

“ENVISIONING ENVIRONMENT”

**An Inventory and Campus Conversation
with Recommendations for
Investment and Future Planning
at University of Vermont**

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Envisioning Environment Work Group;
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**for
President Tom Sullivan
Former Provost Jane Knodell
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EXECUTIVE SUMMARY

The Envisioning Environment Work Group was charged by President Tom Sullivan and Provost Jane Knodell in October 2012, to develop an inventory and recommendations regarding environmental research, education, and outreach at University of Vermont. We gathered broad campus input from environmentally-related units; participant summaries are inventoried on the provost's web site. The committee interviewed UVM deans and experts at other institutions with a strong environmental focus; we also gathered public input via web portal and faculty survey. Our report is set in the context of the significant "grand challenges" shaping the future at global, national, and state levels as well as in higher education. The committee chose to redefine its task with a broad focus on "environment, sustainability, and health (as it pertains to environment)" (ESH) to indicate the importance of a systems approach to addressing long-term planetary and human well-being. Detailed findings are reported according to the charge: research, graduate education, undergraduate education, and outreach.

Areas of prominence. One of UVM's core missions is to foster the development of knowledge across all fields of study. ESH research is exemplary in its interdisciplinary approach to building fundamental understanding and addressing challenging issues. The committee identified a number of areas of strength and potential investment for UVM. Current strengths include: (1) fundamental science related to the natural environment; (2) sustaining landscapes and watersheds; (3) promoting regional food systems; (4) environment and society (e.g. economies, cultures, and governance); and (5) environmental health. Emerging areas of demand include: (6) sustainable business and entrepreneurship and (7) ecological and environmental design. A high priority theme is global change (including climate) and the pressing need for effective science, policy, management and communication.

Supporting elements. The committee noted a number of unique features that characterize and support all aspects of UVM's ESH programs. These include: (1) Vermont as a small but well connected state, with a vibrant entrepreneurial spirit; (2) our location in an ecologically complex setting, adjacent to a very large freshwater lake and between two mountain ranges with a strong sense of place attractive to faculty and students; (3) a number of well established professional schools, some very highly ranked, with strong existing or potential ESH programs; (4) a small enough campus community to be well connected internally and to participate effectively in productive relationships locally and regionally.

Major Recommendations. The committee identified five "big ideas" to guide long-term strategic planning. These are: (1) Develop an ESH Institute that fosters collaboration among ESH researchers, provides fellowships to ESH scholars, and creates an umbrella for interdisciplinary ESH graduate advising. (2) Assign responsibility within the Office of the Provost to lead, coordinate, and manage ESH activities in research, education, and outreach at UVM. (3) Streamline ESH graduate and undergraduate programs to identify curriculum synergies and redundancies, orienting UVM education to the global "grand challenges." (4) Expand graduate support for ESH to recruit the most talented graduate students with competitive funding packages in ESH. (5) Create an "Environmental Commons" -- a physical and web gateway for undergraduate activity in ESH to coordinate advising, research, and internships.

Immediate Action Steps. To build momentum, the committee recommends five steps that can be implemented promptly. (1) Enroll UVM in Sustainability Tracking and Assessment Rating System (STARS) to participate in this nationally recognized campus rating system for monitoring our campus sustainability initiatives. (2) Appoint faculty leadership to follow up on Work Group recommendations to continue forward momentum. (3) Develop sustainability general education learning outcomes through the Faculty Senate. (4) Create a high profile ESH publicity and marketing print and web vehicle that clearly describes ESH undergraduate choices. (5) Convert the Work Group inventory to an accessible master list for internal reference and public review.

I. INTRODUCTION AND CONTEXT

The Envisioning Environment Work Group was charged by President Tom Sullivan and Provost Jane Knodell in October 2012, to develop an inventory and set of recommendations regarding environmental research, education, and outreach at University of Vermont (see Appendices 1 and 2 for the full charge and the president's decision-making criteria). This report is the result of generous and thoughtful participation and discussion by all members of the Work Group (listed in Appendix 3 with process outlined in Appendix 4). We appreciate the extensive time contributions of committee members and also greatly appreciate the participation by so many members of environmentally-related units on campus (see Appendix 5 for lists of participants). Their reports are inventoried on the central provost web site and findings summarized in this report. Feedback from the public comment period and faculty survey generated over 40 pages of comments (see summary in Appendix 6), all of which were read and considered by the work group to inform the final version of this report.

The "Envisioning Environment" conversations at UVM have taken place in a time of competing social demands, serious ecological and economic challenges, and new pressures on higher education. An effective long-term vision for environmentally-related research, education, and outreach at UVM will be most coherent in response to the significant driving factors shaping the future. As one forum participant observed, "Clearly the economy and the health of the environment are more closely linked than ever. To shift from an economy that measures our rate of dying to one that measures and promotes life and well-being is the challenge of this century. How can UVM lead to restore and protect the climate and the earth's living systems?" The importance of context cannot be overestimated as we seek strategic areas of investment for the University of Vermont. Our thoughts are outlined briefly below to provide an appropriate frame for the findings and recommendations of this report.

GLOBAL CONTEXT

Environmental concerns continue to accelerate under the pressures of rising material production and consumption, rising global population, and serious threats to climate stability, water quality and access, and food production. Leading scientists have enumerated these as 21st century "grand challenges," calling for thoughtful reordering of research and education priorities. The National Academy of Sciences (2001) highlights these top concerns: 1) global climate change, 2) air and water pollution, 3) overpopulation, hunger and poverty, 4) extinction of species, 5) exhaustion of natural resources, and 6) destruction of ecosystems. Other similar lists include: 7) energy and transportation needs, 8) urban sprawl and mega-cities, 9) waste and toxics reduction, and 10) infectious disease. These are further exacerbated by global patterns of power and privilege that maintain inequities and suffering.

NATIONAL CONTEXT

In 2012 the National Council on Science and the Environment gathered information from over 1400 interdisciplinary environmental education programs in the U.S. These data are now being analyzed and released. Programs across the full range of institutional types were surveyed for degrees, minors, and certificates offered; curriculum content in knowledge, skills, and values; program structure and administration; and emerging trends in new programs, particularly with sustainability and energy themes. These data indicate an explosion of new offerings with a strong focus on interdisciplinary environmental research and education. Many campuses offer best practice examples for UVM; at the same time the presence of many new competitors in these fields should spur us to develop and promote our particular ESH niche.

Plans for future environmental initiatives at UVM should anticipate the changing nature of higher education. New technologies have the capacity to deliver intellectual content and learning experiences digitally to markets beyond the campus to regional, national, and even global populations. Four year residential degrees are increasingly unaffordable and are being replaced by packages of required courses from multiple institutions. To attract and engage future learners, UVM will need to embrace new technologies and learning models and highlight the added value of our distinctive offerings. This will require a substantial investment in technical and human resources.

STATE CONTEXT

Vermont offers a distinctive setting for supporting research, outreach, and education in environmental fields. As a state, Vermont has a strong reputation for political leadership and progressive policies related to environmental protection and social equity. For example, Act 250 provided early recognition and mitigation against the impacts of urban sprawl. Current policy initiatives address groundwater quality, toxics policy, and nuclear power. The state delegation to Washington D.C. ranks among the highest for its supportive environmental record by the League of Conservation Voters. As a state dependent on a tourism economy, Vermont promotes a strong sense of place and is regarded by many as a place of beauty and intelligent citizen engagement.

The 2012 report to Governor Shumlin on UVM-state relations articulates a clear call for UVM engagement in state priorities and needs. As the state land grant institution, UVM holds a special responsibility to provide research, education, and outreach that will support the health and resilience of Vermont's ecosystems and economies. The "Shumlin Report" indicates needs for strategic coordination with state agencies and priorities. Among other things, it calls for doubling the size of UVM's engineering programs and enhancing health education and outreach in Vermont.

UNIVERSITY OF VERMONT CONTEXT

In a time of increasing budget pressures for UVM as for most institutions of higher education, it is essential to allocate resources strategically and to leverage assets for the greatest return. Given the tremendous strengths in environmental research, education, and outreach at UVM, this is an obvious area to invest in to shape UVM's future. UVM has a well-established reputation for strong and popular undergraduate education programs. The Environmental Program (hosting Environmental Studies) was founded as a university-wide program in 1972 by presidential mandate and has now grown to ~500 majors, the third largest major at UVM. The School of Natural Resources (now the Rubenstein School) was formed that same year from units in the College of Agriculture and Life Sciences. In 1997, the Environmental Sciences major was approved, providing a range of options for ~350 students in CAS, CALS, and RSENR. Minors in Geospatial Analysis, Food Systems, and Green Building have also been created, and interest is growing in sustainable business and environmental health. Environmentally-related graduate programs are offered in Biology, Environmental Pathology, Geology, Engineering, Natural Resources, Public Administration, and Community Development and Applied Economics, with programs under development in Business and Public Health.

In comparison with other regional and east coast research universities, UVM's environmental offerings are broad and rich (see Appendix 7). To complement these academic offerings, we support a number of research centers that focus on environmental work, including the Gund Institute for Ecological Economics, the James M. Jeffords Center for Policy Research, the Center for Rural Studies, the Transportation Research Center, and the Center for Sustainable Agriculture. In addition, UVM hosts regional and national research and outreach programs, including the Vermont Water Resources and Lake Studies Center, the Lake Champlain Sea Grant program, the Northeastern States Research Cooperative and EPScor, the Experimental Program to Stimulate Competitive Research. These programs

provide substantial federal support to UVM faculty and graduate students for ESH research, student training, and community engagement. UVM's Extension offers leadership and assistance to the state in a wide range of forward thinking environmental programs.

University of Vermont faculty affiliated with the various colleges and schools have considerable strength in both fundamental and applied environmental science, in environmental engineering, as well as in the environmental social sciences and humanities. We host an unusually high proportion of social scientists working in areas of environment, sustainability, and health (as it pertains to the environment). This is a great advantage as academic institutions recognize the critical need to consider the human as well as the technical dimensions of these disciplines. The innovative Sustainability Faculty Fellows professional development program is in its fourth year and has engaged 68 faculty in course development related to sustainability themes. Progress is under way toward articulating general education learning outcomes in sustainability.

Environmentally-related education at UVM is supported by well-established infrastructure for service and experiential learning and incentives for undergraduate research. Almost half the service learning courses offered to date have been environmentally-related. Many units support senior capstone research and internship experiences. The small-scale nature of UVM academic departments enhances student-focused learning and access to faculty and peer mentorship. Co-curricular activities in the residential halls (particularly GreenHouse) and Davis Center have built a nationally known green campus culture. The Office of Sustainability, one of the most highly respected such programs in the U.S, supports the Eco-Reps program and many campus greening activities. UVM has received national attention as one of the first campuses to create a substantial revolving loan fund for energy improvements and to replace bottled water with refillable stations. We have signed the American College and University Presidents Climate Commitment and developed a plan for attaining carbon neutrality by 2025; UVM is among the first to commit to the national Real Food Challenge. Our leadership in service learning and campus sustainability provides significant value-added learning that makes UVM stand out next to its peer east coast Research One institutions.

Nonetheless, as stated in the Work Group charge, these efforts at UVM are distributed across many units and are not well-integrated or cohesively publicized. It has been many years since UVM has undertaken any significant initiative to enhance or refine its reputation as an environmental university. New programs in graduate and undergraduate education have been launched to meet student demand but without well coordinated strategic planning. As stated in the Work Group charge, "there is a growing sentiment that we have the potential to achieve far greater excellence, visibility, and impact in the study of the environment through a clear intellectual vision, better coordination, and building on our existing strengths."

LIMITS TO STUDY

These findings and recommendations were developed under a very short time frame by volunteer faculty with a limited budget. They are informed by our understandings of what is both desirable and possible given current budget, organizational, and political realities. Certainly more study, investigation, and engagement are needed to develop and refine the recommendations. Specific to the charge, there was insufficient time to evaluate program reviews for existing undergraduate programs in environment. We chose instead to highlight the breadth of offerings at UVM and the need for continued dialog to strengthen existing programs and cultivate faculty support across multiple units. Likewise, we did not attempt to redesign the organizational structure at UVM to create new academic units or merge existing units as this would require extensive budget and program analysis, consultation, and strategic planning beyond the scope of this work group.

II. FINDINGS

OVERVIEW

Redefining our scope. The committee was charged to inventory and assess UVM programs related to “environment.” Through campus forums, interviews with deans, and committee discussions, we came to a broader definition of the task that we felt was better described as “environment, sustainability, and health (as it pertains to the environment).” We heard a range of opinions about which of these terms was the most inclusive and which carried the most definitional baggage. “Environment” is perceived by some to indicate only the natural environment, exclusive of the human or social environment. “Sustainability” is preferred by others for its emphasis on the long view and the power of economic, social, and policy choices to sustain human and nonhuman life. “Health,” in this phrase, indicates well-being, resilience, and adaptability to environmental change. As a group we concurred that no one term is sufficient to represent our understanding but that collectively all three terms describe a comprehensive systems approach that addresses the synergistic relationships necessary for long-term planetary and human well-being. In this report we use the acronym **ESH** to indicate this inclusive systems approach reflected broadly and consistently in UVM’s outreach, research, and education initiatives.

Areas of prominence. The committee considered extensive input from a wide range of participants and identified a number of areas of strength and potential investment for UVM (see Appendices 5 and 6). Current strengths include: (1) fundamental science related to the natural environment, (2) sustaining landscapes and watersheds, (3) promoting regional food systems, (4) environment and society (e.g. economies, cultures, and governance), and (5) environmental health. Emerging areas of demand include: (6) sustainable business and entrepreneurship and (7) ecological and environmental design. In general, these areas of strength intersect well with UVM’s existing transdisciplinary research initiatives and add further possibilities for collaboration and creativity. A high priority theme across a number of these areas is global change (including climate) and the pressing need for effective science, policy, management and communication.

Supporting elements. The committee noted a number of unique features that characterize and support all aspects of UVM’s ESH programs, with identifiable and enhancing synergisms. (1) Vermont is a small but well-connected state, with a vibrant entrepreneurial spirit. We are able to put new ideas into action and accelerate these with modest human and capital resources of the university. (2) We are positioned in an ecologically complex setting, adjacent to a very large freshwater lake and between two mountain ranges, with management opportunities through well-established interstate and international policies and relationships. Sense of place is a strong theme for residents, visitors, and students attracted to UVM. (3) We have a number of well established professional schools, some very highly ranked, in medicine, health sciences, business, engineering, and natural resources, as well as strong connections to Vermont Law School -- all of these with strong existing or potential ESH programs. (4) The UVM community is small enough to be well connected internally and to participate effectively in productive relationships locally and regionally. Creative research and problem-solving innovations can be tested and mainstreamed quickly (e.g. food systems, smart grid technology).

The following sections offer a summary of strengths and challenges related to research, graduate and undergraduate education, and outreach as reported in university-wide forums and interviews with UVM Deans and environment-related outside experts.

A. RESEARCH

1. Strengths

Breadth and depth. The breadth and depth of environment-related research is impressive. ESH-related research is ongoing throughout many departments, colleges and schools across the UVM campus. Our exploration and inventory revealed that ESH research is being conducted by faculty, staff, graduate and undergraduate students in (but not limited to): Anthropology, Biology, Business Administration, Chemistry, Computer Science, Community Development & Applied Economics, Economics, Education, Engineering, English, Environmental Science, Environmental Studies, Geography, Geology, Health Sciences, History, Materials Science, Mathematics, Medicine, Microbiology & Molecular Biology (MMG), Nutrition & Food Science, Pathology, Philosophy, Physics, Plant Biology, Plant & Soil Science, Political Science, Psychology, Rubenstein School of Environment & Natural Resources, Sociology. In addition to these departments, programs, and schools, a number of other affiliated units contribute significantly to environmental research. These include (but may not be limited to): the Agricultural Experiment Station, Experimental Program to Stimulate Competitive Research (EPSCoR), UVM Extension, Gund Institute for Ecological Economics, James M. Jeffords Center for Policy Research, UVM Transportation Research Center, Park Studies Laboratory, Office of Sustainability, Center for Research on Vermont, Center for Sustainable Agriculture, Office of the Vermont State Climatologist, the Vermont Water Resources and Lake Studies Center, Lake Champlain Sea Grant program, and Northeastern States Research Cooperative. Many constituencies expressed a willingness to identify synergies and opportunities to work collaboratively on top priority projects. ***It is clear that the study of Environment, Sustainability, and Health is not the sole dominion of any one or even a handful of programs.***

Focus. Our breadth provides a significant foundation for future ESH investment and marketing that would highlight UVM's signature areas of ESH excellence among national institutions of higher education. Emergent areas of focused effort can easily be expanded with additional resources and effort. These include, for example, using the Lake Champlain basin as a natural laboratory and fostering research on the aquatic-terrestrial-human landscape. Likewise the presence of a teaching hospital at UVM offers a tremendous opportunity to use the state as a laboratory for environmental health research. Using the concept of "Healthy Environment, Healthy People, and Healthy Economy," as cited by deans of College of Medicine, College of Engineering and Mathematical Sciences, and the Rubenstein School, UVM could capitalize on existing areas of research excellence in Vermont and facilitate collaborations with other states and nations, particularly Canada.

Funding. Although federal, state and private budgets are limited, the amount of grant dollars brought in by faculty engaging in environmentally-related research is impressive and significant. Vermont's designation as an EPSCoR state provides an opportunity to compete for and secure EPSCoR funding within the major federal granting agencies, including NSF, NASA, and DoD, all of which have or have had active EPSCoR programs at UVM. Federal formula funds also provide dollars for environmental research through the Vermont Water Resources and Lake Studies Center (USGS-supported), Agriculture Experiment Station and the Northeastern States Research Cooperative (USDA supported), Sea Grant (NOAA supported) and Space Grant (NASA supported). As reported by UVM's Sponsored Projects Administration for FY 2012, approximately ***half of the total grant awards at UVM***, (\$66,851,912 out of \$129,466,938) were awarded for projects with an important environmental component to the research and education. These research dollars give individual faculty, collaborative teams, and programs clout in the eyes of the local, national and international community to call the study of the environment "our own." However, we need a strong messaging program and better cataloging of both funded and unfunded research to develop our reputation and open new doors of funding.

2. Challenges

Approach. Environment means different things to different constituencies, internal and external. In clarifying our focal areas, we need a unifying approach that best encompasses our research at UVM. The committee believes that the creation of a single “spire”-like mechanism in “environment” would derail the broad momentum of the Envisioning Environment process by disenfranchising some groups in favor of a single area. It would be wiser to think broadly and ***invest in a range of existing and developing ESH programs that offer a range of unique strengths that support emerging creativity.***

Scale. Some environment-related research units are large both in terms of funding and number of people (e.g., Vermont EPSCoR, RSENR) while others are quite small (e.g., Office of the Vermont State Climatologist, Center for Research on Vermont). Each provides a useful if not critical service but, because of both physical and intellectual fragmentation, smaller units or programs may be overlooked and not fully utilized or appreciated. Some units are particularly small and poorly funded but nonetheless provide excellent value for the dollars invested. Highlighting these successes is a challenge.

Communication gaps. Although some people successfully navigate between the silos at UVM that fragment ESH-related research, overall there is a substantial lack of cohesiveness and communication across the units that host environmentally-focused researchers. This generates inefficiencies and makes for missed opportunities to collaborate and develop shared projects and grant support. For example, beyond Environmental Pathology and Neurotoxicology, there is little formal organization in the area of environmental impact on human health. Yet there is as much research at UVM on the impact of environment on human health as there is on the health of the environment. Without clear and transparent “packaging” (as in web or print media) the environmental research lens at UVM is not well focused to internal and external audiences.

Need for support funds. Compared with other R1 universities, UVM research efforts are greatly underfunded, with extremely limited internal resources available for ESH research. Sharing resources between smaller and larger ESH-related programs can be difficult, especially when smaller units feel it is critical to retain their individual identity. Several forum groups called for the promotion of ESH research across academic boundaries, emphasizing the transdisciplinary nature of this work. Investments are sorely needed to provide seed funds and course release time to enable faculty to develop ESH-related research enterprises in key areas of expertise.

Faculty workload. Heavy undergraduate teaching loads and curricular needs constrain the ability of many faculty to expand their research scope by developing successful broad, integrative research proposals such as IGERT or HHMI training grants. Interdisciplinary proposals (which are typical for ESH) are complex and time-consuming to develop, and resulting research programs are demanding not only intellectually but logistically as well. Workload planning and institutional support can fall short in appreciating the important links between research and education. Faculty in ESH fields at UVM are overloaded with the demands of maintaining excellence in traditional undergraduate teaching as well as in R1 level research and graduate education. Promotion guidelines and funding models often generate unrealistic expectations for faculty productivity with inadequate support (see Appendix 8 for UVM-wide challenges to strategic planning).

B. GRADUATE EDUCATION

1. Strengths

Breadth and depth. There is a tremendous amount of ESH graduate education activity across campus. At least six graduate programs have focused degrees in ESH fields. These include: Civil and Environmental Engineering (MS, PhD), Community Development and Applied Economics (MS in CDAAE, MPA), Geology (MS), Natural Resources (MS, PhD), Plant Biology (Field Naturalist MS, PBIOPhD), and Plant & Soil Science (MS, PhD). A good number more routinely award graduate degrees in which an individual student's scholarship focuses on ESH issues. This includes: Animal Science (MS, PhD), Biology (AMP, MS, PhD), Chemistry (MS, PhD), Education (MEd, EDD, PhD), English (MA), History (MA), Materials Science, Mechanical Engineering (MS, PhD), Nutrition and Food Science (MS, PhD), Pathology (MS).

Cross-disciplinary programs are hosted and coordinated across multiple units (e.g., Ecology; Cellular, Molecular and Biomedical Sciences; Clinical and Translational Science; and Food Systems). UVM offers graduate certificates in Ecological Economics, Sustainable Transportation Systems and Planning, Ecological Design, Complex Systems, and Public Health. Proposed programs are currently under review, including Environmental Governance (through a PhD in Policy & Governance), and Sustainable Entrepreneurship (MBA). Associated faculty members have formed a hub network for Ecology Evolution, and Environmental Biology. There is faculty interest from CAS and RSENR in developing an interdisciplinary Environment and Society graduate program to support research in the social sciences, humanities, and fine arts. Forum participants also proposed strengthening graduate opportunities in Ecological Design.

Themes. UVM and the state of Vermont have a national reputation in environment, sustainability, and health (e.g. "healthy places, healthy people, health economies"). Environmental stewardship connected to public health and well-being attracts students interested in studying the environment. However, as noted below, Vermont's image as a "clean green" state and UVM's image as an "environmental" university are both in peril. The fact that "the environment" did not become a TRI spire of excellence was disappointing to many across campus. Among other things, this postponed an important conversation about coordinating ESH graduation education. The word "spire" is now a lightning rod for many stakeholders that the committee feels is inadequate in representing the wide-range of complementary ESH work being done in many units. Key themes enumerated by forum participants indicate important opportunities for internal synergies in graduate education.

2. Challenges

Communication gaps. A number of forum participants indicated that UVM is weak in communicating the values of its programs and the successes of its ESH endeavors. People internal and external to UVM believe we have not made good on our mission, as we are not yet recognized nationally as a premier "environmental university." It is difficult to present a common purpose and shared commitment to ESH when graduate students are dispersed across several small departments. Chairs and program coordinators expressed a strong need for an "Environmental Clearinghouse" to promote research and fellowship opportunities that include programs that are currently self-contained (e.g., chemistry and computer science) but also want to contribute to ESH research.

Faculty Workload. Heavy undergraduate teaching loads and curriculum needs pose significant challenges that constrain faculty ability to develop and offer graduate courses. A number of graduate programs are dependent on 200-level courses shared with senior undergraduates and eager for more challenging 300-level courses. There is overlap in course offerings between programs and unrealized possibilities for synergies in content delivery.

Funding for Graduate Students. To be competitive for top graduate students who could raise the profile of UVM in ESH fields, graduate student support needs to be increased in relevant graduate programs (e.g., Biology, CDAE, RSENR) to match national standards. Some BIOL doctoral students, for example, are currently dependent on Teaching Assistantships for up to five years, making it difficult to meet basic living expenses or complete their research projects. RSENR Graduate Teaching Assistant stipends are often split in half to accommodate more students. Few graduate students have adequate funding for their own research or travel to professional conferences.

C. UNDERGRADUATE EDUCATION

1. Strengths

Breadth and depth. Undergraduate teaching in ESH areas at UVM occurs in many degree programs and departments across all colleges. There has been significant growth in the number of ESH courses, certificates, concentrations, programs, and degrees over the past two decades. -Student demand is rising in current areas of concern and application, e.g. climate, energy, transportation, food, ecological design, and sustainability education. Environmental Studies and Environmental Sciences are currently some of the most popular majors at UVM. Enrollments in Environmental Engineering and Sustainable Entrepreneurship are growing quickly. Given UVM's strong reputation in these areas and high levels of global environmental concern, the growth in student interest of the last decade is likely to continue. Investing resources in these nationally attractive and critically relevant programs will ensure their central role in maintaining UVM's "green" reputation.

Range of approaches. Environmental offerings at UVM reveal a wide array of educational and environmental philosophies as well as differing academic priorities. Definitions of "environment" reflect different understanding of interdisciplinarity, different attitudes toward applied science and advocacy, different cultural perspectives, and different environmental values and ethics. For some students, ESH offers a gateway to a paradigm shift, for others a global worldview, for yet others a stimulating career path. *The Work Group sees this range of options as a strength* rather than a weakness, providing great diversity of educational experience for developing broadly informed scholars, capable citizens, and engaged communities.

Market position. With respect to environment and sustainability, UVM is better positioned to take advantage of the changing nature of undergraduate education than it is in many other areas. In contrast to a number of large research universities, many more opportunities already exist at UVM for students to engage in ESH research, hands-on training, experiential learning through internships, service learning, and study abroad (see Appendix 7). Strong and vibrant Environmental Studies (ENVS) and Environmental Sciences (ENSC) programs are central to UVM's reputation, mission, and success as an environmental university. Strengthening UVM's undergraduate environmental programs, improving communication and advising about environmental options, and raising UVM's green profile through better marketing would attract more students of higher quality to UVM.

2. Challenges

Need for coordination. The diversity of UVM's undergraduate offerings in ESH also has some down sides. Forum participants reported that it can be confusing to explain the range of options to incoming students and advisors and suggested there may be inefficiencies in program delivery. UVM's undergraduate environmental curriculum can be better coordinated, integrated, and publicized. Many forum participants, particularly Admissions, called for a comprehensive advising "map" for prospective and current students as well as faculty, to navigate UVM's undergraduate offerings in ESH. Curriculum and course offerings need to be assessed for overlap and potential for efficiencies.

Administrative structure. Various proposals reflected opposing approaches with pros and cons: (a) consolidate key environmental offerings within specific assigned units, or (b) allow and encourage ESH to be part of many units to foster cross-campus strength for more students. Current administrative structures vary widely and are not easily combinable. ENSC, for example, is decentralized and managed by three coordinators in three units, while ENVS is managed centrally under a single director with faculty assigned contractually to the program. Because ENVS reports to the RSENR dean and is widely perceived to be part of RSENR, deans of other units are not necessarily committed to faculty staffing and program success. Of the units served by ENSC and ENVS, CALS and CAS have departmental structures but RSENR does not. Forum participants reported little enthusiasm or rationale for combining ENVS and ENSC programs, either as whole programs or through a shared entry-level course, due to pedagogical, administrative, historical, and cultural differences in the two programs. National research indicates that the most successful ESH programs have greater internal leadership authority (e.g. departmental chairs vs. program directors) and a greater degree of budget autonomy.

Teaching capacity. Faculty assignments to undergraduate ESH teaching and advising have not kept pace with student enrollments and interest, and needs assessment has been hampered by the university-wide nature and administrative reporting structure of the ENVS and ENSC programs. Despite a number of calls for additional faculty lines in program self-studies and external reviews, this has not been a high priority. ENVS, with over 500 majors and minors has only eight FTE equivalent faculty and is heavily dependent on part-time lecturers hired through Continuing Education to meet enrollment needs. Full-time faculty face a challenging 50:1 student advising ratio. ENSC likewise has inadequate base budget funding to cover curriculum needs and rising enrollments. There is no clear and broadly accepted mechanism to add faculty affiliates to either of these high demand university-wide programs, either through course buyouts or joint workload planning. Faculty across campus, and particularly in CAS, have been constrained in sharing their considerable strengths in ESH due to other teaching priorities. CAS recruitment pressures and instructional needs have limited faculty line commitments to ESH programs. The committee recognizes that the situation is administratively complex and thus recommends further dialogue and in-depth analysis. For now we believe these funding and staffing gaps are holding the programs back from reaching their full academic potential.

D. OUTREACH

UVM outreach efforts exist to (a) connect UVM with the community as partners in addressing real world challenges through engaged scholarship and transformative learning experiences; (b) provide flexible, relevant educational options for life-long learning; (c) listen and connect community and business needs with university resources to inform program development; and (d) cultivate elements and processes that support healthy communities. With the world of higher education changing rapidly, UVM's outreach units are well positioned to address these challenges.

1. Strengths

Broad capacity. UVM has a strong tradition of environmentally focused initiatives and outreach programs. UVM's Extension Program has long supported environmental efforts at the university and beyond. With a staff of ~200 (mostly off-campus) including 9 CALS faculty, 2 RSENR faculty, and 17 field faculty, Extension has been involved with a number of community and youth programs and initiatives including: Community Development Energy Conference, Town Officer Management, Certification for Sustainable Transportation, Master Gardener Program, Sea Grant (institutional match), 4-H/STEM Programs and the Watershed Alliance for High Schools. Extension is known for its sustainable agriculture and natural resource outreach initiatives on water quality and nutrient management, soil

health and protection, climate change, solar and biofuel alternatives, and crop mitigation. The Center for Sustainable Agriculture is one of the strong grant-funded focal areas hosted under Extension.

Continuing Education (CE) has partnered with many local and statewide organizations such as Vermont Businesses for Social Responsibility, Vermont Environmental Consortium, Workforce Investment Board, Vermont Department of Labor, Vermont Department of Economic and Housing and Community Development to provide ESH programming and outreach efforts. In addition, CE has supported many campus-based ESH programs and initiatives including: Food Systems, Sustainable Business, Sustainable Community and Economic Development, Environmental Health, Summer Academy with ESH themes, and ESH Professional Certificate Programs. The Community-University Partnerships & Service-Learning Program (CUPS) reports that ESH is the focus for 25% of faculty fellows, 40% of faculty planning and implementation grants, and over half the community-based research. During FY12 ~40% of service learning courses with over 90 community partners had an ESH focus.

Outreach is also central for several other ESH-related units on campus. The missions of the Gund Institute, the Jeffords Center, and the Transportation Research Center, among others, emphasize connecting research with real-world problems. As part of their collaborative activities, Gund, Jeffords, and TRC Fellows and students engage with governments, non-profit agencies, and businesses in Vermont, across the United States, and overseas.

Strong state connection. Through extensive community and state partnerships, these units help fulfill state missions using UVM expertise and academic programs. They are able to serve a wide range of populations and are poised to be able to expand this reach with the anticipated growth of online learning. Related academic centers (e.g. Jeffords Center, Gund Institute, Transportation Research Center, Water Resources and Lake Studies Center, Center for Research on Vermont, Center for Sustainable Agriculture, and the Office of the Vermont State Climatologist) specifically hold service to Vermont as a central mission.

2. Challenges

Weak integration with campus. Several outreach units expressed a sense that they could be better integrated into campus ESH initiatives. While opportunities for research collaboration abound, they are difficult to facilitate due to the physical isolation of some units and some degree of campus ignorance about unit functions and purpose. There is a felt need for a concerted collaborative facilitation effort to better integrate research from campus faculty with the outreach units

Complex reporting structures. Lines of authority tend to reinforce silo-based activity rather than synergistic efforts. Differences in budget/accounting models makes financial arrangements cumbersome for shared grants and state research projects. Though faculty and staff interests overlap considerably with core campus units, bureaucratic barriers prevent constructive collaboration.

E. EXPERIENCES OF OTHER INSTITUTIONS

Many other efforts are under way to coordinate ESH scholarship on U.S. campuses (e.g., Duke, Yale, Arizona State, Universities of Washington, Minnesota, Michigan, California, and others). Some places have successfully established productive units with clear administrative structures; others have struggled. The comments below represent a sample of four universities and a national research analysis; our interviews were clearly far from exhaustive (see Appendix 4 for sources and interview questions). Nevertheless, the committee found the key insights that emerged to be useful for UVM. These are supported by informal conversations and stories from other campuses and from UVM itself.

1. What works

Institute, not a School or College. Establishing an ESH-related institute or cross-campus collaborative center has generally been more successful than reorganizing existing academic units into new schools or colleges. Such reorganization efforts tend to exclude people, create new silos and reduce buy-in. They incur large transaction and political costs that may undercut hoped-for benefits. An institute, in contrast, can be owned by the whole campus, allow engagement and buy-in from anyone according to interest, and avoid the distraction, emotions, and politics of reorganization.

Bottom up is more successful. Efforts to reorganize around ESH are more likely to succeed if the design process is bottom up – e.g., driven by faculty and staff. We heard specific success stories based on this process as well as cautionary tales from failures. In particular, the eventual Director or Dean of any new unit will face an uphill battle if institute formation is viewed by faculty as top-down. Beyond the design phase, bottom-up participation in ongoing governance is also necessary to sustain creativity, equitable participation, and campus-wide support.

Resources are essential to success. This would seem obvious, but initiatives at UVM are often put into motion without adequate financial support. Interviewees were very clear that any new effort must be launched with both significant funding and a clear mandate. This point was underlined in many faculty survey and public input comments. Major initiatives at Portland State and Stanford were launched with large private gifts (tens of millions), and University of Minnesota's institute was supported by a large investment raised through internal savings. These funds are necessary to support collaborative seed grants, shared faculty lines, student and faculty fellowships, events and conferences, communication support, and physical space.

Get the incentives right. We heard repeatedly that it is critically important to provide clear benefits for units and people to participate in any new institute such as this. This involves understanding which incentives motivate faculty and students as well as developing process and budget mechanisms to support them. Examples range from major drivers (e.g., revising RPT guidelines to reward interdisciplinary collaboration and application of research) to moderate rewards (e.g., offer seed grants for interdisciplinary collaborations and supply grant writing support to those teams) to minor perks (e.g., provide lunch at events to encourage participation).

2. Cautions

Avoid degree-granting authority. While an institute has a clear role in faculty and graduate student research, its role in graduate and undergrad education is less clear, and possibly weak or politically problematic. In some places, institutes offer minors or graduate certificates, but they do not oversee graduate or undergraduate curriculum. Those generally reside within academic units and are better managed there, particularly in institutions with resource-centered management (RCM) budget models. Many public comments pointed to these concerns and highlighted the need for well thought out goals and structure for an ESH institute.

Community relations. Several people emphasized the unique role of an ESH-related unit in engaging effectively with the surrounding community, e.g. Burlington. This offers many opportunities for real-world application of research, while creating strong institutional partnerships with local, regional, and state entities. Developing tangible connections with stakeholder organizations and agencies could be one of our greatest assets in providing a strong ESH training and research program reflecting community needs and interests. However, the university may not be able to leverage this to generate new jobs or meet current demand.

Need for physical space. Interviewees were not unanimous on the importance of an inviting physical space to encourage collaboration. Some felt it was very important, while others did not. With space limited on the UVM campus and major capital projects held to strict debt ceilings, it would require a significant gift to accomplish a new physical space for an ESH institute. However, we think this could serve as a valuable catalyst for a campus-wide ESH initiative.

III. RECOMMENDATIONS

Recommendations from the Work Group were developed in several stages, beginning with post-forum debriefs in October-November 2012, and following up with core area assessments prepared by subcommittees. In mid-December 2012 we agreed on our top five Big Ideas as guideposts for future action. These are listed first with brief descriptions of what would be involved in each Big Idea. These are followed by five immediate next steps that can be launched in 2013. Continued progress will require top-level leadership and support as well as specific assignments for further action. The last section is a compilation of additional promising suggestions collected through the public forums and inventory process. These need further evaluation to determine strategic priorities for resource allocation before additional action can be taken.

The draft report was presented to President Sullivan on January 7, 2013 and posted by the committee for a public comment period from January 14-February 18, 2013. Public input was received via the web link on the provost's page and via a faculty survey administered in early February (summary results in Appendix 6). A total of 231 faculty responded to the survey with 467 comments and we received 30 additional comment submissions, some quite substantial, via email or the web link. In total we received over 40 single spaced pages of comments. This input was reviewed by the committee on February 13 and 20, 2013 and incorporated into this report to clarify and augment the findings and recommendations. The final report was presented and discussed with President Sullivan and Provost Low on February 28, 2013.

A. BIG IDEAS

1. Develop an ESH Institute or collaborative

Consider organizational structure, physical space, budget needs, and finance models for a university-wide institute-like structure that encourages cross-disciplinary collaboration within the ESH community (e.g. faculty, staff, students) and offers opportunities for scholars to develop ESH proposals and conduct ESH-related research, teaching and outreach. Such an institute will obviate the need for restructuring of administrative units and will provide a space for integration and focus in the key areas of ESH. It will be most successful if there is grassroots faculty buy-in, real financial resources, and a direct reporting line for the director to the provost's office. In addition, it will be important for deans of faculty-affiliate homes to recognize some return on their release of faculty to Institute engagement and for the Institute to manage relationships with other integrating and ESH-focused units.

Faculty affiliation. There are many strong graduate faculty in a range of units across campus, including those that do not currently offer graduate degrees (e.g., anthropology, economics, geography, political science, sociology, statistics, etc.). Creating an umbrella institute would facilitate interaction and collaboration between these dispersed faculty. It would also allow faculty in interdisciplinary programs as well as units without graduate programs to advise graduate students related to their research area, thereby increasing the UVM graduate education capacity and strengthening research across campus.

2. Assign ESH coordinating responsibility within the Office of the Provost

In order to effectively coordinate ESH activities in research, education, and outreach at UVM the committee recommends leadership at a level above the existing college units. This would mitigate against divisive tendencies between silos and unit-driven competition for resources. We suggest that

university-wide programs such as ENV5 and ENSC as well as interdisciplinary graduate programs (e.g., Food Systems) report directly to this level. With central responsibility designated for these programs, publicity, curriculum, and ESH value messages could be more strategic and coordinated. Likewise, with provost level responsibility, MOUs could be negotiated with existing units for ESH academic offerings similar to the model employed by the UVM Honors College. Consistent hiring and promotion practices could be developed for cross-unit interdisciplinary hires to remove barriers to academic success.

3. Streamline undergrad curricula in ESH

Chairs and directors of ENV5, ENSC, CDAE, NR, BIOL, GEOG, GEOL, ENV ENG, BSAD (and interested others) should be charged to consider potential for collaboration on shared courses and to identify and reduce overlaps/duplication in curriculum offerings. This could be coordinated from the provost's office and led by a committee of representative faculty. We recommend considering any restructuring in the context of today's "grand challenges" – i.e. what undergraduate students need to be learning to prepare for and be effective in coming decades. A new major or minor in Sustainability Studies or Sciences should be explored as one option to meet the current national trend in this area. This group should recommend ways to facilitate more interaction and collaboration among interested faculty in ESH with regard to undergraduate teaching and advising, particularly to integrate health and environment into UVM undergraduate programs. This process needs to be facilitated in a way that units and students see clear gains rather than losses as a result of this coordination.

4. Expand graduate support for ESH

If ESH scholarship is to flourish at UVM, we must attract the most talented graduate students to participate in cutting-edge research and training. UVM needs to allocate significantly more resources toward competitive funding packages for graduate students. We need to increase the number of doctoral and post-doctoral fellowships in ESH, so that young scholars are fully supported and can focus on their research. We also recommend increasing ESH graduate stipends for GRAs and TAs to match offers from our competitors. In addition, UVM needs to create a specific fund to support graduate student research projects, available on a competitive basis.

5. Create an "Environmental Commons"

Create an attractive and comprehensive web site. This would draw attention front and center to UVM's considerable strength in environment, sustainability, and health (as it pertains to environment). A strong gateway front page could provide a clear map for incoming first year and prospective graduate students as well as faculty and staff advisors reviewing ESH options at UVM. The web portal could include links to undergraduate and graduate faculty and programs, and could highlight UVM's expertise in ESH research and outreach. It could also include links provided by Sponsored Project Administration to opportunities for research, training, and funding and could celebrate faculty accomplishments such as grant awards, presentations, and publications. The committee felt that this priority was of sufficient importance that an expert or consultant with marketing and design experience should be engaged to accomplish this work. Before such an effort is initiated, staffing and funding should be identified for ongoing responsibility and maintenance for this crucial information portal.

Develop a physical "hub", i.e. a new or repurposed space that can serve as a gateway for undergraduate activity in ESH. This might be as small as a desk in a kiosk or as large as new welcome center. This will require assessing costs, feasibility, and donor interest in supporting such a space. As described in the forum presentation, this Environmental Commons would increase the physical visibility of ESH at UVM, would encourage interaction and relationship-building across ESH-related fields and activities, and would foster a sense of community among the students, faculty, and staff in ESH departments. This space could house peer advisors, research opportunity and study abroad materials,

ESH internship listings and staff coordinator, seminar rooms for thesis defenses, gallery space for ESH art displays, the Office of Sustainability, CUPS, and Eco-Reps programs, a student lounge, and of course, a convivial cyber café.

Environmental internships. These could be streamlined into a single one-stop office that also provides environmental research opportunities for undergraduates. Students need professional development opportunities that can translate into early career experience. Local agencies, businesses, and non-profits can benefit from engaging student energy and support. We recommend expanding investment in CUPS and the UVM Career Center to meet this highlighted need.

B. IMMEDIATE ACTION

1. Enroll UVM in STARS

UVM no longer fills out annual surveys from Sierra Club, Princeton, and Sustainable Endowments Coalition due to their faulty criteria and inconsistent processes. Thus we have fallen off the top college green lists, even though we have tremendous green credibility. The UVM Office of Sustainability is already tracking the necessary data required for national rating status by the Association for the Advancement of Sustainability in Higher Education (AASHE). Over 250 campuses are now participating in STARS, Sustainability Tracking and Assessment Rating System, a well tested, nationally accepted campus equivalent of LEED building certification. We are overdue to participate in this rating system and take up the close monitoring of our campus sustainability initiatives.

2. Appoint faculty leadership for following up on these recommendations

The Envisioning Environment process generated great momentum, interest, and a desire to take action steps immediately. Leadership and authority is needed to build on the efforts of the Work Group and maintain forward direction. The president and provost should appoint faculty leadership to generate the next step conversations enumerated in this report.

3. Develop general education learning outcomes for Sustainability

The General Education focus in sustainability has been approved in principle by the Faculty Senate and a committee has begun work to develop a framework of learning outcomes. Their efforts should be supported to generate a proposal for Senate approval that can move forward toward implementation as quickly as possible.

4. Prepare a high-profile ESH publicity and marketing web/print vehicle

This is a high priority for Admissions to ensure that ESH opportunities are communicated clearly to prospective students attracted to UVM's green brand. It should describe ESH undergraduate choices at UVM in a clear and simple way and be easily accessible from multiple entry points. Likewise it should serve faculty and staff advisors assisting students in making the appropriate academic choices.

5. Convert program inventory to web portal

As a first step toward a master ESH web portal, the inventory of existing programs at UVM and faculty self-identified as ESH researchers and teachers should be converted into an accessible master list, edited and streamlined for public review. This might be housed as part of the ESH communication portal described above.

C. NEXT STEPS

A number of next steps have been suggested that would increase synergies and/or create efficiencies between programs. Facilitating these would stimulate creativity, entrepreneurship, and generate further ESH research, education, and outreach activity. This broad list requires further evaluation and strategic planning to maximize impact and build momentum.

Research Support

1. Provide annual investment in a campus-wide, competitive, peer-review process of seed funding for ideas and research proposals in ESH.
2. Develop mechanisms and policies to provide release time for faculty to develop large coordinated grants. This might include: (a) pilot funding and/or faculty fellowships for ESH collaborations similar to the new UVM REACH Grant Program; (b) release time for professional development in ESH-related niches; (c) ESH scholar in residence options for 1-3 months; (d) competitive funds for sabbatical leaves, conference attendance or summer training; and (e) faculty course buy-outs with research dollars.
3. Align Vermont state research needs and Office of Sustainability campus goals with UVM researcher expertise and capacities.
4. Invest in an electronic institutional repository to provide data management for Vermont and UVM scholars. While this would require significant resources, it would greatly enhance data sharing with state agencies and other researchers and would support more sophisticated ESH scholarship.

Curriculum Support

General

1. Review potential for expanding ESH learning opportunities through hybrid courses, online courses, MOOCs, summer field courses, and summer research programs.
2. Develop ways to provide campus-wide advising and integration of career development, research options, and internship opportunities into the various undergraduate ESH degrees.
3. Develop mechanisms for course buyouts or faculty affiliation with cross-campus programs in order to support more widespread contribution and collaboration with ESH units such as ENVS and ENSC.
4. Commit base funding for the Sustainability Faculty Fellows program to offer professional development to more fellows and develop more ESH courses.

Undergraduate

1. Strengthen and invest in ENVS in future faculty hires consistent with findings of recent program reviews and student/faculty ratios. Consider the possibility of cluster hiring in key areas such as sustainability to maintain national prominence. Evaluate options for faculty affiliate status for existing UVM faculty from a range of contributing units. Provide incentives for hiring units to commit some portion of faculty workload effort to ENVS.
2. Invest in and raise the profile of ENSC and promote potential STEM-related support and collaboration. As with ENVS, evaluate options for faculty affiliate status for existing UVM faculty. Provide incentives for hiring units to commit some portion of faculty workload effort to ENSC.

3. Develop ESH undergraduate gateway courses in BIOL, CHEM that can serve a wide range of students and meet science requirements for many entry-level students. Models would be GEOG 40 Weather and Climate, PHYS 009 Energy and the Environment, and GEOL 007 Earth Hazards. Likewise, consider and coordinate potential ESH gateway courses in the social sciences and humanities such as SOC, ANTH, HST, PHIL, REL. Models would be HST 67 Global Environmental History, PHIL 006 Ethics of Eating, and ANTH 23 Anthropology of Development.

4. Develop Environmental Education as a core concentration for the elementary, middle and secondary teacher licensure programs in the College of Education and Social Services.

5. Provide incentives for faculty to be more involved in GreenHouse and other Residential Learning Communities in relationship to ESH themes.

Graduate

1. Assess graduate curriculum gaps and redundancies, and solicit faculty interest in teaching and advising in desired niche areas. Identify relevant graduate courses with an ESH acronym across all programs.

2. Provide funding to develop and promote ESH-related graduate certificates. Potential certificate areas include: Environmental Management and Policy, Terrestrial Ecosystems, Aquatic Ecosystems, Community Development and Land Use, Environmental Dispute Resolution, and Watershed Management. A core curriculum could be developed that would apply to all certificates. If possible, offer a package discount for a certificate at lower cost than individual courses taken separately.

3. Consider cross-listing all ESH graduate students under a single administrative umbrella. This would help UVM communicate the scope of these efforts and could facilitate more efficient coverage of graduate curriculum and offer students a larger array of graduate course options.

Communications

1. Provide institutional grant information in a single accessible place to publicize campus-wide competitive research grants more widely (Sea Grant, EPSCoR pilot awards, the new UVM REACH grant program, etc.), encourage wider ESH participation, and set up mechanisms for internal peer review of grant proposals.

2. Clearly define the various UVM "faculty fellow roles" in their diverse arenas (e.g. writing, sustainability, Gund, etc.) and publicize them together as professional development opportunities.

3. Evaluate UVM's AdvoCat training for admissions tours and check for accuracy and appropriate information regarding ESH messaging.

Events

1. Develop campus-wide events that draw large groups of people together to showcase innovative ESH research on campus. Models include: George Aiken lectures, neuroscience workshops, Behavior and Health Research Forum) and the UVM TEDx event.

2. Develop/expand a cross-campus seminar series (perhaps with the guidance of a council with diverse representation as on the Envisioning Environment Work Group) to encourage dialogue among campus ESH researchers. Models include the RSENR seminar series and the Climate Action seminar sponsored by the Clean Energy Fund.

V. CONCLUSION

The findings of the Envisioning Environment Work Group committee and process indicate that UVM has an impressive foundation in environment, sustainability, and health (as it pertains to environment). To distinguish ourselves in this rapidly expanding niche, however, we need to streamline our many strengths and invest strongly in key areas. With continued work and strategic investments, UVM has potential to be among the nation's leaders in ESH, with a distinctive niche that will be attractive to students, scholars, partners, and donors. We believe our recommendations can help to move UVM in this direction.

This report highlights a number of key take-home points. First, there is clear strength in environment, sustainability, and health (ESH) across many units at UVM, with no single unit claiming a central or guiding role. That said, there are several areas of well-developed capacity with others emerging from current interests. It has become clear to us that a single "spire" type initiative would not enjoy cross-campus support and that UVM would be better served through investing in multiple lead areas identified in this report.

Second, there is a significant opportunity for coordination among existing academic units and interdisciplinary degree granting programs to maximize clarity and effectiveness. Some key units such as ENVS and ENSC need additional faculty investments to meet increased ESH enrollments. We recommend providing strategic oversight of this campus-wide process at the provost level. It is also essential to develop supportive mechanisms to build institutional capacity for interdisciplinary appointments of various types. Coordinating ESH activity from a central and high-level administrative office will greatly increase capacity to energize and communicate the efforts of various centers, offices and teaching/research support services to raise the profile of ESH activity at UVM.

Third, there is well-articulated need for a central ESH informational portal, both virtual (web-based) and physical. A thorough and well-designed ESH web portal would serve multiple audiences and indicate UVM's priority investment in these areas of research, education, and outreach. It could also host the faculty inventory of ESH-related research and teaching strengths. An innovative and attractive physical "hub" would build community, foster creativity, and be a physical entry point and home base for new, prospective, and current students interested in ESH themes.

Fourth, there is a need for better coordination of existing competitive research funds and new investments in ESH to support faculty and graduate students and to stimulate interdisciplinary, collaborative work. This could be best supported by the creation of a campus-wide ESH research institute that provides additional support for ESH graduate education. We need faculty advisory groups to encourage and select research ideas/proposals from across campus that will succeed with the national and international funding agencies. This should be accompanied by an assessment program that defines and tracks the success of current investments. This can then provide the roadmap for future ESH investments.

Fifth, a number of action steps can be taken immediately to deepen UVM's commitment to ESH research, education, and outreach. We recommend enrolling in the STARS program, generating next conversations with chairs and directors of undergraduate and graduate programs, upgrading web and print vehicles for ESH information, and appointing ongoing faculty leadership to continue the successful process begun by the Envisioning Environment committee.

ENVISIONING ENVIRONMENT AT UVM

APPENDICES

Appendix 1: Charge to the Work Group on Envisioning Environment

Appendix 2: President Sullivan's Decision Making Criteria

Appendix 3: Members of the Work Group on Envisioning Environment

Appendix 4: Work Group Process

Appendix 5: Envisioning Environment Public Forum Participants

Appendix 6: Faculty Survey Results

Appendix 7: UVM Comparator Institutions and their ESH Programs

Appendix 8: UVM-Wide Challenges to Strategic Planning

Appendix 1: Charge to the Work Group on Envisioning Environment

Date: 7 October 2012

To: The Envisioning Environment Faculty Work Group

From: Jane Knodell, Provost

I extend my sincere appreciation for your willingness to take on this important work on behalf of the University of Vermont. In this memo I'd like to share the rationale for forming this work group, and to convey your charge.

Rationale:

1. Impressive breadth, but fragmentation. Work in the environment spans the entire University: environmental engineering, environmental science (chemistry, biology, physics, geology), environmental health, environmental economics, environmental education, environmental policy, and sustainability in business to name a few. Yet the study of the environment on campus is fragmented and lacks the visibility it deserves. There is a growing sentiment that we have the potential to achieve far greater excellence, visibility, and impact in the study of the environment through a clear intellectual vision, better coordination, and building on our existing strengths.

2. Unique moment in our history. We have a new President who has significant experience related to the study of the environment as Provost of one of the world's major research universities. In addition, during the 2011-12 Strategic Initiatives Project, a committee of deans and faculty developed a report which concluded that certain alternative organizational structures would create greater academic synergy and more logical intellectual communities than we have in our current structure. There is openness in the Senate leadership to considering alternatives.

Charge to Work Group:

1. Conduct an inventory of environmental education (undergraduate and graduate, including advising and outreach) and research (including applied research through Extension). Develop a list of faculty by college or school whose central research interests relate to the environment. Identify areas of strength and comparative advantage. Interpret "study of the environment" broadly, to include approaches in all disciplines.

2. Evaluate our current way of organizing education and research on the environment at UVM, using President Sullivan's criteria where applicable. Assess "best practices" nationally and internationally: how do the universities with the best environment research and education programs organize this activity?

3. Develop 2-3 feasible proposals for change, including organizational change, that would improve our effectiveness, measured against Pres. Sullivan's criteria. The group is encouraged to solicit big, transformative ideas from the community. Consult, communicate, and engage the faculty and the deans in your work to find the best ideas.

Timeline:

Please report back to Pres. Sullivan, Provost Knodell, and Senate President Roberts by December 20 2012.

Appendix 2: President Sullivan's Decision Making Criteria

1. Advances quality and excellence
2. Reflects centrality to mission, vision, and focus
3. Fosters comparative advantage and multiple strengths
4. Affects a positive and transformative "Impact"
5. Increases academic synergy and interdisciplinarity
6. Satisfies cost, benefit, risk assessment and "unintended consequence" analysis, including actual and projected supply and demand
7. Promotes distinctiveness /uniqueness of the University
8. Builds competencies and capacity
9. Leverages multiple initiatives and resolves multiple issues
10. Builds community and develops talent among faculty, staff, and students

Appendix 3: Members of the Work Group on Envisioning Environment

Stephanie Kaza, Co-Chair, Professor, Environmental Studies, Rubenstein School of Environment & Natural Resources; Director, Environmental Program; Faculty Senate Vice-President

Beverley Wemple, Co-Chair, Associate Professor, Department of Geography, College of Arts and Sciences

Robert Bartlett, Gund Professor of Liberal Arts, Department of Political Science, College of Arts and Sciences

Breck Bowden, Professor, Watershed Science and Planning, Rubenstein School of Environment & Natural Resources; Director, Water Resources and Lake Studies Center

Alison Brody, Professor, Department of Biology; Co-Director, Integrated Biological Science Program

David A. Jones, Associate Professor, School of Business Administration

Ernesto Mendez, Associate Professor, Plant and Soil Science and Environmental Studies, College of Agriculture and Life Sciences

Matthew Poynter, Associate Professor, Department of Medicine – Pulmonary Disease & Critical Care Medicine, College of Medicine; Associate Director, Vermont Lung Center

Taylor Ricketts, Professor, Environment and Natural Resources, Rubenstein School of Environment & Natural Resources; Director, Gund Institute for Ecological Economics

Donna Rizzo, Associate Professor, Environmental Engineering, School of Engineering

Don Ross, Research Associate Professor, Department of Plant and Soil Science; Co-Director, Environmental Sciences Program, College of Agriculture and Life Sciences

Regina Toolin, Associate Professor, Department of Education, College of Education and Social Services

Brian Reed, Provost's Office Liaison, Associate Provost for Curricular Affairs

Catherine Symans, Provost's Office, Staff Support

Sharon Haas, Provost's Office, Web Support

Appendix 4: Work Group Process

I. Conduct of internal inventory

To inform our inventory of environmental education, research and outreach endeavors at UVM, the work group conducted a series of weekly forums, beginning on October 17, 2012. Invitees to the forums were provided with a Request for Information and asked to provide a narrative document and slides outlining (1) thematic areas of work, (2) indicators of the scope and scale of contributions in the area of environmental research, education and/or outreach, (3) constraints and opportunities that impact effectiveness, and (4) ideas and “visions” for supporting the work of individuals and units and strengthening “Environment” as a core theme of UVM’s academic offerings. Forums were announced through the “UVM News You Should Know” with an open invitation to participate and to contact co-chairs Kaza and Wemple indicating an interest in presenting.

The forums were organized around the key areas of our charge:

Environmentally-engaged outreach programs (October 17)

Environmentally-engaged research centers (October 24)

Environmentally-engaged graduate education (October 31)

Environmentally-engaged undergraduate education (November 7)

Research and academic support for environmentally-engaged programs (November 28)

Materials provided by the presenters at these forums are posted on the Envisioning Environment website (<http://www.uvm.edu/provost/envisioningenvironment/?Page=forums.html>), hosted by the Provost’s office and include a wealth of feedback that informs our findings.

In addition, we held a forum to solicit input from graduate and undergraduate students on November 29, asking students to provide us with their sense of strengths, barriers to success, and ideas for establishing UVM as a premier university for seeking training in ESH-related fields.

Finally, on December 5, we held a forum staged to solicit “big ideas” from the UVM community. Materials from these presentations are also posted on the Envisioning Environment website, under the Public Forums page.

To solicit input from individuals, we implemented an “Input Forum” on the Envisioning Environment website, announcing this tool at the November 12 Faculty Senate meeting and through the UVM Communications email “UVM News You Should Know.”

Members of the work group also conducted interviews with each Dean to solicit their input on UVM’s strengths in the area of environmental research, education and outreach and their sense of barriers to success. The Deans were asked what initiatives they would implement if charged to dedicate resources to strengthening UVM’s efforts on ESH-engaged research, education and outreach. We also asked the Deans what initiatives they would be particularly inclined to support.

Request for information given to presenters at Envisioning Environment Forums

A. Powerpoint Slides (a brief set of slides to include the following information)

1. Primary environmental thematic areas of the teaching, research, or outreach aspects of your unit; define what "environment" means for your unit
2. Quantitative indicators that best show the scope and scale of your contribution (such as # faculty, # of majors, # of courses, # of grants and grant dollars, # of degrees awarded over the past 5-10 years – please use the indicators appropriate to your unit)
3. Constraints and opportunities that currently impact or could impact your effectiveness
4. Your ideas and vision for how the "Envisioning Environment" process could help support your work and strengthen "Environment" as a core theme of UVM's academic offerings
5. Anything else you would like to add for the committee and UVM community

B. Written Narrative (1-2 pages single-spaced describing these aspects of your environmental effort)

1. Your niche and contribution to environment-related teaching, research, or outreach at UVM; define what "environment" means for your unit
2. Nature and list of the cross-unit collaborations at UVM that support your work
3. Particular program strengths in the context of UVM offerings
4. Your program or unit in comparison to similar offerings elsewhere in the U.S. (generally)
5. Your ideas for how the "Envisioning Environment" process could help support your work and strengthen "Environment" as a core theme of UVM's academic offerings

II. Conduct of survey to determine "best practices"

As part of the work group's research, we interviewed five representatives from other institutions about efforts to coordinate and strengthen environment-related work. We chose universities that represented a range of sizes and types, and that had all undergone a concerted effort to organize more strongly around environment.

We interviewed people from four institutions: Stanford University (Pamela Matson, Dean of Earth Sciences), Colorado State University (Mike Manfredi, Chair of Human Dimensions of Natural Resources), Portland State University (Jennifer Allen, Director of Institute for Sustainable Solutions), and University of Minnesota (Jon Foley, Director of Institute on Environment). We also interviewed Shirley Vincent, Director of Educational Research, National Council on Science and Environment, who has recently published survey results on interdisciplinary environmental education programs across the country.

The conversations revealed remarkable consensus around four points, presented in the report's Findings. The report also describes four additional points that enjoyed weaker consensus but are particularly relevant to UVM. Finally, within the report, we interpret our findings briefly and provide some context and caveats.

Questions posed to outside experts interviewed by Envisioning Environment Work

Group

1. What was the nature and scale of the initiative at your institution?
2. What were the drivers? Who were the key players?
3. What were the two smartest things you or your institution did in this process?
4. What two things did you or your institution do in this initiative that you would not advise?
5. Who else has successfully organized around environment (who has done this intelligently on other campuses) and what do you admire or find inspiring about what they have done?

Appendix 5: Envisioning Environment Public Forum Participants

(All materials submitted by presenters are posted on the Envisioning Environment web site at <http://www.uvm.edu/provost/envisioningenvironment/?Page=forums.html>.)

October 17 – Environmentally-engaged Outreach Programs

<i>Presenter</i>	<i>On behalf of</i>	<i>Materials posted</i>
Susan Munkres	Community-University Partnerships (CUPS)	Slides, narrative
Matt Sayre	UVM Continuing Education	Slides
Doug Lantange	UVM Extension	Slides

October 24 – Environmentally-engaged Research Centers

<i>Presenter</i>	<i>On behalf of</i>	<i>Materials posted</i>
Tom Vogelmann	Agriculture Experiment Station and CALS	Slides
Judith Van Houten	Vermont NSF EPSCoR	Slides, narrative
Taylor Ricketts	Gund Institute of Ecological Economics	Slides, narrative
Bud Meyers	Jeffords Center for Policy Research	Slides, narrative
Jim Sullivan	Transportation Research Center	Slides, narrative
Breck Bowden	Vermont Water Resources and Lake Studies Center	Slides, narrative

October 31 – Environmentally-engaged Graduate Education

<i>Presenter/Attendee</i>	<i>On behalf of</i>	<i>Materials posted</i>
David Kerr and Stephen Pintauro	Animal Nutrition & Food Science	
Jim Vigoreaux	Biology	Slides
David Jones	Business Administration *	Slides, program credit guide
Giuseppe Petrucci	Chemistry	
George Pinder	Civil & Environmental Engineering	
Jane Kolodinsky	Community Development & Applied Economics	Slides
Margaret Eppstein	Computer Science*	Narrative
Anthony McInnis	Ecological Design	Slides, narrative
Don Stratton	Ecology, Evolution & Environmental Biology	Slides, narrative
Adrian Ivakhiv	Environment & Society	Narrative
Albert van der Fliet	Environmental Pathology	
Amy Trubeck	Food Systems	Narrative
Andrea Lini	Geology	Slides, narrative
Randy Headrick	Materials Science	
Dave Barrington	Plant Biology	Narrative
Josef Gorres	Plant & Soil Science	Slides
Curt Ventriss	Policy & Governance	Slides
Chris Koliba	Public Administration	Slides
Jan Carney	Public Health	Slides
Kimberly Wallin	Rubenstein School	Narrative

* Delivered during make-up session on December 5

November 7 – Environmentally-engaged Undergraduate Education

<i>Presenter/Attendee</i>	<i>On behalf of</i>	<i>Materials posted</i>
Jim Vigoreaux	Biology	Slides
Sara Helms Cahan	Biological Sciences, Integrated	Narrative
William Cats-Baril	Business Administration*	Slides
Giuseppe Petrucci	Chemistry*	Narrative
Jane Kolodinsky	Community Development & Applied Economics	Slides
Margaret Eppstein	Computer Science*	Narrative
Diane Gayer	Ecological Design	Slides, narrative
Leon Walls, Regina Toolin	Education and Social Services	
Mandar Dewoolker	Engineering, Civil & Environmental	Slides
Steve Titcomb	Engineering, Electrical	Slides
Darren Hitt	Engineering, Mechanical	Slides
Stephanie Kaza	Environmental Studies	Narrative
Charlotte Mehrtens	Environmental Sciences	Slides
Meghan Cope	Geography	Slides, narrative
Andrea Lini	Geology	Narrative
Dave Barrington	Plant Biology	Slides
Yolanda Chen	Plant & Soil Science	
Allan Strong	Rubenstein School (Forestry, Natural Resources, Parks Recreation Tourism, Wildlife and Fisheries Biology)	Slides, narrative

* Delivered during make-up session on November 28

November 28 – Research and Academic Support for Environmentally-engaged Programs

<i>Presenter</i>	<i>On behalf of</i>	<i>Materials posted</i>
Cheryl Morse	Center for Research on Vermont	
Linda Berlin	Center for Sustainable Agriculture	
Nick Heintz	Environmental Pathology	
Gioia Thompson	Office of Sustainability	Slides
Lesley-Ann Dupigny-Giroux	Office of Vermont State Climatologist	Narrative
Robert Manning	Park Studies Laboratory	Narrative
Laurie Kutner	UVM Libraries	Narrative
Wendy Verrei-Berrenbeck	Center for Teaching and Learning	
Karen Nordstrom	GreenHouse	Slides

November 29 – Student Forum

Graduate students from BIOL, RSENR, Engineering.

Undergraduate students from NR, ENVS, Ecological Design, Students for Climate Culture.

Caitlan Stephens, recent alum, "Environmental Commons" (narrative posted)

December 5 – Campus-wide call for Ideas

<i>Presenter</i>	<i>On behalf of</i>	<i>Materials posted</i>
Patti Prelock	College of Nursing and Health Sciences	Slides
Lini Wollenberg	Climate Change Scholarship and Teaching	Faculty participants database
Jon Erickson	Rubenstein School	
Crea Lintilhac	Rubenstein School Board of Advisors	Narrative
Chris Lucier	Enrollment Management	
Adrian Ivakhiv	University-wide Environmental PhD	Narrative
Richard Watts	Centralized environmental reporting	Narrative
David Raphael	Landscape Architecture Program	
Liz Calabrese	Environmental Design Program, Center for a Restorative Environment	Summary, proposal, poster
Cami Davis	Environmental Art	Narrative
Will Rapp	Intervale Foundation	Narrative
Dan Cmejla	Students for Climate Culture	Proposal
Tom Hudspeth	Sustainability Education	Narrative

Appendix 6: Faculty Survey Results

Report Prepared by Davis A. Jones, School of Business Administration, February 19, 2013

Sample Size: $N = 231$

The sample does not include the people who didn't respond to items about the Work Group's recommendations or about the database of faculty expertise. Some respondents ($n = 7$) were identified as members of the EE Work Group and were included in the analyses reported herein.

Self-Categorization in ESH Categories

The first page of survey items read as follows.

The Work Group found that faculty, staff, and students at UVM are engaged in an impressive array of environmental-related education, research, and outreach. The Work Group adopted a broad conceptualization of what "environment" means at UVM to reflect the rich diversity of these activities in which our students, staff and faculty are engaged, using the term "Environment, Sustainability, and Health" (ESH) to refer to these activities in the collective.

Would you characterize any of your research, teaching, and/or outreach activities as pertaining to one or more of these three categories, or to some other related category?

Among the 231 respondents, 172 (74.46%) selected one or more ESH categories or "other."

$n = 108$: Environment

$n = 72$: Sustainability

$n = 63$: Health (as it relates to the Environment)

$n = 28$: Other (please specify)

These 172 respondents were then asked to "indicate the nature of your ESH activities during the last three years by selecting any and all that apply from the list below."

$n = 102$: Teaching Undergraduate Courses

$n = 68$: Supervising Undergraduate Research

$n = 74$: Teaching Graduate Courses

$n = 84$: Supervising Graduate Research

$n = 55$: Conducting Research

$n = 68$: Performing Outreach

Endorsement of the Work Group's Recommendations

The next page of survey items read as follows.

The questions and statements on this page are to solicit your reactions to the Work Group's recommendations described in the Envisioning Environment Report.

You can learn more about each recommendation summarized in a single statement below by reading the full report. Space is provided if you'd like to provide comments about each recommendation, and you are welcome to provide general comments about the Work Group's report using the Input Tool on the Provost's web page.

The first five statements are about the larger-scale recommendations put forward by the Envisioning Environment Work Group. To what extent do you endorse each recommendation for the purpose of achieving greater excellence, visibility, and impact in the study of ESH at UVM?

Respondents were asked to rate their level of endorsement for the 10 recommendations copied below and were invited to offer their comments about each one. Response options for the endorsement ratings ranged from 1 (Strongly Object) to 5 (Strongly Endorse):

5 = strongly endorse

4 = endorse

3 = neither endorse nor object

2 = object

1 = strongly object

Reported below are the means (*M*) and standard deviations (*SD*) on the endorsement ratings for each recommendation, and people's responses ranged from 1 to 5 on each of the 10 recommendations. Also reported is the ratio of people who instead selected "I am not sufficiently informed or prefer not to respond" out of the total number of people who provided any response to each recommendation.

A. Big Ideas

1. ESH Institute

Develop an ESH Institute that encourages cross-disciplinary collaboration among ESH researchers, provides fellowships to ESH scholars, and creates an umbrella for interdisciplinary ESH graduate advising.

M = 3.80, SD = 1.13. No Response/Total Respondents: 21/229

2. Associate Provost Level Accountability

*Create an associate provost ESH position to lead, coordinate, and manage ESH activities in research, education, and outreach at UVM. [*Note the wording of this item differs from the notion that an existing Associate Provost, rather than a new one, is accountable for this.]*

M = 2.46, SD = 1.33. No Response/Total Respondents: 20/228

3. Coordinating Undergraduate Curriculum

Coordinate ESH graduate and undergraduate programs and identify curriculum synergies and redundancies, orienting UVM education to the global “grand challenges” (e.g., global climate change, overpopulation, and the destruction of ecosystems).

M = 3.80, SD = 1.03. No Response/Total Respondents: 13/226

4. Expand Graduate Support

Expand graduate support for ESH to recruit talented graduate students with competitive funding packages.

M = 3.74, SD = 1.06. No Response/Total Respondents: 7/224

5. Environmental Commons

Create an Environmental Commons—a physical space and corresponding web hub to serve as a gateway for undergraduate activity in ESH and to coordinate advising, research, and internships.

M = 3.46, SD = 1.13. No Response/Total Respondents: 10/222

B. Immediate Next Steps

After rating the five larger-scale recommendations, survey respondents then read:

The Work Group also recommended several actions to be enacted promptly. To what extent do you endorse these recommendations for the purpose of achieving greater excellence, visibility, and impact in the study of ESH at UVM?

6. Enroll in STARS

Enroll UVM in the Sustainability Tracking, Assessment and Rating System (STARS) to join the over 250 other campuses that participate in this national rating system for monitoring campus sustainability initiatives. (The UVM Office of Sustainability has already been tracking the data required for national rating status by the Association for the Advancement of Sustainability in Higher Education).

M = 4.10, SD = .82. No Response/Total Respondents: 20/227

7. Faculty leadership

Appoint a lead faculty person for implementing recommendations to build on the efforts of the Work Group and generate forward direction.

M = 3.73, SD = 1.02. No Response/Total Respondents: 15/226

8. Gen Ed Outcome

Develop general education learning outcomes pertaining to sustainability through the Faculty Senate.

M = 3.32, SD = 1.17. No Response/Total Respondents: 15/223

9. ESH Marketing

Create a high profile ESH publicity campaign to attract prospective students that clearly describes ESH undergraduate course offerings, majors, and other opportunities.

M = 3.73, SD = 1.02. No Response/Total Respondents: 20/223

10. ESH Inventory

Convert the Work Group's inventory of ESH activities at UVM into an accessible master list for internal reference and public review.

M = 3.94, SD = .78. No Response/Total Respondents: 14/224

Summary of Results for Endorsement Ratings:

Overall, respondents tended to endorse most recommendations, especially the following with mean endorsement scores ranging from 4.10 to 3.73 on the five-point scale, listed in order starting with the most strongly endorsed: 6 (STARS), 10 (ESH Inventory), 1 (ESH Institute), 3 (Coordinating Curriculum), 4 (Graduate Support), 7 (Faculty Lead), and 9 (Marketing).

Recommendations that received relatively less support were 5 (Environmental Commons, $M = 3.46$), 8 (Gen Ed Outcome, $M = 3.32$). Recommendation 2 (Associate Provost Accountability, $M = 2.46$) received the least endorsement but see the note about how this item was worded differently than what some Work Group members have stated verbally in public since the draft report was submitted.

Comparing Endorsement Ratings: ESH Self-Categorization Vs. Others

All respondents who self-categorized themselves in one or more ESH categories (or other) were coded as 1, and everyone else was coded as 0. Interestingly, this variable was significantly correlated with only one of the 10 recommendations ($r = -.14$ for Recommendation 10 about the Inventory), indicating that on average people who identified as ESH were slightly less enthusiastic about the Inventory. However, while this correlation was *statistically* significant, the strength of this relationship given the context and measures is not *practically* significant or all that meaningful. Thus, whether respondents identified as ESH or not had little bearing on their endorsements of the recommendations.

Requested Inclusion in the Database of Faculty Expertise

175 of the 231 respondents (75.76%) indicated whether they'd like to be included in a database of faculty expertise. The survey read as follows:

A second purpose of this survey is to begin building an internal database of faculty expertise pertaining to research, education and outreach in areas relating to Environment, Sustainability, and Health. This database will be used to inform the final report on Envisioning Environment at UVM, and may be used to inform the implementation of some of the Work Group's recommendations. The Work Group will not make this database available to the general public.

If you want to be included in this database you will be asked to provide your name, rank, the Department/School of your primary appointment, and brief description of your areas of

expertise. You will also be asked if your work pertains to any of six areas of existing or emerging strength at UVM. Providing this information is completely optional.

Would you like to be included in this database?

Among the 175 who responded, 96 of indicated “yes” (54.86%), and these 96 then read the following:

In the space below, please provide your name, rank, the Department or School of your primary appointment, and a one to two-sentence description of your areas of expertise pertaining to ESH.

Would you characterize your work as pertaining to any of the six identified areas of existing or emerging strength at UVM that are listed below? Please select any and all that apply.

Below are the numbers of the 96 respondents who identified in one or more of each of the six areas (or other).

$n = 25$: Ecological or Environmental Design

$n = 30$: Environmental Health

$n = 53$: Environment and Society (e.g. economies, cultures, governance)

$n = 96$: Food Systems

$n = 96$: Landscapes and Watersheds

$n = 15$: Sustainable Entrepreneurship

Comparing Endorsement Ratings: Requested Inclusion in Database vs. Others

All respondents who indicated they wanted to be included in the database of faculty expertise were coded as 1 ($n = 96$), and those who responded no were coded as 0 ($n = 79$). Interestingly, for all 10 recommendations there was a negative relationship, indicating that on average people who wanted to be included in the database were less enthusiastic about all recommendations. However, only four of these relationships were significant: Recommendation 3 about Coordinating Curriculum: $r = -.25$; Recommendation 4 about Graduate Support: $r = -.19$; Recommendation 9 about Marketing: $r = -.24$; and Recommendation 10 about the Inventory: $r = -.26$.

Appendix 7: UVM Comparator Institutions and their ESH Programs

Selected institutions represent UVM peer and aspirant universities used for other UVM comparison studies regarding costs, enrollment, etc.

Institution	Env Studies	Env Science	Natural Resources	Sustainability	Other related	Graduate programs	Research Institutes, Centers, Programs
Boston College	minor	--	--	--	--	Earth Env Sciences M.S.	--
Boston University	Env Policy B.A., minor	B.A., minor	GIS B.A., minor	--	Geography B.A., minor	Env Health MPH, M.S., Ph.D.; GIS M.S.; Geog & Env M.A., Ph.D.	Center for Energy and Env Studies; Center for Ecology and Cons Biology
George Washington	B.A.	--	--	--	Geography B.A., minor	Geography M.A., Env Resource Policy M.A., Env Health Science & Policy, MPH	--
Syracuse University	--	--	--	Energy & its Impacts major	Geography B.A., minor	Geography M.A., Ph.D.	Center for Env Policy & Admin; Center for Env Systems Engineering; Center for Sustainable Engineering
Tufts University	major	ENVS track	--	ENVS track	--	Urban & Env Policy Planning M.A.	Tufts Institute of the Environment; Global Development & Env Institute
U Connecticut	minor	B.S.	B.S. (5 tracks); Wildlife Cons minor	--	Minors in Env Econ & Policy, Geog, Env Eng, EEB (also major)	Nat Resources M.S., Ph.D.	Center for Energy & Env Law; Center for Env Sciences & Engineering; Center for Clean Energy Engineering
U Mass-Amherst	--	B.S., minor	B.S. NR Cons	B.S. Bldg & Constr Technol	Org & Evol Biology M.S., Ph.D.	Env Conservation M.S., Ph.D. (5 tracks, incl Building Systems); Sustainability Science M.S.	Center for Energy Efficiency & Renewable Energy; Climate System Research Center; Wind Energy Center; Transportation Center; Center for Agriculture
U Rochester	B.A.	B.S.	--	minor	Env Geology and Env Eng minors	Alternative Energy M.S.	--
William and Mary	--	B.S., minor	--	--	--	Marine Science M.S., Ph.D.	Commonwealth Center for Energy & Env; Virginia Inst for Marine Science; Center for Conservation Biology
American University	B.A.	B.S., minor	--	--	--	Env Science M.S.	Center for Env Filmmaking
Brown University	A.B.	Sc.B.	--	--		Ecology Evolution Biology M.S.; [Env Studies M.S. discont'd]	Environmental Change Initiative

Cornell University	concentration	B.S., minor	B.S.	w/ ENSC, Climate Change minor		Natural Resources M.S., M.P.S., Ph.D.; Earth Energy M.S. Ph.D., M.Eng.	Atkinson Center for Sustainable Future; Institute for Food, Agriculture, & Development; Earth Energy IGERT
Dartmouth College	B.A., minor	--	yes	minor	Geography major	Earth, Ecosystem, & Ecol Sciences Ph.D.	IGERT in Polar Env Change
Georgetown U.	minor	--	--	--	--	--	Georgetown Env Initiative (env justice)
UVM	B.A., B.S., minor	B.S., minor	B.S. in NR, WFB, FOR, PRT; minor in WFB, FOR, PRT	ENVS concentration; Green Bldg minor	B.S. Env Eng, CDAE; B.A. Geography	Natural Resources M.S.; Ph.D.; Biology, M.S., Ph.D.; CDAE M.S.; Food Systems M.S.; [Sustainable MBA in process]	Gund Institute; Smart Grid IGERT; Transportation Research Center ; Jeffords Center, Center for Sust Agriculture, etc.

Appendix 8: UVM-Wide Challenges to Strategic Planning

These observations were collected from Envisioning Environment public forums and committee discussions, pointing out some of the broader limitations to achieving success in ESH at UVM.

A. General

1. Tension exists in faculty workload allocation between undergraduate mission and budget needs vs. research expectations. We need to find more undergraduate program efficiencies to free up faculty for grad education and research, including expanding the pool of graduate teaching assistantships to provide support for large classes in social sciences and humanities.
2. Inter- and trans-disciplinary work in teaching and research is not well accounted for in promotion and tenure process and incentives are unclear. We need clear, institution-wide guidelines for joint unit faculty hires to ensure success. As one contributor pointed out, "The fundamental problem at UVM is a lack of any real administrative structure to support, promote, nurture, and recognize faculty, staff, and students involved in interdisciplinary, cross-disciplinary, transdisciplinary, and multidisciplinary programs. IF we can solve this issue, then ALL such programs will benefit."
3. There is general fear around reorganization, both from being left out of the process and from what may be decided or implemented. There is also general cynicism that much has been proposed and little has been done.
4. Inter-unit issues over "where the dollars go" and "who gets the credit" are disincentives for leaders to create revenue-generating programs that will support new faculty lines and degrees; this is also true for distribution of F&A.

B. Research

1. Declining grant fund availability impacts single investigators, generating unrealistic grant achievement expectations in some fields. Funding agencies are moving toward multi-investigator interdisciplinary awards but UVM is not yet well poised to meet agency criteria.
2. Generally there is inadequate SPA support and grant-writing support; this is a common complaint among faculty. We need better mechanisms for leveraging outreach impacts from Extension, CE, and CUPS where grants require this match. General UVM institutional information needs to be easily accessible for grant writers.
3. There are few mechanisms to support faculty to write large grants (e.g. course releases). If awards are small, the disincentives to invest effort in grant writing outweigh the benefits. UVM can't meet criteria for certain grants without demonstration of critical mass in relevant areas, e.g. such things as a PhD program in Public Policy.
4. Existing formula funds (Hatch, McIntyre Stennis, Sea Grant, Space Grant), center-based funding (Water Resources and Lake Studies Center, Northern States Research Consortium, Transportation

Research Center, Jeffords Center), and federal EPSCoR funding (NSF, NASA, DoD) could be more effectively leveraged to bring researchers together to pilot collaborative projects and establish UVM's capacity for large, multi-disciplinary research.

C. Graduate Education

1. Stipend awards are uneven and inequitable as are work opportunities for graduate students. Some programs are very dependent on graduate TAs. Students report high stress from meeting the rising cost of living and increasing student debt.
2. Investment in graduate education at UVM is relatively low; it is difficult to get industry funding to support grad students and grad education in small state.
3. Students report a general lack of career information and professional advising for graduate students.
4. We need more capacity for graduate teacher training through Center for Teaching and Learning; this is an effective and efficient way to deliver teacher training to students from multiple units.

D. Undergraduate Education

1. Course catalog approval for cross-campus programs is lengthy and unwieldy and at the mercy of different college opinions of what the programs should be and how well they fit college criteria.
2. Budget incentives and penalties for meeting or not meeting enrollment targets are unclear and vary from year to year and according to changing administrative principles.

E. Outreach

1. Outreach unit efforts are not well coordinated with campus initiatives except in specific units with designated faculty.
2. Campus attitudes toward CE and Extension units sometimes limits the possibilities for creative collaborations.