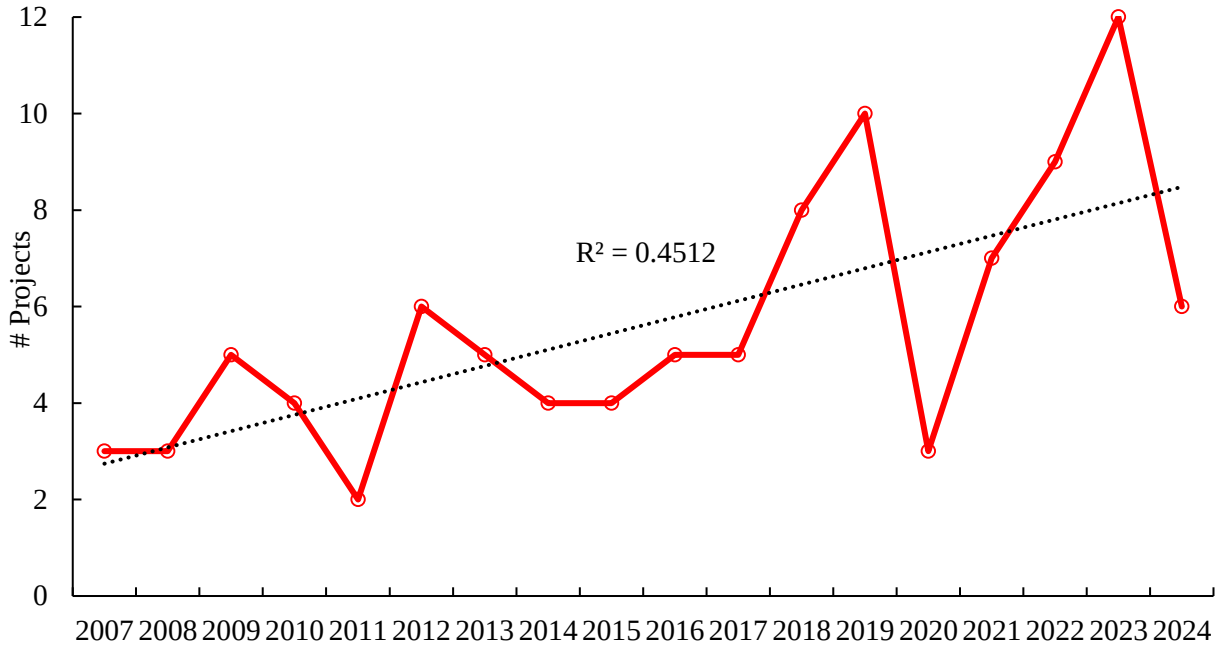

Figure 1. Number of yearly course-based outward-facing projects in the Allegheny College ESS Department, 2007-2024.

Collaborators

Over the study period, ESS has engaged with a variety of partners, including governmental, non-profit, and business sectors (Table 2, 3). In addition, nearly a quarter of projects have collectively included nine different offices within Allegheny College. Partnerships have been primarily with entities operating in the local or regional area, where faculty members have developed working relationships with organization representatives and leadership. Engagement with national organizations is less common. ESS has long had a productive relationship with the US Fish and Wildlife Service, based at the Erie National Wildlife Refuge in Guys Mills, PA. Though a US federal agency, the partnership is at the local level, with a solid rapport between the department and the local director and staff biologist. Similarly, ESS has enjoyed a partnership with the National Wildlife Federation (NWF) as two ESS courses developed information that ultimately lead to the college being recognized as a NWF Certified Campus Wildlife Habitat. Notably, Allegheny's campus habitat report was recognized by NWF as a model for other campuses to follow, and is featured on the NWF website (https://www.nwf.org/EcoLeaders/Get-Involved/Protect-Wildlife- on-Campus). Although the NWF project, and another project that used Arbor Day Foundation campus tree guidelines to help Allegheny gain recognition as an Arbor Day Foundation Tree Campus were successful interactions with national organizations, we have found that logistics, communications, and direct interaction with students are easiest when the partners are local and the projects are visible, tangible, and proximal to students.

Courses

Twelve different courses have included outward-facing community engagement (Table 4) since 2007. Of the ESS courses, Environmental Research Methods (ES210) and Environmental Junior Seminar (ES585) have been the most common venues for projects. This makes sense, given that these two courses have

explicit, hands-on approaches, with ES210 focusing on ways in which research questions are identified and answered, and ES585 focusing on sustainability projects on campus or in the community. When taught by ESS faculty, even FS101, which is a college-level course, has included projects as a means to teach the communications skills that are the foci of the course.

Table 2. Categories of community partners engaged in ESS outward-facing course projects.

Community Partners	Number	% of Total
Business	6	16
Non-profit	12	32
Local Govt, State Agency	9	24
Federal Agency	1	3
Allegheny College Offices	8	24
Total	37	100

Senior Theses

Even though we did not include ES600/610 in the count of courses that are outward-facing because students choose their own projects, it is clear that many students choose theses that either interface directly with community partners or embark on environmental projects where the findings have relevance to environmental partners or local environmental concerns. Of the 616 senior projects (2007-2021), 282, or 46%, either partnered directly with environmental organizations, or produced outcomes that would be directly relevant to organizations.

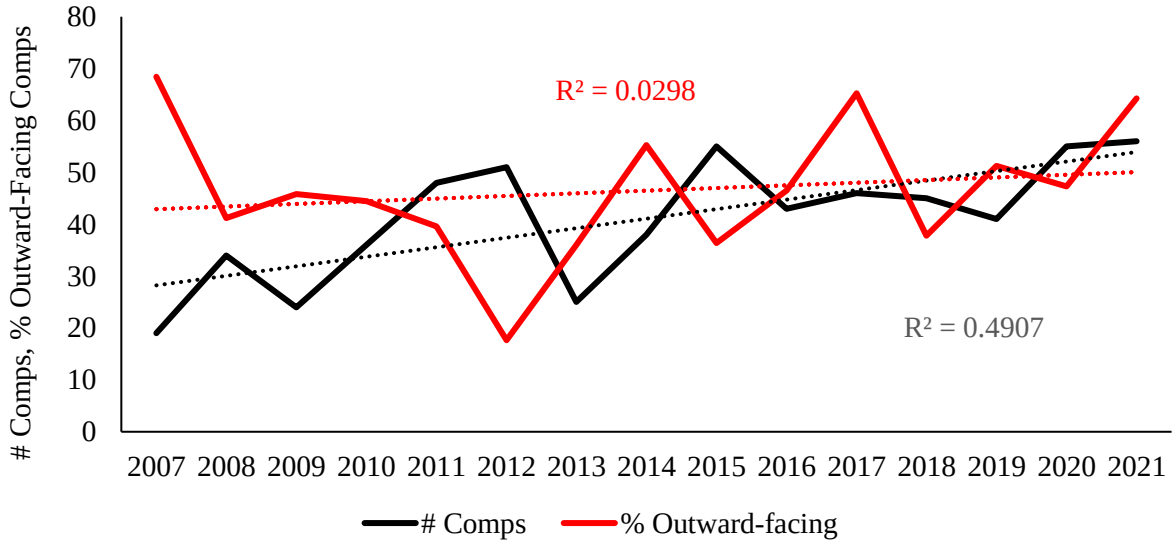

Figure 2. Senior theses and percentage of theses that are outward-facing (2007-2021).

Table 3. Allegheny College offices and community partners who have collaborated in outward-facing ESS courses.

Partners				
Allegheny College	**Business**	**Non-profit**	**State/local agency**	**Federal Agency**
Watershed Conservation Research Center	Ernst Seeds	French Creek Valley Conservancy	PA Fish and Boat Commission	Erie National Wildlife Refuge; US Fish and Wildlife Service
Office of Sustainability	Vorisek Backyard Bee Farm	Foundation for Sustainable Forests	PA Game Commission	
ESS Department	Conservation Compost	Meadville Medical Center	Crawford County Conservation District	
Physical Plant	Moorhead/Mazza Vineyards	National Wildlife Federation	PA Conservation and Natural Resources	
Community-Engaged Learning Network	Tunisia Tour Guides	Northwest PA Beekeepers Association	PA Department of Transportation	
Office of the President	Meadville Business Communities	Women's Services, Inc.	Crawford County Convention and Visitors Bureau	
Office of Admissions		Crawford Community Heritage Foundation	PA Department of Environmental Protection	
Development Office		Seton Catholic School	PA Senator	
		Unitarian Universalist Church	City of Meadville	
		Meadville Area Recreation Complex		
		Common Roots		
		Reynolds Middle/High School		

Community-facing senior theses are not a new phenomenon in ESS. The number of ESS theses have grown annually as the department has grown, and the proportion of senior projects that are outward-facing varies annually, ranging from 18-68% over the time period. However, there is no recent time trend over the analysis period (r^2=0.03), with consistently strong choice by students for community-engaged, outward-facing senior projects.

Outward-facing projects have involved a range of community partners, from Allegheny College, to local, state, and federal organizations (Table 2, 3, 5). We point out that of those senior projects that we did not categorize as being directly connected to partnering organizations, nearly all address pressing environmental issues, including, but not limited to water use, acidic deposition, climate change, agriculture, environmental education, resource consumption, and forest resources.

Course Outcomes

Project outcomes shared with partners have taken a variety of forms (Table 6), with 68 presentations and 43 reports provided to community partners. On average, there are 4.0 class presentations per year and 2.5 reports per year. When appropriate, many classes have delivered their findings to partners in class presentations, some of which have been given only to the community partners, and others that have been open to the entire department, as well as other appropriate invitees. In some cases, data has been provided to the community partner (e.g. river otter data to the Erie National Wildlife), and some classes have included both presentations and written reports to community partners. A number of projects have been prepared as departmental publications that are publicly available on the ESS website (https://sites.allegheny.edu/environmental-science-sustainability/newsletters/). Project results have also been reported in professional venues, including conference presentations and peer-reviewed publications or outcomes (e.g. World Symposium on Sustainability and Higher Education). In some cases, projects were hands-on activities that did not necessarily include a final report or presentation. For example, in FS101, students assisted a local beekeeper at an apiary and partnered with a social service agency to provide baked goods.

Table 4. Courses taught by ESS faculty members that have included outward-facing community engagement.

Course Number	Course Name
FS101	First-year Seminar
FSES201	Second-year Seminar
ES210	Environmental Research Methods
ES305	Environmental GIS I
ES306	Environmental GIS II
ES332	Forest Ecology and Management
ES385	Intro to Sustainable Energy
ES355	Field Ecology and Conservation
ES395	Applied Conservation Biology
ES490	Solar Installation
ES585	ES Junior Seminar
ENERG485	Applied Energy Analysis

Table 5. Examples of ESS senior thesis projects that have engaged directly with community partners or have engaged in projects developing outcomes relevant to community partners.

Year	Author	Partner or Relevant Organization	Thesis Title
2007	Surface, Margaret E.	Allegheny College	Solar at Allegheny: Model for the Future
2008	Carey, Paula	Penns Woods Project	Evaluation of Action-Learning Forest Science Modules by High School Students
2009	Walker, Jeremy	FCVC	Comparative Analysis of Abiotic and Biotic Variables of Brook Trout Candidate Streams in Woodcock Creek Watershed
2010	Conroy, Abby	Allegheny College	Solving the Problem of Student Energy Consumption: An Energy Competition for Allegheny College
2011	Johnson, Carlyn	Allegheny College	Allegheny College Clean Energy Education Initiative
2012	Wyckoff, Samuel	HAS Hospital	Powering a Reverence for Life: A Feasibility Study for a Solar-PV Hybrid Energy System at Hospital Albert Schweitzer, Haiti
2013	Anderson, Brian	Allegheny College	Allegheny College Students in the Context of Community Development
2014	Burkhart, Mark	PFBC	Are There Opportunities to Reintroduce Brook Trout at the Edge of Their Original Range in Northwestern Pennsylvania?
2015	Burgert, Katherine	Allegheny College (Aquaponics Project)	Supplemental Duckweed in the Diet of Blue Tilapia (Oreochromis aureus), and the Potential for Implementation at Allegheny College
2016	Flannery, Naisy	Mt Hope Golf Course	GIS in Support of Environmental Sustainability and Economic Development at Mt. Hope Golf Course
2017	Gould, Bennett	Allegheny College	Feasibility Study for a WVO Radiant Heat System in Allegheny's Greenhouse
2018	Locy, Kristen	Allegheny College	Socially Beneficial Carbon Offsets for Allegheny College to Achieve Carbon Neutrality
2019	Theberge, Paige	MARC	Saving Energy With LED Lights at the Meadville Area Recreation Complex
2020	Wilson, Zachary	PADCNR	Accessing what Recreational Activities Attract the Most Visitors to Moraine State Park
2021	Gates, Taylor	ENWR	Suitability Analysis of River Otters (Lontra canadensis) in Northwestern Pennsylvania and Conservation Efforts

Table 6. Class presentations, reports, and professional outputs from outward-facing ESS course projects.

Outcome		**Number**
Presentations	**Total**	**68**
	To campus partners	13
	To community partners	54
	To both	1
	Ave/yr	4.0
Reports	**Total**	**43**
	To campus partners	8
	To community partners	34
	To both	1
	Ave/yr	2.5
Professional presentations or publications		**29**

Additional Outward-Facing ESS Efforts

In addition to courses and senior thesis projects, ESS engages in numerous ways with community partners. This list below is indicative, but not exhaustive, of these partnerships and contributions.

Creek Connections (CC)

Creek Connections has been an outward-facing outreach program since 1995 working with 40 schools throughout western Pennsylvania annually. Creek Connections reaches 3,000-6,000 middle and high school students annually directly and even more indirectly when they share what they learn with other grades and their communities. CC employs 8-12 Allegheny students yearly through work-study and hosts 1-6 semester interns for credit each semester.

Watershed Conservation Research Center (WCRC)

The WCRC has worked directly with 30 individual Allegheny College students on a range of projects via work study, summer study, and independent study opportunities. In this vein, the work done through the WCRC has been instrumental in teaching students crucial biology and ecology-related research skills, creating opportunities for individual student research in the form of senior comprehensive projects, allowing students the opportunity to present findings at local, regional, and statewide conferences (25 presentations), and incorporating WCRC work into eight different courses at Allegheny College. Additionally, the WCRC has already worked with 13 community partners to date, including the FCVC, the Pennsylvania Fish and Boat Commission, The Erie National Wildlife Refuge, and Penn State University. Each of these partners has collaborated on at least one WCRC project, including notable stream restoration projects and projects related to invasive aquatic species in the French Creek watershed.

Faculty Efforts with Community Partners

In addition to a host of professional affiliations, ESS faculty and staff members have been involved in numerous regional and local organizations and boards. For example, Terry Bensel was instrumental in founding the Foundation for Sustainable Forests and the Northwest PA Woodland Association; Richard Bowden now serves as a board member for both organizations. Bowden was a long-time director of the Pennsylvania Environmental Resource Consortium and has served on its board since its founding in 2000. Adrienne Krone is Secretary of the Meadville Market Authority, and Matt Bethurem was one of the lead authors of Meadville's Climate Action Plan, one of the few in the state. As founding Director of the former Center for Economic and Environmental Development, Eric Pallant facilitated numerous connections between faculty members and local and regional organizations, including, but not limited to the Crawford County Convention and Visitors Center, the Meadville Chamber of Commerce, the Meadville and Crawford County Redevelopment Agencies, Ernst Seeds, Acutec Precision Aerospace, Firth Maple Products, the PA Bureau of Forestry, and the Meadville Market House. As Co-Directors of WCRC, Kelly Pearce and Casey Bradshaw-Wilson are closely engaged with community partners, as described above. Bradshaw-Wilson has long been a board member of the Research Science Consortium at the Tom Ridge Center, and Pearce currently serves as the Treasurer. Chris Shaffer has engaged in numerous collaborations with partners, including the City of Meadville, the Foundation for Sustainable Forests and FCVC. Ian Carbone has been active in Common Roots. Wendy Kedzierski has long been active in the FCVC, currently serving as its president. Most of those faculty affiliations and involvement have enabled additional student engagement through internships and student volunteer efforts. Furthermore, active participation in these organizations has resulted in additional partnerships within classes.

Benefits to Students

Students in project-based courses routinely comment favorably in RSEs upon the value of these approaches to their learning. Importantly every ESS major is involved in at least two outward-facing projects, first in ES210 (Research Methods), and second in ES585 (Junior Seminar). Many students also have other opportunities for partnerships in other courses, their senior theses, internships, and summer experiences, thus most students graduate Allegheny College with several hands-on, outward-facing experiences. Students gain not only from the actual experiences, but from having at least two or more professional reports or presentations that they can add to their resumes, thus enhancing their employability or qualifications for graduate school.

Most projects deal in one way or another with the United Nations Sustainable Development Goals (UNSDG) (https://sdgs.un.org/goals), which are often, but not always, pointed out to students involved in the projects. Across the ESS curriculum, all UNSDGs are included in ESS course offerings. The UNSDGs are frequently held as critical benchmarks for global environmental sustainability[7].

Expertise of ESS Faculty in Outward-Facing Collaborations

The ESS Department has a wealth of practical experience with community-facing, hands-on projects in ESS courses. In addition, all the senior faculty members have collectively reviewed scores of ES programs and departments at other colleges and universities, giving us opportunities to learn about community-facing endeavors at other universities. In nearly every case, Allegheny is leagues ahead of other institutions in outward-facing course projects. During the most recent ESS external departmental review, the department was lauded for its engagement in hands-on, community-facing sustainability collaborations. ESS also has experience in this arena from a scholarly perspective, with peer-reviewed papers[1-6] exploring college-community partnerships in classes, one of which[1] received a best paper award at the 2022 World

Symposium on Sustainable Development at Universities Conference on Educating the Sustainability Leaders of the Future. ESS faculty members have also written a number of papers similarly describing college-community partnerships. For their environmental sustainability efforts, especially college-community projects, a number of ESS faculty members have been recognized throughout the years by the Pennsylvania Environmental Resource Consortium as Campus Sustainability Champions. Faculty members so recognized include Kedzierski, Carbone, Pearce, Pallant, Bradshaw-Wilson, and Bethurem.

Challenges in Outward-Facing Course Collaborations

ESS faculty members heartily embrace outward-facing projects as rewarding pedagogical approaches that substantiate lecture-based learning, ideas, and theory with practical application. For students, having an opportunity to apply classroom learning is satisfying and meaningful; students typically comment positively about their experiences in these elements of courses. Nonetheless, developing important and beneficial outward-facing projects is not without challenges, which we addressed at length in a recent publication[1], and some of which we highlight below.

Planning for Projects, Anticipating the Unexpected

There is substantial work involved in planning new, meaningful projects. Much effort is required long before the course actually begins - ensuring that the project is feasible, tying into course objectives, meeting partner needs, and anticipating potential pitfalls that might challenge or undermine a course in ways that would not occur in a lecture- or discussion-oriented course. In many ways, planning lectures and in-class activities, where variables can be controlled, is much easier. Even with much planning, things in projects can go awry in ways that lectures or indoor lab exercises would not face. For example, recent efforts to conduct a partner-based project on salamanders was thwarted by repeated bad weather, and in another case, a planned environmental review of a potential mining project was rendered moot when the mining project was abruptly and unexpectedly halted.

Appropriate and Timely Collaborations

The ability to conduct projects depends on timing of when appropriate collaborations are available and when project outcomes and course learning outcomes come into suitable alignment. Sometimes community partners may wish to partner with Allegheny faculty and students, but the timing of courses may not be suitable. For example, one potential partner had hoped that students in a spring course could develop a grant proposal for early February for a project occurring in central New York. Neither the timing nor the location were suitable for student involvement, however. Shifting of ESS personnel among courses to meet departmental or college course needs can also make it challenging to anticipate and plan for potential projects. For example, due to addition of two new faculty members and an unexpectedly low enrollment in Environmental Research Methods for fall 2024, a planned project at the Erie National Wildlife Refuge had to be reconsidered.

Fostering Relationships with Potential Partners

Developing projects requires relationships with members of the community, and it takes time to establish awareness of the strengths, expertise, and needs of potential partners. Furthermore, establishing mutual trust and respect is critical to developing meaningful projects, and that takes time and open dialogue, even for faculty who might be well experienced in these approaches.

It is especially challenging for new faculty members to quickly incorporate outward-facing projects into

their courses, given that it takes time to develop relationships with community members, even within the Allegheny community. Of the current ESS complement, four are untenured faculty members and one was tenured only this spring. Two faculty members have only recently joined ESS, coming from departments where community collaborations have not been part of department culture. Nonetheless, two new faculty members, even in their first year, partnered with the Office of Sustainability to explore issues of Indigenous peoples' land history in this region and developed a native people's land acknowledgement statement for consideration of use by the college and another was successful in obtaining an environmental education grant due to efforts in the course.

Appropriateness of Courses

Finally, not all courses lend themselves well to project-based approaches with community partners. For example, ES110, Introduction to Environmental Science, although it does have hands-on activities, has objectives that are not suitable to a meaningful outward-facing project. And similarly, even upper-level courses are not always appropriate or easily amenable to outward-facing projects. For instance, Climate Policy is a very popular course that focuses on state- and federal-level climate policy, but it would be challenging to partner with state or federal agencies in ways that would influence laws or regulations. Many courses that do not have outward-facing projects do have community-facing interactions. For example, the highly popular Soil-to-Plate course visits many farms in the region, engaging students with farmers and producers. And courses that do often have partner-based projects also engage students with the community. For example, the Forest Ecosystems and Management course often has projects, but also provides field trips so that students can meet with and learn from forest resource professionals.

Increasing Community-Facing Projects

We always seek ways to improve our ability to include community-facing projects in our courses. As active members of the community, we are in touch with many different sectors, leaders, and organizations, and we routinely seek new partnerships at the intersection of community needs, faculty interests and experience, and pedagogical appropriateness. Returning to the suggestion given to ESS that our courses be outward-facing, the data show that we

- already adopt this approach routinely,
- that we have been doing it for a long time,
- that it is ingrained in our faculty culture and student expectations,
- that we do it very well, often, and appropriately, and
- that we are well-recognized by our peer organizations outside the Allegheny Community for these efforts.

Can we add more? Perhaps. If so, then how?

- *Increasing our awareness of opportunities*. We will need to increase our awareness of current issues and opportunities that can link our students and courses with community partners, and consistently work to maintain and increase relationships with community partners. Given our responsibilities within a large department, and thus limited ability to reach out regularly to community members in the region, those at the college whose responsibilities involve routine engagement with the community might learn more about ESS interests and expertise, and share that information with community entities during the course of their outreach activities. Those offices can also pass along to us opportunities of which they become aware. ESS welcomes suggestions and guidance from the offices of the President and Provost, as well as the Economic, Civic and Community Engagement Office, the Allegheny College Community

Impact Hub, the Allegheny Lab for Innovation & Creativity, relevant members of the Strategic Pathways Teams, and all others on ways in which ESS can engage more and in greater depth in meaningful and appropriate outwardly-facing course-community collaborations. Specific suggestions and tactics would be most useful.

- *Working With Alumni.* There may be new opportunities with Allegheny alumni to develop meaningful partnerships. For example, a junior seminar course will partner in fall 2024, with alumni and former AC trustee Rob Smith to explore environmental development opportunities at his Cussewago Square Project. ESS has some ability to stay in touch with alumni, but additional support from the Alumni Office would help in this effort.

- *Assisting New Faculty.* We will be certain to continue assisting new faculty members in finding opportunities to link their courses with community members. Given that other departments also interact with the community, it would be efficient if there were college-wide efforts to assist faculty, both veterans and new, in the opportunities, advantages, challenges, and approaches of outward-facing courses.

- *Partnerships with National/International Organizations.* There may be opportunities for us to partner more with national organizations to address issues that can be approached in courses that provide the utility and sense of empowerment that students find attractive in these kinds of projects. Most proximally, this will occur based on individual faculty member interests and expertise. We would certainly welcome input from others across campus who may have connections to relevant national, or even international organizations with whom we might be able to partner.

- *Marketing and Communications.* We have frequently communicated with the Office of Marketing and Communications to invite them to attend class presentations, or, where appropriate, to suggest that project outcomes be publicized. Some outcomes have been publicized, whereas most have not. We understand that not all outcomes are newsworthy, but we think that there is considerable room for broadcasting the results of some course efforts. For example, the recent recognition of the college as a National Wildlife Federation Certified Habitat, as an Arbor Day Foundation Tree Campus, and as a Certified Pollinator Habitat is remarkable for a college campus, and we know of no other college that has received recognition for such a holistic approach to the campus landscape. Furthermore, Allegheny is the only college featured by the NWF as a model of how to conduct a campus habitat analysis. Clearly there is room here for a national story that can highlight Allegheny's sustainability efforts and outward-facing efforts. Such efforts will show the community that their partnerships are of public interest, and may well spur additional collaborations.

- *Proceeding forward.* Perhaps those in relevant outreach offices who have greater expertise and training than those of us in ESS can provide a tactical blueprint for ESS, and at a mutually convenient time, meet with the department to share guidance and suggestions.

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Appendix 1. Department of Environmental Science and Sustainability outward-facing course projects, community partners, and deliverables. x = no partner or outcome in that category.

				Partners				
Project	**Course**	**Year**	**Contact Person(s)**	**Community Partner(s)**	**Allegheny Partner(s)**	**Presentations, deliverable**	**Reports**	**Professional Outcomes (Publications, Presentations, Other)**
Campus forest education project	ES585	2021	Swann-Quinn	x	Office of Sustainability	x	x	Successful grant proposal, PA DEP Environmental Education Mini-Grant
Campus forest education project	ES210	2022	Swann-Quinn	PADEP (funder)	Office of Sustainability, ALIC	x	x	x
WCRC French Creek Video Project	ES210	2024	Swann-Quinn		WCRC			
Chestnut reintroduction project	ES210	2023	Swann-Quinn	x	Office of Sustainability/AC Physical Plant	x	Report, Suitability Analysis	x
Indigenous Land Acknowledgement Statement	ES210	2020	Swann-Quinn / Byrnes/Boulton	x	Office of Sustainability	x	Developed report that was presented to CoDE, the President's Cabinet, and the Board of	x

							Trustees; current stage is a proposal for a 5-year plan to incorporate efforts to support Indigenous sovereignty into curriculum and campus	
PA Conservation Landscape consideration	ES585	2022	Swann-Quinn	CCCVB	Community Engaged Learning Network	Class presentation to stakeholders	Report, Spatial database	x
Brook trout conservation	ES305	2022	Shaffer	PAFBC	WCRC	x	Data table	x
Brook trout conservation	ES306	2023	Shaffer	PAFBC	WCRC	x	Data table	x
Land acquisition prioritization	ES305	2023	Shaffer	FCVC	WCRC	x	Maps, data table	x
Agricultural land preservation	ES305	2019	Shaffer	CCCD	x	x	Maps, data table	x
Agricultural land preservation	ES306	2021	Shaffer	CCCD	x	x	Maps, data table	x
Evaluation of Lyme disease risk	ES305	2019	Shaffer	ENWR	x	x	Maps	x
Compost facility siting	ES305	2018	Shaffer	Conservation Compost	x	x	Maps	x
Lake Wilhelm eutrophication	ES305	2016	Shaffer	PADCNR	x	x	Maps, data table	x

Forest conservation survey	ES305	2014	Shaffer	FSF	x	x	Maps, data table	2014 Northwest Pennsylvania GIS Conference
Forest conservation survey	ES306	2015	Shaffer	FSF	x	x	Maps, data table	2015 Northwest Pennsylvania GIS Conference
Garden and bee hive placement	ES210	2013	Shaffer/Choate	x	Office of Sustainability	x	Maps	x
Vineyard placement analysis	ES305	2012	Shaffer, Waggett	Moorhead/Mazza Vineyards	x	x	Maps	x
Lake Erie offshore wind turbine favorability	ES210	2011	Shaffer/Bradshaw-Wilson	PA Senator Jane Earll			Report	x
Switchgrass land suitability	ES305	2010	Shaffer, Pallant	Ernst Seeds	x	x	Maps	x
Waste Analysis for Meadville Medical Center	ES210	2019	Shaffer/Dawson/Pallant	MMC	x	Meadville Medical Center	Report	x
European Bison Reintroduction	ES395	2019	Shaffer/Bradshaw-Wilson		x	x		International Journal of Geographical Information Science publication; 2018 ESRI Users Conference Science
Campus wildlife survey	ES210	2021	Pearce	x	Office of Sustainability	x	x	Transatlantic Symposium on Sustainable Development, MIT - Presentation;

								Transatlantic Symposium on Sustainable Development - Book Chapter
Riparian Restoration	ES355	2024	Pearce	CCCD	x	tbd	x	x
Bousson Deer Management	ES585	2024	Pearce	x	Office of Sustainability; Physical Plant			
Sustainability EL Tours	ES585	2021	Pallant	Tour guides in Tunisia	Office of the President	Presentation to President's Office, Admissions, Study Away, Development	x	x
Promoting Allegheny Sustainability	ES585	2020	Pallant	x	Development, Admissions	Presentation to President's Office, Admissions, Study Away, Development	x	x
Sustainability in Meadville's fifth ward	ES585	2018	Pallant	City of Meadville	Development	Presentation to Meadville City Officials	x	x
Allegheny as Anchor Institution	ES585	2020	Pallant	City of Meadville	Office of the President	Presentation to Meadville City Officials	x	x
French Creek Sculpture and Art Pathway	ES585	2022	Pallant	Meadville Business Communities, City of Meadville	Watershed Conservation Research Center	Presentation to Allegheny and Meadville economic development	x	x

						agencies and City Officials		
Community Energy Audit	ES585	2022	Carbone	Seton Catholic School	x	Class Presentation to Seton Catholic		
Community Energy Audit	ENERG485	2021	Carbone	Unitarian Universalist Church	x	Class Presentation to UUCM		
Community Energy Audit	ES585	2019	Carbone	Meadville Area Recreation Complex		Class Presentation to CR Board		
Community Energy Audit	ES585	2022	Carbone	Reynolds Middle/High School	x	Class Presentation to Reynolds School Board		
Community Solar Installations	ES480	2023	Carbone	Common Roots	PA Solar Center	Class Presentation to CR Board		Solar Installation
Community Solar Installations	ES480	2023	Carbone	Crawford Community Heritage Foundation	PA Solar Center	Class Presentation to CCHC Director		Solar Installation
Developing Greenspace for new Trail in Meadville & Creating Work Plan	ES585	2023	Bradshaw-Wilson	Crawford County Planning Commission, PennDOT	x	Class Presentation to Crawford County Planning Agency, Crawford County Trail Association	Report	x

Developing Greenspace for new Trail in Meadville & Creating Work Plan	ES585	2024	Bradshaw-Wilson	Crawford County Planning Commission, PennDOT	x	Class Presentation to Crawford County Planning Agency, Crawford County Trail Association	Report	x
Vernal Pool Assessments	ES385	2021	Bradshaw-Wilson	FCVC, ENWR	x	x	Report	x
Vernal Pool Assessments	ES385	2024	Bradshaw-Wilson	FCVC, ENWR	x	x	Report	x
Switchgrass Biomass	ES210	2007	Bowden	Ernst Seeds	x	Presentation to Ernst Seeds	x	x
Switchgrass Biomass	ES210	2008	Bowden	Ernst Seeds	x	Presentation to Ernst Seeds	x	x
President's Home Energy Audit	ES210	2009	Bowden	x	x	Presentation to Physical Plant, Office of the President	x	x
Switchgrass Biomass	ES210	2009	Bowden	Ernst Seeds	x	Presentation to Ernst Seeds	x	x
Switchgrass Biomass	ES210	2010	Bowden	Ernst Seeds	x	Presentation to Ernst Seeds	x	Bioenergy Research Journal
Lighting use on campus	ES210	2011	Bowden	x	x	Presentation to Sustainability Office	x	x
Switchgrass Biomass	ES210	2012	Bowden	Ernst Seeds	x	Presentation to Ernst Seeds	x	x
Honey Bee Acceptance Survey	ES210	2012	Bowden	NWPBA	x	Information to NWPBA	x	x

Little Blue Stem Biomass	ES210	2013	Bowden	Ernst Seeds	x	Presentation to Ernst Seeds	x	x
Switchgrass soil absorbancy	ES210	2013	Bowden	Ernst Seeds		Presentation to Ernst Seeds	x	x
Switchgrass soil absorbancy	ES210	2014	Bowden	Ernst Seeds	x	Presentation to Ernst Seeds	x	x
Wise Center recycling	ES210	2015	Bowden	x	x	Presentation to Athletic Department	x	x
Dormitory recycling	ES210	2016	Bowden	x	x	Presentation to Sustainability Office	x	x
Invasive plants survey	ES210	2017	Bowden	FSF, ENWR	x	Presentation to FSF, ENWR	ESS Publication	x
FSF Member needs survey	ES210	2017	Bowden	FSF	x	Presentation to FSF	x	x
AC transportation energy use	ES210	2018	Bowden	x	x	Presentation to Office of Sustainability, Physical Plant	x	x
Biotic integrity of ENWR streams	ES210	2018	Bowden	ENWR	x	Presentation to ENWR	ESS Publication	x
Plant oil and water absorption capacity	ES210	2019	Bowden	Ernst Seeds	x	Presentation to Ernst Seeds	x	x
Goat browsing of invasive multiflora rose	ES210	2019	Bowden	ENWR	x	Presentation to ENWR	ESS Publication	Natural Areas Journal, Research Science Consortium Annual Symposium Posters (2020, 2023);iInvasives Newsletter,

								Western PA Conservancy on-line seminar
Assessment of campus trees	ES210	2021	Bowden	x	Physical Plant, Office of Sustainability	Presentation to Physical Plant, Office of Sustainability, Admissions, Development	ESS Publication	Book chapter: Educating the Sustainability Leaders of the Future; College application for Tree Campus, Arbor Day Foundation
Bousson red pine growth	ES210	2023	Bowden	x	Physical Plant, Office of Sustainability	Presentation to Office of Sustainability, Physical Plant	ESS Publication (in prep)	x
Campus wildlife habitat projects	ES210	2024	Bowden	x	Office of Sustainability, Development Office	Presentation to Office of Sustainability, Development Office	Campus Presentation, Research proposal for NWF (planned)	x
ENWR historic land use	ES332	2016	Bowden	ENWR	x	Presentation to ENWR	x	x
Moxie Woods historic land use	ES332	2017	Bowden	FSF	x	Presentation to FSF	Data provided to FSF	x
Bail Woods historic land use	ES332	2018	Bowden	FSF	x	Presentation to FSF	Data provided to FSF	x
Effectiveness of goats in controlling an invasive plant	ES332	2019	Bowden	ENWR	x	x	Report Provided to ENWR	Natural Areas Journal, Research Science Consortium Annual Symposium

								Posters (2020, 2023);iInvasives Newsletter, Western PA Conservancy on-line seminar
Damage to trees due to invasive plant species management by goats I	ES332	2020	Bowden	ENWR	x	x	Report Provided to ENWR	Natural Areas Journal, Research Science Consortium Annual Symposium Posters (2020, 2023);iInvasives Newsletter, Western PA Conservancy on-line seminar
Beech Leaf Disease in Young v Old Trees	ES332	2023	Bowden	FSF	x	x	Data provided to FSF	2023 Research Science Consortium Annual Symposium Poster
Damage to trees due to invasive plant species management by goats II	ES332	2023	Bowden	ENWR	x	Presentation at ENWR	Data, student reports provided to ENWR	Video posted on ENWR website; featured during invasive species week
Assessment of campus wildlife habitat	ES585	2023	Bowden	NWF	Physical Plant, Office of Sustainability	Presentation to Physical Plant, Office of Sustainability, Admissions,	Report to Office of Sustainability; ESS Publication	Transatlantic Symposium on Sustainable Development, MIT -

						Development	(report endorsed by National Wildlife Federation)	Presentation; Transatlantic Symposium on Sustainable Development - Book Chapter; College recognized at National Wildlife Federation Certified Campus Habitat
Bee service project	FS101	2007	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x
Food donation	FS101	2007	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service project	FS101	2008	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x
Food donation	FS101	2008	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service project	FS101	2009	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x
Food donation	FS101	2009	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service project	FS101	2010	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x
Food donation	FS101	2010	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service project	FS101	2012	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x

Food donation	FS101	2012	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service project	FS101	2013	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x
Food donation	FS101	2013	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service project	FS101	2014	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x
Food donation	FS101	2014	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service project	FS101	2015	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x
Food donation	FS101	2015	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service project	FS101	2016	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x
Food donation	FS101	2016	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service project	FS101	2017	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x
Food donation	FS101	2017	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service project	FS101	2018	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x
Food donation	FS101	2018	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service	FS101	2019	Bowden	Vorisek	x	Apiary	x	x

project				Backyard Bees		assistance		
Food donation	FS101	2019	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Bee service project	FS101	2022	Bowden	Vorisek Backyard Bees	x	Apiary assistance	x	x
Food donation	FS101	2022	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
Food donation	FS101	2023	Bowden	Women's Services, Inc.	x	Food preparation and donation	x	x
City of Meadville walkability study	ES210	2022	Bethurem	City of Meadville	x	Presentation to Meadville city officials	Report to City of Meadville	x
City of Meadville bike rack suitability survey	ES210	2023	Bethurem	City of Meadville	x	Presentation to Meadville city officials	Report to City of Meadville	x
Water bottle survey	ES210	2018	Bethurem	x	Office of Sustainability	Presentation to Office of Sustainability	Report to Office of Sustainability	Installation of water bottle refilling stations; Publication in Sustainability
Evaluation of ESS curriculum	FSES201	2012	Bensel	x	ESS Department	Presentation to ESS Department	x	x