Building Environmental Sustainability
at
Bowling Green State University

Final Report

Bud Beatty, Academic Affairs (Chair)
Bryan Benner, Finance and Administration
Jim Evans, Geology
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September 2002

Environmental Sustainability
Committee Recommendations and Action Steps

Bowling Green State University can become a leader in environmental sustainability. Achieving this leadership would enhance our stature and effectiveness as a public institution, and move the university forward toward its goal of becoming the premier learning institution in the state and one of the best in the nation. The five recommendations and accompanying action steps below provide a framework for meeting this goal.

1. Adopt an institutional statement on Environmental Sustainability that clearly demonstrates its centrality to the mission of Bowling Green State University

Action step needed:
The "Bowling Green State University Statement on Environmental Sustainability," (as presented on the following page) proposed for adoption by the University President to the University Board of Trustees.

2. Proclaim the achievement of environmental literacy a goal of Bowling Green State University undergraduate education.

Action step needed:
A committee appointed by the University Provost to develop and promote specific options for modifying general education requirements to include environmental literacy.

3. Establish a centralized university structure to promote environmental academic programming, curricular initiatives and research, and to provide leadership to activities across administrative areas related to environmental sustainability.

Action step needed:
A committee appointed by the University President, in consultation with the University Vice Presidents, to develop specific options for centralized university structures. Part of the responsibility of this committee would be to include estimates of resource needs associated with each option.

4. All major operations should be audited in such areas as waste reduction, energy conservation, green purchasing and educational/information sharing programs.

Action step needed:
A committee appointed by the University President, in consultation with the University Vice Presidents, to identify options and associated costs for conducting audit.

5. Incorporate environmental sustainability standards into the design, construction, post construction and renovation of new and existing buildings and their surroundings.

Action step needed:
Work group appointed by the Senior Vice President for Finance and Administration to identify sustainability standards and develop a model for the incorporation of these standards into future renovation and building projects.

Statement on Environmental Sustainability
Bowling Green State University

In 1991, Bowling Green State University became a signatory of the Talloires Declaration, an international agreement "founded on the belief that institutions of higher learning must exercise leadership to promote and reinforce environmental responsibility by integrating the ethical, social, economic, and ecological values of environmentally sustainable development into institutional policies and practices" *(Association of University Leaders for a Sustainable Future, 1990).*

Environmental sustainability means protecting and preserving the environment while meeting human needs in a manner that assures a healthy environment for future generations. To attain its goal of becoming the premier learning community in Ohio and one of the best in the nation, BGSU must adopt a leadership role in promoting and practicing environmental sustainability.

In honoring its commitments, Bowling Green State University pledges to:

- Engage the University Community in conversations that promote environmental sustainability as central to its mission.
- Establish environmental literacy as an institutional goal.
- Promote interdisciplinary and multidisciplinary research, education, and creative work on environmental sustainability.
- Establish partnerships with primary and secondary schools to help develop capacity for teaching about environmental sustainability.
- Apply best management practices for environmental sustainability to University operations, with the following goals:
    - To protect the natural environment and its biodiversity.
    - To use energy, water, and other resources wisely, and to maximize the use of conservation practices, efficiency improvements, and renewable-resource alternatives.
    - To minimize the production of hazardous and other wastes, to minimize pollution, and to maximize the use of recyclable materials.
    - To establish purchasing practices to account for the recycled content, energy efficiency, and minimal hazardous-material content of new purchases.
    - To apply sustainability concepts to land acquisition, use and development.
    - To apply sustainability concepts to new construction and remodeling.
- Achieve or exceed compliance with applicable environmental laws and regulations.
- Set an example through community outreach including demonstrating and showcasing the success of sustainability concepts.

Environmental Sustainability
Subcommittee Recommendations

Four subcommittees identified ways in which Bowling Green State University can achieve environmental sustainability. The recommendations of each of the four subcommittees are provided below.

Marketing and Outreach Subcommittee

1. Create an Environmental Sustainability Planning Commission (ESPC) to provide leadership and direction to senior administration officials on issues, programs, and initiatives related to environment sustainability.

2. Designate at least one of the Provost's Lecture Series lectures to an environmental issue.

3. Adopt an institutional statement on Environmental Sustainability.

4. Develop an annual awards program that recognizes individuals, organizations and offices that have helped make BGSU or the surrounding community more environmentally sustainable.

5. Host an annual symposium or conference on an environmental sustainability topic or issue.

6. Work with Marketing and Communications to design a marketing concept for environmental sustainability that may include the use of the word "green" in Bowling Green, and the design of a logo.

7. Produce an Annual Report on Environmental Sustainability at BGSU.

8. Create a website that promotes campus efforts towards sustainability.

9. Through the ESPC, offer Environmental Sustainability Audits for units interested in modifying their current work practices, ordering and reliance on products and practices that challenge the environment.

10. Work with Marketing and Communications to write short news articles about new or ongoing sustainability projects.

11. Earmark a pool of funds to encourage faculty research that has an environmental focus.

12. Solicit offices that would serve as models on how to become more environmentally sustainable.

13. Produce educational materials on how to select "green products" when ordering.

14. Include BGSU's commitment to environmental sustainability in all promotional materials and on the Website

15. Continue to work with select units to develop collaborative outreach projects with local schools and communities.

General Studies Education, Graduate Programs, Interdisciplinary Incentives, Reconfiguration, and Other Academic Initiatives Subcommittee

1. Proclaim the achievement of environmental literacy a goal of BGSU undergraduate education.

2. Graduate education and research initiatives should be explored.

3. BGSU should provide mechanisms to encourage team-taught interdisciplinary courses.

4. Mechanisms to formally link academic environmental units across the campus should be explored.

Operations Subcommittee

1. All major operations areas should be audited for waste reduction activities, energy conservation activities, green purchasing and educational/information sharing programs.

2. A strong link must exist between academics and operational implementation of sustainable activities.

3. All current and future sustainable activities must be promoted both internally and externally.

4. BGSU should hire a full-time Sustainability Coordinator to oversee the implementation of future projects.

5. Specific and detailed recommendations are provided for a number of operational areas. For these areas, detailed are BGSU's current status and examples of activities to increase sustainable behaviors. Recommendations are prioritized on the basis of: A = Must Do, B = Should Do, C = Important, D = Not Urgent

Capital Development Subcommittee

1. Those who originate project ideas to inception should be required to demonstrate global thinking that is sensitive and inclusive of environmental sustainability.

2. Include the requirements for a general commitment to environmental sustainability to projects and the continuous proactivity required during design, construction and post construction.

3. Identify all environmental sustainability items to be researched and reviewed for a project.

4. Determine the level of commitment and level of investment projects would be suited for regarding environmental sustainability.

5. Provide and define the particular design requirements for environmental sustainability in projects.

6. Include requirements for any and all space requirements, functional aspects, building form, or systems associated with environmental sustainability.

7. Provide the global and micro connectivity to campus environmental sustainability plan for projects.

8. Generate the needed budgetary and financial commitment to environmental sustainability for projects.

9. Provide the analysis aspects of including environmental sustainability in projects.

10. Provide all hazard control and mitigation of hazards in the process of producing a project.

11. The capital planning process should incorporate designs that maximize the efficient use of energy.

12. The reuse or recycling of buildings should be the primary alternative considered before the construction of new facilities.

13. Building designs should include space that facilitates recycling.

14. Building designs should incorporate proper maintenance access for the provision of good indoor air quality.

15. Building design should incorporate community spaces into the building design.

16. The process for selecting project architects should give consideration to the firm's present capabilities to evaluate sustainable options and past accomplishments.

17. Project designers and engineers should offer "low environmental impact construction materials" options that minimize product packaging.

18. Building designs should be based upon flexible structures that are easily reused.

19. Project designers should attempt to minimize construction and demolition debris.

20. Project designers should attempt to incorporate educational exhibits highlighting elements of a building that support a sustainable environment.

21. Campus landscaping plans should incorporate indigenous plants that are acclimatized to the local conditions.

22. Guidelines concerning the construction phases should be developed by a working group during FY 2002-03.

23. Guidelines concerning Post Occupancy evaluation of sustainable systems should be developed by a work group during FY 2002-03.

Table of Contents

Introduction

Bowling Green State University can become the premier public university in Ohio for students selecting to study an environmental discipline, and for those selecting to study or work at an institution with a deep commitment to building a sustainable environment. BGSU began this process over ten years ago when President Paul Olscamp signed the Talloires Declaration, an international agreement "founded on the belief that institutions of higher learning must exercise leadership to promote and reinforce environmental responsibility by integrating the ethical, social, economic, and ecological values of environmentally sustainable development into institutional policies and practices.". More than 280 university leaders from around the world have signed this agreement, including those from such prestigious U.S. institutions as Brown University, University of Virginia, Rice University, Rutgers University, and the University of Wisconsin, Madison (for a complete list, see www.ulsf.org/programs_talloires_signatories.html#US). Many of the signatory universities have made substantial changes to their operations, missions and academic practices in response to their commitment. Although a signatory institution, BGSU has not moved aggressively forward.

Establishing a strong environmental identity will provide a new niche for Bowling Green State University, one for which we are very well prepared. The University offers a variety of academic programs in environmental disciplines, and includes in its operations an office dealing with environmental health and safety. However, its environmental activities are diffuse and do little to establish a reputation for overall campus environmental excellence. In Ohio, the only two institutions with well-established, progressive environmental reputations are private colleges: Oberlin College and Antioch College. Of the Mid-American Conference institutions, only Ball State University has implemented a comprehensive campus sustainability assessment review process. Elsewhere, environmental awareness continues to grow as the international community better recognizes the significance and character of environmental problems, as evidenced by the recent World Summit on Sustainable Development in Johannesburg, South Africa. The time could not be more ideal for BGSU to raise awareness of its current environmental capabilities and enhance its commitment to environmental sustainability.

During the 2001-2002 academic year, a committee was appointed by Provost John Folkins to offer recommendations for building an environmentally sustainable community at Bowling Green State University. The recommendations of the full committee are identified under the heading "Committee Recommendations and Action Steps." These are broad, institutional recommendations documenting major policy areas that may require substantial structural change. Following these initial recommendations are reports of each of the subcommittees:

1. Marketing and Outreach,
2. General Studies Education, Graduate Programs, Interdisciplinary Incentives, Reconfiguration, and Other Academic Initiatives,
3. Operations, and
4. Capital Development

The full subcommittee reports are labeled, respectively, Section 1, 2 3 and 4. Each of these subcommittee reports begins with a summary of recommendations and is followed by recommendation detail and rationale.

This document provides only the beginnings of a blueprint to move BGSU forward in achieving prominence for its environmental programs, attitudes and practices. However, this initial work clearly shows the potential of BGSU's environmental activities to achieve preeminence throughout the state and the region, and to serve as another example of the excellence of Bowling Green State University.

Environmental Sustainability
Committee Recommendations and Action Steps

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- Set an example through community outreach including demonstrating and showcasing the success of sustainability concepts.

Section 1
Marketing and Outreach Subcommittee
Report and Recommendations

Bud Beatty, Academic Affairs (Chair)
Jodi Haney, Division of Teaching and Learning
Beth Walter Honadle, Center for Policy Analysis and Public Service
Holly Myers-Jones, Environmental Programs
Dan Parratt, Environmental Health and Safety
Teri Sharp, Marketing and Communications
Linda Ueltschy, Legal Studies and International Business

Marketing and Outreach Subcommittee
Summary Recommendations

1. Create an Environmental Sustainability Planning Commission (ESPC) to provide leadership and direction to senior administration officials on issues, programs, and initiatives related to environment sustainability.

2. Designate at least one of the Provost's Lecture Series lectures to an environmental issue.

3. Adopt an institutional statement on Environmental Sustainability.

4. Develop an annual awards program that recognizes individuals, organizations and offices that have helped make BGSU or the surrounding community more environmentally sustainable.

5. Host an annual symposium or conference on an environmental sustainability topic or issue.

6. Work with Marketing and Communications to design a marketing concept for environmental sustainability that may include the use of the word "green" in Bowling Green, and the design of a logo.

7. Produce an Annual Report on Environmental Sustainability at BGSU.

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10. Work with Marketing and Communications to write short news articles about new or ongoing sustainability projects.

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14. Include BGSU's commitment to environmental sustainability in all promotional materials and on the Website

15. Continue to work with select units to develop collaborative outreach projects with local schools and communities.

Recommendation Detail and Rationale

If Bowling Green State University is to become one of the leaders in environmental sustainability, it is imperative that a system be created and implemented that promotes its efforts on an ongoing basis. As can be seen in other subcommittee reports, the University is already doing a considerable amount to educate students on environmental issues, adopt efforts to recycle and reuse products, and explore ways to become a regional and national leader in environmental sustainability. These efforts, however, have not received a considerable amount of attention. Therefore, as we move to make BGSU a more progressive institution in this area, a more conscious effort must be made to increase the level of thinking, practice, and understanding about the environment. Otherwise, all of the future efforts will follow the same fragmented, disjointed process as past efforts.

The Marketing and Outreach Subcommittee of the Bowling Green State University Environmental Sustainability Committee would like to offer the following recommendations to promote and reinforce the importance of environmentally related issues and activities

Create an Environmental Sustainability Planning Commission (ESPC) to provide leadership and direction to senior administration officials on issues, programs, and initiatives related to environment sustainability. This Commission would oversee the University's environmental sustainability initiatives. It would be comprised of faculty and staff, have a small operating budget, and some form of staff support or a graduate assistant. Ideally, a full-time staff member should be hired, or should assume the responsibility of overseeing environmental sustainability on the campus. Given the economic realities of our institution, however, creating this commission might be a more acceptable alternative. Regardless of the direction taken, the subcommittee strongly supports the need for some type of administrative support for the ESPC. Many university committees and task forces have either failed or become ineffective because they did not have proper administrative support. It would be unfortunate if the ESPC suffered the same fate due to lack of support.

The scope and responsibility of the ESPC could be determined at a later time. However, the group could coordinate many of the recommendations in this subcommittee report. One of the bigger issues that would need to be resolved is to whom the ESPC should report, and under what university division should it fall. Given the potential scope and responsibility of the ESPC, there are two divisions where it is a natural fit. These two areas are the Office of the Executive Vice President, or the Senior Associate Vice President for Finance and Administration. It would become the responsibility of the designated division administrator to establish the Commission charge and appoint the members. The subcommittee recommends that there be defined terms of service and that the appointments be staggered to assure continuity.

Adopt an institutional statement on Environmental Sustainability. Like the University Core Values or Strategic Future Directions, it is important for BGSU to adopt a statement that reaffirms its commitment to environmental sustainability. The subcommittee recommends that the *Bowling Green State University Statement on Environmental Sustainability*, as presented in the text box below (or a slightly modified version), be introduced by the appropriate official at the next available Board of Trustees meeting for adoption. History has proven that without institutional support at the highest levels, initiatives like environmental sustainability stand little chance of succeeding.

Bowling Green State University Statement on Environmental Sustainability

In 1991, Bowling Green State University became a signatory of the Talloires Declaration, an international agreement "founded on the belief that institutions of higher learning must exercise leadership to promote and reinforce environmental responsibility by integrating the ethical, social, economic, and ecological values of environmentally sustainable development into institutional policies and practices" *(Association of University Leaders for a Sustainable Future, 1990).*

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- Achieve or exceed compliance with applicable environmental laws and regulations.
- Set an example through community outreach including demonstrating and showcasing the success of sustainability concepts.

Host an annual symposium or conference on an environmental sustainability topic or issue. Bowling Green State University has an opportunity to become a regional and national leader in environmental sustainability. One of the ways in which we can promote the subject, and our university's commitment, is to sponsor an annual conference on topics related to the environment. The ESPC could be instrumental in working with departments like Environmental Programs, Environmental Health, and Environmental Health and Safety to coordinate such a meeting. Start up funding for the event could be provided by the ESPC. Through two grants, the University is currently sponsoring focused colloquia and presentations on environmental issues involving students from the University and the region, so there is a model there for developing this type of symposium or conference in the future. Ideally, this conference or symposium would involve local schools and communities.

Designate at least one of the Provost's Lecture Series lectures to an environmental issue. Given the large numbers of lectures and programs that already occur on campus, the subcommittee thought this might be more reasonable to incorporate a lecture on an environmental issue into an existing lecture series than to try to develop a separate one. This way there could be an assurance that a presentation on this subject would occur annually. One of the responsibilities of the ESPC could be to recommend a speaker to the Provost, and to help coordinate the event. The timing of the lecture could coincide with the annual symposium or conference on an environmental sustainability issue.

Earmark a pool of funds to encourage faculty research that has an environmental focus.One of the ways for the University to show its commitment to environmental sustainability is to encourage a higher level of scholarship by offering small amounts of start up money to faculty interested in conducting research in this area, especially for collaborative, multi-disciplinary work. Beyond lectures and symposia, research in areas with an environmental focus would help identify BGSU as an institution that believes in this discipline. The ESPC could again be helpful in administering the program. What would even be more relevant and timely is if research in this area could be incorporated into the institution's efforts to obtain funding for Third Frontier initiatives.

Work with Marketing and Communications to design a marketing concept for environmental sustainability that may include the use of the word "green" in Bowling Green, and the design of a logo. A representative of the ESPC would work with Marketing and Communications to help establish an "environmental presence" on the campus through a marketing campaign and through the creation of a logo. This would provide an important sense of identity not only for the ESPC, but also for the importance of environmental sustainability on the campus and in the community.

Create a website that promotes campus efforts towards sustainability. It would be crucial for a website to be created and maintained that provides current information on campus environmental sustainability issues. The website could be linked to the University's home page and contain such items as the annual report on environmental sustainability, campus events related to the environment, general announcements, facts, a calendar that included facts on environmental issues, and other useful information. The website could be maintained by the staff member who manages the websites for the Divisions of Academic Affairs and Finance and Administration.

Produce an Annual Report on Environmental Sustainability at BGSU. As part of an ongoing educational process for the campus and community, it would be important to produce an annual report that highlighted the accomplishments, programs, and initiatives related to the "greening" of the campus and surrounding community. This type of report could be placed on the website and made available to all of our constituents. The gathering of information and production of this report could be the responsibility of the ESPC.

Develop an annual awards program that recognizes individuals, organizations and offices that have helped make BGSU and the surrounding community more environmentally sustainable. As noted in other sections of this report, there are numerous examples of individuals and offices that have made significant contributions to the environmental sustainability of BGSU. It is important, therefore, to recognize these individuals and/or offices for their efforts. Instituting this type of recognition may inspire other offices or individuals to adopt a more "green" philosophy as it pertains to their work. The ESPC could be instrumental in developing awards criteria, soliciting nominations, selecting the recipients, and planning the ceremony.

Through the ESPC, offer Environmental Sustainability Audits for units interested in modifying their current work practices, ordering and reliance on products and practices that challenge the environment. An important service that could be offered by the ESPC is to conduct an environmental

sustainability audit. A three-person team would produce a non-binding audit that would identify areas where units could modify behaviors or practices that would support the institutional statement on environmental sustainability. Units that choose to implement recommendations from the audit report could apply for funding assistance through the ESPC, if appropriate. Units that modified their practices based upon the audit could be considered for the annual awards that recognize contributions toward increased environmental sustainability at the University, and also be recognized on the website.

Work with Marketing and Communications to write short news articles about new or ongoing sustainability projects. As this continued endeavor advances, it will be important to ensure that articles that promote our work and successes in this area appear in the media. The ESPC can assist in channeling information to our news service that can be prepared for our local, regional and national papers, or that can appear on news programs. This information can also be placed on the web site.

Solicit offices that would serve as models on how to become more environmentally sustainable. There are several offices that are prepared to adopt more environmentally sound operating principles. The Office of Registration and Records is one such unit. Where there will be a potential cost savings as a result of the adoption of more environmentally sustainable practices, it should be worked out in advance what will be done with the cost savings. If there is no reward structure or incentives built in to such an undertaking, there will be few offices that will volunteer to move in this direction. The ESPC can be instrumental in working with this office, charting their progress on the web site, and working with Marketing and Communication to promote the unit's decision to become more environmentally sensitive.

Produce educational materials on how to select "green products" when ordering. One of the concrete ways for units to be more environmentally sensitive is to prepare materials on how to make good decisions when selecting products such as paper, toner, and other office products. The ESPC could work with Purchasing to help identify products that are more environmentally friendly and make sure these items are promoted when it is time to order. This same arrangement could also be made with areas such as Unigraphics or other copy centers on campus. There are times when the paper selected on which to print posters or flyers is not recyclable, and that should be noted so the consumer is aware before making a paper selection. This educational material could be placed on the web site and promoted through the Monitor.

Include BGSU's commitment to environmental sustainability in all promotional materials and on the Website. It will be important for the University to promote its commitment to environmental sustainability beyond what has been recommended in this report. One way to do this is to include statements about our commitment, practices, and expectations in our major marketing publications, including admissions materials. The "green" web site alone cannot be expected to represent the University and its interest. It must be a consistent message found throughout all of its brochures, reports, and other marketing pieces.

Continue to work with select units to develop collaborative outreach projects with local schools and communities. As a potential leader in environmental sustainability in the area, it is important for the institution to promote and encourage these practices in our community. Using existing outreach units, the University should continue to support and develop collaborative initiatives that focus on environmental issues, education, and sustainability. The ESPC can work with University offices, businesses, and community groups to develop and sustain such partnerships. University faculty, staff, and students should be represented on committees and working groups that seek to improve the local and regional environment. Conversely, representatives from local and regional organizations and businesses could contribute to University working groups on environmental issues that connect the University with the wider community.

Section 2
General Studies Education, Graduate Programs, Interdisciplinary Incentives, Reconfiguration, and Other Academic Initiatives Subcommittee Report and Recommendations

Sarah Cech, Environmental Programs undergraduate student
Bettina Heinz, Interpersonal Communication
Rob Malcolm, Environmental Health undergraduate student
Holly Myers-Jones, Environmental Programs
Gary Silverman, Environmental Health
Bruce Smith, Geography
Phil Terrie, American Culture Studies (Chair)

May 2002

General Studies Education, Graduate Programs, Interdisciplinary Incentives, Reconfiguration, and Other Academic Initiatives Subcommittee
Summary Recommendations

1. Proclaim the achievement of environmental literacy a goal of BGSU undergraduate education.

2. Graduate education and research initiatives should be explored.

3. BGSU should provide mechanisms to encourage team-taught interdisciplinary courses.

4. Mechanisms to formally link academic environmental units across the campus should be explored.

Recommendation Detail and Rationale

This subcommittee considered ways in which BGSU could institute academic initiatives to improve its environmental profile, more efficiently and faithfully apply the Talloires Declaration, and offer a curriculum to its students, both undergraduate and graduate, that promotes environmental literacy and environmental integrity. We examined several basic topics:

- General Education, including the option of a university-wide requirement to promote environmental literacy.
- Graduate Education and Research initiatives.
- Interdisciplinary teaching, including institutional incentives and obstacles.
- Academic Program reconfiguration.

What follows is a series of recommendations concerning these topics, with rationale and supporting documentation.

Establish a university center to promote and facilitate environmental academic programming, curricular initiatives, and research across the campus.

Rationale: examination of all the individual issues above suggested a need for such a center.

Proclaim the achievement of environmental literacy a goal of BGSU undergraduate education. For example, revise (as needed) and adopt environmental literacy guidelines as suggested in the 1990 Pennsylvania System of Higher Education Faculty Development Forum report:

- Students must develop an understanding of how humans relate to natural systems and the importance of making wise decisions regarding the use of natural resources and maintaining human habitat fit for life and fit for living.
- Students must develop a knowledge and appreciation of local and global environmental issues.
- Students must develop a firm knowledge of fundamental scientific principles so that they can understand the consequences of human actions on natural systems.
- Students must develop reasoning and problem-solving skills that lead to responsible decision making and action regarding the interaction between humans and the environment.
- Create a general education environmental literacy requirement. This requirement could take the form of
    - selection from a menu of courses (analogous to cd [cultural diversity] or
    - a requirement met within another General Education area, e.g., ip [international perspectives] or
    - a single self-contained lower-division, general education course specifically designed to have students gain environmental literacy skills
    - In this course, students should
        - Describe the relationship of human society to natural systems and how the two have affected each other.
        - Analyze a wide variety of historic and current environmental issues, ranging from local to global importance.

- Describe the ecological, political, social, and economic implications of selected environmental issues and assess alternative solutions to those issues.
- Identify, describe, and evaluate their individual impacts on the environment.

Rationale: Environmental literacy is essential to responsible citizenship.

Documentation:

1. Environmental Literacy Requirement fulfilled by taking a course from an approved list of courses e.g., University of Georgia; Augustana University College (Canada); Eckerd College; University of Minnesota; Northland College; University of Wisconsin-Stevens Point.
2. Environmental Programs of Study/Specialized Schools e.g., Green Mountain College students must complete a 37-credit Environmental Liberal Arts Program (formerly knows as the General Education Program); Colorado School of Mines requires 9 semester hours in Earth and Environmental Systems.
3. Cross-disciplinary Immersion Programs, e.g. Florida Gulf Coast University: The University Colloquium brings together students from all four colleges in a series of interdisciplinary learning experiences focusing on ecological perspectives. University of Nebraska-Lincoln offers cross-disciplinary seminar series on environmental issues.
4. Curricular Diffusion e.g., Mount Holyoke College: listing of courses with environmental content through the college's Center for Environmental Literacy; Virginia Tech.
5. 1990 Pennsylvania System of Higher Education Faculty Development Forum report "Achieving Undergraduate Environmental Literacy".
6. 1992 United Nations Earth Summit "Agenda 21' Plan for Education' calls on universities to play role in preparing citizens to analyze and resolve environmental issues.
7. 1994 Council of State Governments' book of Suggested State Legislation calls on state legislatures to mandate environmental education.
8. Wilke, Richard. " Environmental Literacy and the College Curriculum Colleges and universities have a challenge to meet. EPA Journal http://www.epa.gov/epajrnal/spring95/story13.htm
9. Talloires Declaration.

Graduate education and research initiatives should be explored.

- BGSU should investigate establishing an interdisciplinary M.A. degree in Environmental Studies.
- BGSU should investigate establishing an interdisciplinary M.S. degree in Environmental Studies.
- BGSU should investigate establishing an interdisciplinary Master's degree in Environmental Management.
- BGSU should investigate establishing a Master's degree in Environmental Health.
- BGSU should encourage interdisciplinary research on environmental topics.

Rationale: This region is not well endowed with graduate programs in environmental disciplines; this presents BGSU with an opportunity to claim regional prominence.

Documentation: The following table provides information on graduate programs and degrees in environmental fields offered by Ohio institutions and other universities in the MAC.

Graduate Programs In Environmental Fields*

Institution	Environmental Science	Environmental Studies	Environmental Management	Occupational Health & Safety
Ohio				
Case Western Reserve				MS, PhD in Env. Health and other disciplines
Cleveland State	MS-Env. Science	MA-Env. Studies	MS, PhD-Urban Studies	
Medical College of Ohio				MS in various disciplines
Miami University	MS-Env. Science			
Ohio University		MA-Env. Studies		
Ohio State University	Degree unknown but listed with Biology and Env't Science			
Univ. of Cincinnati	MS & PhD-Env. Science			
Univ. of Findlay			MS-Env. Mgmt.	
Univ. of Toledo		Certificate in Env. Law		
Youngstown State			MS-Engineering	
Mid-American Conference				
Ball State			MA, MS-Nat'l Resources & Env. Mgmt.; EdD-Science	
Northern Illinois Univ.		MA-Geography and Env.Studies		
SUNY Buffalo	MS in Engineering with concentration in Env. Science			

*Source: Gradschools.com
No programs in Environmental Education and Environmental Policy were listed.

BGSU should provide mechanisms to encourage team-taught interdisciplinary courses.

Rationale: Formal mechanisms for encouraging and rewarding team interdisciplinary teaching do not exist at BGSU.

Mechanisms to formally link academic environmental units across the campus should be explored.

Rationale: Environmental programming at BGSU began in the 1970's with its environmental oriented programs clustered together with administrative responsibility directly to the VPAA. In the 1980's programs diverged to separate colleges. Subsequently, viable programs have been maintained in different colleges, but their respective roles are unclear and often confusing. Moreover, substantial overlap exists between their desired student outcomes. Many common resources are needed by both units. Other resources, available primarily only to one unit, could be productively used by multiple units (e.g. Environmental Studies' Resource Room; Environmental Health's laboratories).

Documentation:

1. Appendix 1 - ENVH 492 Class Report - Updating National Wildlife Federation's Report on Provosts and Academic Officers
2. Appendix 2 - ENVH 492 Class Report - Updating National Wildlife Federation's Report on Operations Officers
3. Appendix 3 - ENVH 492 Class Report - Updating National Wildlife Federation's Report on University Presidents
4. Appendix 4. - Listing of professional positions held by Environmental Health Program graduates

Section 3
Operations Subcommittee
Report and Recommendations

Tim Carney, Residence Life
Shelley Clagg, Graduate Student
Virginia Cogar, Environmental Programs
Ellen Dalton, College of Music
Jim Evans, Geology
Duane Hamilton, Facilities Services
Dave Heinlen, Environmental Health and Safety
Marion Scharf, College of Arts and Sciences
Dan Sturges, Facilities Services
Krisztina J. Ujvagi-Roder, Office of the President
Craig Wittig, Facilities Services (Chair)
Mary Young, Undergraduate Student

May 2002

Operations Subcommittee
Summary Recommendations

1. All major operations areas should be audited for waste reduction activities, energy conservation activities, green purchasing and educational/information sharing programs.

2. A strong link must exist between academics and operational implementation of sustainable activities.

3. All current and future sustainable activities must be promoted both internally and externally.

4. BGSU should hire a full-time Sustainability Coordinator to oversee the implementation of future projects.

5. Specific and detailed recommendations are provided for a number of operational areas. For these areas, detailed are BGSU's current status and examples of activities to increase sustainable behaviors. Recommendations are prioritized on the basis of: A = Must Do, B = Should Do, C = Important, D = Not Urgent

Recommendation Detail and Rationale

In examining BGSU's ability to comply with the Talloires Declaration, attention to operational activities will be crucial. More than twenty five areas were identified at BGSU that we feel would fall under the scope of this sub-committee (see text box below), and we looked at seven in detail.

Operations Areas at BGSU

Athletic Department	Library
Bursar	Marketing and Communications
Design and Construction	Materials Handling
Environmental Health and Safety	Parking and Traffic
Facilities Services	Postal Services
Custodial	Printing Services
Grounds	Purchasing
Trades	Residential Computing Connection
Waste Management	Residence Life
Energy Management	Registration and Records
Finance and Administration	Student Life
Dining Services	Student Publications
Student Union	Residential Facilities
Catering	Information Technology Services
Judicial Affairs	

All of these areas should be audited for waste reduction activities, energy conservation activities, green purchasing and educational/information sharing programs.

A strong link must exist between academics and operational implementation of sustainable activities. BGSU should use a wide variety of academic courses to research/evaluate sustainable management practices; this involvement must extend beyond traditional environmental students. Examples could include Economics students evaluating cost/benefit analysis of T8 lighting, Technology students evaluating alternative fuel vehicles, Journalism students drafting a public relations plan, Purchasing students developing a green purchasing manual.

All current and future sustainable activities must be promoted both internally and externally. Sustainable actions must be accompanied by education and promotion.

BGSU should hire a full-time Sustainability Coordinator to oversee the implementation of future projects. This person would serve in an advisory capacity to the many areas that oversee operational activities.

The following are areas that the sustainability operations subcommittee has examined at BGSU and attempted to examine our current status and give examples of what increased sustainable behavior would mean. On each of the future recommendations, we have ranked A=Must Do, B=Should Do, C=Important, Not Urgent

GROUNDS/LANDSCAPING

Current status and projects

1. Integrated pest management system that emphasizes chemical control only as a last resort
2. Establishing a Geographic Information System (GIS) to monitor and manage the 4,000+ trees on-campus
3. Tree Replacement Program – at least two planted for each taken down
4. Collaborated with other campus units to support native plantings in numerous locations
5. Composting program – handles all leaves and grass

Future

1. Need top down support (A)
2. Need to educate the campus community on issues such as native plantings, integrated pest management, etc. (B)
3. Need to involve more native plantings in landscaping (B)
4. Need to promote what we are already doing (B)

HAZARDOUS WASTE MANAGEMENT

Current status and projects

1. Significant waste minimization in research facilities
2. Established liaison in each department that uses hazardous waste
3. External contractor packages waste properly for off-site removal
4. All waste that can be disposed of in non-land application is, to minimize future problems
5. Always striving to identify non-hazardous replacements for current chemicals
6. Classroom chemicals are neutralized prior to disposal
7. Currently removing PCB ballasts and mercury thermometers
8. Established nationally known orphan chemical exchange program that is used by BGSU and other government entities

Future

1. Increase a budget that has remained static for 10 years (A)
2. Implement fluorescent tube recycling (B)
3. Implement electronics recycling, especially computers and components (C)

WASTE MANAGEMENT

Current status and projects

1. Currently recycle 28% of the campus waste stream
2. Currently compost at least 11% of the campus waste stream
3. Currently have 250+ recycling stations on every floor of every building that would accept one
4. Recycling station on every floor of every large residence hall
5. Collect cardboard from 32 locations across campus
6. Establishing Geographic Information System (GIS) to track and manage recycling and solid waste collection services

Future

1. Need a top down statement supporting/encouraging employees to recycle (A)
2. Establish additional locations so recycling is available on every floor of every building (B)
3. Implement special event recycling for picnics, graduation etc. (C)
4. Implement athletic event recycling (C)
5. Establish recycling collection stations in accessible outdoor areas (C)
6. Establish small residential unit recycling program (B)
7. Implement waste reduction education program (A)
8. Automate recycling collection (A)

ENERGY AND RESOURCE CONSERVATION

Current status and projects

1. Natural Gas is the primary fuel source for generating steam used for heating and food preparation for most of the campus.
2. Facilities staff have implemented a "Red Dot" system for identifying light fixtures intentionally unlit in over lit areas.
3. Electronic ballasts and T8 lamps are installed in any new installations or fixture replacement projects.

Future

1. Broad replacement of inefficient lighting systems with T-8 lighting (A)
2. Installation of occupancy sensors for light control and energy savings when spaces are unoccupied (B)
3. Installation of vending machine energy consumption controllers (C)
4. Replacement of old chillers and cooling towers with newer, more efficient units (B)
5. Installation of digital control automation on building HVAC Systems (B)
6. Improve condensate system to reduce loss and chemical usage (C)
7. Replace roofs to increase energy savings and reduce maintenance costs (C)

DINING SERVICES

Current status and projects

1. Make the right choice program tries to promote the usage of permanent ware
2. Extensive recycling of all recyclable items from food service areas
3. Attempting to purchase local produce when possible
4. Reusable cups available to incoming freshman

Future

1. Provide recycling at every catered event (B)
2. Implement food waste composting estimated 65-80 tons of pre-consumer waste per year (C)
3. Retool strategies to prevent improper use of disposables (A)
4. Impose user fee for disposables (A)
5. Establish a student committee to examine disposable usage (A)
6. Strengthen plastic recycling program (C)
7. Look to purchase local produce and other products (C)

RESIDENCE LIFE

Current status and projects

1. Using paperless procedures for numerous forms and paperwork for staff
2. 70% of residents register on-line for housing
3. Financially supported the placement of recycling bins on every floor of each residence hall
4. Mandatory recycling program in place for all staff members
5. Residential Computing Connection recycles paper and toner cartridges in all labs

Future

1. Need top down support both verbal and financial to support future actions (A)
2. Educate students more aggressively on energy and water usage (A)
3. Continue to develop educational piece for residence hall recycling (B)
4. Utilize "green technology" and recycled products in future construction (B)

PURCHASING

Current status and projects

1. 47 tons of tissue products purchased by BGSU contained at least 50% post consumer recycled content
2. All current copy paper in BGSU warehouse contains 30% post consumer recycled content

Future

1. Purchasing policies similar to those from the University of Illinois at Urbana-Champaign (text box below) need to be implemented (A)

University of Illinois at Urbana-Champaign Purchasing Policies
(http://www.admin.uiuc.edu/CAM/CAM/vii/vii-b-9.html)

RECYCLING, RECYCLED PRODUCTS PROCUREMENT, AND WASTE REDUCTION
Use of Services and Stores Policies, Storerooms/Purchases, Section VII/B – 9

These policies implement the university's commitment to recycling and waste reduction.

The University of Illinois at Urbana-Champaign implemented the University Recycling Program in February 1989 for both environmental and economic considerations. Recycling has become an important waste management activity, which conserves natural resources and landfill space and also reduces waste disposal costs…the program has been expanded into a Recycling and Materials Reduction Program (RMRP) to reflect a unified approach to campus waste management. The RMRP is assigned to the building operation section of the Operation and Maintenance Division.

The three policies below should save resources, reduce our waste stream, and improve the market for recycled materials. Each individual's active participation is crucial if the University's program is to be successful.

II. PROCUREMENT OF PRODUCTS MADE WITH RECYCLED MATERIALS

The University will purchase products with recycled material content whenever cost, specifications, standards, and availability are comparable to products without recycled content…Additional preference will be given to the specification of items with the highest content of recycled material.

Examples of products and materials covered by this policy include, but are not limited to, office supplies, paper products, building materials, lubricants of all types, reprocessed chemicals, remanufactured parts, landscape products (yard wastes), and materials used in pavement construction projects. The use of recycled materials should also be encouraged when orders are placed for brochures, catalogs, books, letterheads, business cards, etc. In addition, to ensure that a larger percentage of the University's waste stream can be recycled, the procurement policy will seek to eliminate the purchase of nonrecyclable materials when suitable substitutes exist.

Date Issued: May 3, 1990
Approved by: Vice Chancellor for Administration and Human Resources

NOTE:

Printing trade customs allow for plus or minus 10% in over/under-runs. This means an order close to $5,000 might exceed the P-Card limit. Units should be certain the final order will be under the $5,000 limit before using a P-Card for the purchase.

The University has standards for certain stationery materials including items with logos, items with the University of Illinois Seal, and business cards. If using off-campus sources for printing these materials, units must obtain written confirmation from the campus to ensure that the proposed materials conform to those standards prior to making the purchase.

Units must purchase stationery and other printed products with recycled material content whenever cost, specifications, standards, and availability are comparable to products without recycled content.

Date: October 2000
Approved: Sr. Assoc. VP for Bus. & Fin.

Section 4
Capital Development Subcommittee
Report and Recommendations

Wil Roudebush, Technology Systems
Jim McArthur, Architect's Office

June 2002

Capital Development Subcommittee
Summary Recommendations

1. Those who originate project ideas to inception should be required to demonstrate global thinking that is sensitive and inclusive of environmental sustainability.

2. Include the requirements for a general commitment to environmental sustainability to projects and the continuous proactivity required during design, construction and post construction.

3. Identify all environmental sustainability items to be researched and reviewed for a project.

4. Determine the level of commitment and level of investment projects would be suited for regarding environmental sustainability.

5. Provide and define the particular design requirements for environmental sustainability in projects.

6. Include requirements for any and all space requirements, functional aspects, building form, or systems associated with environmental sustainability.

7. Provide the global and micro connectivity to campus environmental sustainability plan for projects.

8. Generate the needed budgetary and financial commitment to environmental sustainability for projects.

9. Provide the analysis aspects of including environmental sustainability in projects.

10. Provide all hazard control and mitigation of hazards in the process of producing a project.

11. The capital planning process should incorporate designs that maximize the efficient use of energy.

12. The reuse or recycling of buildings should be the primary alternative considered before the construction of new facilities.

13. Building designs should include space that facilitates recycling.

14. Building designs should incorporate proper maintenance access for the provision of good indoor air quality.

15. Building design should incorporate community spaces into the building design.

16. The process for selecting project architects should give consideration to the firm's present capabilities to evaluate sustainable options and past accomplishments.

17. Project designers and engineers should offer "low environmental impact construction materials" options that minimize product packaging.

18. Building designs should be based upon flexible structures that are easily reused.

19. Project designers should attempt to minimize construction and demolition debris.

20. Project designers should attempt to incorporate educational exhibits highlighting elements of a building that support a sustainable environment.

21. Campus landscaping plans should incorporate indigenous plants that are acclimatized to the local conditions.

22. Guidelines concerning the construction phases should be developed by a working group during FY 2002-03.

23. Guidelines concerning Post Occupancy evaluation of sustainable systems should be developed by a work group during FY 2002-03.

Recommendation Detail and Rationale

The relationship between the BGSU Capital Develop process and future sustainability efforts is best understood by first identifying the domain for which environmental sustainability is active and is within our purview of control. Essentially we are bound by the BGSU campus proper and the limitations of Capital Development principally fall within this domain. However, considering that environmental sustainability is not a static system we realize that the full domain may be considered larger and outside the campus proper. (Refer to Appendix 5.) For purposes of this scope of investigation we are interested primarily in the portion of the sustainable domain that is the campus proper.

It is also important to recognize that Capital Development can be viewed as a layering of the campus from a global perspective and also a layering from an individualized subset of the whole. Capital Development is therefore a holistic system requiring systems thinking that has very broad and very focused venues of concern. Capital Development and the layering of the campus for these purposes is certainly interconnected in relationships that encompass environmental sustainability. The development of environmental sustainability for the campus is occurring at a very opportune time because there are two other significant developments beginning for BGSU. The development of campus Master Planning for the next 30 years and the initiation of the infrastructure Central Data Hub are concurrent planning activities that define how BGSU will move into the future. Therefore, environmental sustainability planning can be inclusive and interconnected with these two other plans. Additionally, the backbone of all three of these planning activities is the ongoing and essential Financial Plan that makes the future possible. (See the Concurrent Planning Systems diagram in Appendix 6.)

Capital development includes the following: buildings (to include indoor environment), grounds, infrastructure (streets, parking, sidewalks, communications, etc.), university vehicles and equipment, material procurement, and funding sources related to capital development.

Capital development projects at Bowling Green State University go through six stages of project development and implementation. These stages are idea generation, inception/planning (feasibility/viability/assessment), program statement development, design, construction, and post-occupancy. Principles for each of the six stages will be established. Best practices will be established for each of the principles developed. During the post-occupancy stage of project development and implementation, feedback to design is critical toward an environmentally sustainable campus at Bowling Green State University. A systems approach and pattern language will be used to establish the capital development principles and their best practices.

Six stages of project development:

1. Idea
2. Inception point
3. Program, programming, program statement
4. Design
5. Construction
6. Post occupancy

<u>Idea</u> – It is a point in the project process that does not require any notion of environmental sustainability, as this point is more pragmatic in originating a means to an end for a specific purpose or function.

<u>Inception/Planning</u> -- This point broadens the idea and initiates a greater realization of the idea. At this point it is very likely that environmental sustainability will enter the dialogue and be the point where stipulation for inclusion of environmental sustainability be posed as the counter weight to a good idea. A

good project idea should be tested against the ability to include environmental sustainability. Thus, there is a need for principles that guide this phase of activity.

Those who originate project ideas to inception should be required to demonstrate global thinking that is sensitive and inclusive of environmental sustainability. This would be the beginning of environmental sustainability leadership.

This should be the orientation period of those furthering ideas. Parties of project inception should be advocates of environmental sustainability and should begin to reflect on clear notions about fostering an environmental sustainability plan to accompany this growth of an idea.

There should be no reluctance to initiate the thinking and reasoning of environmental sustainability. Those who are unsure about the concept of environmental sustainability should begin their education of the subject matter and be proactive for its inclusion to their project evolution.

Programming -- This point in the project life is the stage for elucidating problems associated with the future project and it is a period to ask many questions. This is not the time to propose solutions. At this point project needs are fully unveiled, but solutions remain veiled and do not accompany programming. A good program will be inclusive of the need for environmental sustainability. Thus, the general provisions and the unique provisions for dealing with environmental sustainability will be provided. There will be a comprehensive, clear, and concise path for inclusion of environmental sustainability in the workings of this project.

Include the requirements for a general commitment to environmental sustainability for the project and the continuous proactivity required during design, construction and post construction. This would be a continuous and more important level of environmental sustainability leadership.

Identify all environmental sustainability items to be researched and reviewed for a project. Reference relevant documents to be complied with in the process of design solutions.

Determine the level of commitment and level of investment this project would be suited for regarding environmental sustainability.

Provide and define the particular design requirements for environmental sustainability in this project. Provide the necessary and comprehensive level of environmental sustainable design required by the architects and engineers of the project.

Include requirements for any and all space requirements, functional aspects, building form, or systems associated with environmental sustainability.
Provide the global and micro connectivity to campus master plan for this particular project.

Provide the global and micro connectivity to campus environmental sustainability plan for this particular project.

Generate the needed budgetary and financial commitment to environmental sustainability for this project. Provide involvement with BGSU Development for attainment of funding as it relates to the project's environmental sustainability.

Provide the analysis aspects of including environmental sustainability in the project. Include life cycle cost analysis and reduction of such, expected operating costs and reduction of such, return on investment and maximum return, energy source costs and energy conservation, building efficiency and space utilization, value engineering, environmental impact, etc.

Provide all hazard control and mitigation of hazards in the process of producing the project. Include thorough requirements of evaluation of hazards or potential hazards to the project. This includes how the project will be constructed and the procedures to be used in construction process.

Design -- This point in the project development means that all architect and engineer and specialty consultants will be contracted with and are ready to engage in design solutions to the program established. All the parameters of the design professional's service requirements should be fully, clearly, and concisely included in the legal contract for professional services. At this point there is little opportunity or cost effective opportunity to modify the service and scope requirements for design. Thus, the consultants should already know what level of environmental sustainability should be performed and the requirements and expectations for environmental sustainability in the design process and the final design solution.

The capital planning process should incorporate designs that maximize the efficient use of energy. Designs that incorporate high efficiency windows, motors, digital ventilation controls, and insulation systems should be a high priority for building projects. Minimizing the consumption of energy is a key factor in minimizing the environmental footprint resulting form energy production.

The reuse or recycling of buildings will be the primary alternative considered before the construction of new facilities. The reuse of existing structures offers the best opportunity to minimize demolition debris while conserving those resources that would be utilized in constructing a new building.

Building designs will include space that facilitates recycling. To support recycling efforts space must be provided to facilitate the collection and processing of recycled materials.

Building designs will incorporate proper maintenance access for the provision of good indoor air quality. The development of "tighter" buildings has heightened the need to allow for the proper maintenance and cleaning of ventilation systems. A sustainable building must be one that provides a healthy environment.

Building design will incorporate community spaces into the building design. Space that facilitates public transportation would be an example of community space.

The process for selecting project architects will give consideration to the firm's present capabilities to evaluate sustainable options and past accomplishments. In order to seek out sustainable alternatives architectural firms must be made aware that these alternatives are important to the university community. Including a review of a firm' sustainable capabilities is a means to highlight the importance.

Project designers and engineers will offer "low environmental impact construction materials" options that minimize product packaging. Informing project designers that environmental impact of building materials is important to our community is a key step in helping to shape the project. In turn letting the purchasing agents of construction materials know that minimizing packaging is important to containing the environmental impact of a building project.

Building designs will be based upon flexible structures that are easily reused. In order to facilitate the reuse of a building consideration should be given to sufficient utility spaces and conduits to ease the reconfiguration of space.

Project designers will attempt to minimize the construction and demolition debris.
Project designers will attempt to incorporate educational exhibits highlighting elements of the building that support a sustainable environment. The education of community members about the sustainable elements of specific building will serve to promote their understanding and future support of sustainable systems. Building systems that support sustainability are not always apparent to the uniformed community member.

Campus landscaping plans should incorporate indigenous plants that are acclimatized to the local conditions. Indigenous landscaping that has been acclimatized to the local area is more disease resistant and usually requires less investment to maintain.

Construction – This point is the actual implementation period of the project. The project is constructed in phasing as is deemed necessary during the project planning and design. There is an identified duration that construction should occur. Construction is accomplished based on the construction documents that are produced during the design phase and requires project management and project administration to oversee and control process or procedures related to implementation and quality of care. Thus, this point is where the requirements of project environmental sustainability as it relates to the building design and environmental sustainability for construction practices is overseen and monitored for compliance. This point is interesting because while a permanent product of environmental sustainability is being produced through construction for the long-term enrichment of the campus, short term, and temporary environmental sustainability practices are occurring through construction related sustainability.

Guidelines concerning the construction phases should be developed by a working group during FY 2002-03.

Post Occupancy -- This point is when the project is fully in operation and begins to function with the intended expectations described in the program and the design phases. The project begins utilizing the environmental sustainability features and begins the very important environmental sustainability performance monitoring as well as a feedback loop related to systems improvement. Thus, this point is important to the continued success of environmental sustainability for the campus and for future project improvement.

Recommendations: **Guidelines concerning Post Occupancy evaluation of sustainable systems will be developed by a work group during FY 2002-03.**

It is interesting that energy in the form of "analysis energy" must be expended in order to stabilize and maintain the self-organization of the global system. This type energy as well as various forms of energy in general, we must attempt to sustain in the system to the best of our ability. We must formulate principles and practices in the form of a pattern language that makes our energy expenditures efficient. (Refer to Appendix A for Pattern Language description and definition.) Varied forms of energy exist in our domain and become the central focus of our objectives with environmental sustainability. All inputs and outputs formulate into a relationship with energy in one way or another. Energy is an extremely complex commodity to optimize because of the significant quantity of variables it involves. In fact, it is difficult to isolate the totality of variables and even more difficult to assess the distribution of these energy resources, and the expenditure of energy to multiple consumer variables. However, these variables of energy are ever present and exist within our system. If sustainability is first and foremost energy related, how can a sustainable system quantify and qualify the self-organization and generate

system optimization over time? This in essence, is what we believe is the goal of Capital Development as it relates to an environmentally sustainable system.

One might understand this concept better if we could isolate this campus energy in terms of a Global Information System (GIS) layering over the campus. If we could ask the GIS questions in the quest for resultant graphic interfacing, in a three-dimensional context we might observe where there are energy loses, energy sinks, energy sources, latent energy, etc., as several examples. We might ask for one example, over the domain of the campus proper provide us results of energy utilization of all buildings and facilities? The GIS would produce a comprehensive, three-dimensional graphic, layered over the campus to identify the energy utilization for each building. We might equally ask a less definitive type question of the GIS. An example of this could be an illustration of university college energy expenditures and resultant outputs related to research as a GIS quest. The GIS would again produce a graphic that would illustrate the optimization of our research output and we could conclude the level of sustainability that research provides to the university over time. It is easy to see that there are enumerable variables that could be isolated and studied for their impact or effect on the global environmentally sustainable system, a system we must thoroughly evaluate to assure that there are efficiencies in the system to produce optimization.

One might immediately ask if we are assessing the correct information as it relates to environmental sustainability. We might want to ask again, what is environmental sustainability and what do these terms really mean? These are important questions. Lets look at the term environment. The environment can be all circumstances and conditions that surround one within a system. Therefore, the environment becomes all things that will impact the domain of our study and assessment. Sustainability might represent the systems ability to recognize the need for nourishment, commitment, maintenance, and resolution to keep the system from falling, sinking, or failing. Again, we can see that optimization is the active concept for sustainability. We speak of the university as a composite whole as a system with the potential for growth and change through a methodology of self-organization that will provide optimization of input. When this level of optimization is achieved we have environmental sustainability. To recognize environmental sustainability as anything less than a comprehensive understanding of the innate complexity that truly exists would be simple "lip service" to the terms and would not result in a complete and objective understanding of environmental sustainability.

Based on what we have defined above, we quickly come to the realization that we have an entropic system. Entropy can be defined as the tendency of a system to lose energy over time and similarly the measure of energy not available to maintain the order of the system. Thus, the tendency of a system is to lose energy over time and forces the system toward continuous loss of order, or in other words, the system alteration tends toward greater system chaos. Entropic systems continuously lose energy and chaos becomes ever more progressive over the system, unless energy is infused into the system to right the dissipation of energy. The system also becomes more static (see Graphic 1.2). Unless there is a continuous infusion of new energy into the system the system is said to move toward higher entropy, until such time when the system is completely static and absent of energy. The magnitude of system's degradation is a direct relationship to the energy required to reorder the system. With this being true, there is quite likely a point in time, without new energy infusion to the system that the system can no longer be adequately managed. The quantity of energy necessary to reorder the system is ever greater than the supply of energy required. If this becomes true, abandonment of the system becomes the only alternative. A new system must be initiated where such inception point begins a system new, utilizing the re-proportion of energy that is remaining available. Therefore, the design of each system must be responsive to the quantity of energy available and should be developed with the concept of optimization inclusive to the proportioning or allocation of available energy. The new system has the allowable energy needs available to generate a self-organizing system where order is sustainable within the created principles and practices that help to optimize systems.

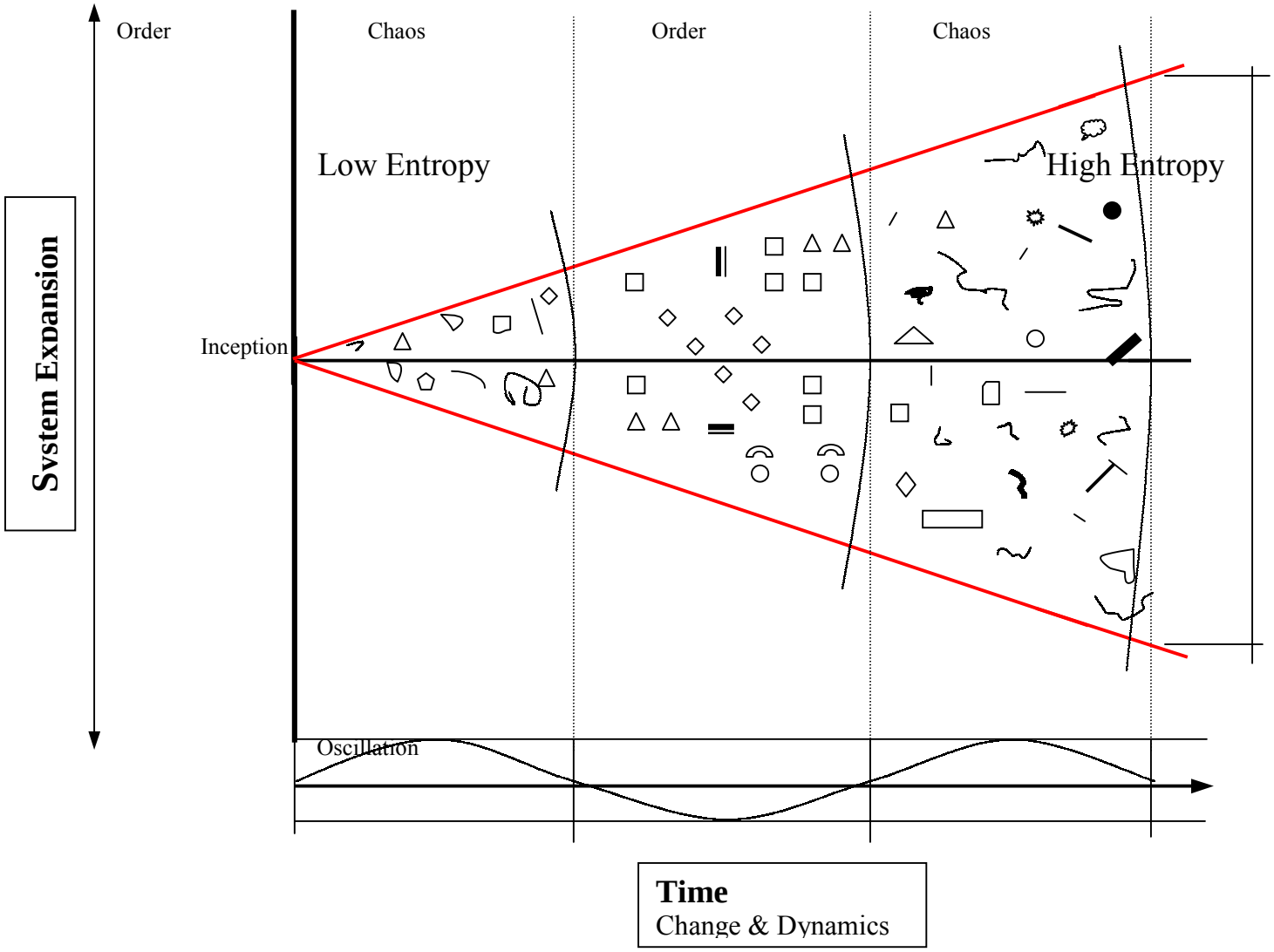
Development of a pattern language for Bowling Green State University is recommended toward an environmentally sustainable campus. According to Alexander et al. (1977), a pattern language has the structure of a network. The network is hierarchical from large- scale patterns to detail patterns.

Patterns are like key words or elements of a problem or project. A pattern language helps develop the best in these patterns toward problem solution. A pattern language example is the pattern porch. What makes a good porch? Certain attributes, such as width, orientation, and so forth, make a good porch.

A pattern language can be developed to include each of the fives key areas of environmental sustainability at Bowling Green State University. The pattern language would provide environmental sustainability solution foci.

Reference:
Alexander, C., Ishikawa, S., and Silverstein, M. (1977). A pattern Language. New York: Oxford University press.

Graphic 1.2



Appendix 1
ENVH 492 Class Report:
Updating National Wildlife Federation's Report on Provosts and Academic Officers

Prepared by ENVH 492 Class:
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December 2001

Appendix 1
ENVH 492 Class Report:
Updating National Wildlife Federation's Report on Provosts and Academic Officers

The National Wildlife Federation surveyed signatory universities to the Talloires Declaration. Its report was separated into three sections: University Presidents and Executive Offices, Chief of Facilities of Plant Operations, and Provosts and Academic Officers. During the Fall semester of 2001, students enrolled in ENVH 492 completed these surveys for BGSU using information that they were able to obtain from university documents and through discussion with key individuals. That information is presented below for Provosts and Academic Officers in italics, following the National Wildlife Federation results (non-italicized font).

Key Findings

Colleges and Universities Offer Environmental Courses

Colleges and universities, uniquely situated to educate America's future leaders on environmental issues, have taken strides towards including environmental studies in their curricula. Nearly four in five offer at least one course on environmental studies. In half of all four-year schools a majority of students take a course related to environmental issues, although a smaller number of two-year schools can boast this level of participation. There is even a small but notable minority that require most or all students to take a course on environmental studies, and a larger minority requiring at least some students to take such a course.

BGSU offers several courses on environmental studies, including courses that satisfy general education requirements in the social sciences, natural sciences and in international perspectives. A substantial number, but probably less than the majority, of students at BGSU take broad environmental courses. During the spring and fall semesters of the year 2000, approximately 560 students took the general education courses ENVS 101 (Introduction to Environmental Studies), 1380 took BIOL 101 (Environmental of Life) and 45 took ENVH 210 (Global Commons: International Perspectives on Environmental Health and Protection). (Please note that some students may have taken more than one of these courses).

BGSU has no general requirement for all students to include environmental studies in its educational programs. Only those students majoring in environmental policy, environmental science and environmental health are required to take environmental classes.

Majority of Four-Year Colleges and Universities Offer Environmental Studies Major or Minor

In addition to the prevalence of environmental studies courses on college campuses, many schools have truly made environmental studies an academic priority with the establishment of an undergraduate major or minor. A large minority of colleges and universities offer an environmental studies major or minor, and a majority of four-year schools do so, as well. Moreover, a solid number offer the option to pursue environmental studies through an interdisciplinary degree program, and many also offer opportunities for environment-related studies through internship programs, independent research projects, and service projects.

BGSU offers undergraduate majors through the College of Arts and Science in Environmental Policy and

Analysis and Environmental Science, through the College of Health and Human Services in Environmental Health. These programs also offer minors, and require internships. Opportunities for independent research and service projects are available.

In the End, Many Students May Not Gain Basic Environmental Literacy

While a few departments offer courses that deal with environmental topics, these tend to concentrate in the physical sciences such as biology and chemistry. More work, in particular, needs to be done in offering environmental courses in the fields of education, engineering, and law. Meanwhile, students can avail themselves of the many opportunities colleges and universities offer to study environmental topics outside the classroom, through independent research projects, internship programs, community service programs, and campus service projects.

BGSU offers environmental topics in courses outside of the physical sciences and environmental programs as shown on Table 1. Many BGSU students graduate without having taken any course designed to provide environmental literacy.

Table 1. Courses on Environmental Issues Separate From Physical Sciences, Environmental Health and Environmental Programs.

Department	***Course Number***
American Culture Studies	*ACS 338*
Architecture/ Env. Design Studies	*ARCH 436*
Architecture/ Env. Design Studies	*ARCH 490*
Construction Mgmt & Technology	*CONS 412*
Economics	*ECON 335*
Education	*EDFI 416*
History	*HIST 338*
Legal Studies	*LEGS 431*
Philosophy	*PHIL 332*
Political Science	*POLS 336*

Faculty Environmental Research Receives Support from Colleges and Universities

Aside from providing students with opportunities in environmental studies, many schools also support faculty who are engaged in environmental research. Half of all campuses have programs to support faculty professional development on environmental topics, and one in three four-year schools house a research institute that studies environmental issues. Although supporting faculty in environmental studies is common, few schools evaluate professors on how they integrate environmental topics into their courses.

BGSU does not house a research institute that has environmental research as its primary mission. Some campus research centers address issues with environmental ramifications - one example is the Center for Policy Analysis and Public Service. BGSU has no program evaluating faculty integration of environmental topics into course work. Faculty professional development opportunities are available at BGSU, but none are specifically oriented toward environmental areas.

Environment Grabs Strong Foothold in the Curricula

Although there is a great deal of variation in the extent to which colleges and universities make the environment part of the college experience, virtually all schools in the United States incorporate the environment, at least in some way, into the academic curriculum. Schools have designed many different avenues for students to pursue studies on the environment, including internship programs, community service projects, interdisciplinary degree programs, majors or minors, or even required courses.

Percentage of Students Who Take One or More Environmental Studies Courses

	TOTAL (%)	2-YEAR DEGREE	4-YEAR DEGREE
Basic functions of the earth's natural systems			
Less than 30% of students	38	51	30
30% or more of students	50	39	55
Correlation between human activity and environmental sustainability			
Less than 30% of students	52	63	45
30% or more of students	38	29	41
Practices that support a sustainable lifestyle			
Less than 30% of students	57	63	54
30% or more of students	30	25	33
Policy strategies that support environmental sustainability			
Less than 30% of students	61	71	57
30% or more of students	26	18	31

Environmental studies is not as predominant in classrooms as more traditional subjects in the natural and social sciences, but schools have nonetheless chosen to promote environmental studies in many different ways. Although virtually every school has an English, biology, math, political science, and chemistry program, more and more colleges and universities are choosing to make environmental studies part of their core curricula as well.

Does School Offer Major or Minor in Environmental Studies?

	TOTAL (%)	2-YEAR DEGREE	4-YEAR DEGREE
Major or Minor	43	18	57
Major	35	17	44
Minor	32	7	45
Both Major & Minor	23	6	32

In nearly half (45%) of all colleges and universities, a majority of students take a course related to the environment during their tenure. In fact, in half (51%) of four-year schools a majority of the student body take an environmental studies course, compared with 35 percent of two-year schools. Half (50%) of all provosts say that 30 percent or more of their students take at least one course on the basic functions of the earth's natural systems, and four in 10 (38%) say at least 30 percent of students have had a course on the

correlation between human activity and environmental sustainability. Somewhat fewer schools say at least 30 percent of their students have taken a course addressing practices that support a sustainable lifestyle (30%) or policy strategies that support environmental sustainability (26%). Just 6 percent of provosts say that no students at their schools have taken a course on any of these subjects. In each of these specific areas, more students at four-year schools than two-year schools have taken a course dealing with the environment.

BGSU courses matching the category descriptors used by the Wildlife Federation were identified. The number of students who took these courses during the year 2000 calendar is shown on Table 2.

Table 2. Number of BGSU Students In Courses Dealing with Environmental Issues, Calendar Year 2000

	Number	***Courses***
The basic functions of the	*558*	*ENVS 101*
earth's natural systems	*1376*	*BIOL 101*
The correlation	*600*	*GEOL 104*
between human	*45*	*ENVH 210*
activity & environmental	*12*	*ENVH 402*
sustainability	*60*	*ENVS 301*
	60	*BIOL 354*
Practices that support	*60*	*ENVS 301*
a sustainable lifestyle	*45*	*ENVH 210*
	33	*ENVS 401*
	15	*BIOL 409*
Policy strategies that	*60*	*ENVS 301*
support environmental	*40*	*ENVS 402*
sustainability	*20*	*ENVH 306*
	48	*POLS 336*
	60	*PHIL 332*

Many schools have established a commitment to environmental studies through the development of a major or minor for undergraduate students. Four in 10 (43%) colleges and universities offer undergraduates the opportunity to major (35%) or minor (32%) in environmental or sustainability studies. In fact, among four-year colleges and universities, 57 percent offer an undergraduate major (44%) or minor (45%) in environmental studies, and one in three (32%) offer both. Schools with less than 1,000 students (22%) are half as likely as all other schools (52%) to offer a major or minor. Aside from offering majors and minors in environmental or sustainability studies, many schools have incorporated environmental studies into the curriculum through interdisciplinary degree programs. Fully half of colleges and universities (49%) allow undergraduates to design interdisciplinary degree programs incorporating the study of environmental issues. Four-year schools (61%) are twice as likely as two-year schools (27%) to allow students to design interdisciplinary degree programs.

Bowling Green State University offers undergraduate majors and minors dealing with environmental issues in two different colleges. The College of Health and Human Services offers both a major and minor in Environmental Health. The College of Arts and Sciences contains the Environmental Studies Program, which offers both majors and minors in Environmental Science and Environmental Policy and Analysis.

Top 5 Departments in Which Courses on Environmental Issues are Taught

	TOTAL (%)	2-YEAR DEGREE	4-YEAR DEGREE
Biology	68	53	75
Chemistry	43	20	55
Political science or sociology	33	12	43
Business or economics	25	7	35
Philosophy or religion	22	9	30

Undergraduate courses on environmental issues are taught in a wide range of academic departments. Environmental studies tend to be concentrated within the physical sciences, although some schools offer environmental studies as part of the social science curriculum, as well. Two in three (68%) schools offer environmental studies courses in their biology departments, while another four in 10 (43%) offer courses on the environment in their chemistry departments. One in three (33%) schools offer environmental studies courses within their political science or sociology departments, while a solid minority offer courses in environmental studies in the business or economics department (25%) or the department of philosophy or religion (22%). Colleges and universities are least likely to offer courses on the environment in computer science or engineering (12%), education (11%), law (9%), and communications (6%) departments. For each department, four-year schools are more likely than two-year schools to offer environmental studies courses.

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Table 3. Departments That Offer Courses on Environmental Issues at BGSU

Department	***Course Number***	***Course Name***
American Culture Studies	*ACS 338*	*American Environmental History*
Architecture/ Environmental Design Studies	*ARCH 436*	*Planning and Design of Industrial Facilities*
	ARCH 490	*Problems in Architecture/Env Design Studies*
Biology	*BIOL 101*	*Environment of Life*
	BIOL 325	*Applied Ecology of Urban Pests*
	BIOL 354	*Population and Community Ecology*

Department	*Course Number*	*Course Name*
	BIOL 409	*Conservation Biology*
	BIOL 449	*Epidemiology*
Construction Management and Technology	*CONS 412*	*Water Resources and Treatment*
Economics	*ECON 335*	*Environmental Economics*
Education	*EDFI 416*	*Philosophy of Environmental Education*
Environmental Health	*ENVH 210*	*The Global Commons: International Perspectives on Environmental Health and Protection*
	ENVH 301	*Public Health and Sanitation*
	ENVH 302	*Industrial Hygiene*
	ENVH 303	*Industrial Hygiene Laboratory*
	ENVH 304	*Air Quality Management*
	ENVH 305	*Air Quality Laboratory*
	ENVH 306	*Environmental Regulation, Organization and Administration*
	ENVH 307	*Occupational Safety*
	ENVH 308	*Industrial Ventilation*
	ENVH 402	*Principles of Water Quality*
	ENVH 403	*Water Quality Laboratory*
	ENVH 405	*Hazardous Material Management*
	ENVH 407	*Environmental Toxicology*
	ENVH 449	*Epidemiology*
Environmental Studies	*ENVH 101*	*Introduction to Environmental Studies*
	ENVS 201	*Concepts in Environmental Studies*
	ENVS 301	*Environmental Problems*
	ENVS 401	*Environmental Strategies*
	ENVS 402	*Environmental Impact Statements*
	ENVS 403	*Geographic Information Systems*
	ENVS 412	*Great Lakes Ecosystems*
	ENVS 415	*Strategies and Resources for Environmental Education*
Geology	*GEO 40*	*Earth Environments*
	GEOL 332	*Human Environmental Geology*
	GEOL 420	*Environmental Aspects of Geology*
History	*HIST 338*	*American Environmental History*
Legal Studies	*LEGS 431*	*Environmental Law*
Philosophy	*PHIL 332*	*Environmental Ethics*
Political Science	*POLS 336*	*Environmental Politics and Policies*

Alternative Means for Studying Environmental Issues

	TOTAL (%)	2-YEAR DEGREE	4-YEAR DEGREE
Percentage of schools that offer different options			
Internship programs	58	41	67
Independent research projects	69	53	78
Campus service projects	49	34	56
Community service projects	58	45	65
Mastery learning	7	7	7

In addition to individual courses, colleges and universities have developed other means for students to pursue environmental studies. At least half of schools offer students the opportunity to study environmental issues through independent research projects (69%), internship programs (58%), community service programs (58%), and campus service projects (49%), all of which are more prevalent at four-year schools than two-year ones. Few two- or four-year colleges and universities offer environmental studies opportunities through mastery learning (7% in each).

Internships are required for BGSU students majoring in Environmental Health, Environmental Policy and Analysis, and Environmental Science. Independent research projects and community service projects are available offered to students with these majors. The Environmental Studies Program does not have a mastery program established, but it is open to this idea and will consider it in the future. The Environmental Health Program does not support mastery learning.

Students Required to Take Courses on Environmental Studies

	TOTAL (%)	2-YEAR DEGREE	4-YEAR DEGREE
All students	8	3	13
Most students	5	2	7
Some students	21	24	18
No students	63	66	59

Although most colleges incorporate environmental studies into the classroom, students are most often not required to take a course on environmental issues. There is a small minority of colleges (8%) that explicitly require all students to take at least one course related to the environment, and another handful (5%) that require most students to enroll in such a course. Still, one in three (34%) schools require at least some students to take an environmental studies course. Private colleges (20%) are four times as likely as public colleges (5%) to require all or most students to take a course on the environment. Four-year colleges and universities are (39%) more likely than two-year schools (23%) to require at least some students to take an environmentally related class.

BGSU has no general requirement for all students to include environmental studies in their educational programs. Only those students majoring in environmental policy, environmental science and environmental health are required to take environmental classes.

Schools That Have Taken Lead in Teaching Students about Environment

Leading Schools for Offering Majors & Minors and Requiring Environmental Courses (Schools listed alphabetically)

Alaska Pacific University
Albion College
Arizona State University
Dominican College of San Rafael
Humboldt State University
Tri-State University
University of the Incarnate Word
University of LaVerne
University of Minnesota-Twin Cities
University of Wisconsin-Stevens Point
Wilson College

A good portion of colleges and universities offer majors or minors in environmental studies and a solid number of schools require at least some students to take courses on the environment, but some schools stand apart in their dedication to bringing environmental studies to the classroom. These campuses offer undergraduates the option of both an environmental studies major and minor. Moreover, they require all or most students to take at least one course related to the environment. Each of these schools is a four-year college or university, and most are located in either the western or Midwestern regions of the United States.

BGSU offers majors and minors in environmental studies. Students are not required to take any courses related to the environment.

Colleges Provide Faculty Support for Environmental Studies

College Support for Faculty and Environmental Issues

Percent of colleges that. . .	TOTAL (%)	2-YEAR DEGREE	4-YEAR DEGREE
Have programs to support faculty professional development on environmental topics	50	54	49
Formally evaluate or recognize how faculty have integrated environmental topics into their courses	8	5	9
House any research institutes that study environmental issues	23	6	32

For colleges and universities there are two main ways to promote studies on any particular subject matter: They can provide students the opportunity or require students to take courses on that subject, and they can support faculty development in that area. We know colleges and universities provide at least modest opportunities for students to learn about environmental issues, but what steps, if any, are colleges taking to support or encourage faculty engagement in environmental studies?

Similar to the pattern observed with students, there is a solid share of schools that support faculty development on environmental issues, even if few overtly encourage faculty to make the environment part of their classroom activities. Fully half of colleges and universities (50%) have programs to support faculty professional development on environmental topics, a trend that does not differ much by school size or the type of degree the school offers. There is also a sizable number of schools that have made environmental studies a priority in faculty research. One in four (23%) house research institutes that study environmental issues. In this case, four-year colleges and universities (32%) are far more likely than two-year schools (6%) to have such a research institute. Campuses with 4,000 or more students (42%) are more than twice as likely as smaller schools (13%) to house a research institute that studies environmental issues, while public colleges and universities (29%) are more likely than private schools (16%) to do so. Although many schools support environmental studies as part of the classroom and research experience of their faculty, a small minority formally evaluate professors for bringing the environment into t h e classroom. One in 10 (8%) colleges formally evaluate or recognize how the faculty has integrated environmental topics into their courses, and this does not vary across schools with different characteristics.

BGSU does not house a research institute that has environmental research as its primary mission. Some campus research centers address issues with environmental ramifications. BGSU has no program evaluating faculty integration of environmental topics into course work. Faculty professional development opportunities are available at BGSU, but none are specifically oriented toward environmental areas.

Colleges That Make Environment Part of Faculty Experience

Leading Schools for Supporting and Evaluating Faculty on Environmental Studies

(Schools listed alphabetically)
Calvin College
Central Methodist College
Edinboro University of Pennsylvania
Humboldt State University
Illinois Wesleyan University
Indiana University-Kokomo
James Madison University
Kent State University-Trumbull Campus
Lynchburg College
Massachusetts Maritime Academy
Oliver Nazarene University
Palo Alto College
Pitzer College
Rappahannock Community College
Towson University
University of Minnesota-Twin Cities

University of Wisconsin-Stevens Point
Viterbo College
Warren Wilson College
Westminster College
Westchester Community College

Although most schools do not evaluate faculty based on how they have brought the environment into the classroom, there is a group of schools that have taken this step towards promoting environmental studies. There are 21 schools that not only have programs to support faculty professional development on environmental topics, but also formally evaluate or recognize how faculty have integrated environmental topics into their courses. The colleges and universities are located throughout the nation, and vary both in size and the type of degree that they offer. In fact, half of these schools also house a research institute that studies environmental issues.

Appendix 2
ENVH 492 Class Report:
Updating National Wildlife Federation's Report on Chief of Facilities

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Appendix 2
ENVH 492 Class Report:
Updating National Wildlife Federation's Report on Chief of Facilities

The National Wildlife Federation surveyed signatory universities to the Talloires Declaration. Its report was separated into three sections: University Presidents and Executive Offices, Chief of Facilities of Plant Operations, and Provosts and Academic Officers. During the fall semester of 2001, students enrolled in ENVH 492 completed these surveys for BGSU using information that they were able to obtain from university documents and through discussion with key individuals. That information is presented below for Chief of Facilities in italics, following the National Wildlife Federation results (non-italicized font).

Key Findings

College and University Campuses Making Strides Towards Energy Efficiency

Colleges and universities across the nation are making concerted efforts to improve energy efficiency, and many plan to do more in the future. Large majorities of schools have already implemented lighting, water, heating, ventilation, and air conditioning upgrades, while half of schools have developed efficiency design codes and implemented life-cycle analysis for energy project evaluation. Moreover, a solid minority of campuses meet at least some of their electricity, heating, and cooling demands by renewable energy sources.

American Colleges and Universities Major Consumers of Energy and Natural Resources

Despite efficiency efforts, as the home to millions of students each year, colleges and universities consume huge amounts of energy and natural resources. The average campus uses millions of gallons of water and consumes millions of kilowatt hours of electricity, in addition to thousands of gallons of gasoline, propane, and fuel oil. Each school provides heating and air conditioning to thousands, if not millions, of square feet of building space. To meet their diverse energy needs colleges use everything from coal and firewood to purchased steam and chilled water.

In 1999, Bowling Green used an estimated 163 million gallons of water, and consumed about 86 million-kilowatt hours of electricity and 497,000 million cubic feet of natural gas.

Recycling Widespread on College and University Campuses

Virtually every campus in the country has initiated recycling efforts, and these efforts are not just limited to aluminum cans. In addition to aluminum, majorities of colleges and universities across the country are recycling corrugated cardboard and high and low grade paper, while half of colleges and universities recycle glass bottles, food scraps and landscape trimmings, construction materials, and plastic. More than half of schools also have a materials exchange program. One caveat, while so many schools have

recycling programs, only a quarter of the total municipal solid waste generated was recycled or composted, so much waste still ends up in landfills or incinerators.

Bowling Green recycled 26% (803 short tons) of its total municipal waste in 1999. Bowling Green recycles various wastes including mixed office paper, newspaper, magazines, corrugated cardboard, aluminum, glass, scrap metal, wooden pallets, and #1 and #2 plastic. About 175 tons of green waste was composted in 1998-1999, including leaves, grass and brush.

Reducing Paper Consumption, Environmental Purchasing Top List of Programs

In addition to recycling, schools have taken steps towards greater environmental responsibility through other programs. Many schools have already created programs to reduce the need for paper hard copies and encourage both environmentally sound purchasing and micro-scale lab experiments. Fewer, yet still a significant number, have programs requiring that office paper be chlorine-free or have a minimum of 25 percent post-consumer waste.

BGSU does not have a policy regarding office paper although purchase of paper with a substantial recycled content is often done due to its very competitive price. There is no specification that office paper purchased must be chlorine-free.

Landscaping and Grounds Programs Gain Footing on Campuses

Not only have colleges and universities begun to embrace recycling and energy conservation efforts, many schools now factor the environment into their landscaping and grounds management plans. Integrated pest management and native landscaping programs have already been implemented on at least half of campuses, while solid minorities of schools have also implemented programs to provide food and shelter to attract wildlife, restore natural habitats on campus, and identify and remove exotic species. Majorities of colleges and universities have also reserved at least part of their campuses as protected, agricultural or horticultural land.

Bowling Green State University has roughly 1,628 acres of total land. Of this land, about 76 acres are protected as wild lands and 225 acres are used for agricultural and horticultural purposes. Currently, a GIS system is being implemented to catalog significant landscaping, geographic, and land use features of the campus.

The environmental studies program has implemented a 10-acre woodland restoration program on Poe road next to the BGSU driving range. A controlled burn was executed in the wood lot to remove thistles, which are an invasive species. Students participated in the woodland restoration project.

The university is currently doing native landscaping beside the Math and Physical Sciences building. Falcon boxes were installed at the football stadium to attract nesting red tail hawks and a butterfly garden was created at the wood lot.

Transportation Programs Slowly Moving Forward

A few schools have made concerted efforts to make transportation around campus more environmentally responsible, an area of great opportunity for colleges and universities to make strides into a relatively uncharted, but highly important, territory. Schools are making strides by providing adequate and protected bicycle racks and free or discounted bus passes for students, faculty, and staff, creating carpooling programs, and providing incentives not to drive alone. Moreover, a relatively small, but significant group of schools use alternative fuels for at least some of their fleet vehicles.

Roughly 39% of the students at Bowling Green State University live on campus. This means that the remaining 61% commute to classes. For the 2001-2002 school year, 4,682 commuter-parking passes and 2,673 faculty and staff parking passes were issued. An additional 294 parking passes were issued for just the fall semester. This does not indicate that all these persons drive to the university. There are many routes of commuting to the university, including bike riding, walking, driving, or taking the off campus shuttle. There are two off campus shuttle routes: the north route and the south route. Neither route deviates more than four miles off campus, so students that live more than four miles away from campus or are not within close walking distance to one of the stops will typically drive to campus.

The university owns or leases 210 fleet vehicles. These vehicles include 65 passenger automobiles and 145 trucks and cargo vans, which include the on and off campus shuttles. None of these fleet vehicles use alternative fuels such as electric hybrid, propane, or biodiesel. The university's fleet vehicles consumed 59,582 gallons of gasoline in 1999. There is no record at the university on how much diesel fuel was consumed.

The university does offer an incentive not to drive in the form of emergency rides home by dialing 372-RIDE. Adequate and protected bicycle racks are available in some areas of the campus, however there are many areas with inadequate and unprotected bicycle racks. The university currently does not provide any bicycle lanes, nor are there plans to construct bicycle lanes in the future.

Schools That Talk the Talk are Walking the Walk

Of the small number of schools that answered both the presidents section and the facilities sections, the schools that say they have written policies for recycling, water efficiency and conservation, and environmentally sound purchasing are more likely to be recycling, making water efficiency upgrades, and purchasing environmentally sound goods.

BGSU does not have written policies for recycling, water efficiency and conservation, and environmentally sound purchasing

Energy and Utilities

Perhaps because the cost benefits are relatively easy to calculate, energy and utility upgrades have been implemented by a large majority of American campuses. In particular, we asked about three types of upgrades-lighting, water, and heating, ventilation and air conditioning. Lighting upgrades top the list of energy efficiency programs implemented on campuses. Most colleges and universities have implemented lighting efficiency upgrades in all or some campus units (81%), and some schools (20%) have plans to do more in this area. Almost as many schools implemented heating, ventilation, and air conditioning

upgrades. Three in four (73%) have implemented heating, ventilation, and air conditioning efficiency upgrades in all or some campus units, and a quarter (24%) plan to do more. Water efficiency upgrades are equally as common as heating and cooling upgrades. Three in four have implemented water efficiency upgrades in all or some campus units (72%). One in five plan to do more regarding water efficiency upgrades (19%). Small schools (enrollment <1,000) are less likely than others to have implemented heating, ventilation, and air conditioning upgrades, while schools in the East are more likely than those in the Midwest to have done so.

In the majority of the campus units, BGSU has implemented most of the following water efficiency upgrades: low flow toilets, showerheads, faucets, and re-circulating fountains. Heating, ventilation, and air conditioning upgrades, such as occupancy sensors, variable-air-volume ventilation, and thermal insulation of buildings have also been implemented in some campus units.

According to Carl Cogar, the facilities manager, the university has plans to invest more in energy efficient programs. For example, the university has plans to change magnetic ballasts with electronic ballasts that could save as much as 40% in energy. Efficiency design codes for new and existing buildings have been developed. The new student union, which is currently under construction, will have many of these efficiency implementations.

For buildings and departments under renovation, efficiency upgrades depend on the department budget. If an energy program is not in the budget or does not directly payback, then the program will more than likely not be implemented. This illustrates that the university does not use life cycle analysis for energy project evaluations nor are there plans to do so in the future. Most decisions concerning energy efficient projects are based on simple payback analysis.

Implementation of Energy Efficiency Programs and Plans to Do More[1]

	CURRENT	FUTURE
Lighting efficiency upgrades		
Heating, ventilation, and air conditioning upgrades	73	24
Water efficiency upgrades	72	19
Efficiency design codes for new or existing buildings	52	17
Life-cycle analysis for energy project evaluation	48	14

[1] When tables in this section are not broken down by two- and four-year schools it is because no statistically significant difference between two- and four-year schools exists.

Colleges and universities are less likely to have implemented efficiency design codes for buildings and life-cycle analysis for energy project evaluation. One in two have developed efficiency design codes for new or existing buildings (52%), with 17 percent planning to do more in this area. Again, the smallest schools are less likely than larger ones to do this. Half of all campuses (48%) have implemented life-cycle analysis for energy project evaluation, with 14 percent having plans to do more in this area.

Amount of Electricity, Heating, or Cooling Demands Met by Renewable Sources

None	63%
Less than 10 percent	11
10 percent or more	13
Gave no answer	14

Although not utilized as often as energy efficient up-grades, some schools are using renewable sources and alternative fuels such as solar, wind, hydro, or fuel cells to meet their heating and cooling demand. One in four (24%) colleges and universities report using renewable energy sources to meet their electric, heating, or cooling demand, with 13 percent of schools reporting that 10 percent or more of their energy needs are met by renewable sources. One in 10 plan to do more to meet their schools' energy needs by utilizing renewable energy resources.

Renewable resources, such as wind, solar, or hydropower supply none of BGSU's electricity, heating and cooling demand. A project currently being pursued would produce electricity from solar cells mounted on the roof of the campus ice arena.

Colleges Especially Committed to Energy Conservation

Leading Schools for Energy Efficiency and Conservation

(Schools listed alphabetically)
Bard College
Cardinal Stritch University
Chippewa Valley Technical College
College of Saint Benedict
Colorado State University
Florida Gulf Coast University
Humboldt State University
Jefferson Davis Community College
Middlebury College
Raritan Valley Community College
Rush University
Umpqua Community College
University of Wisconsin-River Falls
University of Utah

Leading Schools for Doing More w/Energy Efficiency and Conservation

(Schools listed alphabetically)
Barstow College
Bates College
Bethany College
Catholic University
George Fox University
Jefferson College
Johns Hopkins University
Massachusetts Institute of Technology
Mercer County Community College
Minot State University
Ohio University

Portland Community College
Reed College
Salish Kootenai College
Tufts University
Tuskegee University
University of Nebraska at Omaha
University of South Carolina-Aiken
University of Texas Medical Branch-Galveston
University of Vermont
Washburn University

Throughout the country, colleges and universities have designed programs to reduce energy consumption, but there is a small group of schools that stand apart from the rest when it comes to energy conservation. These schools have taken virtually all of the steps listed above to improve efficiency— including using renewable energy resources, upgrading water, lighting, heating, ventilation, and air conditioning efficiency, developing efficiency design codes for new or existing buildings, and implementing life-cycle analysis for energy project evaluation. These high performing colleges and universities are located across the nation, and vary with regard to size and the types of degrees offered.

Leading Schools for Which More than 50% of Energy Comes from Renewable Sources

(Schools listed alphabetically)
Central Oregon Community College
Central Virginia Community College
George Fox University
Jefferson Davis Community College
John Brown University
Johnson Bible College
Linfield College
Northwest Missouri State University
Pierce College
Reconstructionist Rabbinical College
Saint Peter's College
Salish Kootenai College
Santa Monica College
University of Idaho
University of Portland

There is also a group of colleges and universities that, while not necessarily energy efficient right now, are especially committed to doing more to promote energy efficiency and conservation on their campuses. Of the six policies listed above— using renewable energy sources, upgrading water, lighting, heating and cooling efficiency, developing efficiency design codes for new or existing buildings, and implementing life-cycle analysis for energy project evaluation— these schools have plans to pursue at least five of them. Similar to the leading schools that already excel in energy efficiency and conservation, this group includes two-year and four-year schools that vary in size and are located all over the country In terms of using renewable energy, all of the schools listed say that in order to meet their heating and cooling demand, more than 50 percent of the energy comes from renewable sources such as solar, wind, hydro, or fuel cells. This group is diverse, containing large public universities as well as private and two-year community schools. They come from across the county with the largest ones located in the West.

BGSU does not have plans to pursue at least five of the six policies listed above (using renewable energy sources, upgrading water, lighting, heating and cooling efficiency, developing efficiency design codes for new or existing buildings, and implementing life-cycle analysis for energy project evaluation), nor to have more than 50 percent of its energy come from renewable sources.

Solid Waste, Recycling, and Materials Exchange

Amount of Municipal Solid Waste That is Recycled or Composted

None	4%
1%-10%	20
20%-30%	25
40%-50%	9
60% or more	8
Gave no answer	34

Recycling is another way schools are protecting the environment. Six in ten recycle or compost at least some of the municipal solid waste generated on their campus (62%). In fact, two in 10 (17%) report that they recycle or compost 40 percent or more of their waste. Only 4 percent of schools say that none of the municipal solid waste generated on campus is recycled or composted. The schools that give an answer to this questions report an average recycling rate of about a quarter (26%) of their total municipal waste generated. Even though a large number of schools recycle at least somewhat, more than three quarters of waste generated still ends up in landfills or incinerators.

What do campuses recycle? Aluminum, paper (higher and lower grade), and cardboard top the list. A large majority of schools report that they recycle aluminum containers in all or some campus units (85%). And the same large percentages of schools say they recycle higher grades of paper (84%). Nearly as many schools say they recycle corrugated cardboard (80%) and lower grades of paper (77%). Relatively few schools intend to do more recycling of these waste products. Fifteen percent or less say they plan to do more recycling of higher grades of paper (15%), lower grades of paper (12%), aluminum containers (10%), or corrugated cardboard (9%).

BGSU Green recycled 26% (803 short tons) of its total municipal waste in 1999. Bowling Green recycles various wastes including high and low grades of paper, corrugated cardboard, aluminum, glass, and one or more grades of plastic.

BGSU does not compost food-scraps, nor are their plans to do so in the future. Bowling Green does not recycle construction waste, such as scrap metals, concrete, and bricks, because the contractors hired to do the construction typically handle this waste. The university could require the contractors to recycle construction waste or hire based on whether or not the contractors recycle; however, at this time, Bowling Green does not exercise these stipulations. Contractors may recycle materials such as scrap metals because they have substantial economic value.

BGSU has a program in place aimed at reusing yard waste. Some of the trimmings and clipping are collected, processed, and used for mulch. In addition, the campus has a materials exchange program, where, for example, materials such as furniture, computers, or lab equipment are available for exchange between campus units. If exchanges are not made, this type of equipment is auctioned to the community.

BGSU's chemical exchange program is nationally recognized and serves the local community in addition to campus facilities.

Percentage of Schools That Recycle Specific Items and Plan To Do More

	CURRENT	FUTURE
Aluminum		
Higher grades of paper	84	15
Corrugated cardboard	80	9
Lower grades of paper	77	12
Glass bottles and jars	50	9
Food scraps and landscape trimmings	48	8
Construction materials	47	6
Plastic	46	9

In addition to these four solid waste products-aluminum, high- and low-grade paper, and cardboard-colleges and universities have taken on the challenge of recycling other items, as well. Half of American colleges and universities say they recycle glass bottles and jars (50%), food scraps and landscape trimmings (48%), construction materials (47%), and plastic (46%). One in 10 plan to do more recycling of glass bottles and jars (9%), plastic (9%), food scraps or landscape trimmings (8%), or construction materials (6%). Moreover, 55 percent have a materials exchange program. Overall, larger colleges and universities, public schools and Eastern schools report more recycling than smaller schools, private schools and Western, Southern and Northern schools.

Purchasing, Hard-Copy, and Lab Practices and Plans to Do More

	CURRENT	FUTURE
Programs to reduce the need for paper hard copies	69%	15
Programs to encourage environmentally sound purchasing	49	20
Programs to encourage microscale lab experiments	43	7
Programs requiring minimum 25% post-consumer waste for office paper	29	9
Programs requiring chlorine-free requirements for office paper	8	4

Traditionally, schools and paper go together hand in hand, so both the reduction of hard copies and attention to the type of paper purchased are significant ways for schools to contribute to the greening of campuses. This fact is not lost on our colleges and universities, as a strong majority indicate they have programs in place to reduce the need for hard copies (69%). And some schools plan to do more in terms of reducing hard copies (15%). Moreover, when asked about paper purchasing practices, three in 10 (29%) schools said they purchase office paper with a minimum of 25 percent post-consumer waste and 8 percent said they purchase paper that is chlorine-free. More generally, one in two schools report they have programs to encourage environmentally sound purchasing (49%). The other half of American colleges and universities do not (41%) or gave no answer (11%). Public colleges and universities (56%) are more likely than private schools (42%) to have programs that encourage environmentally sound purchasing. Lab experiments are another area for conservation. A large minority (43%) of schools have programs in place in all or some campus units to encourage lab courses to implement micro-scale experiments that consume milliliters rather than liters. This practice is more prevalent among the largest colleges (enrollment ³ 8,000) than it is among those with fewer than 1,000 students.

Lab courses at BGSU occasionally use microscale experiments. These experiments reduce waste and cost by consuming milliliters of reagents rather than liters. It should be noted, however, that macroscale experiments are still widely used in many courses.

BGSU does not have any programs in place to reduce the need for hard copies, although transferring information over the Internet is encouraged. E-mail is often used instead of paper mail. In a few classes, homework is assigned or turned in via e-mail. It should be noted that transferring information through the Internet does not necessarily reduce paper waste because students, faculty, and staff often print much of the material on the Internet.

Colleges and Universities That Take Lead in Recycling Efforts

Leading Schools for Recycling, Solid Waste, and Materials Flow

(Schools listed alphabetically)
Bard College
Barstow College
Brown University
California State University-San Marcos
Colorado State University
Dartmouth College
East Carolina University
Georgia Institute of Technology
Humboldt State University
Kaskaskia College
Lenoir Community College
Medical College of Wisconsin
Miami University (Ohio)
Middlebury College
Northwest Missouri State
Princeton University
University of Colorado at Boulder
University of Maine at Augusta
University of Nebraska at Omaha
University of Oregon
University of South Carolina-Columbia
University of Vermont
Warren Wilson College

Most colleges and universities across the country are taking giant steps in recycling the various sources of waste that they produce, but there is a group of schools that truly stand out above the rest. They collect virtually all solid wastes for recycling, including paper, food scraps, plastic, and corrugated cardboard. Moreover, most of these elite schools have a materials exchange program and programs in place to encourage environmentally sound purchasing, reduce the need for paper hard copies, and encourage lab courses to implement micro-scale experiments that will consume milliliters rather than liters. Many of these schools also specify that office paper purchased must contain a minimum 25 percent post-consumer waste and also have chlorine-free requirements for office paper. Of the eight recyclable goods and six environmental programs, the top recycling schools have undertaken at least twelve of these.

Leading Schools for Doing More w/ Recycling, Solid Waste, and Materials Flow

(Schools listed alphabetically)
Albany State University
Alvernia College
Ball State University
Barstow College
Bethany College
Catholic University
Johns Hopkins University
Massachusetts Institute of Technology
Mercer County Community College
Princeton University
Reed College
Saint Peter's College
Salish Kootenai College
SUNY-Potsdam
University of Oregon
University of South Carolina-Spartanburg
University of Texas at Arlington
University of Texas Medical Branch-Galveston
Washburn University of Topeka
Westfield State College

There are other colleges and universities that should also be noted here, not just for their current recycling efforts, but for their future plans to do more recycling. Some of these schools already have strong recycling programs and would just like to improve upon them, while others are just beginning to seriously undertake recycling efforts. As was the case with the schools that currently have recycling, material exchange, and environmentally sound purchasing programs, these colleges and universities are big and small in size and are located across the US. Most of these colleges are four-year schools, although there are some two-year schools in this group, as well.

Leading Schools for Recycling 60% or More of Their Total Municipal Waste Generated

(Schools listed alphabetically)
Bainbridge College
Ball State University
Bard College
Bates College
Bridgewater State College
Cardinal Stritch University
Chippewa Valley Technical College
Emperor's College of Traditional Oriental Medicine
Henderson Community College
John Brown University
Kaskaskia College
Miami University
Middlebury College

Mt. Hood Community College
Portland Community College
Reconstructionist Rabbinical College
Texas Christian University
Texas Tech University
The University of Maine at Augusta
United Theological Seminary of the Twin Cities
University of Idaho
Waycross College

Finally, a select group of schools report that they recycle or compost a large percentage, 60 or more, of the total waste generated. The schools listed vary in size, include both public and private campuses, two- and four-year schools, and are located throughout the country

In May 2001, BGSU recycling started using the full-time custodial staff to help collect recyclables in each building. Stations on every floor of every building that did not object received 64-gallon containers to receive recycled materials (totaling about 900 additional containers on the campus). These stations have increased recycling in residence halls by about 50 - 100 %.

Landscaping and Grounds

Percentage of Schools with Landscaping and Grounds Programs

Integrated Pest Management	60%
Native Landscaping	51
Food and Shelter to Attract Wildlife	37
Habitat Restoration	36
Identification and Removal of Exotic Species	29

Colleges and universities have undertaken numerous landscaping and grounds programs with varying levels of frequency. Integrated pest management tops the list of grounds programs, and is the only program present in a clear majority of schools. Sixty percent have implemented integrated pest management in all or some campus units. Another half (51%) have implemented native landscaping programs in all or some campus units.

BGSU does not have an integrated pest management program.

Proportion of Land That is Protected and Agricultural/Horticultural

Protected	
None	40%
1%-20%	15
21%-50%	10
More than 50%	10
Unknown/Not sure/No answer	28
Mean percentage	17%
Mean acres of land	99

Agricultural and Horticultural	
None	45%
1%-20%	12
21%-50%	13
More than 50%	6
Unknown/Not sure/No answer	28
Mean percentage	13
Mean acres of land	127

Although not quite as prevalent as pest management and native landscaping programs, a significant minority of colleges and universities have established other programs as well. Slightly less than four in 10 have programs to provide food and shelter to attract wildlife (37%) and to restore the natural habitats on their campuses (36%). Another three in 10 (29%) have implemented programs to identify and remove invasive exotic species. Rural and small-town schools have done more than city and suburban ones to provide food and shelter to attract wildlife, while large schools have done more than smaller ones to restore natural habitats and remove exotic species from the campus. Midwestern colleges and universities lag behind in promoting integrated pest management and native landscaping programs. Schools were asked about the kinds of land they have and about the environmental management of those grounds. Our findings show that colleges and universities have chosen to protect a great deal of land that they own. A third (35%) have at least some protected land, with one in 10 (10%) reporting that half or more of their land is protected. Another two in 10 (25%) report that less than half of their land is protected. Three in 10 (28%) facilities chiefs are not sure how much campus land is protected or gave no answer. On average, schools protect 99 acres of land, which amounts to 17 percent of their total land.

Turning to the percentage of total land that is agricultural or horticultural, 45 percent report that they have no agricultural or horticultural land at all. Three in 10 (31%) have land that is agricultural or horticultural. One in four (25%) report that half or less of their total land is agricultural-horticultural land, while 6 percent reserve more than half of their land for agriculture or horticulture. Three in 10 (28%) schools are not sure how much land is gricultural or horticultural or gave no answer.

About 76 acres of BGSU land are protected as wild lands and 225 acres are used for agricultural and horticultural purposes. A 10-acre woodland restoration program is located on Poe road next to the BGSU driving range

The university is currently doing native landscaping beside the Math and Physical Sciences building. Falcon boxes were installed at the football stadium to attract nesting peregrine falcons and a butterfly garden was created at the wood lot.

Colleges and Universities That Take the Lead in Landscaping and Grounds Programs

Leading Schools for Land and Grounds Management Programs

(Schools listed alphabetically)
Bethany College
Florida Gulf Coast University
Lackawanna Junior College
Mt. Hood Community College
Northwest Missouri State University
Norwich University
Pepperdine University

Portland Community College
Reed College
Saint Olaf College
University of California-Berkeley
University of Nebraska at Omaha
University of North Carolina at Asheville
University of Oregon
Villanova University

There is a group of schools that stand out from the rest with regard to landscaping and grounds management programs. They have implemented all of the five types of programs discussed above—habitat restoration, native landscaping programs, identification and removal of invasive exotic species, integrated pest management, and programs to provide food and shelter to attract wildlife. Located throughout the US, this group consists of four-year and two-year colleges and universities, and campuses of various sizes. Three of these schools are located in Oregon, indicating a particularly strong commitment coming from our 33rd state.

Leading Schools for Doing More w/ Land and Grounds Management Programs

(Schools listed alphabetically)
Bethany College
Denison University
Mercer County Community College
George Fox University
Purdue University North Central Campus
Reed College
Saint Olaf College
United States Naval Academy
University of South Carolina-Columbia

Other colleges and universities stand out for their commitment to future plans for improving their land management from an environmental perspective. Some of these schools have already taken significant steps toward environmentally-focused land management. Again, this group is diverse in terms of size, location, and types of degrees that undergraduates can pursue.

Transportation

Percentage of Schools with Transportation Programs

	CURRENT	FUTURE
Adequate and protected bicycle racks	59%	5
Free or discounted bus passes to students	23	2
Free or discounted bus passes to faculty and staff	19	2
Carpooling program	17	3
Incentives not to drive alone	13	2

Transportation is an area where campuses are doing somewhat less to protect the environment. While a majority (59%) of schools offer adequate bike racks, beyond this basic transportation program many

schools fall short. Still, promotion of mass transit through free or discounted bus passes for students (23%) and employees (19%), a carpooling program (17%), or incentives not to drive alone (13%) are offered at a significant minority of colleges and universities. Although a solid number have established environment-friendly transportation programs, few schools plan to do more to promote mass transit in the future. Most likely because transportation programs are most necessary at larger colleges and universities, schools with enrollment of 8,000 or higher are far more likely than smaller ones to have established each of these programs.

Roughly 39% of the students at Bowling Green State University live on campus. This means that the remaining 61% commute to classes. 4,682 commuter-parking passes and 2,673 faculty and staff parking passes were issued for the 2001-2002 school year. An additional 294 parking passes were issued for just the fall semester. This does not indicate that all these persons drive to the university. There are many routes of commuting to the university, including bike riding, walking, driving, or taking the off campus shuttle. There are two off campus shuttle routes: the north route and the south route. Neither route deviates more than 4 miles off campus, so students that live more than 4 miles away from campus or are not within close walking distance to one of the stops will typically drive to campus.

The university owns or leases 210 fleet vehicles. These vehicles include 65 passenger automobiles and 145 trucks and cargo vans, which include the on and off campus shuttles. None of these fleet vehicles use alternative fuels such as electric hybrid, propane, or biodiesel. The university's fleet vehicles consumed 59,582 gallons of gasoline in 1999. There is no record at the university on how much diesel fuel was consumed.

The university does offer an incentive not to drive in the form of emergency rides home by dialing 372-RIDE. Adequate and protected bicycle racks are available in some areas of the campus, however there are many areas with inadequate and unprotected bicycle racks. The university currently does not provide any bicycle lanes, nor are there plans to construct bicycle lanes in the future.

Use of Alternative Fuels in Fleet Vehicles on Campus

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
Do not use alternative fuels	80%	92	75
Use alternative fuels in some vehicles <10% of vehicles	13	3	17
10% or more of vehicles	7	5	9

Use of alternative fuels follows the same pattern. Among colleges and universities that answered the question, 80 percent say that none of their fleet vehicles use alternative fuels. Two in 10 (20%) use alternative fuel in at least some of their fleet vehicles. Again, this practice is more prevalent among larger rather than smaller colleges and universities, in four-year as opposed to two-year schools, and is also more prevalent among schools in the West than schools in the Midwest or South.

No alternative fuel vehicles are used at BGSU

Colleges That Lead the Way on Transportation Programs

Leading Schools for Transportation Programs

(Schools listed alphabetically)
Colorado State University
Georgia Institute of Technology
Humboldt State University
Massachusetts Institute of Technology
Mt. Hood Community College
Ohio State University
Reed College
Seattle Central Community College
South Puget Sound Community College
Southern Illinois University at Edwardsville
University of Colorado at Boulder
University of Minnesota-Twin Cities
University of Portland
University of Texas Medical Branch-Galveston
University of Vermont

There is a group of colleges and universities that stand above the rest with regard to their transportation programs and policies. These schools have shown a dedication toward promoting environment-friendly transportation by establishing most of the following programs—providing adequate bicycle racks, free or discounted bus passes for students, faculty and staff, establishing a carpooling program, and creating incentives for members of the community to not drive alone. Moreover, most of these schools own at least some fleet vehicles that operate on alternative fuels. Many of these schools are located in the West, three again coming from Oregon, although this group has representation across the country.

Background Information on Consumption

Transportation

Parking Spaces Provided for Student, Faculty, or Staff Parking[6]

400 spaces or less	20%
401-800 spaces	23
801—1,500 spaces	23
1,501—3,000 spaces	16
3,001—5,000 spaces	9
More than 5,000 spaces	10
Mean number of parking spaces	3,093
Median number of parking spaces	938

[6] Percentages are only for schools that answered the question on the number of parking spaces (n=208; 54 from 2-year schools and 154 from 4-year schools).

Colleges and universities were asked about the number of parking spaces they offer and about the average commute in miles. Among schools that responded to the parking space question, two in 10 (20%) have 400 spaces or less, one in four (23%) have between 401 and 800 parking spaces, and another 23 percent have between 801 and 1,500 spaces. One in four (25%) have between 1,501 and 5,000 parking spaces, while 10 percent have more than 5,000 spaces. Four in 10 (38%) did not respond to this question.

Average Commute of Students, Faculty, and Staff Who Drive to Campus[7]

5 miles or less	14%
6—10 miles	35
11—15 miles	22
16—25 miles	20
More than 25 miles	9
Mean commuting distance (in miles)	16
Median commuting distance (in miles)	12

[7] Percentages are only for schools that answered the question on the average commute (n=179; 47 from 2-year schools and 132 from 4-year schools).

Total Municipal Solid Waste Generated in 1999

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
50 short tons or less	37%	3	26
51—200 short tons	19	33	11
201—1,000 short tons	21	11	28
More than 1,000 short	23	3	36
Mean short tons	1,773	351	2,691
Median short tons	150	50	452

For the most part, students, faculty, and staff do not have a very long commute to get to campus each day. Among colleges and universities that answered this question, half (49%) said the average commute for students, faculty and staff who drive to campus was no more than 10 miles. In another four in 10 (42%) the average commute is between 11 and 25 miles, while one in 10 (9%) have an average student and employee commute of more than 25 miles. Nearly half (47%) of all respondents did not answer this question. The mean commuting distance is 16 miles, and the median is 12.

Solid Waste

Chiefs of facilities or plant operations were asked about the total municipal solid waste (product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, batteries) generated on their campus in 1999. Like many of the other open-ended questions from the survey, nearly half (45%) of all schools did not answer the question. Among those that responded, nearly four in 10 (37%) generated 50 short tons of municipal solid waste or less in 1999, with another four in 10 (40%) generating between 51 and 1,000 short tons of waste, and 23 percent generating more than 1,000 short tons of municipal solid waste. The mean amount of waste totaled 1,773 short tons, while the median equaled 150 short tons. In other words, the 165 colleges and universities that responded to this question generated a total of 292,545 short tons of municipal solid waste. Not surprisingly, waste varied by the size

of the school with larger schools reporting more waste generated on their campus than smaller schools, and four-year colleges and universities producing vastly more waste than two-year colleges.

Per capita, waste also varies among different campuses. For each student, faculty, and staff member, colleges and universities generate a mean of 1.17 short tons and a median of .08 short tons of municipal solid waste. Students and employees of four-year schools generate greater amounts of waste per capita than those at two-year schools, while those in the Midwest produce far greater waste per capita than those in the East, South, or West.

In 1999, 3088 short tons of total municipal waste was generated at BGSU.

Water Use

Water Use on College Campuses

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
5 million gallons or less	31%	67	31
5—20 million gallons	18	20	18
20—80 million gallons	27	10	27
80+ million gallons	25	3	25
Mean gallons (millions)	27	9.8	27
Median gallons (millions)	16.1	4.8	16.1
Mean per capita use	14,671	3,821	14,671
Median per capita use	6,411	1,000	6,411

Schools with the Lowest Per Capita and Per Square Foot Water Use

(Schools listed alphabetically)[9]
California State Polytechnic University-Pomona
Community College of Allegheny County-Boyce
Emory University
Kent State University Main Campus
Massachusetts College of Liberal Arts
Pace University-White Plains Campus
Pensacola Junior College
Saint Louis University
State University of New York Albany
Sul Ross State University
University of Kansas Main Campus
University of South Carolina-Aiken

[9] Percentages only for schools that answered question on the amount of water consumed (n=134; 27 from 2-year schools and 107 from 4-year schools; 83 from public schools and 51 from private schools).

Our nation's colleges and universities use a great deal of water, even as many of them are trying to conserve one of our planet's most essential resources. Conserving water can reduce energy consumption and costs since most schools get charged three times: to purchase the water, to heat the water, and to discharge it to the sewer system. On average, each school used 27 million gallons of water in 1999. The median amount of use equaled 16.1 million gallons. Among those that responded to the question, half (49%) used 20 million gallons of water or less, one in four (27%) used between 20 million and 80 million

gallons, and 25 percent used more than 80 million gallons of water. More than six in 10 (63%) gave no answer or did not know how much water their campuses used.

Thinking of water use in terms of how much each campus used can be a bit daunting. What does it really mean for a campus to use 27 million gallons of water? Surely the answer differs with regard to the physical size of the campus and the number of people it holds. Five million gallons for a 20-acre campus with 500 students is very different than five million gallons for a 2,000-acre campus with 30,000 students. Therefore, we calculated the amount of water used per student, faculty, and staff member, and the amount used per square foot of campus land. We find that colleges and universities use a large amount of water per person, and per square foot each year. The average per capita use of water in 1999 totaled 14,671 gallons, with a median of 6,411 gallons. Among schools that responded to the water use question, four in 10 (43%) used less than 5,000 gallons of water per capita, one in three (32%) used between 5,000 and 14,999 gallons per student or employee, and 25 percent used 15,000 gallons or more per capita. Average residential use is 90 gallons per capita per day. Probably due to economies of scale, average use on campuses is a bit less than residential use, roughly between 40 and 54 gallons per person per day depending upon the length of the school year.

When analyzed by area rather than by person, we find that in 1999, schools used an average of 9.6 gallons of water per square foot of campus space and a median of 2.1 gallons. Among those that responded to the water use question, one in three (35%) use less than one gallon of water per square foot of campus space, another one in three (31%) between one and five gallons of water per square foot of campus space, and the final third (34%) more than five gallons of water per square foot of campus space.

Per capita water use differs across demographic groups. Four-year schools (mean=18,653) use far more gallons of water per student and employee than two-year colleges (mean=3,821). This disparity might be expected since students at four-year schools are far more likely than those at two-year colleges to live on campus. On average, private colleges and universities use nearly twice as much water per capita than public ones (20,024 vs. 11,319 gallons).

Approximately 163 million gallons of water was used at BGSU in 1999.

Electricity and Natural Gas

Colleges and universities were also asked about their consumption of electricity and natural gas in 1999. With a mean of 44.6 million kilowatt hours (KWHs) of electricity and a median of 11.0 million KWHs, it is clear that colleges are a major consumer of electricity. Again, six in 10 (60%) did not respond to this question. But among those that did respond to the electricity question, one in four (27%) used 4 million or fewer kilowatt hours of electricity in 1999. Another one in four (24%) consumed between 4 million and 50 million kilowatt hours, 28 percent used 10 million to 50 million KWHs, and one in five (21%) consumed more than 50 million KWHs.

Electricity Consumption on College Campuses

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
<4 million kilowatt hours	27%	52	17
4—10 million KWHs	24	35	19
10—50 million KWHs	28	11	35
50+ million KWHs	21	3	29
Mean KWHs (millions)	44.6	13.5	44.6
Median KWHs (millions)	11.0	4.7	11.0
Mean per capita KWHs	12,673	1,602	7,288
Median per capita KWHs	2,986	925	3,733

It is also useful to understand how much electricity schools consume per student, faculty, and staff member. On average, colleges consumed 12,673 kilowatt hours of electricity per student, faculty, and staff member in 1999, with median per capita consumption totaling 2,986 KWHs. Among colleges and universities that responded to the electricity consumption question, one in five (22%) consumed 1,000 or fewer KWHs per capita, three in 10 (29%) consumed between 1,000 and 3,000 KWHs, 29 percent consumed between 3,000 and 5,000 KWHs, and 21 percent consumed more than 5,000 KWHs per capita. As with other consumption and use patterns, four-year schools consume far more electricity than two-year schools, both overall and per capita.

In 1999, approximately 86 million-kilowatt hours of electricity was used at BGSU.

Natural Gas Consumption on College Campuses

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
<10K MCFs	36%	50	31
10K—80K MCFs	20	17	21
80K—200K MCFs	20	21	19
200K + MCFs	24	12	28
Mean MCFs (000s)	486.5	83.3	652.61
Median MCFs (000s)	93.1	67.4	103.9
Mean per capita MCFs	619	18	865
Median per capita MCFs	10	4	14

Natural gas consumption varies greatly across college and university campuses. Whereas all schools use large quantities of electricity, a large number did not consume any natural gas in 1999, and among those that did there is a great deal of variability. This is evident in the huge difference between the mean (486,000 MCFs) and the median (93,000 MCFs) natural gas consumption levels. The distribution is positively skewed, with many schools consuming little or no natural gas, and others consuming huge quantities.

Again, six in 10 (61%) did not respond to this question. Among those that answered the question, 36 percent used 10,000 or fewer MCFs, two in 10 (20%) used between 10,001 and 80,000 MCFs, 20 percent consumed 80,000-200,000 MCFs, and 24 percent used more than 200,000. Per capita natural gas consumption varies tremendously across college and university campuses, which is once again evident with the disparity between the mean and median levels. Mean natural gas consumption per student,

faculty, and staff totals 619.4 MCFs, but the median is just 10.1 MCFs. Among the schools that answered the natural gas consumption question, three in 10 (29%) used less than one MCF per student, faculty, and staff member in 1999. Two in 10 (20%) used between one and 10 MCFs of natural gas per capita, one in four (25%) consumed between 10 and 30, and 26 percent consumed 30 or more MCFs of natural gas per capita. Consumption varies tremendously between two- and four-year schools.

In 1999, 497,000 million cubic feet of natural gas were used at BGSU

Fuel, Fuel Oil, Propane, Coal, Steam/Hot/Chilled Water, and Firewood

Consumption of Other Sources of Energy

Percentage of colleges that consumed each source of energy in 1999.

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
Gasoline or diesel fuel	93%	87	96
Fuel oil	43	20	57
Propane	28	25	30
Coal	9	0	15
Purchased steam or hot water	4	0	6
Firewood	2	0	4
Purchased chilled water	1	0	2

Aside from water, electricity, and natural gas, schools also consume a number of other sources of energy. We asked specifically about seven different kinds of energy sources and found a wide range of consumption patterns. As was the case for virtually all open-ended energy questions, approximately six in 10 respondents did not answer the various questions. Among those schools that did respond, virtually all (93%) used gasoline or diesel fuel in 1999, while less than a handful consumed purchased steam or hot water (4%), purchased chilled water (1%), or firewood (2%). Consumption patterns of other energy sources were less extreme, with four in 10 (43%) reporting consumption of fuel oil and three in 10 (28%) reporting propane consumption. One in 10 (9%) consumed coal in 1999.

With different needs for their campuses, colleges and universities consume gasoline or diesel fuel at varying levels. Two in 10 (18%) schools used less than 3,000 gallons of gasoline or diesel fuel in 1999, and an equal amount (20%) used between 3,000 and 9,999 gallons. Another one in three (33%) consumed 10,000-29,999 gallons of gasoline or diesel fuel in 1999, while 22 percent used 30,000 gallons or more. Just 7 percent did not use gasoline or diesel fuel in 1999. On average, colleges and universities consumed 29,287 gallons of gasoline or diesel fuel in 1999, while the median consumption level was 10,346 gallons. The largest schools (enrollment 8,000) consumed more gasoline and diesel fuel than smaller schools.

Consumption of fuel oil is not as common on college and university campuses as gasoline use, but there are many schools using fuel oil. Similar to gasoline and diesel fuel consumption, schools use varying amounts of fuel oil. In 1999, nearly two in 10 (17%) used some fuel oil, but less than 10,000 gallons, while 11 percent used between 10,000 and 99,999 gallons of fuel oil. Another 16 percent consumed 100,000 gallons of fuel oil or more. Slightly more than half (57%) of colleges did not use fuel oil in 1999. Colleges and universities consumed an average of 107,007 gallons of fuel oil in 1999.

Schools are even less likely to have used propane, but still a considerable minority of schools utilizes this energy source. Sixteen percent of colleges and universities consumed some propane in 1999, but less than 1,000 gallons, while 13 percent used 1,000 gallons or more. Seven in 10 (72%) schools did not consume any propane in 1999. On average, schools used 1,412 gallons of propane. If we limit the analysis to only those that used propane, this average jumps to 4,978 gallons, with a median of 677. Per capita consumption of gasoline, fuel oil, and propane also vary greatly among colleges and universities.

One in four (27%) consumed less than one gallon of gasoline per student, faculty, and staff member in 1999. Another 16 percent consumed between one and two gallons of gasoline per capita, while one in four (23%) consumed between two and five gallons. A third (33%) consumed five or more gallons of gasoline per capita. The mean per capita consumption equaled 6.1 gallons, while the median totaled 2.8 gallons. Although fewer schools used fuel oil than gasoline, per capita fuel oil consumption is actually higher. Six in 10 (57%) schools did not use fuel oil in 1999, but the average per capita consumption was 19.5 gallons. In fact, if we just examine the averages for schools that consumed fuel oil, we find that the mean per capita consumption totaled 46.6 gallons. The median per capita consumption for schools that used fuel oil was just 4.7 gallons in 1999, suggesting that most schools did not consume very much fuel oil, but that there was a group that used a great deal of this resource. Per capita consumption of propane was far lower, with 14 percent having used .20 gallons of propane per capita in 1999, and 11 percent having consumed more than .20 gallons of propane. Mean per capita consumption was .39, while the mean per capita consumption only for those schools that used propane totaled 1.5 gallons.

When comparing consumption patterns at two- and four-year schools, two-year schools reported using predominantly gasoline or diesel fuel. About two in 10 said they use propane or fuel oil. None of the two-year schools claimed to use coal, firewood, purchased steam or hot water, or purchased chilled water. Four-year schools had a greater diversity of fuel types used, but used predominantly gasoline or diesel fuel and fuel oil. Smaller percentages reported used propane (30%), coal (15%), purchased steam or hot water (6%), firewood (4%), and purchased chilled water (2%).

BGSU's transportation fleet consumed 59,582 gallons of gasoline in 1999. Fuel oil, coal or other alternative fuels were not used.

Electricity (Co)Generated

A small group of colleges and universities generate at least some of the electricity that their campuses consume. Among those that answered the question, one in 10 (9%) say they generated at least some electricity in 1999, while 91 percent did not generate electricity. Half of all schools (52%) did not respond to this question. If we examine all colleges and universities, including those that did not generate electricity in 1999, we find that schools generated an average of 5.2 million KWHs of electricity in 1999. In fact, if we narrow our analysis to only those schools that generated electricity in 1999, the mean electricity generated equals 55.8 million KWHs with a median of 3.1 million.

Schools were even less likely to produce cogenerated steam or hot water from their campus electrical generators. Just 11 percent of colleges and universities that answered this question produced cogenerated steam or hot water. Eight in 10 (81%) did not respond to this question, so it is difficult to get a good read on what campuses are doing with regard to producing cogenerated steam or hot water.

On average, colleges and universities produced 32.0 billion BTUs of cogenerated steam. And if we consider only those schools that produced cogenerated steam or hot water in 1999, they produced a mean of 284.5 billion BTUs and a median of 3.3 billion BTUs.

No cogeneration occurs at BGSU.

Total Area of Heated and/or Air Conditioned Buildings on Campus

200,000 square feet or less	18%
200,001—400,000 square feet	23
400,001—600,000 square feet	14
600,001—1,000,000 square feet	15
1,000,001—2,000,000 square feet	16
More than 2 million square feet	14
Mean square footage (in millions)	1.33
Median square footage (in millions)	0.55

Even a quick look at the heating and cooling demands of schools shows just how much energy they consume in order to cover their campuses' needs. Looking at colleges and universities that answered the question, we find that a full 30 percent of schools have more than one million square feet of heated and/or air conditioned buildings on their campuses. Another three in 10 (29%) have between 400,000 and 1 million square feet of building space that is heated and/or air conditioned, while 41 percent of schools have 400,000 or fewer square feet of heated and/or air-conditioned buildings on campus. On average, campuses have 1.3 million square feet of building that is heated and/or air-conditioned. The median amount of campus space equals 550,000 square feet. As one might expect, larger schools had more building space that was heated or air conditioned than smaller ones, while four-year schools had more square feet of heated and/or air conditioned buildings than two-year ones. Three in 10 (28%) did not respond to this question.

Open-ended Questions Yield Low Response Rate

One consistent finding from the analysis of facilities and operations officers is that, for the most part, a large portion of respondents did not answer the open-ended questions. Whether the question concerned municipal solid waste generated on campus, the number of heating or cooling days, or the amount of water used, many, if not most, colleges did not respond to the question. There are several possibilities for why this might happen, and these should have implications for future research in this area.

As is the case with any other survey, there is always the possibility that some of the respondents simply did not want to disclose certain information. But it is unlikely that this is the major cause of the high rate of "no answers" for the facilities and operations questionnaire because regular close-ended questions had much lower refusals (»10%). Moreover, for the most basic open-ended question of how much total land area the campus included, just 15 percent gave no answer. Therefore, it is more likely that the problem rests somewhat with the questions that were asked or, more specifically, with the kind of information that we asked chiefs of facilities or plant operations to pro-vide in the survey. There are two potential problems that might have happened that pertain to the type of information we asked for. First, many of the open-ended questions asked schools to provide very detailed information that nobody would know without investigating. It is highly unlikely that the chiefs of facilities or plant operations knew offhand how many kilowatt hours of electricity their campuses consumed or the gallons of water that the campus used in 1999. We knew going into this project that we would be interviewing very busy people, and although this questionnaire could be done in pieces, some respondents probably decided not to research the answers to these open-ended questions.

While non-response for the above reason is cause for concern, another important issue might be at stake, as well. Some respondents might not have all of this data available to them, or they did not entirely understand what we were asking for. Do all schools keep records on the number of heating and cooling days, MCFs of natural gas, or gallons of gasoline that are consumed annually? It is likely that while some excel in keeping records on their energy, waste, and landscaping activities, others do not.

Assuming that poor records and data gathering are at least part of the problem, this provides a unique and important opportunity for the National Wildlife Federation. Because these issues are so important, it is essential that colleges and universities understand why they should keep better records on their environmental practices. Perhaps NWF can take steps toward providing schools with assistance towards improving how they collect information and process data on energy consumption, waste management, and landscaping practices.

Appendix 3
ENVH 492 Class Report:
Updating National Wildlife Federation's Report on University Presidents and Executive Officers

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Appendix 3
ENVH 492 Class Report:
Updating National Wildlife Federation's Report on University Presidents and Executive Officers

The National Wildlife Federation surveyed signatory universities to the Talloires Declaration. Its report was separated into three sections: University Presidents and Executive Offices, Chief of Facilities of Plant Operations, and Provosts and Academic Officers. During the fall semester of 2001, students enrolled in ENVH 492 completed these surveys for BGSU using information that they were able to obtain from university documents and through discussion with key individuals. That information is presented below for University Presidents and Executive Officers in italics, following the National Wildlife Federation results (non-italicized font).

Key Findings

Environmental Programs Fit in with Campus Culture, Values

A solid majority of presidents agree that environmental values go hand in hand with the values of their esteemed colleges and universities. A near majority of schools have found environmental programs to be good public relations tools and many college and university decision-makers note that these programs are cost-effective and can even be helpful in recruiting students.

BGSU's value statements do not explicitly include environmental values.

Setting and Reviewing Environmental Goals a Common Practice

A majority of schools currently set and review goals to conserve energy, to factor environmental performance in the design of buildings, and to reduce solid waste, as well as maximize recycling. Near majorities have goals for protecting natural habitats, purchasing environmentally sound goods, reducing pollution, and conserving water. Some schools even set goals for making environmentally sound investments and purchasing organic foods.

BGSU does not have explicit goals regarding energy conservation or environmental performance of building. Some efforts are made to reduce energy and conserve water such as by installing low flow showerheads during building renovations. Facilities services has written goals of recycling or composting no less than 40% of the waste stream. BGSU has no policies regarding environmentally sound investments or on the purchase of organic foods.

Put That in Writing! Many Colleges and Universities Already Have

The commitment that many campuses have made to increased environmental planning and responsibility is not merely flimsy rhetoric. A large group of schools currently have written policies designed to improve energy conservation, environmental performance in the design of buildings, and recycling efforts. Overall, nearly half have or plan to have written policies promoting environmental responsibility, while many also have or plan to have written policies promoting environmental responsibility as part of their academic mission.

BGSU has no written policies designed to improve energy conservation, environmental performance in the design of buildings, and recycling efforts. Facilities services has written goals of recycling or composting no less than 40% of the waste stream

Campuses Hire Professionals to Handle Environmental Matters

Another way American colleges and universities have stepped up efforts to improve the handling of environmental matters is to hire staff to tackle important issues and implement programs. A majority of colleges and universities have hired a recycling coordinator, while many have also hired an energy conservation coordinator, a full-time administrator to deal with environmental issues beyond compliance, and even a green purchasing coordinator.

BGSU has a recycling coordinator. BGSU does not have an energy conservation coordinator, an administrator to dealing with environmental issues beyond compliance, or a green purchasing coordinator.

Future Environmental Programs Face Roadblocks Ahead

While colleges and universities have increased efforts to improve campus environmental performance, problems still abound. A strong majority of presidents cite inadequate staff time, more pressing campus needs, and inadequate funding as concerns in the expansion of environmental programs. In addition, few schools report having any environmental orientation for faculty, students, or staff or plan on doing so in the future— one of the biggest missed opportunities we have found. Moreover, just a small number of colleges and universities have either systems for accountability or environmental councils of any kind.

BGSU has no environmental orientation for faculty or staff, or plans to develop an orientation program. Facilities has a booth at new faculty orientation. Incoming students may elect to participate in a one-day clean up of a local river, The Portage, during freshman orientation. This activity will provide some environmental orientation to some students.

Giving Credit Where Credit is Due

While many colleges and universities are showing real commitment to greater environmental performance on their campuses, some stand out from the rest. These schools, listed further on in the report, have taken extraordinary measures in protecting the environment on their campuses. Their efforts have included setting goals and establishing written policies in multiple areas, ranging from recycling and conserving energy to protecting natural habitats and purchasing organic foods.

Reasons Schools Develop and Implement Environmental Programs

Role of Various Factors in the Development of Environmental Programs

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
Feel environmental programs fit in with the culture and values of the campus	64%	59	67
Have found environmental programs are good public relations	47	39	52
Have found them to be cost-effective	40	39	41
Have found environmental programs help recruit students	17	11	20

Why do schools offer environmental programs? A key reason, according to a majority of college presidents (64%), is that environmental programs fit the culture and values of campus life. College presidents also cite environmental programs as good public relations tools (47%) and as cost effective programs (40%). Some select schools, almost two in 10 (17%), even say that offering environmental programs helps them recruit students. Public relations and student recruiting are cited more by four-year schools than two-year schools.

BGSU has not identified its rationale for offering environmental programs. The Provost's Committee currently examining campus environmental sustainability may obtain some insight regarding the advantages to BGSU of offering these programs.

Role of Various Factors in Shaping Environmental Programs

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
Government regulations	60%	66	56
Student interest	47	29	56
Faculty interest	49	42	43
Staff interest			
Alumni interest	8	7	8

When Environmental Programs Began

ALL SCHOOLS	
Were started within the past year	16%
Were started within the past five years	40
Were started more than five years ago	30

Another motivating factor is government regulations. A majority of presidents (60%) say that government regulations have played a role in shaping their environmental programs. Government regulations play a much greater role in public schools (73%) than private ones (46%). In addition, near majorities say that staff (50%), faculty (49%), and student interest (46%) motivate their schools to implement environmental programs. Just 8 percent of college and university presidents say alumni interest has played an important role in encouraging their campuses to implement environmental programs. Student, faculty, and staff interests are a larger factor at four-year schools, while government regulations play a larger role at two-

year schools. Many campus environmental programs came about relatively recently. On average, more than half (56%) of campus environmental initiatives were started in the past five years, including 16 percent that were started within the last year. An average of 30 percent of environmental programs commenced more than five years ago.

Degree programs in Environmental Health, Environmental Policy and Analysis and Environmental Science were started at BGSU during the mid-1970's. The campus recycling program was begun in 1986.

Written Environmental Policies

Types of Written Policies Schools Have

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
Promote environmental responsibility			
Currently have	27%	23	30
Plan to have	16	14	17
Don't Have	54	62	49
Environmental responsibility part of the academic mission			
Currently have	21	14	24
Plan to have	13	12	14
Don't Have	61	71	56

For many schools, environmental protection fits well into their culture and values and they set goals and put policies in writing which reflect that. Presidents were asked about two types of general written commitments: promoting environmental responsibility and including environmental responsibility as part of the academic mission. More than four in 10 schools (43%) either have a written commitment to promote environmental responsibility or have plans to develop one.

No written environmental commitments are evident in the University Charter or on the BGSU web site.

Goals Set for Improving Environmental Responsibility

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
Conserving energy	64%	57	67
Environmental performance in the design of buildings			
Reducing solid waste & maximizing recycling	56	53	58
Protecting habitats	47	41	51
Purchasing environ. sound goods	47	39	51
Reducing pollution	44	32	50
Conserving water	41	29	47
Making environmentally responsible investments	29	27	30
Purchasing organic food	9	2	12

Many schools also have written declarations promoting environmental protection as part of their academic mission. Over three in 10 (34%) colleges and universities either have a written declaration that

educating students about environmental responsibility is part of their academic missions, or plan on developing one in the future. Four-year schools are more likely to have or plan to have these broad written policies than two-year schools.

No written environmental commitments are evident in the University Charter or on the BGSU web site.

Written Policies for Improving Environmental Responsibility

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
Conserving energy	37%	28	42
Environmental performance in the design of buildings	37	29	41
Reducing solid waste & maximizing recycling	40	33	44
Protecting habitats	23	17	27
Purchasing environ. sound goods	22	12	27
Reducing pollution	24	11	31
Conserving water	21	11	25
Making environmentally responsible investments	15	10	18
Purchasing organic food	5	1	7

Many schools have written policies or standards that cover a range of environmental concerns from energy conservation to recycling to protecting natural habitats. Even more schools, while not formalizing their environmental policies in writing, do regularly set and review their environmental goals. Schools are most likely to have written policies and review goals for conserving energy and the environmental performance in the design of buildings, two activities that most directly affect the financial bottom line. Colleges are also more likely to perform the highly visible task of reducing solid waste and maximizing recycling. Other activities that receive attention from many school policy makers include protecting natural habitats, purchasing environmentally sound goods, reducing pollution, conserving water, and even making environmentally sound investments.

Four-year schools are more likely to both set and review goals and have written policies for these activities. In terms of setting goals, four-year schools are more likely to set goals for conserving water, reducing pollution, purchasing environmentally sound goods, purchasing organic foods, and environmental performance in the design of buildings. Four-year schools are more likely to have written policies than two-year schools in every area.

BGSU does not regularly set and review its environmental goals, although the recycling program reviews its compliance with the state requirement of no less than 25% reduction in solid waste. No written environmental commitments are evident in the University Charter or on the BGSU web site.

Schools with Goals and Written Policies to Buy Organic Foods in All Campus Units

(Schools listed alphabetically)
Bates College
College of the Atlantic
New Mexico State University at Carlsbad
Northland College
Union Theological Seminary

In addition, some exceptional schools purchase organic food. Not only has this select group of colleges set goals for purchasing organic foods, they are also currently purchasing organic foods in all campus units. These colleges are located across the country, with schools on both the East and West coastsand in both the North and the South.

BGSU does not purchase organic food.

Plans to Set More Goals and Create Written Policies for Environment

	WRITTEN POLICIES	SETTING GOALS
Percent who plan to do more towards setting goals and establishing written policies		
Reducing solid waste and maximizing recycling	18%	25
Conserving energy	19	24
Environmental performance in the design of buildings	16	18
Reducing pollution	14	15
Protecting natural habitats	13	14
Purchasing environmentally sound goods	12	13
Conserving water	15	17
Making environmentally responsible investments	8	10
Purchasing organic food	4	5

Plans to do more towards setting goals and establishing written policies are not underway at BGSU.

While a lot is going on in schools at the policy level, more can be done to encourage future development of goals and written policies. One in four schools or fewer say they plan to develop written policies or regularly set and review environmental goals for their campus. In terms of written policies, conserving energy and reducing solid waste and maximizing recycling comprise the activities for which campuses are most likely to do more. In all the other areas, schools have diminished intentions for more activities. Few schools plan on doing more to set and review goals. A quarter of campuses indicate that they plan to do more in recycling and conserving energy. Fewer schools plan to do more in the design of buildings, conserving water, reducing pollution, protecting natural habitats, purchasing environmentally sound goods, and making environmentally responsible investments. Almost no schools plan to do more in purchasing organic food. No differences exist in the likelihood to set and review goals in these areas among schools that currently accomplish these tasks and the ones that don't.

BGSU has no plans regarding its future environmental activities. The Provost's Committee currently examining campus environmental sustainability may result in future environmental planning.

Colleges and Universities That Have Taken the Lead on Environmental Goals and Policies

Leading Schools for Environmental Goal-Setting and Environmental Policies

(Schools listed alphabetically)
Bates College
Clackamas Community College
College of the Atlantic
Duke University
Mississippi State University
Oral Roberts University
Paul Smith's College of Arts and Sciences
Saint Francis College
Slippery Rock University of Pennsylvania
Union Theological Seminary
University of Texas-Pan American
Warren Wilson College

Schools of all shapes and sizes have made commitments to environmental responsibility, but there are some noteworthy ones that have gone to particularly great lengths to ensure that the environment is part of their planning process. These schools have established a written declaration of commitment to environmental responsibility and have a written declaration that educating students about environmental responsibility is part of their academic mission. What's more, these schools have taken the lead in setting and reviewing goals and writing policies and standards for conservation and environmental issues. Schools that have made a special effort towards this planning process are located throughout the US and vary both in terms of size and the type of degree (4-year vs. 2-year) that they offer.

Leading Schools for Doing More with Goals and Written Policies for Environment

(Schools listed alphabetically)
Albany State University
Aquinas College
Bemidji State University
Cal Tech — Pomona
Carteret Community College
Hellenic College
Kean University
Lane Community College
Northwest College
Northwest Indian College
North Carolina Wesleyan
Oberlin College
Pensacola Junior College
Rust College

Saint Louis University
SUNY — Stony Brook
Mercer County Community College
Warren Wilson College

There is another elite group of colleges and universities that are especially committed to doing more towards setting goals and creating written policies on environmental responsibility. Although some of these colleges have already taken steps towards establishing environmental policies and reviewing their goals, other colleges in this group have not yet begun to set environmental goals for their campuses. Again, this is a diverse group of schools both with regard to size and the type of degree that the schools offer. These schools are located in the East, Midwest, South and West, with each region holding similar representation.

Environmental Personnel on Campus

Staff Responsible for Handling Environmental Issues

	CURRENT	FUTURE
Percent who have each type of staff member or plan to have one in the future		
A recycling coordinator	51%	5
An energy conservation coordinator	36	6
A full-time administrator who manages environmental issues beyond regulatory compliance	21	6
A green purchasing coordinator	7	6

Many schools have hired people to head specific environmental tasks. A majority (51%) of schools have a recycling coordinator; while close to four in 10 (36%) have an energy conservation coordinator. Another 21 percent have a full-time administrator who manages environmental issues beyond regulatory compliance, and some schools (7%) even have a green purchasing coordinator. The challenge will come in encouraging schools that don't have these personnel to hire them. Only 6 percent plan to do more in employing energy coordinators, full-time administrators to deal with environmental issues, and green purchasing coordinators, and only 5 percent plan to do more in hiring a recycling coordinator.

BGSU has a recycling coordinator. BGSU does not have an energy conservation coordinator, an administrator who manages environmental issues beyond regulatory compliance or a green purchasing coordinator. No plans exist to create these positions at BGSU.

Schools That Have Taken the Lead on Hiring Environmental Personnel

Leading Schools for Employing Environmental Administrators and Coordinators

(Schools listed alphabetically)
Aquinas College
Bemidji State University
College of Lake County
Dartmouth College
Idaho State University
Indiana State University
New Mexico State University at Carlsbad
SUNY Institute of Technology at Utica-Rome
University of Oregon
University of Rochester
University of Vermont
Warren Wilson College
Worcester State College

Although most schools have made some efforts toward hiring personnel who deal with environmental issues, there is an elite group that have been particularly aggressive in this area. These colleges and universities commonly have a full-time administrator who manages environmental issues beyond regulatory compliance and coordinators in charge of recycling, energy conservation, and green purchasing. They are located mostly in the Northeast and Midwest, although some are located in the West and South.

Challenges to Expansion of Environmental Programs

ALL SCHOOLS

Percentage of schools rating each as one of the biggest or a key challenge

Inadequate staff time	69%
Concern that other campus needs are more pressing	69
Inadequate funding	63
Inadequate information about what problems to address and/or what strategies to implement	30
Concern that environmental programs are not cost-effective	31
Disagreement about what problems to address and/or what strategies to implement	16
Lack of commitment among mid-level managers in key departments	23
Lack of faculty and staff interest in participating in environmental programs	23
Lack of commitment among top-level administrators	22
Lack of student interest in participating in environmental programs	22

Schools face a number of challenges to expanding their environmental programs. Most are resource based, including inadequate staff time (69%), other campus needs taking higher priority (69%), and inadequate funding (63%). Fewer presidents say that concerns about the cost-effectiveness of environmental programs (31%) and inadequate information about what problems to address and/or what strategies to implement (30%) are the biggest or key challenges. Less than two in 10 (16%) consider disagreement about what problems to address and what strategies to implement the biggest or a key challenge. Lack of commitment among staff, faculty, and students does not rate as a major challenge in the expansion of environmental programs. Slightly more than two in 10 presidents consider the lack of commitment among mid-level managers in key departments, lack of faculty and staff interest in participating in environmental programs, lack of commitment among top-level administrators, and lack of student interest in participating in environmental programs as the biggest or key challenges to expanding environmental programs. Public schools rate the lack of faculty and staff interest in participating in environmental programs (27%) higher than private ones (18%).

BGSU has no obvious commitment to the expansion of environmental programs. Therefore, it is impossible to adequately describe the magnitude of the barriers to expansion if such a commitment existed. Nevertheless, the barriers to implementation listed in this report appear to be similar to those that BGSU would have if trying to expand its environmental programs.

Orientation and Accountability

Current or Future Environmental Orientation Programs

	CURRENT	FUTURE
Percent who offer various orientation programs and have plans to do more in the future		
Students	13%	9
Staff	13	11
Faculty	11	11

Areas for improvement include offering orientation programs, creating systems for accountability, and establishing environmental councils. Only a small group of campuses offer orientation sessions on campus environmental programs to students (13%), staff (13%), or faculty (11%), with a similarly small number planning to do more in the future. Four-year colleges and universities are more likely than two-year schools to offer students an orientation session about campus environmental programs. A similar percentage of two- and four-year schools offer orientation programs for staff and faculty. Likewise, only a few schools have systems for accountability. Currently, fewer than one in 10 (8%) hold campus units accountable for environmental performance through incentives, and/or penalties. Almost eight in 10 (78%) do not hold campus units accountable while 14 percent do not give an answer.

Public schools and four-year institutions require more accountability than their private and two-year counterparts. Few colleges and universities (8%) have future plans to do this. Schools that currently hold all campus units accountable for meeting environmental standards show more desire to do so in the future than schools that currently have no accountability system. Those most likely to hold units more accountable include large schools and schools with large research budgets.

Schools with Environmental Accountability Standards in All Campus Units

(Schools listed alphabetically)
Bemidji State University
Columbia University
Life Chiropractic College West
Marine Corps University
New Mexico State University at Carlsbad
Santa Ana College
State University of New York at Albany
Sul Ross State University
The Ohio State University Newark Campus
University of Colorado at Colorado Springs
University of Nebraska at Omaha
University of North Texas

Percentage of Schools That Have an Environmental Council or Task Force

	TOTAL	2-YEAR DEGREE	4-YEAR DEGREE
Have an environmental council or task force that does not include students	6%	6	6
Have an environmental council or task force that does include students	18	12	21
Do not have any environmental council or task force	64	71	64

In terms of environmental councils, fewer than one in 10 presidents (6%) say they have an environmental task force or council that does not include students, 18 percent have an environmental task force or council that includes students, 64 percent do not have any environmental task force or council, and 12 percent do not give a response to this question. The largest schools show a greater propensity to have a council. More schools in the East have them than do schools in the South. Schools with large research budgets show a greater likelihood to have councils than those with smaller or no research budget, as do four-year schools compared with two-year schools.

BGSU does not have an environmental task force or council.

Appendix 4.
Environmental Health Program Alumni - Professional Positions

Appendix 4. Environmental Health Program Alumni – Professional Positions

Title	Company/Agency
	Ohio EPA
Env. Specialist	Ohio EPA
Order Selector	Super Value
	Advanced Tech & Lab Int, Inc
Environmental Coordinator	Cooper Tire & Rubber Company
Chemist/Environ. Engineer	W.C. Wood Company, Inc.
Env Sanitation Spec	City of St. Louis Health Division
Health & Safety Specialist	Geo-Con
Sanitarian	Henry County Health Department
	Brush Wellman
	Ohio EPA
EHS Specialist	Environmental & Occupational Risk Mgmt
	Amgen Inc.
Environmental Specialist 3	EPA, Div of Solid & Infectious Waste
Research/Dev scientist	Photonics Systems
Environmental Engineer	Gannett Fleming, Inc.
Inspector	Ohio EPA
Assistant Health Scientist	McLaren/Hart Environmental Engineering
Environmental Consultant	Vision Environmental, Inc. (VEI)
System Safety Officer	Mount Carmal Health Systems
Process Control Admin	City of Toledo Water Reclaimation
	Abbott Laboratories
	Emilcott – DGA
	Operating Consulting Services
Environmental Professional	Frost & Jacobs LPA
	Ohio EPA
Industrial Hygienist	Toledo Edison
Env. Health & Safety Scienti	Earth Tech Consulting Company
President	Dine Comply Inc.
Safety & Environmental Engineer	Ferro Corporation
Laboratory Technician	Envirosafe Services
Env. Specialist 2	Ohio EPA
Microbiologist	Guittard Chocolate Co.
Regional Risk Control Rep.	Hylant Administrative Services, Inc.
Grad Student	Geology Dept.
Environmental & Safety Mgr	E.L. Stone Company, Inc.
Registered Sanitarian	City Toledo, Dept Heath & Environment
	Ohio EPA
Industrial Hygienist	Foley Consultants
	Cardinal Laboratories, Inc
Industrial Hygiene Technician	TolTest, Inc.
Sanitarian-in-Training	Cuyahoga County Board of Health
	Marion Co Health Dept
	Emilcott-dga

Title	Company/Agency
Industrial Hygienist	State of Ohio, Div. of Safety & Hygiene
Environmental Specialist I	HZW Environmental Consultants, Inc.
Industrial Hygienist	Ohio Division of Safety and Hygiene
Environmental Technician	CWM Resource Recovery, Inc.
Ind. Hyg. Consultant	Mosely and Associates, Inc.
	B.F. Goodrich Corp. Specialty Additives
Hlth. Safety & Env. Spec	Allied Signal, Consumer Products Group
Env. Compliance Specialist	Hamilton County Environmental Svs.
Safety & Compliance Officer	The Flood Company
	Ohio EPA
	Green Manufacturing Inc.
Env. Specialist	Ohio EPA
	HZW Environmental Consultants, Inc.
	Ehove Career Center
Grad Student	Univ. of Illinois, School of Public Health
Analyst	The Sherwin-Williams Company
Grad Student	Harvard School of Public Health
	Olin Corp
Reg. Sanitarian 2	Cuyahoga County Board of Health
	Ottawa County Health Department
	Tetra Tech NUS
Env. Specialist	Ohio EPA
Industrial Hygienist	BWC-Division of Safety and Hygiene
Environmental Spec.	Ohio EPA
	Oakland County Sanitation
Staff Industrial Hygienist	Clayton Environmental Consultants
Industrial Hygienist	Ferro Corporation
	Emilcott-dga
Sanitarian	Lake County General Health District
Mgr. of Safety & Health	Abbott Laboratories
Envir. Spec	Phibro USA
Plant Manager	Great Lakes Trucking Equipment
Industrial Hygienist	Emilcott/DGA
Industrial Hygienist	Bowling Green State University
Sanitarian	Richland County Health Dept
Manufacturing Engineer	Ford Motor
Env. Specialist	Ohio EPA
Industrial Hygienist	Emilcott-dga, Inc.
Senior Technician	Midwest Environmental Consultants
	Columbia Gas of Ohio
Env. Hlth & Sfty Manager	The Bibb Company
Postdoctoral Research Fellow	The George Washington University Medical Center
Occ. Hlth. & Sfty. Technician	Environmental Health & Safety

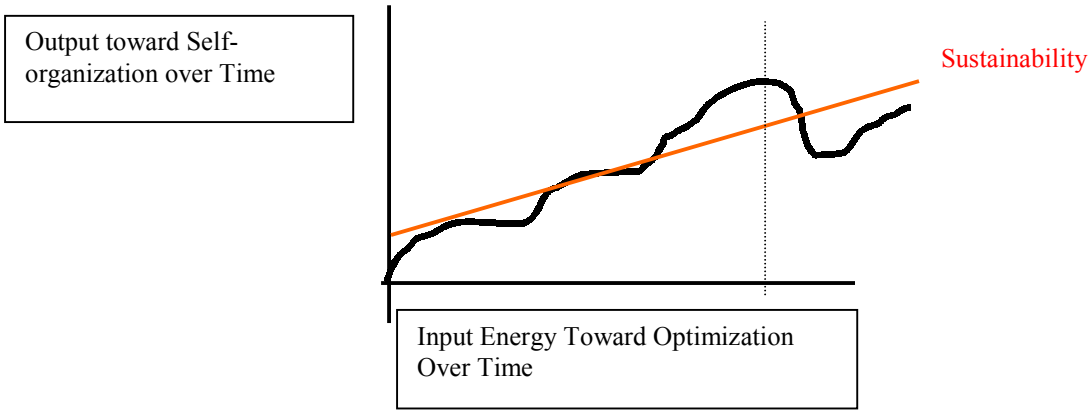
Title	Company/Agency
	Whirlpool Corporation-Marion Division
Env. Hlth. Generalist	Miami County Health Department
Industrial Hyginene Student	Purdue University
Env/Lab Scientist 2	FERMCO
Public Health Sanitarian	Oakland County Health Division
Sanitarian	Cuyahoga County Health Department
	Department of Air Pollution Control
	ATL International Inc.
Env. Hlth. Specialist	Southwest District Health Dept.
	Chemical Abstracts Service
Environmental Specialist	Vadose Research
Env. Specialist	Dept. of Natural Resources-Georgia
Manager	Ohio EPA, Central District Office
Field Risk Manager	PepsiCo, Frito Lay Division
Quality Control Chemist	Elf Atochem North America
Env. Specialist	Ohio EPA
Industrial Hygiene Tech.	Honda of America Mfg. Inc.
Customer Service Chemist	Safety-Kleen
Manager-Env. Hlth.	American Hospital Assoc
Reg. Sanitarian 2	Cuyahoga County Board of Health
	Ohio EPA Div. Of Air Pollution Control
	Toledo Metro Parks
Registered Sanitarian	City of Piqua, Ohio
Safety Director	NASA Glenn Research Center
Recycling Coordinator	Bowling Green State University
Corp EHS Compli Spec	Parker Hannifin Corp
Industrial Hygienist	East Ohio Gas
IWS Supervisor	BFI
Project Scientist	Environmental Resources Management
EHS Coordinator	Reserve Environmental Services
Environmental Specialist	State of MO, Dept of Natural Resources
Environmental Engineer	Martin Marietta Energy Systems, Inc
President	Affinity Environmental Group, Inc.

Appendix 5
Capital Development, Sustainability and Organizational Systems

Appendix 5

Capital Development, Sustainability and Organizational Systems

It may be easier to understand environmental sustainability and its relationship to Capital Development as a system of self-organization. One example of this self-organization is financial resources. Financial resources come into the university and are distributed with the expectation of achieving a particular output. The determinations of this resource distribution directly relate and impact the self-organization of the entire system or its subsets. We see from this example—possibly the most significant example of Capital Development—that the system will thrive based on the amount of "analysis energy" invested toward the proper distribution of resource input upon the assets of the university (see the graph 1.1 below). Again, this example illustrates the difference between self-organization and sustainability concepts, and provides the insight that sustainability is always an optimization of the systems available resources. These resources can be identified in terms of "sustenance type measurable elements" such as, funding, culture, energy, research, growth potential, image, etc. and/or as physical type measurable elements such as, students, staff, buildings, land, physical environment, infrastructure and other physical assets and attributes.



Graph 1.1

Appendix 6
Concurrent Planning Systems

Appendix 6

Concurrent Planning Systems