

Fertile Ground for Campus Greening



Programming and Organizational Recommendations for the
Ecological Sustainability of Bucknell University

Prepared for the Bucknell University Environmental Center



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Executive Summary

This report is intended to provide the background, research, and analysis necessary for the development of a committed and systemic campus sustainability program at Bucknell University. The report includes:

- **An introduction to the campus sustainability movement and an analysis of how sustainability principles fit into the general context of Bucknell’s evolving strategic plan and emerging Environmental Center.** This section establishes the moral imperative for the campus sustainability movement and demonstrates a high level of compatibility between the principles of sustainability and the principles of the strategic plan.
- **A detailed history of greening efforts at Bucknell including both organizational work and specific initiatives.** This section establishes a record of the successes and failures of past sustainability programming at Bucknell, revealing that the greatest obstacles to future success lie in the areas of administrative support and program coordination.
- **An in-depth account of the concerns and perceptions of members of the Bucknell community regarding the university’s environmental practices and policies.** This section establishes that, in the minds of those with the greatest interest and expertise in sustainability issues, there are many aspects of university operations that require substantial attention and improvement.
- **A selective investigation of benchmarks of sustainability at other institutions of higher education, focusing on Bucknell’s general and aspirational peer groups, as well as outstanding programs at larger regional “mentor” universities and “peer-like” institutions.** This section establishes the unmistakable commitment to sustainability among a broad spectrum of highly-competitive colleges and universities, with summary information on each program’s organization, staffing, statements of commitment, and notable initiatives. Prominent umbrella and support organizations are also reviewed in this section.
- **Programming and organizational recommendations including guiding principles for prioritizing future initiatives, recommended initiatives, and recommended program organization.** On the basis of the above four sections, the following recommendations are offered:
 - **Guiding principles.** Emphasize visibility and teachability in campus greening projects through a systemic approach to program organization that focuses on producing responsible future leaders and uses good science to inform decision-making.

- ***Secure administrative backing for campus greening*** by engaging the President and Trustees in a dialogue that 1) brings sustainability explicitly into the language of the strategic plan, and 2) results in their official endorsement of an environmental statement of principles for the university.
- ***Initiate an environmental audit*** as a basis for establishing the base-line environmental impact of the university. The audit should combine some level of outside objectivity with an equal measure of campus participation from students, faculty, and staff, while using educational value of the auditing process its greatest advantage.
- ***Make sustainability a high priority in the Campus Master Plan.*** Consider hiring planning and architectural firms that have an established record in sustainable design, and engage them in an inclusive dialogue with the campus community. Additionally consider:
 - Adopting a resolution that all new buildings on campus be LEED Certified at the basic level.
 - Taking measures to discourage the use of automobiles and encourage alternative modes of transportation.
 - Restoring and naturalizing Miller Run between Route 15 and 7th Street.
 - Returning stormwater to groundwater via “rain gardens”.
 - Naturalizing forested areas on campus to eliminate excessive lawn-mowing and leaf-blowing.
 - Creating a more aesthetic and accessible connection to the Susquehanna River, and connect to the Susquehanna Greenway.
- ***Promote and coordinate sustainability-related educational efforts on campus through development and support of the Environmental Center.*** Do this by enhancing environmental education across the curriculum, supporting team teaching, creating a database of sustainability-related student projects, creating a highly visible and navigable website, and bringing motivational speakers to campus to discuss sustainability issues.
- ***Consider employing students as peer educators and ecological monitors.*** Research suggests that work/study students are effective in educating each other about sustainable living practices and can also play a useful role as recycling and energy-use monitors on campus.
- ***Develop a logo for enhanced visibility.*** Sustainability projects are most effective when they are easily identifiable as such. A well-designed logo would help to establish this identification.

- ***Achieve the above recommended initiatives through the establishment of a permanent organizational structure.*** A committed and systemic sustainability program cannot be achieved without a critical level of administrative support and financial backing. Toward this end the following are recommended:
 - ***Staffing.*** The minimal level of staffing required to initiate the program is a full-time permanent Sustainability Coordinator. The coordinator should work within the Environmental Center to guide and promote the recommended initiatives.
 - ***Governance.*** Policy and programming recommendations should be decided by a Sustainability Council representing staff, students, and faculty, and including the Sustainability Coordinator, the Director of Facilities, and a liaison to the Environmental Center Steering Committee. The council should report directly to the Vice President of Finance and Administration.
 - ***Working relationships.*** The Sustainability Coordinator should work closely with, Facilities, Environmental Studies, Bucknell Environmental Club, the Environmental Residential College, and all other staff of the Environmental Center. The coordinator and council members should attend relevant conferences and workshops to enhance networking and communications with sustainability programs at other institutions. Close relationships should also be maintained with local and regional environmental organizations.
 - ***Funding.*** An operating budget provided by the university administration is essential to the survival of the program and should include, at the very least, the salary of a full-time Sustainability Coordinator and initial programming costs. Additional funding should be sought through corporate, foundation, and government grants, as well as individual donors, and savings from conservation programs.

“The human race is challenged more than ever before to demonstrate our mastery, not over nature but of ourselves.”



--Rachel Carson

Introduction

Background

The words of Rachel Carson, first spoken at the onset of the emerging environmental crisis of the 1960's and '70's, were once considered radical and even outlandish. But as the 20th Century has come to a conclusion, the environmental movement has gone mainstream. The poignant and unprecedented environmental damage of the past hundred years of human history is well documented (McNeill 2001), and the turn of the millennium has brought with it a heightened awareness of issues related to the sustainability of human life on Earth. It is now widely acknowledged that this awareness must be followed by action.

This trend is particularly reflected in the activities and rhetoric of institutions of higher education, both in the United States and internationally (McIntosh 2001, Calder and Clugston, 2002). Although many college and university campuses have long been centers of environmental advocacy, it wasn't until the early 1990's that these institutions began to take a serious look at their own environmental practices. In October 1990 a group of 31 university leaders from 15 nations convened in Talloires, France, to draft a statement known as the Talloires Declaration of University Presidents affirming a commitment to sustainability in higher education and outlining a ten point action plan. At present the declaration has been signed by over 300 university presidents and chancellors from over 40 countries (University Leaders for a Sustainable Future 2005.)

Another major milestone occurred in 1994 when campus delegates from 50 states and 22 countries gathered at Yale University for the Campus Earth Summit. The collaborative work of summit resulted in the publication of “Blueprint for a Green Campus,” which documented practical steps toward campus sustainability and had significant impact within the academic community (Heinz Family Foundation 1995). In a nutshell, the report determined that

A green campus is one that integrates environmental knowledge into all relevant disciplines, improves environmental studies course offerings, provides opportunities for students to study campus and local environmental problems, conducts environmental audits of its practices, institutes environmentally responsible purchasing policies, reduces campus waste, maximizes energy

efficiency, makes environmental sustainability a top priority in land-use, transportation, and building planning, establishes a student environmental center, and supports students who seek environmentally responsible careers.

In the years following the Campus Earth Summit, the academic community as a whole has demonstrated a decided improvement in environmental performance, with a significant number of institutions adopting sustainability policies and “campus greening” programs. Taken individually, these efforts have displayed varying degrees of commitment and success, from profound institutional transformations to token gestures (Calder and Clugston 2002, McIntosh 2001). The challenge issued by Carson to “master ourselves” is no small task. As eloquently stated by David Orr,

“The question, then, is whether the institutions that purport to advance learning can themselves learn new ways appropriate for an ecological era. What would it mean for the ecological idea to take root in colleges and universities? It would mean, for one thing, that such institutions would have to become learning organizations in order to reinvent themselves” (Orr 2002, p.80).

Campus Greening and Bucknell’s Strategic Plan

Bucknell is currently taking significant steps toward its own reinvention and redirection as the University makes its way through the strategic planning process. Although subsequent sections of this investigation will provide a more concrete justification for Bucknell’s investment in specific sustainability initiatives, it is important first to consider how sustainability fits into the overall vision of the university’s future. The first widely distributed draft of “The Plan for Bucknell” presents an overall mission along with five broad initiatives (Bucknell 2005). As demonstrated below, both the mission and each of the initiatives are highly compatible with the philosophy and goals of an ecologically responsible, sustainable university. (*Note that because the plan is not yet in final form, it is not quoted verbatim in this discussion, but rather in general terms.*)

■ **The Mission Statement.** The mission provided in the strategic plan emphasizes that Bucknell students must be prepared to take on positions of high responsibility, deal with complex global issues, and apply knowledge actively. Providing students with an opportunity to be immersed in an ecologically responsible academic culture, where the teaching of complex global issues is matched with appropriate action, provides an outstanding academic and ethical model for students to carry with them throughout their careers in positions of leadership. If actions truly do speak louder than words, campus greening provides Bucknell with the opportunity to amplify its voice and its mission through the legacies of its graduates.

■ **Strategy #1: The Academic Core.** This strategy calls for students to achieve a level of academic excellence that will allow them to address the needs of the

contemporary global community. In the rationale for this strategy, particular attention is given to interdisciplinary teaching approaches and alternative learning models that require a high level of student engagement. Here the match to campus sustainability is particularly good. First, due to the complex nature of ecological relationships, local actions have global implications in that they have impacts on a web of interrelated beings and systems. Secondly, campus greening provides extraordinary occasions for active learning, as students begin to look into ways to address those impacts by solving complex problems within their own sphere of existence, the university campus. Thirdly, the complexity of these problems naturally lends itself to an interdisciplinary approach, requiring expertise from economics, to engineering, biology, chemistry, aesthetics, philosophy, communications, and beyond.

- ✦ **Strategy #2: The Residential Learning Experience.** This next strategy calls for an expansion of the learning environment into students' day-to-day activities, particularly highlighting ethical responsibility within the community. As restated by President Mitchell in his strategic planning update to members of the Bucknell community in October, “. . . the plan is student-centered in that it will attempt to turn *every action* taken by our students in to a teachable moment that will enhance the quality of the education they receive” (Mitchell 2005, emphasis added). Sustainability education deals intimately with everyday actions in a way that few other areas of inquiry address. With a focus on sustainability, the otherwise mundane activities of filling a cup, eating a meal, turning off a light, using the restroom, washing hands, and discarding unwanted items all become teachable moments with ethical relevance.
- ✦ **Strategy #3: Diversity.** The third strategy addresses the need to support and nurture all forms of diversity within and beyond the campus. Although not immediately obvious, there is a profound connection between sustainability and “diversity in all its forms”, which is that, in recognizing our ecological responsibility, students learn to respect the broad diversity of all forms of life, whose quality of life and very existence our daily actions can influence. Sustainability also addresses the welfare of many marginalized groups of people including low-income people, who, due to the prevalence of the “not in my backyard” phenomenon, tend to bear more of the burden of environmental harm, indigenous cultures, who are experiencing rapid decline due to global environmental degradation, young children, who are more sensitive to the effects of many environmental hazards, and an often forgotten group, future generations, who will inherit the problems unaddressed by the present ones.
- ✦ **Strategy #4: Financial Strength.** This strategy focuses on the need for Bucknell to build its endowment and broaden its base of support, so as to operate under conditions of institutional vitality and independence. At first glance, a proposed commitment to campus greening might appear to present an overly taxing burden on university finances, and opponents of sustainability measures have often succeeded in

falsely associating environmental programs and policies with a negative economic impact. In reality, the reverse is often the case. Sustainability measures most often involve the conservation of resources and energy, which frequently turns into monetary savings. Although up-front investments are usually required, pay-backs can occur relatively quickly on many projects. For instance, after just four years of growth Harvard's Green Campus Initiative is saving the university over 1 million dollars per year (Harvard Green Campus Initiative 2005).

■ **Strategy #5: Building Bridges.** This final strategy makes the very important commitment to strengthening the university's connections to the outside world, locally, regionally, nationally, and internationally. Once again the ecological model of interconnectedness is highly compatible with the strategy. The challenges of creating a proactively sustainable university require earnest cooperation with local and regional organizations and agencies, such as land conservation groups, watershed associations, regional development agencies, and others. On a larger scale sustainability requires the comprehension of global issues such as global climate change, tropical deforestation, global biodiversity, ozone layer depletion, and many more. Furthermore, a successful campus greening program would require extensive networking with other universities and colleges who are undergoing their own learning processes with respect to sustainability. All of these relationships provide ample opportunities for students to investigate outside of the "Bucknell bubble".

The profound resonance between the moral imperative for sustainability and the admirable goals of Bucknell's strategic plan is more than coincidental. It suggests that a quality education in the contemporary world goes hand in hand with a deep understanding of that world and the interconnectedness of each individual within it. It is therefore vital that the issue of sustainability be considered more explicitly in the strategic planning process (see "Recommended Initiatives").

Campus Greening and the Bucknell Environmental Center

The Campus Greening Initiative is one of two major initiatives of the Bucknell Environmental Center (BUEC), an interdisciplinary center of excellence initiated in November, 2004 by a dedicated group of faculty, staff, and students. Its mission is

. . . to integrate perspectives from the natural and social sciences, humanities, and engineering to enhance faculty, staff, student, and community understanding of complex contemporary environmental issues and of the interaction between nature and human beings in traditions throughout the ages. The center supports faculty, staff, and students dedicated to environmental and nature-related learning, teaching, scholarship, service, and action at local, regional, national, and international levels (BUEC Steering Committee 2005).

The other major initiative of the Environmental Center is the Susquehanna Bioregion Initiative, which “. . . focuses on bioregional approaches to tributary and river restoration, quality of life and health issues, public education and awareness, natural history and scholarship, and cultural heritage projects levels (BUEC Steering Committee 2005).” The two initiatives are mutually supportive and share common concerns, with the Campus Greening Initiative focusing more locally and intensively, and the Susquehanna Bioregion Initiative focusing more regionally and extensively.

The Environmental Center at Bucknell offers an invaluable asset to a campus greening program. The center provides an instrument for focusing attention on environmental issues, coordinating and publicizing student projects, supporting faculty research and teaching efforts, attracting scholarly and professional speakers, and developing relationships with community partners. Although many of our peers have campus greening programs, instances of such programs coupled with environmental centers of excellence are rare, and thus Bucknell possesses a distinct advantage in launching such a program.

*Nothing has really happened until it has
been recorded.*



--Virginia Woolf

A History of Greening Efforts at Bucknell

Organizational Efforts

On the basis of available documents, the first organized efforts toward campus greening occurred in the 1970's through the Environmental Advisory and Coordinating Committee led by geology professor Dennis Marchand (Tucker 1992). This was an official university committee with an elected membership, but in the late 1970's a change of governance resulted in the loss of the committee's official status. With its lower stature, and a voluntary rather than elected membership, the committee lost momentum and eventually died in the 1980's (Abrahamson 2005).

The greening effort was revived in 1992, at the request of Bucknell President Gary Sojka, under the new name Greening of Bucknell Taskforce (Tucker 1997). The revival grew out of a series of lectures known as the President's Forum on the Environmental Imperative. The forum brought several high-profile speakers including Lynn Margulis, author of the Gaia hypothesis, and Barry Commoner, renowned biologist and early leader of the environmental movement. The inspirational nature of the talks naturally led the forum from a mode of discussion into a mode of action.

The Greening Taskforce, as it came to be known, was co-chaired by Gary Sojka and Mary Evelyn Tucker, then an associate professor of religion. The taskforce had a broad base of membership from the university community consisting of faculty, students, staff, and administrators, and organized into several advisory boards with themes such as energy, food, recycling, paper waste, awareness, and landscaping. (See Appendix I for a full account).

The period from 1992 to 1995 was a time of quick gains including a significant increase in the use of recycled paper products, a higher recycling rate, better recycling education, and decreased mailbox stuffing. The taskforce also contributed input and perspective toward the construction of Bucknell's co-generation power plant. (Abrahamson 2000). But when Gary Sojka left the presidency in 1995, the taskforce lost its administrative backing, and progress slowed considerably. The group had addressed the most obvious and easily-handled issues, and now were left with more complex and difficult ones. Furthermore, ground was actually being lost in some areas. For instance, the university

produced 65 tons more trash and recycled 46 tons less in 1996 as compared to 1995 (Abrahamson 1997.) The decline in recycling is also reflected in data from the Bucknell Facilities website (Bucknell Facilities 2005, see Figure 1 below.)

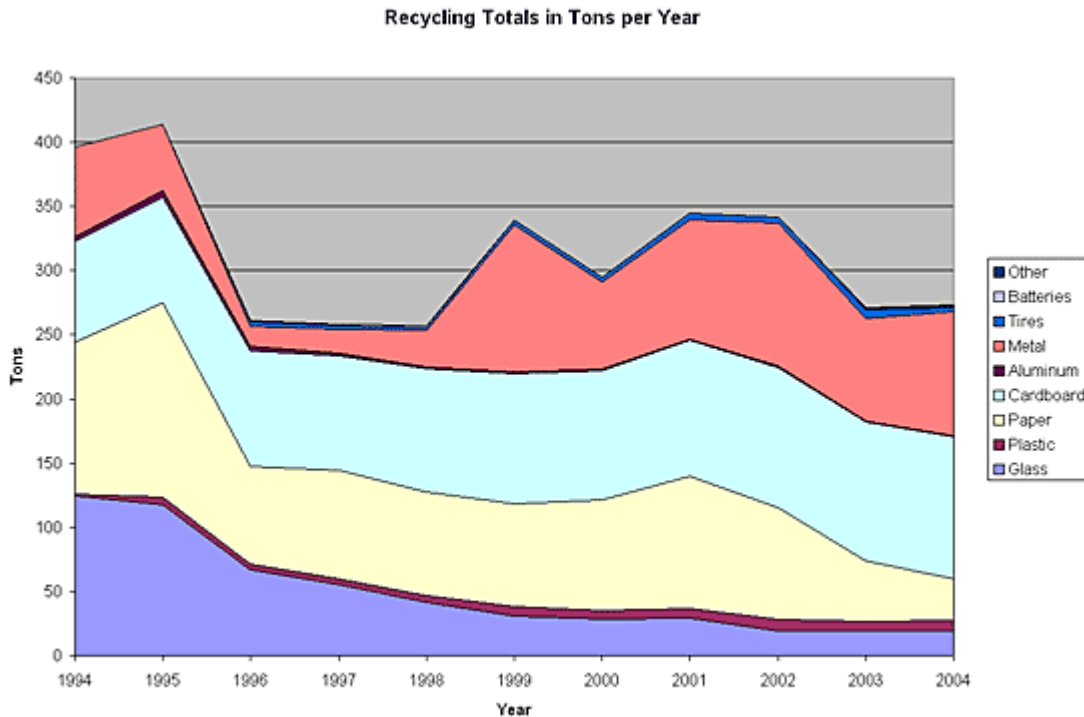


Figure 1: Recycling totals (Bucknell University Facilities 2005).

Limited to volunteer time and provided with no administrative mandate, the taskforce explained its position to the subsequent administrations in 1997 and 2000:

Currently there is no central focus or strategic plan to coordinate efforts, to generate initiatives and ideas, to plan, to execute, or to follow-up for greening at Bucknell University. Students and staff do not know where to get help nor do they know what programs and initiatives exist on other campuses. Often our faculty is unaware of innovations being used on other campuses to link sustainability and environmentalism to our curriculum. Important connections among students, staff, curriculum and community are not occurring at Bucknell (Abrahamson 2000).

Appeals for support to President Adams in 1997 and President Rogers in 2000 were met with a congenial response, but essentially no action. After 2000 the activities of the taskforce and its advisory boards diminished and eventually ceased. However, the dialogue initiated by the taskforce did have a lasting impact, and due to the energy and creativity of highly motivated individuals, sporadic initiatives continued on a

departmental level, particularly in Facilities, even without official administrative support or funding. These gains are documented in the following section on specific initiatives.

One other type of organizational effort toward campus greening has occurred within the arena of student activism. During the active period of the Greening Taskforce the student environmental organization was a chapter of the national Student Environmental Action Coalition (SEAC), and it cooperated informally with the taskforce. Later known as Environmentally Minded Students in Action (EMSA) and currently known as the Bucknell Environmental Club (BEC), activities of student environmental group at Bucknell have included organizing the campus Earth Day program, active campaigning and consciousness-raising on national and global environmental issues, and lobbying for changes in campus policies such as increasing recycled content in paper.

Currently the BEC has been paying particular attention to the issue of recycling. This year Bucknell has entered the sixth annual RecycleMania, an intercollegiate competition running from January to April which challenges universities to improve their recycling rates. The BEC hopes to use this event to generate greater awareness of recycling among members of the Bucknell community.

Specific Initiatives

As mentioned previously, several green projects and initiatives have been undertaken by specific departments and individuals within the university. A summary of each of these follows:

■ Initiatives undertaken by Facilities

- *Promoting a walking campus:* In recent years roads and parking areas within the interior of campus have been closed (Dana-Olin parking lot, Coleman Rd., Vaughn Literature Rd., Fraternity Rd. at Breakiron), and more parking has been located toward the perimeter of campus. This has resulted in new green spaces, such as the Dana-Olin quadrangle (see Figure 2 below), and more incentive to walk rather than to take short car trips.
- *Stormwater retention innovations:* During the construction of the O'Leary Center, an underground stormwater retention system was installed to delay the release of high volumes of stormwater into Miller Run and the Susquehanna River during rainstorms.



Figure 2: New green spaces on campus. Dana-Olin quad (above) and the old Vaughn Literature Road (below)

- *Building construction:* Although all university buildings are meet minimum energy efficiency standards required by law, architectural design firms hired to by Bucknell are asked to consider green alternatives. For instance, in the new Breakiron building, the heating, ventilation and air conditioning system (HVAC)

was specifically designed to conserve energy through the use of a variable air volume system.

- *Long range master planning:* The university is currently revisiting its master plan as part of the strategic planning process. Sustainability has been listed as a priority item for consideration in the requests-for-proposals recently sent out to planning firms.
- *Co-generation Power Plant:* In 1998 Bucknell's power plant was converted from a conventional coal-burning facility to a natural gas co-generation power plant, which allows it to be cleaner and more efficient. The plant captures and reuses waste heat for an overall efficiency is 75-80%, which is exceptionally high compared to the typical 35% efficiency of a conventional power plant.

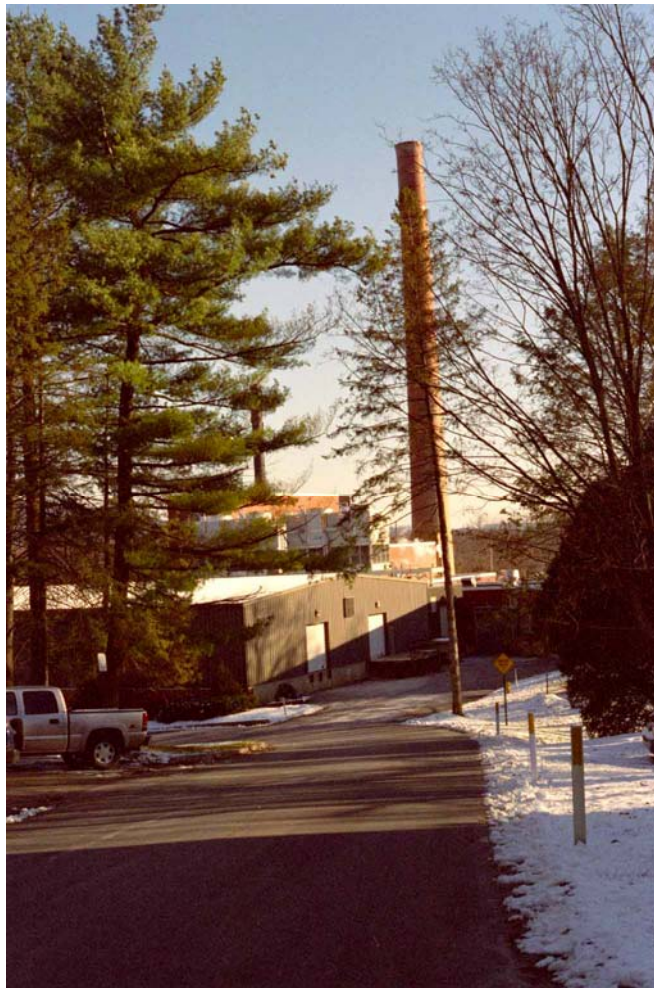


Figure 3: Bucknell's co-generation power plant.

- *Alternative energy:* Although 95% of Bucknell's energy comes from the central power plant, 5% is purchased from other sources. Half of the purchased energy now comes from wind power for a total of 2 ½ %.
- *Energy conservation:* Facilities is now in the process of looking into automatic shut-offs to conserve energy in some of its most energy intensive buildings. An outside consultant has been hired to look into energy saving measures for the Weis Center, the science complex, Breakiron, and the athletic complex.
- *Replacement of fixtures:* Facilities has a policy to replace all light fixtures with energy-saving alternatives when they become worn out. One exception to this policy is in the case of Bertrand Library where, due to intensive use, facilities is looking into replacement lighting to be installed sooner.
- *Residence Hall Renovations:* Renovations have taken place in Kress Hall and Trax Hall for the purposes of improving energy conservation. Steam radiators were replaced with water system and pipes were insulated.
- *Water use:* A low flow central chiller plant has been installed, resulting in a 30% reduction in water use on campus. Low flow shower heads are installed in cases where renovations are being done and new fixtures are needed. The university has also installed one waterless composting toilet at the Cowan conference facility.
- *Solid waste:* Bucknell began its recycling program in 1971 with cardboard and newspaper, and now recycles over 17 different materials. Aluminum, metal, glass, plastic, cardboard, and office paper widely collected throughout campus, whereas computers, ink jet and toner cartridges, yard waste, rubber, solvents, oil, antifreeze, batteries, furniture, fluorescent tubes, and wooden construction debris have more limited collection times and sites (see Figure 4 below). Facilities maintains a recycling web page with clear guidelines as to what may be recycled, and how recycled materials should be treated and sorted. The website also provides data on recycling totals such as the table shown in Figure 1 (Bucknell University Facilities 2005.)
- *Food Composting.* Bucknell Facilities is in the process of writing a collaborative grant with the Union County and the Lewisburg Federal Penitentiary to begin composting food waste off-site within the county.
- *Landscaping.* Bucknell uses integrated pest management (IPM) techniques in landscaping its grounds, resulting in a reduction in the quantity of herbicides and insecticides required. Organic compost is frequently used to amend soil for bed preparation, and the university makes its own mulch from recycled yard waste.

Irrigation is limited to the golf course and playing fields, except to save plants in some emergency situations. A campus reforestation program, with preference for native species, ensures that mature trees are replaced (see Figure 5 below).



Figure 4: One of Bucknell's two dozen recycling stations.



Figure 5: Young trees planted in Bucknell's oak grove.

- *Toxic materials.* Cleaning supplies used on campus have been standardized to minimize the quantity of hazardous chemicals washed down drains and evaporated into the air. All paints used on campus are water-based and low in volatile organic compounds (VOC).

■ Initiatives undertaken by Dining

- *Local/organic food sources:* Local sources such as Pocono Produce of Lancaster, PA, provide 20-30% of the food in Bucknell's dining program. Parkhurst Dining Services, the university's food service subcontractor, has a standing policy to obtain at least 20% of its food from local sources, and to label local foods with information about its source. Organic sources are used when available.
- *Vegan/vegetarian options:* In response to student demand vegan and vegetarian options are offered at every meal.
- *Waste:* Unbleached recycled napkins are used in all facilities. Parkhurst has agreed to collaborate with the food composting project and has sent representatives to preliminary meetings.
- *Herb garden:* Parkhurst is exploring the potential to grow fresh herbs in the greenhouse facilities in the Biology Building.

■ Initiatives undertaken by Purchasing

- *Paper and printing:* During the peak period of interest in campus greening at Bucknell from 1992 to 1995, the purchasing department began to look into recycled paper products. A variety of recycled papers are now used for in-house printing, from 10% to 100% post-consumer recycled content. Soy-based inks are also used in-house. Recycled paper was also tried for printers and copiers, but was found to cause jams in many laser printers and clog them with residual lint.
- *Furniture:* Whenever possible, Purchasing looks for furniture with recycled content. The department has identified and purchased from several innovative vendors of such products including Steelcase, Herman Miller, and Baltix. For instance, all of the furniture in the newly renovated 7th Street Café has upholstery with recycled content.
- *Vehicles:* The university has purchased one hybrid vehicle, a Toyota Prius, for its fleet. The purchasing department has also looked into acquiring very small, low emissions vehicles similar to golf carts for transporting facilities workers on campus, but has run into conflicts with safety regulations requiring air bags.

- *Washing Machines*: The university has been moving to front-load washing machines which use 1/3 as much water as the old top-load models. As of January 2006 all residence halls will have front-load machines.

■ Initiatives Undertaken in the Curriculum and Classroom

- *Environmental Studies Program*: Bucknell's Environmental Studies Program was established in 1979, with BA and BS degrees awarded since 1990. Four faculty members have joint or entire appointments in the program, and twenty-two other faculty from over a dozen different departments and programs contribute to courses, advising, and committee support. The program graduates approximately 20 students per year (Bucknell University Environmental Studies 2005).
- *Environmental Residential College*: The Environmental Residential College offers first-year students with an interest in environmental issues the opportunity to live together in the same residential hall, take common courses, gather for evening discussions, and explore the region through a series of educational field trips. This program helps to broaden the opportunities for environmental education on campus by giving non-majors the chance to explore environmental topics.
- *Natural and Fabricated Worlds Requirement*: As part of Bucknell's Common Learning Agenda (CLA), all students are required to take one course providing perspective on natural and fabricated worlds (NFBW). A review of the CLA provided in the "Self-Study for Middle States Association Re-Accreditation" states that the intention of NFBW courses is to provide "a substantial focus on a) the influence and impact of technology on society and the environment or b) principles that help us to live harmoniously with the natural world" (Bucknell University 2004). The most recent CLA update lists a total of courses in satisfying the NFBW requirement (Bucknell University Common Learning Agenda 2005).
- *Service Learning*: Bucknell's Office of Service Learning facilitates the engagement of students in environmental and other service projects by maintaining contacts with community organizations and acting as a "matchmaker" to connect these organizations to university faculty and courses. The office also provides reference materials, workshops, and course development grants to facilitate the expansion of service learning within the curriculum. The office's database currently lists twelve local organizations requesting assistance from environmental courses (Bucknell University Office of Service Learning 2005). Service Learning also sponsors Scholars in Service, a program that allows students to earn money toward tuition for completing 450 hours of service each year. Currently one scholar is working at T&D's Cats, a rescue operation for

exotic felines, and another works at the Merrill Linn Land and Waterways Conservancy.

- *Course projects:* The flexibility of Bucknell's curriculum allows environmentally themed projects to occur in a number of different settings. Many courses have collaborative term projects where students work together to apply course material to environmental problems. Examples of this type of assignment include water quality testing of the Susquehanna River by students in Environmental Chemistry, a film on the environmental degradation of Miller Run by students in Environmental Ethics, and a project to benefit the Linn Conservancy in Management 101.
- *Independent study:* Independent study courses are available to students in most majors, and independent design projects are required of seniors in the College of Engineering. These projects have often been used to address environmental issues directly or indirectly related to campus. For instance, environmental studies senior Jackie Feinberg has recently completed an independent study with Ben Marsh on Bucknell's recycling program, and civil and environmental engineering professor Tom DiStefano has three students working on the design of an engineered reactor to convert food waste into methane for energy.



Figure 6: Apple saplings in the campus organic garden.

- *Campus organic garden*: The campus organic garden was initiated in 2004 by environmental studies professor Ben Marsh and biology professor Mark Spiro to be used as a teaching tool in multiple courses. The garden currently consists of a dozen raised beds and a grove of apple saplings planted in 2005 (see Figure 6 above).

✦ Community Outreach Initiatives

- *Internships*: Paid internships are often arranged for Bucknell students in conjunction with community organizations such as the Linn Conservancy or the Susquehanna Economic Development Agency Council of Governments (SEDA-COG). Representatives of these organizations have expressed a strong interest in continuing these relationships.
- *Service Projects*: Sororities and fraternities have helped the Linn Conservancy with numerous clean-up efforts in places like Buffalo Creek and Montandon Marsh.
- *Lewisburg Neighborhood Project*: Lewisburg Neighborhood Project: In 2003 members of Bucknell's administration began working with SEDA-COG, local government officials, and local residents, to develop a conceptual plan for the "Lewisburg Neighborhood", an area of highly concentrated student rental properties in downtown Lewisburg that lies mostly within the 100 year floodplain. The plan addresses a broad range of economic, social, and environmental issues related to the university's proposal to require all students to live on campus by the year 2013.

The broad variety of Bucknell's many greening initiatives and the sincere enthusiasm behind them are remarkable, especially considering that there is no standing policy mandate or dedicated funding to drive such efforts. The absence of an entity with real authority in the arena of campus environmental concerns has essentially meant that many of these initiatives take place in a vacuum where well-intending staff, students, and faculty have been unaware of related ongoing efforts within the university and similar projects undertaken in the past. These circumstances once again suggest that the Environmental Center can play an invaluable role in furthering the sustainability of the university by functioning as a coordinator and clearinghouse for the wide-ranging activities related to campus greening.

*If it's a penny for your thoughts, and you put
in your two cents worth, then someone,
somewhere is making a penny.*



--Steven Wright

Concerns and Perceptions of the Bucknell Community

Methods

Listening to the opinions of others is almost always a profitable endeavor, especially within the university community where a great number of individuals possess specialized and up-to-date knowledge on numerous subjects. As part of a preliminary investigation, the aim of this section of the report is to stimulate discussion, provide a general sense of Bucknell's environmental performance, and point out specific areas that warrant further study in the minds of Bucknell's citizens and neighbors.

The information represented in this section was derived from informal interviews with over seventy-five staff, faculty, administrators, students, and community members. Those interviewed were sought out on the basis of their demonstrated interest and/or expertise in environmental issues, or their knowledge and experience in university operations. Opinions were solicited from environmental studies faculty, environmental studies majors, Bucknell Facilities administrative personnel, the campus greening interest group, the Environmental Center interest group, the Student Environmental Club, the Environmental Residential College, leaders within community environmental organizations and agencies, and others.

The majority of the interviews were conducted in person, with some being conducted by phone or email. Interviewees were asked to mention any particular concerns or priority issues that they felt were relevant to the greening of the campus. "Greening" was broadly defined, to include operational aspects of the university as well as less tangible matters such as curriculum and community relations. Due to the somewhat sensitive nature of providing personal opinions, individual's names are not attributed to particular quotations or responses within the text of the report. A full list of contributors is provided in Acknowledgements. *(Note: The methods used in this survey were anecdotal and subjective rather than scientific and standardized. However, to give some sense of the frequency of responses, concerns were tallied by theme, and these numbers are given in parentheses within the text of the report. These numbers should be considered approximate and not absolute.)*

Responses

⌘ Concerns Regarding Administrative Endorsement

A prevailing concern among those who were most experienced in past greening efforts at Bucknell (3) is that the support and endorsement of the President and high level administrators should be obtained for any future greening efforts on campus. One felt that having faculty, especially untenured faculty, serve voluntarily on an unofficial university committee places too high a burden on their time.

The others felt that a critical level of authority was missing in the process of making recommendations for policy changes on campus. In the words of one faculty member “Clearly, this issue [greening] has to have a place in our long-range strategic plan. It needs to have some oversight from a person or group that is a part of the regular decision-making apparatus of the institution.”

⌘ Concerns Related to the Master Plan

- *University buildings:* Many responses (8) addressed concerns about university buildings. Faculty members (3) described perceived inefficiencies within their own buildings such as leaky windows, energy intensive lighting, or insufficient insulation. A larger number of respondents (5) expressed interest in green buildings constructed on campus.
- *Transportation planning:* Several respondents (10) mentioned concerns with the over-use of automobiles on campus including the frequency of short car trips (2). The issue of supporting alternative modes of transportation such as walking or biking was prevalent, with some (4) suggesting a greater number of biking and walking paths on campus, especially around the golf course and playing fields, and others (4) suggesting more bike racks or communal bikes.
- *Campus grounds:* A very large number of respondents (23) had concerns regarding the planning, design, and maintenance of campus grounds. Several respondents (4) had strong opinions about the condition of Miller Run and would like to see efforts to restore and naturalize the waterway (see Figure 7 below). According to one respondent with considerable professional experience in the ecology of waterways, “Miller Run is just one step above an open sewer,” while another such individual described the situation this way:

Miller Run is an extremely unhealthy ecosystem. Improving the functioning of this ecosystem through watershed management would help reduce the flooding of the Hunt Hall parking lot and could

contribute to campus beautification. Since Bucknell owns essentially the entire watershed, we could effectively improve the entire system through integrative management. A healthy stream can be a beautiful addition to an otherwise gorgeous campus...



Figure 7: Miller Run near the athletic complex.

Several others (9) had concerns about the quantity and quality of stormwater runoff on campus and suggested mitigation measures such as rain gardens (naturalized stormwater retention ponds), porous pavement, or green roofs on large buildings like the athletic complex. A few (4) mentioned grounds maintenance issues such as pesticide/fertilizer use on the golf course, and the over-use of lawnmowers and leaf-blowers. According to this respondent,

The engines that power mowers and blowers aren't very large, it's true, but in general these small engines produce more pollution than automobile engines. We experience this in a direct way on the second floor of Roberts Hall whenever leaf-blowing is happening on our quad: somehow the exhaust fumes are pulled directly into the building, causing eye and throat irritation, headaches, and of course unpleasant smells and a disruptive amount of noise.

Finally, others (4) wanted to see attention given to the preservation of open space on campus, with special mention of the river-front area as a place that could be more naturalized and accessible to the campus community (see figure 8 below).



Figure 8: Bucknell's river frontage.

❏ Concerns Regarding Energy

- *Energy waste:* A common concern of those interviewed (5), cutting across all categories of interviewees, is that too many lights are being left on in offices, hallways, and classrooms around campus. Respondents reported being on campus at odd hours at night, on weekends, or on holidays and seeing many lights left on in buildings. Some suggested that some effort be coordinated with security to have unnecessary lights turned off, while others suggested the installation of smart lights with motion detectors that would shut themselves off when no one was present.

Other concerns (2) regarding wasted energy include computers left on, issues related to climate control, for instance rooms overheating in winter or overcooling in summer. According to this respondent,

We waste tremendous amounts of energy running computers and lights in empty classrooms. I understand that ISR needs computers running for maintenance, but I think it would be worth estimating how much that convenience costs (every computer in the GIS lab, for example, has been running all fall and all summer, despite the fact that it probably has fewer than 2 users per week). Not only do we pay to run the computers constantly, but in the summer, we then pay to cool the rooms (export that expensive heat back outside).

- *Alternative energy:* Some respondents (3) wished to see more examples of alternative energy on campus (in addition to those that might be used in newly constructed green buildings). For instance, one respondent with professional expertise in energy issues has researched photovoltaic roofing and suggests that it could be added economically to one or more existing buildings. Others would like to see purchasing of more wind power.

⌘ Concerns Regarding Solid Waste

- *Recycling*: Concerns around recycling (10) had to do with several different issues. Some (3) had to do with destination, i.e. whether or not the items placed in recycling were actually going to a recycling facility or just being dumped in the general waste stream. Others (5) were concerned that there was not enough recycling education on campus. Still others (2) felt that recycling wasn't accessible enough, and that more containers should be placed.
- *Paper waste*: Several respondents (6) were concerned with paper waste on campus, and these concerns were echoed by several others when the discussion took place in groups of students. Some mentioned the over-use of computer printers, while others were concerned that duplex printing was not being used to the fullest extent, and not available on some printers. Still others felt that campus mailings, in some instances, were excessive, and that recipients should be able to "opt out" of receiving hard copies of campus notices and publications.

⌘ Concerns about Dining

- *Local/organic food*: Several respondents (7) would like to see greater offering of local and organic foods in the dining establishments on campus, and a few of these, echoed by several others in group discussions with students, indicated that they felt Parkhurst is not fully delivering on promises to offer and label local/organic foods.
- *Waste*: Several respondents (8) felt that there was too much waste generated in dining facilities like the Bison and the 7th Street Café. Some (4) mentioned the general use of plastic packaging, while others (4) were specifically concerned about policies disallowing or discouraging the use of reusable cups for coffee. These pointed out that the previous food service provider gave a discount on coffee when customers brought their own cups. According to this student respondent,

Instead of packaging a large amount of pastries, muffins, etc. in one large container from which they can be taken out of, Parkhurst individually wraps each piece of food it sells. The use of mugs instead of "to go" containers on campus is not even stressed or encouraged at all. On top of this, I think Parkhurst uses higher grade plastics at higher rates than the previous caterer. They use thicker plastics, for all food products in outdoor and high occupancy events, which increases the overall use of plastic, for which they do not advertise the need to recycle, nor make it easier for us to recycle.

■ Concerns Regarding Curriculum

- *Broad-based environmental education:* Providing all students with a practical understanding of environmental issues was a concern of several respondents (7). These concerns were voiced in addition to those (mentioned above) who felt that more education was needed to address specific issues on campus such as recycling and energy conservation. Two of the respondents specifically mentioned that the NFBW requirement was too broadly defined to allow Bucknell students to leave the university as environmentally aware citizens.
- *Research projects:* Some respondents (4) felt that more needed to be done to encourage campus greening research projects on campus. Two of these specifically mentioned interdisciplinary team teaching as a necessary step in creating the foundation for such projects. Another suggested having information about campus operations and more readily available for senior engineering projects.

■ Concerns Regarding Community Collaboration

Several of those interviewed (7) held active positions of leadership in local agencies, working committees, or organizations. All of these individuals expressed the desire to continue working with the university in a collaborative manner, and for communications to be frequent and consistent between the university and the community. Projects specifically mentioned as collaborative opportunities include the Susquehanna Greenway, the SEDA-COG Center for Energy and Community Innovation, the local foods initiative led by SEDA-COG and the Pennsylvania Association for Sustainable Agriculture (PASA), and the Union County comprehensive plan currently under revision by the Union County Planning Commission (UCPC). More general opportunities for collaboration mentioned were the continued integration of campus and downtown Lewisburg, and the continued support of the university in helping to promote clean and responsible economic growth within the region.

Perspective on Concerns and Perceptions

The concerns and perceptions offered in this report provide a point of departure for future dialog and inquiry into the sustainability of Bucknell. They represent a broad awareness of environmental issues, as well as a down-to-earth sensibility about the day-to-day environmental impacts of university operations. Although the accuracy of individual perceptions may vary, even those that are demonstrably inaccurate provide food for thought, because they reveal a communications gap. It is hoped that the issues raised in this section of the report can help construct a foundation for improvement in both environmental performance and communications within the university community.

The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn.



Alvin Toffler

Benchmarks of Sustainability at other Institutions

Methods

Benchmarks of sustainability at educational institutions are benchmarks in learning, unlearning, and relearning. They are also testaments to a commitment to “walking the walk” of what is now commonly taught in environmental studies courses, a challenge that is often difficult and demanding to meet. As already discussed in the introduction to this report, the trend toward campus greening is pronounced and well-documented, with many and varied examples available for study. So many, in fact, that for the purposes of this investigation, they were limited in order to maintain a manageable scope. The institutions discussed in this report are divided into three basic categories: peer institutions, mentor institutions, and other notable programs. A number of umbrella and support organizations for campus sustainability are also reviewed.

“Peer institutions” were derived from Bucknell’s general and aspirational peer lists. Information obtained on peers was largely acquired through a series of searches of university web sites, the working assumption being that universities are very likely to publicize their greening efforts in some form. All peer websites were searched under environmental studies program sites, student organization sites, and key words such as “campus greening”, “green campus”, “sustainable”, and “sustainability”.

“Mentors” were defined as universities too large to be compared to Bucknell, but from whose programs guidance and useful information might be obtained. In contrast to peers, these institutions were not systematically researched, but rather encountered through general research on the campus sustainability movement mentioning them as exceptional examples of campus greening programs. Examples of mentors were limited to the northeastern region of the United states, to provide suitable ecological, geographical, and cultural comparisons with Bucknell’s own location and to focus on institutions that Bucknell’s faculty, staff, and students might easily access for field trips, collaboration, and networking.

“Other notable programs” were limited to institutions of similar size to Bucknell, and also limited to the northeastern United States. These were added in order to include some institutions that, although not on Bucknell’s peer lists, are peer-like in many respects. Finally, a list of umbrella and support organizations is provided as a reference base for other types of resources that could be helpful to Bucknell in assessing the campus greening programs at other universities and developing its own. A summary table is provided below for easy reference. Institutions are covered in detail in the order shown in the table.

Table 1: Summary of sustainability programs at institutions covered in this report.

Name Of Institution	Type Of Institution	Organization	Staffing	Major Initiatives
Middlebury College	General and aspirational peer	Office of Environmental Affairs, Environmental Council	Director of Environmental Affairs, Campus Sustainability Coordinator	Certified wood, Green dining, Food composting, Grants program, Many others
Oberlin College	General peer	Environmental Advisory Committee	Environmental Sustainability Coordinator sought 11/05	Adam Joseph Lewis Center for Environmental Studies
Colgate University	General peer	Green Strides		Student audit, Alternative energy source, Low emission mass transit, LEED library renovation (in progress)
University of Richmond	General peer	Environmental Awareness Group		LEED certified building
Franklin and Marshall College	General peer	Campus Sustainability Committee	Sustainability Intern	Dump and Run
Villanova University	General peer			Urban Stormwater Partnership
Lehigh University	General peer			Lehigh Earth Observatory
Bowdoin College	Aspirational peer	Sustainability Office (under facilities)	Coordinator for a Sustainable Bowdoin, 3 student employees	Campus audit, LEED certified residence halls, Food composting, Sustainability education
Carleton College	Aspirational peer	Environmental Advisory Committee		Utility-grade wind turbine, Green roof, Environmental audit

Name Of Institution	Type Of Institution	Organization	Staffing	Major Initiatives
Grinnell College	Aspirational peer	Campus Advisory Committee on Environmental Concerns		Communal bikes, Prairie restoration, LEED certification for four buildings (under consideration)
Davidson College	Aspirational peer	Environmental Action Coalition (student only)		Davidson Ecological Preserve, Waste audits, Reusable cups, Communal bikes
Harvard University	Mentor	Harvard Green Campus Initiative	2 Co-chairs, Director, 10 project coordinators, 20 student peer educators	Renewable energy purchasing, Solar panels, Energy conservation, Peer education, Green buildings, Green loan fund, Greenhouse gas inventory, Extension course
Penn State University	Mentor	Center for Sustainability, Green Destiny Council	Executive Director, Associate Director, Director of Operations, Director of Outreach	Green technology demonstration projects, Green technology workshops, Extensive audits, Awareness education
Carnegie Mellon University	Mentor	Green Practices Committee	Environmental Coordinator, Recycling and Waste Coordinator, Several Student Interns	All 30% post-consumer recycled paper since 2001, Alternative fuel vehicles since 2001, All new buildings LEED Silver since 2001, Green roof, Steinbrenner Institute for Environmental Education, Peer education
Cornell University	Mentor	Cornell Sustainable Campus Initiative	Sustainability Coordinator, Sustainability Intern	Stakeholders' summit, Energy conservation, Lake-source cooling, Subsidized public transit, Open space preservation, LEED residence hall
Connecticut College	Peer-like	Environmental Model Committee	Environmental Coordinator, Summer Sustainability Intern	Arboretum, Earth House, Reforestation project, Solar array, Light bulb exchange, Green loan fund, Sustainable garden

Name Of Institution	Type Of Institution	Organization	Staffing	Major Initiatives
Dickinson College	Peer-like	Committee on the Environment	Recycling coordinator, Environmental Specialist	Sustainability in strategic plan, 12.5% wind power, All paper 30% post-consumer recycled, LEED Silver science building in progress, Organic café, Model residence in progress, Student organic garden, Green cleaning supplies
Wellesley College	Peer-like	Wellesley Energy and Environmental Defense (student group only)		Naturalized landscaping and related environmental education, Arboretum

Programs and Activities Addressing Sustainability at Peer Institutions

The following information about programs and activities addressing sustainability at peer institutions is presented to give a sense of the organization and scope of each program, the level of commitment to sustainability, and any original or notable activities. For many peer institutions, a complete account of campus greening activities is too extensive to list in this report, but can be easily accessed through the links provided in References.

General Peers:

✠ Middlebury College, Middlebury, Vermont

(Note: Middlebury is on both the general and aspirational peer lists.)

- *Program organization and staffing:* Middlebury college has one of the most extensive and long-standing sustainability programs of any college or university in the nation, and the organizational structuring of that program bears witness to an outstandingly high level of commitment to a green campus. The program began with a verbal commitment in 1994, leading to an advisory committee in 1995, and the establishment of an Office of Environmental Affairs in 1997 (Middlebury College Office of Environmental Affairs 2005). The Office of Environmental Affairs is governed by the Environmental Council, which is chaired by the Director of Environmental Affairs and Vice-Chaired by the Campus Sustainability Coordinator, both full-time employees. Seven students, three to four staff representatives, and three to four faculty representatives are appointed to serve on the council, which, as a standing committee of the college,

makes recommendations directly to the President (Middlebury College Environmental Council 2005).

- *Statements of commitment:* In addition to signing the Talloires Declaration, Middlebury College has affirmed its commitment to sustainability in the college's "Guiding Principles" which is a document stating the college's intentions for future growth, not unlike Bucknell's strategic plan. The document, endorsed by the College Trustees in 1999, specifically refers to environmental values and stewardship and states that,

. . . the College and its appointees shall consider: energy systems, life cycles, water use, scale and location, light pollution, recycling and waste management, materials, community and product sources, community and regional impacts, transportation, aesthetics, indoor air quality, construction site management, viewsheds, open space and other issues related to the campus (Middlebury College Office of Environmental Affairs 2005, "Guiding Principles").



Figure 9: Certified wood inside Middlebury's Bicentennial Hall (Middlebury College Environmental Affairs 2005 "Green Certified Wood").

- *Notable initiatives:* Middlebury has numerous environmental initiatives underway (for a full list see Middlebury College Office of Environmental Affairs 2005), but some stand out as particularly notable including the following:

- *Green Certified Wood program:* This holistic approach to green building originally involved locating sustainably-harvested wood for a new science building (see Figure 9 left), and resulted in cultivating an a local sustainable wood industry. The college partnered with two non-profit organization, Vermont Family Forests and the Forest Stewardship Council, to obtain seventy percent of the wood for the building from sustainably-harvested forests within 33 miles of the College. Having been strengthened economically by the initial project, the same local

forestry operations have been enlisted to supply the college with certified wood for subsequent construction projects (Middlebury College Environmental Affairs 2005, “Green Certified Wood”).

- *Green dining program:* The college’s subcontractor Burlington food services, regularly supplies food from 33 different sources within the state, and offers 15 certified organic products on a regular basis. The dining service also purchases small amounts of produce from the student organic garden. 70% of food waste is composted, along with paper plates, cups, and napkins, and biodegradable utensils made from a corn starch base. Additionally, every new student, staff, and faculty member is given a reusable travel mug upon entering the college. These measures have allowed the college to divert 20% of its waste stream, saving the over \$200,000 in disposal fees since 1993 (Middlebury College Environmental Affairs 2005, “Green Dining”, “Composting”).
- *Environmental grants program:* The college encourages innovative approaches to sustainability on campus by awarding ten small grants yearly (\$100 each) to faculty, staff, or students who come up with novel small scale greening ideas for the campus. This program, financed through the President’s discretionary funds, has allowed members of the college community to launch over 40 different sustainability projects (Middlebury College Environmental Council 2005).

■ Oberlin College, Oberlin, Ohio

- *Program organization and staffing:* Oberlin’s main sustainability initiative to date has been the construction of a highly innovative green building for use as a teaching and research tool in its environmental studies program, and therefore has been administered primarily through its environmental studies program. However, the college has recently initiated a search for a full time Environmental Sustainability Coordinator to report directly to the Provost and serve *ex officio* on the President’s Environmental Advisory Committee. The coordinator is charged with maximizing the environmental performance of the college through coordinating activities of faculty, students, and staff within the college, and reaching into local, regional and national issues as well (Oberlin College Human Resources 2005.)
- *Statements of commitment:* In March of 2004 the Board of Trustees adopted an Environmental Policy Statement proposed and approved by the General Faculty Planning Committee, and drafted by the Environmental Policy Advisory Committee. The statement says that

Oberlin College must be a responsible steward of the environment. As such, the College will seek 1) to reduce the rate at which it contributes to the depletion and degradation of natural resources; 2) to increase the use of renewable resources; and 3) to consider other measures that can enhance the physical environment in which we live. The development of priorities and the implementation of decisions regarding energy production and use, the use and development of our grounds, facilities construction, modernization, maintenance, transportation, and materials use will be informed by the environmental impact they have (Dye 2004).

- *Notable initiatives:* The Adam Joseph Lewis Center for Environmental Studies is one of the most innovative green buildings on record, addressing every imaginable environmental impact of a building including energy use, building materials, indoor air quality, wastewater, landscaping, and many others. Remarkable features of the building include its design to be an energy exporter (the building is intended to make more energy than it uses), and its ability to treat its own wastewater using a “living machine”. The building has proven to be an outstanding research and teaching tool, as well, and is outfitted with an array of over 150 sensors to monitor material and energy flows throughout the building and its grounds (Oberlin College 2005). The building is a highly visible and tangible expression of the college’s commitment to sustainability, and has attracted over 8000 visitors per year (Peterson 2002.)



Figure 10: The Adam Joseph Lewis Center for Environmental Studies at Oberlin (Oberlin College 2005 "Adam Joseph Lewis Center")

of the electricity required for the building during its first 27 months of use (Peterson 2002).

However, the building is not without disadvantages. Construction costs were high, with a price-tag of \$6.5 million for the 13,600 square foot building (Peterson, 2002), \$3 million of which was donated by the building’s namesake, Adam Joseph Lewis (*Academe* 1999). This works out to nearly \$500 square foot, which is three to five times higher than the cost of \$100 to \$150 per square foot for typical academic buildings (Middlebury College Office of Environmental Affairs 2005, “McCardle Bicentennial Hall”). Furthermore, energy savings have fallen short of expectations, with the building’s photovoltaic array producing only 17%

■ Colgate University, Hamilton, New York

- *Program organization and staffing:* Compared to schools like Middlebury and Oberlin, Colgate's sustainability program is relatively undeveloped, but gaining momentum. The program, known as Green Strides, is organized around a series of annual meetings or "Green Summits" during which students, faculty, and staff come together to plan greening initiatives. The first summit in 2003 resulted in a sustainability plan known as the "Colgate University Green Print". At subsequent summits the plan has been revisited and revised as necessary (Colgate University Green Strides 2005, "Green Summit").
- *Statements of commitment:* The university's stated commitment to sustainability is offered in the Green Strides mission statement which says,

Colgate University and members of its community recognize not only the need to engage in dialogue about our environmental future, but more importantly our responsibility to take active steps towards improving it. Through Green Strides, an ongoing, University-wide effort, Colgate is committed to promoting environmental citizenship and reducing its environmental impact (Colgate University Green Strides 2005, "Home").

It is not clear whether this statement is officially supported by the University President or the Board of Trustees.

- *Notable initiatives:* One of the first environmental initiatives taken on Colgate's campus was an environmental audit of the university performed by students in Environmental Studies 480, an interdisciplinary senior seminar. The audit covered air quality, food, energy, facilities, grounds, materials, transportation, and water, and helped form a baseline assessment from which the Green Summits could proceed (Colgate University Green Strides 2005, "ENST 480 Audits"), and has led to more recent initiatives including:
 - *Green renovation:* Leadership Excellence in Environmental Design (LEED) Certification is in progress for a renovation of the campus library.
 - *Transportation initiatives:* Environmental Protection Agency (EPA) Certified low emissions shuttle buses are in operation for commuting to and from the campus, and a communal bike program to be implemented April '06.
 - *Alternative energy source:* A wood chip boiler provides 60% of the heating and hot water needs for campus, with 30% of its fuel obtained as waste from a local furniture manufacturer (Colgate University Green Strides 2005, "Home").

■ University of Richmond, Richmond, VA

- *Program organization and staffing:* University of Richmond's sustainability program is administered through an organization known as the Environmental Awareness Group. The group is charged with monitoring the implementation of environmental aspects of the campus master plan, communicating with the campus community on environmental issues, making sustainability recommendations to the Provost, and initiating new studies concerning the campus environment. The committee is chaired by a tenured faculty member and composed of two other faculty members, the Director of Facilities, two other staff members, and three students (University of Richmond Environmental Awareness Group 2005, "EAG").
- *Statements of commitment:* President William Cooper signed the Talloires Declaration in January of 2003 (University of Richmond Environmental Awareness Group 2005, "Talloires Agreement.").
- *Notable initiatives:* In 2003 the university was awarded LEED certification on Weinstein Hall, its expanded and renovated social sciences building. The expansion (from 15,000 to 53,000 square feet) included an energy-saving HVAC system, special parking for car pooling and alternative fuel vehicles, recycled steel and other materials, and low VOC paints and carpets (University of Richmond Environmental Awareness Group 2005, "Weinstein Building").

■ Franklin and Marshall College, Lancaster, PA

- *Organization and staffing:* Sustainability initiatives of Franklin and Marshall are administered through the Campus Sustainability Committee, formed in 2004 by the President on the basis of an appeal from faculty and students. The 2005-06 committee membership consists of four students, three faculty members, the Director of Facilities, the Director of Dining Services, and the Campus Sustainability Intern, and its charge is to make recommendations to the President on policy and planning issues related to environmental concerns (Franklin and Marshall Campus Sustainability Committee 2005, "About"). The Campus Sustainability Intern works under supervision of the Dean of the College and is responsible for assessment, research, and networking on sustainability issues (Franklin and Marshall Campus Sustainability Committee 2005, "Sustainability Intern").
- *Statements of commitment:* The committee has proposed the following mission for the college:

At Franklin & Marshall College we seek to live, work, and play such that we enhance the environmental, economic, and social well-being of our

communities, minimize our use of natural resources and our environmental impacts, and educate ourselves and others about the roles and responsibilities of citizens in a sustainable world (Franklin and Marshall Campus Sustainability Committee 2005, “Sustainability”).

There is no indication that this statement has been formally adopted by the President or Trustees.

- *Notable initiatives:* There are no particularly unique initiatives publicized by the campus, with most of the activities of the committee centering on campus awareness of commonly addressed issues like recycling. The college participated in a Dump and Run event in 2004, geared toward the redistribution and reuse of student cast-offs at the end of the school year.

▣ Villanova University

Although Villanova does not have a broad-based sustainability program, its Department of Civil and Environmental Engineering has launched a highly innovative initiative known as the Urban Stormwater Partnership, linking government, industry, and academia. The program implements novel stormwater treatment projects on campus, and uses these projects as demonstration sites to teach others about sound stormwater management practices (see Figure 11 below). Active partners include the Pennsylvania Department of Environmental Protection (DEP), the EPA, the Delaware River Basin Commission, and several regional engineering firms, and the project receives significant funding from the DEP’s Growing Greener program (Villanova University Urban Stormwater Partnership 2005, Brouwer 2002).



Figure 11: Stormwater wetland at Villanova (Villanova Urban Stormwater Partnership 2006, “Stormwater Wetlands”).

▣ Lehigh University

Although Lehigh also does not have a sustainability program per se, it does have an interdisciplinary environmental research institute known as the Lehigh Earth Observatory (LEO). The function of this institute is to focus attention on environmental systems and their relationship to society. LEO sponsors paid student internships and undergraduate research, and maintains working relationships with several local and regional environmental partners (Lehigh Earth Observatory 2005).

Aspirational Peers

▣ Bowdoin College, Brunswick, Maine

- *Organization and staffing:* Bowdoin has a well-developed campus greening program known as Sustainable Bowdoin, and administered through a Sustainability Office within Facilities Management (Bowdoin College Sustainable Bowdoin 2005.). The office is overseen by the Coordinator for a Sustainable Bowdoin, a permanent staff position created in 2001 to promote the implementation of recommendations generated by a comprehensive environmental audit of the campus (Bowdoin College Campus News 2001). The program also lists three student employees.
- *Statements of commitment:* Bowdoin has an official “Environmental Mission Statement” issued by the Office of Communications and Public Affairs. It outlines specific environmental education and policy goals and emphasizes that

Being mindful of our use of the Earth's natural resources, we are committed to leading by example to integrate environmental awareness and responsibility throughout the college community. The College shall seek to encourage conservation, recycling, and other sustainable practices in its daily decision making processes, and shall take into account, in the operations of the College, all appropriate economic, environmental, and social concerns (Bowdoin College Office of Communications and Public Affairs 2005).

- *Notable initiatives:* Bowdoin officially adopted sustainable building design principles in 2003 and went on to construct two new LEED-Certified first-year residence halls completed in August 2005. The two residence halls are approximately 35,000 square feet each with a total project cost of \$14.3 million (Bowdoin College Facilities Management 2005). Innovative features include a rainwater collection system that stores water for flushing toilets, indoor bike

rooms, geothermal heating, local and high recycled-content materials (Bowdoin College Sustainable Bowdoin 2005, “LEED Residence Halls”). The campus also composts food waste and educates its residents in sustainable living practices.



Figure 12: Construction of West Hall, a LEED certified residence hall at Bowdoin (Bowdoin College Sustainable Bowdoin 2005 "LEED Residence Halls").

✚ Carleton College

- *Organization and staffing:* Carleton has an Environmental Advisory Committee that reports to the Vice President and Treasurer of the college. The committee is composed of three students, three faculty, the Director of facilities, and two other staff, and chaired by a 5th year ENTS Educational Associate (Carleton College Environmental Advisory Committee 2005). Sustainability initiatives are implemented through Facilities Planning and Management.
- *Statements of commitment:* The college’s “Environmental Statement of Principles” was endorsed by the Board of Trustees in 2001 and states,

Carleton College recognizes that it exists as part of interconnected communities that are affected by personal and institutional choices. We are dedicated, therefore, to investigating and promoting awareness of the current and future impact of our actions in order to foster responsibility for these human and natural communities. Carleton strives to be a model of environmental stewardship by incorporating ideals of sustainability into the operations of the College and the daily life of individuals (Carleton College Facilities Planning and Management 2005, “Sustainability”).

- *Notable initiatives:* In 2004 Carleton purchased the first utility-grade wind turbine to be owned by a U.S. college. The 1.65 megawatt turbine was obtained at a cost of \$1.8 million and funded in part by the Minnesota Department of Commerce (Carleton College Facilities Planning and Management 2005, “Wind Turbine”). The college has also successfully engaged students in several campus greening projects including a green roof, a straw-bale house, and a comprehensive environmental audit (Carleton College Facilities Planning and Management 2005, “Student Projects”).



Figure 13: Carleton's wind turbine (Carleton College Facilities Planning and Management 2005, “Wind Turbine”).

■ Grinnell College, Grinnell, Iowa

- *Organization and staffing:* Grinnell’s environmental initiatives are administered through the Campus Advisory Committee on Environmental Concerns, or EcoCampus Committee for short. It was founded in 1996 and has been charged by the President to research environmental impacts of the campus, and communicate with the campus community on environmental issues. Its membership includes five faculty (one of which is the chair), three staff, and five students (Grinnell College EcoCampus Committee 2005).
- *Statements of commitment:* A college-wide environmental mission statement is reportedly underway, but not yet completed.
- *Notable initiatives:* Grinnell has many diverse campus greening initiatives including a communal bike program, an initiative to recycle used vegetable oil as biodiesel fuel, exploration of LEED certification for four existing buildings, a 365 acre prairie restoration near campus, sustainability audit planned for fall 05, donation of student cast-offs for reuse every semester, and a student organic garden (Grinnell College EcoCampus Committee 2005, “Environmental Stewardship”).

■ Davidson College, Davidson, North Carolina

Although Davidson does not have a broad-based sustainability program, it does have some notable initiatives. The college maintains a 200 acre ecological preserve adjacent to the campus, which was established in 2001 and is maintained by the Biology Department as a living laboratory for teaching and research (Davidson College Ecological Preserve, 2005). The college also has a student-led Environmental Action Coalition which performs annual waste audits and has instituted reusable cups and communal bikes on campus. The college also sponsors a student EcoTeam which conducts environmental education in local 3rd grade classrooms (Davidson College Environmental Action Coalition, 2005).



Figure 14: Aerial view of the Davidson College Ecological Preserve (Davidson College Ecological Preserve 2005).

Programs and Activities Addressing Sustainability at Mentor Institutions

As mentioned previously, mentor institutions are defined as much larger universities which are not particularly comparable to Bucknell organizationally and demographically, but whose sustainability programs offer many valuable examples as well as opportunities for collaboration and networking. It should also be noted that larger universities do not necessarily have the edge over smaller ones in matters of sustainability. Although larger universities have larger budgets to draw upon, they also have much more complexity in their community structures and physical operations. In that sense, small colleges and universities have a distinct advantage, just as it would be simpler to create sustainability in a village, population 4,000 than it would in a small city, population 40,000. Where large universities do have an edge is in staffing, because each new member added to the staff represents less of a drain on the overall budget. Due to this advantage, the programs of larger universities often get off the ground quicker, and as they do, they leave behind a “paper trail” of valuable documents, most often available online, for smaller institutions to study.

■ Harvard University

- *Organization and staffing:* Harvard’s sustainability program began in 1999 with a group of interested people meeting on a voluntary basis. Initial progress was slow until Leith Sharp, who had developed a successful campus sustainability program in Australia, came to present her approach to the group, particularly emphasizing the need for dedicated funding and staffing. Sharp was later recruited to become the first director of Harvard’s program, now known as the Harvard Green Campus Initiative (Harvard Green Campus Initiative 2005, “About Us”). The program has a two-fold approach that is aimed at the systemic transformation of university culture. The first component employs an \$3 million interest-free loan fund to seed conservation projects with payback periods of 5 years or less. The second component involves creating partnerships within the campus community through communication, education, and promotional activities, along with fundraising efforts to maintain the program (Sharp 2003, p. 14). The program has two co-chairs (one faculty, one vice president of facilities), a director, and 10 coordinators of various programs and initiatives (Harvard Green Campus Initiative 2005, “Our Team”).
- *Statements of commitment:* Harvard’s commitment to a green campus is most explicitly stated in a set of “Sustainability Principles” which are broadly acknowledged throughout university operations and procedures, such as the capital planning and construction approval process and the annual financial budget and planning process. Harvard’s “Sustainability Principles” include:
 - *Demonstrating institutional practices that promote sustainability*, including measures to increase efficiency and use of renewable resources, and to

decrease production of waste and hazardous materials, both in Harvard's own operations and in those of its suppliers.

- **Promoting health, productivity and safety** of the University community through design and maintenance of the built environment.
- **Enhancing the health of campus ecosystems** and increasing the diversity of native species.
- **Developing planning tools** to enable comparative analysis of sustainability implications and to support long-term economic, environmental and socially responsible decision-making.
- **Encouraging environmental inquiry** and institutional learning throughout the University community.
- **Establishing indicators for sustainability** that will enable monitoring reporting and continuous improvement

(Harvard Green Campus Initiative 2005, "Sustainability Principles").

- **Notable initiatives:** Some of Harvard's numerous green initiatives include renewable energy purchasing, installation of photovoltaic panels on some buildings, an energy conservation program aimed at shutting down personal computers when not in use, 20 students employed in peer-based environmental education, a campus-wide greenhouse gas inventory, and a wide range of green building projects. The campus also runs an extension course entitled "Achieving Institutional Transformation for Environmental Sustainability" for both local and distance learners. The course focuses on the systemic transformation of the educational institution using Harvard's own program as a case study. The university also hosts a series of shorter (1-2 hour) programs on various subjects, known as "Best Practices Exchanges". Through these unique programs Harvard functions most directly among large universities as a mentor institution, allowing others to learn from its successes and failures. (Harvard Green Campus Initiative 2005, "Summary of Programs").

■ Penn State University

- **Organization and staffing:** Penn State's Center for Sustainability was initiated in 1995 with a broad-based mission to "integrate education, research, and outreach on issues of sustainability through innovative, interdisciplinary projects, facilities, and hands-on learning opportunities." The center is administered by the College of Engineering has hosted a series of directors, all of whom have had research or teaching positions in the college. The center's programming specializes in demonstrating green technologies as well as developing tools for "sustainability metrics", the measurement of ecological footprints. The center has an Executive Director, an Associate Director (both engineering faculty), as well as a Director of Operations, and a Director of Outreach (Center for Sustainability at Penn State 2006, "About Us").

Separately, Penn State also has an organization known as the Green Destiny Council (GDC), an association of faculty, students, and staff committed to sustainability on campus. GDC conducted a campus-wide audit of the university in 1998, and updated it in 2000, detailing the environmental impact of the university and its operations (Green Destiny Council 2006).

- *Statements of commitment:* In 2001 the GDC drafted an ecological mission statement for the university, which was subsequently unanimously adopted by the Faculty Senate and the President. It states:

The Faculty Senate hereby recommends that Penn State incorporate, to the fullest extent possible, the following LONG-TERM GOALS into all future Strategic Plans.

- Significantly Reduce Fossil Fuel Dependence
- Conserve and Protect Water Resources
- Minimize Solid, Liquid, and Hazardous Wastes
- Utilize, to the Fullest Extent Possible, Food Produced Using Sustainable Practices
- Create and Abide by a Land Ethic that Promotes Stewardship of Natural Processes, Ecosystems, and the Conservation of Green Space
- Promote and Use Sustainable Transportation Options
- Strive to Create Sustainable Campus Environments by Considering Ecological Impacts in the Planning, Design, Construction, Renovation and Maintenance of all University Facilities.
- Promote Ecological Literacy by Modeling Sustainable Practices
- Act as a “Role model” for Students and Society for Ecological Responsibility
- Act as a Lead Institution in Promoting and Supporting Research for a Sustainable World

(Green Destiny Council 2001).

- *Notable initiatives:* Both the Center for Sustainability and the GDC have ongoing initiatives at Penn State. The Center for Sustainability has ongoing demonstrations of active and passive solar energy collection, strawbale construction, winter and biointensive gardening, and natural wastewater remediation (Center for Sustainability 2006, “Projects”). The center also conducts formal workshops around these projects.

The GDC’s projects revolve around two major areas of concern, environmental audits and consciousness-raising. The GDC’s extensive audits of the university resulted in the Penn State Indicators Report which details the university’s ecological footprint and serves as the basis for the university’s ecological mission statement (Green Destiny Council 2000). Penn State’s environmental audit is an excellent example of the educational value of sustainability programming on campus. As explained in the report,

[The research team] visited the Somerset County landfill that receives Penn State's trash, journeyed to the open pit mines near Dubois that provide PSU's coal, and walked through the local well fields that supply the University with water. And this was just a start. They went on to look into campus dumpsters to see what was being thrown away, to examine the food offerings in the dining halls, to study land transactions at the County deeds office, to calculate the loss of campus green space using maps in Pattee Library, to determine the numbers of exotic vs. native plants on campus through botanical surveys, to characterize the ecological literacy of graduating PSU seniors by administering questionnaires, and much more. These researchers conducted not an abstract educational exercise, but rather engaged in face-to-face interactions with Penn State's complex and often invisible support systems and the people responsible for running them.

The GDC also engages in projects to raise awareness within the university community on subjects such as university investments, environmental racism, military research on campus, and food on campus. The GDC has proposed a plan to address green practices through "building communities", creating a sustainable culture one campus building at a time. It also sponsors a graduation pledge encouraging seniors to consider the impact of their future careers (Green Destiny Council 2006, "Projects 2001-2003"). Most recently the GDC has been working on a *Finance and Business Strategy for Environmental Stewardship* (Green Destiny Council 2006).

■ Carnegie Mellon University

- *Organization and staffing:* Carnegie Mellon began addressing sustainability in 1990 by hiring a Recycling and Waste Coordinator and adopting a formal recycling policy. To broaden the scope of its greening efforts, in 1998 the university created a Green Practices Committee (GPC) consisting of faculty, student, and staff representatives, and in 2000 hired a full-time Environmental Coordinator. Additionally, the program also hosts several student interns (Carnegie Mellon Green Practices 2006, "Background").
- *Statements of commitment:* In 1999 the GPC was charged by the President to "develop university practices that improve environmental quality, decrease waste, and conserve natural resources and energy, thereby establishing Carnegie Mellon as a practical model for other universities and companies" (Carnegie Mellon Green Practices 2006, "Background").

- *Notable initiatives:* Carnegie Mellon has made some of the strongest commitments to sustainability of any university of its size. In 2001 the university committed to purchasing 100% of its paper with at least 30% post consumer recycled content. Additionally in 2001 the university made commitments to purchasing only alternative fuel vehicles, and constructing all future buildings with LEED Silver certification. In 2003 a new LEED Silver residence hall was constructed, and in 2004 another residence hall was renovated to these specifications. In 2003 the Steinbrenner Institute for Environmental Education was launched with \$4 million grant from trustee, and with a grant from the Henry Luce foundation, began a program to introduce environmental literacy across the curriculum in early undergraduate courses. Green roof and solar panel projects were under construction in 2004 and completed in 2005. A peer education program initiated 2005 (Carnegie Mellon Green Practices 2006, “Background”, “Education and Research”).



Figure 15: One of three green roofs at Carnegie Mellon University (Carnegie Mellon Green Practices 2006, “Green Initiatives”).

■ Cornell University

- *Organization and staffing:* A relative newcomer to the sustainability movement, Cornell established its Sustainable Campus Initiative in 2005 with a university-wide stakeholders' summit and the hiring of a full-time Sustainability Coordinator. Although the initiative is still in the early developmental stages, the developmental process has been well-conceived and well-documented, resulting in a paper trail of several interesting and useful reports (Cornell Sustainable Campus Initiative 2006, "Organizations and Policies"). One such document is a preliminary survey of other 28 other institutions and their sustainability programs summarized in the table below, providing an informative glance at other sustainability programs not covered in this report.

Table 2: A summary of sustainability programs at institutions covered in Cornell's preliminary study (Meigs 2005, p.4).

	Cornell	Colorado U	Duke	Harvard	U-Michigan	U-Vermont	Bowdoin	Brown	Clarkson	Columbia	Dartmouth	Ithaca College	Michigan State	Middlebury	MIT	Princeton	Rutgers	Stanford	Tufts	U-British Columbia	U-Buffalo	U-Chicago	U-Connecticut	U-North Carolina	U-New Hampshire	U-Oregon	U-Pennsylvania	U-Wisconsin	Yale
1. Office of Sustainability																													
2. Professional coordinator(s)																													
3. Institutional Authority								?			?				?						?				?			?	?
4. Environmental Advisory Council																													
5. Sustainability faculty hiring initiative						?					?													?					
6. Environmental degree/certificate																													
7. Sustainable business center																						?							?
8. LEED building(s)									?		?		?								?	?	?						
9. Green purchasing																													
10. Energy conservation initiative																													
11. Green dining initiative (food service)																													
12. Composting																													
13. Successful Recycling																													

LEGEND

- = Yes
- = Pending or limited in scope
- = No
- ? = Respondent unsure, or no answer

- *Statements of commitment:* In 1997 President Rawlings (now serving as Interim President) signed a statement pledging the following:

The Cornell community pledges to promote sustainable futures through its educational activities.

As the Land-Grant institution in New York State, Cornell has played and will continue to play an active role in helping students and members of the community in understanding local, regional, national, and global environmental issues.

The Cornell community pledges to promote sustainable futures through improvements to its campus environment.

Through efforts such as reducing waste, decreasing the university's consumption of nonrenewable resources, increasing recycling and the purchasing of recycled products, promoting public transportation, increasing ties to its local community, and reducing the use of environmentally harmful substances such as chlorofluorocarbons, Cornell has made and will continue to make substantial contributions towards minimizing its overall environmental impact.

The Cornell community pledges to promote sustainable futures through its research and outreach activities that ultimately lead to practical solutions to environmental problems facing the university and the world. The expertise within the university community is a resource that can contribute to devising and implementing solutions to environmental problems.

The Cornell community pledges to promote sustainable futures through environmentally responsible stewardship of all the resources entrusted to its care.

Toward this end, Cornell will exercise environmentally sound stewardship of its lands and properties, strive to protect and preserve the biodiversity of its lands, and work to improve energy efficiency in its facilities and equipment. Such measures to address the environmental challenge require focus and commitment at the institutional level and equally demand support and participation by all. Accordingly, we, the members of the Cornell University community, pledge to continue to conduct our affairs in manners that support, promote, and ensure sustainable futures.

(Cornell Sustainable Campus Initiative 2006, "Organizations and Policies").

- *Notable initiatives:* The university composts dining food scraps and recycles diligently, resulting in a 50% solid waste diversion rate. 60% of paper used on campus has a recycled content of 30% or higher. A number of energy-saving measures instituted since 1980 have reduced energy costs by a total of \$7 million. One of these involves a particularly innovative use of a local resource, lake-source cooling, to provide air conditioning in the summer months. This measure alone has reduced electricity consumption by 10%. The university subsidizes public transit, maintaining 40 established routes into Ithaca and surrounding rural towns. In 2005 the first LEED certified residence hall in New York State was built on the Cornell campus. The university also sustainably manages over 7,000 acres of open space both on and off campus.

Other Notable Campus Sustainability Programs at Peer-like Institutions

■ Connecticut College

■ *Organization and staffing:* Connecticut College is similar in size and mission to Bucknell and its peers, and has demonstrated a long-standing commitment to developing a sustainability program. It's first environmental coordinator position was created in 1994 as a student internship, and recently it has been upgraded to a full-time permanent administrative position. (Green Living at Connecticut College 2006, "History"). Additionally, a summer sustainability internship has been in place since 2000. The Environmental Model Committee (EMC) was established in 2003 as a standing university committee with a broad membership of students, faculty, and staff, including the Vice President for Administration (Green Living at Connecticut College 2006, "EMC").

■ *Statements of commitment:* Although no formal statement of commitment to sustainability is made available by the EMC, there are two major policy documents that have been adopted by the college. The renewable energy policy was established through a 2004 student referendum to add \$25 to the student comprehensive fee. It states

100% of this additional student fee must be directly used towards purchasing renewable energy, where renewable energy is defined as electric power derived from sources that have a minimal impact on human health and the natural environment such as, but not limited to, solar, wind, and low-impact hydro-electric dams (Green Living at Connecticut College 2004).

In 2005 the EMC adopted a green building policy to incorporate standards of sustainability into the guidelines for building construction on campus (Green Living at Connecticut College 2006, "History").

■ *Notable initiatives:* There are many sustainability initiatives at Connecticut College dating back to open space preservation in 1931 with the establishment of the college's 750 acre arboretum, a living laboratory emphasizing native species and sound environmental practices. Other notable programs include "Earth House", an model residence for environmentally and socially conscious living (1994), a 30-year reforestation project in Costa Rica designed to offset the college's carbon emissions (1999), a 10 kW solar array installed during a dormitory renovation (1999), an innovative light bulb exchange program that turned old incandescent bulbs into artwork (2004), a revolving loan fund for energy conservation projects (2005), and a sustainable garden (2005).

■ Dickinson College

- *Organization and staffing:* Due to its geographic proximity and similar size, Dickinson also provides a good example for Bucknell to study. Dickinson's Commission on the Environment (COTE) was appointed by the President in 1991 to investigate environmental issues on campus. Its membership includes a diverse representation of faculty, students, and staff. As for staffing the program, the campus facilities department has recently hired a recycling coordinator (Dickinson College Commission on the Environment 2006), and COTE is implementing an ongoing one-year Environmental Specialist internship for a selected graduating senior (Dickinson College Commission on the Environment 2006, "Current Initiatives").
- *Statements of commitment:* One of COTE's major achievements has been the acceptance of sustainability as a "defining characteristic" in Dickinson's strategic plan. The plan states

We recognize that engaged global citizenship requires an awareness of, and respect for, the natural world that supports the social world. We also recognize that responsible citizenry requires the prudent use of resources of all types, physical and fiscal. Educating for sustainability requires a holistic approach to decision making which embodies liberal arts education and promotes an engaged community. The College must serve as a living example of sustainability in all arenas (Dickinson College Strategic Plan 2005).

- *Notable initiatives:* Dickinson's sustainability initiatives include a LEED Silver science building in the planning phase, a commitment to at least 30% post-consumer recycled content for all paper, purchased wind power for 12.5% of the college's total energy use, and a shift to green cleaning supplies. The college also maintains an all-organic café, and a student organic garden, and is working on a model residence for the demonstration of environmentally sound living practices and technologies (Dickinson College Commission on the Environment 2006, "Current Initiatives").

■ Wellesley College

Although Wellesley has no official sustainability program underway (with the exception of a student activist organization known as Wellesley Energy and Environmental Defense) it does have one very notable sustainable feature, and that is its landscape plan. A result of excellent sustainable design work, Wellesley's campus is both naturalized and exceptionally beautiful, integrating wetlands, meadows, forested areas, and an arboretum into its formalized landscape. Forested areas have natural undergrowth requiring no mowing or leaf-blowing, and low-lying wet meadows and ponds absorb excess stormwater. The waterfront is both natural and

accessible with a small grassy area permitting one to view and approach the lake, and a lakeside trail allowing recreational passage through the native vegetation around the shore.

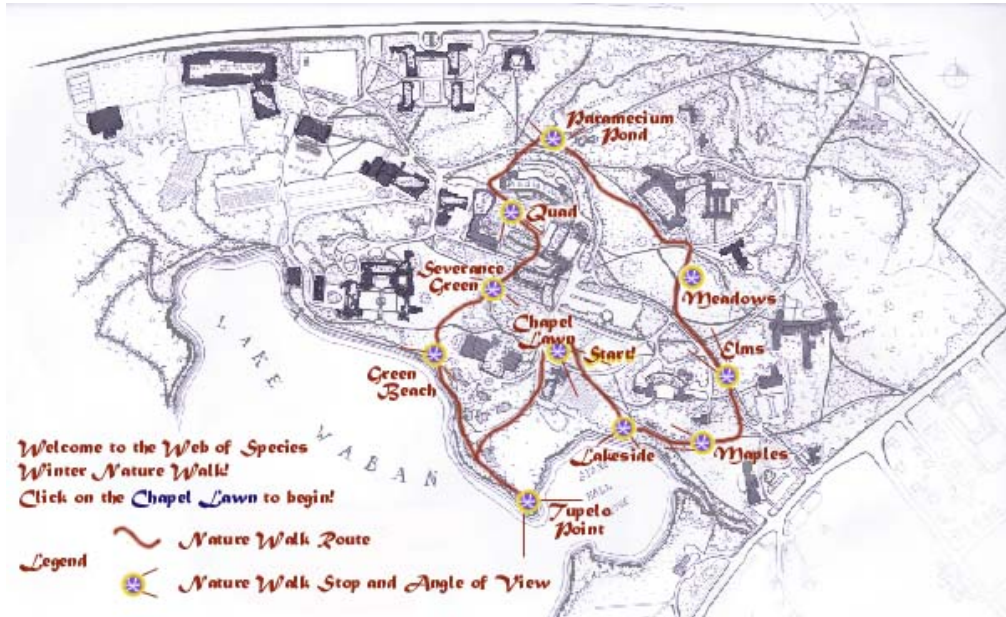


Figure 16: Web-based interactive map of Wellesley campus featuring a winter nature walking route (Wellesley College Web of Species 2006).

It's low-maintenance grounds provide ample habitat for wildlife, and it is not uncommon to see hawks and herons soaring over the campus. The landscape is a focal point of nature study and biological inquiry, and has become a valuable teaching tool for the college (Wellesley College Web of Species 2006). Situated on hilly terrain adjacent to a major body of water, Wellesley's physical setting is quite similar to Bucknell's, and provides inspiration for new possibilities in Bucknell's landscape plan.



Figure 17: Wet meadows in front of the science building at Wellesley College.



Figure 18: Naturalized pond at Wellesley.



Figure 19: Naturalized forest at Wellesley.



Figure 20: Naturalized meadows at Wellesley.

Umbrella and Support Organizations for Campus Sustainability

In addition to the examples provided by the many sustainability programs on campuses throughout the region and nation, other valuable sources of information can be obtained through umbrella and support organizations that have grown up around the campus greening movement. Brief summaries of some of the more prominent ones are provided below:

■ National Wildlife Federation’s Campus Ecology Program

In 1989 the National Wildlife Federation (NWF) created the Campus Ecology Program to challenge and support institutions of higher education in campus greening projects. The program assists in the design and implementation of projects, provides training and technical support, and documents projects in its database (NWF Campus Ecology 2006, “About”). The NWF provides small research fellowships for student-driven campus sustainability projects through a program funded by the Nathan Cummings Foundation, the Town Creek Foundation, and the Tides Foundation (NWF Campus Ecology 2006, “Fellowships”).

■ University Leaders for a Sustainable Future

University Leaders for a Sustainable Future (USLF) is a non-profit organization whose mission is

to make sustainability a major focus of teaching, research, operations and outreach at colleges and universities worldwide. USLF pursues this mission through advocacy, education, research, assessment, membership support, and international partnerships to advance education for sustainability (USLF 2006, “About”).

USLF serves as the secretariat for the Talloires Declaration and also publishes a Sustainability Assessment Questionnaire (SAQ) as a self-assessment tool for campus greening (USLF 2005, “Sustainability Assessment Questionnaire”). The organization studies and monitors the campus greening movement both nationally and internationally, publishes its findings in reports and papers, and also provides consulting services.

■ Pennsylvania Consortium for Interdisciplinary Environmental Policy

The Pennsylvania Consortium for Interdisciplinary Environmental Policy (PCIEP) seeks to facilitate discourse and collaboration among environmental policy-makers and environmental studies programs in institutions of higher education (PCIEP 2006). The consortium regularly hosts workshops and conferences on campus sustainability and environmental education, and also monitors sustainability programs at member

institutions (PCIEP 2005) Bucknell University is currently a member of the consortium, and has recently sent representatives to PCIEP conferences.

‡ Northeast Campus Sustainability Consortium

The Northeast Campus Sustainability Consortium (NECSC) was established in 2004 to promote sustainability programs at colleges and universities in the northeastern and maritime regions of North America. The consortium hosts an annual meeting to facilitate networking, professional development, and exchange of information among sustainability practitioners. The NECSC has more than forty member institutions of higher education from the northeastern United States and Eastern Canadian Provinces (Harvard Green Campus Initiative 2006 “About the NECSC”).

‡ Society for College and University Planning

The Society for College and University Planning (SCUP) works to support all types of planning efforts at institutions of higher education nationwide. The society also hosts a web-page specifically devoted to sustainability, offering many useful links and resources including published reports and papers on current campus greening issues. The society also hosts conferences and workshops on sustainability (SCUP 2006 “Sustainability in Higher Education”).

‡ Apollo Alliance/Energy Action

The Apollo Alliance is a non-profit advocacy organization with a mission to “build a broad-based constituency in support of a sustainable and clean energy economy that will create millions of good jobs for the nation, reduce our dependence on foreign oil, and create cleaner and healthier communities” (Apollo Alliance 2006, “Who We Are”). Apollo has collaborated with Energy Action, a coalition of college environmental and social justice organizations, to produce a report entitled *New Energy for Campuses: Energy Saving Policies for Colleges and Universities*. The report covers a comprehensive list of strategies for reducing dependence on non-renewable energy sources including generation, purchasing, conservation, buildings, transportation, audits, and financing, and includes many case studies for reference (Rhodes-Conway et al 2005).

‡ United States Green Building Council

The United States Green Building Council (USGBC) is the organization that sponsors Leadership Excellence in Environmental Design (LEED) certification of new and existing buildings. The council seeks to “forge strategic alliances with key industry and research organizations and federal, state and local government agencies to transform the built environment,” using a committee-based, member-driven, consensus-focused process (USGBC 2006, “About”). In addition to publishing

certification guidelines, the council sponsors expos, conferences, workshops, and web-based learning (USGBC 2006 “Education”). The USGBC also has a local affiliate chapter, the Green Building Association of Central Pennsylvania (GBACPA), promoting education, outreach, and networking in the design and planning of green buildings (GBACPA 2006).

*I can't understand why people are
frightened of new ideas. I'm frightened of
the old ones.*



John Cage

Recommendations for a Sustainable Bucknell

Four Guiding Principles for Prioritizing Future Initiatives

Before discussing specific initiatives for a more sustainable university, it is important to review some general considerations that will help to establish the “big picture” and provide guidance in the decision-making process. The rationale offered in these guiding principles will be used, along with the research presented in previous sections, as a basis for the recommended initiatives and program organization in the next sections of the report. The guiding principles include: 1) visibility and teachability, 2) a systemic approach, 3) cultivating “good growth”, and 4) using good science to inform choices.

✦ Principle 1: Visibility and Teachability

Projects that are highly visible on campus naturally lend themselves to the educational experience in that they become both literally and figuratively a part of the educational landscape, and thus cannot be ignored. According to architect Sim Van der Ryn, “making nature visible” is a fundamental principle of ecological design. “If the built environment is a powerful teacher, we can change the message people get from it. It can be redesigned so that people are richly informed about their place and the ecological processes endemic to it” (Van der Ryn and Cowan 1996, p. 162).

Oberlin’s environmental center is an excellent example of this principle. Although it was expensive to build, and is not without its technical problems, it is in essence a statement so visible that it has drawn 8,000 visitors per year to the campus to learn from its example. Although it is difficult to place a monetary value on such a far-reaching attraction, it is also worth noting that the building’s visibility has caused it to become a magnet for grant money from various sources, helping to offset its high initial costs (*The Observer* 1997).

The Bucknell University Environmental Center has the potential to play a central role in the visibility and teachability of campus greening projects through promoting and coordinating teaching efforts around sustainability. The center can also play a vital role in fostering students’ natural energy towards improving their world by supporting and facilitating the culture of student activism.

■ Principle 2: A Systemic Approach

A fundamental step in envisioning a campus greening program involves choosing effective organizational approach. Three basic types of approaches might be labeled as centralized, compartmentalized, and systemic. Of the three approaches, outlined below for comparison, the systemic philosophy stands out as the most effective.

- *Centralized:* A centralized approach would place the campus greening program in the control of one centralized authority, and give that authority the lion's share of responsibility for originating and administering green initiatives. In most examples of campus sustainability programs where this approach is taken, the central authority in charge is the facilities department. Although this approach would seem to be efficient, it is disadvantageous for two reasons. First, it places too much of a burden on one department to solve problems that are essentially the responsibility of everyone in the university. In other words, it sends the message that sustainability is a "facilities problem" when it is actually a "people problem". Second, it denies the opportunity for all sectors of the campus community to share ownership of the solutions to environmental problems.
- *Compartmentalized:* A compartmentalized approach to campus greening would place the responsibility for different initiatives into different university departments without establishing any official organizational entity to oversee and coordinate greening activities. This is essentially what Bucknell has had in the past, and to some extent would also describe the approach currently taken by institutions like Colgate and Davidson, where the coordinating organizations have minimal status within the larger institution. The advantages of compartmentalized approach are less bureaucracy and less expense toward staffing. The disadvantages, previously discussed with respect to Bucknell's past greening efforts, are that the compartmentalized approach suffers from a lack of communication and overall support, leaving individuals with too much of a burden on their time, and often resulting in successive "reinventions of the wheel".
- *Systemic:* A systemic approach to campus greening could be defined as a program that has both centralized leadership and broad participation from within the university community. It is an approach that recognizes the importance of addressing sustainability at every level of organization and planning within the university, and this essentially means tapping into the energy and talents of every individual as a potential environmental problem-solver. As discussed by Van der Ryn,

Ecological design suggests a deeply participatory process in which technical disciplinary languages and barriers are exchanged for a shared

understanding of the design problem. Ecological design changes the old rules about what counts for knowledge and who counts as knower. It suggests that *sustainability is a cultural process rather than an expert one*, and that we should all acquire basic competence in shaping our world (Van der Ryn and Cowan 1996, p. 147, emphasis added).

Of all the peer-level sustainability programs reviewed here, Middlebury stands out as the most successful as well as the most systemic. At a central level, the program has unequivocal administrative support, dedicated funding, and permanent staffing, while it also maintains democratic representation through its Environmental Council, broadly cultivates community relationships, and solicits design solutions from all members of the campus through its environmental grants program. As described by Middlebury's Director of Environmental Affairs, Nan Jenks Jay, it is the systemic nature of the program that has brought its ultimate success (Jenks Jay 2003). Given the accomplishments of the program, along with the fact that Middlebury is both a general and aspirational peer of Bucknell, the systemic approach would appear to be a very favorable model for Bucknell. It is also worth noting that the systemic is strongly supported at Harvard, arguably the most successful program among mentor institutions (Sharp 2003, p. 4).

✦ Principle 3: Cultivating “Good Growth”

Another guiding principle worthy of consideration is the principle of “good growth” espoused by architect Bill McDonough, designer of the Adam Joseph Lewis Center at Oberlin, and many other highly acclaimed green design projects (McDonough 2001). The idea behind good growth is that it is important to emphasize the positive aspects of greening, rather than becoming bogged down, energetically speaking, in efforts to be “less bad”. For a university, this would mean placing the most energy into producing what universities grow best, responsible future leaders.

Although it is often easier to become focused on the details of greening a university, the big picture reveals that an educational institution's greatest impact is likely to be not whether it has recycled every container, or conserved every last sheet of paper, but rather what kinds of graduates it sends into the world to create positive change. This principle would suggest that the university place priority on initiatives that stimulate and engage students, and create an endemic culture of sustainability on campus, so that principles of sustainability become second nature to the young adults who leave the campus four years later.

✦ Principle 4: Using Good Science to Inform Choices

Finally, it is important to state that within the context of good growth, visibility, and teachability, campus greening initiatives do need to address the bottom line of environmental impact, and in order to do so, must sometimes make difficult choices

as to where to invest time and money. What kinds of actions make the most difference in the world, and on what basis can that difference be measured? For instance, if faced with the need to choose, should university invest in recycling or energy conservation? Should it first work to reduce plastic packaging in the dining halls, or first work to reduce the consumption of paper in the library?

It is not within the scope of this report to answer such questions, but it is worth pointing out that some answers do exist. For example, a study released in 1999 by the Union of Concerned Scientists presents a scientifically-backed rationale for consumers who wish to make effective environmental decisions. The study ranks the top three priorities for individual action as 1) reducing gasoline consumption, 2) eating organic food and less meat, and 3) choosing a home that is energy efficient (Brower and Leon 1999, p. 85). Although a university is not simply a collection of individual consumers, this study helps to suggest that three priority areas for the greening the university might include reducing automobile use on campus, purchasing more organic food in the dining facilities, and building new buildings that are energy efficient. (In fact the third priority might easily move up in the university setting, because campuses are building-intensive, with each individual frequently making use of more than one building.) These kinds of issues should be considered thoughtfully during the campus environmental audit process, explained in greater detail in the section on Recommended Initiatives.

Recommended Initiatives

Having presented the case for campus greening through historical, perceptual, and peer-based data, and having established general principles for setting priorities, the question now arises, how should the Bucknell community proceed toward a more sustainable campus? This is a question that is best answered through an inclusive group process, yet any such process requires some degree of initial organization and direction. The initiatives recommended below are intended to serve as points of departure for future action, and emphasize areas where urgent action is necessary in order to take advantage of important decisions currently under consideration. These initiatives are 1) to secure administrative backing for campus greening, 2) to initiate an environmental audit, 3) to make sustainability a high priority in the campus master plan; 4) to promote and coordinate sustainability-related educational efforts on campus, 5) to consider employing students as ecological monitors and peer educators, and 6) to develop a logo for enhanced visibility.

■ Initiative #1: Secure Administrative Backing for Campus Greening

The benchmarks of sustainability at other colleges and universities speak clearly of the steadily growing commitment to campus greening at peer and mentor institutions. A clear endorsement from the President and Trustees is the first and most important

step that the university must take if Bucknell is to become competitive in this facet of campus life. As the commitments continue to build at other institutions, so will the interests of potential students, faculty, and funders. The recent lapse in Bucknell's efforts toward campus greening necessitates focused attention to bring the university back up to speed.

Although the process of securing administrative backing may take some time, it should be initiated soon, especially in light of the fact that the university currently drafting its strategic plan, a document that is likely to hold weight for many years to come. It is recommended that the BUEC engage the President and Trustees in a dialogue that 1) brings sustainability explicitly into the language of the strategic plan, and 2) results in their official endorsement of an environmental statement of principles for the university. (For a more detailed discussion of how sustainability fits into the strategic plan, see the Introduction to this report. For numerous examples of the statements adopted at other colleges and universities, see the previous section on Benchmarks of Sustainability at other Institutions.)

A common approach in the development of college and university strategic plans is to focus on "areas of strength". In light of Bucknell's interdisciplinary Environmental Studies Program, its emerging Environmental Center, its renewed interest in sustainability, and its high-quality natural setting, "environment" could easily fit into the evolving strategic plan as a focused "area of strength" for the university. Middlebury and Dickinson have made similar written commitments, with Middlebury designating environment as one of its "peaks of excellence" and Dickinson designating sustainability as one of its "defining characteristics".

An environmental statement of principles could be approached in one of two ways. One course of action, resulting in a public declaration of intent, would be asking the President to sign the Talloires Declaration (See Appendix II). Another course of action would be to draft a statement unique to Bucknell. If this is the path chosen, it is important that the language of the statement be as specific as possible to ensure a sound commitment to sustainability. Although words such as "green," "sustainable," or "environmentally friendly," offer a good sense of the spirit of such a statement, they are not explicit enough to ensure a long-term commitment. It should be noted that during the active period of the Greening of Bucknell Taskforce a set of "Bucknell Environmental Principles" was drafted, and that this document could easily serve as a point of departure for an updated statement of commitment for Bucknell (See Appendix III).

Finally, and most importantly, ***a declaration of principles must be backed by a critical mass of support from the administration in the form of funds and staffing.*** The principle of a critical mass is discussed further in the section on Recommended Program Organization below.

■ Initiative #2: Initiate an Environmental Audit

Environmental audits are conducted by most, but not all, colleges and universities with sustainability programs. The purpose of an audit is to make a thorough assessment of the environmental impact of the university, which can then be used in future sustainability planning. Some campuses, such as Carleton and Bowdoin, have hired outside consultants to do their audits, while others, like Grinnell and Colgate, have done them as student projects, and still others, like Penn State and Cornell have enlisted a broader representation of faculty, students, and staff (See Benchmarks of Sustainability at Other Institutions for more details and references). There are pros and cons to each different approach.

A consultant offers the objectivity and specialized expertise of an outside party, and requires less time from university employees. For example, The Good Company, a consulting firm based in Oregon, offers a campus environmental assessment that can be completed in four months time, using only 60 total employee hours (The Good Company 2005). The down-side of this approach is that campus community members are less involved in the process, and therefore less invested in the outcome of the audit. Student-driven audits are economical, and in many cases highly educational, but are sometimes constrained by time and skill level.

It is recommended that the environmental audit undertaken by Bucknell combine some level of outside objectivity with an equal measure of campus participation, while using the educational value of the auditing process to its fullest advantage. Exactly how this is to be done is beyond the scope of these recommendations. For examples of campus environmental audits online see (Cochran et al 2004; Woodward and Curran 2000; Green Destiny Council 2000).

■ Initiative #3: Make Sustainability a High Priority in the Campus Master Plan

As with the strategic plan, the master plan for Bucknell's campus is a document that has a profound influence on the university's future, and it will soon be under revision. The following recommendations are offered for consideration in the master planning process:

- ***Consider seeking environmentally reputable planning consultants and team members for the drafting and implementation of the master plan.*** A systemic approach to sustainability needs to occur at every level, especially in the master plan. Hiring firms with experience in sustainable design helps to set the stage for success rather than failure, by ensuring that the best design options are open to the university, and that unforeseen roadblocks to project completion are minimized. On the other hand, if planning and design firms are inexperienced in sustainable approaches, there less likelihood that the full range of sustainable options will be considered, and for those that are adopted, more likelihood of cost over-runs and

delays, leading to frustration and the sense that sustainability is more trouble than it is worth. (See Appendix IV for a list of recommended firms). In keeping with the systemic approach, it is also of great importance that the master planning process be broadly inclusive of members of the campus community.

- ***Consider adopting a resolution that all new buildings on campus be LEED Certified at the basic level.*** The fact that Bucknell has recently acquired a large parcel of farmland adjacent to campus, suggests an intent to expand through the construction of new buildings. Once a campus building is constructed, its environmental impacts and inefficiencies are amplified over a long lifespan. Currently Bucknell Facilities maintains a policy not to replace building fixtures and components until they are worn out. This means that decisions made in the design of new buildings are likely to have an impact for many years, until major renovations take place. Furthermore, new buildings are prime opportunities for visible, teachable projects, leading to the reinforcement of a sustainable culture on campus.
- ***Consider measures to discourage the use of automobiles on campus and encourage alternative modes of transportation, such as walking, biking, and carpooling.*** With the removal of central roads and creation of the Dana Olin quadrangle, the university is already headed in the direction of a walking campus. With a concerted effort in the master planning process, and a modest allocation of resources, Bucknell could make significant improvement in its environmental impact by continuing to decentralize parking, providing amenities for alternative modes of transportation. A particularly visible and useful addition to the master plan would be the provision of walking and biking trails in the intensively-used areas around the golf-course and playing fields, allowing commuters from the Linntown area to access campus more easily without a car, and creating a safer environment for the many people who already walk, run, and bike in conflict with automobiles in the roads around the golf course.
- ***Consider the restoration and naturalization of Miller Run between Route 15 and 7th Street.*** A stream offers many wonderful opportunities for environmental education, wildlife habitat, and aesthetic appreciation. A restoration project to reshape and revegetate the most channelized portion of this stream in the central area of campus between Moore Avenue and the athletic facilities, would create a highly visible, highly educational opportunity for the entire campus community. Furthermore, the restoration could be done in a way that would allow the flow of stormwater to be slowed during high-intensity rainstorms, helping to reduce the problems of flash flooding in areas of campus downstream.
- ***Consider returning stormwater to groundwater through the construction of “rain gardens”.*** A rain garden is a landscaped area designed to absorb excess stormwater and return it to the ground. Although Bucknell has installed

innovative storm drains for the O’Leary Center, this type of stormwater retention simply delays the release of stormwater into the surface water channels, leaving unaddressed the more serious problems of pollution and flooding created by excess stormwater runoff. Rain gardens allow stormwater to be filtered naturally by plants and soil, and once again offer conspicuous and educational examples of sustainable design.

- ***Consider naturalizing some of the forested areas of campus to eliminate the need for excess lawn-mowing and leaf-blowing.*** Although aesthetically pleasing to many, the coexistence of mature trees and grass is not a natural combination in the temperate forest biome of the northeastern United States. Trees and grass compete with each other for water, while tree roots interfere with mowing, and mowers tend to injure trees. Naturalizing some of the more intensively forested areas of campus with groundcovers and shrubs, as has been done at Wellesley and other places, would eliminate the need for mowing and leaf-blowing, and save the university on labor, fuel, and machinery.
- ***Create a more aesthetic and accessible connection to the Susquehanna River, and connect the university to the Susquehanna Greenway.*** With such a historic and beautiful river as the Susquehanna adjacent to campus property, Bucknell should maximize its connection to this invaluable natural resource, providing greater opportunities for education, recreation, and appreciation. Although important facilities operations are currently located in this area, some creative work in the master planning process could allow for the relocation of these operations to less conspicuous sites.

✚ **Initiative #4: Promote and Coordinate Sustainability-Related Educational Efforts on Campus**

As mentioned previously, the emergence of the Bucknell Environmental Center provides an invaluable opportunity to promote and coordinate greening efforts. Due to the Environmental Center’s academic focus, it is particularly well-suited to the promotion and coordination of such educational programs and activities as service learning, internships independent studies, course development, seminars and colloquia, and others. As recommended by the “Blueprint for a Green Campus” a sound campus greening plan should incorporate educational and curricular aspects of greening as a primary component of its greening initiatives. Some specific suggestions for proceeding with this initiative include the following:

- ***Revisit ways to enhance environmental education across Bucknell’s curriculum.*** Ironically, one of the most over-looked areas of sustainability programming at institutions of higher education is the education of students across the curriculum in environmental literacy, a task that universities should be easily prepared to accomplish (McIntosh 2001). The Common Learning

Agenda's Natural and Fabricated Worlds (NFBW) requirement begins to address this issue at Bucknell, but the concerns and perceptions of some students and faculty indicate that the requirement is not specific enough to create environmentally literate graduates. It is recommended that the BUEC revisit the issue of environmental literacy at Bucknell, either by investigating ways to enhance the NFBW requirement, or creating new mechanisms by which students can become educated as environmentally aware citizens. The Sustainability Assessment Questionnaire (SAQ) published by University Leaders for a Sustainable future, is particularly thorough in addressing the issue of environmental literacy, and should be consulted by any who wish to undertake an evaluation of this aspect of campus sustainability (USLF 2005, "Sustainability Assessment Questionnaire").

- ***Support interdisciplinary team teaching.*** Problems of sustainability can seldom be solved by a single discipline. If the university is to use its full measure of talent and expertise in addressing practical sustainability issues, it needs to invent and support team teaching models that allow professors to come together across disciplines, so that technical, financial, ecological, aesthetic, ethical, and psychological approaches to environmental problems can be integrated to the fullest and most effective extent.
- ***Create a database of sustainability-related student projects.*** Due to a lack of centralized record-keeping, student projects often either "reinvent the wheel" or don't reach a stage of completion from which they can be implemented. An easily accessible database of student projects would allow for greater awareness and continuity in this area.
- ***Develop a highly visible, and easily-navigable website.*** As part of the larger BUEC website, the sustainability efforts at Bucknell should be publicized to the fullest extent possible. Ideally, the website would contain complete and up-to-date information on Bucknell's own greening efforts, as well as links to local and regional environmental organizations, umbrella and support organizations, and other campus sustainability programs. Research for this report has revealed that visibility and navigability is a common shortcoming of campus sustainability websites. Very often information on highly commendable programs and initiatives is buried deeply within the maze of the university server, with no links to logically-related entities like environmental studies or facilities. It is therefore recommended that Bucknell's sustainability webpage be linked to as many related websites as possible.
- ***Bring motivational speakers to campus to address sustainability issues.*** As discussed in the section, A History of Greening Efforts at Bucknell, much motivation toward campus greening was generated in the early 1990's with the President's Forum on the Environmental Imperative. It would be prudent to bring

another round of motivational speakers to campus in the near future to re-awaken and re-energize the campus on sustainability. Although nationally-known figures are always desirable, local and regional leaders should not be overlooked. Inviting speakers such as Stacy Richards who is developing the SEDA-COG Center for Energy and Community Innovation, or Shawn McLaughlin, who is updating the Union County Comprehensive plan would help to strengthen ties to the local community, and inviting sustainability directors and coordinators from other institutions would help strengthen networking opportunities.

■ Initiative #5: Consider Employing Students as Ecological Monitors and Peer Educators

Students have ample energy and enthusiasm toward environmental initiatives and have been found to function as effective peer educators in sustainability programs at Harvard, Bowdoin, and Dickinson, where students teach other students the basics of sustainable living practices such as recycling and energy conservation (See Benchmarks of Sustainability at Other Institutions for more details and references). Furthermore, many campus environmental dilemmas require relatively simple, low-tech cures, such as reminding people to turn off computers over holidays, shutting windows and turning off lights in campus buildings, reminding people to print double-sided copies, or posting water conservation guidelines in bathrooms. In support of this concept, a recent independent study by Senior Jackie Fienberg showed that a common characteristic of highly successful campus recycling programs (with recycling rates over 30%) was the hiring of students as recycling monitors (Feinberg 2005). The work/study model provides a relatively inexpensive mechanism through which the university might accomplish such tasks.

■ Initiative #6: Develop a Logo for Enhanced Visibility

Although logo development may seem like a minor undertaking, the visibility and teachability of sustainability projects requires that these efforts are identifiable as such by the general population of the campus. A logo for the Environmental Center designed to communicate the intention of a sustainable campus culture would go a long way toward achieving that identification. Powerful visual symbols of sustainability might include the Bison (once an indigenous species of the region, as well as Bucknell's mascot) or the Susquehanna River. Such a design project would be an excellent opportunity to involve fine arts students in campus greening. A particularly attractive example of a campus sustainability logo is shown in the figure below.



Figure 21: Bowdoin College's logo (Bowdoin College Sustainable Bowdoin 2005).

Recommended Program Organization

As discussed previously in the Four Guiding Principles for Prioritizing Future Initiatives, a systemic organizational approach that would include both centralized leadership and broad-based participation from all sectors of the university, stands out as the most favorable general model for a sustainability program at Bucknell. Additional factors to consider in program organization are staffing, governance, working relationships, and funding.

■ Staffing: The study of benchmarks of sustainability at other institutions reveals that the most successful campus greening programs, such as Middlebury and Harvard, have full time directors dedicated to their campus greening programs. A larger number of institutions, including Middlebury, Oberlin, Bowdoin, Harvard, Carnegie Mellon, Cornell, Connecticut College, and Dickinson have at least one full-time permanent position dedicated to coordinating sustainability efforts and/or particular programs on campus. Other types of staffing positions include sustainability internships (Franklin and Marshall, Connecticut College, Cornell) and recycling coordinators (Carnegie Mellon, Dickinson). Due to the temporary and/or compartmentalized nature of these positions, they are most effectively used in combination with at least one permanent coordinator.

On the basis of research presented in this report it is recommended that *at the very least* Bucknell begin staffing its program with a full-time permanent Sustainability Coordinator. This coordinator should be within the Environmental Center to guide and

promote the initiatives recommended above. The Sustainability Coordinator should share administrative assistance and other administrative resources with the Environmental Center. Functionally, the coordinator should operate much like the Director of Service-Learning at Bucknell, who also seeks to promote a desirable social and educational agenda within the university culture. As the work of the coordinator proceeds, it is recommended that, as an early priority, the office should secure additional funding through outside grants and any other available sources. This additional funding should then be used to obtain additional staffing assistance in the form of work/study students and/or interns, thus ensuring a critical mass of human resources to further the sustainability program.

■ **Governance:** The Good Company's environmental auditing toolkit recommends the following guidelines for good governance in campus greening programs:

- Clear policies, principles or goals that provide direction for staff, administrators, and other members of the campus community.
- Clear decision-making power and reporting mechanisms with responsibilities to monitor, report on, give advice about, and promote action and awareness around environmental sustainability. (Cochran et al 2004).

For most accomplished greening programs, this is achieved through a committee or council with, *at the very least*, official university status, a direct connection to an upper level member of the administration (Vice President or President), and a broad-based membership representing staff, students, and faculty. Such an administrative entity exists in nearly every effective campus greening program (See Benchmarks of Sustainability at Other Institutions for more details and references).

At Bucknell it is recommended that governance be achieved through a Sustainability Council that should make policy and programming recommendations on campus greening directly to the Vice President of Finance and Administration. Council membership should include the Director of Facilities, faculty, staff, and student representatives, the Sustainability Coordinator, and a liaison to the Environmental Center Steering Committee. Staff members on the council should include administrative-level representatives of Facilities, Dining, Procurement Services, Residential Life, Information Services and Resources, and any others significantly affected by its policies. Faculty members should demonstrate a strong interest in sustainability and should be given full credit toward their service requirements for participating on the council. The recommended policies of the council should be administered primarily through the Environmental Center, with full cooperation from the aforementioned departments.

■ **Working Relationships:** The Sustainability Coordinator and members of the Sustainability Council, should cultivate a close working relationship with all other programs and initiatives of the Environmental Center, the Environmental Studies

Program, Bucknell Facilities, the Bucknell Environmental Club, and the Environmental Residential College. Additionally, collaboration and networking outside of the university is highly recommended. At the very least, the Sustainability Coordinator should attend the Northeast Campus Sustainability Consortium on a yearly basis, and additionally, it would be desirable to send the Sustainability Coordinator, student interns, and interested members of the Sustainability Council to visit nearby mentor institutions for workshops and field trips. Close working relationships should also be maintained with local and regional environmental organizations such as the Pennsylvania Consortium for Interdisciplinary Environmental Policy, SEDA-COG, the Linn Conservancy, the Buffalo Creek Watershed Alliance, the Pennsylvania Association for Sustainable Agriculture, the Union County Planning Commission, and others.

¶ Funding Sources: The most effective campus sustainability programs, i.e. those that make quick and consistent progress, begin with an operating budget from the university administration to be used for initial staffing and administrative purposes. Once staffing is secured, the director or coordinator of the program often seeks additional sources of funding through grants, donations, and the savings generated from conservation projects. As mentioned previously, it is recommended that the Environmental Center be given an operating budget by the university for *at the very least* a full-time coordinator and initial programming costs. Once established, the office should pursue other sources of funding including corporate and foundation grants, government grants, and others.

Some of the outside sources of funding supporting campus greening at other institutions include the Heinz Endowment (Penn State and Carnegie Mellon), the Coen Foundation (Penn State), the Pennsylvania Department of Environmental Protection (Carnegie Mellon), the Henry Luce Foundation (Carnegie Mellon), The George Gund foundation (Oberlin), and the Nord Family Fund (Oberlin), the National Wildlife Federation (many), and individual philanthropists (Carnegie Mellon and Oberlin).

Additionally, the Director of the Office of Corporate and Foundation Relations at Bucknell has suggested seeking grants from the Kresge Foundation (for green buildings), Rebuild America (for energy audits and alternative energy) and Learn and Serve (for environmental service-learning projects).

*There is a tide in the affairs of men, which
taken at the flood leads on to fortune.
Omitted, all of the voyage of their life is
bound in shallows and in miseries. On such
a full sea we are now afloat, and we must
take the current when it serves, or lose our
ventures.*



--William Shakespeare

Conclusion

The research presented in this report has established that the campus greening movement began in earnest in the early 1990's and continues as a major force in higher education. Although energetic and conscientious members of the Bucknell community have attempted to keep the university in pace with leaders of the movement, a constantly shifting administrative climate over the past ten years has resulted in an absence of essential administrative backing, and an inevitable lag in sustainability efforts. Nevertheless, concerns and perceptions revealed by the report's many contributors demonstrate an unmistakable desire for members of the campus community to live and work in a sustainable campus culture, where the lessons of responsible global citizenship taught in the classroom are reflected in the actions of everyday life.

This investigation has shown that the campus greening movement is now unquestionably well-established among a broad spectrum of institutions of higher education, including Bucknell's peers, and that this movement can no longer be ignored by any competitive college or university that wishes to educate its students in a climate of global awareness. On the basis of the many fine examples of campus greening programs provided by peer and mentor institutions, recommendations have been made herein for the establishment of a committed and systemic campus sustainability program at Bucknell, addressing physical, educational, social, and philosophical aspects of university culture. The challenge is now presented to leaders of the campus community to ride the current of conscience into a more sustainable future.

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Appendices

- Appendix I.** Tucker, Mary Evelyn. Circa 1997. “Greening at Bucknell”
- Appendix II.** Talloires Declaration.
- Appendix III.** Greening of Bucknell Taskforce. Circa 1997. “Bucknell Environmental Principles.”
- Appendix IV.** A Partial List of Recommended Sustainable Design Firms
- Appendix V.** U.S. Green Building Council LEED Certification Guidelines, “Project Checklist”.

Appendix I. Tucker, Mary Evelyn. Circa 1997. “Greening at Bucknell”

Appendix II. Talloires Declaration. (University Leaders for a Sustainable Future 2005, “Talloires Declaration”)

THE TALLOIRES DECLARATION

We, the presidents, rectors, and vice chancellors of universities from all regions of the world are deeply concerned about the unprecedented scale and speed of environmental pollution and degradation, and the depletion of natural resources.

Local, regional, and global air and water pollution; accumulation and distribution of toxic wastes; destruction and depletion of forests, soil, and water; depletion of the ozone layer and emission of "green house" gases threaten the survival of humans and thousands of other living species, the integrity of the earth and its biodiversity, the security of nations, and the heritage of future generations. These environmental changes are caused by inequitable and unsustainable production and consumption patterns that aggravate poverty in many regions of the world.

We believe that urgent actions are needed to address these fundamental problems and reverse the trends. Stabilization of human population, adoption of environmentally sound industrial and agricultural technologies, reforestation, and ecological restoration are crucial elements in creating an equitable and sustainable future for all humankind in harmony with nature.

Universities have a major role in the education, research, policy formation, and information exchange necessary to make these goals possible. Thus, university leaders must initiate and support mobilization of internal and external resources so that their institutions respond to this urgent challenge.

We, therefore, agree to take the following actions:

1. Increase Awareness of Environmentally Sustainable Development

Use every opportunity to raise public, government, industry, foundation, and university awareness by openly addressing the urgent need to move toward an environmentally sustainable future.

2. Create an Institutional Culture of Sustainability

Encourage all universities to engage in education, research, policy formation, and information exchange on population, environment, and development to move toward global sustainability.

3. Educate for Environmentally Responsible Citizenship

Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate and have the awareness and understanding to be ecologically responsible citizens.

4. Foster Environmental Literacy For All

Create programs to develop the capability of university faculty to teach environmental literacy to all undergraduate, graduate, and professional students.

5. Practice Institutional Ecology

Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.

6. Involve All Stakeholders

Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in environmentally sustainable development. Expand work with community and nongovernmental organizations to assist in finding solutions to environmental problems.

7. Collaborate for Interdisciplinary Approaches

Convene university faculty and administrators with environmental practitioners to develop interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.

8. Enhance Capacity of Primary and Secondary Schools

Establish partnerships with primary and secondary schools to help develop the capacity for interdisciplinary teaching about population, environment, and sustainable development.

9. Broaden Service and Outreach Nationally and Internationally

Work with national and international organizations to promote a worldwide university effort toward a sustainable future.

10. Maintain the Movement

Establish a Secretariat and a steering committee to continue this momentum, and to inform and support each other's efforts in carrying out this declaration.

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Appendix III. Greening of Bucknell Taskforce. Circa 1997. “Bucknell Environmental Principles.”

Appendix IV. A partial list of recommended sustainable design firms.

	Nationally Recognized	Regionally Recognized
Planning Firms	EDAW, EDSA, HOK, Sasaki,	Ayers/Saint/Gross
Architecture Firms	McDonough and Partners	Noelker and Hull, Bohlin Cywinski Jackson, Highland Associates
Landscape Architecture Firms	Olin Partnership, Andropogon	LandStudies

Appendix V. U.S. Green Building Council LEED Certification Guidelines, “Project Checklist”.

Project Checklist

Sustainable Sites 14 Possible Points

- Prereq 1 **Construction Activity Pollution Prevention** Required
- Credit 1 **Site Selection** 1
- Credit 2 **Development Density & Community Connectivity** 1
- Credit 3 **Brownfield Redevelopment** 1
- Credit 4.1 **Alternative Transportation**, Public Transportation Access 1
- Credit 4.2 **Alternative Transportation**, Bicycle Storage & Changing Rooms 1
- Credit 4.3 **Alternative Transportation**, Low Emitting & Fuel Efficient Vehicles 1
- Credit 4.4 **Alternative Transportation**, Parking Capacity 1
- Credit 5.1 **Site Development**, Protect or Restore Habitat 1
- Credit 5.2 **Site Development**, Maximize Open Space 1
- Credit 6.1 **Stormwater Design**, Quantity Control 1
- Credit 6.2 **Stormwater Design**, Quality Control 1
- Credit 7.1 **Heat Island Effect**, Non-Roof 1
- Credit 7.2 **Heat Island Effect**, Roof 1
- Credit 8 **Light Pollution Reduction** 1

Water Efficiency 5 Possible Points

- Credit 1.1 **Water Efficient Landscaping**, Reduce by 50% 1
- Credit 1.2 **Water Efficient Landscaping**, No Potable Use or No Irrigation 1
- Credit 2 **Innovative Wastewater Technologies** 1
- Credit 3.1 **Water Use Reduction**, 20% Reduction 1
- Credit 3.2 **Water Use Reduction**, 30% Reduction 1

Energy & Atmosphere 17 Possible Points

- Prereq 1 **Fundamental Commissioning of the Building Energy Systems** Required
- Prereq 2 **Minimum Energy Performance** Required
- Prereq 3 **Fundamental Refrigerant Management** Required
- Credit 1 **Optimize Energy Performance** 1–10
- Credit 2 **On-Site Renewable Energy** 1–3
- Credit 3 **Enhanced Commissioning** 1
- Credit 4 **Enhanced Refrigerant Management** 1
- Credit 5 **Measurement & Verification** 1
- Credit 6 **Green Power** 1

Materials & Resources 13 Possible Points

- Prereq 1 **Storage & Collection of Recyclables** Required
- Credit 1.1 **Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof 1
- Credit 1.2 **Building Reuse**, Maintain 95% of Existing Walls, Floors & Roof 1
- LEED for New Construction Version 2.2
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- Credit 1.3 **Building Reuse**, Maintain 50% of Interior Non-Structural Elements 1
- Credit 2.1 **Construction Waste Management**, Divert 50% from Disposal 1
- Credit 2.2 **Construction Waste Management**, Divert 75% from Disposal 1
- Credit 3.1 **Materials Reuse**, 5% 1
- Credit 3.2 **Materials Reuse**, 10% 1
- Credit 4.1 **Recycled Content**, 10% (post-consumer + 1/2 pre-consumer) 1
- Credit 4.2 **Recycled Content**, 20% (post-consumer + 1/2 pre-consumer) 1
- Credit 5.1 **Regional Materials**, 10% Extracted, Processed & Manufactured Regionally 1
- Credit 5.2 **Regional Materials**, 20% Extracted, Processed & Manufactured Regionally 1
- Credit 6 **Rapidly Renewable Materials** 1
- Credit 7 **Certified Wood** 1

Indoor Environmental Quality 15 Possible Points

- Prereq 1 **Minimum IAQ Performance** Required
- Prereq 2 **Environmental Tobacco Smoke (ETS) Control** Required
- Credit 1 **Outdoor Air Delivery Monitoring** 1
- Credit 2 **Increased Ventilation** 1
- Credit 3.1 **Construction IAQ Management Plan**, During Construction 1
- Credit 3.2 **Construction IAQ Management Plan**, Before Occupancy 1
- Credit 4.1 **Low-Emitting Materials**, Adhesives & Sealants 1
- Credit 4.2 **Low-Emitting Materials**, Paints & Coatings 1
- Credit 4.3 **Low-Emitting Materials**, Carpet Systems 1
- Credit 4.4 **Low-Emitting Materials**, Composite Wood & Agrifiber Products 1
- Credit 5 **Indoor Chemical & Pollutant Source Control** 1
- Credit 6.1 **Controllability of Systems**, Lighting 1
- Credit 6.2 **Controllability of Systems**, Thermal Comfort 1
- Credit 7.1 **Thermal Comfort**, Design 1
- Credit 7.2 **Thermal Comfort**, Verification 1
- Credit 8.1 **Daylight & Views**, Daylight 75% of Spaces 1
- Credit 8.2 **Daylight & Views**, Views for 90% of Spaces 1

Innovation & Design Process 5 Possible Points

- Credit 1.1 **Innovation in Design** 1
- Credit 1.2 **Innovation in Design** 1
- Credit 1.3 **Innovation in Design** 1
- Credit 1.4 **Innovation in Design** 1
- Credit 2 **LEED Accredited Professional** 1

Project Totals 69 Possible Points

Certified 26–32 points Silver 33–38 points Gold 39–51 points Platinum 52–69 points