

Interdisciplinary Environmental and Sustainability Education and Research:

Leadership and Administrative Structures

A research study conducted by the Center for Environmental Education Research, National Council for Science and the Environment for the Council of Environmental Deans and Directors



Shirley Vincent, Katelyn Dutton, Rica Santos, and Lilah Sloane

Foreword by Roderic Parnell

November 2014



National Council for Science and the Environment

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NCSE brings together individuals, institutions and communities to advance environmental and sustainability science, education, and their applications in five strategic areas:

- Strengthening Education and Careers;
- Communicating Science to the Public;
- Hosting the annual National Conference on Science, Policy and the Environment;
- Science Solutions to Specific Environmental Challenges; and
- Advancing Policy that Improves the Connection between Science and Decision-making.

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The Council of Environmental Deans and Directors (CEDD) is the leadership group for members of the NCSE University Affiliate Program (listed at back of report). CEDD brings together environmental and sustainability leaders from members of the NCSE University Affiliate Program to improve the quality, stature and effectiveness of academic environmental programs at U.S. universities and colleges. CEDD represents academic environmental programs of all sizes and types. CEDD holds regular meetings that facilitate networking and collaborations. Among its many activities, CEDD supports projects and committees on

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- Interdisciplinary Tenure
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- Campus-wide subscriptions to online environmental and energy news services;
- Sabbatical opportunities; and
- Special reports and studies.

This report is a product of NCSE's ongoing academic program research and is distributed as a service to members of the NCSE University Affiliate Program.

Cover photos (left to right): Wrigley Hall, Arizona State University Institute of Sustainability; a student in the DC EnvironMentors chapter with a mentor from the National Institutes of Health (photo by Jacklyn Krusch); Dr. Roderic Parnell, Professor of Earth Sciences and Environmental Sustainability, Northern Arizona University and President-Elect, NCSE Council of Environmental Deans and Directors.

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About the Authors

Shirley Vincent, Director, Center for Environmental Education Research (CEER), National Council for Science and the Environment (NCSE). Dr. Vincent leads two NCSE programs: higher education research and strategic consulting services. She holds a PhD in Environmental Science from Oklahoma State University and an MS in Biological Sciences from the University of Tulsa.

Roderic Parnell, Coordinator of Academic Sustainability Programs at Northern Arizona University (NAU) and Professor of Earth Science and Environmental Sustainability. Dr. Parnell is the past chair and current vice chair of the Environmental Caucus of NAU. He is the President-Elect of the Council of Environmental Deans and Directors, an organization of academic program leaders affiliated with NCSE, and serves on the Education and Professional Development Steering Committee of the American Association for Sustainability in Higher Education. Dr. Parnell holds a PhD in Geology from Dartmouth College.

Katelyn Dutton, Program Assistant, Center for Environmental Education Research, NCSE. Ms. Dutton supports the research and consulting programs of CEER. She holds a BA in Environmental Policy from Barnard College, Columbia University.

Rica Santos, Former Program Assistant, Center for Environmental Education Research, NCSE. Ms. Santos supported the research and consulting programs of CEER until recently. She earned a BS in Political Science and a BS in Environmental Studies from Santa Clara University.

Lilah Sloane, Program Coordinator, NCSE. Ms. Sloane contributes to CEER research and coordinates NCSE's annual National Conference and Global Forum on Science, Policy and the Environment. She earned a BA in Religious Studies from Wesleyan University.

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List of Profiles

Group A 22-33

Dr. J. Anthony Abbott and Dr. Wendy Anderson, Stetson University, FL

Dr. Jan Boll, University of Idaho, ID

Dr. Christopher Boone, Arizona State University, AZ

Dr. John Byrne, University of Delaware, DE

Dr. Peter Crane, Yale University, CT

Dr. Christopher D'Elia, Louisiana State University, LA

Group B 38-49

Dr. Elizabeth DeSombre, Wellesley College, MA

Dr. Gwendelyn Geidel, JD, University of South Carolina, SC

Dr. Eban Goodstein, Bard College, NY

Dr. David Gosselin, University of Nebraska, Lincoln, NE

Dr. Robyn Hannigan, University of Massachusetts, Boston, MA

Dr. David Hassenzahl, University of California, Chico, CA

Group C 64-75

Dr. Philip Hopke, Clarkson University, NY

Dr. Meghann Jarchow, University of South Dakota, SD

Dr. Stephanie Kaza, University of Vermont, VT

Dr. Sandra Lubarsky, Appalachian State University, NC

Dr. Valerie Luzadis, State University of New York, NY

Dr. Michael Manfredo, Colorado State University, CO

Group D 90-101

Dr. Marie Lynn Miranda, University of Michigan, MI

Dr. Stephanie Pfirman, Barnard College, NY

Dr. Paul Robbins, University of Wisconsin-Madison, WI

Dr. Kimberly Smith and Dr. Tsegaye Nega, Carleton College, MN

Dr. John Volin, University of Connecticut, CT

Dr. Richard Wallace, Ursinus College, PA

Foreword

Over the last 40 years, interdisciplinary environmental and sustainability (IES) programs have moved from being uncommon and experimental toward becoming mainstream, high enrollment academic programs.

In the United States, there are now over 1,150 programs, centers, and institutes providing thousands of degree programs in the environment, sustainability, and energy. The explosive growth of IES programs continues today, with the total number of new programs in just the last three years equaling half the total growth for the last decade.

IES programs are expanding not just in number but in foci; new programs are being implemented in energy, environment and sustainability, engineering and environment, and global engagement.

The leaders of IES programs face a unique set of challenges and opportunities, with no common “toolbox” to aid them. This robust dataset and detailed analysis can help individual programs leaders identify shared commonalities in their programs, in program challenges, and, most importantly, in program opportunities. This report provides, for the first time, a clear picture of the landscape upon which IES program leaders operate and will facilitate productive conversations among them.

The report outlines the wide variety of leadership structures rooted in diverse institutional homes, of leadership and staffing models, and of curricular and research expectations.

This report provides two new sets of resources for leaders of these programs.

First, the report details the range of administrative structures that currently exist for IES programs and how different administrative structures work at different types of institutions. Only one quarter of IES programs report that they are housed in traditional academic departments or schools, and a majority of programs exist outside long-established institutional settings. Whether in a relatively newly established IES department or as a program spanning multiple academic units, these programs face resource and administration challenges unfamiliar to long-established single discipline academic departments.

The very nature of these structures creates challenges shared by many types of interdisciplinary programs. The report documents several of these challenges, which include the following:

- Many leaders of interdisciplinary programs come from traditional disciplinary, not interdisciplinary, backgrounds and commonly have less than half-time appointments devoted to administration. This study documents that coadministration by multiple leaders can successfully address this challenge.
- The ad hoc nature of staffing resources for many IES programs, combined with lack of professional accreditation or programmatic standards, results in IES programs receiving fewer resources from higher levels of administration than are made available to traditional academic departments. This often results in more flexible and changing curricula.
- Only half of the programs surveyed control their own faculty appointments and less than half of the non-departmentalized programs control their own budgets.

Challenges unique to IES programs are found to include the need to address:

- Demands for evolution of curriculum, particularly with respect to sustainability and community and global engagement.

- Bridging the huge academic cultural differences when disciplines as disparate as engineering, sociology, and humanities are folded into a single curriculum.
- An emphasis on co-curricular and experiential education, often focused on internships.

Second, this report identifies opportunities for program leaders.

The wide variety of case studies from a comprehensive cross section of IES programs allows the reader to find models that can fit virtually any individual situation, and to see how similar programs have navigated similar waters.

IES leaders can identify new peers.

IES leaders can also identify the most productive areas to concentrate efforts to build influence within their institutions. For example, Tables 21-25 document the influence of different factors on IES program success and the satisfaction of program leaders with success factors.

Connections between IES programs and potential partners that yield the greatest likelihoods of success are identified for over 260 different programs. Satisfaction on the part of these leaders with different success factors is also documented.

A summary of differing perspectives on program goals may assist you in better articulating your own.

Finally, this report has provided leaders of IES programs with the opportunity for some reflection on what key questions are central to successful program administration. This report will provide the readers with the background and opportunity to reflect on next moves to improve the success of their own programs.

However you use this report, and whatever questions and answers you develop as a result, this report is just one part of an ongoing process and conversation facilitated by the National Council for Science and the Environment (NCSE) and the Council of Environmental Deans and Directors (CEDD) and carried out by NCSE's Center for Environmental Education Research (CEER).

We have long recognized that leaders of IES programs are a unique community and the membership of CEDD encourages you to continue to engage with your peers through NCSE and CEDD in a further exploration of effectiveness in leadership of IES programs.

Roderic Parnell, Professor of Earth Sciences and Environmental Sustainability;
Coordinator of Academic Sustainability, Northern Arizona University;
President-Elect, Council of Environmental Deans and Directors
of the National Council for Science and the Environment

Executive Summary

Interdisciplinary environmental and sustainability (IES) programs study coupled human-nature systems using interdisciplinary knowledge and insights gained from systems-based approaches and different epistemological viewpoints.

Working at the science-policy, science-management, and policy-management interfaces, IES programs have a distinctive goal: preparing sustainability-oriented problem solvers through interdisciplinary scholarship, research, practice, and informed citizenship.

This report is the second in a series presenting the results of the 2012-13 Center for Environmental Education Research/National Council for Science and the Environment (CEER/NCSE) survey of IES baccalaureate and graduate academic programs in the United States. The first report—*Interdisciplinary Environmental and Sustainability Education on the Nation's Campuses 2012: Curriculum Design*—covered findings related to curriculum design. Additional reports will focus on learning outcomes and student assessment, program evaluation, alignment with workforce and societal needs, and partnerships.

The data for this report were obtained from 354 IES program administrators, who provided data about their roles as primary administrator, their programs' structures and resources, and their views on the factors important for program success (262 completed this question). The statistical frequencies reported have a margin of error of $\pm 5\%$.

Key findings include:

- Many IES programs (43%) span multiple disciplinary and professional field units, about a third (32%) are located within their own IES unit, and the remainder (25%) are degree programs within traditional units.
- IES programs that offer both undergraduate and graduate IES degree programs are more likely to be located in their own IES unit; almost all of these units were established before 2000.
- Newer programs and programs that offer only undergraduate degrees or only graduate degrees are more likely to be programs that span multiple units or degree programs in traditional departments.
- Many programs have limited autonomy: only 77% of program administrators and less than half of program faculty are included in primary decision making (hiring, promotion, resource allocation, curriculum design, etc.).
- Programs have vast disparities in resources. A few are run with no budget and volunteer faculty while others have budgets that exceed those of other programs with similar numbers of students and scores of full-time, tenured and tenure-track faculty and staff.
- There are also substantial differences in student and faculty support services and resources among IES programs.

Working at the science-policy, science-management, and policy-management interfaces, IES programs have a distinctive goal: preparing sustainability-oriented problem solvers through interdisciplinary scholarship, research, practice, and informed citizenship.

The views of the factors important for program success were analyzed using three statistical analyses. The first investigation was an exploratory factor analysis to reveal the nature and number of interrelated components that influence program success. The correlations between the components illustrate how they are related to each other. The results of this analysis include:

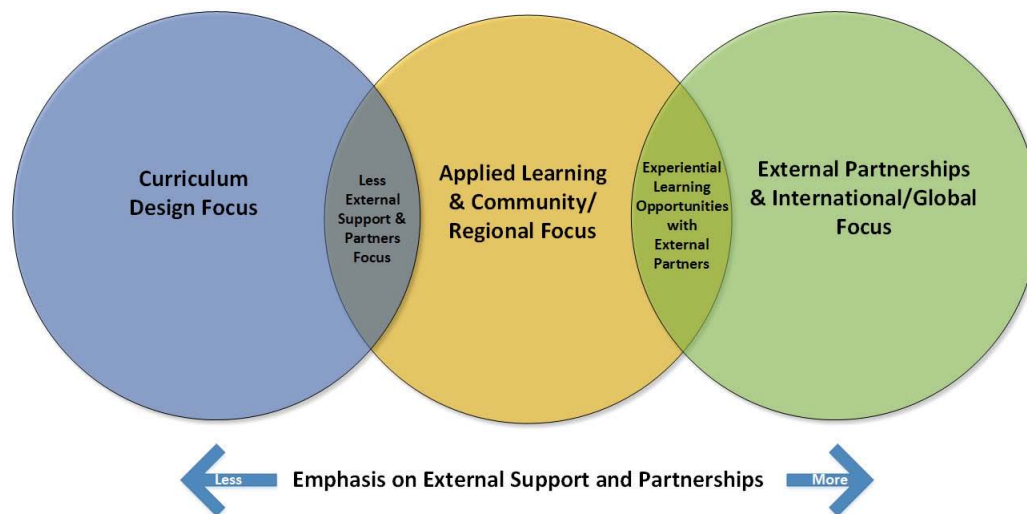
- Nine areas of influence on program success.
- A framework illustrating how the nine areas are interrelated.

The second investigation used cluster analysis to identify groups of program leaders with similar importance ratings to reveal the nature and number of different views on what factors are important for program success. The results of this analysis include:

- Three views on the factors most important for program success.
- Characteristics of the IES programs associated with each view.

The final investigation used discriminant analysis to confirm the results of the cluster analysis and to identify the functions that distinguish the groups from each other. The results of this analysis include:

- A framework for understanding IES program leaders' views on leading for success.



The findings in this report add to the understanding of IES programs being developed by CEER research studies which have consistently discovered that program leaders have three distinct views on different aspects of IES program management with overlapping areas of consensus. These include three views on the educational goal of IES programs (and the desirability of defined core competencies), three views on ideal curriculum design, and three views on the factors most important for program success. Although imperfect and not predictive, correlations reveal relationships between the three sets of findings to define three program leader perspectives.

Background of the NCSE Center for Environmental Education Research

NCSE initiated its extensive research program on IES higher education in 2003. The original study sought to understand the nature and number of academic leaders' perspectives on ideal curriculum design for baccalaureate and graduate IES degree programs.

One of the most important findings from this initial study was a consensus on the identity of the IES field: it is focused on the interfaces and interactions of coupled human-nature systems with the goal of preparing students to be sustainability-oriented problem solvers. Key learning outcomes include disciplinary synthesis abilities, systems-thinking cognitive skills, knowledge of the sociopolitical and natural aspects of environmental problems, understanding of the limits of science and technology, and recognition of the importance of acknowledging and reporting uncertainty.¹

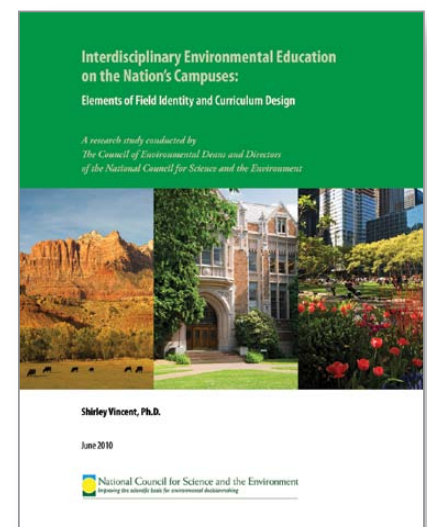
IES programs have a distinctive role in higher education in preparing students to understand problems and devise solutions using insights gained from interdisciplinary knowledge and different epistemological viewpoints and a systems approach rather than a traditional reductionist approach.

In 2008, NCSE conducted a census to identify all baccalaureate and graduate IES degree programs offered by universities and colleges in the U.S. The census served to define and characterize the population for ongoing research.

The census was followed in 2009 by an extensive national survey of IES program leaders. The three related research tasks together comprised the first comprehensive empirical study that sought to identify the defining characteristics of the IES field and describe the diversity of programs' administrative and curricular structures at U.S. higher education institutions.

The national survey of IES academic program administrators elucidated the characteristics that collectively describe the diversity of programs, including:

- Ideal core interdisciplinary knowledge and integrated skills competencies.
- Ideal models for curriculum design.
- A framework for understanding the diversity of programs.
- Different types of administrative structures for programs.



1. For more information on the study, see: Vincent, S. and W. Focht (2009). U.S. Higher Education Environmental Program Managers' Perspectives on Curriculum Design and Core Competencies: Implications for Sustainability as a Guiding Framework. *International Journal of Sustainability in Higher Education* 10(2): 164-183. For a more thorough discussion on sustainability and its relationship to the consensus view of IES program identity, see: Vincent, S. and W. Focht (2010). In Search of Common Ground: Exploring Identity and the Possibility of Core Competencies for Interdisciplinary Environmental Programs. *Environmental Practice* 12(1):76-86.

The findings of these studies are summarized in the 2010 NCSE report *Interdisciplinary Environmental Education on the Nation's Campuses: Elements of Field Identity and Curriculum Design*.

The 2012-2013 Census and Surveys

The census of IES programs was updated and extended in 2012. A total of 1,562 public and not-for-profit and 76 for-profit schools were reviewed. The new census identified baccalaureate and graduate academic programs with an explicit interdisciplinary approach, academic programs in disciplines and professional fields with formal specializations in the environment and/or sustainability, minors and certificate programs focused on the environment and/or sustainability, and centers and institutes focused on the environment and/or sustainability. A series of three reports from NCSE illustrates the rapid growth in the IES field overall—especially in sustainability academic programs—and the emergence of new types of interdisciplinary energy programs:

- *Interdisciplinary Environmental and Sustainability Education: Results from the 2012 Census of U.S. Four-Year Colleges and Universities.*
- *Sustainability Education: Results from the 2012 Census of U.S. Four-Year Colleges and Universities.*
- *Non-traditional and Broad Energy Education: Results from the 2012 Census of U.S. Four-Year Colleges and Universities.*

A series of reports will be released throughout 2014-2015 combining findings from the survey with case studies and relevant information from other published journal articles and reports.

A survey of the leaders of IES academic programs was completed in spring 2013. The survey instrument was developed with numerous experts and included questions on degree program attributes and curriculum design, program leadership and faculty, administrative structure and resources, internal and external partnerships, and influences on programs' success. A series of reports will be released throughout 2014-2015 combining findings from the survey with case studies and relevant information from other published journal articles and reports. The first report was released in August 2013:

- *Interdisciplinary Environmental and Sustainability Education on the Nation's Campuses 2012: Curriculum Design.*

A separate survey of the directors at IES institutes and centers (IESICs) at research universities was completed in summer 2013. This survey included questions on the institutes' and centers' missions and goals, administrative structures, personnel, and resources. The census identified a total of 1,121 IESICs at 236 universities. The directors of these IESICs were invited to participate in the survey. Completed survey responses were received from the directors of 340 IESICs for a response rate of 28%. This report was released in March 2014:

- *Interdisciplinary Environmental and Sustainability Education and Research: Institutes and Centers at Research Universities.*

All reports are available on the NCSE website at www.NCSEonline.org.

Rapid Growth in Environmental and Sustainability Higher Education

The number of IES programs continues to expand dramatically. The 2012 census identified 1,151 academic units/programs offering 1,859 IES baccalaureate and graduate degrees located at 838 colleges and universities. In the four years following the 2008 census, the number of schools offering IES programs increased by 29%, the number of academic units by 37%, and the number of degree programs by 57%.

Matriculation in IES programs also increased: 64% of baccalaureate programs reported positive growth trends, as did 30% of master's programs and 23% of doctoral programs. The average number of students enrolled in IES programs increased by 49% for undergraduate programs and 15% for master's programs; the average number of students enrolled in doctoral programs remained steady.

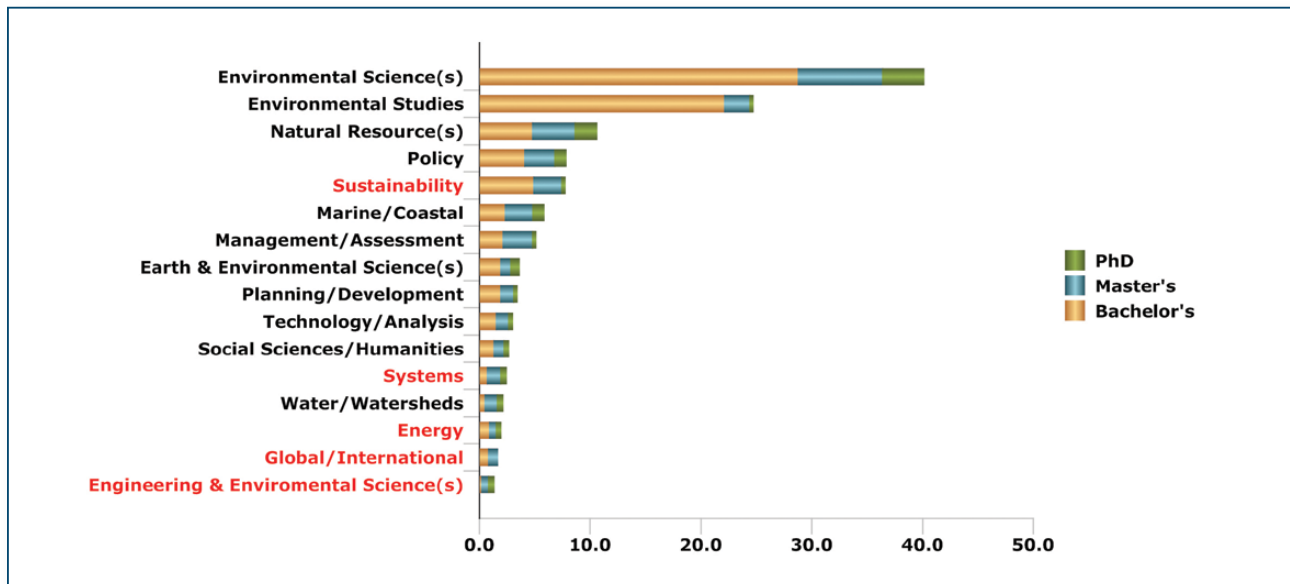
The census findings reveal several trends:

- The last few years have seen an expansion of IES institutes and centers administering academic programs: the proportion of IES degree programs offered by IES institutes, centers, colleges, and schools increased by 6%.
- There are more degree programs focused on specific themes or problem solving domains. The numbers of all types of IES degree programs increased, but the proportion of the total named environmental science(s) or environmental studies declined, while programs with other names such as Community, Environment and Development; Environmental Dynamics; or Coastal and Watershed Science and Policy increased.
- There has been tremendous growth in the number of sustainability degree programs—from 13 in 2008 to 141 in 2012.
- New types of IES programs have emerged, including interdisciplinary energy programs, environmental/sustainability systems programs, programs that combine engineering and environmental science, and programs with an international or global focus.
- More master's programs have been created: the number of master's degrees increased by 68%, compared with 57% for baccalaureate degrees and 35% for doctoral degrees. A number of the new master's programs—37—have received a Professional Science Master's™ designation (www.NPSMA.org).

The number of IES programs continues to expand dramatically. The 2012 census identified 1,151 academic units/programs offering 1,859 IES baccalaureate and graduate degrees located at 838 colleges and universities.

One of the defining characteristics of IES programs is their diversity, both in the types of programs offered and in their administrative structures. The largest proportion of IES degree program names, 40%, includes the term environmental science or sciences (Figure 1). Another 25% include the term environmental studies. Program names that include natural resource(s) comprise 11%. The growth in sustainability programs brings this group to 8%, tied with the proportion that includes policy in their names.

Figure 1. IES degree program types (lighter titles indicate new types of programs)



IES degrees are offered in a variety of administrative locations, including degree programs within a traditional disciplinary department or school; IES departments, schools, and colleges; IES centers and institutes; programs that span multiple departments, one or more colleges, or an entire institution; and degree programs operated by a consortium of campuses or institutions. The administrative homes for the majority of IES degrees are interdisciplinary academic units or programs. About a third (32%) are located in interdisciplinary IES academic units—a department, school, division, college, center or institute. Another 43% are offered through interdisciplinary programs that span multiple units. Only 25% are located in traditional academic departments, schools, or divisions.

Interdisciplinary Environmental and Sustainability (IES) Program Structure

Introduction

The history of interdisciplinary environmental and sustainability (IES) academic programs in the United States begins in the 1900s when the first higher education programs focused on natural resources science and management were established. The first wave of programs named environmental studies and environmental science(s) arose around 1970 and the first sustainability program was created in 2006. Other types of IES programs include those focused on specific themes, such as water science and policy, urban and environmental studies, and coastal science and management. Emerging new types of IES programs include those focused on systems, climate and energy, and international/global issues and those that combine environmental science and engineering. The number of IES degree programs continues to grow rapidly; between 2008 and 2012, the number of baccalaureate degrees grew by 57%, master's degrees by 68%, and doctoral degrees by 35%. Enrollments also continue to expand as most programs report growth trends.

IES programs are different from disciplinary and professional academic programs in their diversity of foci and in other ways. There is no accreditation criteria or accrediting body for IES programs (the scope of IES studies, the diversity of programs, and their continuing evolution make agreement on criteria problematic) and they often exist outside of departments as programs that span multiple units. The diversity of IES degree programs and their locations within their institutions complicate efforts to define effective IES program structure and leadership; each program is unique in its own curricular and institutional context. Administrative locations range from IES degrees located in traditional departments, divisions, or schools (25%); IES departments, divisions, schools, colleges, institutes, and centers (32%); and IES programs that span multiple units—a few departments, a college, multiple colleges, the entire college or university, or even multiple higher education institutions (43%).

Older programs (those created before 1990) tend to be housed in their own IES units—departments, schools, colleges—while younger programs tend to be located in programs that span multiple units or in traditional departments (such as biological sciences or earth sciences). Some older programs expanded from natural resources emphases, such as the School of Forestry and Environmental Studies at Yale University (est. 1900). Others were established as interdisciplinary environmental schools or departments, including the School of Public and Environmental Affairs at the University of Indiana at Bloomington (est. 1972) and the Department of Environmental Science and Studies at Allegheny College (est. 1972).

Although most IES programs established in the last two decades (~80%) are programs that span units or degree programs within traditional units, recent years have seen a steady stream of new IES research and education-focused colleges, schools, centers, institutes, and campuses. Examples include the Julie Ann Wrigley Global Institute of Sustainability and School of Sustainability at Arizona State University; the Falk School of Sustainability, formerly the School for Sustainability and the Environment, at Chatham University (housed on its own campus); the School of Global Environmental Sustainability at Colorado State University; the Dr. Kiran C. Patel College of Global Sustainability at the University of South Florida; and the Center for Sustainability and the Environment at Albion College. The pro-

portion of IES degree programs administered through these types of IES programs has increased rapidly from 4% in 2008 to 10% in 2012.

IES program leaders, like other university administrators, are under pressure to deliver inventive solutions to a range of emerging issues. The interdisciplinary nature of IES studies encourages creative innovation but can also create hurdles that can be hard to overcome on campuses structurally organized around disciplines and professional fields. Newer programs housed in traditional disciplinary departments or across disciplinary departments face the inherent difficulty of leading an interdisciplinary program that relies primarily or solely on faculty and courses provided through disciplinary departments. The challenges and opportunities of leading an IES program are similar in some respects (ensuring student success, concerns about staffing and resources) but will also differ profoundly for different types of program leaders: the dean of an IES college or the director of an IES institute will have different leadership issues than the chair of an IES department, the director of a unit-spanning IES program, or the coordinator of an IES degree program in a biological sciences department.

Institutional Challenges

Regardless of the location of their IES programs in their institutions, all IES leaders work within the context of the pressures faced by the university. Colleges and universities across the U.S. are faced with declining enrollments, flat or declining revenues, and pressure from trustees, legislators, and the public to reduce costs while improving quality and incorporating new approaches and technologies. In contrast to declining enrollments at the institutional level, IES programs continue to attract rising numbers of students as described at the beginning of this report. The findings of recent surveys of college and university leaders and faculty further illustrate how different groups view current institutional challenges.

A recent survey of college and university presidents finds that they believe the U.S. higher education system of the future will be very different from today and that the pace of change is too slow.² Two thirds think massive or moderate disruption is required. Presidents believe the top forces driving change are politicians and business leaders, but that the driving force for change should be led by faculty, presidents, and students. They feel faculty influence is low because faculty aren't stepping up to the plate and it is crucial for faculty to take a more active role. They believe the focus should be on changing the model of teaching and learning. They favor the use of technology in hybrid courses that blend face-to-face and online learning and adaptive learning that uses technology to adjust lessons to meet the individual needs of students. Both presidents and provosts are cautious but positive in their view of competency-based degree programs and generally hostile toward massive open online courses (MOOCs).

A survey of chief academic officers showed that most schools continue to experience fiscal stress; only a few agreed that the economic downturn is over at their institutions.³ A quarter of chief academic officers at public and private not-for-profit colleges and universities believe they need to cut academic programs this year. Most believe that new spending on academic programs will come from reallocation rather than new revenues. How IES programs are viewed by their institutions could impact whether they receive more or

2. The Chronicle of Higher Education (2014) *The Innovative University: What College Presidents Think About Change in American Higher Education*.

3. Jaschik, S. and D. Lederman (2014) *Survey of College and University Chief Academic Officers*. Inside Higher Education.

less support: the majority of chief academic officers plan major investments in STEM fields, online programs, and professional programs, but only a few anticipate investments in arts and sciences programs.⁴ The majority of provosts indicate they plan to increase emphasis on funding programs based on alignment with their institutional mission and on collaboration with other colleges and universities.

Chief academic officers are also feeling continuing demands for more accountability and academic rigor. Only 56% believe their institutions' academic programs are very effective in preparing students for the workforce and only 42% in preparing students for engaged citizenship. Less than a third agree their institutions are very effective in identifying and assessing student outcomes. While a majority of institutions have created common learning goals for all students, only 40% report that the learning goals of all their academic programs are aligned with their institutions' missions.⁵ Chief academic officers also believe that more faculty involvement is essential to improving teaching, learning, and institutional effectiveness.

Assessment is primarily driven by expectations of regional and program/specialized accrediting agencies, but a variety of forces prompt institutions to gather assessment data, including internal commitments to improving students' learning and institutional effectiveness. External pressures, such as state mandates and governing boards, are more of a factor for public institutions than private. In addition, the more selective an institution's admissions standards, the less likely it is to employ assessment approaches or use the results for strategic planning or curricular change. Demands for assessment activities and their use in program design will likely vary widely for IES program leaders, especially given that IES programs do not have an accrediting agency.

At the program level, capstone courses, rubrics, performance assessments, and final projects are the most commonly used assessment tools.⁶ Situating assessment as a curricular review function is seen as a promising approach at the program level for engaging faculty and aligning assignments with achievement of proficiency levels. The Degree Qualifications Profile (DQP) developed by the Lumina Foundation can be used to guide a curricular mapping process for individual majors to determine which outcomes are being addressed adequately in terms of breadth and depth and which need more attention.⁷ CEER is currently working on upcoming reports that will address IES program learning outcomes and assessment in depth.

Assessment pressures and institutional change are part of the new demands on department chairs and program directors who also have new roles of fiscal oversight, fundraising, student recruitment, and public relations in addition to the traditional managerial duties of creating class schedules, hiring adjuncts, and managing student advising, faculty evaluations, and curriculum reviews.⁸ Many chairs and directors do not have formal professional managerial training but are increasingly being held accountable for their

4. CEER is developing a study to learn more about how IES programs, their host institutions, and their state Commissions of Higher Education classify different types of IES programs.

5. Kuh, G. D., Janowski, N., Ikenberry, S. O. and J. Kinzie (2014) *Knowing What Students Know and Can Do: The Current State of Student Learning Outcomes: Assessment in U.S. Colleges and Universities*. National Institute for Learning Outcomes Assessment.

6. Ewell, P., Paulson, K. and J. Kinzie (2011) *Down and In: Assessment Practices at the Program Level*. National Institute for Learning Outcomes Assessment.

7. Lumina Foundation (2014) *The Degree Qualifications Profile: A Learning-Centered Framework for What College Graduates Should Know and Be Able to Do to Earn the Associate, Bachelor's or Master's Degree*.

8. June, A. W. (December 2, 2013). *For Chairs, the Seat's Gotten Hotter*. The Chronicle of Higher Education.

program's and faculty's success all while staying within budget. Their roles are critical to expanding their program's stature and performance, which in turn influence administrative allocation of limited resources. The results presented in this report reveal that curriculum design issues (designing degree programs and specializations, developing courses), faculty participation, institutional support, aligning degree programs with workforce needs, providing research opportunities for students, and engaging with campus sustainability initiatives are all pressing concerns for IES department chairs and program directors.

Faculty are more pessimistic about the changes they see happening and believe that colleges and universities are losing focus on their academic mission. Full-time faculty members' salaries stagnate even as they are asked to do more while the number of new administrative staff positions is increasing and substantial salary increases for some senior administrators cause controversy.⁹ Spending priorities for competitive athletics are often viewed as taking away resources for the core missions of teaching and learning and can divert focus due to scandal and excess. Faculty view themselves as struggling to provide excellence in instruction and research while coping with reduced resources and ever-changing demands—particularly in assessment. They worry about rising numbers of contingent faculty appointments and staff hiring freezes, benefit cuts, and layoffs. They are often caught between two visions of higher education: the senior leaders of universities focus on research as a core mission, while most stakeholders—students, parents, alumni, legislatures, businesses, and foundations—focus on skills development through teaching-centric higher education institutions.

Roles of IES Programs

IES programs are instrumental in their colleges' and universities' contributions to solving major challenges of the 21st century. They contribute to educating future decision makers, conducting environmental and sustainability research, promoting community outreach and service, engaging with campus sustainability initiatives to develop models of best practice, supporting collaborative research within the university, and leading collective research and project implementation projects with diverse external partners. IES programs are uniquely positioned to support sustainability-focused interdisciplinary and transdisciplinary research, provide expertise for real-world projects, and develop interdisciplinary problem solvers,¹⁰ transacademic interface managers,¹¹ interdisciplinary executive scientists,¹² and disciplinary and professional experts who effectively collaborate to understand complex environmental and sustainability problems and devise solutions.

Not all IES programs have the capacity to undertake leadership roles in all these areas, but all do contribute to the extent that makes sense for each based on their mission, the mission of their institution, their resources, and their capabilities.

9. Curtis, J.W. and S. Thornton (2014) Losing Focus: The Annual Report on the Economic Status of the Profession 2013-14. Academe March-April.

10. Clark, S. and R. Wallace (2012) Interdisciplinary Environmental Leadership: Learning and Teaching Integrated Problem Solving. pp 420-429 in Gallagher, D. R., Christensen, N., and R. N. L. Andrews, eds. *Environmental Leadership: A Reference Handbook*. Thousand Oaks, CA: Sage Publications.

11. Brundiers, K., Wiek, A. and B. Kay (2013) The Role of Transacademic Interface Managers in Transformational Sustainability Research and Education. *Sustainability* 5:4614-4636.

12. Hendren, C. O. (August 14, 2014) "Inreach" and the Interdisciplinary Executive Scientist: The Missing Puzzle Pieces for Effective Interdisciplinary Research. Team Science Toolkit website blog post accessed August 15, 2014. <https://www.teamsciencetoolkit.cancer.gov/Public/ExpertBlog.aspx?tid=4>

Overview

IES programs and their administration represent an ongoing national experiment in learning how to best support interdisciplinary IES education and research in the various individual contexts presented by different colleges and universities. The 2012 census of IES programs, defined for the purposes of this report as degree-granting administrative structures, found that about a third (32%) are IES units (department, school, college, institute, or center); a quarter (25%) are IES degree programs housed within another department, school, or division within a college; and the remaining 43% are IES programs that span other units.¹³

The proportions of programs that participated in the survey are representative of the census results: 34% are IES departments, schools, or divisions within a college, a primary level school or college, or an institute or center. The 2012 census revealed that the number of IES degrees housed in IES colleges/schools and institutes/centers increased 6% from 2008; this is reflected in the number of these degree programs that participated in the survey (12%). The largest proportion of survey programs (46%) are programs that span other units and the remaining 20% are IES degree programs located within a traditional department, school, or division within a college (Table 1). The survey reveals that programs that span units are relatively equally distributed among those that span a few departments, one college (or similar unit), two or more colleges (or similar units), or the entire school.

Table 1. IES program structure/location within institution

IES academic program location	Baccalaureate colleges n=76			Master's colleges and universities n=104			Doctoral/research universities n=154			Total n=334
	UG n=73	UG/GR n=1	GR n=2	UG n=70	UG/GR n=19	GR n=15	UG n=48	UG/GR n=66	GR n=40	
IES institute or center	4%	-	50%	1%	-	7%	4%	8%	7%	5%
IES college/school	-	-	-	1%	-	7%	-	8%	10%	3%
IES school/division within a college	-	-	-	-	11%	-	8%	8%	2%	4%
IES department	19%	-	-	21%	48%	7%	6%	47%	7%	22%
All IES units	23%	-	50%	23%	59%	21%	18%	71%	26%	34%
Consortium of institutions program	-	-	-	1%	5%	-	-	-	-	1%
Institution-spanning program	10%	-	50%	6%	5%	27%	10%	4%	15%	10%
Multiple-colleges-spanning program	14%	-	-	9%	16%	6%	21%	6%	13%	11%
College-spanning program	7%	-	-	19%	5%	13%	21%	4%	18%	13%
Departments-spanning program	26%	-	-	8%	5%	6%	13%	3%	5%	11%
All IES programs (span multiple units)	57%	-	50%	43%	36%	54%	65%	17%	51%	46%
IES degree program(s) in a non-IES dept./school/div.	20%	100%	-	34%	5%	27%	17%	12%	23%	20%

13. Vincent, S., Bunn, S. and S. Stevens (2012) *Interdisciplinary Environmental and Sustainability Education: Results from the 2012 Census of U.S. Four-Year Colleges and Universities*. National Council for Science and the Environment: Washington, DC.

IES units that offer both undergraduate and graduate degrees are more likely to offer a wider range of IES academic programs including undergraduate and graduate minors and certificates as well as accelerated five-year degrees (Table 2, n=328). Graduate degree only programs are more likely to offer professional master's degrees including Professional Science Master's™.

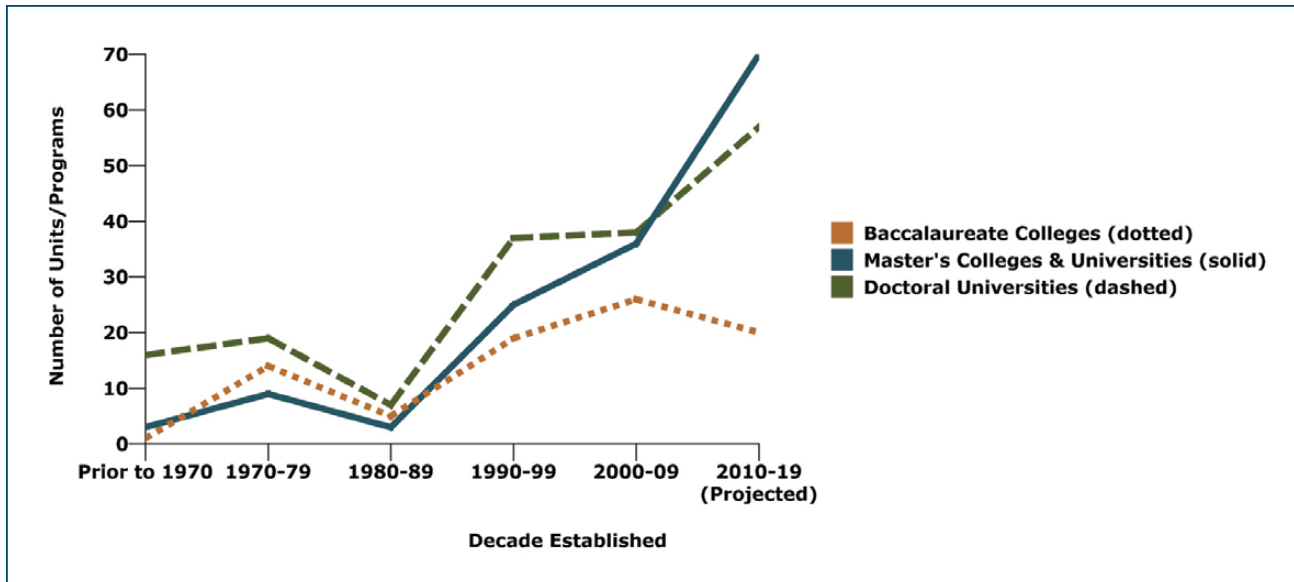
Table 2. IES academic programs offered by unit/program type

IE academic program type	UG only programs n=189	UG/GR programs n=82	GR only programs n=57
Bachelor's degrees	100%	100%	-
Undergraduate minors	38%	71%	-
Undergraduate certificates	4%	15%	-
Five-year bachelor's/master's degrees	-	18%	4%
MA/MS degrees	-	77%	68%
Professional master's degrees	-	11%	23%
Professional Science Master's™ degrees	-	9%	18%
Executive master's degrees	-	4%	5%
Doctoral degrees	-	44%	44%
Graduate minors	-	12%	11%
Graduate certificates	-	27%	12%
Professional/continuing education certificates	-	5%	-

The ages of the IES units/programs included in the survey reflect a previously documented pattern of two waves of program establishment (Figure 2). Current IES programs established prior to 1970 have their roots in natural resources conservation and management and are almost all located at research universities. The first wave of programs designed to explicitly link human and natural systems arose in the 1970s in response to the development of the field of human ecology; many of these programs were named environmental studies. In the 1980s there was an overall decline in the number of IES programs and a turn toward a more narrowed focus on environmental science, especially risk analysis and regulatory compliance. A second and continuing wave of rapid growth in the number of IES programs began following the 1987 United Nations Conference for Science and Development and the first international declaration on sustainability that emerged from the conference—the Rio Declaration on Environment and Development. New types of programs continue to emerge, in particular sustainability programs, programs that link engineering and environmental science, and broadly focused programs in energy.

Our representative survey sample illustrates that almost half of all current IES programs were established between 2000 and 2013. The number of programs created in just the last three years alone (2010-2013) is almost half the total created in the last decade (2000-2009). The accelerating expansion of IES programs has been led by doctoral universities (dashed line) followed closely by corresponding gains in master's institutions (solid line) and baccalaureate colleges (dotted line). Projections for the remainder of this decade, based on the number of programs created from 2010-2013, indicate that the highest level of new program creation may be at master's colleges and universities while new program establishment at baccalaureate colleges may be slowing.

Figure 2. IES program creation



IES programs that offer both undergraduate and graduate degrees are more often located in their own IES units as shown above (Table 1). These units are also more mature: almost all were created before 2000 and many likely evolved from existing units (Table 3). In contrast, 60% of programs that only offer IES graduate degrees and 55% of programs that only offer IES undergraduate degrees were created from 2000-2013.

Table 3. IES academic unit/program age by level of degrees offered

Decade established	UG only units/programs n=177	UG/GR units/programs n=75	GR only units/programs n=51	Total n=303
2010-2013	18%	3%	20%	14%
2000-2009	37%	19%	43%	33%
1990-1999	26%	34%	17%	27%
1980-1989	5%	4%	6%	5%
1970-1979	12%	23%	8%	14%
Prior to 1970	2%	17%	6%	7%
Total				100%

The top factors that lead to the creation of IES programs are similar for all types of institutions, with faculty initiatives most important (Table 4). Student interest and anticipated growth in environmental and sustainability careers are the other two factors cited most often. Although programs are often established due to anticipated jobs demand, documented workforce demand is one of the factors named least, indicating a lack of information about career paths for IES program graduates.

Although the most common top factors are consistent across all institution types, there are some differences based on program level (undergraduate only, undergraduate and graduate, or graduate only). Undergraduate/graduate programs are more often established in response to environmental and sus-

tainability concerns (both local/regional and national/global) and graduate only programs to prepare entrepreneurs, leaders, and change agents. It is interesting to note that bottom-up factors, particularly faculty initiatives and student interest, predominate top-down factors like administrative initiatives.

Table 4. Factors that led to IES unit/program establishment by institution type

Factor	Baccalaureate colleges n=74	Master's colleges and universities n=103	Doctoral universities n=151	Total n=328
Faculty initiative	76%	71%	61%	67%
Student interest	53%	51%	53%	52%
Anticipated growth of new environmental/sustainability careers	43%	55%	44%	47%
Viewed as essential to the mission of the institution	24%	23%	28%	26%
Response to national/global environmental/sustainability concerns	23%	24%	25%	25%
Desire to create environmental/sustainability entrepreneurs, leaders and change agents	28%	21%	22%	23%
Administrative initiative	16%	21%	21%	20%
Response to local/regional environmental/sustainability concerns	14%	18%	15%	16%
Documented near-term or historic workforce demand	8%	17%	11%	12%
Private donation/endowment	7%	2%	4%	4%
Unknown	4%	3%	5%	4%
Other*	4%	3%	1%	2%

*Federal funding/initiative, increase interdisciplinary collaboration, train tribal environmental professionals



Dr. J. Anthony Abbott

Former Director, Environmental Science Program
Stetson University, FL

Dr. Wendy Anderson

Chair, Department of Environmental Science and Geography
Stetson University, FL



Dr. Abbott is an Associate Professor and geographer specializing in political ecology of the Americas. He formerly served as the Director of the Environmental Science Program at Stetson University. Under his leadership the majors became more streamlined, attracting an ever-growing student enrollment and justifying two new faculty positions as the Program merged with the Department of Geography. Professor Dr. Wendy Anderson now serves as Chair of the new Department of Environmental Science and Geography. She is an ecologist specializing in cross-ecosystem flow at land-water interfaces. Assistant Professor Dr. Jason Evans is an interdisciplinary ecologist specializing in climate adaptation in coastal and freshwater spring systems.

The dynamism of the Department of Environmental Science and Geography at Stetson University is evident in its curriculum, research, community engagement, and leadership. At the core of Stetson's mission is collaborative and interdisciplinary work that transcends institutional divisions. The Department offers a BA and a BS in Environmental Science and Geography as well minors in Environmental Science or Geography. Twelve departments from the College of Arts and Sciences and the School of Business contribute classes for the major core and elective requirements that comprise the interdisciplinary curriculum. Major core courses emphasize knowledge of social and environmental systems and geospatial analysis. All students complete a senior thesis and most do an internship.

The emergence of Environmental Science and Geography as a priority growth area for Stetson has developed through collaboration from faculty, students, administration, and staff. Historically, the greatest challenge for the Department has been to manage its popularity. Core introductory courses that also serve General Education needs are in high demand. Careful enrollment management for gateway courses allows undecided students to discover the major, and this has helped drive a 250% growth in majors over five years. Environmental Science and Geography is among the most-enrolled programs and attains high completion success.

The Department benefits from factors that foster intra-institutional collaboration. Stetson's commitment to the environment is asserted by the administration in several ways. Stetson is a signatory of the Talloires Declaration, a Charter Member of the American College and University Presidents Climate Commitment, and a participant with the Association for the Advancement of Sustainability in Higher Education's Sustainability Tracking, Assessment and Rating System (STARS), all requiring the University to perform tangible activities for environmental responsibility and to include environmental sustainability in the university's curricula.

"Personal and social responsibility" is at the core of Stetson's mission, with environmental responsibility as one of fourteen priority themes. Community engagement, in the form of service to community, is considered a pillar of practicing values at the University. Taken together, these institutional priorities create a setting where students, faculty, and administration work together to practice environmental responsibility. Examples of success include sustainability tracking conducted by students and staff, seven active student groups associated with environmental themes (cycling, agriculture, health, development), and diverse campus initiatives (free bike rental, Recyclemania drives, native plant landscape policy).

The Department's continued success and development is based on communication of its expertise, mission, and development goals. Responding to the Provost's charge to identify Stetson's topical, interdisciplinary strengths, Dr. Abbott formed an ad hoc committee to articulate Stetson GREEN (Global and Regional Eco-Expertise Network) in 2010. The working document highlighted existing expertise at

STETSON UNIVERSITY

the University in climate change, resilience, bioethics, sustainability assessment, alternative energy, nature writing, nutrient cycling, wetlands policy, freshwater springs, and international development. The document then identified axes of shared interest among University actors, with freshwater studies emerging as a principal theme. The document also specified development priorities, including the creation of an institute for the environment to coordinate research, outreach, and institutional operational activities across the University. The Stetson GREEN document has been the blueprint to inform new faculty appointments in several disciplines, interdisciplinary coursework among various colleges, and community workshops on sustainability.

With Drs. Anderson and Evans joining Dr. Abbott this year as core faculty in the Department and several other faculty with environmental expertise hired in other departments over the last two years, Stetson can launch an institute for the environment. This will be the nexus for public education and outreach, community partnerships, policy development, and research and support Stetson's role as educator, convener, and leader in the region's efforts to protect and restore natural resources. In particular, freshwater supplies in Florida and the southeast U.S. are under serious strain through the combined impacts of agricultural and urban development and climate change. The institute will serve as an essential component to Stetson's commitment to educate a new generation of environmental leaders by providing opportunities for students to network and work with government agencies, not-for-profit organizations, and businesses that are collectively tackling these immediate and long-term challenges.



Dr. Jan Boll

Founding Director, Water Resources Program;
Director, Environmental Science, Water Resources,
and Professional Science Masters Programs
University of Idaho, ID

Dr. Boll spearheaded the creation of the interdisciplinary Water Resources (WR) Program in 2007 and has served as Director since then. In 2011, WR and the Environmental Science (EnvS) Program combined administratively and Dr. Boll was appointed full-time Director of both programs. Dr. Boll is Professor of Biological and Agricultural Engineering with research and teaching in watershed hydrology and water quality. As Director, he teaches “Interdisciplinary Water Resources Projects” and team teaches “Interdisciplinary Methods in Water Resources.”

The EnvS-WR Program offers three interdisciplinary degree programs: a BS, MS, or PhD in Environmental Science; an MS or PhD in Water Resources; and a Professional Science Master’s™ (PSM) in Natural Resources and Environmental Science. All graduate degrees can be completed concurrently with a JD. While it is referred to as a university-wide Program, it reports administratively through the College of Natural Resources. The Program has one faculty in Environmental Science, housed in Idaho Falls, and promotes strong participation from approximately 100 faculty across the university and its outlying centers in Coeur d’Alene, Twin Falls, and Idaho Falls. Program staff include a full-time advisor, financial specialist, part-time administrative assistant, and several graduate teaching assistants.

Many important assets in Idaho relate to the environment and water, as are many of the complex problems facing the nation and world. The EnvS-WR Program utilizes an interdisciplinary approach to study and understand environmental and water resource issues from a scientific and broadly integrative perspective. At the graduate level, students are trained in interdisciplinary methods and the thesis or dissertation includes components that reflect integration beyond a single discipline. Participatory approaches link research of students and faculty to basins and regions where water and environmental issues are most pressing, including collaboration with Native American tribes. Graduates continue on to pursue higher degrees and are employed across a broad spectrum of careers, including private industry and consulting, government agencies, research and education, and not-for-profit organizations.

The Program enrolls about 300 students, with 130 to 150 undergraduates, 90 to 100 master’s students, and 45 to 50 PhD students. Overall, the split between male and female students is 50-50, with underrepresented minorities ranging from 15% of undergraduates to 22% of graduate students. There

is a strong contingency of international students and the non-thesis MS in Environmental Science and PSM degree have a rapidly growing number of online students.

The EnvS Program started in 1993 and is the oldest and largest interdisciplinary program on campus. Undergraduate majors choose one of three option areas: Biological Science, Physical Science, or Social Science. All students are required to take core courses in math, biology, chemistry, and physics. At the upper level, students select from emphasis areas such as Water, Animal, or Aquatic Ecology; Geo-



Students collect data during an EnvS-WR program field course on water quality and habitat analysis.

spatial Tools; and Climate Change. An increasing number of students are interested in topics related to sustainability, including water quality and quantity, energy, climate, food systems, and ecohydrology. The WR Program started in 2007 and includes three option areas: Engineering and Science; Science and Management; and Law, Management, and Policy. The PSM, added in 2010, includes tracks in Climate Change, Sustainability Science, Sustainable Food

and Fiber, Environmental Contamination, Bioenergy and Bioproducts, Water Resources Management, Ecohydrological Science and Management, and Management of Regulated River Systems.

In 2006, the EnvS Program partnered with students to create the Sustainability Center. Students are encouraged to work or volunteer at the Center and the majority of its support staff as well as four of its seven student directors have been EnvS majors. Under Dr. Boll's leadership, WR faculty created the Waters of the West (WoW) Program in 2006, which in turn launched the degree program. WoW develops methods for integrative education and research in water resources through collaboration between students and faculty.

The EnvS-WR Program draws faculty from eight colleges whose responsibilities include supporting graduate students, mentoring senior capstone students, developing curriculum, and forming collaborative teams for research grants. Dr. Boll manages for success by maintaining strong ties with these faculty and creating an atmosphere of customer service focusing on the student experience. While EnvS-WR is promoted as a signature program at the university, Dr. Boll identifies its challenges as disconnect between bottom-up enthusiasm and activities by students and the need for consistent policies by the administration regarding promotion and tenure, counting of students, returned overhead, and sustainable funding models for staff, teaching aids, and other resources.



Dr. Christopher Boone

Dean, School of Sustainability; Global Institute of Sustainability
Arizona State University, AZ

Dr. Boone was appointed Dean of the School of Sustainability in July, 2014. He previously served as Associate Dean for Education and was the Graduate Director of the School of Sustainability when it was launched in 2006. He is also Professor in the School of Human Development and Social Change and has affiliate faculty appointments in the School of Public Affairs and the School of Geographical Sciences and Urban Planning. Boone received his PhD in Geography from the University of Toronto and was a postdoctoral fellow at McGill University. His research expertise is urban sustainability.

The School of Sustainability (SOS) developed the nation's first comprehensive degree granting program in sustainability. Its mission is to educate a new generation of scholars and practitioners and create innovative modes of scholarship by bringing together people from multiple disciplines, leaders, and stakeholders to develop practical solutions to the most pressing sustainability challenges.

It is housed in the Julie Ann Wrigley Global Institute of Sustainability, established in 2004 to infuse sustainability principles in all teaching, research, practice, and operations at a large research university of 82,000 students. The Director of the Institute works closely with the Dean of the School and the Executive Director of the Institute and School, who together make up the Directorate.

This group reports directly to the University President and a management team that includes the Provost, the Vice President for the Office of Knowledge Enterprise Development, and the CEO of ASU Foundation. Separately, the Dean reports to the Provost since the School operates as a distinct college.

In addition to managing its own degree programs, faculty, staff, and students, the School supports sustainability education across the entire campus through the creation of a university-wide Sustainability minor; sustainability concentrations in business, engineering, interdisciplinary studies, and public programs; and concurrent undergraduate and graduate degrees with other colleges. It is now working closely with the rapidly growing ASU Online programs to increase sustainability offerings. The end result is that approximately 1,500 students are enrolled in sustainability-focused degrees, concentrations, and the minor, with more than 65,000 seats filled in sustainability-related classes last year.

SOS engages three categories of faculty: appointed, graduate, and sustainability scientists and scholars. At present, there are 31 appointed faculty in the School, half of whom have salaried appointments in other colleges. These faculty are evaluated every year by the Dean and receive part or all of their

salary through the School. All appointed faculty plus another 52 faculty are graduate faculty, meaning they have been approved to chair dissertation committees of PhD students. Sustainability scientists and scholars, who number over 300, are faculty and other staff whose research, teaching, and practice contribute to the School and the Institute. Every college has representatives in this group, which is critical given the breadth and expertise necessary to devise solutions to complex sustainability challenges.

Success means continuous improvement of educational opportunities in sustainability. In the last two years, ASU launched two new degree programs: an Executive Master's for Sustainability Leadership, a hybrid online program targeted to working professionals, and a Master of Sustainable Solutions, an applied degree that links sustainability principles to different knowledge domains and problem sets. The School recently remapped the undergraduate curriculum based on five core sustainability competencies of systems thinking, future thinking, normative thinking, strategic thinking, and collaborative thinking. This led to the development of program level learning outcomes, including portfolios to track what sustainability majors should know and be able to do when they graduate. The School has also invested heavily in project- and problem-based learning—or solutions learning—as a critical pedagogical tool.

Since sustainability is a relatively new field, the School has made special investments to help with internship and experiential learning, career services, and study abroad opportunities. As a result, it has some of the highest retention rates on campus and students are doing exceedingly well in finding meaningful careers and gaining acceptance into graduate programs. A growing alumni network offers a job shadowing program and opens the door to internship and job opportunities. The Walton Sustainable Solutions Initiative provides opportunities for students to engage in real-world problem solving and has invested in student success programs such as study abroad scholarships and development of the Executive Master's for Sustainability Leadership.

The School of Sustainability has benefited tremendously from the unwavering support of ASU's leadership.

Student participation in education programs, the growth in external partnerships, the rapid expansion of sustainability faculty, the acceleration in sponsored research awards in the Institute, the generous investments from philanthropy, and other achievements have validated the bold experiments envisioned for Sustainability at ASU crafted more than a decade ago. A critical point is that sustainability is not a special project at ASU—it is infused into all aspects of the university. Sustainability is a defining principle of ASU and central to the identity of a new kind of university ready to tackle the challenges of this century.

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Dr. John Byrne

Director, Center for Energy and Environmental Policy
University of Delaware, DE

Dr. Byrne is the Distinguished Professor of Energy and Climate Policy and Chairman and CEO of the Foundation for Renewable Energy and Environment (FREE). FREE was created in 2011 with a mission of promoting a better future based on energy, water and materials conservation, renewable energy use, environmental resilience, and sustainable livelihoods. He has contributed since 1992 to Working Group III of the Intergovernmental Panel on Climate Change (IPCC) and is among the Panel's authors credited by the IPCC for its selection for the 2007 Nobel Peace Prize. Dr. Byrne is currently Distinguished Professor of Sustainable Energy at the Daegu Gyeongbuk Institute of Science and Technology, a new university created by South Korea to lead its plan for green energy technology and policy development. He is the architect of the Sustainable Energy Utility (SEU) and its innovative energy efficiency and renewable energy finance program, which received U.S. White House recognition as part of the nation's Better Buildings Challenge.



Established in 1980, the Center for Energy and Environmental Policy (CEEP) was the first in the nation to offer interdisciplinary graduate research degrees in energy and environmental policy and sustainability. It is an intercollegiate, multidisciplinary unit supported by four colleges: Arts and Sciences, Engineering, Agriculture and Natural Resources, and Business and Economics. CEEP is a leader in research-based education that offers PhD, Master's and BS degrees in Energy and Environmental Policy. An official UN Observer on climate issues, CEEP reframes energy and the environment as more than commodity and technology issues, examining underlying social, economic, and policy challenges in order to identify pathways which integrate equity and justice.

CEEP is comprised of a faculty and student community with backgrounds in the social sciences, engineering, physical and natural sciences, and the humanities. CEEP brings together an internationally diverse faculty, including eight core University faculty members, 18 affiliate University faculty, and six adjunct faculty from around the world. It typically enrolls 70 to 75 graduate students from more than 20 countries each year in addition to more than 60 undergraduate majors since the program's launch in Fall 2011.

Its degree programs immerse students in the study of fundamental challenges confronting local to global efforts to realize energy and environmental sustainability. Students prepare for careers in en-

ergy and environmental planning, policy analysis, research, and outreach, taking positions in local and national governments, international agencies, universities, consulting firms, utilities, research centers, and 'green' businesses. Courses and research programs explore energy and climate sustainability, environmental justice, sustainable development, global environments, political ecology, and water security. Collaborative international research and exchange agreements with 22 Asian, African, European, and Latin American universities and research institutions enable students to explore energy and environmental policy issues throughout the world.

Typically, CEEP works on 15 projects each year. CEEP's research programs address a wide range of topics including climate change and energy sustainability, restoring biodiversity, sustainable development, community agriculture, water security, and environmental justice. CEEP has created a variety of scholarly publication platforms as well as policy series to enable faculty and students in and beyond the Center to share ideas with researchers in the field and the general public. It is the editorial host of an annual book series, *Energy and Environmental Policy*, published by Transaction Publishers and for which CEEP's director is editor-in-chief. This book series enables the Center to



publish its newest ideas on the interrelated research challenges of policy, economics, and ecology to address pressing energy and environmental problems for our time. CEEP's Political Ecology Research Program is led by this book series. CEEP also supports the journal *Energy and Environment* published six times per year by Wiley and Sons as part of its WIREs series and for which CEEP's director is co-editor-in-chief. Papers appear by invitation only, are peer-reviewed, and enable researchers around the world to publish on leading issues of the field. It manages a Policy Briefs series and a professional network, FREE Minds, for the Foundation for Renewable Energy and Environment (FREE) in order to foster a commons of dialogue and critical thinking on issues of the field.



Dr. Peter Crane

Carl W. Knobloch, Jr. Dean,
School of Forestry and Environmental Studies
Yale University, CT

Dr. Crane has been the Carl W. Knobloch, Jr. Dean at the School of Forestry & Environmental Studies (F&ES) since 2009. He is also Professor of Botany, with a research focus on the diversity of plant life — its origin, fossil history, current status, conservation, and use. He holds appointments in the Yale Departments of Ecology & Evolutionary Biology and Geology & Geophysics. From 1999 to 2006, he was the Director of the Royal Botanic Gardens, Kew, one of the largest and most influential botanical gardens in the world. Before joining Kew he was Director of the Field Museum in Chicago, where he was responsible for the museum's vast collections and associated scientific and conservation programs.

Dean Crane is a Fellow of the Royal Society and the American Academy of Arts and Sciences. He is also a Foreign Associate of the U.S. National Academy of Sciences, a Foreign Member of the Royal

Yale SCHOOL OF FORESTRY & ENVIRONMENTAL STUDIES

Swedish Academy of Sciences, and a Member of the German Academy Leopoldina. In 2004, he was knighted in the U.K. for services to horticulture and con-

servation. In December he will receive the 2014 International Prize for Biology, which is administered by the Japan Society for the Promotion of Science, for his work on the evolutionary history of plants.

Yale F&ES is an internationally recognized professional school that develops and trains future environmental leaders. Through its research and other professional activities it is also engaged in creating new approaches and knowledge for improved environmental management. Founded in 1900 as the “Yale Forest School,” F&ES has evolved over time in its mission and objectives — as well as its name. The School now provides professional training across a broad range of specializations in the environmental sphere, offering master's degrees in Environmental Management, Forestry, Forest Science, and Environmental Science, in addition to a PhD program. The School also offers joint master's degrees with nine different schools at Yale and elsewhere, with disciplines including law, management, public health, public policy, divinity, and architecture.

Research and teaching at Yale F&S are focused in several broad areas including ecology, ecosystems, and biodiversity; environmental management and social ecology; energy and the environment; forest science and management; global change science and policy; health and environment; industrial environmental management; policy, economics, and law; urban ecology, environmental planning, and design; coastal systems; water resource science and management; and business and the environment.

Yale F&ES is also home to several centers that sponsor student internships, coordinate faculty research in areas of common interest, and create symposia, conferences, and outreach programs. These include the Yale Center for Business and the Environment; the Yale Center for Environmental Law and Policy; the Center for Green Chemistry and Green Engineering at Yale; the Center for Industrial Ecology; the Yale Project on Climate Change Communication; and GEM: the Governance, Environment, and Markets Initiative.

Since arriving in 2009, Dean Crane has overseen continued improvements to the School's curriculum, an increased emphasis on the use of technology in the classroom, and closer interaction between F&ES and Yale University's central administration and other professional schools. The integration of new technologies will continue to be an emphasis at the School, including the introduction of several online courses that "flip" the traditional classroom model. These courses deliver instruction online, while also continuing to provide in-person instructor interactions. The School will also continue to place more focus on teaching professional skills of all kinds that are important facets of environmental leadership.

Despite fiscal challenges in the broader U.S. economy, F&ES has been able to strengthen its academic programs and faculty over the last five years through the careful management of resources, the creativity of its faculty and staff, and the generosity of its broad alumni base. The size of the faculty, as well as the number of postdoctoral and postgraduate positions, has increased. To help meet this expansion in numbers, the School last year launched a long-term series of renovations to some of its historic buildings to supplement the world-class facilities in the LEED platinum certified Kroon Hall.

The core of the program at F&ES involves thoughtful analysis and rigorous scientific study of the interaction between human societies and the natural world as a basis for sound environmental management. Because many of the solutions to these environmental challenges lie outside the established environmental sector, the School also reaches into many other areas, including economics, business, law, engineering, and medicine. The School aims to develop professionals trained in environmental management who can also wield influence in these broader arenas. Environmental thinking, Dean Crane asserts, needs to be incorporated into corporate planning, energy strategy, technology policy, research and development funding, tax policy, international trade and finance, development assistance, and many other areas that once seemed far removed from traditional environmental concerns.





Dr. Christopher D'Elia

Dean, School of the Coast and Environment
Louisiana State University, LA

Dr. D'Elia joined Louisiana State University (LSU) as Dean of the Coast and Environment in 2009. He earned his PhD in Zoology from the University of Georgia and completed post-doctoral work at the University of California, Los Angeles and Woods Hole Oceanographic Institution. Dean D'Elia began his career in higher education at University of Maryland where he rose through the academic ranks to professor and served as Director of the Maryland Sea Grant College. He has held a number of other administrative appointments including Director of the Biological Oceanography Program at the National Science Foundation in Washington, D.C. At the University at Albany, SUNY, Dean D'Elia held professorships in Biological Science and Public Administration and Policy and served as Vice President for Research and SUNY Research Foundation Operations Manager. At the University of South Florida, St. Petersburg, he served in a variety of administrative positions including Interim Vice Chancellor for Academic Affairs.

The School of the Coast and Environment (SC&E) provides knowledge, technology, and human resources for successful management of natural resources and the resolution of environmental issues important to Louisiana, the Gulf of Mexico region, and comparable areas throughout the nation and the



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COAST & ENVIRONMENT

world. Founded in 2001, the School is an interdisciplinary academic research and educational organization that embraces a systems approach to coastal, oceanic, and environmental sciences—uniting 40+

faculty from a variety of subject areas including but not limited to biology, chemistry, computational and information technologies, oceanography, economics, toxicology, engineering, scientific modeling, public policy, and law. Within the LSU system, SC&E has strong affiliations with the Coastal Studies Institute, the Coastal Sustainability Studio, the Energy Law Center, and the Center for Computation and Technology, through which SC&E provides faculty fellows and/or participates in joint hires.

SC&E is made unique by its location in Baton Rouge, Louisiana, one of the richest natural labs in the world for coastal and wetlands studies. Louisiana's geography and abundance of natural resources and wildlife have bound lives and livelihoods inextricably to the environment for centuries, and the 21st century's natural and manmade disasters in the Gulf increased demand for new types of multi-disciplinary, environmental science-based jobs. Mentored by SC&E's world-renowned researchers and fostered in hands-on fieldwork, SC&E students develop an understanding of the precarious balances struck between the environment and the economy to preserve a healthy, environmentally sustainable lifestyle.

With regard to its international standing, SC&E has strong research partnerships in China and Latin America and serves as the North American node of “Land-Ocean Interactions in the Coastal Zone,” a core project of the International Geosphere-Biosphere Programme and the International Human Dimensions Programme on Global Environmental Change. Furthermore, SC&E faculty represent a variety of cultural backgrounds and faculty research has been conducted on all seven continents and in all oceans. As respected experts in their fields, faculty are frequently called upon to provide expert testimony, commentary, and insight for a number of areas, including oil spills and hurricanes.

SC&E’s academic programs educate and train tomorrow’s environmental scientists, managers, and policymakers through specialized study opportunities and degree programs focused on the Gulf Coast region. Over 120 graduate students study in SC&E’s Master’s and PhD programs within the Department of Oceanography and Coastal Sciences and the Department of Environmental Sciences. The School’s unique Coastal Environmental Science (CES) Program offers a BS degree focused on the interdisciplinary nature of real-world issues in Louisiana’s coastal regions that works toward enhancing the stewardship of Earth’s natural resources through classroom and research experience. Launched six years ago, the CES Program started with five students and now numbers approximately 100. It offers two paths for students: one geared toward research to support pursuit of an advanced degree and the other for direct entry into the workforce. SC&E has partnered with Baton Rouge Community College (BRCC) to seamlessly admit and enroll BRCC students who have successfully completed two years of study.



All SC&E students enjoy personalized learning experiences through low student-faculty ratios and academic mentors. Graduates begin community outreach early in their careers by participating in School-sponsored volunteer activities such as EnvironMentors, a weekly science program for high school students; Beach Sweep, a day-long trash pick-up in and around the lakes; and Marsh Madness, a day dedicated to planting thousands of seedlings in the marsh. Roughly one third of SC&E’s alumni pursue higher education, one fourth go into government service, and one fourth go into fields related to energy, engineering, oil, and gas.

IES Program Leadership

In this section, we present the survey data on program administrators and reporting. The data include: primary administrator's title, primary administrator's FTE (full-time equivalent) appointment, primary administrator's academic preparation, whether the program has official co-administrators, who the primary administrator reports to, and who is involved in the primary decision making for the IES unit/program(s).

IES program administrators' titles and reporting structures reflect the diversity of IES program administrative structures (Table 5). With few exceptions, administrators for IES departments and degree programs within other departments are the department chair or head. Director is the most common title for the administrators of programs that span units. IES colleges and schools are led by deans and institutes and centers by directors or deans. A small number are program coordinators and a few programs do not have an official administrator.

Table 5. Unit/program primary administrator title

Primary Administrator Title	Proportion of Total n=342
Program director/chair (or equivalent)	42%
Department chair/head	34%
Program coordinator	8%
College/school dean (including assistant, associate)	6%
School/division within a college dean/head	4%
Institute/center director	4%
No official administrator	2%
Total	100%

A little over a fifth of programs (22%) have co-administrators (e.g. associate chairs, assistant directors or program managers) that assist with unit/program management. Co-administrators are more common at larger institutions: 30% of units/programs at doctoral institutions have co-administrators compared with 14% at master's colleges and universities and 16% at baccalaureate colleges.

A little over half (51%) of IES administrators have a part-time specified FTE appointment for serving as the program administrator; most of these are below 50% FTE (Table 6). The mean part-time appointment is 31% FTE. A few IES administrators (9%) have a full-time appointment as administrator. The remaining administrators' appointments are unspecified.

Table 6. IES unit/program primary administrator appointment

Primary administrator appointment	Proportion n=324
Full-time appointment as administrator	9%
Administrator appointment not specified*	40%
Administrator FTE >50% FTE (maximum 85%)	4%
Administrator FTE between 26-50%	17%
Administrator FTE 25% or less (minimum 1%)	30%
Total	100%

*Includes those that reported a 0% FTE

IES administrators come from a variety of backgrounds. Almost a third report that their academic preparation was interdisciplinary and 42% were trained in the physical or life sciences (Table 7). The remainder have training in other disciplines, with the majority in the sciences but a few in professional fields or humanities.

There is a strong correlation evident between administrator training and title, which also provides clues about the origins of IES programs.¹⁴ IES college/school deans, institute/center directors, program directors, and program coordinators are all more likely to identify their academic preparation as interdisciplinary. Physical sciences is the second most common field for IES college/school deans and institute/center directors; life sciences is second most common for program directors and coordinators. Department chairs/heads most often identify their field as physical sciences, while interdisciplinary is second. Directors/deans/heads of divisions or schools within a college most often identify natural resources management/agriculture as their primary field with interdisciplinary and life sciences tied for second.

Table 7. Primary administrator academic preparation

Primary administrator academic preparation	Proportion n=341
Interdisciplinary	29%
Physical sciences	22%
Life sciences	20%
Natural resources management/agriculture	10%
Social sciences	8%
Applied sciences/engineering	6%
Professional fields (e.g. public administration, law, business)	3%
Humanities	2%
Total	100%

As would be expected, reporting structures are related to the primary administrator's title. Almost all department chairs/heads report to the dean of their college or to their school's chief academic officer.

14. Mann-Whitney t test, a non-parametric test of the difference in the shape or location (central tendency) of two independent groups.

Most deans/heads of colleges and schools report to the chief academic officer or to the dean of their college, if they lead a school or division within a college.

The majority of IES administrators (66%) report to a college dean or to the deans of two or more colleges (Table 8). A fair number (17%) of administrators report to the chief academic officer of their institution; a smaller number (13%) report to a department chair/head or to the chairs/heads of several departments. Only a few (4%) report to the office of the president/chancellor, to a steering committee, or to another administrator.

Table 8. IES unit/program primary administrator reporting structure

Primary administrator reports to	Proportion n=340
Dean of one college	59%
Provost/chief academic officer	17%
Chair/head of one department	11%
Deans of two or more colleges	7%
Chairs/heads of two or more departments	2%
President/chancellor	1%
Steering committee of administrators	1%
Steering committee of administrators & faculty	1%
Other*	1%
Total	100%

*Institute director, area leader (biology, chemistry & environmental studies)

Reporting structures for IES program directors, program coordinators, and institute/center directors are more diverse (Table 9), although most program administrators also report to a college dean or deans or to the office of the chief academic officer. About a third (29%) of program coordinators report to a department chair/head as do 16% of program directors/chairs and 15% of institute/center directors.

Table 9. Primary administrator reporting structure for program directors/coordinators and institute/center directors

Primary administrator reports to	Program director/chair n=143	Program coordinator n=28	Institute/center director n=28
Dean of one college	60%	36%	31%
Provost/chief academic officer	11%	3%	31%
Chair/head of one department	16%	29%	15%
Deans or two or more colleges	9%	11%	23%
Chairs/heads of two or more departments	1%	18%	-
President/chancellor	-	-	-
Steering committee of administrators	1%	-	-
Steering committee of administrators & faculty	2%	3%	-
Total	100%	100%	100%

It is surprising to note that, for many programs, the program administrators and faculty are not participants in primary decision making (resource allocation, curriculum design, hiring, promotion, etc.). Only 77% of programs report that primary decision making includes the administrators and less than half include the faculty appointed in or that participate in the program (Table 10). Many programs' decision making involves executive/steering/advisory committees or administrators of other units, especially graduate only programs at doctoral institutions. Limited autonomy is likely a significant challenge for some IES programs.

Table 10. Primary decision making participants by program level

Decision-making participants	Baccalaureate colleges n=74			Master's colleges and universities n=103			Doctoral universities n=151			Total n=328
	UG n=71	UG/GR n=1	GR n=2	UG n=70	UG/GR n=19	GR n=14	UG n=48	UG/GR n=64	GR n=39	
Unit/program administrators	68%	100%	100%	74%	74%	93%	75%	91%	82%	77%
Tenure/tenure-track faculty appointed in unit/program	54%	-	50%	47%	68%	50%	33%	75%	36%	52%
Tenure/tenure-track faculty that participate in unit/program	54%	-	-	47%	32%	36%	42%	30%	64%	44%
Other faculty that participate in unit/program	28%	-	50%	20%	32%	21%	33%	27%	23%	26%
Executive/steering/advisory committee	15%	100%	-	7%	11%	29%	23%	19%	41%	19%
Other unit administrators	17%	-	100%	14%	37%	14%	17%	14%	21%	18%
Unit/program staff	14%	-	50%	10%	26%	29%	19%	17%	21%	17%
Student advisors	1%	-	-	3%	-	-	-	-	-	1%



Dr. Elizabeth DeSombre

Director, Environmental Studies Program
Wellesley College, MA

Since 2001, Dr. DeSombre has been the Camilla Chandler Frost Professor of Environmental Studies and Director of the Environmental Studies (ES) Program at Wellesley College. She earned her PhD in Political Science from Harvard University in 1996 and has a BA with honors in Government and Latin American Studies from Oberlin College. DeSombre previously served as Assistant Professor of Environmental Studies and Political Science at Colby College.

The ES Program and major at Wellesley College were created in 2001, facilitated by a donation from alumna Camilla Chandler Frost, who endowed two faculty positions (one in the social sciences from outside the college, and one in the sciences, to be chosen from among existing Wellesley faculty members) and a small budget for the Program. A minor was created in 2007.

WELLESLEY COLLEGE

The ES Program also administers the Wellesley component of the three-college Sustainability Certificate Program, a joint program with Babson and Olin Colleges.

The ES Program includes one staff member (Program Coordinator), three full-time faculty members (one professor, one associate professor, and one assistant professor), and one full-time visiting lecturer who are directly appointed to the Program, along with half of the staffing time of a lab instructor directly appointed in the Biological Sciences department. In addition, nine Advisory Faculty Members and six Affiliated Faculty Members have different home departments and are involved in the administration of the ES Program. ES Advisory and Affiliated Faculty positions are voluntary for those outside of the ES Program, but Advisory Faculty members are full members of the governance structure of the Program. This committee meets every two weeks for official ES business and weekly for casual coffee and tea gatherings. At this point both Program and Affiliated Faculty are scattered throughout campus. The current capital campaign has as one of its funding goals the creation of a Center for the Environment that would house all directly appointed ES faculty members.

The Program's mission statement acknowledges that Environmental Studies is a particular way of thinking, conducting research, and posing questions that is inherently interdisciplinary. An ES major or minor aims to provide students with critical skills that will allow them to engage current environmental issues and prepare to recognize future ones. Central to this goal is helping students develop independent critical thinking, problem framing, and problem solving skills across disciplines and cultures with which they can diagnose and prioritize a wide range of environmental issues, from the local to the international, from the most pressing to the most long-term.

The Program is quite structured, building from required interdisciplinary introductory and intermediate courses through a project-based capstone course, along with elective courses that students choose based on their particular interests. Requirements also include intermediate-level work in the sciences, social sciences, and humanities via courses designed specifically for the major. The ES major has grown dramatically since its inception, now in the top quarter of majors in terms of enrollment. It has also involved a particular focus on diversity within ES, and in recent years more than 50% of majors have been students of color. That issue has been important in curricular discussions and the ES Program is hosting a conference in summer 2015 on the topic of race and privilege across the ES curriculum. The Program supports student research, and faculty members have co-authored papers with undergraduates while students have also received external fellowship support.

The position of Program Coordinator, which serves as the administrative hub, is key to the success of the Program. The coordinator helps students obtain jobs and internships, publishes a weekly e-newsletter, organizes alumnae events and surveys, and serves as informal advisor. In addition, the congenial relationship among affiliated faculty members has helped create an inclusive and friendly atmosphere for faculty, staff, and students. The “teach each other stuff” series takes place at the end of every semester; over dinner and wine, two or three faculty members teach faculty and guests a basic concept or tool they cover in ES-related courses. This regular and popular event allows the faculty to develop shared understandings across disciplinary backgrounds.



Challenges include adequate long-term staffing, as the major is growing while the college is decreasing the number of faculty positions; long-term retention of the Program Coordinator position, which is currently supported on an ad hoc basis; and the place of an interdepartmental program that crosses divisional boundaries within the college’s administrative structure.



Dr. Gwendelyn Geidel, JD

Director, Environment and Sustainability Program
University of South Carolina, SC

Dr. Geidel was appointed in October, 2012 to a five-year term as the Director of the Environment and Sustainability Program (E&SP). She earned her doctorate in Geology from the University in 1982 and earned her JD from the USC School of Law in 1989. While her current research blends environmental and sustainable education with environmental resource management, she also specializes in geoscience with an emphasis on the anthropogenic impacts of water-rock interactions and a focus in environmental law on the Clean Water Act and Surface Mining Control and Reclamation Act (SMCRA).

The E&SP is the interdisciplinary home for academic programs, scholarship, and community outreach activities that link environmental and sustainability initiatives at the University of South Carolina (USC). The Program is part of the recently formed School of the Earth, Ocean, and Environment, which also includes the Marine Science Program, the Department of Earth and Ocean Sciences, and two institutes. The E&SP fosters creative interactions among multiple campus units, provides undergraduate and graduate degree programs, and is dedicated to providing the broader community with educated scholars and scientists, as well as research- and policy-based solutions for the planet's environmental and societal needs.

Sustainable Carolina
UNIVERSITY OF SOUTH CAROLINA



tions among multiple campus units, provides undergraduate and graduate degree programs, and is dedicated to providing the broader community with educated scholars and scientists, as well as research- and policy-based solutions for the planet's environmental and societal needs.

The Environment and Sustainability Program promotes a university-wide focus on the environment and the creation of a sustainable future by:

- supporting interdisciplinary activities among faculty and students;
- fostering and enhancing research and scholarship to generate new knowledge;
- helping to apply new knowledge and create new technologies to advance environmental understanding and sustainable practices;
- promoting awareness of environmental and sustainability issues among students, faculty, and administrators; and
- providing interdisciplinary education for undergraduate and graduate students and providing outreach to broader public communities to promote sustainable use of natural and cultural resources.

The E&SP represents a wide range of synergistic disciplines, with over 100 faculty cutting across the Columbia and regional USC campuses. The voting faculty of the unit is made up of jointly appointed faculty, with ½ E&SP and ½ tenure-granting unit per formal MOU, and Senior Associate

faculty, who contribute significant time and effort but do not have formal MOUs. Affiliated faculty meet effort criteria, but do not have voting rights. Interdisciplinary faculty teams conduct research on complex problems related to sustainability, eco- and earth systems, climate change and weather, environmental risks and hazards, water resources, and society and the environment.

The academic programs offer diverse opportunities that take advantage of outstanding expertise from departments and programs across campus. Two undergraduate majors, a BS in Environmental Science and a BA in Environmental Studies, and a minor in Environmental Studies coupled with a proposed minor in Sustainability provide undergraduates with the opportunity to study an interdisciplinary curriculum with a strong science or policy environmental perspective. While the E&SP faces the obstacle of obtaining recognition of its degrees as STEM majors by the state, the distribution of jobs obtained upon graduation indicates that it has been successfully preparing students for STEM careers.

Additionally, the Master in Earth and Environmental Resource Management (MEERM) trains graduate students for management positions in earth and environmental resources, such as minerals, water, sustainable development within ecosystems, and use of man-made materials in the environment. The joint MEERM/JD degree provides a streamlined program for students wanting both the Master's and Law degrees.

The E&SP also provides a number of Beyond the Classroom (BTC) experiences for students, including internships with Sustainable Carolina, research explorations, and field courses within Congaree National Park. The Program also provides opportunities to graduate with Leadership Distinction, which recognizes students' efforts in community and civic engagement, research, or study abroad.



The success of E&SP faculty in meeting their research and scholarship objectives is paramount. Dr. Geidel indicates that assisting faculty in meeting personal goals is equivalent to assisting E&SP undergraduate and graduate students in obtaining the best education possible and preparing them for successful careers. As Director, she strives for success in key areas such as retention and promotion of faculty, while primary obstacles include managing time and funds to offer meaningful faculty interactions across a broad interdisciplinary program. As a leader of the E&SP, Dr. Geidel also continues to seek new ways to integrate sustainability and the environment across campus. This has led to strong relationships for new research this year with nutrition and food supply, offshore energy from wind to gas, climate change, and biodiversity, as well as more integrated relationships for outreach and student engagement, including Sustainable Carolina and USC Connect.



Dr. Eban Goodstein

Director, Bard Center for Environmental Policy
Bard College, NY

Dr. Goodstein was appointed Director of the Center for Environmental Policy (CEP) in 2009 and also serves as Founding Director of the MBA in Sustainability. Dr. Goodstein holds a PhD in Economics from the University of Michigan and a BA in Geology from Williams College. CEP offers two MS degrees, the first in Environmental Policy and the second in Climate Science and Policy. The Center also hosts public programs including the National Climate Seminar and C2C Fellows, a national undergraduate leadership training program.

Graduate education in sustainability at Bard is guided by the understanding that its students are living at an extraordinary moment in human history and the work they will do over the next few decades will profoundly impact the earth's future.



Bard's programs explicitly focus on leadership education through courses that teach leadership skills in the context of career development. Bard commits to providing its students in two short years with the highest quality mix of classroom education, professional experience, and career development opportunities so that they can start changing the world, soon. In 2014, the Princeton Review ranked Bard College first in best classroom experience, and its graduate programs share this focus through excellence in teaching. Both programs are small, with 15 to 30 students each year, and rely on dedicated faculty who teach very little in other programs.

MS policy students learn to "change the rules" at the international, national, regional, and urban levels, as well as within corporations. The two MS policy programs offer a residential first-year core at Bard's main campus in Annandale-on-Hudson, including year-long courses in environmental or climate science, environmental or climate law and policy, and environmental and natural resource economics. Students also take econometrics, GIS, and an elective course during a two-week January term. Beginning in June of the second year, students pursue high-level experiential opportunities before returning to complete a capstone thesis.

In contrast, the MBA students are focused on "playing the game" within the confines of the existing rules by building financially viable for-profit and not-for-profit organizations focused on solving environmental or social problems. The MBA is one of a handful of programs globally that fully integrates sustainability into a core business curriculum. While teaching conventional topics – such as economics, finance, strategy, and marketing – all courses focus on using business tools to build mission-driven organizations.

The MBA also has a key experiential dimension. First-year students participate in teams in a year-long consultancy working for business clients on sustainability challenges, while second-year students pursue a capstone that allows them to drive entrepreneurial projects or gain experience in an internship or practicum. In its low-residency structure, classes meet once monthly in New York City from Friday morning to Monday afternoon and online on Tuesday and Thursday nights. This allows students to work up to thirty hours per week. Those working full time opt for a part-time, three-year track.

Dr. Goodstein identifies two primary challenges. First, Bard is not known for graduate programs in business and social science; consequently, it has become an expert in grassroots marketing. A second, more serious challenge is increasing undergraduate student debt, as taking on additional debt can be a serious obstacle to graduate student enrollment, particularly for policy students. This challenge is being addressed structurally and by integrating leadership training with career development. As many extended internships in the policy program were turning into jobs, Bard now enables a non-residence capstone for students who find employment in their second year. Consequently, both master's programs are moving toward hybrid models combining intensive residencies with synchronous online classes.

Simultaneously, Bard is focusing on both leadership education and high-level experiential opportunity as foundations for career development and success, as its students will not change the world as professionals unless they can quickly gain positions of influence. Leadership skills – visioning, self-understanding and empathy, team-building, persuasive communication, network development, and comfort in asking for support and money – are also critical career skills. Moreover, students enter Bard's graduate programs in sustainability with the understanding that their generation has a unique role to play in the history of our species. Dr. Goodstein sees CEP's commitment as providing its students with the academic training, set of experiences, and career networks to enable them to grow quickly into leadership positions and get the job done.





Dr. David Gosselin

Director, Environmental Studies Program; College of Agricultural Sciences and Natural Resources and College of Arts and Sciences
University of Nebraska, Lincoln, NE

Dr. Gosselin is a Professor in the School of Natural Resources. He was appointed Director of the Environmental Studies Program in 2008 and holds a PhD in Geology from the South Dakota School of Mines and Technology. The Environmental Studies Program awards a BA and BS in Environmental Studies and a Master's and PhD degree-level specialization in Environmental Studies. The undergraduate program provides both a comprehensive education in the physical, biological, and social sciences and development of competency in a specific discipline, thus preparing students to contribute solutions for current and future local, regional, and global environmental challenges. It currently has approximately 110 majors, double majors, and minors. It annually graduates 26 to 28 students.

The Environmental Studies Program is owned and operated by two Colleges, the College of Arts and Sciences (CAS) and the College of Agricultural Sciences and Natural Resources (CASNR). The



Program is advised by the Environmental Studies Coordinating Committee, consisting of four faculty from each College and a representative from each of the respective

dean's offices. A part-time program director and full-time program coordinator, who also serves as chief academic advisor, administer and teach all courses in the Program. No faculty are assigned full time to the Program. Although Dr. Gosselin's academic appointment is in the School of Natural Resources, he devotes the majority of his time to teaching the Environmental Studies core curriculum.

Altogether, the Environmental Studies Program's interdisciplinary curriculum uses a student-centered approach to create a positive and nurturing learning community that emphasizes community engagement, internship opportunities, communication skills, collaboration, teamwork, leadership skills, and critical thinking. These qualities will serve students well in the workplace, in the pursuit of advanced degrees, and/or as life-long learners. The extent to which objectives related to 21st century competencies are achieved is assessed through a partnership with Target Training International Performance Systems, LTD. This approach allows the Program to gain unique insights into the behaviors, motivators, and personal and professional competencies of students to determine their growth throughout the program, as well as their individual correlation with pre-defined employer expectations.

Program learning goals and outcomes are set to ensure that graduates are conversant in the issues and demands of global society, prepared to meet the needs of employers who want employees that possess 21st century competencies, and able to work across disciplines. Ultimately, they will be competitive in the job market or graduate program matriculation. Sustainability is embedded into the program philosophy as a basic framework principle to emphasize the importance of sustaining the life support systems of the planet while meeting the needs of people today and in the future. The curriculum consists of four components: core courses, collateral courses, an emphasis area, and a senior thesis or project. Students can choose from eleven emphasis areas in the CAS, including Anthropology, Biology, Chemistry, Communication Studies, English, Geosciences, Climatology/Meteorology, Geography, Political Science, Psychology, and Sociology. Emphasis areas in the CASNR include Natural Resources, Applied Climate, and Entrepreneurship and Leadership. The Program also has a cooperative agreement with the University of Nebraska Medical Center for a four plus one program in Public Health.

The Program's success has been influenced by a curriculum updating process initiated in Fall 2008 and driven by Dr. Gosselin and the program coordinator. Due to limited institutional commitment to sustainability as an educational



concept at the time of the changes, the Environmental Studies Program chose to integrate sustainability at the program level where it had control of curriculum content. This process required minimal university resources and institutional commitment yet enabled the Program to add sustainability to the curriculum as a framework element and foundational concept.

Dr. Gosselin identifies collaboration, compromise, and the Program's student-centered focus as its keys to success, as the Program benefits from the diverse interests and talents of its students while the director and the coordinator share the same educational philosophy. During the curriculum updating process, there was little to no significant resistance encountered by faculty, while the biggest challenge was the need to move changes through the administrative processes of two different colleges. Overall, the limited faculty resources devoted to the Program is its primary obstacle to growth.



Dr. Robyn Hannigan

Founding Dean, School for the Environment
University of Massachusetts, Boston, MA

Dr. Hannigan has served as Founding Dean for the School of the Environment since August, 2013. She holds a PhD and MA in Earth and Environmental Sciences from the University of Rochester, an MA in Geology from the University at Buffalo, SUNY, and a BS in Biology from the College of New Jersey. She also completed postdoctoral work at Woods Hole Oceanographic Institution and Old Dominion University.

The School for the Environment exists to generate, communicate, and activate knowledge to solve environmental problems. It was founded on the premise that environmental problems don't recognize



disciplinary or geographic borders, such that the School should overlap boundaries between units, operations and academics, and university and community in return. The School is led by Dean Hannigan and supported by Program Directors, including the Environmental Sciences undergraduate and graduate Programs, the Environmental Studies Program, the Marine Sciences Program, and, starting in Fall 2015, the Urban Planning and Community Development Program. The Dean is further supported by an Executive Committee comprised of representative faculty, a Green Dean team of students from all programs within the School, and an external Advisory Board. The School recognizes four categories of faculty and three tiers within each category. As a unit that emerged from an academic department, there are core, tenure-track faculty and jointly appointed faculty from the original department to total

15 FTE. In addition, 15 faculty are formally associated with the School from other units, externally-funded and jointly appointed research faculty, and adjunct faculty.

The School offers a BA and BS in Environmental Science with four tracks: Marine Science; Policy and Management; Earth and Hydrologic Sciences; and Geospatial Analysis and Modeling for the Environment. At the undergraduate level, the School also offers a program of study in Environmental Studies which is transitioning to a BA degree. The School awards three minors – Environmental Science; Clean Energy and Sustainability; and Geospatial Analysis and Modeling for the Environment – and supports three additional minor programs. At the graduate level, the School offers an MS and PhD in Environmental Science, an MS and PhD in Marine Science and Technology, and a Professional Science Master's™ (PSM) in Environmental Science or Marine Science. In Fall 2015, an MS in Urban Planning and Community Development will be added. The faculty are made unique by the inclusion of

formal appointments within the University and at two not-for-profit organizations, the New England Aquarium and the Center for Coastal Studies.

The undergraduate curriculum and support services are designed to ensure student retention and graduation in a timely manner. These initiatives include the Building a Beacon program, which leverages course co-registration; experiential seminars each semester; School-wide field excursions each semester; an intensive freshman seminar series; an intermediate seminar to inculcate transfer students into the community; and a capstone research course that allows seniors to apply their knowledge to solving real-world problems. Students are also connected to focus experiences, including residential conservation semesters on Nantucket Island, international experiences through exchange with partner campuses, and field research experiences.

The School's graduate programs are distinguished by a first-year case-based team-taught core sequence that leverages the University's disciplinary diversity as well as required training in Responsible Conduct of Research. Both PSM programs benefit from the University's partnerships with agencies and not-for-profit organizations which host students as interns and ultimately hire them upon graduation.

Dean Hannigan identifies the School's focus on community building and residential programming at the Nantucket Island campus as fundamental to timely degree completion at a non-residential University. The School's retention is the highest of any unit, with first-time freshmen completing degrees within 4.5 years and community college transfer students completing degrees within two years due to close alignment of programming. She also identifies graduate placement as a source of pride, stemming from the School's formal partnerships with agencies in the New England region.



Undergraduate students working with the National Park Service to seed soft shell clams off the coast of Thompson Island.

As a young unit, the obstacles faced by the School include those presented by the institution, such as how to credit team teaching, how to merit faculty during reviews, and how to capture the excellence in environmental scholarship on campus. Dean Hannigan aims to resolve these barriers by working closely with both academic and non-academic administration and “walking the walk.” She defines success as knowing that the School's faculty are achieving their professional goals and moving forward their collective vision, knowing that the School's programs are developing the best environmental practitioners and professionals possible, and knowing that UMass Boston is the environmental campus of the system.



Dr. David Hassenzahl

Dean, College of Natural Sciences
University of California, Chico, CA

Dr. Hassenzahl has served as Dean of the College of Natural Sciences, since August, 2014. His previous leadership positions include Founding Dean of the Falk School of Sustainability at Chatham University and Chair of the Department of Environmental Studies at the University of Nevada, Las Vegas (UNLV). At Chatham, he led a team that established a stand-alone school with graduate and undergraduate programs as well as a farm and new campus facilities, while at UNLV he was a member of and later chaired a stand-alone department that housed undergraduate, master, and doctoral degrees served by a core faculty. Dean Hassenzahl earned his PhD in Science, Technology, and Environmental Policy from Princeton University and holds a BA in Environmental Science and Paleontology from the University of California, Berkeley.

The College of Natural Sciences is a confluence of traditional departments, non-traditional departments, nursing, centers, and a museum. The College promotes science for the public interest and awards a variety of undergraduate and graduate degrees. Its disciplinary departments train their own majors while also promoting science literacy for all students. These departments include Biological Sciences; Chemistry and Biochemistry; Geological and Environmental Sciences; Mathematics and Statistics; and Physics. The College also includes several innovative interdisciplinary programs, including the Center for Water and the Environment, the Center for Nutrition and Activity Promotion, the Department of Nutrition and Food Science, the School of Nursing, the Center for Math and Science Education, the Department of Science Education, the Rural Northern California Clinical Simulation Center for Nursing, and the Gateway Science Museum. The College heavily utilizes the 4,000 acre Big Chico Creek Ecological Reserve.

Although Dean Hassenzahl is new to CSU, he was attracted to Chico due to its strong, documented commitment to sustainability as well as its commitment among senior academic leaders to work across college boundaries. As a whole, the system provides high-quality education to hundreds of thousands of students, many of whom are first generation and/or from historically underrepresented populations.

As researcher, teacher, institution builder, and administrator, Dean Hassenzahl's philosophy demands that the tools and approaches that are applied and taught should be driven by questions of interest, countering his finding that much of academia is driven by disciplines, rather than the questions those disciplines should answer. Increasing emphasis from funding agencies and administrators on interdisciplinarity has driven a quest for "doing interdisciplinary work" as an end, which is not particularly productive. This "encourages sequential disciplinarity, since individuals are still encouraged to write for their peers and tenure or promotional committees; excludes valuable input from outside academia, where knowledge is generated and processed differently but still has great value for answering important questions; and constrains the questions pursued to those generated by academia, which may

help explain the chronic challenge in increasing diversity.” He believes that academics most productively cross disciplinary lines when doing so is in pursuit of answers.

Dean Hassenzahl provides the following strategies and cautionary notes for leaders of IES programs, although he concedes that many successful leaders have done things very differently. He does not assume that everyone who has shared this path will agree and suggests that his notes be taken as points of discussion.

1. Securing program support involves knowing the work that people within your program are doing and sharing it with administrators, private donors, and stakeholders. This should mean actively soliciting information, framing concise messages, and publishing information. If this requires that you drink good wine with interesting people, you should bravely do this for your unit.
2. Far more good ideas for program activities, curricula, and directions will be generated within a unit than that unit can successfully undertake. Many academics believe that ideas are their capital and jealously guard them. In fact, good ideas are a dime a dozen. Successfully implementing an idea requires choosing a few of the many, equally important ideas and working hard to pursue them.
3. There are enough environmental projects for everyone to work on. Celebrate them, promote them, and share in them if your unit has time. However, don’t create boundaries or try to possess your college or university’s environmental and sustainability initiatives.
4. Effective leaders can work from the bottom up to identify options, but at some point priorities must be set and democratic consensus may not be sufficient to achieve this. Leaders need to lead and structures should be in place to allow decisions to be made.
5. Programs change and programs fail. This is understood in the business world and we all have research projects that didn’t pan out or papers that didn’t get published. Despite this, we often forget that even well designed and supported programs can fail, and successful programs often need to change for internal and external reasons.
6. Share credit with others and accept blame for yourself. This is good managerial practice and not just true of environmental programs.
7. Create institutions only when necessary to accomplish a goal. In my experience, I have seen centers started to attract projects or make a director look good and I have seen projects fail due to a lack of institutional structure to support them.
8. If you want interdisciplinarity to succeed in your unit, actively promote it: include it as a criterion in funding opportunities; list it explicitly in departmental, college, and university tenure and promotion standards; and write internal and external letters that explain how it serves the academic mission. While doing so, call out and reject poorly done interdisciplinary work.
9. Finally, always remember that mutual commitment to a better world doesn’t necessarily mean that we will get along. Individuals involved in environmental programs extend to the same range of personalities as any other work environment, and a failure to engage in intentional team building, conflict management, and other managerial strategies will be as deleterious for environmental programs as for any other discipline. There is a value to working to address problems of collegiality and to stepping down or away as a leader when the fit is not good.



IES Program Resources

The diversity of IES programs is reflected in vast disparities in resources. A few programs are run with no dedicated budget while others have budgets that exceed those of comparable programs at their schools. Some have budgets that are 100% from institutional allocations while others have substantial support from other sources. Some have overhead from interdisciplinary grants, but many do not. Some have budgets tied to enrollment numbers either directly or indirectly, but others do not. Some support scores of faculty and staff positions while others are run entirely by volunteer administrators, faculty, and staff salaried through other units. Some provide a variety of student services and IES program-specific funding opportunities for students and faculty while others do not.

Interpretation of the survey data is complex due to the individuality of each program in terms of their own set of resource parameters, and inconsistencies in naming conventions. For example, a few 'IES departments' are operated like unit-spanning programs where the chair and all the participating faculty are salaried through other units and some unit-spanning 'programs' have full-time faculty appointments tenured in the program. The bottom line is there are many, many different configurations of IES programs and wide variability of resources.

In this section, we examine the survey data on program resources: budgets, faculty and staff, IES program-specific student services, IES program-specific funding, and support resources for students and faculty. Budget data include how budgets compare with other programs with similar numbers of students, sources of funding, how grant overhead is distributed, and whether budgets are tied to enrollment numbers. Faculty resources include full-time positions, jointly appointed positions, part-time contract positions (primary employment within the institution), part-time adjunct positions (primary employment outside the institution), and formally affiliated faculty (faculty with a formal commitment to participate in the program). Staff resources include full-time staff, part-time staff, and staff salaried through other units that serve the program (volunteer staff).

Student services include study abroad/travel courses specifically for the IES majors, careers exploration courses or opportunities, career placement services (specific to the program), professional development courses or training opportunities, minority/diversity support or enhancement programs, and formal articulation agreements with other institutions (such as community colleges or five-year accelerated bachelor's/master's programs). IES program-specific student support includes scholarships, fellowships, and assistantships; travel for scholarly activities; internal research grant funding; research or service awards; and funding for external learning opportunities. IES program-specific funding for faculty includes internal research grants, teaching/course development support, awards, support or funding for facilitating service learning and/or outreach activities, and time buyout for participation in program development activities (such as course development or grant proposal preparation).

Budget Resources

The proportions of programs that report that their budgets are equivalent to, lower than, or higher than the budgets for similarly sized programs are similar for both undergraduate and graduate programs (Table 11). A number of programs (12-13%) do not have a dedicated budget and others

(13-20%) are unsure how their budget compares with similarly sized programs. Overall, less than half of IES programs' budgets are equivalent or greater than other programs with similar numbers of students. About a third report their budgets are equivalent to similar programs and a small proportion (9-11%) have budgets that exceed other programs. The remainder have budgets lower than equivalent programs.

Not surprisingly, IES programs within academic units tend to do better than programs that span units in terms of how their budgets compare with comparable programs. For undergraduate budgets, programs based in IES units and traditional units are similar—about half (48-51%) of programs located in their own IES units or in other units report their budgets are equivalent to or greater than other programs while only 31% of programs that span units report their undergraduate budgets are equivalent or greater. For graduate programs, IES units have a distinct advantage—54% of those located in their own IES unit had equivalent or higher budgets compared with 42% of IES programs that span units and only 22% of IES degree programs in other units.

The average proportions of funding from each of the different sources are similar for all types of IES undergraduate programs (Table 12). The largest proportion is direct institutional allocations, making up an average of 80% of undergraduate programs' budgets. The average proportion for grants and contracts is 9% and other sources 10%.

For graduate programs, the average for institutional allocations is only 41%, while grants and contracts average 16% and other sources 10%. Unlike undergraduate program budgets, there are distinct differences in the average proportions for programs in different locations. IES units have the lowest average proportion of their budgets from institutional allocations, averaging only 26% versus 68% for IES programs in other units and 52% for unit-spanning IES programs. IES units also have the highest averages from endowments and donor gifts, although these sources only provide an average of 13%. Program-spanning units have the lowest proportion from grants and contracts, averaging only 7% versus 22% for IES units and 24% for IES degree programs in other units.

Note that the total average proportions of funding for all programs will not equal 100%, but the total comes very close for undergraduate programs at 99%. The total of the average proportions for graduate programs is only 67%, indicating graduate programs may receive funding from other sources such as the provision of services.

Table 11. Unit/program budget compared with comparable units/programs (enrollment size)

Undergraduate program budget					
Unit/program location	Less than others	Equivalent to others	Greater than others	No budget	Unsure
IES institute/center (n=11)	46%	9%	9%	9%	27%
IES college or school (n=5)	60%	20%	-	-	20%
IES school or division within a college (n=11)	27%	36%	27%	9%	-
IES department (n=67)	25%	45%	8%	4%	18%
All IES units (n=94)	30%	38%	10%	5%	17%
Consortium program (n=2)	50%	50%	-	-	-
Institution-spanning program (n=20)	50%	35%	-	15%	-
Multiple-colleges-spanning program (n=30)	44%	10%	20%	13%	13%
College-spanning program (n=29)	38%	17%	7%	31%	7%
Departments-spanning program (n=31)	39%	22%	13%	10%	16%
All IES programs (n=112)	42%	20%	11%	17%	10%
IES degree program(s) in a non-IES dept./school/div. (n=55)	18%	38%	13%	18%	13%
Total all units/programs (n=261)	32%	31%	11%	13%	13%
Graduate program budget					
Unit/program location	Less than others	Equivalent to others	Greater than others	No budget	Unsure
IES institute/center (n=8)	25%	12%	-	-	63%
IES college or school (n=9)	22%	34%	22%	11%	11%
IES school or division within a college (n=7)	29%	43%	28%	-	-
IES department (n=35)	14%	51%	9%	9%	17%
All IES units (n=59)	19%	42%	12%	7%	20%
Consortium program (n=0)	-	-	-	-	-
Institution-spanning program (n=14)	28%	36%	-	-	36%
Multiple-colleges-spanning program (n=10)	40%	20%	10%	10%	20%
College-spanning program (n=11)	27%	64%	9%	-	-
Departments-spanning program (n=6)	67%	17%	-	16%	-
All IES programs (n=41)	36%	37%	5%	5%	17%
IES degree program(s) in a non-IES dept./school/div. (n=19)	11%	11%	11%	42%	26%
Total all units/programs (n=119)	24%	35%	9%	12%	20%

Table 12. Average proportion of unit/program budget by source (avg. over last 3 years)

Mean proportion - Undergraduate program budget				
Unit/program location	Non-directed funds (e.g. tuition & fees)	Long-term directed funds (e. g. endowments)	Short-term directed funds (e.g. grants & contracts)	Gifts (e. g. alumni)
IES institute/center (n=8)	62%	1%	19%	5%
IES college or school (n=2)	60%	35%	3%	2%
IES school or division within a college (n=6)	72%	3%	7%	3%
IES department (n=52)	79%	8%	11%	2%
All IES units (n=68)	76%	7%	11%	3%
Consortium program (n=2)	100%	-	-	-
Institution-spanning program (n=17)	78%	9%	7%	3%
Multiple-colleges-spanning program (n=26)	80%	8%	10%	2%
College-spanning program (n=24)	86%	5%	7%	2%
Departments-spanning program (n=23)	78%	8%	7%	7%
All IES programs (n=92)	81%	7%	7%	4%
IES degree program(s) in a non-IES dept./school/div. (n=32)	83%	6%	10%	2%
Total all units/programs (n=192)	80%	7%	9%	3%
Mean proportion - graduate program budget				
Unit/program location	Non-directed funds (e.g. tuition & fees)	Long-term directed funds (e. g. endowments)	Short-term directed funds (e.g. grants & contracts)	Gifts (e. g. alumni)
IES institute/center (n=6)	43%	4%	27%	6%
IES college or school (n=4)	23%	33%	15%	9%
IES school or division within a college (n=4)	24%	2%	16%	3%
IES department (n=19)	22%	7%	23%	2%
All IES units (n=33)	26%	9%	22%	4%
Consortium program (n=0)	-	-	-	-
Institution-spanning program (n=10)	44%	3%	7%	2%
Multiple-colleges-spanning program (n=7)	43%	5%	14%	2%
College-spanning program (n=6)	67%	13%	-	2%
Departments-spanning program (n=1)	100%	-	-	-
All IES programs (n=24)	52%	6%	7%	2%
IES degree program(s) in a non-IES dept./school/div. (n=8)	68%	1%	24%	1%
Total all units/programs (n=65)	41%	7%	16%	3%

IES units and degree programs in other units have a decided advantage over programs that span units in terms of grant support. About a third of IES units and other units receive grant overhead, compared with less than a fifth of unit-spanning programs (Table 13). For programs that span units, grant overhead is more often distributed to the home units of the participating faculty. Interestingly,

more IES units report that grant overhead is retained at the college or institutional level compared with other units or unit-spanning programs. A substantial number of all units/programs (12%) have no grant overhead experience.

Table 13. Unit/program interdisciplinary grants overhead

Unit/program location	Unit/program receives overhead for grants awarded to unit/program	Unit/program receives overhead for grants awarded to participating faculty	Overhead distributed to other units	Overhead retained at institution or college level	No experience
IES institute/center (n=16)	31%	38%	6%	13%	25%
IES college or school (n=9)	22%	33%	22%	-	-
IES school or division within a college (n=12)	25%	33%	50%	17%	-
IES department (n=74)	35%	32%	18%	18%	8%
All IES units (n=111)	32%	33%	20%	15%	9%
Consortium program (n=2)	50%	-	-	-	-
Institution-spanning program (n=30)	23%	27%	27%	13%	13%
Multiple-colleges-spanning program (n=39)	18%	15%	46%	5%	8%
College-spanning program (n=41)	20%	12%	32%	12%	20%
Departments-spanning program (n=35)	11%	11%	26%	11%	23%
All IES programs (n=147)	18%	16%	33%	10%	16%
IES degree program(s) within a non-IES dept./school/div. (n=70)	29%	34%	19%	10%	10%
Total all units/programs (n=328)	25%	26%	25%	12%	12%

Not unexpectedly, higher proportions of IES units report their budgets are tied to enrollments versus IES degree programs in other units or programs that span units; this is especially true for undergraduate programs where 73% of IES units report their budgets are tied to the number of students versus only 43-45% for other programs (Table 14). The gap narrows for graduate programs: 62% of IES units have budgets tied to student numbers versus 52-55% for other programs. Overall, 54-57% of IES programs have budgets tied to enrollment numbers and another 10% do not know whether enrollment is a factor in budgeting decisions.

Table 14. Unit/program budget tied to enrollment

Undergraduate program budget				
Unit/program location	Yes, directly	Yes, indirectly	No	Unsure
IES institute/center (n=9)	11%	45%	33%	11%
IES college or school (n=5)	-	60%	40%	-
IES school or division within a college (n=8)	-	75%	25%	-
IES department (n=66)	23%	53%	17%	7%
All IES units (n=88)	18%	55%	20%	7%
Consortium program (n=2)	100%	-	-	-
Institution-spanning program (n=18)	-	50%	44%	6%
Multiple-colleges-spanning program (n=30)	6%	37%	37%	20%
College-spanning program (n=25)	20%	36%	36%	8%
Departments-spanning program (n=29)	-	28%	69%	3%
All IES programs (n=104)	9%	36%	46%	9%
IES degree program(s) in a non-IES dept./school/div. (n=52)	10%	33%	42%	15%
Total all units/programs (n=244)	12%	42%	36%	10%
Graduate program budget				
Unit/program location	Yes, directly	Yes, indirectly	No	Unsure
IES institute/center (n=9)	11%	33%	45%	11%
IES college or school (n=7)	43%	29%	28%	-
IES school or division within a college (n=6)	-	50%	33%	17%
IES department (n=35)	17%	49%	31%	3%
All IES units (n=57)	18%	44%	33%	5%
Consortium program (n=1)	100%	-	33%	-
Institution-spanning program (n=14)	29%	36%	21%	14%
Multiple-colleges-spanning program (n=10)	10%	30%	50%	10%
College-spanning program (n=11)	9%	27%	55%	9%
Departments-spanning program (n=6)	17%	50%	17%	16%
All IES programs (n=42)	19%	33%	36%	12%
IES degree program(s) in a non-IES dept./school/div. (n=20)	15%	40%	25%	20%
Total all units/programs (n=119)	18%	39%	33%	10%

Faculty and Staff

The survey questions on faculty and staff asked respondents to provide the number of faculty who are salaried in the IES program/unit or, for programs located in traditional departments or schools, to include only faculty that teach courses for the interdisciplinary degree(s) and staff that support the program(s). Examination of the data reveals some inconsistencies in naming conventions. For example, a few 'IES departments' are operated like unit-spanning programs where the chair and all the participating faculty are salaried through other units and some unit-spanning 'programs' have full-time faculty appointments tenured in the program and are similar to departments. There may also be inconsistencies in how a unit-spanning program is classified. For example, a program that has participating faculty in

a few departments in different colleges may be categorized by the administrator as a department-spanning program or a multiple-college-spanning program. It is important to keep these inconsistencies in mind when reviewing the data.

There is enormous disparity in IES program faculty and staff resources. This is true for programs based in their own IES units and degree programs located in traditional departments and schools as well as programs that span units. Some support scores of faculty and staff positions while others are run entirely by volunteer administrators, faculty, and staff salaried through other units. Ratios of full-time faculty equivalents to majors vary dramatically and are impossible to calculate for many programs because they rely on faculty from across the university.

Overall, three-fourths of programs have one or more full-time faculty positions salaried through the program and half have jointly appointed faculty. Most of the tenure decisions for full-time and jointly appointed faculty lie in their home units whether they are IES units or other units, but about 10% of full-time and 23% of joint appointments have tenure decisions shared between two units or a unit and a program. A small proportion of schools do not have tenure (8-9%). Less than half of IES programs have part-time contract or adjunct positions. Formally affiliated faculty are more common for institutes and centers, IES colleges, and unit-spanning programs and less common for IES schools/divisions, IES departments, and other departments/schools/divisions.

Overall, fewer than half of all IES programs employ full-time or part-time staff, almost a third receive support from staff members with their primary appointments in other units (volunteer staff), and a fifth (21%) report no staff support. The average number of staff positions ranges from one to three but a few programs report very high numbers—up to ninety-five.

Very few programs have no faculty or staff salaried through the program. A lack of positions salaried through the program doesn't necessarily mean that the program is unstable or weak, however. For example, the Environmental Science and Studies Programs at the University of Delaware are strong and growing multiple-college-spanning programs run by a director with the support and assistance of the administration of the College of Earth, Ocean, and Environment and the cooperation of many units across campus.

As would be expected, all IES colleges, schools/divisions, and almost all departments have full-time faculty appointments and higher average numbers than other types of programs (Tables 15 and 16). These include some of the largest programs with many faculty and staff.

Examples include:

- The Rubenstein School of Environment and Natural Resources at the University of Vermont, which has 104 full- and part-time faculty appointments and 43 staff, and the School of Forestry and Environmental Studies at Yale University, which supports 81 full- and part-time faculty positions and an equal number of staff.
- The Division of Science and Environmental Policy, College of Science, Media Arts and Technology at California State University, Monterey Bay, which has 80 full- and part-time faculty appointments and 9 full-time staff positions, and the School of Environmental and Forest Sciences, College of the Environment at University of Washington, Seattle, which employs 75 full- and part-time faculty positions and 79 staff members.

- The Department of Environmental Science, Policy, and Management at the University of California, Berkeley, which has 65 tenured and tenure-track full-time appointments but no staff, and the Department of Natural Resources and Environmental Sciences at the University of Illinois at Urbana-Champaign, which has 20 tenured and tenure-track full-time appointments, 5 joint appointments, 25 adjuncts, and 5 full-time staff members.

Patterns may be discerned from the data based on the locations of the programs, although most of the categories have few programs. The largest groups are the department-based programs—those based in IES departments and those based in other departments and schools. Findings include:

- IES primary level colleges/schools and institutes and centers have higher proportions and a higher average number of positions for all types of faculty positions and full-time staff.
- IES schools and divisions within a college and IES departments have similar patterns: almost all have full-time faculty, about half have jointly appointed faculty, and about half employ adjunct faculty. These units are among the least likely to have contract and formally affiliated faculty. Most have one or more full-time staff positions and about a third support part-time staff. IES schools are more likely than IES departments to have staff assistance from other units (volunteer staff).
- Most IES degree programs in traditional units have faculty that support the programs, but they are less likely to have all other types of faculty positions. Less than half of these programs have dedicated support from full- or part-time staff and a third report volunteer staff help with the IES programs.
- All the unit-spanning programs are less likely than the other groups to have full-time faculty positions, especially the multiple-college and department-spanning programs. They are also less likely to have jointly appointed faculty positions, with the exception of department-spanning programs. They are more likely than department-based programs to have contract and formally affiliated faculty, with the exception of the department-spanning programs, which have the lowest levels of contract faculty. Many, from a third to half, employ adjunct faculty. Institution-spanning programs are the most likely of this group to have full-time and part-time staff, while college-spanning programs are least likely. About a third of college-spanning and department-spanning programs have support from volunteer staff.

Table 15. IES unit/program faculty

Unit/program type	Faculty type	Proportion reporting >0	Number of positions	
			Maximum	Mean
All units/programs n=322	Full-time appointments	74%	70	10
	Joint appointments	50%	35	4
	Formally affiliated	43%	150	17
	Contract (internal)	32%	30	1
	Adjunct (external)	44%	25	2
IES institute/center n=15	Full-time appointments	73%	37	5
	Joint appointments	67%	14	3
	Formally affiliated	67%	150	25
	Contract (internal)	47%	20	2
	Adjunct (external)	53%	19	3
IES college/school (primary level) n=11	Full-time appointments	100%	70	31
	Joint appointments	100%	35	7
	Formally affiliated	56%	50	9
	Contract (internal)	78%	30	8
	Adjunct (external)	43%	20	3
IES school/division (within a college) n=10	Full-time appointments	100%	49	21
	Joint appointments	50%	13	2
	Formally affiliated	33%	15	3
	Contract (internal)	33%	13	2
	Adjunct (external)	42%	14	4
IES department n=72	Full-time appointments	97%	65	11
	Joint appointments	51%	14	1
	Formally affiliated	28%	20	2
	Contract (internal)	32%	10	1
	Adjunct (external)	56%	25	3
Consortium program n=2	Full-time appointments	100%	6	4
	Joint appointments	50%	6	3
	Formally affiliated	-	-	-
	Contract (internal)	100%	4	3
	Adjunct (external)	100%	2	2
Institution-spanning program n=29	Full-time appointments	70%	10	3
	Joint appointments	40%	7	1
	Formally affiliated	53%	122	20
	Contract (internal)	40%	10	2
	Adjunct (external)	40%	8	1
Multiple-colleges-spanning program n=38	Full-time appointments	46%	11	2
	Joint appointments	44%	21	3
	Formally affiliated	69%	70	10
	Contract (internal)	35%	25	1
	Adjunct (external)	38%	25	2
College-spanning program n=39	Full-time appointments	72%	8	1
	Joint appointments	45%	9	2
	Formally affiliated	54%	45	7
	Contract (internal)	44%	8	1
	Adjunct (external)	46%	15	2

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Departments-spanning program n=37	Full-time appointments	43%	4	1
	Joint appointments	63%	17	4
	Formally affiliated	49%	15	4
	Contract (internal)	20%	5	1
	Adjunct (external)	34%	8	1
IES degree program(s) in non-IES dept./school/div. n=69	Full-time appointments	84%	28	6
	Joint appointments	43%	18	1
	Formally affiliated	27%	20	2
	Contract (internal)	24%	6	1
	Adjunct (external)	36%	12	1

Table 16. IES unit/program staff

Unit/program type	Staff type	Proportion reporting >0	Number of positions	
			Maximum	Mean
All units/programs n=322	Full-time staff	47%	95	3
	Part-time staff	31%	23	1
	Volunteer staff	28%	80	1
IES institute/center n=15	Full-time staff	80%	15	3
	Part-time staff	33%	6	1
	Volunteer staff	20%	2	<1
IES college/school (primary level) n=11	Full-time staff	67%	95	17
	Part-time staff	43%	13	3
	Volunteer staff	44%	80	9
IES school/division (within a college) n=10	Full-time staff	67%	56	10
	Part-time staff	33%	23	2
	Volunteer staff	32%	15	3
IES department n=72	Full-time staff	65%	35	3
	Part-time staff	39%	5	1
	Volunteer staff	21%	8	<1
Consortium program n=2	Full-time staff	-	-	-
	Part-time staff	100%	2	2
	Volunteer staff	-	-	-
Institution-spanning program n=29	Full-time staff	53%	76	3
	Part-time staff	40%	3	1
	Volunteer staff	23%	8	1
Multiple-colleges-spanning program n=38	Full-time staff	41%	4	1
	Part-time staff	23%	2	<1
	Volunteer staff	28%	10	1
College-spanning program n=39	Full-time staff	22%	2	<1
	Part-time staff	19%	1	<1
	Volunteer staff	35%	4	1
Departments-spanning program n=37	Full-time staff	26%	1	<1
	Part-time staff	34%	2	<1
	Volunteer staff	34%	48	2
IES degree program(s) in non-IES dept./school/div. n=69	Full-time staff	46%	16	2
	Part-time staff	27%	8	<1
	Volunteer staff	33%	8	1

Student and Faculty Resources

The most commonly offered student services specific to IES undergraduate programs are study abroad courses designed for IES students (Table 17). About a third also offer careers exploration courses or equivalent programs, career placement services, professional development courses or equivalent opportunities, and formal articulation agreements with other higher education institutions (transfer programs and five-year bachelor's/master's programs). Only a few have programs designed to enhance enrollments of and support underrepresented students. Proportions are similar across all institution types, except that formal articulation agreements and professional development courses and opportunities are much lower at baccalaureate colleges. Proportions are also similar across IES programs, except for IES study abroad/travel courses which are offered less often by IES degree programs in traditional units. Programs in IES units (especially IES colleges/schools) also have higher proportions than IES programs and programs in traditional units for professional development options, career placement services, minority/diversity support programs, and articulation agreements.

Table 17. Unit/program student services

Undergraduate program student services						
Unit/program location	Professional development courses	Careers exploration	Career placement	Minority/diversity support	Study abroad/travel courses	Academic articulation agreements
IES institute/center (n=9)	33%	44%	22%	11%	56%	11%
IES college or school (n=5)	60%	-	60%	60%	80%	40%
IES school or division within a college (n=8)	25%	38%	38%	13%	63%	75%
IES department (n=65)	26%	35%	23%	15%	54%	34%
All IES units (n=87)	29%	35%	26%	17%	56%	36%
Consortium program (n=2)	-	-	50%	-	-	100%
Institution-spanning program (n=18)	22%	33%	33%	17%	72%	28%
Multiple-colleges-spanning program (n=29)	35%	45%	28%	17%	62%	17%
College-spanning program (n=26)	12%	27%	12%	-	50%	27%
Departments-spanning program (n=28)	25%	29%	25%	7%	64%	25%
All IES programs (n=103)	23%	33%	24%	10%	60%	25%
IES program(s) in a non-IES dept./school/div. (n=52)	21%	35%	21%	15%	39%	31%
Total all units/programs (n=242)	25%	34%	24%	14%	54%	30%

CONTINUED ►

Graduate program student services						
Unit/program location	Professional development training	Careers exploration	Career placement	Minority/diversity support	Study abroad/travel courses	Academic articulation agreements
IES institute/center (n=10)	40%	10%	30%	10%	30%	10%
IES college or school (n=8)	63%	38%	50%	50%	50%	25%
IES school or division within a college (n=7)	29%	14%	43%	29%	14%	-
IES department (n=39)	36%	13%	21%	21%	23%	-
All IES units (n=64)	39%	16%	28%	23%	27%	5%
Consortium program (n=1)	-	-	-	-	-	-
Institution-spanning program (n=14)	36%	21%	29%	21%	36%	7%
Multiple-colleges-spanning program (n=13)	39%	8%	31%	8%	15%	8%
College-spanning program (n=11)	64%	9%	27%	-	18%	9%
Departments-spanning program (n=6)	17%	-	33%	33%	-	-
All IES programs (n=45)	40%	11%	29%	13%	20%	7%
IES program(s) in a non-IES dept./school/div. (n=21)	24%	19%	24%	5%	38%	10%
Total all units/programs (n=130)	37%	15%	28%	17%	26%	6%

The most commonly offered student service specific to IES graduate programs is professional development training (Table 17). Only a few graduate programs offer other services specific to IES students. IES units and programs are much more likely to offer professional development preparation and minority/diversity support programs than IES degree programs in other units, but IES degree programs in other units are more likely to offer study abroad or travel courses.

The most common IES program-specific funding for students are scholarships and assistantships and travel support (Table 18). Over a third also provide student research grants and awards and a quarter provide funding to support external learning opportunities. Master's and doctoral colleges and universities are more likely to provide IES program-specific scholarships and assistantships, but baccalaureate colleges more often support undergraduate student funding for travel and external learning opportunities and undergraduate research grants. Doctoral universities and master's institutions have similar proportions for all support categories except awards; doctoral universities are twice as likely to provide awards for graduate research or service.

A third or fewer IES programs offer funding and other support for faculty; most common are internal research funding and support for course development. Baccalaureate colleges have higher proportions than other institutions for internal research funding, course development support, awards, and facilitating external learning opportunities.

Table 18. Unit/program funding and other resources for students and faculty

Undergraduate students				
Funding/resources	Baccalaureate colleges' units/ programs n=64	Master's colleges' and universities' units/ programs n=79	Doctoral universities' units/ programs n=99	Total n=242
Student scholarships, fellowships, assistantships	39%	47%	59%	50%
Student travel support (conferences and other scholarly activities)	55%	46%	51%	50%
Student research and/or service awards	39%	33%	39%	37%
Student research grants	44%	33%	33%	36%
Funding for external learning opportunities (study abroad, internships support)	34%	19%	28%	27%
Graduate students				
Funding/resources	Baccalaureate colleges' units/ programs n=3	Master's colleges' and universities' units/ programs n=32	Doctoral universities' units/ programs n=95	Total n=130
Student scholarships, fellowships, assistantships	33%	75%	65%	67%
Student travel support (e.g. conferences and other scholarly activities)	33%	56%	61%	59%
Student research grants	33%	38%	40%	39%
Student research and/or service awards	33%	22%	40%	35%
Funding for external learning opportunities (e.g. study abroad, internships support)	33%	25%	25%	25%
Unit/program faculty				
Funding/resources	Baccalaureate colleges' units/ programs n=68	Master's colleges' and universities' units/ programs n=93	Doctoral universities' units/ programs n=134	Total n=295
Internal faculty research grant (e.g. seed money)	47%	40%	24%	34%
Teaching course/development support (e.g. funding, workshops)	34%	33%	27%	31%
Teaching, research and/ or service awards	25%	22%	24%	23%
Funding or staffing support for facilitating service learning opportunities	28%	17%	20%	21%
Funding or staffing support for facilitating outreach programs	16%	15%	17%	16%
Time buy-out/course load reduction to enable participation in program (e.g. course development, proposal development)	7%	17%	15%	14%

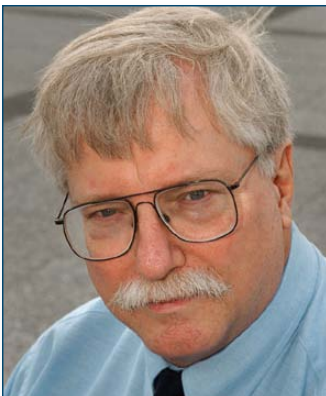
The availability of IES-specific funding and support also varies by location. Not surprisingly, faculty support levels are highest in IES units and lowest in non-IES units. Support for undergraduate students is higher in IES units; IES unit-spanning programs and IES degree programs in other units have similar proportions. For graduate programs, IES institutes/centers, colleges/schools, and schools/divisions have the highest levels of support; proportions for IES departments, other units, and unit-spanning programs are similar.

The majority of IES degree programs, both undergraduate and graduate, utilize specialized IES computer and laboratory/technical facilities and various types of field locations (campus lands and facilities; parks, reserves, and other public or private lands; field stations and nature centers) in their curricula (Table 19). Graduate programs are more likely to have relationships with independent or governmental research laboratories and facilities, but a substantial number of undergraduate programs also utilize these resources. A few programs incorporate the use of design studios or demonstration projects, CEDD/NCSE-developed educational resources, or decision theaters or other simulation/communication centers.

Table 19. Facilities and resources used in degree curricula

Undergraduate degree programs				
Facilities/resources used in curricula	Baccalaureate colleges' units/ programs n=64	Master's colleges' and universities' units/ programs n=79	Doctoral universities' units/ programs n=95	Total n=238
Specialized IES computer facilities	77%	62%	76%	71%
Campus lands and facilities	83%	68%	66%	71%
Parks, reserves or other public or private lands	72%	73%	65%	70%
Field stations and nature centers	63%	49%	66%	60%
Specialized IES laboratories or technical facilities	73%	62%	63%	66%
Independent/governmental research laboratories or other facilities	20%	24%	19%	21%
Design studio or demonstration projects	20%	16%	14%	16%
NCSE/CEDD developed educational resources (Encyclopedia of Earth, CAMEL, OCEAN-OIL)	16%	15%	12%	14%
Decision theaters or other simulation/communication center	-	4%	3%	3%
Other*	3%	1%	1%	2%
*Other includes AASHE educational resources, NWF Campus ecology educational resources, community partner sites, and bio-regional hub collaborations.				
Graduate degree programs				
Facilities/resources used in curricula	Baccalaureate colleges' units/ programs n=3	Master's colleges' and universities' units/ programs n=31	Doctoral universities' units/ programs n=93	Total n=127
Specialized IES computer facilities	33%	65%	71%	69%
Specialized IES laboratories or technical facilities	33%	58%	65%	62%
Campus lands and facilities	67%	61%	52%	54%
Parks, reserves or other public or private lands	33%	65%	49%	53%
Field stations and nature centers	33%	48%	52%	50%
Independent or governmental research laboratories or facilities	33%	45%	35%	38%
Design studio or demonstration projects	-	23%	16%	17%
NCSE/CEDD developed educational resources (Encyclopedia of Earth, CAMEL, OCEAN-OIL)	33%	16%	6%	9%
Decision theaters or other simulation/communication center	-	3%	5%	5%
Other*	-	3%	4%	4%

*Other includes community and international partner sites, and bio-regional hub collaborations.



Dr. Philip Hopke

Founding Director,
Clarkson Institute for a Sustainable Environment
Clarkson University, NY

Dr. Hopke is the Bayard D. Clarkson Distinguished Professor and the Director of the Center for Air Resources Engineering and Science. In July, 2010 he became the Founding Director of the Institute for a Sustainable Environment. He served previously at Clarkson University as Dean of the Graduate School, Chair of the Department of Chemistry, and Head of the Division of Physical and Chemical Sciences. Professor Hopke earned his PhD in Chemistry from Princeton University in 1969 and his BS from Trinity College.

The Institute for a Sustainable Environment (ISE) provides support for a broad array of interdisciplinary research, educational, and outreach programs across Clarkson University related to the environment, including undergraduate and graduate degree programs in environmental science and policy and faculty research. The mission of ISE



is to facilitate the development, promotion, and operation of scholarly research, education, and creative activities within the University and among its partners aimed at understanding the natural and built environments and how conflict and competition within these systems can be resolved in a sustainable manner. ISE fosters links and collaboration among faculty, students, and external partners who participate actively in the activities required to meet its vision of

excellence. ISE also has the responsibility for increasing the sustainability of the campus and helping to make it a living laboratory for the future of sustainable education in the 21st century.

The Institute is led by a Director who reports to the Provost. The Director has the overall responsibility for the activities of the Institute. The Director is assisted by an Associate Director for Educational Programs and an Associate Director for Sustainability.

The Institute awards two undergraduate degrees, a BS in Environmental Health Science (EHS) and a BS in Environmental Science and Policy (ES&P). The EHS Program, which evolved from a BS in industrial hygiene and environmental toxicology, focuses on recognizing, evaluating, and controlling the chemical, biological, and physical environmental factors that adversely affect human health. The degree requires students to select and fulfill a capstone project in one of three concentrations that allows

the students to the ability to align themselves for a specific career or academic focus: Environment and Security; Ergonomics; and Industrial Hygiene.

The ES&P Program prepares students to become leaders in addressing environmental challenges by combining rigorous courses in the sciences with “big picture” courses in history, law, policy, economics, and ethics. The Program offers students a solid grounding in the tools and techniques of science and policy, as well as a working knowledge of interdependence. It also recognizes the importance of developing a deep and abiding awareness, respect, and affection for the natural world. The Institute also offers four minors: Environmental Health Science; Environmental Science & Environmental Policy; Sustainable Energy Systems Engineering; and Sustainable Solutions for the Developing World.

The undergraduate programs are made unique by the Adirondack Semester, which allows students to live for a semester in Saranac Lake, NY as a resident explorer, entrepreneur, environmental scientist,



poet, and policy advocate of the Adirondack Park, one of the largest protected landscapes in North America. Students become absorbed and committed, and think and work to create intelligent solutions in a six million acre laboratory for wildlife, small town communities, and recreation enthusiasts alike.

ISE also has two interdisciplinary graduate degree programs: an MS and PhD in Environmental Science and Engineering (ESE) and an MS in Environmental Politics and Governance (EPG). In the ESE Program, a flexible curriculum requires a core set of courses to provide a broad understanding of the multiple disciplines, while allowing each student to build an in-depth knowledge in their area of interest by choosing from courses in biology and ecology; chemistry and physics; control technologies; and fluid mechanics and transport. This encourages the student to develop an understanding of scholarship across disciplines and to understand the different modes of thought and inquiry that occur. By spanning multiple disciplines, students investigate how

science and engineering interact with the environment in a wide-ranging context and are better able to understand their interactions with policy.

In turn, EPG studies focus on the socioeconomic and political basis for mechanisms as diverse as the allocation of federal funding of environmentally related research, the development of science-based environmental policy, and the interests of private sector, non-governmental organization, and government stakeholders in the environmental arena. This knowledge is fundamental to understanding why and how environmental quality outcomes occur as they do, as their functioning and management are embedded within social, political, and economic institutions. The EPG degree differs from traditional public policy programs that are dominated by either political science or economics; rather, it follows an emerging trend of more broadly interdisciplinary graduate and undergraduate degrees that incorporate courses and faculty from a variety of social science disciplines.



Dr. Meghann Jarchow

Coordinator, Sustainability Program;
College of Arts and Sciences
University of South Dakota, SD

Dr. Jarchow is Assistant Professor of Sustainability and began as Coordinator of the Sustainability Program in July, 2012. Her home department is the Biology Department. She holds a PhD in Ecology and Evolutionary Biology and Sustainable Agriculture from Iowa State University, an MS in Biology from Minnesota State University-Mankato, and a BA in Biology from Ripon College. Her background is in applied plant ecology.

The Sustainability Program falls within the College of Arts and Sciences and receives administrative support from the Dean and Associate Dean of Academics in the College. The mission of the Program aligns with that of the College and includes fostering the development of personal responsibility and

global stewardship, dedication to democratic citizenship, and the application of multidisciplinary problem solving to improve the human condition. Dr. Jarchow is the only faculty member with an appointment specifically with the Sustainability Program. Although her direct supervisor is the Chair of the Biology Department, the Chair does not oversee the Sustainability Program.



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Approximately 17 faculty members in various departments teach courses that fall within the Sustainability Program curriculum, but the courses they teach are part of teaching requirements for their home departments. While no staff members are specifically appointed to the Program, the staff in the Biology Department and, to a lesser degree, the College of Arts and Sciences, do administrative work for the Program. Dr. Jarchow also chairs a Sustainability Advisory Committee comprised of ten faculty who volunteer their time to meet monthly and provide feedback, recommendations, and guidance on issues related to the Program.

The Sustainability Program offers two interdisciplinary undergraduate degrees, a BA or BS in Sustainability with a specialization in Natural Sciences or Social Sciences, as well as a minor in Sustainability. The major is designed to enable students to understand and address complex sustainability issues, including some of the world's most pressing challenges, using an interdisciplinary, systems thinking approach. As such, the curriculum emphasizes experiential learning in order to find solutions to real-world environmental, social, and economic problems and thus includes a required internship, undergraduate research, or field experience component. Service learning is included in multiple courses and students are encouraged to study abroad or at another university. While the majority of the credits

taken by Sustainability majors are from different departments, newly hired faculty and newly developed courses are being cross-listed as sustainability courses.

The Sustainability Program is relatively new, as it began in August, 2012, and is the only undergraduate Sustainability major in the state and region. Currently, there are approximately 25 Sustainability majors and a small number of graduates. Students have completed a range of internships in the public and private sectors, undergraduate research, and summer field experience abroad. The Program's inter-disciplinarity benefits students by ensuring that there is a large number of faculty actively conducting research on a range of environmental, social, and economic issues with whom they could work.

Dr. Jarchow identifies the provision of opportunities for students to *do* sustainability as the most important factor for the success of the Program. This is reflected in the Program's emphasis on providing opportunities for students to do service learning, have meaningful internships, do undergraduate sustainability research, use campus and the local community as a learning laboratory, and participate, volunteer, and become leaders with sustainability-related student and community organizations. While the Program is doing all of these things successfully, she sees further opportunities for growth. She also sees student employment after graduation as a crucial measure of success, as it is a goal of the Program for students to find careers that they think are meaningful. However, as these might not be the jobs that students get immediately upon graduating, it is necessary to wait a few years to measure this.



Sustainability students conduct undergraduate research covering a range of topics such as prairie restoration ecology.

She also pinpoints a number of obstacles to the continued development of the Sustainability Program. First, while sustainability is a progressive field, South Dakota tends to be a conservative state. This creates a challenge in ensuring that sustainability is framed in a way that clarifies that sustainability is about improving human well-being in addition to enhancing the environment. The second impediment is that participation in the Sustainability Program currently generates extra work for all faculty besides the Coordinator due to the administrative structure. Consequently, Dr. Jarchow works to associate Sustainability Program services, courses, and events with distinct departments in order to facilitate faculty involvement.



Dr. Stephanie Kaza

Director, Environmental Program
University of Vermont, VT

Dr. Kaza was appointed Director of the Environmental Program in 2008 and is Professor in the Rubenstein School of Environment and Natural Resources. She earned a PhD in Biology from University of California, Santa Cruz, an MA in Education from Stanford University, and a BA in Biology from Oberlin College. She serves as faculty advisor for the University of Vermont (UVM) Office of Sustainability and faculty director for the Sustainability Faculty Fellows program. Her research focus areas include Buddhist environmental thought, ethics of consumerism, and urban bicycle commuting.



The Environmental Program was founded in 1972 and is a campus-wide unit with full-time faculty appointed through four tenure home units. The undergraduate Environmental Studies (ENVS) major is offered in three schools: a BS in the College of Agriculture and Life Sciences (CALS); a BA in the College of Arts and Sciences (CAS); and a BS in the Rubenstein School of Environment and Natural Resources (RSENr). The minor is available to students in all colleges. Majors choose from six concentrations and prepare an individually-designed course of study. The ENVS major is the second most enrolled at UVM, with over 500 majors and minors.

The Program Director position is most parallel to a department chair but without tenure and promotion authority. The Director is responsible for managing course scheduling, faculty meetings, budget approvals, student crises, curriculum initiatives, staff supervision, advising overloads, and, most importantly, relationships with other academic units. The Program has its own building, two full-time staff including a student services coordinator/web manager, and a sizeable endowment fund that generates faculty and student support funds, allowing room for creative initiatives.

The Director communicates regularly with chairs, deans, and associate deans and attends monthly chairs meetings for all three units. For the first 30 years, the Director position reported to the Provost, an arrangement that protected the Program from the changing tides of college politics. Ten years ago the report line moved to the Rubenstein School dean. Since then, Program-School relations have reflected the dean's knowledge of the Program and regard for Environmental Studies as an academic endeavor. Most RSENr deans have been trained in natural resource paradigms, presenting some challenges for understanding the broadly interdisciplinary field of Environmental Studies. The Director has actively worked to bridge these intellectual and cultural gaps and defend the role of an interdisciplinary curriculum.

In Dr. Kaza's experience, the arenas of review, promotion, and tenure are some of the most hazardous for an interdisciplinary environmental program. As she says, "I have personally played a very active role in coaching junior faculty toward promotion, reviewing promotion materials to assure they were 'bullet-proof' before the standards committees. It has been my conviction that the stronger the faculty, the stronger the program, and that means investing what it takes to bring everyone through the ranks from assistant to associate to full professor or from lecturer to senior lecturer."

Maintaining a strong collegial community of faculty and staff is also an important factor in Program success. This is accomplished in a number of ways, including monthly meetings to take up curriculum proposals, research support, advising issues, program events, and unit relations; updates on initiatives from the president and provost, the three deans, and related units; and her particular campus service as Faculty Senate vice-president which places her close to administrative decisions and keeps the Program highly visible.

During her service as Director, Dr. Kaza has negotiated rapid enrollment growth, from 300+ to 500+ majors and minors, with no significant increase in faculty and staff support. To gain efficiency in advising she oversaw the development of six major concentrations as well as modification of the capstone requirement. Each of these took several years of pilots, feedback, reevaluation, and eventual passage through the curriculum committees and faculties of three colleges. Dr. Kaza also expanded the number of Continuing Education courses offered by environmental professionals to provide adequate course offerings for the swelling student population.

Dr. Kaza writes that "managing an interdisciplinary cross-campus unit is fraught with challenges, not the least of which is stereotyped thinking about Environmental Studies as a field. It is not uncommon for such programs to be called 'soft,' or 'lacking in depth,' often with little supporting evidence. Science-trained academics can be unaware of the rigor in research methods and curriculum within the social sciences and humanities. The word 'interdisciplinary' is used to mean many different things – co-teaching, working on grants together, promoting academic dialogues. The particular signature of an environmentally-oriented interdisciplinary approach is that it welcomes all methods in addressing environmental problems and encourages cross-informing perspectives, both civic and academic."

In reflecting on her strategies for success, Dr. Kaza reports that she is always looking for ways to build positive relations with deans, department chairs, staff, and student groups who may be in a position to help the Program flourish. She takes seriously her responsibility as Director to give voice to the Program and the collective concerns for the deteriorating state of the planet. Perhaps the most crucial thing she does as a program leader is, in her words, "encourage faculty, staff, and students to take the long view and celebrate the power of human imagination in creating a path forward to a more sustainable and human world."





Dr. Sandra Lubarsky

Chair, Department of Sustainable Development;
College of Arts and Sciences
Appalachian State University, NC

Dr. Lubarsky has served as Chair of the Goodnight Family Sustainable Development Department since 2011. She holds a PhD from Claremont Graduate University, an MA from the University of Chicago, and a BA from Pomona College. Previously, she created and directed the MA in Sustainable Communities at Northern Arizona University. Dr. Lubarsky has been involved in efforts to bring the conversation on sustainability into higher education for most of her time in the academy. Like many of her generation, she came to the conversation less directly than those who are now able to focus their graduate studies on sustainability. Instead, she studied process-relational philosophy and was exposed to a deeply ecological worldview, from which she gained an understanding of how sus-

Department of Sustainable Development

APPALACHIAN STATE UNIVERSITY

tainability requires much more than knowledge about human-nature relations. It requires a new metaphysics and a new curricular structure. She believes that when the lesson is the interdependence of life, the cur-

riculum must be transdisciplinary and issue-based; theory and practice must be wound together; and an orientation of ethical commitment and personal engagement must be encouraged.

The Sustainable Development Department at Appalachian State University is an interdisciplinary program that integrates theory and practice from across the humanities, natural sciences, and social sciences. Its mission is to prepare students to engage in the social, economic, and environmental transformations necessary to create thriving, equitable, and sustainable communities within an ecologically healthy world. This mission is achieved through integrative teaching and mentoring; applied research; experiential education; restorative creative endeavors; and effective and ethical community engagement. Graduates will be equipped with the knowledge and skills they need to effectively and ethically address sustainability challenges in public, private, and non-profit sectors through informed, engaged, and hopeful work. The Department is located within the College of Fine and Applied Arts, possesses eight core faculty, and maintains strong ties with faculty across campus who address dimensions of sustainability in their courses.

The Department offers BA and BS degrees in Sustainable Development with three concentrations: Environmental Studies; Agroecology and Sustainable Agriculture; and Community, Regional, and Global Development. There are currently about 300 majors and 50 minors. The faculty give a great deal of attention to curriculum development and regularly introduce new methods, practices, and courses.

The curriculum is the backbone of the Department and it is here that its commitment to interdisciplinarity, the interweaving of theory and practice, and to ethics and personal agency take form.

All majors take an introductory survey course exploring five major dimensions of sustainable development: climate change, food, water, energy, and social justice. The rest of the required core ensures that majors have a firm foundation in sustainability from the perspective of the natural sciences, social sciences, and humanities, as well as a field-based farm experience and integrative capstone seminar. Students take additional coursework to gain depth in their chosen concentration. Each degree program also requires a set of skills courses that help students gain the capacity to be effective in the workplace. Internships and study abroad are strongly encouraged.

The Department is particularly distinct because it is home to one of the largest sustainable teaching-research farms in the nation. The farm is approximately 35 acres of pasture and 130 acres of woodlands and includes a variety of livestock, a poultry research station, a large greenhouse, a late-nineteenth century barn, and a student residence where five to six students live rent-free in exchange for ten hours of farm work per week. The farm serves as a learning laboratory for lessons in agroecology, agroforestry, and sustainable farming practices. Students in the Technology and Design and Building Science programs at the university have designed and built several structures on the farm and the farm has benefited from the expertise of students in the program in Appropriate Technology. Results from research on the farm are shared with local community members to encourage sustainable agricultural practices in the region.



Since the Department began awarding degrees in 2009, it has seen exceedingly fast enrollment growth, reflecting the upsurge of interest in sustainability and sustainable development on a national level. Most courses fill to capacity within a few weeks of registration and a significant number of students come to Appalachian State specifically to major in Sustainable Development. Due to articulation agreements with community colleges that offer two-year programs in agroecology, there is a steady flow of transfer students into the Department's programs.

Overall, the Department continues to be on an upward trajectory on all counts: enrollment, majors, and graduates. Dr. Lubarsky identifies its greatest challenge as keeping pace with student demand. While the rapid growth of the major coincided with reduced state budgets, the administration has been remarkably responsive in providing new tenure lines, a full-time farm manager, and a half-time farm assistant. Such support is emblematic of the university which has written sustainability into its strategic plan and is committed to creating a campus culture of sustainability. With a strong faculty, deep community roots, widespread affiliate support, and an enthusiastic student population, the Department is well positioned for continued and vibrant growth.



Dr. Valerie Luzadis

Chair, Department of Environmental Studies
State University of New York
College of Environmental Science and Forestry, NY

Dr. Luzadis has been Professor of Environmental Studies since 2010 and previously served as Assistant Provost for Academic Initiatives and Assessment. She holds a PhD in Forest and Natural Resources Economics and Policy from the SUNY College of Environmental Science and Forestry (SUNY-ESF) and a BS and MS in Natural Resources from Cornell University. Her academic background lies in ecological economics and policy; social-ecological systems; and natural resources, forest science, and communication.

SUNY-ESF is unique in that nearly all programs on campus are interdisciplinary environmental programs. The Environmental Studies undergraduate and Environmental Science graduate programs will be featured here. The former offers a BS in Environmental Studies while the latter offers MS, Master of Professional Studies, and PhD degrees.



State University of New York
College of Environmental Science and Forestry

The undergraduate program is administered by the Environmental Studies Department, which hosts 11 full-time faculty, all of whom engage in teaching, research, service, and advising. The Environmental Studies Department is one of eight academic departments, each with a

Department Chair who reports to the Provost. The Department Chairs serve on the Academic Council, a body led by the Provost to address institutional academic needs.

The undergraduate Environmental Studies program emphasizes interdisciplinary social science, humanities, and natural science approaches to environmental understanding and stewardship. It is designed to provide a comprehensive understanding of environmental affairs by bringing together scientific, philosophical, theoretical, and practical perspectives on a range of environmental concerns. The program prepares students with the knowledge and experience to work towards an ecologically sustainable and socially just world by providing opportunities for community engagement, valuable hands-on internship experiences, and multiple destinations for a semester studying abroad. Efforts are guided by the following program learning outcomes: critical thinking, communication, interdisciplinary synthesis, ecological literacy, and sustainability. The program facilitates student and faculty engagement with fundamental environmental challenges and dynamics such as multiple and conflicting levels of environmental governance, participatory democracy, sustainable development, uses and limits of scientific prediction, discourses of environment, and cultural expressions of nature, risk, and ecological sustainability.

Both first-year and transfer students may enter the program. In the final two years, students select one of three specializations or Option Areas: Environment, Communication and Society; Environmental Policy, Planning and Law; or Natural Systems Applications. Graduates go on to graduate programs in social and biophysical sciences as well as law and medical school. They also work in non-governmental organizations, education, government, and the private sector, pursuing careers in such areas as policy, advocacy, conservation, consulting, administration, law, and education.

The graduate program in Environmental Science (GPES) was created in the early 1970s as a response to the emerging institutional and analytical challenges of developing environmental problems. Its mission is to provide interdisciplinary education, research, and public service to prepare students to comprehensively address environmental concerns and problems, investigate practical solutions to them, and foster effective environmental stewardship. The program is designed to provide a multidisciplinary approach, holistic perspectives, topical grounding, and realistic experience. Graduate students choose among eight Areas of Study: Biophysical and Ecological Economics; Coupled Natural and Human Systems; Ecosystem Restoration; Environmental Communication and Participatory Processes; Environmental and Community Land Planning; Environmental Monitoring and Modeling; Environmental and Natural Resources Policy; and Water and Wetland Resource Studies.



In contrast to the undergraduate program, GPES draws upon faculty from throughout the College, each of whom has a primary home in an academic department. All faculty activities are accounted through the academic departments, such that the departments benefit from faculty participation in the interdisciplinary graduate programs. Each of the eight Areas of Study is formally approved by ESF Faculty Governance and has at least three active faculty members, including a Coordinator. The Area Coordinators, GPES Graduate Coordinator, and Director of the Division of Environmental Science make up the GPES Committee, which is responsible for admissions, allocation of graduate fellowships, curriculum changes, and program administration and assessment.

Dr. Luzadis identifies minimizing ineffective administrative structures and demands to actively support faculty to do the best and most they can in teaching, research, and service as one of the most important factors in leading for success. She sees faculty ownership of academic programs as critical and attainable through effective, efficient administrative approaches. Additionally, Dr. Luzadis indicates that administrative structures must support the primary academic departments from which faculty pursue interdisciplinary programs. This is because clarification of relationships between departments and interdepartmental programs in terms of accounting for faculty effort minimizes the problem of split loyalties that often arise when faculty have appointments in two units.



Dr. Michael Manfredo

Head, Department of Human Dimensions of Natural Resources;
Warner College of Natural Resources
Colorado State University, CO

Dr. Manfredo has served as Department Head for 16 years. He earned a PhD in Recreation Resources at Colorado State University, and an MS in Parks Management and BA in Anthropology from Pennsylvania State University.

The Department of Human Dimensions of Natural Resources (HDNR) is one of five academic departments in Colorado State University's (CSU) Warner College of Natural Resources and is dedicated to contributing to the conservation, stewardship, and enjoyment of natural and cultural resources



Colorado State University
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and advancing those resources in a way that serves the greater good of both the environment and society. The Department provides education, research,

and outreach that are focused on elevating knowledge and understanding of human components to natural resources issues and of how to integrate social sciences with ecology to create effective management solutions. Fifteen faculty develop and teach the curriculum for the Department.

The Department offers a BS in Natural Resource Recreation and Tourism with four areas of concentration: Natural Resource Tourism, Global Tourism, Environmental Communication, and Parks and Protected Area Management. Incorporated into the undergraduate curriculum are opportunities for engaged learning, including interdisciplinary field courses on social and ecological studies abroad. At the graduate level, the Department offers traditional MS and PhD programs as well as two innovative, interdisciplinary offerings: a Master of Science in Conservation Leadership and a Master of Tourism Management. Approximately 340 undergraduates and 90 graduates are currently enrolled in the traditional degree programs. Alumni have a long legacy of careers in the park service, but also go on to lead private tourism businesses, conservation non-governmental organizations, environmental policy, and education and outreach initiatives.

The two new, non-traditional master's programs were designed to address rapid changes in conservation science and to create a learning community of adaptive change makers who gain the experience needed to make an impact on real-world problems. The first, Conservation Leadership Through Learning (CLTL), is a cohort-based master's degree based on systems learning, interdisciplinary collaboration, experiential place-based learning, and cross-cultural engagement. The program accepts approximately 20 students in each two-year cohort and combines on-campus curriculum with international, immersive engaged learning on conservation issues. It was designed in response to dialogue by HDNR

faculty beginning in the mid-2000s about the need for new approaches to graduate education and the necessity for a program that would prepare graduates to hit the ground running with pragmatic scientific knowledge and real-world problem solving experience.

The program began as a joint degree program between CSU and El Colegio de la Frontera Sur, Mexico. Students spent their first year on the CSU campus completing intensive curriculum to integrate technical knowledge across ecological and social sciences, contextualize big picture conservation issues, and identify potential solutions. During the second year, the students studied in Mexico and were challenged with identifying a priority conservation issue and developing a solution that could be implemented to help the community. In 2014, the program expanded its study abroad options to include Peru, New Zealand, and Kenya.

The second program, the Master of Tourism Management (MTM), is a non-thesis, nine-month program offered both on-campus and online that blends courses led by HDNR faculty with curriculum taught by CSU's College of Business and Department of Food and Nutrition. Its creation was driven by the Department's desire to create an interdisciplinary program in sustainable tourism that could merge natural resource-based tourism with hospitality-based tourism.

Dr. Manfredo sees one of HDNR's key challenges as the necessity for student education outcomes to reflect the changing demands of conservation professionals, while the process of adaptation at universities can be generally slow, tradition-bound, and conservative as well as constrained by shrinking state education funding and rising tuition costs. In response, the Department has envisioned new approaches to education, fostered innovation, and converted these ideas into reality. Most important for its success in this process has been engaging and empowering key people who can provide leadership and spread enthusiasm for programs at all levels. This engagement involves the support of donors and university leadership and creating financial models that allow programs to begin and be sustained.



CLTL students study in the field near Chiapas, Mexico.

Overall, one of the most important indicators of HDNR's success is the ability of students to graduate with the skills and passion to secure a rewarding career. This success is exemplified by the first class of CLTL students, who graduated in 2011 with 100% success and 100% employment within a few months. On a larger scale, success means that the Department is making a significant contribution to conservation and natural resources challenges.

Leading for Success

The Council of Environmental Deans and Directors collectively identified three key questions central to IES program administration:

- How do program leaders view their roles, especially with respect to other unit/institutional leaders? Are there general models of leadership for IES programs?
- How do program leaders view their IES unit's/program's role in terms of engagement with other units and within the institution?
- How does the location of the IES unit/program in the institution influence how leaders view their role and their unit's/program's role?

In this section, we report the findings from the survey on significant changes in programs over the last two years and program leaders' views on the greatest challenge to interdisciplinarity as well as the most important elements to manage for success. We also include the findings of an analysis that reveals three distinct views on which factors are essential for IES unit/program success. This analysis sheds some light on the three key questions: how leaders view their role, how leaders view their unit's/program's role, and how their location in the institution influences their view of these roles.

Over half of the programs included in the survey reported one or more significant changes in the last two years—mostly positive (Table 20). These results indicate that IES program leaders are coping with a rapid pace of change coupled with tight budgets; almost a fifth of programs reported reduced budgets, although a fair percentage received budget increases. Almost a quarter have experienced a change in their mission and/or status and many have added new faculty lines, added or revised degree programs, and added or revised specializations, minors, or certificates. Almost a third have new or renovated facilities.

Table 20. Significant program changes over last two years

Area of Change	Proportion n=295	Type of Change
Faculty	52%	41% added new 3% added joint 8% lost
Degrees	45%	27% added new 15% revised existing 3% removed
Specializations/minors/certificates	40%	33% added new 6% revised existing 1% removed
Budget	31%	18% decrease 12% increase
Facilities	29%	21% new 8% renovated
Mission	23%	14% new 9% revised
Status	23%	9% location within institution 6% name change 5% status change (e.g. program to department) 3% merger with another unit

Entrenched traditional institutional structures and cultures continue to be the prominent concerns for IES program leaders. The survey included a question that asked, “What is the single greatest challenge for interdisciplinary education/research?” The answers provided by 207 IES program leaders focus on institutional structure and support, cooperation, perceptions of interdisciplinary programs, and struggles with curriculum design. The breakdown of responses is as follows:

- 23% issues with interdepartmental cooperation (‘silo syndrome’).
- 18% inadequate administrative support.
- 14% issues with recruiting, retaining, and supporting faculty.
- 13% institutional bias toward traditional disciplines and/or negative perceptions of career preparation.
- 12% issues with interdepartmental or intra-program cooperation.
- 11% lack of funding and/or resources competition.
- 11% achieving depth and breadth and/or curricular balance.
- 9% lack of identity and/or cohesive home.

The survey asked program leaders to rate the importance of 32 factors in terms of their influence on their IES program’s success by ranking the influence of each as high, moderate, low, or not applicable. The respondents were also asked to rate their level of satisfaction with each factor in regard to its influence on their own program’s success (see Appendix C for the questionnaire).

Table 21 lists the factors in order of their mean importance and the mean levels of satisfaction with each factor as rated by 262 program leaders. The factors rated of utmost importance include curriculum design factors, program leadership, faculty participation, and student interest and support. Institutional support, experiential learning, and graduate employment opportunities factors are also ranked of higher importance. External support (government, federal funding, etc.) and partnership factors are rated of lower importance.

Factor analysis is a statistical method that reduces a number of interrelated variables to a smaller number of dimensions or factors, each representing a common construct. The influence areas listed in Table 21 illustrate how the 32 factors are significantly correlated with nine areas of influence on success revealed by a factor analysis as discussed below.

Table 21. Mean influence of factors on success

Factor	Influence Area*	Importance n=262	Satisfaction n=262
Incorporating real world topics into courses	Curriculum design	++++	++++
Program/unit leadership	Curriculum design	++++	++++
Student interest and support	Curriculum design	++++	++++
Faculty participation	Institutional support	++++	+++
Incorporating research experiences	Federal grants	++++	+++
Developing courses	Curriculum design	++++	+++
Designing degrees and specializations	Curriculum design	++++	+++
Incorporating internship experiences	Experiential learning	+++	+++
Institutional support (resources)	Institutional support	+++	++
Institutional support (leadership)	Institutional support	+++	+++
Incorporating service/applied learning	Experiential learning	+++	+++
Local/regional employment opportunities	Workforce	+++	++
Program/unit location in institution	Institutional support	+++	+++
National employment opportunities	Workforce & International connections	+++	++
Sequencing courses	Curriculum design	+++	+++
Campus sustainability efforts	Experiential learning	+++	++
Curriculum approval process	Curriculum design	+++	+++
Career support services	Workforce	++	++
Competition with other units/programs	--	++	++
Grant support services	Federal grants	++	++
Local community partnerships	Community partners	+	++
NGO partnerships	Community partners	+	++
International employment opportunities	International connections	+	+
Foundation/donor support	--	+	+
Federal funding/grants	Federal grants & Public/government support	+	+
Public support	Public/government support	+	+
State/local funding	Public/government support	+	+
Government/agency partnerships	Government/higher education partners	+	+
Private organization partnerships	Community partners & Government/higher education partners	+	+
Political support	Public/government support	+	+
HE institution partnerships	Government/higher education partners		+
Foreign HE institution partnerships	Government/higher education partners & International connections		+

* See discussion below that describes the factor types.

Legend:

++++	2.5-3.0	most important/satisfied
+++	2.0-2.4	more important/satisfied
++	1.5-1.9	moderately important/satisfied
+	1.0-1.4	less important/satisfied
	<1.0	least important/satisfied

Satisfaction is lower than the importance ranking for 8 of the 32 factors (all rated more or most important), indicating that these eight represent challenges for program leaders (bold in Table 21). These factors include curriculum design (designing degree programs and specializations and developing courses), institutional support (faculty participation and institutional resources support), workforce alignment (local/regional and national employment opportunities for graduates), provision of research opportunities for students, and engagement with campus sustainability initiatives. Factor satisfaction is higher than importance for four types of partnership relationships: local community partnerships, non-governmental organization partnerships, domestic higher education institution partnerships, and foreign higher education partnerships.

Three Views of Factors Important for Success

The findings presented above represent the average ratings for all 262 program leaders, but there are considerable differences in how individual leaders rate the importance of the 32 factors for their own IES unit/program. A statistical analysis of the program leaders' ratings revealed three different views on leadership models based on which factors must be managed effectively for program success.

The three views or groups were derived using a two-step analysis. The first step was maximum likelihood factor analysis of the importance ratings to reveal how program leaders group the various factors into dimensions (components) of success. The resulting components represent nine areas of influence on IES unit/program success (Table 22). The interrelationships of the nine areas (revealed by correlations between the components) illustrate how the components are related to and influence each other (Table 21; Figure 2). The second step was cluster analysis to determine which program leaders rated these components similarly. The cluster analysis found three distinct groups which were confirmed using a discriminant analysis and testing for significant differences between the groups for other program parameters not included in the analysis, such as program location within the institution and program age (Figure 3).

The factor analysis condensed the 32 factors into nine areas of influence labeled: *Public and Government Support*, *Community Partnerships*, *Institutional and Faculty Support*, *Curriculum Design*, *Experiential Learning Opportunities*, *Local/Regional Employment Opportunities*, *Federal Grant Support*, *Government and Higher Education Partnerships*, and *International Connections*.¹⁵ Each area represents a dimension of influence and is characterized by significant correlations with a subset of the 32 influence factors aligned with each area to varying extents (Table 23). The names of the areas are based on the influence factors significantly correlated with the area and the magnitude of the correlations. For example, *Public and Government Support* includes four factors—state/local funding, political support, public support, and federal funding/grants—with state/local funding most highly correlated with the factor and therefore contributing most strongly to this area of influence.

The nine areas of influence are also correlated with each other to varying extents as shown in Table 23. Figure 3 illustrates the interrelationships (correlations) between the nine areas.

15. Although factor is the correct statistical term, area is used hereafter as it is more descriptive of what the factors represent. All but two of the original 32 factors—competition with other programs and foundation/private donor funding—are significantly correlated with at least one area of influence. The total variance explained is 61%, the goodness-of-fit test of the model was $p < .035$, and the Cronbach's alpha scores confirm the reliability of each area.

Table 22. Areas of influence on IES unit/program success

Influence area	Influencing factor (correlation with area)
Public and government support	State/local funding (.799) Political support (.761) Public support (.599) Federal funding/grants (.463)
Community partnerships	Local community partnerships (.868) NGO partnerships (.867) Private organization partnerships (.441)
Institutional and faculty support	Institutional support – resources (.860) Institutional support – leadership (.642) Faculty participation (.519) Program/unit location in institution (.426)
Curriculum design	Curriculum approval process (.542) Developing courses (.493) Designing degrees and specializations (.478) Incorporating real world topics into courses (.473) Sequencing courses (.472) Unit/program leadership (.401) Student interest and support (.355)
Experiential learning opportunities	Incorporating service/applied learning (.700) Incorporating internship experiences (.571) Campus sustainability efforts (.346)
Local/regional employment opportunities	Local/regional employment opportunities (.742) National employment opportunities (.510) Career support services (.463)
Federal grant support	Grant support services (.703) Federal funding/grants (.472) Incorporating research experiences (.371)
Government and higher education partnerships	Government/agency partnerships (.644) HE institution partnerships (.448) Foreign HE institution partnerships (.433) Private organization partnerships (.326)
International connections	International employment opportunities (.763) National employment opportunities (.487) Foreign HE institution partnerships (.411)

Table 23. Influence components correlation matrix

Influence Area	P&GS	CP	I&FS	CD	ELO	L/REO	FGS	G&HEP	IC
Public and government support (P&GS)	1.000	.413	.287	.074	.221	.067	.375	.450	.294
Community partnerships (CP)		1.000	.279	.204	.455	.036	.124	.447	.352
Institutional and faculty support (I&FS)			1.000	.427	.339	.211	.217	.175	.464
Curriculum design (CD)				1.000	.216	.258	-.017	.106	.327
Experiential learning opportunities (ELO)					1.000	.238	.170	.173	.311
Local/regional employment opportunities (L/REO)						1.000	.236	.173	.150
Federal grant support (FGS)							1.000	.278	.091
Government and higher education partnerships (G&HEP)								1.000	.186
International connections (IC)									1.000

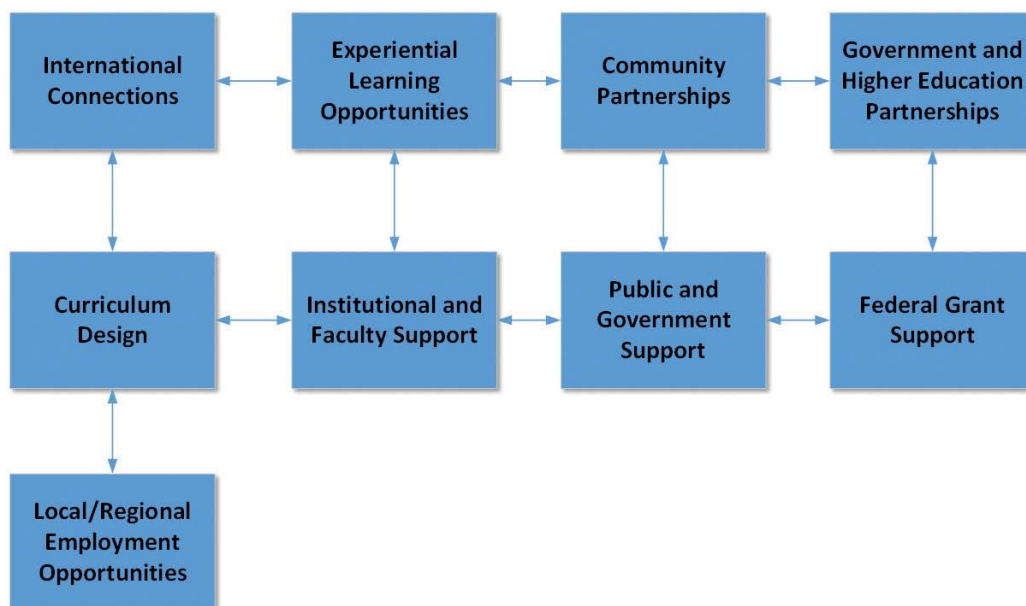
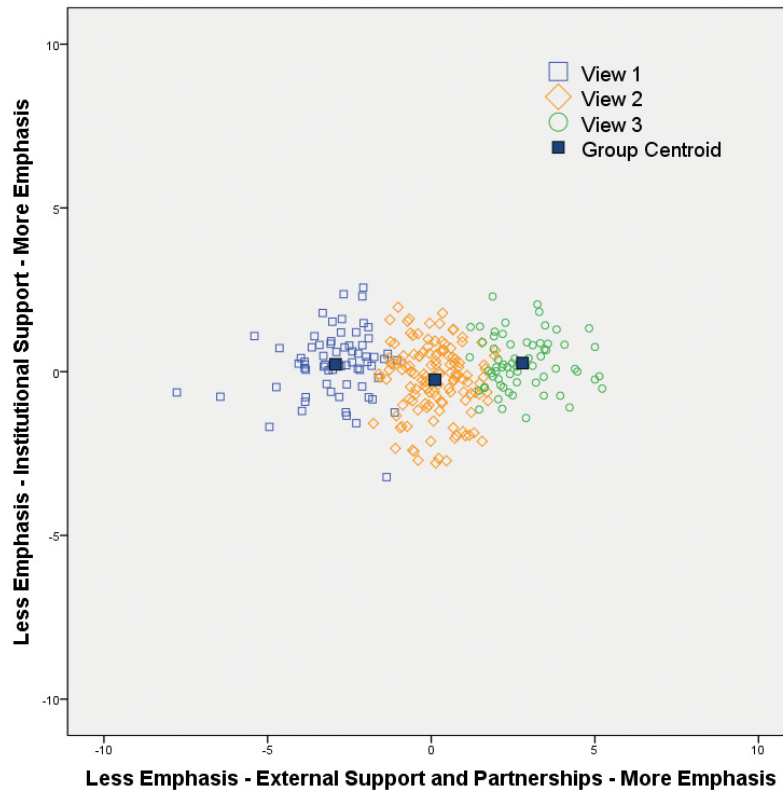
Figure 3. Framework illustrating the relationships between the areas of influence

Figure 4 is a graph illustrating the results of a discriminant analysis used to confirm the validity of the finding of three clusters. Each point in the graph represents a program leader and how her/his factor scores (based on how they rated the importance of the 32 factors) plot on the two functional dimensions that separate the three clusters from each other. Half of the program leaders who participated in the survey are aligned with Leadership View 2, with the remaining half split equally between Leadership Views 1 and 3.

Only one function (represented on the x axis) is a highly significant predictor ($p < .000$); the second function is only marginally significant ($p < .058$). The significant function is characterized by the importance program leaders place on external support and partnerships factors. Leadership View 3 program leaders place more importance on these factors and Leadership View 1 leaders less. The non-significant function is characterized by the importance placed on institutional support and international connections.

Figure 4. Program leaders' factor scores plotted on the two dimensions that separate the groups



Tables 24 and 25 illustrate how the three leadership groups are distinguished from each other by the number of factors rated of higher importance and the level of importance placed on various factors. Leaders with the Leadership View 3 perspective rank all factors of moderate to high importance, Leadership View 2 leaders view rate 69% of the factors of moderate to high importance, and Leadership View 1 leaders only rate 59% of the factors of moderate to high importance.

Key areas of difference include the importance placed on program location within the institution, the importance placed on alignment with employment opportunities, and the importance of partnerships of all types. Leadership View 1 places lowest importance on all these factors, Leadership View 3 places the highest importance on these factors, and Leadership View 2 falls in between. Figure 5 illustrates the relationships between the three views.

Table 24. Mean influence of factors on success

Factor	All programs n=262	View 1 n=67	View 2 n=130	View 3 n=65
Incorporating real world topics into courses	++++	++++	++++	++++
Program/unit leadership	++++	++++	++++	++++
Student interest and support	++++	++++	++++	++++
Faculty participation	++++	+++	++++	++++
Incorporating research experiences	++++	+++	++++	++++
Developing courses	++++	+++	++++	++++
Designing degrees and specializations	++++	+++	+++	++++
Incorporating internship experiences	+++	+++	+++	++++
Institutional support (resources)	+++	+++	+++	++++
Institutional support (leadership)	+++	+++	+++	++++
Incorporating service/applied learning	+++	++	+++	++++
Local/regional employment opportunities	+++	++	+++	+++
Program/unit location in institution	+++	++	+++	++++
National employment opportunities	+++	++	+++	++++
Sequencing courses	+++	+++	+++	+++
Campus sustainability efforts	+++	++	+++	+++
Curriculum approval process	+++	++	+++	+++
Career support services	++	++	++	+++
Competition with other units/programs	++	++	++	++
Grant support services	++	+	++	+++
Local community partnerships	+		++	+++
NGO partnerships	+		++	+++
International employment opportunities	+	+	+	++
Foundation/donor support	+		+	++
Federal funding/grants	+		+	++
Public support	+		+	++
State/local funding	+		+	++
Government/agency partnerships	+		+	++
Private organization partnerships	+		+	++
Political support	+		+	++
HE institution partnerships				++
Foreign HE institution partnerships				++

Legend:		
++++	2.5-3.0	most important
+++	2.0-2.4	more important
++	1.5-1.9	moderately important
+	1.0-1.4	less important
	<1.0	least important

Differences between the three Leadership Views are also apparent in their satisfaction ratings and in which factors are management challenges (satisfaction rating lower than importance rating). All three groups rate institutional resources support of higher importance than their level of satisfaction.

Table 25. Mean satisfaction with success factors

Factor	All programs n=263	View 1 n=67	View 2 n=130	View 3 n=65
Incorporating real world topics into courses	++++	++++	++++	++++
Program/unit leadership	++++	++++	++++	++++
Student interest and support	++++	+++	++++	++++
Faculty participation	+++	+++	+++	++++
Incorporating research experiences	+++	+++	++++	++++
Developing courses	+++	+++	+++	+++
Designing degrees and specializations	+++	+++	+++	++++
Incorporating internship experiences	+++	+++	+++	+++
Institutional support (resources)	++	++	++	+++
Institutional support (leadership)	+++	+++	+++	+++
Incorporating service/applied learning	+++	++	+++	++++
Local/regional employment opportunities	++	++	+++	+++
Program/unit location in institution	+++	++	+++	+++
National employment opportunities	++	+	+++	+++
Sequencing courses	+++	+++	+++	+++
Campus sustainability efforts	++	++	+++	+++
Curriculum approval process	+++	++	+++	+++
Career support services	++	+	++	+
Competition with other units/programs	++	++	++	+
Grant support services	++	+	++	+++
Local community partnerships	++		++	+++
NGO partnerships	++		++	+++
International employment opportunities	+	+	+	+
Foundation/donor support	+		+	+
Federal funding/grants	+		+	+
Public support	+		+	+
State/local funding	+		+	+
Government/agency partnerships	+		+	+
Private organization partnerships	+		+	+
Political support	+		+	+
HE institution partnerships	+		+	+
Foreign HE institution partnerships	+			+

Legend:

++++	2.5-3.0	most satisfied
+++	2.0-2.4	more satisfied
++	1.5-1.9	moderately satisfied
+	1.0-1.4	less satisfied
	<1.0	least satisfied

Other Leadership View 1 challenges include student interest and support, national employment opportunities, and career support services. Leadership View 2 challenges include faculty participation and developing courses. Leadership View 3 challenges include developing courses, institutional leadership support, location within their institutions, competition from other units, national and international employment opportunities for students, career support services, public and government support, and private sector, governmental, and higher education partnerships.

Contextual Parameters Associated with the Three Views

The three views of program success are related to the contexts in which the leaders work. Significant differences in program parameters include:¹⁶

- The role (title) of the program leader.
- The program leader's academic preparation.
- The location of the academic program within its institution.
- Program age.
- Level of IES degrees offered (undergraduate only, graduate only, or both).

Leadership View 3 is significantly distinct from the other two models on all five program leader and program parameters (Table 26). Leadership Views 1 and 2 are more similar; they differ significantly from each other on only two administrative parameters: program leader title and program level. The models do not differ significantly from each other in terms of institution type (basic Carnegie class and control: public or private not-for-profit).

The three Leadership Views also differ significantly from each other in their alignment with views on ideal curriculum design for IES degree programs.¹⁷ All three groups are significantly different from each other in their views on ideal curriculum for undergraduate programs; Leadership Views 2 and 3 also differ significantly from each other on ideal graduate program curricula. The models do not differ significantly in terms of average enrollment numbers, but Leadership View 3 undergraduate and master's programs and Leadership View 1 doctorate programs tend to be larger. Table 26 summarizes the characteristics of each group.

Leadership View 1 –Curriculum Design Focus

Leadership View 1 represents the views of 67 program leaders that participated in the survey, a quarter of IES program leaders. These programs administer 57 undergraduate IES degrees and 19 graduate IES degrees included in the survey. This group appears to have a more internal program focus and they view program/unit leadership, student interest and support, institutional leadership and resources support, faculty participation, aspects of curriculum design, and research and internship opportunities for

16. Mann-Whitney t test, a non-parametric test of the difference in the shape or location (central tendency) of two independent groups.

17. For a description of the ideal curriculum models see Vincent, Shirley, Bunn, Stevenson and Lilah Sloane. 2013. *Interdisciplinary Environmental and Sustainability Education on the Nation's Campuses 2012: Curriculum Design*. National Council for Science and the Environment, Washington DC. A summary is included in the conclusion below.

students as the most important factors for program success. External support factors and partnerships are viewed as unimportant. This group also views their location within their institution and employment opportunities for students as less important than the other two models. Areas where Leadership View 1 leaders see obstacles are institutional resources support, student interest and support, career support services, and national employment opportunities.

The majority in this group are program directors or coordinators (68%) that manage newer (many since 2010), undergraduate only IES degree programs. This group has the highest proportion (57%) of unit-spanning programs and the lowest number located in an academic administrative unit—an IES or other department, school or division within a college, primary level school or college, or center/institute. It also has the lowest proportion of program leaders whose academic preparation is interdisciplinary or natural resources (31%) and the highest with training in either life or physical sciences (49%). Many of these programs (48%) are located at master's colleges and universities. Distinguishing factors for this group include the highest proportion of undergraduate degree programs that align with the *Natural Sciences Emphasis* or the *Social Systems Emphasis* ideal curriculum models and the lowest proportion that aligns with the *Sustainability Solutions Emphasis* model.

Leadership View 2 – Curriculum Design, Applied Learning and Community and Regional Partnerships Focus

Leadership View 2 represents the views of 130 program leaders that participated in the survey, half of all IES program leaders. These programs administer 117 undergraduate IES degrees and 44 graduate IES degrees included in the survey. This group shares the views of Leadership View 1 on the factors most important for success, but more importance is also placed on the program/unit location within the institution, employment opportunities for students, and applied learning experiences for students (incorporating research experiences, incorporating applied learning experiences, local community partnerships, non-governmental partnerships, and campus sustainability efforts). This group of leaders appears to have a more applied learning/regionally focused view that values partnerships that provide real-world, applied research opportunities to students via partnerships with campus sustainability initiatives, local community, and non-governmental organization partners. Other external partnerships and external support factors are viewed of lower importance. Grant support services are viewed as moderately important, but governmental funding is not important, indicating the importance of grant support is tied to funding to develop student research and experiential learning opportunities. This group views their location within their institution and employment opportunities for students as more important than Leadership View 1 leaders but less important than Leadership View 3 leaders. Areas where Leadership View 2 leaders see obstacles are institutional resources support, faculty participation, and developing courses.

Leadership View 2 programs are similar to Leadership View 1 programs but there is a more equal distribution on most parameters. About half of the leaders direct unit-spanning programs and half manage academic units, about half are newer programs (established since 2000), 60% offer only undergraduate IES degrees, and there is a more equal distribution in types of institutions. Similar to Leadership View 1 leaders, about a third have their academic preparation in interdisciplinary or natural resources (33%) and about half in either life or physical sciences (47%). Undergraduate degrees offered by these programs have a relatively equal distribution of degrees aligned with the three undergraduate ideal curricula models. A distinguishing feature of this group is the alignment of more graduate programs with the *Natural Systems Emphasis* model for graduate curriculum.

Leadership View 3 – Curriculum Design, External Partnerships and International/Global Engagement Focus

Leadership View 3 represents the views of 65 program leaders, a quarter of all IES programs leaders. This group is the most distinctive and differs significantly from the other two models on a number of program parameters as well as the leaders' views on factors of importance for success and ideal curriculum design. These leaders view all of the factors included in the survey of moderate to high importance for success, including external support factors and all types of partnerships, especially local community and non-governmental organization partners. They view their location within their institutions and national employment opportunities for their students of highest importance. Leadership View 3 leaders identify a number of challenges including institutional resources support, institutional leadership support, location within their institution, competition from other units, developing courses, national and international employment opportunities for students, career support services, public and government support, and private sector, governmental, and higher education partnerships.

Most of these leaders are department chairs/heads, deans of schools or colleges, or center or institute directors (64%) with interdisciplinary or natural resources academic preparation (63%). This group has the highest proportion of IES units (55%) and the lowest number of unit-spanning programs. Almost a quarter are leaders of IES schools or divisions within colleges, primary level schools or colleges, or centers or institutes. About half of these programs award both undergraduate and graduate IES degrees and most are older programs, established before 2000. Many are located at doctoral/research institutions (55%). This group is also distinguished by the high proportions of both undergraduate (67%) and graduate degrees (82%) aligned with the *Sustainability Solutions Emphasis* ideal curricula models for both undergraduate degrees and graduate degrees. The undergraduate and master's degree programs have higher average enrollments than degree programs associated with Leadership View 1 and 2.

Figure 5. Framework for understanding the relationships between the three IES program leadership perspectives on what is important for program success

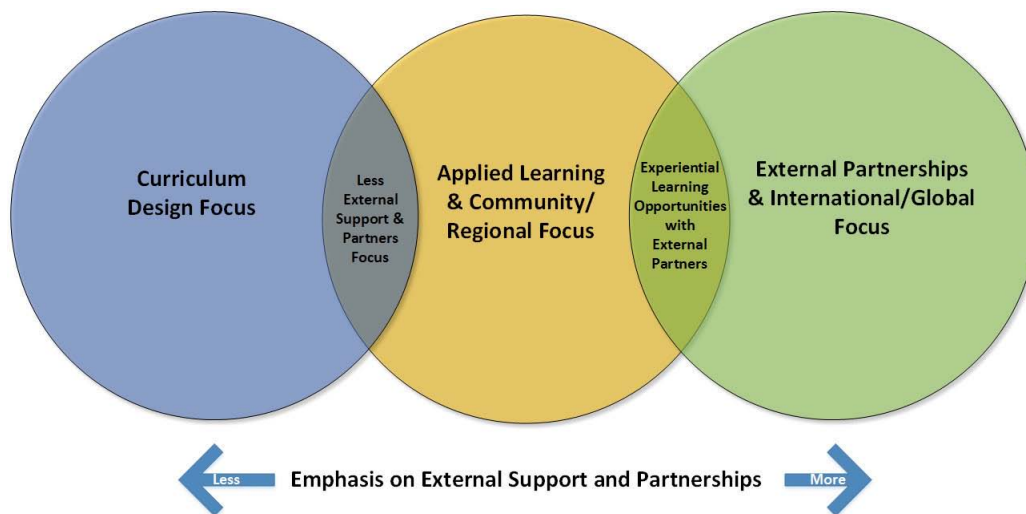


Table 26. Parameters associated with the three Leadership Views

Parameter	Leadership View 1	Leadership View 2	Leadership View 3
Institution Carnegie class	19% Baccalaureate college 48% Master's college/univ. 33% Doc/research univ.	28% Baccalaureate college 29% Master's college/univ. 43% Doc/research univ.	20% Baccalaureate college 25% Master's college/univ. 55% Doc/research univ.
Institution control	48% Public 52% Private not-for-profit	49% Public 51% Private not-for-profit	59% Public 42% Private not-for-profit
Administrator title	68% Program Director/Coor. 30% Department Chair/Head 1% Center/Institute Director 1% Dean	53% Program Director/Coor. 37% Department Chair/Head 5% Center/Institute Director 5% Dean	36% Program Director/Coor. 40% Department Chair/Head 11% Center/Institute Director 13% Dean
Administrator training	31% Interdisciplinary/natural res 49% Life/physical Sciences 12% Social science/humanities 8% Other	33% Interdisciplinary/natural res 47% Life/physical Sciences 12% Social science/humanities 8% Other	63% Interdisciplinary/natural res 26% Life/physical Sciences 5% Social science/humanities 6% Other
Location within institution	57% Unit-spanning program 22% IES unit 21% Other unit	48% Unit-spanning program 28% IES unit 24% Other unit	31% Unit-spanning program 55% IES unit 14% Other unit
Program level	75% UG only 12% UG and GR 13% GR	60% UG only 23% UG and GR 18% GR only	35% UG only 49% UG and GR 15% GR only
Program established	57% since 2000 mean 1997	48% since 2000 mean 1995	66% before 2000 mean 1985
Mean average enrollment	56 BA/BS (57 degrees) 20 Master's (14 degrees) 40 PhD (5 degrees)	49 BA/BS (117 degrees) 29 Master's (33 degrees) 20 PhD (11 degrees)	114 BA/BS (56 degrees) 41 Master's (31 degrees) 23 PhD (12 degrees)
Ideal curriculum - undergraduate	44% Natural systems 42% Social systems 14% Sustainability solutions	35% Natural systems 28% Social systems 37% Sustainability solutions	18% Natural systems 15% Social systems 67% Sustainability solutions
Ideal curriculum – graduate	35% Natural systems 65% Sustainability solutions	43% Natural systems 57% Sustainability solutions	18% Natural systems 82% Sustainability solutions



Dr. Marie Lynn Miranda

Samuel A. Graham Dean and Professor,
School of Natural Resources and Environment
University of Michigan, MI

Dr. Marie Lynn Miranda became dean of the University of Michigan School of Natural Resources and Environment in January, 2012. This Detroit native has devoted much of her career to research aimed at improving the health status of disadvantaged populations. She is the Founding Director of the Children's Environmental Health Initiative, a research, education, and outreach program that fosters environments where all children can prosper. She maintains a deep, abiding personal and professional interest in social and environmental justice.

Dean Miranda also holds appointments in the Department of Pediatrics and the Department of Obstetrics and Gynecology at the University of Michigan (U-M). Prior to joining U-M, she was a faculty member in the Nicholas



School of the Environment, the Integrated Toxicology and Environmental Health

Program, and the Global Health Institute at Duke University. She also was a faculty member in the Department of Pediatrics within Duke Medicine.

The University of Michigan School of Natural Resources and Environment (SNRE) offers the most comprehensive and integrated academic environmental programs in the nation. SNRE's mission is to help protect the Earth's resources and achieve a sustainable society. Through research, teaching, and outreach, faculty, staff, and students generate knowledge, policies, techniques, and skills to help practitioners manage and conserve natural and environmental resources to meet the full range of human needs on a sustainable basis.

SNRE provides the intellectual challenges and scientific experiences that prepare students to be leaders and agents of environmental change. SNRE students learn in the classroom, field, and lab. They work on team projects with nationally known clients. They find internship opportunities with the government, private sector, and non-governmental organizations. They are guided by faculty who are foremost in their fields. And they join a worldwide community—8,000 strong—of alumni, students, scholars, and partners who champion bold ideas for a better world.

The hallmarks of an SNRE education are: a customizable learning experience that offers all the benefits of a small, intimate school embedded in a world-class research university; an interdisciplinary emphasis that joins natural and social scientists, designers, and engineers; a century-old tradition of active, place-based, engaged learning that transforms knowledge to application; and global engagement that equips students to change the world.

Students, faculty, and staff together compose a vibrant community of roughly a thousand environmental change agents on U-M's campus. The School offers degree programs at the bachelor's, master's, and doctoral levels, as well as special programs for veterans and active-duty military, returned Peace Corps volunteers, laboratory researchers, students with families, and dual-degree students.

Research and teaching at SNRE focus on seven fields of study: Behavior, Education, and Communication; Conservation Ecology; Environmental Informatics; Environmental Justice; Environmental Policy and Planning; Landscape Architecture; and Sustainable Systems. The faculty comprises 41 tenure-stream professors, 13 secondary appointments, and 11 adjunct professors. Women account for 39% of SNRE's faculty, while 2% are African American, 12% are Latino, and 8% are Asian. Faculty members come from more than a dozen highly diverse disciplinary backgrounds.

Since its founding, SNRE has been a leader in environmental education, pioneering practices like remote sensing and establishing fields like environmental justice and environmental education. SNRE hosted the first Earth Day in 1970 and has spearheaded many other important breakthroughs in environmental understanding. Dean Miranda explains, "Great minds are drawn to this school, and from here great ideas have been launched. Throughout our history, we have advanced new frontiers, whether the field was forestry, environmental education, environmental justice, sustainable systems, or interdisciplinary research more broadly."

SNRE has evolved in noteworthy ways during Dean Miranda's tenure. Average student loan debt has shrunk, students receive more mentorship, average time to graduation has decreased, job placement has improved, and there is greater diversity in the faculty, staff, and student body. Faculty are more engaged in School decision making. Funded research has increased, and more faculty are serving on national boards and councils, editing major academic journals, engaging in policy decision making, and leading professional societies.

In the years to come, SNRE will continue to graduate environmental leaders who are prepared to implement bold ideas for a better world. As Dean Miranda says, "The need for thoughtful, well-trained leaders in environmental sustainability has never been greater, and there is no better place for training than SNRE. We embrace working across disciplines. We are committed to justice and sustainability. We work relentlessly on problems of daunting complexity – and we do that as a community. We fight the good fight together."



Incoming master's students conduct fieldwork in northern Michigan as part of SNRE's orientation program.



Dr. Stephanie Pfirman

Co-Chair, Department of Environmental Science
Barnard College, NY

Dr. Pfirman, Professor of Environmental Science and Alena Wels Hirschorn '58 and Martin Hirschorn Professor of Environmental and Applied Sciences, joined the faculty of Barnard College in 1993 and serves as co-Chair of Barnard's Department of Environmental Science. She holds a joint appointment with Columbia University, where she is a member of the faculties of the Earth Institute and the Department of Earth and Environmental Sciences as well as Adjunct Research

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Scientist at the Lamont-Doherty Earth Observatory. Prior to joining Barnard, Professor Pfirman was a senior scientist at the Environmental Defense Fund and co-developer of the award-winning exhibition, "Global Warming:

Understanding the Forecast," produced jointly with the American Museum of Natural History. She has worked for the House of Representatives as a staff scientist, for the U.S. Geological Survey as an oceanographer, and for the GeoMarine Research Institution in Kiel, Germany as an Arctic researcher. Her PhD is from the Massachusetts Institute of Technology/Woods Hole Oceanographic Institution joint program in Oceanography and Oceanographic Engineering and she holds a BA with high honors in Geology from Colgate University.

Professor Pfirman's scientific research focuses on the Arctic environment, particularly on the nature and dynamics of Arctic sea ice under changing climate. Her previous research activities have included melting and surging glaciers and pollution transported by sea ice. In 2010, she was elected as a fellow of the American Association for the Advancement of Science in the Section on Atmospheric and Hydrospheric Sciences. She is currently principal investigator of the Polar Learning and Responding: PoLAR Climate Change Education Partnership supported by the National Science Foundation (NSF), and she is a member of NSF's Advisory Committee for Environmental Research and Education and served as its first Chair.

As a past NSF Advancing Women in the Sciences (ADVANCE) coPI and past President of the Council of Environmental Deans and Directors, Professor Pfirman helped to understand and foster the career trajectories of women and interdisciplinary scholars. She has contributed to the development of innovative educational approaches in interdisciplinary, environmental, and STEM education including chairing the Education and Faculty Development committees of the Earth Institute and serving as a consultant for the Andrew W. Mellon, Sherman Fairchild, and Luce foundations.

Her current teaching includes: "Exploring the Poles," a First-Year Seminar considering polar exploration over the ages coupled with an examination of leadership, teamwork, and decision making under

uncertainty; “Responding to Climate Change,” an upper level course on mitigation and adaptation; and Environmental Science Senior Seminar, a capstone experience guiding students through design and implementation of their senior thesis.

Barnard College’s Environmental Science Department provides young women with BA degrees in Environmental Science, Environmental Biology, and Environmental Policy. The program is thriving: the number of majors has tripled since 2008. Faculty members are recognized scholars and educators as well as active in research and curriculum development.

In addition to Professor Pfirman, the Department includes Professor and co-Chair Martin Stute, also an Adjunct Senior Research Scientist at the Lamont-Doherty Earth Observatory; Associate Professor Brian Mailloux, also Columbia Earth Institute Faculty Associate Member; Senior Lecturer Peter Bower; Senior Lecturer and Lab Director Terryanne Maenza-Gmelch; Lecturer and Laboratory Instructor Sedelia Rodriguez; and two Adjunct Professors, Frank Nitsche, Research Scientist at the Lamont-Doherty Earth Observatory, and Cynthia Rosenzweig, Senior Research Scientist at the NASA Goddard Institute for Space Studies.

Independent, guided research, interdisciplinary courses, and training in fieldwork, measurements, and data analysis ready Barnard’s students with the tools needed to think critically, evaluate and solve problems, and understand and communicate science to address the needs of society. The Department takes advantage of every available connection and resource that the city has to offer to provide its students with the best opportunities to learn and succeed. The urban setting, the proximity to the Hudson River, and the numerous affiliations maintained with Columbia University through the Lamont-Doherty Earth Observatory, the Earth Institute, and the School of Public Health, as well

as Black Rock Forest, the American Museum of Natural History and other institutions, allow Barnard to offer undergraduates extraordinary opportunities for research and educational experiences. Courses are innovative, featuring multimedia and technologically advanced resources. Each student is required to complete an in-depth senior thesis in collaboration with a research mentor. Upon successful completion of the program, the students are well prepared to continue their academic studies as graduate students or to pursue successful careers in a wide range of fields.

Leslie Raucher



Barnard College students aboard the Research Vessel Seawolf on the Hudson River.



Dr. Paul Robbins

Director, Nelson Institute for Environmental Studies
University of Wisconsin-Madison, WI

Dr. Robbins was appointed Director of the Nelson Institute for Environmental Studies in August, 2012. As the Institute is a free-standing Division within the University of Wisconsin-Madison, the Director is a member of the Dean's council, who reports directly to the Provost. Robbins was previously Professor and Chair of the School of Geography and Development at the University of Arizona and earned his PhD in Geography from Clark University in 1996.

The Institute's mission is to build partnership to synergize and sustain excellence in the interdisciplinary research, teaching, and service that make the University of Wisconsin-Madison a world leader



in addressing environmental challenges. The Institute is engaged in degree-granting educational efforts, interdisciplinary research oversight and administration, and outreach and engagement. The Institute contains four interdisciplinary research centers, an undergraduate degree in Environmental Studies, two undergraduate certificates (Environmental Studies

and Sustainability), and graduate programs in Environment and Resources, Environmental Conservation, and Water Resources Management. Approximately 600 undergraduate students and 200 graduate students are linked to Nelson programs.

Nelson controls approximately 12 FTE, spread over many partial/joint and full appointments including approximately 24 faculty. However, the Institute has 175 affiliated faculty who hold their line elsewhere but who actively engage in overseeing graduate and undergraduate programs, join in research, and support Nelson outreach and engagement. In sum, there are modest, solid, resources for a few dedicated faculty, but like many programs of this kind, Nelson also runs on faculty passion.

The undergraduate program is exciting and unique because it is offered solely as a second major, with students' first majors coming from all corners of campus. Therefore, Nelson classes are filled with majors in economics, engineering, journalism, dance, history, and agronomy. Despite the demands of a double major, moreover, the program has had as many as 400 majors at a time. Additionally, the double major model means that Nelson does not compete with other programs for students, but instead provides additional training and credentials. Nelson undergraduates all culminate their education with a capstone experience, typically linked to community needs and service learning. Trish O'Kane's popular Nelson service-learning course, "Birding to Change the World," combines natural history, school service, and environmental justice and was recently described in the New York Times.

At the graduate level, the program produces many research-focused PhDs who go on to successful academic careers. Nelson is notable in that a majority of graduates from its doctoral programs go on to professional careers in government, not-for-profits, and environmental management. This is further reinforced by the focus of both of its two master's programs on non-academic professional career training and placement as well as their termination in problem solving practicums, rather than research theses.

Nelson acts as a source for ideas, resources, and students, which is key to its thriving, survival, and success both on and off campus. For example, the Institute generates opportunities and linkages for faculty interested in working with communities around the state and around the world. Notably, Nelson runs major regional events, including an Earth Day conference and the globally-recognized film festival Tales from Planet Earth, and in 2015 Nelson will convene the first ever statewide summit on environmental issues facing Wisconsin tribes. Finally, Nelson flows resources to interdisciplinary teams interested in hunting “big calls” like NSF’s Sustainability Research Network program and operates as a “front door” for those off campus seeking expertise from across the spectrum of other colleges.



Nelson Institute graduate student Trish O’Kane teaching a renowned community-focused service learning capstone “Birding to Change the World.”

The central obstacles for success are those felt by all interdisciplinary units, particularly the tug of war between the understandable commitments by faculty to their home units weighed against the time and dedication necessary to support the interdisciplinary unit. Budget models shifting towards allocation by unit based on key metrics may incentivize competition over cooperation, which might put Nelson in an awkward position. This challenge is being addressed head-on, by stressing what Nelson can do for other units, how Nelson serves their faculty and students with opportunities, and how Nelson brings external resources onto campus to be put at the disposal of the greater community. Director Robbins’ job, therefore, is to be the face of Nelson to the wider world, including visiting with the business community, tribal leaders, and community organizations, while acting as the person on campus that leads programs to serve the university as a whole: be a source, not a sink.



Dr. Kimberly Smith

Outgoing Director, Environmental Studies Program
Carleton College, MN

Dr. Tsegaye Nega

Incoming Director, Environmental Studies Program
Carleton College, MN



From 2011 to 2014, the Environmental Studies Program was directed by Dr. Smith. Professor Smith earned her PhD in Political Science from the University of Michigan and a law degree from the Boalt School of Law at the University of California, Berkeley. She is on the editorial board of *Environmental Ethics* and served as the first President of the Association for Environmental Studies and Sciences. Her research centers on intellectual history and philosophy, particularly the history of American environmental thought, environmental political theory, and environmental ethics.

Dr. Nega takes over as Director of Environmental Studies in 2014. He received his PhD in Conservation Biology from the University of Minnesota, an MS in Agronomy from Centro Universitario de Pinar del Rio, Cuba, and an MS in Geographic Information Systems from City University of London.

Carleton College

Professor Nega's research and teaching explores linkages across disciplines to better understand environmental problems, particularly the application of spatial analysis techniques to model and evaluate human activity into natural landscapes. His current research focuses on understanding the impact of urban growth on ecological processes in Addis Ababa, Ethiopia.

Carleton's Environmental Studies Program aims to educate the next generation of environmental leaders and engage in pioneering environmental research. It seeks to develop a better understanding of the complexity of and interconnections between human and natural communities, and to marshal that knowledge in pursuit of a more sustainable society. It offers an integrated, interdisciplinary program emphasizing critical thinking and information literacy; communication and collaborative work; problem-oriented service learning and civic engagement; place-based learning; and internships and other field experiences.

Only Professor Nega has a full-time appointment in the Program; three other faculty have joint ap-

pointments. An additional 15 to 18 faculty contribute courses to the Program through arrangements with their departments. The Program is supported by an administrative assistant and GIS lab director. It is governed by a director (a three-year position that rotates among the senior faculty), a small steering committee comprised of the core faculty, and a larger curriculum committee consisting of volunteer faculty and key staff. This committee meets once a term to discuss such issues as major requirements, hires, and course development.

Beginning in 2010, the Program has offered a BA in Environmental Studies. About 15 to 20 students choose this major annually. The program of study is characterized by breadth of subject matter, including the humanities, arts, social sciences, and natural sciences, and offers courses that deal explicitly with human-environment relations. It aims to equip students to understand environmental phenomena at different spatial and temporal scales, from long-term global forces like climate change to shorter-term local and regional forces like water pollution from agricultural runoff. The major also emphasizes geographic information science, statistical analysis, and research methods. The program's breadth ensures that its main emphasis is fostering an understanding of the plurality of ways of knowing and understanding the world. Nevertheless, it offers five "foci" to encourage students to develop interdisciplinary expertise in a particular policy domain: (1) conservation and development; (2) food and agriculture; (3) water resources; (4) landscapes and meaning; and (5) environmental justice.

All students take advanced courses in both the natural and social sciences, and all complete a year-long group interdisciplinary research project during their senior year. In addition, most students complete an internship involving environmental policy, research, or community service. Most majors pursue career paths in public policy, teaching, land management, or environmental research. Although the major is fairly new, about 80% of its graduates are expected to receive graduate education, which is on par with the rest of the student body. The Program aims to prepare them for graduate work in public policy, law, natural resource management, or other interdisciplinary environmental programs.

Carleton has long been a leader in environmental studies, but it also benefits from strong programs in the natural sciences, political science, and economics, as well as a favorable campus climate for interdisciplinary work. For example, interdisciplinary research and participation in interdisciplinary programs is considered positively in the tenure process. The Environmental Studies Program has traditionally been a center for innovative teaching and civic engagement on campus. However, Carleton College also has a very strong departmental culture, and in recent years budget constraints have created competition for resources. When resources are scarce, interdisciplinary programs find it difficult to compete with disciplinary departments.

The Program is reasonably well-funded, and support for the Program remains strong. But it faces a challenge in securing the necessary space and equipment to fully implement the current major as well as the faculty and staff resources to develop a more integrated interdisciplinary curriculum. Decisions about resources are made in the Dean's and President's offices, with some input from committees, and the Director has very limited authority, time, or resources to affect those decisions. Addressing these challenges involves constant attention to advocating for the Program, maintaining a strong sense of community and engagement within the Program, and developing a broadly-shared understanding of appropriate interdisciplinary learning objectives. Specifically, the Director seeks to articulate more clearly and precisely the distinctive intellectual contribution of Environmental Studies to a liberal arts education, in order to provide a strong intellectual foundation for further program development.



Dr. John Volin

Head, Department of Natural Resources
and the Environment;
Director, Environmental Science Program
University of Connecticut, CT

Dr. Volin joined the University of Connecticut (UConn) in 2007 as Professor and Head of the Department of Natural Resources and the Environment and since 2013 has also been the Director of the undergraduate Environmental Science Program. Volin received his PhD in Forestry from the University of Wisconsin-Madison, where he also completed a postdoctoral fellowship. At UConn, Dr. Volin founded and directs the Natural Resources Conservation Academy, a new program that reconnects high school students to nature and facilitates participation in conservation-focused projects to help educate the next generation of environmental leaders.

The Department of Natural Resources and the Environment is in the College of Agriculture, Health and Natural Resources. Its mission is to provide high quality undergraduate and graduate education, to generate new knowledge by conducting research, and to provide extension and outreach programs. The Department places distinct emphasis on the problems associated with the interface between rural



and urban environments. Its overall purpose is to contribute to the solution of environmental problems, to increase the understanding of natural resource systems, and to improve management of these resources. There are 15 tenure-track and eight affiliate and extension faculty members in the Department. While the De-

partment focused on forestry when it was founded in 1900, students majoring in natural resources today choose among six areas of concentration, including Climate and Water Resources, Environmental Conservation, Fisheries and Wildlife Conservation, Geomatics, International Studies in Sustainable Natural Resources, and Sustainable Forest Resources.

The Environmental Science Program, established in 1994 as an interdisciplinary major, spans nine departments and is jointly housed in the College of Agriculture, Health and Natural Resources and the College of Liberal Arts and Sciences. Environmental Science aims to educate students who will: (1) understand the scientific principles and social factors underlying local, national, and international environmental issues; (2) have the skills to work in the public and the private sectors; and (3) have sufficient grounding in one environmental discipline as well as the interdisciplinary scientific base to pursue advanced degrees.

In addition to the Director, the Program has an eleven-member Environmental Science Advisory Committee and a full-time Environmental Program Coordinator, who also coordinates the newly es-

established interdisciplinary undergraduate Environmental Studies major. Students majoring in Environmental Science choose among nine concentrations: Environmental Biology, Environmental Chemistry, Environmental Health, Environmental Geography, Environmental Geoscience, Marine Science, Natural Resources, Resource Economics, and Soil Science. Currently 300 undergraduate students are pursuing a major in either the Department of Natural Resources and the Environment or the interdisciplinary Environmental Science Program.

The Natural Resources and Environmental Science programs are administratively different, as the former has a departmental structure with its own faculty and graduate program, while the latter is interdisciplinary across colleges and departments, with no dedicated faculty or affiliated graduate program. While the challenges in leading the two programs are not necessarily the same, they share an integrated approach to addressing today's complex and rapidly changing relationships between natural resource and environmental problems.

Using these commonalities as a foundation, Professor Volin embraces a multidisciplinary and integrated approach to leadership and places particular emphasis on collaboration, as exemplified by the reshaping of the curricula of both majors. In recent years, there was wide and unanimous recognition that each program needed renewal. In response, in 2013 Volin helped lead the effort to write self-studies and organize external program reviews, allowing faculty members to come together and collectively undertake substantial revision to the undergraduate curricula. The Department will keep close to its roots in conservation, water resources, and sustainability and reduce its number of concentrations from six to four. The Program, on the other hand, will reduce the number of concentrations from nine to three, focusing on Sustainable Systems, Global Change, and Human Health.

While helping to lead these changes, Dr. Volin is firmly committed to maintaining an inclusive and collaborative faculty-driven process. The Department of Natural Resources and the Environment has broken into faculty-led teams that are working collaboratively to shape each new concentration. Likewise, the Environmental Science advisory committee met numerous times including two all-day retreats to work collaboratively to develop its new curriculum. Both approaches, while slightly different, are based on collaboration and work well given the different program structures. The curricular changes across both programs have been responsive to student and societal needs and continue to advance UConn's long tradition of educating future leaders and developing solutions to society's most pressing natural resource and environmental problems.



CRISTOBAL ORTEGA

John Volin with faculty and high school students in the Natural Resources Conservation Academy, learning about forest gaps.



Dr. Richard Wallace

Professor and Founding Chair,
Department of Environmental Studies
Ursinus College, PA

Dr. Wallace is Professor of Environmental Studies and Co-Director of the Whittaker Environmental Research Station at Ursinus College. He served as Founding Chair of the Department of Environmental Studies (ENV) in 2002, where he helped develop the undergraduate program on a foundation of applied practice based on the theory and methods of integrative problem solving. He earned a Master's and PhD from Yale University and a BA from the University of Vermont, all in Interdisciplinary Environmental Studies. He currently maintains two research programs: an assessment of marine mammal conservation under the U.S. Endangered Species Act and Marine Mammal Protection Act, and an appraisal of the history of and prospects for interdisciplinarity in American higher education with an emphasis on the field of environmental studies. He formerly analyzed U.S. species and habitat conservation programs for the U.S. Marine Mammal Commission.

The Department offers a BA in Environmental Studies, which may be changed to a BS if it is paired with a minor or second major in a natural science field, as well as a minor in Environmental Studies. Dr. Wallace and colleagues Drs. Leah Joseph and Patrick Hurley comprise the full-time core ENV fac-



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ulty and are supported by nearly a dozen faculty in other departments, who teach courses that are cross-listed with the Department. ENV provides opportunities for students to develop applied analytical skills in concert with practical experience.

The curriculum requires students to master coursework in the core ENV foci of integrative problem solving, interdisciplinary data analysis, community engagement, and advanced analytical methods, as well as courses in the natural sciences, social sciences, and humanities. Majors are also required to complete at least one off-campus internship, for which there is both an applied and academic component.

The most distinctive element of the Ursinus ENV approach is its combination of integrative theory and applied practice engaged by students through short- and long-term co-curricular programs. In these programs, students are given the opportunity to demonstrate leadership and stewardship, which are coupled to scholarly analysis in independent and group contexts.

During his service, Dr. Wallace has developed or helped to create the following programs: a three acre student-run organic farm on campus; a local producer and grower farmers' market, established with student assistance in partnership with the Collegeville Economic Development Corporation; a land stewardship initiative for Collegeville's municipally-owned natural area, established with student assistance in partnership with the town manager and the Pennsylvania Horticultural Society; riparian

restoration projects along two tributaries of the Schuylkill River, involving students in partnership with the Perkiomen Watershed Conservancy and other local government and non-governmental organizations; and the planning and construction of a naturalized storm water basin that handles water from half of campus. Lastly, the newly established Whittaker Environmental Research Station (WERS) is under the direction of Dr. Wallace, Dr. Hurley, and Dr. Cory Straub and will provide students and faculty with opportunities to conduct agroecological and ecosystem services research while producing food for the campus and community marketplace.

About his work, Dr. Wallace writes:

“In my work on interdisciplinarity, I explore the history and prospects of environmental studies in the United States, as well as developing and implementing strategies for teaching and training current and future leaders and analysts who will be adept at confronting problems of great complexity and uncertainty. Many professionals in the environmental realm are trained in disciplinary approaches to problem solving, e.g., in biology, policy, economics, ethics, and many other fields. Their disciplinary expertise is the foundation of understanding complex problems, but workable solutions require the integration of disciplines towards pragmatic and realistic goals. No one disciplinary approach can help us adapt to anthropogenic climate change, nor can several disciplinary approaches operating on parallel but separate tracks. It’s much more likely that the answer lies in the integration of disciplinary approaches into a problem solving methodology that better reflects the complexity of the problem! These integrative methods are the subject of my teaching and research as well as my work in developing curricula at the undergraduate and professional levels.”

Ursinus ENV students graduate with integrative analytical skills, substantive applied problem solving experience, and sensitivity to the topical and conceptual complexity of the challenges ENV faces, both topically (e.g. climate, biodiversity, and globalization) and conceptually (e.g. how to think interdisciplinarily). They successfully enter the workforce or undertake graduate education in many interdisciplinary contexts and have gone on to careers in science, policy, management, education, and law, among many other areas. In preparing students for careers, the Department faces the same challenges as all interdisciplinary programs do: undertaking integrative, holistic approaches to academic practice in institutions that are not traditionally designed to foster such approaches. As a result, the Department must help not only its students to develop an understanding of the value of interdisciplinarity and integrative analysis, but also its colleagues and administrators.



Conclusion

CEER studies of IES programs have consistently discovered that program leaders have views that fall into three distinct groups with overlaps or shared areas of agreement. These findings include three perspectives on the goal of IES education (see summary below), three perspectives on ideal curriculum design (see summary below), and, as described in this report, three perspectives on program leadership. Previous analyses have found correlations between the three perspectives on program goals and the three ideal curricula perspectives. In this report we illustrate correlations between the three perspectives on IES program leadership and the ideal curricula perspectives. Although imperfect and not predictive, relationships between the findings are evident such that:

- The *Environmental Citizen* perspective on IES educational program goals is associated with the *Societal Systems Emphasis* in curriculum design and with *Leadership View 1 – Curriculum Design Focus*.
- The *Environmental Scientist* perspective on IES educational goals is associated with the *Natural Systems Emphasis* in curriculum design and the *Leadership Views 1 – Curriculum Design Focus* and *2 – Curriculum Design, Applied Learning, and Community and Regional Partnerships Focus*.
- The *Environmental Problem Solver* perspective on IES educational program goals is associated with the *Sustainability Solutions Emphasis* in curriculum design and with the *Leadership View 3 – Curriculum Design, External Partnerships, and International/Global Engagement Focus*.

These three perspectives are associated with different IES program leaders' groups. The first group is representative of the leaders of newer programs that span multiple units, the second is split between department chairs or heads and directors of programs that span multiple units, and the third best represents the views of deans and directors of IES schools, colleges, and institutes and centers.

THREE PERSPECTIVES ON IES PROGRAM GOALS

The first study on IES program leaders' perspectives, conducted in 2003, found three primary perspectives oriented differently on educational goals, general curriculum design, and the need for defined core competencies (Table 27; Figure 6). In addition to the three perspectives, one of the major findings of this study was a consensus on IES field identity.¹⁸ The characteristics of this common view are summarized as follows:

- *Goal*. To prepare graduates to be sustainability-oriented problem solvers through scholarship, research, practice, and informed citizenship.
- *Focus of Study*. The interfaces and interactions between human and natural systems (coupled human-nature systems).
- *Educational Approach*. A holistic educational approach that focuses on interdisciplinary knowledge and insights gained from systems approaches and diverse epistemological viewpoints to understand

18. For more information on the perspectives study see Vincent, S. and W. Focht. 2009. U. S. Higher Education Environmental Program Managers' Perspectives on Curriculum Design and Core Competencies: Implications for Sustainability as a Guiding Framework. *International Journal of Sustainability in Higher Education*. 10(2): 164-183.

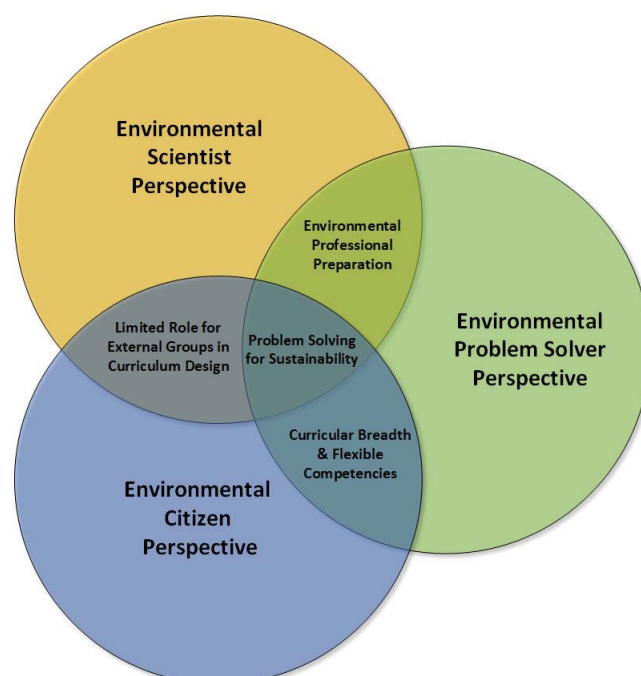
environmental problems and devise solutions. Includes key concepts from the natural sciences, the social sciences, the applied sciences, and the humanities. Problem solving is conducted using a systems approach rather than a traditional reductionist approach.

- *Key Learning Outcomes.* Disciplinary synthesis and systems thinking cognitive skills; knowledge of the sociopolitical and natural aspects of environmental problems; understanding of the limits of technology and science for solving environmental problems; and the importance of acknowledging and reporting uncertainty.

Table 27. Three Perspectives on IES program goals/curricula

Model	Environmental Citizen	Environmental Scientist	Environmental Problem Solver
Educational goal	Liberal arts education	Professional training with disciplinary specialization	Professional training
Constituency involvement	Student oriented	Employer oriented	Employer oriented
Curricular approach	Breadth, emphasize social sciences and humanities	Depth in a traditional discipline, emphasize natural and applied sciences	Breadth, emphasize interdisciplinary problem solving
Core competencies (should be)	Broad and flexible	Defined and universal	Broad and flexible

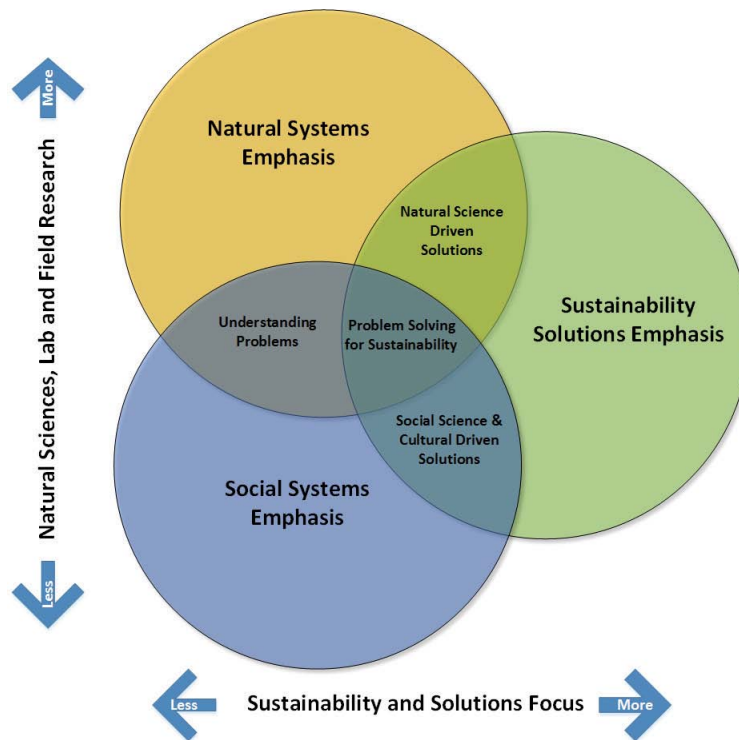
Figure 6. Framework for understanding IES program leader perspectives on educational goals (overlaps are areas of agreement between perspectives)



THREE PERSPECTIVES ON IES IDEAL CURRICULUM DESIGN

Analysis of data gathered from two separate surveys of IES program leaders—one in 2008 and one in 2012—revealed that program leaders have three primary perspectives on ideal curriculum design with overlapping views on the importance of core knowledge and skills (Figure 7).¹⁹ The three views on curriculum design emphasize the importance of interdisciplinary knowledge components and integrated skills components differently but as a group concur on the importance of key knowledge and skills, including: sustainability, climate change, water systems, basic natural sciences, policy, cognitive skills, communication skills, research skills, statistics, spatial analysis, mathematics skills, interpersonal skills, and community engagement skills.

Figure 7. Framework for understanding three perspectives on undergraduate ideal curriculum design (graduates programs are similar but are associated with only two of the three groups—Natural Systems Emphasis and Sustainability Solutions Emphasis)



Social Systems Emphasis: The *Social Systems Emphasis* model of ideal curriculum design emphasizes knowledge of the social sciences and collaborative engagement skills. The orientation for this model is societal and institutional change with a focus on public awareness and an emphasis on economics, policy, and governance processes. These programs prepare students to understand how political institu-

19. For more information of these perspectives see Vincent, S., Bunn, S. and L. Sloane (2013) *Interdisciplinary Environmental and Sustainability Education on the Nation's Campuses 2012: Curriculum Design*. National Council for Science and the Environment: Washington, DC.

tions, societal and industrial processes, and individual choices contribute to practices that can either threaten or create resilient and sustainable linked human societies-natural systems interfaces.

This approach represents the lowest proportion of undergraduate programs (29%) and is not associated with graduate IES programs. It places highest emphasis (importance) on social sciences knowledge and collaborative engagement skills. These degree programs are more likely to be named environmental studies or have sustainability or policy in their name, are more likely to be Bachelor of Arts degrees, are least likely to require fieldwork experience, and are more likely to require participation in an applied project.

Natural Systems Emphasis: The *Natural Systems Emphasis* model of ideal curriculum design emphasizes knowledge of the natural sciences and technical research and analysis centered on laboratory and field research skills. It has an analytic orientation that emphasizes traditional scientific skills and expertise in the natural sciences. These programs prepare students to conduct interdisciplinary analyses to develop understanding of the complexity of ecosystems and the biosphere, anthropogenic stressors, and the interactions of social and natural systems.

This approach is associated with about a third of undergraduate IES programs (34%) and about a third of graduate IES programs (34%). For undergraduate programs, this approach places highest emphasis on physical and life sciences knowledge as well as laboratory and field research skills. These degree programs are more likely to be named environmental science(s) or have another science-focused name, are more likely to be Bachelor of Science degrees, are more likely to require fieldwork experience, and are less likely to require participation in an applied project.

For graduate programs this approach places highest emphasis on natural sciences, field research, and analysis skills (interdisciplinary knowledge and integrated skills components similar to those for undergraduate programs). These graduate programs are more likely to focus on marine/coastal systems, geosciences, and environmental science and engineering; about half of the graduate degree programs named environmental science(s) are also associated with this group. Most are Master of Science (58%) or Doctor of Philosophy (34%) degrees; a small percentage are professional master's programs (8%).

Sustainability Solutions Emphasis: The *Sustainability Solutions Emphasis* model of ideal curriculum design emphasizes a systems-oriented approach that encompasses a broad range of knowledge and skills. This approach has an orientation that emphasizes solution development through collaborative engagement processes and informatics. These programs prepare students to solve complex environmental problems using integrated processes that directly inform policy and management decisions to effectively manage human societies-natural systems interfaces.

This approach represents the highest proportion of undergraduate IES programs (37%) and about two-thirds of graduate IES programs (66%). For undergraduate programs this approach places the highest emphasis on systems, built environment, and sustainability knowledge areas as well as collaborative engagement, informatics, and systems thinking skills. These degree programs are more diversified in their names with relatively equal proportions of programs named environmental science(s) or studies. Most programs named natural resources and a fifth of sustainability programs are also in this group. These degree programs are more balanced between Bachelor of Science (60%) and Bachelor of Arts (40%) degrees, are more likely to require fieldwork experience, and are most likely to require participation in an applied project.

For graduate programs this approach places highest importance on governance and policy knowledge and social research skills, but also places higher importance on a range of knowledge and skills in comparison to the *Natural Systems Emphasis* for graduate programs. These graduate programs are more likely to focus on sustainability, energy, water, policy, management, natural resources, systems, environmental studies, environmental social sciences, or humanities; about half of the graduate degree programs named environmental science(s) are also associated with this group. The degree types for this group include more Master of Arts (18%) and professional master's programs (16%) in addition to Master of Science (43%) and Doctor of Philosophy (23%) degrees.

The findings included in this report add to the understanding of IES programs being developed by CEER research studies which have consistently discovered that program leaders have three distinct views on different aspects of IES program management with overlapping areas of consensus. These include three views on the educational goal of IES programs (and the desirability of defined core competencies), three views on ideal curriculum design, and three views on the factors most important for program success. Although imperfect and not predictive, correlations reveal relationships between the three sets of findings to define three program leader perspectives.

Appendix A – Methodology

Acknowledgements

The research conducted by the NCSE Center for Environmental Education Research relies on the time and effort of the IES program leaders who participate. Their contributions are greatly appreciated.

Methodology

The 2012 Census. A census of all four-year colleges and universities in the United States was conducted in 2012 by reviewing the websites and catalogs for all 1,562 public and non-for-profit and 76 for-profit colleges and universities. Four categories defined by the Carnegie Classification of Institutions of Higher Education were included: doctorate-granting universities, master's colleges and universities, baccalaureate colleges, and tribal colleges (four-year colleges). The census identified baccalaureate and graduate degree-granting programs with an explicit interdisciplinary approach. This population included all degree programs named environmental science(s) or environmental studies as well as degree programs with related names such as sustainability, environmental policy, environmental management, environmental systems, natural resources management, and energy. Degrees in allied fields such as environmental engineering, environmental law, environmental health and safety, environmental chemistry/toxicology, environmental geology/hydrology, conservation biology, sustainable agriculture, forestry/rangeland management, environmental economics, natural resource geography, and environmental statistics were not included.

A total of 1,151 IES programs at 838 institutions awarding 1,859 degrees were identified as meeting the selection criteria.

2012 Survey and Sample. The 2012 survey of U.S. IES program administrators was conducted between August and December 2012. All 1,151 primary program administrators identified in the census were invited to participate in the survey. The primary program administrators were the targeted respondents because they are expected to be most familiar with their programs and because many programs do not employ their own faculty, but instead rely on faculty from other academic units.

Complete survey responses were received from administrators of 262 programs awarding 354 IES degrees (see the survey questionnaire in Appendix C). Another 90 program administrators partially completed the survey; partial information was also obtained for another 54 IES degree programs (see the list of participating institutions and units/programs in Appendix B). The completed survey sample size is sufficient to measure correlations between attributes with a power of 0.90 to detect a 0.20 effect size at $\alpha=0.05$; statistical frequencies have a margin of error of $\pm 5\%$.

The representativeness of the sample (completed survey sample and total number of respondents) was assessed by comparing four defining program attributes between the sample and target population at $\alpha=0.05$: institution basic Carnegie class, institution control (public or private-not-for-profit), institution census division, and degree types (name/degree level). The sample was found to be representative for all four parameters.

Exploratory Factor Analysis. Exploratory (maximum likelihood) factor analysis was used to explore administrators' judgments on the importance of 32 items in terms of their influence on their

IES program's success by ranking the influence of each as high, moderate, low, or not applicable. The respondents were also asked to rate their level of satisfaction with each factor in regard to its influence on their own program's success (see Appendix C for the questionnaire).

Factor analysis reduced the ratings into a fewer number of groups (nine) of similarly rated sets (areas of influence). These areas of influence reveal how the 32 individual influencing items are related to each other.

Maximum likelihood factor extraction was used because it includes a statistical goodness-of-fit test and allows generalizations from an unbiased sample to a population of either subjects or variables. The validity of the factor structure and model is established by the maximum likelihood goodness-of-fit test and by testing the reliability of each factor using Cronbach's alpha reliability coefficient (value ≥ 0.7 indicates that the variables loading on the factor are sufficiently similar). Model goodness-of-fit tests for the factor solution were significant at $p < .035$; all nine factors were shown to be reliable.

Five criteria can be considered when determining the number of factors to retain for interpretation. All five criteria were evaluated. The popular Kaiser criterion was selected, which recommends retaining all factors with eigenvalues ≥ 1 .

Factor rotation is used to simplify data structures by rotating factor axes so that the variables are loaded maximally on only one factor (minimizes unexplained variance). Orthogonal rotation maintains factor independence while oblique rotation allows factors to correlate. Oblique rotation should be used if factors are believed to be related. Since it was suspected that factors that influence program success are related, an oblique (Promax) rotation method was employed for the primary analysis and then the results were compared to an orthogonal (Varimax) rotation.

The meaning of each factor is interpreted using factor loadings. A factor loading is the Pearson correlation coefficient of original variables (in this study, the importance ratings) with a factor. Factor loadings indicate an association of the variable with a factor and range from 1 (perfect positive association) to -1 (perfect negative association). The relative importance of each variable is indicated by the magnitude of the squares of the factor loadings. In social science research, 0.32 is cited as a conservative value for the minimum loading of a variable on a factor because it equates to approximately 10% overlapping variance. This value was used as the critical value for this study.

Cluster Analysis. Principal component analysis, followed by SPSS two-step clustering method, was used to identify groups of program administrators who rate the influencing items similarly.

Cluster analysis is used to combine or classify objects into groups using a predetermined selection criterion. The resulting clusters will exhibit high internal (within cluster) homogeneity and high external (between cluster) heterogeneity. It allows the researcher to group cases into similar groups.

The SPSS two-step method was selected as the most appropriate clustering method for this study because of the characteristics of the clustering algorithm and because it provides graphical outputs that aid interpretation.

Because cluster analysis involves a subjective judgment on an optimal cluster solution, it is important to validate the solution. Two methods were used to ensure the validity and practical significance of the results. Descriptive discriminant analysis was used to test the fidelity of cluster membership using the original important rating variables and analysis of variance tests were conducted using program

attribute variables to demonstrate significant differences between clusters. The discriminant analysis revealed two functions that separate the three clusters: one is a highly significant predictor at $p < .000$ and the second was only marginally significant at $p < .058$. A number of significant differences in program attributes between the clusters were evident.

Relationships. Three types of tests ($\alpha = .05$) were used to explore relationships among the views of program success and various program attributes. One-way analysis of variance (ANOVA) was used for scale variables. For ordinal and categorical variables, two tests were used: the Mann-Whitney U test, a non-parametric test of the difference in the shape or location (central tendency) of two independent groups, and the Kruskal-Wallis one-way analysis of variance by ranks (KWANOVA), a non-parametric test of the difference in shape or location (central tendency) of populations underlying two or more groups.

Appendix B – List of Participating Institutions and Units/Programs

Institution	City	State	Academic Unit
Abilene Christian University	Abilene	TX	Department of Agriculture & Environmental Sciences; College of Arts & Sciences
Air Force Institute of Technology-Graduate School of Engineering & Management	Wright Patterson AFB	OH	Department of Systems and Engineering Management
Albright College	Reading	PA	Interdisciplinary Studies: Environmental Studies Program
Allegheny College	Meadville	PA	Department of Environmental Science and Studies
American University	Washington	DC	Global Environmental Politics Program; School of International Service
Antioch New England Graduate School	Keene	NH	Department of Environmental Studies
Appalachian State University	Boone	NC	Environmental Science Program; College of Arts and Sciences
Appalachian State University	Boone	NC	Sustainable Development Program; University College
Appalachian State University	Boone	NC	Interdisciplinary Studies; University College
Aquinas College	Grand Rapids	MI	Environmental Science Program
Arizona State University	Tempe	AZ	School of Earth and Space Exploration
Arizona State University	Tempe	AZ	School of Human Evolution and Social Change; College of Liberal Arts and Sciences
Arizona State University at the West Campus	Glendale	AZ	Division of Mathematical and Natural Sciences; New College of Interdisciplinary Arts and Sciences
Asbury University	Wilmore	KY	Department of Natural Science
Assumption College	Worcester	MA	Department of Natural Science; Undergraduate Programs
Auburn University	Auburn	AL	Environmental Science Program; Department of Agronomy and Soils; College of Agriculture (College of Engineering and the College of Sciences and Mathematics Partner)
Augsburg College	Minneapolis	MN	Environmental Studies Program
Austin College	Sherman	TX	Center for Environmental Studies
Bard College	Annandale-on-Hudson	NY	Bard Center for Environmental Policy
Barnard College	New York	NY	Department of Environmental Science
Bentley University	Waltham	MA	Department of Natural and Applied Sciences and the Office of Sustainability
Biola University	La Mirada	CA	Environmental Science Program; School of Arts and Sciences
Boise State University	Boise	ID	Environmental Studies Program; College of Social Sciences and Public Affairs
Boston University	Boston	MA	Marine Science Program; College of Arts and Sciences
Boston University	Boston	MA	Department of Global Development; Graduate School of Arts and Sciences
Brandeis University	Waltham	MA	Sustainable International Development Graduate Program; School for Social Policy and Management
Bucknell University	Lewisburg	PA	Environmental Studies Program; College of Arts and Sciences

Institution	City	State	Academic Unit
California Institute of Technology	Pasadena	CA	Environmental Science and Engineering Program; Division of Chemistry and Chemical Engineering, Division of Engineering and Applied Sciences, and Division of Geological and Planetary Sciences
California Polytechnic State University, San Luis Obispo	San Luis Obispo	CA	Department of Natural Resources Management; College of Agriculture, Food and Environmental Sciences
California State University, Chico	Chico	CA	Department of Geological and Environmental Sciences; College of Natural Science
California State University, East Bay	Hayward	CA	Department of Geography and Environmental Studies; College of Letters, Arts and Social Sciences
California State University, Los Angeles	Los Angeles	CA	Department of Biological Sciences; College of Natural and Social Sciences
California State University, Monterey Bay	Seaside	CA	Division of Environmental Science and Policy; College of Arts, Humanities and Social Sciences
California State University, Sacramento	Sacramento	CA	Department of Environmental Studies; College of Social Sciences and Interdisciplinary Studies
California State University, San Bernardino	San Bernardino	CA	Environmental Science Program; Department of Chemistry and Biochemistry and Department of Geological Sciences; College of Natural Sciences
Carleton College	Northfield	MN	Environmental Studies Program
Carnegie Mellon University	Pittsburgh	PA	Environmental Policy Program; College of Humanities and Social Sciences
Carnegie Mellon University	Pittsburgh	PA	Energy Science, Technology and Policy Program
Chatham University	Pittsburgh	PA	School of Sustainability and the Environment
Clark University	Worcester	MA	International Development, Community and Environment Graduate Programs; Graduate School of Management
Clarkson University	Potsdam	NY	Clarkson Institute for a Sustainable Environment
Cleveland State University	Cleveland	OH	Department of Urban Studies; College of Urban Affairs
Cleveland State University	Cleveland	OH	Department of Biological, Geological, and Environmental Sciences; College of Sciences and Health Professions
Colby College	Waterville	ME	Environmental Studies Program; Division of Interdisciplinary Studies
Colgate University	Hamilton	NY	Environmental Studies Program; Division of Natural Sciences and Mathematics
College of Charleston	Charleston	SC	Environmental Studies Master's Program; School of Science and Mathematics
College of Saint Benedict	Collegeville	MN	Department of Environmental Studies
College of William and Mary	Williamsburg	VA	Environmental Science and Policy Program; School of Arts and Sciences
Colorado College	Colorado Springs	CO	Environmental Program
Colorado Mesa University (formerly Mesa State College)	Grand Junction	CO	Department of Physical and Environmental Sciences
Colorado State University	Fort Collins	CO	Department of Forest and Rangeland Stewardship; College of Natural Resources

Institution	City	State	Academic Unit
Colorado State University	Fort Collins	CO	Department of Human Dimensions of Natural Resources; College of Natural Resources
Columbia University	New York	NY	Department of Earth and Environmental Sciences; Columbia College
Cornell University	Ithaca	NY	Environmental Science and Sustainability Program; College of Agriculture and Life Sciences
Cornell University	Ithaca	NY	Department of Natural Resources; College of Agriculture and Life Sciences
Creighton University	Omaha	NE	Energy Technology Program, College of Arts and Sciences
Curry College	Milton	MA	Department of Science and Math
Daemen College	Amherst	NY	Interdisciplinary Programs, Division of Arts and Sciences
Denison University	Granville	OH	Environmental Studies Program
DePaul University	Chicago	IL	Department of Environmental Science and Studies; College of Science and Health
Dickinson College	Carlisle	PA	Department of Environmental Studies
Doane College	Crete	NE	Environmental and Earth Sciences Program; Department of Biology
Dordt College	Sioux Center	IA	Environmental Studies Program
Drake University	Des Moines	IA	Environmental Science and Policy Program; College of Arts and Sciences
Duquesne University	Pittsburgh	PA	Center for Environmental Research & Education; School of Natural and Environmental Sciences
Earlham College	Richmond	IN	Environmental Science and Studies Program
Eastern Mennonite University	Harrisonburg	VA	Department of Biology
Eastern Michigan University	Ypsilanti	MI	Interdisciplinary Environmental Science and Society Program; College of Arts and Sciences
Eastern Nazarene College	Quincy	MA	Department of Biology and Chemistry
Eastern New Mexico University	Portales	NM	Department of Physical Sciences; College of Liberal Arts and Sciences
Elizabethtown College	Elizabethtown	PA	Environmental Science Program; Department of Biology
Elon University	Elon	NC	Department of Environmental Studies; College of Arts and Sciences
Emory University	Atlanta	GA	Department of Environmental Studies; College of Arts and Sciences
Eureka College	Eureka	IL	Environmental Science Program; Division of Science and Mathematics
Evergreen State College, The	Olympia	WA	Environmental Studies Graduate Program
Ferrum College	Ferrum	VA	Environmental Planning and Development Program; School of Natural Science and Mathematics
Fordham University	Bronx	NY	Environmental Policy Program; Fordham College at Rose Hill and Lincoln Center
Furman University	Greenville	SC	Department of Earth and Environmental Sciences
George Washington University	Washington	DC	Department of Geography; College of Arts and Sciences
Goucher College	Baltimore	MD	Environmental Studies Program
Haskell Indian Nations University	Lawrence	KS	Environmental Science Program; College of Arts and Sciences

Institution	City	State	Academic Unit
Hawaii Pacific University	Honolulu	HI	Global Leadership and Sustainable Development Programs; College of Humanities and Social Science
Hendrix College	Conway	AR	Environmental Studies Program
Heritage University	Toppenish	WA	Department of Sciences; College of Arts and Sciences
Hobart William Smith Colleges	Geneva	NY	Department of Environmental Studies
Illinois Institute of Technology	Chicago	IL	Environmental Management and Sustainability Program; School of Business
Indiana University-Bloomington	Bloomington	IN	School of Public and Environmental Affairs
Iona College	New Rochelle	NY	Department of Biology; School of Arts and Sciences
Judson University	Elgin	IL	Department of Science and Math
Kings College	Wilkes-Barre	PA	Department of Environmental Studies
Knox College	Galesburg	IL	Department of Biology; College of Arts and Sciences
Lenoir-Rhyne University	Hickory	NC	School of Natural Sciences and Reese Institute for Conservation of Natural Resources
Lenoir-Rhyne University	Hickory	NC	Sustainability Studies Program; Center of Graduate Studies
Lewis University	Romeoville	IL	Environmental Science Program; College of Arts and Sciences
Lincoln Memorial University	Harrogate	TN	Environmental Science Program; Undergraduate Programs
Long Island University-C. W. Post	Brookville	NY	Department of Earth and Environmental Science; College of Liberal Arts and Sciences
Louisiana State University and Agricultural & Mechanical College	Baton Rouge	LA	Coastal Environmental Science Program; School of the Coast and Environment
Louisiana State University and Agricultural & Mechanical College	Baton Rouge	LA	Department of Environmental Sciences; School of the Coast and Environment
Loyola University Chicago	Chicago	IL	Department of Environmental Science; College of Arts and Sciences
Marygrove College	Detroit	MI	Environmental Science Program; Undergraduate Programs
Marylhurst University	Marylhurst	OR	Department of Interdisciplinary Studies; College of Undergraduate Studies
Maryville College	Maryville	TN	Environmental Studies Program
McPherson College	McPherson	KS	Department of Natural Science; Division of Science and Technology
Merrimack College	North Andover	MA	Environmental Studies and Sustainability Program; School of Liberal Arts
Messiah College	Grantham	PA	Department of Biological Sciences; School of Science, Engineering, and Health
Michigan State University	East Lansing	MI	Environmental Science and Policy Program
Michigan Technological University	Houghton	MI	Department of Social Sciences; College of Arts and Sciences
Minnesota State University-Moorhead	Moorhead	MN	Department of Physics & Astronomy; College of Social & Natural Sciences
Montana State University	Bozeman	MT	Ecology and Environmental Science Program; Department of Ecology; College of Letters and Sciences; and Department of Land Resources & Environmental Sciences; College of Agriculture
Moravian College	Bethlehem	PA	Environmental Studies and Sciences Program
Naropa University	Boulder	CO	Environmental Studies Program; School of Natural and Social Sciences
New College of Florida	Sarasota	FL	Environmental Studies Program

Institution	City	State	Academic Unit
New Mexico Institute of Mining and Technology	Socorro	NM	Department of Earth and Environmental Science
New School	New York	NY	Environmental Policy and Sustainability Management Program; School of International Affairs, Management, and Urban Policy
North Carolina State University at Raleigh	Raleigh	NC	Environmental Science Program; Division of Undergraduate Academic Programs; Provost's Office
North Carolina State University at Raleigh	Raleigh	NC	Natural Resources BS Program, Department of Forestry and Environmental Resources; College of Natural Resources
North Carolina State University at Raleigh	Raleigh	NC	Department of Forestry and Environmental Resources; College of Natural Resources
North Carolina State University at Raleigh	Raleigh	NC	Natural Resources MS Program; Department of Forestry and Environmental Resources; College of Natural Resources
North Carolina State University at Raleigh	Raleigh	NC	Professional Science Master of Environmental Assessment Program; College of Natural Resources and College of Agriculture and Life Sciences
North Dakota State University	Fargo	ND	Natural Resource Management Program; School of Natural Resource Sciences; College of Agriculture, Food Systems, and Natural Resources
Northern Michigan University	Marquette	MI	Department of Earth, Environmental and Geographical Sciences; College of Arts and Sciences
Northwest Indian College	Bellingham	WA	Native Environmental Science Program
Norwich University, The	Northfield	VT	Department of Geology and Environmental Science; School of Mathematics & Science
Ohio State University	Columbus	OH	Environmental Science Graduate Program; Graduate School
Ohio Wesleyan University	Delaware	OH	Department of Geology and Geography
Oklahoma City University	Oklahoma City	OK	Department of Biology; College of Arts & Sciences
Olivet Nazarene University	Bourbonnais	IL	Department of Physical Sciences; College of Arts and Sciences
Oregon Institute of Technology	Klamath Falls	OR	Environmental Sciences Program; College of Health, Arts and Sciences
Oregon State University	Corvallis	OR	Water Resources Graduate Program, Graduate College
Pace University	New York	NY	Environmental Studies Program; College of Arts and Sciences
Pennsylvania State University	University Park	PA	Environment and Natural Resources Institute; College of Agricultural Sciences
Piedmont College	Demorest	GA	Department of Natural Science; School of Arts and Sciences
Polytechnic Institute of New York University	Brooklyn	NY	Department of Technology, Culture and Society
Portland State University	Portland	OR	Department of Environmental Science and Management; School of the Environment; College of Liberal Arts & Sciences
Portland State University	Portland	OR	Systems Science Graduate Program; Office of Graduate Studies
Prescott College	Prescott	AZ	Environmental Studies Graduate Program
Prescott College	Prescott	AZ	Sustainability Science and Practice Program
Ramapo College of New Jersey	Mahwah	NJ	Sustainability Studies Program; School of Social Science and Human Services
Randolph College	Lynchburg	VA	Environmental Studies Department
Randolph-Macon College	Ashland	VA	Environmental Studies Program
Regis University	Denver	CO	Environmental Studies Program; College of Liberal Arts

Institution	City	State	Academic Unit
Rice University	Houston	TX	Environmental Analysis and Decision Making Program, School of Natural Sciences
Richard Stockton College of New Jersey	Pomona	NJ	Environmental Studies Program; School of Natural and Mathematical Sciences
Richard Stockton College of New Jersey	Pomona	NJ	Sustainability Program; School of Natural Science and Mathematics
Rochester Institute of Technology	Rochester	NY	Environmental Science Program; College of Science
Rochester Institute of Technology	Rochester	NY	Golisano Institute for Sustainability
Rutgers University-New Brunswick	New Brunswick	NJ	Department of Human Ecology; School of Environmental and Biological Sciences
Rutgers University-New Brunswick	New Brunswick	NJ	Department of Environmental Sciences; School of Environmental and Biological Sciences
Rutgers University-Newark	Newark	NJ	Professional Science Master's Program; Graduate College
Sage Colleges	Troy	NY	Environmental Studies Program; Russell Sage College
Saint John's University	Queens	NY	Environmental Studies Program; College of Liberal Arts and Sciences
Saint Lawrence University	Canton	NY	Department of Environmental Studies
Saint Louis University	Saint Louis	MO	Center for Sustainability
Saint Louis University	Saint Louis	MO	Integrated and Applied Sciences Program; Graduate College
Saint Olaf College	Northfield	MN	Department of Environmental Studies
Saint Peters College	Jersey City	NJ	Department of Chemistry; College of Arts and Sciences
Saint Vincent College	Latrobe	PA	Environmental Science Program; School of Natural Sciences, Mathematics and Computing
Salisbury University	Salisbury	MD	Environmental Studies Program; College of Liberal Arts
Santa Clara University	Santa Clara	CA	Department of Environmental Studies and Sciences; College of Arts and Sciences
Seattle University	Seattle	WA	Department of Environmental Science; College of Science & Engineering
Siena College	Loudonville	NY	Department of Environmental Studies; School of Science
Sierra Nevada College	Incline Village	NV	Department of Science and Technology
Sierra Nevada College	Incline Village	NV	Interdisciplinary Studies Program
Smith College	Northampton	MA	Environmental Science and Policy Program
Soka University of America	Aliso Viejo	CA	Environmental Studies Program
Southeast Missouri State University	Cape Girardeau	MO	Environmental Science Program; College of Science and Mathematics
Southern Illinois University-Carbondale	Carbondale	IL	Department of Forestry; College of Agricultural Sciences
Southern Illinois University-Edwardsville	Edwardsville	IL	Environmental Sciences Program; College of Arts and Sciences
Southern Methodist University	Dallas	TX	Environmental Science and Studies Program; College of Humanities and Sciences
Southern Nazarene University	Bethany	OK	Department of Biology; College of Natural, Social and Health Sciences; Division of Science and Mathematics
Southern New Hampshire University	Manchester	NH	Environmental Management Program; School of Arts and Sciences
Southwestern University	Georgetown	TX	Environmental Studies Program

Institution	City	State	Academic Unit
Stephen F. Austin State University	Nacogdoches	TX	Division of Environmental Science; College of Forestry and Agriculture
Stephen F. Austin State University	Nacogdoches	TX	College of Liberal & Applied Arts
Stetson University	Deland	FL	Department of Geography and Environmental Science; College of Arts and Sciences
Stonehill College	Easton	MA	Environmental Studies Program
Suffolk University	Boston	MA	Environmental Studies Program; Department of Interdisciplinary Studies; College of Arts and Sciences
SUNY-Binghamton	Binghamton	NY	Department of Geological Sciences and Environmental Studies; Division of Science and Mathematics
SUNY-Brockport	Brockport	NY	Department of Environmental Science and Biology; School of Science and Mathematics
SUNY-Cobleskill (College of Agriculture and Technology)	Cobleskill	NY	Center for Environmental Science and Technology; School of Agriculture and Natural Resources
SUNY-Oneonta	Oneonta	NY	Environmental Sciences Program
SUNY-Potsdam	Potsdam	NY	Environmental Studies Program; School of Arts and Sciences
SUNY-Purchase	Purchase	NY	School of Natural and Social Sciences
SUNY-Stony Brook	Stony Brook	NY	Sustainability Studies Program; College of Arts and Sciences
SUNY-Syracuse (College of Environmental Science and Forestry)	Syracuse	NY	Department of Forest and Natural Resource Management
SUNY-Syracuse (College of Environmental Science and Forestry)	Syracuse	NY	Department of Environmental Studies
Susquehanna University	Selinsgrove	PA	International Studies: Sustainable Development, Interdisciplinary Programs
Syracuse University	Syracuse	NY	Department of Physics; College of Arts and Sciences
Tennessee Technological University	Cookeville	TN	Environmental and Sustainability Studies Program; College of Arts and Sciences
Tennessee Technological University	Cookeville	TN	Environmental Sciences Doctoral Program; College of Arts and Sciences
Texas A & M University	College Station	TX	Department of Ecosystem Science and Management, College of Agriculture and Life Sciences
Towson University	Towson	MD	Environmental Science and Studies Program; College of Science and Mathematics
Towson University	Towson	MD	Environmental Science and Studies Graduate Program; College of Science and Mathematics
Trinity College	Hartford	CT	Environmental Science Program
Tufts University	Medford	MA	Environmental Studies Program, School of Arts and Sciences
Union College	Schenectady	NY	Environmental Science, Policy and Engineering Program; Department of Geology
Union Institute & University	Cincinnati	OH	Environmental Studies and Sustainability Program
University at Buffalo	Buffalo	NY	Environmental Studies Program; Office of Interdisciplinary Degree Programs, College of Arts And Sciences
University of Akron	Akron	OH	Department of Geology and Environmental Science; College of Arts and Sciences

Institution	City	State	Academic Unit
University of Alabama	Tuscaloosa	AL	Department of Geography; College of Arts and Sciences
University of Alabama	Tuscaloosa	AL	Marine Science Program; Departments of Biological Sciences, Chemistry and Geological Sciences; College of Arts and Sciences
University of Arizona	Tucson	AZ	School of Natural Resources and the Environment; College of Agriculture and Life Sciences
University of Arizona	Tucson	AZ	Water, Society and Policy Program; College of Agriculture and Life Sciences and College of Social and Behavioral Sciences
University of Arkansas	Fayetteville	AR	Department of Crop, Soil, and Environmental Sciences; College of Agricultural, Food & Life Sciences
University of Arkansas	Fayetteville	AR	Environmental Dynamics Program; College of Arts and Sciences
University of Baltimore	Baltimore	MD	Environmental Sustainability and Human Ecology Program; Division of Science, Information Arts and Technologies; College of Arts and Science
University of California, Berkeley	Berkeley	CA	Department of Environmental Science, Policy and Management; College of Natural Resources
University of California, Los Angeles	Los Angeles	CA	Institute of the Environment and Sustainability Center for Interdisciplinary Instruction; Division of the Institute of the Environment; College of Letters and Science
University of California, Los Angeles	Los Angeles	CA	School of Physical Sciences
University of California, Riverside	Riverside	CA	Department of Environmental Sciences; College of Natural and Agricultural Sciences
University of California, Riverside	Riverside	CA	Department of Environmental Sciences; College of Natural and Agricultural Sciences
University of California, San Diego	La Jolla	CA	Department of Education; Scripps Institution of Oceanography
University of California, Santa Barbara	Santa Barbara	CA	Environmental Studies Program; Division of Mathematical, Life, and Physical Sciences; College of Letters and Science
University of California, Santa Barbara	Santa Barbara	CA	Marine Science Graduate Program; Division of Mathematical, Life, and Physical Sciences; College of Letters and Science
University of California, Santa Cruz	Santa Cruz	CA	Environmental Studies Department; Division of Social Sciences
University of Central Florida	Orlando	FL	Office of Interdisciplinary Studies; Office of Undergraduate Studies
University of Colorado-Boulder	Boulder	CO	Environmental Studies Program; College of Arts and Sciences
University of Connecticut	Storrs	CT	Department of Natural Resources and the Environment; College of Agriculture and Natural Resources
University of Connecticut	Storrs	CT	Environmental Science Program; College of Agriculture and Natural Resources and College of Liberal Arts and Sciences
University of Delaware	Newark	DE	Environmental Science and Studies Program; Department of Geography; College of Earth, Ocean and Environment
University of Delaware	Newark	DE	Center For Energy and Environmental Policy
University of Denver	Denver	CO	Department of Geography; Division of Natural Sciences and Mathematics
University of Hawaii-Manoa	Honolulu	HI	Department of Natural Resources and Environmental Management; College of Tropical Agriculture and Human Resources
University of Houston	Houston	TX	Department of Earth and Atmospheric Sciences; College of Natural Sciences and Mathematics

Institution	City	State	Academic Unit
University of Idaho	Moscow	ID	Environmental Science Program; College of Letters, Arts, and Social Sciences
University of Illinois-Springfield	Springfield	IL	Department of Environmental Studies; College of Public Affairs and Administration
University of Illinois-Urbana-Champaign	Champaign	IL	Global Studies Program; College of Liberal Arts and Sciences
University of Illinois-Urbana-Champaign	Champaign	IL	School of Earth, Society and the Environment; College of Liberal Arts and Sciences
University of Illinois-Urbana-Champaign	Champaign	IL	Department of Natural Resources and Environmental Sciences; College of Agricultural, Consumer, and Environmental Sciences
University of Iowa	Iowa City	IA	Environmental Sciences Program; College of Liberal Arts and Sciences
University of Kentucky	Lexington	KY	Natural Resources and Environmental Science Program; College of Agriculture
University of Maine	Orono	ME	School of Marine Sciences; College of Natural Sciences, Forestry, and Agriculture
University of Maine-Machias	Machias	ME	Division of Environmental and Biological Sciences
University of Massachusetts, Boston	Boston	MA	Department of Environmental, Earth and Ocean Sciences; College of Science and Mathematics
University of Massachusetts, Lowell	Lowell	MA	Department of Environmental, Earth and Ocean Sciences; College of Science and Mathematics
University of Miami	Coral Gables	FL	Division of Marine Affairs and Policy; School of Marine and Atmospheric Science
University of Michigan-Ann Arbor	Ann Arbor	MI	Program in the Environment; School of Natural Resources and Environment and the College of Literature, Science, and the Arts
University of Michigan-Ann Arbor	Ann Arbor	MI	School of Natural Resources and the Environment Program; College of Literature, Science and the Arts
University of Michigan-Flint	Flint	MI	Department of Earth and Resource Science; College of Arts and Sciences
University of Minnesota, Twin Cities	Minneapolis	MN	Natural Resources Science and Management Graduate Program; College of Food, Agricultural and Natural Resource Sciences
University of Missouri-Columbia	Columbia	MO	Department of Soil, Environmental and Atmospheric Sciences; School of Natural Resources; College of Agriculture, Food and Natural Resources
University of Missouri-Kansas City	Kansas City	MO	Environmental Studies Program; College of Arts and Science
University of Montana	Missoula	MT	Department of Ecosystem and Conservation Sciences; College of Forestry and Conservation
University of Mount Union	Alliance	OH	Environmental Science Program; Department of Biology; Division of Math and Science
University of Nebraska-Lincoln	Lincoln	NE	Environmental Studies Program; College of Agricultural Sciences and Natural Resources and College of Arts and Sciences
University of Nevada, Reno	Reno	NV	Department of Natural Resources and Environmental Science; College of Agriculture, Biotechnology, and Natural Resources
University of New England	Biddeford	ME	Department of Environmental Studies; College of Arts and Sciences
University of New Mexico	Albuquerque	NM	Department of Earth and Planetary Sciences; College of Arts and Sciences

Institution	City	State	Academic Unit
University of New Mexico	Albuquerque	NM	Water Resources Program, University College
University of North Carolina-Asheville	Asheville	NC	Department of Environmental Studies
University of North Carolina-Chapel Hill	Chapel Hill	NC	Curriculum for the Environment and Ecology; College of Arts and Sciences
University of North Carolina-Pembroke	Pembroke	NC	Department of Biology; College of Arts and Sciences
University of Oklahoma	Norman	OK	Interdisciplinary Perspectives on the Environment Program, College of Arts and Sciences
University of Pennsylvania	Philadelphia	PA	Vagelos Integrated Program in Energy Research
University of Portland	Portland	OR	Department of Environmental Science; College of Arts and Sciences
University of Rochester	Rochester	NY	Department of Chemical Engineering; School of Engineering and Applied Sciences
University of Saint Francis-Illinois	Joliet	IL	Environmental Sciences Program; Department of Natural Sciences; College of Arts and Sciences
University of Saint Thomas-Texas	Houston	TX	Department of Environmental Science and Studies; School of Arts and Sciences
University of San Francisco	San Francisco	CA	Graduate Program In Environmental Management; College of Arts and Sciences
University of South Dakota	Vermillion	SD	Sustainability Program; College of Arts and Sciences
University of South Florida-St. Petersburg	St. Petersburg	FL	Department of Environmental Science, Policy, and Geography; College of Arts and Sciences
University of Tennessee	Knoxville	TN	Department of Forestry, Wildlife and Fisheries; College of Agricultural Sciences and Natural Resources
University of Texas at San Antonio	San Antonio	TX	Department of Civil and Environmental Engineering; College of Engineering
University of Utah	Salt Lake City	UT	Environmental and Sustainability Studies Program; College of Social and Behavioral Science
University of Utah	Salt Lake City	UT	Environmental Humanities Graduate Program; College of Humanities
University of Utah	Salt Lake City	UT	Institute for Clean and Secure Energy
University of Utah	Salt Lake City	UT	Wallace Stegner Center for Land, Resources and the Environment at the S.J. Quinney College of Law
University of Vermont	Burlington	VT	Center for Sustainable Agriculture
University of Vermont	Burlington	VT	Environmental Program
University of Vermont	Burlington	VT	Environmental Sciences Program
University of Vermont	Burlington	VT	Gund Institute for Ecological Economics
University of Vermont	Burlington	VT	Rubenstein School of Environment and Natural Resources
University of Virginia	Charlottesville	VA	Virginia Natural Resources Leadership Institute
University of Washington-Seattle	Seattle	WA	Buerk Center for Entrepreneurship
University of Washington-Seattle	Seattle	WA	Center for Clean Air Research
University of Washington-Seattle	Seattle	WA	Center for Conservation Biology
University of Washington-Seattle	Seattle	WA	Center for Sustainable Forestry at Pack Forest
University of Washington-Seattle	Seattle	WA	Green Futures Research and Design Lab
University of Washington-Seattle	Seattle	WA	Program on Climate Change
University of Washington-Seattle	Seattle	WA	Quaternary Research Center

Institution	City	State	Academic Unit
University of Washington-Seattle	Seattle	WA	School of Environmental and Forest Sciences; College of the Environment
University of Washington-Tacoma	Tacoma	WA	Urban Studies Program
University of West Florida	Pensacola	FL	Center for Environmental Diagnostics and Bioremediation
University of West Florida	Pensacola	FL	Department of Environmental Studies; College of Arts and Sciences
University of Wisconsin-Madison	Madison	WI	Aquatic Sciences Center
University of Wisconsin-Madison	Madison	WI	Center for Climatic Research
University of Wisconsin-Madison	Madison	WI	Great Lakes Bioenergy
University of Wisconsin-Madison	Madison	WI	Nelson Institute for Environmental Studies
University of Wisconsin-Madison	Madison	WI	Nelson Institute for Environmental Studies and The College of Letters and Science
University of Wisconsin-Madison	Madison	WI	Wisconsin Energy Institute
University of Wisconsin-Milwaukee	Milwaukee	WI	Water Equipment and Policy I/UCRC
University of Wisconsin-River Falls	River Falls	WI	Department of Plant and Earth Science; College of Agriculture, Food and Environmental Science
University of Wisconsin-River Falls	River Falls	WI	Sustainable Management Program (Consortium with UW-Extension, UW-Stout, UW-River Falls, UW-Superior)
University of Wisconsin-Stout	Menomonie	WI	Applied Science Program; College of Science, Technology, Engineering and Mathematics
University of Wisconsin-Stout	Menomonie	WI	Sustainable Management Program (Consortium with UW-Extension, UW-Stout, UW-River Falls, UW-Superior)
University of Wyoming	Laramie	WY	Center for Energy Economics and Public Policy
University of Wyoming	Laramie	WY	Center for Photoconversion and Catalysis
University of Wyoming	Laramie	WY	Ruckleshaus Institute of Environment and Natural Resources
University of Wyoming	Laramie	WY	School of Energy Resources (collaborates with the Colleges of Arts and Sciences, Engineering and Applied Science, Agriculture, Business, Education, and Law, School of Environment and Natural Resources)
University of Wyoming	Laramie	WY	School of Environment and Natural Resources
University of Wyoming	Laramie	WY	Wind Energy Research Center
University of Wyoming	Laramie	WY	Wyoming Reclamation and Restoration Center
Ursinus College	Collegeville	PA	Environmental Studies Program
Utah State University	Logan	UT	Department of Environment and Society; College of Natural Resources
Utah State University	Logan	UT	National Aquatic Monitoring Center
Utah State University	Logan	UT	Western Rural Development Center
Valparaiso University	Valparaiso	IN	Environmental Science Program; College of Arts and Sciences
Vassar College	Poughkeepsie	NY	Environmental Studies Program
Vassar College	Poughkeepsie	NY	Department of Earth Science and Geography
Virginia Commonwealth University	Richmond	VA	Rice Center for Environmental Sciences
Virginia Polytechnic Institute and State University	Blacksburg	VA	Catawba Sustainability Center
Virginia Polytechnic Institute and State University	Blacksburg	VA	Conservation Management Institute

Institution	City	State	Academic Unit
Virginia Polytechnic Institute and State University	Blacksburg	VA	Environmental Science Program; College of Agriculture & Life Sciences
Virginia Polytechnic Institute and State University	Blacksburg	VA	Executive Master of Natural Resource Program; College of Natural Resources and Environment
Virginia Polytechnic Institute and State University	Blacksburg	VA	Institute for Critical Technology and Applied Science
Virginia Polytechnic Institute and State University	Blacksburg	VA	Powell River Project
Virginia Polytechnic Institute and State University	Blacksburg	VA	Virginia Water Resources Research Center
Viterbo University	La Crosse	WI	Environmental Sustainability Program; School of Letters and Sciences and School of Business
Wake Forest University	Winston Salem	NC	Center for Energy, Environment, and Sustainability
Washington and Jefferson College	Washington	PA	Environmental Studies Program; Department of Biology
Washington and Lee University	Lexington	VA	Environmental Studies Program
Washington College	Chestertown	MD	Environmental Studies Program; Division of Natural Sciences
Washington State University	Pullham	WA	Institute for Sustainable Design
Wayne State University	Detroit	MI	Environmental Science Program; College of Liberal Arts and Sciences
Wellesley College	Wellesley	MA	Environmental Studies Program
Wells College	Aurora	NY	Environmental Studies Program; Division of Natural and Mathematical Sciences
Western Carolina University	Cullowhee	NC	Environmental Science Program; College of Arts and Sciences
Western Kentucky University	Bowling Green	KY	Cohort Programs, Division of Extended Learning and Outreach
Western New England College	Springfield	MA	Sustainability Program; College of Arts and Sciences
West Virginia University	Morgantown	WV	Environmental Research Center
West Virginia University	Morgantown	WV	Natural Resource Analysis Center
William Paterson University of New Jersey	Wayne	NJ	Department of Environmental Science; College of Science and Health
Wilson College	Chambersburg	PA	Environmental Studies Program
Winthrop University	Rock Hill	SC	Environmental Sciences and Studies Program; College of Arts and Sciences
Wisconsin Lutheran College	Milwaukee	WI	College of Arts and Sciences
Worcester Polytechnic Institute	Worcester	MA	Institute for Energy and Sustainability
Yale University	New Haven	CT	Global Institute of Sustainable Forestry
Yale University	New Haven	CT	School of Forestry and Environmental Studies
Yale University	New Haven	CT	Yale Institute for Biospheric Studies
Yale University	New Haven	CT	Yale Sustainable Food Project
Youngstown State University	Youngstown	OH	Department of Geological and Environmental Sciences; College of Science, Technology, Engineering & Mathematics

Appendix C – Questionnaire

Program Administrator

1. What is the title of the primary academic unit/program administrator?
 - ☐ College/division/school dean, associate dean, or assistant dean
 - ☐ Head of a division/school located within a larger college/division/school
 - ☐ Institute or center director or equivalent
 - ☐ Department chair/head
 - ☐ Program director/chair or equivalent
 - ☐ Program coordinator or equivalent
 - ☐ Program has no official administrator
 Other(explain): _____

2. What percent of FTE is allocated for serving as the primary administrator? (if unspecified enter NS)
 _____%

3. To whom does the primary program administrator directly report (for the interdisciplinary unit/program)?
 - ☐ President or chancellor (e.g. administrator in the office of the president or chancellor)
 - ☐ Chief academic officer (e.g. administrator in the office of the provost or vice-chancellor)
 - ☐ Dean of one college/division/school (e.g. college where program or academic unit is located)
 - ☐ Deans of more than one college/division/school (e.g. colleges that the program spans)
 - ☐ Dean/chair/head of one division/school located within a college
 - ☐ Chair/head of one department (e.g. department where degree program(s) is located)
 - ☐ Steering committee composed of administrators
 - ☐ Steering committee composed of faculty and administrators
 - ☐ Steering committee composed of faculty
 Other (explain): _____

4. Does the program have official co-administrators?
 - ☐ Yes
 - ☐ No

5. Select the category that best describes the academic preparation (field(s) of study) for the primary program administrator.
 - ☐ Interdisciplinary
 - ☐ Life Sciences
 - ☐ Physical Sciences
 - ☐ Applied Sciences / Engineering
 - ☐ Natural Resources Management / Agriculture
 - ☐ Social Sciences
 - ☐ Humanities
 - ☐ Professional (e.g. law, business, public policy, public administration)

Program Attributes

1. When was this academic unit/program established? Year: _____

2. What types of interdisciplinary environmental and academic programs are offered through this unit/program? Check all that apply.
 - ☐ Baccalaureate degree(s)
 - ☐ Accelerated 5-year baccalaureate/master's degree(s)
 - ☐ Master's degree(s) – MS/MA
 - ☐ Master's degree(s) – Other/Professional (e.g. Master of Environmental Management)
 - ☐ Master's degree(s) – Professional Science Masters™
 - ☐ Master's degrees specifically designed for working professionals (e.g. Executive Masters)
 - ☐ Doctoral degrees(s)
 - ☐ Undergraduate minor(s)
 - ☐ Graduate minor(s)
 - ☐ Undergraduate certificate(s)
 - ☐ Graduate certificate(s)
 - ☐ Professional certificate(s)

3. What primary factor(s) led to the establishment of the degree granting unit/degree programs offered? Check the three most important factors.
 - ☐ Student interest
 - ☐ Documented near-term or historic demand for programs
 - ☐ Anticipated growth of new environmental/sustainability-related jobs in the long-term future
 - ☐ Desire to create environmental/sustainability entrepreneurs, leaders and change agents in the labor market
 - ☐ Faculty initiative
 - ☐ Administrative initiative
 - ☐ Response to local/regional environmental/sustainability concerns
 - ☐ Response to national/global environmental/sustainability concerns
 - ☐ Viewed as essential to the mission of the institution
 - ☐ Private donation/endowment
 - ☐ Unknown
 Other(explain): _____

4. Where in the institutional administrative hierarchy is the degree program/academic unit located?
 - ☐ Consortium or system wide program/academic unit than spans two or more institutions
 - ☐ Interdisciplinary institution level program (spans the institution; include programs located in a graduate college, office of continuing education, or other similar academic home)
 - ☐ Interdisciplinary (environmental and/or sustainability focused) institute/center
 - ☐ Interdisciplinary (environmental and/or sustainability focused) college/division/school
 - ☐ Interdisciplinary (environmental and/or sustainability focused) division/school within a college
 - ☐ Interdisciplinary (environmental and/or sustainability focused) department
 - ☐ Interdisciplinary program that spans two or more traditional colleges/divisions/schools
 - ☐ Interdisciplinary program that spans one traditional college/division/school
 - ☐ Interdisciplinary program that spans two or more traditional departments (but not an entire college/division/school)
 - ☐ Interdisciplinary degree program(s) within a traditional department
 Other(explain): _____

5. Who participates in the program/academic unit's primary decision making (e.g. resource allocation, curriculum design, hiring)? Check all that apply. Do not include secondary groups or individuals that approve the primary decisions.
- ☐ Program/unit administrator(s)
 - ☐ Other administrators
 - ☐ Executive committee
 - ☐ Tenured and tenure track faculty (or equivalent) appointed in the program/unit
 - ☐ Tenured and tenure track faculty (or equivalent) that participate in the program/unit
 - ☐ Other faculty that participate in the program/unit
 - ☐ Program/unit staff
- Other (explain): _____
6. Please provide information about the program or academic unit faculty (include program administrators if they also serve as faculty). Please note the distinction between faculty appointed in the interdisciplinary program/academic unit and participating faculty appointed in other academic units.
- a) Number of faculty with full-time appointments (salaried) in the program/unit (faculty that participate in interdisciplinary environmental and/or sustainability degree programs)
- _____ Lecturer/Instructor
- _____ Research professor
- _____ Assistant professor (tenure-track or equivalent status)
- _____ Associate professor (tenured or equivalent status)
- _____ Full professor (tenured or equivalent status)
- _____ Number of new appointments anticipated in the next two years
- b) Number of faculty with joint appointments (salaried) in the program/unit and other academic units
- _____ Lecturer/Instructor
- _____ Research professor
- _____ Assistant professor (tenure-track or equivalent status)
- _____ Associate professor (tenured or equivalent status)
- _____ Full professor (tenured or equivalent status)
- _____ Number of new appointments anticipated in the next 2 years
- c) Number of faculty (primary employment within the institution) with part-time contracts to teach in or contribute to the program/unit _____
- d) Number of adjunct faculty (primary employment outside the institution) with part-time contracts to teach in or contribute to the program/unit _____
- e) Number of faculty formally affiliated with the program but salaried and tenured entirely through other units _____
7. Please provide information about the program/academic unit staff (administrative, research, technical, etc.).
- a) Number of staff with full-time appointments in the program/unit _____
- b) Number of staff with part-time appointments in the program/unit _____
- c) Number of staff who support the program, but salaried through other units _____

8. Select the answer below that best corresponds to the program or academic unit dedicated budget (total budget) in relation to other programs or units with similar numbers of enrolled students.

	Undergraduate	Graduate
Less than other programs/units	<input type="radio"/>	<input type="radio"/>
Equivalent to other programs/units	<input type="radio"/>	<input type="radio"/>
Greater than other programs/units	<input type="radio"/>	<input type="radio"/>
No dedicated budget	<input type="radio"/>	<input type="radio"/>
Unsure	<input type="radio"/>	<input type="radio"/>
Other (explain):	<hr/>	

9. How is overhead handled for interdisciplinary grants pursued by the program administrators and/or faculty? Check all that apply.

- ☐ Program/unit receives overhead for grants awarded to the program/unit administrator(s)
- ☐ Program/unit receives overhead for grants awarded to faculty affiliated with the program/unit
- ☐ Overhead is distributed among participating faculty departments but not to the interdisciplinary program/unit
- Other (explain):

10. Identify the percentage of the program or academic unit funding that comes from the following sources (average over last three years). Percentages should add to 100%. If the program does not have a dedicated budget, skip this question.

	Undergraduate	Graduate
Percent from non-directed funds (e.g. institutional appropriations, tuition and fees)	___%	___%
Percent from long-term directed funds (e.g. endowments)	___%	___%
Percent from short-term directed funds (e.g. grants and contracts)	___%	___%
Percent from gifts (e.g. alumni, donors)	___%	___%
Percent from other sources (explain):	<hr/>	

11. At your institution are budget allocations based on the number of students enrolled in the program?

	Undergraduate	Graduate
Yes, directly	<input type="radio"/>	<input type="radio"/>
Yes, indirectly	<input type="radio"/>	<input type="radio"/>
No	<input type="radio"/>	<input type="radio"/>
Unsure	<input type="radio"/>	<input type="radio"/>

12. Provide information about important program changes within the last two years and/or approved future changes. Briefly explain (such as created new minor in sustainability science, included more emphasis on climate change in the curriculum, lost x faculty lines due to budget cuts, or program transitioning to a department).

- a) Program/academic unit (name, structure, location within institution)
Explain:

- b) Program mission/vision
Explain:

- c) Degree programs/majors (new, revised, discontinued, renamed)
Explain:

- d) Specializations/concentrations/minors/certificates (new, revised, discontinued, renamed)
Explain:

- e) Faculty appointments (ability to hire faculty, number of faculty, type of appointments)
Explain:

- f) New physical support structures (building, laboratories or other facilities)
Explain:

- g) Budget changes (cuts or increases and the effects on the program)
Explain: _____
- h) Other changes
Explain: _____
13. What student services are provided by the program/academic unit? Do not include services provided to all students by your institution unless they are specifically designed for the program's students (e.g. a position dedicated to environmental students in the career services office). Include only ongoing programs and not temporary initiatives. Check all that apply.
- | | Undergraduate | Graduate |
|---|-----------------------|-----------------------|
| a) Professional development training courses or equivalent | <input type="radio"/> | <input type="radio"/> |
| b) Career exploration courses or equivalent | <input type="radio"/> | <input type="radio"/> |
| c) Career placement services | <input type="radio"/> | <input type="radio"/> |
| d) Minority/diversity enhancement programs | <input type="radio"/> | <input type="radio"/> |
| e) Articulation agreements (e.g. partnerships with regional high schools and/or community colleges) | <input type="radio"/> | <input type="radio"/> |
| f) Study abroad/travel courses | <input type="radio"/> | <input type="radio"/> |
| Other services: _____ | | |
14. Indicate which types of facilities/resources are used in the program curricula. Check all that apply.
- | | Undergraduate | Graduate |
|--|-----------------------|-----------------------|
| a) NCSE/CEDD developed educational resources (Encyclopedia of Earth, OCEAN-OIL, CAMEL Climate Change – see ncseonline.org for information) | <input type="radio"/> | <input type="radio"/> |
| b) Specialized laboratories or technical facilities | <input type="radio"/> | <input type="radio"/> |
| c) Decision theaters or other simulation and communication centers | <input type="radio"/> | <input type="radio"/> |
| d) Design studios or demonstration projects | <input type="radio"/> | <input type="radio"/> |
| e) Specialized computer facilities (e.g. GIS software, modeling software) | <input type="radio"/> | <input type="radio"/> |
| f) Field station(s), nature centers or equivalent | <input type="radio"/> | <input type="radio"/> |
| g) Campus lands and facilities (e.g. greenhouses, agricultural plots) | <input type="radio"/> | <input type="radio"/> |
| h) Independent and/or governmental research laboratories or technical facilities | <input type="radio"/> | <input type="radio"/> |
| i) Parks, reserves, other public or private lands | <input type="radio"/> | <input type="radio"/> |
| Other facilities/resources: _____ | | |
15. Indicate which types of program or academic unit specific funding and other resources are available to program students and faculty. Do not include institutional resources available to all students and faculty or external competitive grants, contracts or fellowships. Check all that apply.
- | | Undergraduate | Graduate |
|--|-----------------------|-----------------------|
| a) Student scholarships and fellowships | <input type="radio"/> | <input type="radio"/> |
| b) Student research grants | <input type="radio"/> | <input type="radio"/> |
| c) Student travel support (for conferences and other scholarly activities) | <input type="radio"/> | <input type="radio"/> |
| d) Student research or service awards | <input type="radio"/> | <input type="radio"/> |
| e) Funding for student external learning opportunities (e.g. study abroad, internships) | <input type="radio"/> | <input type="radio"/> |
| f) Internal faculty research grants | | <input type="radio"/> |
| g) Faculty teaching/course development support (e.g. compensation, workshops) | | <input type="radio"/> |
| h) Faculty time buy-out to enable increased participation in the program (e.g. proposal development) | | <input type="radio"/> |
| i) Faculty teaching, research or service awards | | <input type="radio"/> |

- j) Funding or staffing support for facilitating outreach programs
(e.g. community service, K-12 partnerships) ☐
- k) Funding or staffing support for facilitating external learning opportunities
(e.g. internships, service learning, community-based learning, applied
learning, demonstration projects) ☐
- Other funding or resources for faculty and students: _____

16. What do you view as the single greatest challenge to interdisciplinary education/research/scholarship?

Influences on Program Success

17. The following question is designed to learn more about the influences on your program's success. For each factor listed indicate: (1) the magnitude of the factor's influence, and (2) your degree of satisfaction with how the factor contributes to your program's success.

FACTOR	MAGNITUDE OF INFLUENCE				DEGREE OF SATISFACTION			
	LOW	MOD-ERATE	HIGH	MIN/NA	LOW	MOD-ERATE	HIGH	MIN/NA
INSTITUTIONAL FACTORS								
Institutional support (resources)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Institutional leadership support (other than resources)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Program/unit location within administrative hierarchy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Program leadership	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student interest and support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Faculty participation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Campus sustainability efforts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grant management support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Competition with other programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EXTERNAL SUPPORT FACTORS								
Federal funding support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
State or local government funding support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Foundation or private donor funding support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Local and state political leaders' support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PARTNERSHIP FACTORS								
U.S. higher education institution partnerships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Foreign higher education institution partnerships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Governmental partnerships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Private sector partnerships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-profit organization partnerships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Local community partnership (organizations/government)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

FACTOR	MAGNITUDE OF INFLUENCE				DEGREE OF SATISFACTION			
	LOW	MOD-ERATE	HIGH	MIN/NA	LOW	MOD-ERATE	HIGH	MIN/NA
CURRICULUM FACTORS								
Defining degrees and specializations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developing courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sequencing courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Curriculum approval process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Incorporating real-world topics into courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Incorporating research experiences	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Incorporating internship experiences	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Incorporating community-based/service/applied learning experiences	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
GRADUATE EMPLOYMENT FACTORS								
Local/regional employment opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National employment opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
International employment opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Career services support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

NCSE University Affiliate Members 2014-2015

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Allegheny College	Keystone College	University of California, Berkeley
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Dickinson College	Purdue University	University of Redlands
Doane College	Reed College	University of Rhode Island
Drexel University	Robert Morris University	University of Rochester
Duquesne University	Rutgers-The State University of New Jersey	University of South Carolina
Evergreen State College, The	Sacred Heart University	University of South Florida
Flagler College	Salem College	University of Toledo
Florida A&M University	Salisbury University	University of Texas at Austin
Florida Atlantic University	Salish Kootenai College	University of Utah
Florida International University	Sewanee, The University of the South	University of Vermont
Franklin & Marshall College	Siena College	University of Wisconsin - Extension
Frostburg State University	Smith College	University of Wisconsin - Green Bay
George Mason University	Southern New Hampshire University	University of Wisconsin - Madison
George Washington University	Stanford University	University of Wisconsin - Stout
Georgia State University	Stetson University	University of Wisconsin - Whitewater
Goshen College	Suffolk University	University of Wyoming
Guilford College	SUNY-College of Environmental Science and Forestry	Vassar College
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National Council for Science and the Environment

Improving the scientific basis for environmental decisionmaking

1101 17th Street, NW, Suite 250
Washington, DC 20036

Phone: 202-530-5810

Fax: 202-628-4311

E-mail: NCSE@NCSEonline.org

www.NCSEonline.org

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