

Critical Dimensions of Sustainability in Higher Education¹

This chapter appeared originally in Sustainability and University Life, Walter Leal Filho ed., published by Peter Lang © 1999.

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Abstract

This chapter explores the evolution of the concern for sustainability in higher education. It describes the origin of the Talloires Declaration as a guiding set of commitments for colleges and universities pursuing sustainability. Critical dimensions of sustainability in higher education are presented as a result of the Association of University Leaders for a Sustainable Future's (ULSF)² Sustainability Indicators Project. Critical conditions determining the success of sustainability initiatives are then discussed. Two case studies of university efforts to "green" their institutions are described in light of these dimensions and conditions for success.

Sustainability and Ecojustice

A concern for sustainability arose in the early seventies as growing numbers of people realized that the degradation of the environment would seriously undermine our ability to ensure expanding prosperity and economic justice. The most frequently cited definition of sustainability came from the report of the World Commission on Environment and Development, in its description of new directions for "our common future." Sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987).

A series of United Nations¹ conferences and NGO (Non-Governmental Organizations) meetings in the 1990s have provided a major framework in which the meaning and implications of sustainability have been clarified. In these major international events, representatives of governments, business and civil society have met to wrestle with the direction of development. They produced a series of international agreements, including: Agenda 21 from the United Nations Conference on Environment and Development in Rio; the Vienna Conference Tribunal on Violations of Women's Human Rights; the Cairo Consensus and Action Plan of the International Conference on Population and Development; the Copenhagen Social Summit discussions of equitable, "people-centered" development; the Beijing Commitments regarding Rights and Roles of Women in Development; the Habitat II

¹ Taken from *Sustainability and University Life* (W. L. Filho, ed., Peter Lang, 1999).

² The Association of University Leaders for a Sustainable Future (ULSF), located in Washington, D.C., is an international membership organization of academic leaders and institutions committed to the advancement of global environmental literacy and sustainability. ULSF helps colleges and universities build and strengthen institutional capacity to make sustainability a major focus of academic disciplines, research initiatives, operations and outreach. The ULSF Secretariat promotes the 1990 Talloires Declaration and maintains an international network of signatories, facilitating information exchange, providing technical support, and sponsoring conferences that foster organizational and individual capacity to develop sustainable policies and practices. ULSF is the higher education program of the Center for Respect of Life and Environment (CRLE). The Center, founded in 1986, promotes the greening of higher education and fosters earth ethics to guide sustainable development.

agenda concerned with sustainable human settlements; and the Rome World Food Summit. These international agreements, developed with U.S. government participation, set promising policy directions for a sustainable future (Clugston, 1996).

Agenda 21, adopted by the 1992 Earth Summit, emphasizes that human population, consumption, and technology are the primary driving forces of environmental change. This document outlines steps to reduce wasteful and inefficient consumption patterns in some parts of the world while encouraging increased but sustainable development in others. *Agenda 21* also states that "education is critical for promoting sustainable development and improving the capacity of all people to address environment and development issues" (*Agenda 21*, 1994).

Analysts increasingly recognize that poverty, unemployment, community disintegration, and ecological abuse have accelerated globally, despite a seven-fold increase in global GNP since 1950. A major reason is that we have defined our goals in terms of growing economies to provide jobs—a means—rather than developing healthy sustainable human societies that provide people with secure and satisfying livelihoods—an end. David Korten claims that a new agenda must be designed

to support the right of all people to a place in society and on the earth with access to the resources required to create a secure and fulfilling life for themselves at peace with their neighbors and in balance with the earth's natural systems; to build—complementary to the money economy—strong gender-balanced, non-monetized household and community economies able to replenish the social capital that is essential to healthy societies; and create a global system of localized economies that root economic power and environmental responsibility in people and communities of place (Korten, 1994).

Definitions of and approaches to sustainability vary depending on the view and interest of the definer, but each emphasizes that activities are ecologically sound, socially just, economically viable and humane, and that they will continue to be so for future generations. Historically, the term "sustainable" arose among those with environmental concerns, and most definitions reflect this emphasis. It is critical, however, to address social justice issues and to know that there can be no sustainable communities and institutions without social justice. So, too, is humane consideration toward the whole community of life an essential part of true sustainability. Fundamentally, a commitment to sustainability implies recognition that the social and environmental challenges of the 21st century are real and they require that the global economic and political order be grounded in different values and practices.

A Movement to Promote Sustainability in Higher Education

A significant attempt to define the sustainable university was made in 1990 with the Talloires Declaration. Jean Mayer, the President of Tufts, convened twenty-two university leaders in Talloires, France, to voice their concerns about the state of the world and create a document that spelled out key actions universities must take to create a sustainable future. Recognizing the shortage of specialists in environmental management and related fields, as well as the lack of comprehension by professionals in all fields of their effect on the environment and public health, this gathering defined the role of the university in the following way: "Universities educate most of the people who develop and manage society's institutions. For this reason, universities bear profound responsibilities to increase the awareness, knowledge,

technologies, and tools to create an environmentally sustainable future" (Report and Declaration of The Presidents Conference, 1990).

The following excerpts from the Talloires Declaration describe critical aspects of the presidents' vision of sustainability through higher education:

We the presidents, rectors, and vice chancellors of universities from all regions of the world, are deeply concerned about the unprecedented scale and speed of environmental pollution and degradation and the depletion of natural resources. Pollution, toxic wastes, and depletion of the ozone layer threaten the survival of humans and thousands of other living species, the integrity of the earth and its biodiversity, the security of nations, and the heritage of future generations.

We believe that urgent actions are needed to address these fundamental problems and reverse the trends. University heads must provide the leadership, so that their institutions respond to this urgent challenge.

We, therefore, agree to take the following actions...

- ? Encourage all universities to engage in education, research, policy formation, and information exchange on population, environment, and development to move toward a sustainable future.
 - ? Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate and responsible citizens.
 - ? Set an example of environmental responsibility by establishing programs of resource conservation, recycling, and waste reduction at the universities.
- (ULSF, 1990)

The Talloires Declaration has been signed by more than 265 university presidents and chancellors at institutions in over 40 countries across five continents. This suggests a growing recognition that academic research, teaching, and service must address the sustainability challenge. Undoubtedly, signing the Talloires Declaration for some institutions constituted a symbolic act in the moment. For others, however, the document continues to be an impetus and framework for steady progress toward sustainability.

With or without the Talloires Declaration as a guiding set of commitments, the obstacles to transforming higher education are daunting. The modern university is the embodiment of the mechanistic, utilitarian worldview that shaped the scientific and industrial revolutions. Cartesian dualism (separating pure from applied, objective from subjective); Baconian method (emphasizing manipulation, control, and quantitative measurement); and utilitarian philosophy shape academic functioning. The academy is also deeply involved in providing expertise for an "unsustainable" world economy.

Academic work -research, teaching and service - is organized in disciplines such as psychology, engineering, and theology. It is the responsibility of eminent scholars in each of the disciplines to define what is understood and appropriate to pursue within them. The department is the local, campus -based manifestation of the discipline. The current body of fact and theory accepted by the disciplines largely determines what is taught in these local

places. Academics move from campus to campus but remain in their disciplinary fields. Promoting sustainability in higher education depends significantly on the active engagement of disciplinary leaders in promoting ecologically sensitive theory and sustainable practices as central to the scope and mission of their fields (e.g. in peer-review criteria for journal articles and in the themes and organization of professional associations).

Fortunately, many are engaged in transforming their disciplines at both the national and local (campus) levels. Members of various professional associations have started special interest groups, divisions, or sections focused on environment and sustainability. For example, the American Institute of Architects provides an environmental education program for teachers called "Learning by Design." The American Planning Association and the American Management Association both have formed special interest groups. The American Academy of Religion has an ecology and religion section. Professional journals are emerging, such as the *Journal of Interdisciplinary Studies in Literature and Environment*. This publication provides a forum for critical studies of the literary and performing arts proceeding from or addressing environmental considerations, including ecological theory, conceptions of nature and their depictions, the human/nature dichotomy, and related concerns (Clugston, 1995).

Critical Dimensions of Sustainability in Higher Education

What would a sustainable college or university look like? An academic institution committed to sustainability would help students understand the roots of environmental degradation and motivate them to seek environmentally sustainable practices while also teaching the roots of today's injustices in full integration with modeling justice and humaneness.

While the manner in which academic institutions and programs define and approach sustainability varies, we would expect a genuine commitment to creating a sustainable future to be evidenced in the critical dimensions of institutional life (e.g. in its written statements of mission and purpose; academic programs; energy and purchasing practices; outreach; faculty hiring and development, etc.). ULSF's on-going Sustainability Indicators Project has revealed a set of orientations and activities found in colleges and universities fully committed to sustainability. Though approaches to "greening" higher education vary considerably, the institution must be implementing practices in these seven areas to be very far along the path to sustainability:

1. The written statements of the mission and purpose of the institution and its various units express their philosophies and commitments. The descriptions of learning objectives and public relations materials of the various schools, departments, programs or offices thus would express prominent and explicit concern for sustainability.
2. The college or university appropriately incorporates the concepts of sustainability into all academic disciplines and in liberal arts and professional education requirements, as well as into faculty and student research. Likewise, a firm grounding in basic disciplines and critical thinking skills is essential to pursuing a sustainable future. Institutions committed to sustainability prominently feature certain topics in their course offerings, e.g. Globalization and Sustainable Development; Environmental Philosophy; Nature Writing; Land Ethics and Sustainable Agriculture; Urban Ecology and Social Justice; Population, Women and Development; Sustainable Production and Consumption; and many others.

3. A major shift from the current academic paradigm lies in a conscious reflection of the role of the institution in its social and ecological systems. Students learn about the institutional values and practices in this context. For example, all students would understand:
 - a. how the campus functions in the ecosystem (e.g. its sources of food, water, energy, endpoint of waste and garbage) and its contribution to a sustainable economy.
 - b. how the institution views and treats its employees (such as student, staff, faculty involvement in decision-making, their status and benefits, etc.).
 - c. the basic values and core assumptions present in the content and methods of the academic disciplines.
4. Since research and teaching are the fundamental purposes of academic institutions, knowledge of sustainability is a critical concern in the hiring, tenure and promotion systems. We would expect the institution to:
 - a. reward faculty members' contributions to sustainability in scholarship, teaching, or campus and community activities.
 - b. provide significant staff and faculty development opportunities to enhance understanding, teaching and research in sustainability.
5. The institution has an "ecological footprint." In its production and consumption the institution follows sustainable policies and practices: for example, CO₂ reduction practices and the use of emission control devices; sustainable building construction and renovation; energy conservation practices; local food purchasing program; purchasing and investment in environmentally and socially responsible products; and many others. Furthermore, these operational practices are integrated into the educational and scholarly activities of the school.
6. Institutional support and campus student life services that emphasize certain practices, such as:
 - a. new student orientation, scholarships, internships and job placement counseling related to community service, sustainability and/or justice issues;
 - b. an Environmental or Sustainability Council or Task Force, an Environmental Coordinator or Curriculum Greening Officer;
 - c. regularly conducted environmental audits;
 - d. prominent public, student and staff celebrations of sustainability on campus (for example, lectures, conferences, Earth Day celebrations, etc).
7. The institution is engaged in outreach and forming partnerships both locally and globally to enhance sustainability. The college or university supports sustainable communities in the surrounding region and relationships with local businesses that foster sustainable practices. The institution seeks international cooperation in solving global environmental justice and sustainability problems through conferences, and student/faculty exchanges, among others. This list is an abbreviated version of the questions found in ULSF's Sustainability Assessment Questionnaire, 1999.

Critical Conditions Determining the Success of Sustainability Initiatives

Sustainability initiatives meet with various degrees of success. In some institutions, seemingly broad-based and strong initiatives have faded away. In others, significant academic programs and operations policies have been institutionalized. A variety of factors determine the success

of sustainability initiatives at colleges and universities. Seven critical conditions are noted below.

1. How are the "champions" of sustainability initiatives perceived by others in the institution? Do they have the credibility and the personality needed to promote the initiative or are they marginal institutional actors complaining and promoting their narrow self-interest? Do they persist in the face of resistance, with adaptability and grace, or do they give up or become frustrated?
2. Do the initiatives have the endorsement of key administrative leaders at the institution? Is a commitment to sustainability supported by the President or Chancellor (e.g. by signing the Talloires Declaration), or by other high level and influential figures (e.g. senior managers)?
3. Who benefits from the initiative? Which departments and programs will the faculty and administration perceive the initiative to be strengthening, and which will it threaten? If it is perceived to be the imposition of a special interest group demanding that all faculty understand "Earth Sciences" or embrace a new counter culture or "politically correct" movement, then it is doomed. However, if it promises to empower and strengthen many programs, it will be supported.
4. Does the initiative fit with the institution's ethos, its saga, and its organizational culture? Each college and university has a particular story that it tells about itself and a particular "niche" that it fills in the ecology of higher education. How well does the initiative conform to this institutional identity?
5. Does the initiative elicit the engagement of the college or university community? Is there sufficient publicity (through awareness events, press releases, articles, etc.) for new policies and initiatives? Is there regular disclosure of progress, successes and failures? Is information made available to ensure accountability on the part of those managing and carrying out the initiative? Finally, is the process for critique of current sustainability programs and determining next steps broadly participatory across the school community?
6. Is the initiative academically legitimate? Is it perceived to be grounded in a recognized body of knowledge: of sound theory and scholarly backing? Can it claim an academic rigor and validity? If it lacks this basic sine qua non of academic credibility, it will be rejected.
7. How successful is the initiative in bringing in critical resources (e.g. grants and contracts, state funding, student demand, recognition and support from key stakeholders such as the media or trustees, and state, national and international leaders)? Does the initiative produce cost savings over time (e.g., energy conservation)?

Two Case Studies

The two case studies in this section demonstrate different strengths according to the "critical dimensions" of sustainability and "critical conditions" for success. In its mission to become a "green university," Liverpool John Moores University exemplifies strong environmental practices in operations, and is moving forward in curricular reform and other areas. Santa Clara University shows advancement and innovation in its academic programs, while making genuine progress in its operations.

Liverpool John Moores University (JMU)

For Liverpool John Moores University (JMU), in Liverpool, England, the last decade has been one of considerable accomplishment in sustainable operations. As a city-based institution, JMU comprises approximately 45 buildings spread over three main campuses. Over 20,000 students work with a staff of nearly 3,000. The organization is typical of a 'new' university with fifteen schools in three Academic Divisions (Engineering and Science; Education, Health and Social Science; Arts and Professional Studies).

In 1994, the University's Executive Management Team stated its commitment to:

1. Developing a range of academic programs, from general environmental literacy to specific professional preparation.
2. Ensuring that appropriate environmental content is present throughout its academic programs.
3. The rationalizing and improvement of the physical and working environment and the effective, efficient and sustainable use of all resources.
4. Enabling all members of its community to develop healthy and ecologically sound lifestyles and to protect and improve the physical and social environment in which it is situated. (Liverpool John Moores University's Executive Management Team, 1994)

The following is a list of milestones in JMU's environmental progress over the last decade:

- ? "Toyne Report on Environmental Responsibility" published, 1993.
- ? Environmental Policy and Action Plan (EPAP) was approved by the Executive Management Team in response to Toyne's recommendations, October 1994.
- ? Three new undergraduate degree programs with an environmental theme were approved, 1994.
- ? Environmental purchasing policy implemented, 1995.
- ? In response to "Toyne II," funding was secured for a full-time Environment Coordinator to steer the University's environmental program, 1996.
- ? Energy efficiency awards received in 1994, 1995 and 1997.
- ? Vice-Chancellor signed the Talloires Declaration, October 1996.
- ? Environment Officer position made permanent. Curriculum Greening Officer appointed, 1997.
- ? Environmental awareness training introduced as a core requirement for new staff induction program, 1997.
- ? Publication of first Environmental Performance Report (EPR) stating clear and achievable objectives and targets for continual performance improvement (supervised by an Environmental Review Team), 1997.
- ? Health, Safety and Environment Unit (HS&E Unit) established, born out of the existing Health and Safety Unit and Environmental Management Unit to allow the integration of evolving management responsibilities and operational systems, 1997.
- ? Appointment and introduction of School/Service Environment Officers across the University to champion the new HS&E Policy, 1998.
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The university's first serious excursion into the sphere of environmental responsibility and sustainable practice was formalized following the first "Toyne Report on Environmental Responsibility" in 1993. Professor Toyne, Vice-Chancellor and Chief Executive of JMU, wrote the report after chairing a Committee established by the Government Department of Education to investigate the potential for greening higher education. The Environmental Policy and Action Plan (EPAP), which was established in 1994 to fulfil the recommendations of Toyne I, became the stimulus for a number of critical decisions made by the Executive in the years that followed.

A full-time Environment Officer was appointed to spearhead the remaining implementation of the EPAP as it became clear that projects required coordination on a regular basis. The Officer also established an Environmental Management Unit (EMU) to carry out the recommendations of Toyne II, published in 1996.

In January 1997, the EMU brought together a small in-house group of Senior Managers to form an Environmental Review Team (ERT) and oversee a comprehensive review process. This resulted in the inaugural Environmental Performance Report (EPR) 1997, which represents the University's commitment to accountability through the disclosure of actual performance against stated policy objectives.³ Moreover, it establishes the University's intentions for continual performance improvement and describes how this is to be achieved.

Highlights from the Environmental Performance Report

JMU is fulfilling many of its policy goals in all areas of campus operations. In Energy Conservation, the University has established an ongoing energy management program which has performed an energy audit for all University buildings; completed ten specified energy conservation projects; conducted a University-wide energy awareness campaign including good practice publications and training seminars; developed and promoted Energy Conservation Task Groups; and re-negotiated utility contracts. JMU has earned three energy efficiency awards from utility companies since 1994.

In the area of Waste Management and Reduction, a Waste Management Steering Group was established in 1997 to reduce waste bound for landfill and begin comprehensive recycling programs. With the transfer of various institutional publications, such as the staff and student handbooks, to the Campus Wide Information System (CWIS), paper use has dropped significantly. Many University handbooks and other procedural documents are now only available on the CWIS. A recycling scheme to collect computer consumables such as ink and toner cartridges has been introduced into all University learning resource centers and

³ The EPR 1997 was put on the university website and distributed to a wide audience. The new Health, Safety and Environment Report 1998, replacing the EPR, was due to be released at the time of this writing.

Information Technology suites. The use of the double-sided printers has been encouraged and they have started to replace old printers. A strict policy of double-sided printing and copying was then introduced within the Print Office. A Waste Audit and Review occurred in early 1999.

The JMU Food Policy includes the following goals: to make healthy, nutritious and ethnically sensitive food generally available at all University catering outlets; to purchase foodstuffs from local suppliers wherever possible; to maximize use of organically grown foodstuff; to minimize energy usage in the preparation and cooking of food; and to minimize the packaging of foods at catering outlets. JMU is making significant progress in meeting these goals. Recent changes include in-house production of refectory sandwiches which had previously been brought in, and an increase in vegetarian options at food services.

JMU's policy on Purchasing states: "In purchasing its services, materials, equipment and consumable items, the University will give preference to products which do least harm to the environment, which are not supplied with excessive packaging, and which are benign or at least harmless in their effect on the environment. Where possible, preference will be given to local or regional suppliers to maximize the University's input to the local community." Currently, JMU requires suppliers of furniture and computer hardware (over ten units) to take away packaging after delivery and installation. Cleaning solution containers are also disposed of or refilled by suppliers. JMU held an awareness event to teach product awareness among purchasers in early 1999.

JMU's policy on Transport and Commuting includes a commitment to purchasing fuel efficient University vehicles and minimizing damaging emissions; encouraging walking, bicycle use and public transport among the University community and between campuses; and a campaign for cycling paths linking campuses and other student facilities. In July 1997 a Transport and Commuting Steering Group was established to address these issues. The Steering Group helped introduce a shuttle bus service linking the main University campuses and buildings. JMU also contributed to the Liverpool City Council's cycling strategy in 1997 and then established a University strategy to complement the local plan which includes improved bicycle parking facilities and interest-free loans for staff to purchase bicycles. A University Travel Survey was conducted in February 1999.

The production of an EPR has provided an opportunity to promote positive and practical solutions to environmental concerns; acknowledges the vital contribution made by a number of key 'champions' within the organization; allows the assessment of performance against a set of target indicators; and highlights the need for sustained efforts to raise awareness and encourage cooperation across the organization if policy statements are to be transformed into reality. (excerpts taken from Blyth et al., 1999)

Also in force at JMU is a plan for "greening" the curriculum. The Curriculum Greening Officer, a member of the faculty, is coordinating this effort. As stated in a "Curriculum Greening" summary by a JMU Environmental Policy Officer, "Our students need the means to: develop their own sense of environmental responsibility; understand the principles of sustainability; fully participate as global citizens; and contribute to the efforts of employers to meet their environmental obligations." An initiative in Education for Citizenship is underway and a recent review of curriculum offerings identified "16 degree programs with a major environmental component" (Small, 1998).

Santa Clara University (SCU)

Santa Clara University (SCU), in Santa Clara, California, founded by Jesuits in 1851, is a Catholic institution with an academic organization of five units, including arts and sciences, business, law, engineering, and counseling psychology and education. Enrollment includes just under 2,000 undergraduates and about 4,000 graduates. SCU's undergraduate school has shown considerable motivation and progress on the part of the faculty and administration in "greening" their academic programs. An Environmental Studies Program was founded in 1992 which supports the largest minor on campus in Environmental Studies. A Campus Environmental Assessment (CEA) was conducted in 1995 which spawned debate and environmental action in many other areas on campus.

The strategic plan of the university sets as a primary goal the development of "integrated education" in a "community of scholars," which includes faculty, students and staff. Many courses in the undergraduate school are interdisciplinary in content and some are team-taught. There is even an interest in hiring professors with interdisciplinary backgrounds. For example, the school is in the process of hiring a tenure track ecological archaeologist to work half-time in Environmental Studies and half-time in Anthropology, and a tenure track political ecologist to divide her time between Environmental Studies and Political Science. As a Jesuit school, Santa Clara's teaching and public debate are attentive to social justice issues. Course offerings of this nature include African Economic Development, Environmental Activism, and Environmental Politics in Less Developed Countries.

An Environmental Coordinating Committee (ECC) was formed in 1997 to promote and administer environmental efforts on campus with a particular concern for the ecology and social heritage of Santa Clara. The ECC, which includes a student, staff members and faculty, is currently working on an environmental decision-making procedure to guide all decisions in terms of impact on the community, the physical campus and the region. Recent ECC issues have included the plight of a small burrowing owl population on campus that could be displaced by new construction.

On the operations side, the university is making progress in numerous areas. There is a long-range plan to replace most campus vehicles with electric; two electric vehicles are now in use for waste removal and recycling. SCU is currently improving the energy efficiency of its mechanical systems, in particular heating and air conditioning. In landscaping, the school has recently connected to a local reclaimed water system and will soon use this water to irrigate the grounds. SCU's recycling program compares with the best programs in the country in approaching a 50% recycled solid waste level. Facilities is working to eliminate all hazardous waste products from housekeeping and building and grounds work.

A strong driving force for "greening" of the campus has been student and faculty interest manifested primarily as course-based campus projects at the undergraduate school. Campus environmental research related to the CEA has been conducted in several departments including Chemistry, Biology and Anthropology, with interdisciplinary collaboration in numerous cases. Many of these projects are subsidized by a very supportive administration. Since 1995, specific projects have included:

In Biology:

- survey of campus bird populations especially focusing on their relationship to specific plants and gardens.

- development of a Native Species Garden and of educational materials describing the natural and cultural history of native Californian plants.
- development of a Community Garden utilizing composting techniques for yard waste and yielding produce for donation to local community centers.

In Chemistry:

- evaluation of indoor air quality involving testing for pollutants in areas near copy machines or where complaints of poor air quality had originated.
- investigation of the efficacy of solar energy and of options for incorporating passive solar systems in new campus buildings.
- investigation of handling of hazardous materials in the sciences including an evaluation of spill preparedness, radioactive isotope storage, and inventory methods.
- investigation of electricity deregulation and future "green power" choices.

In Anthropology:

- student/faculty research into SCU's history as a former Franciscan mission site and the environmental impact of early mission activities.
- student/faculty research for the *Research Manuscript Series on the Cultural and Natural History of Santa Clara*.⁴

Off Campus:

SCU has also supported student research beyond the campus. In 1998, twelve natural and social science students learned basic interdisciplinary, environmental research skills in a quarter-long seminar course during the academic year and then participated in a summer research program in Trinidad and Tobago. Research included:

- assessment of local villagers' environmental knowledge for development of an environmental education program on Trinidad.
- testing methods for surveying biodiversity for comprehensive biodiversity census on the island of Tobago.
- bird and ethnobotany survey at a site soon to be developed for ecotourists on Trinidad.
- study of social concerns facing members of the rainforest community as they confront the new industry of tourism on Trinidad.

The Trinidad and Tobago research program has become a paradigm of environmental studies and community outreach. In the near future, students will help the Trinidadian non-profit environmental group, Paria Springs Trust, establish a model of permaculture and sustainable development in the rainforest. SCU's International Programs and Environmental Studies Program sponsored the Trinidad and Tobago program.

Outcomes: Quantitative and Qualitative

Through their research experience, students gain some level of mastery regarding specific content and learn basic methods. They review previous work on campus, obtain information on similar issues at other campuses, gather information through interviews and available documents, and analyze and interpret results. For group projects, leadership and group dynamics skills begin to emerge. Furthermore, students must learn how to present results in various types of written reports and in poster presentations.

⁴ Begun in 1994, the series has focused primarily on the cultural ecology of the region, including topics such as the oak woodlands, the riparian zone, medicinal plants and how different cultures have viewed their environment. Nine series have been published to date.

Although many projects begin as scientific research, due to the complexity of environmental issues, students learn that ethical, social, and economic relationships are often key to the success of their project. Students doing research on campus must develop relationships with staff and administrators to obtain information and gain an understanding of how the university operates. In establishing those connections, students learn the complexities of operations and develop sensitivity to the roles staff and administrators play in defining daily campus functions. Finally, students gain a sense of ownership and a connectedness to the campus. Participating in campus-based projects forces students to realize that they are stakeholders, along with the faculty and staff, in the "greening of the campus." Ultimately, it is hoped that students recognize they are environmental stakeholders in any place they choose to live.

Enhancing Research Experience

Faculty can use the environmental studies curriculum (multidisciplinary by its nature) as a template for developing a program of instruction for conducting research. Clearly, guidance from colleagues in diverse fields is required for faculty to become more effective mentors for the environmental studies students. Workshops focused on the ethical dimensions of multidisciplinary research, such as those offered by SCU's Markkula Center of Applied Ethics, have been helpful. In these workshops, students and faculty address questions concerning interpersonal relationships before and concurrent with their research.

Implementing Change

Disseminating the results and recommendations of course-based projects is considered as important as conducting the research. Several avenues for publicly presenting research results have been adopted at SCU: campus-wide symposia and poster sessions, and student-authored articles for an environmental newsletter and the student newspaper. Implementing a set of recommendations for "greening the campus" has proven to be one of the more difficult and most rewarding aspects of conducting environmental research. (excerpts taken from Edgerly-Rooks et al., 1999).

Reflections on JMU and SCU in Terms of Critical "Dimensions" and "Conditions"

The following comments make specific reference to critical "dimensions" and "conditions" of sustainability (using "D" for dimensions and "C" for conditions in parentheses). According to the seven "critical dimensions" of sustainability, Liverpool John Moores University is clearly strongest in its comprehensive approach to reducing its ecological footprint in terms of waste reduction, transportation and so on. (D5). This has been possible, in part, because of significant accomplishments in other dimensions. For example, JMU's mission statements are evolving to reflect a commitment to sustainability (e.g. written statements by the Executive Management Team and by Vice-Chancellor Toyne) (D1). Significant efforts are underway to incorporate sustainability into the philosophy and content of academic programs (e.g. statements by Environmental Policy Officer, hiring of Curriculum Greening Officer) (D2). JMU is increasingly reflecting on the role of the institution in its social and ecological systems (e.g. new Health, Safety and Environment Unit and the Education for Citizenship initiative) (D3). Numerous student support mechanisms and institutional practices are in place (e.g., awareness events, steering committees and task groups, environmental performance reports, etc.) (D6).

In terms of the "critical conditions" necessary for long-term success, JMU appears to have respected and credible "champions" (C1). Its environmental initiatives are endorsed by the Vice-Chancellor and Chief Executive (e.g. the Toyne Report) (C2). The university's initiatives conform to the new culture and direction of the institution, especially as defined by Vice-Chancellor Toyne, though it is unclear to what extent some university constituencies hold on to the old ethos (C4). JMU's commitment to accountability and disclosure of information is clear from its publication and distribution of the Environmental Performance Report 1997 and its determination to continue this practice (C5). In the area of "greening the curriculum," it is not clear at this point whether the faculty consider this reform process academically legitimate (C6).

The Santa Clara University undergraduate school shows greatest progress in its academic programs and has the backing of administrative leaders in this arena. In terms of "critical dimensions," SCU's curriculum and student research activities are broad in scope and encompass environmental as well as social justice issues (e.g. research in anthropology and off campus on Trinidad and Tobago; courses listed include Environmental Politics in Less Developed Countries) (D2). There is some degree of reflection on the role of the institution in both its social and ecological systems (e.g., coursework and fora stemming from the university's Jesuit tradition, student interaction with staff and understanding of campus operations through research) (D3). There is recent interest in hiring faculty in Environmental Studies who demonstrate an interdisciplinary expertise, and faculty development is emphasized through workshops at the Markkula Center of Applied Ethics (D4). SCU is clearly attempting to minimize its environmental impact through energy efficiency initiatives, recycling of solid waste, etc. (D5). In the area of student support services and campus life, SCU has an established Environmental Coordinating Committee. The university also holds events such as campus-wide symposia to present student research, an example of campus life activities intersecting with academic work (D6). The Trinidad and Tobago research program is a good demonstration of student research functioning as community outreach for sustainability (D7).

In terms of "critical conditions" for success of sustainability initiatives, the faculty at SCU's undergraduate school who are leading the way in reforming academic programs appear to be highly motivated and well respected by their colleagues (C1). They also enjoy the support of their administrators in their endeavor to enhance environmental studies and interdisciplinary research (C2). Furthermore, there is strong belief on the part of numerous faculty in the academic legitimacy of these recent academic initiatives (C6). Finally, efforts to inform the school community of student academic work have been very successful (e.g. sharing of results is a priority in research, campus presentations and poster sessions, environmental newsletter and student newspaper) (C5).

Both institutions are addressing key areas in their progress toward sustainability, though with different emphases. These examples show that the stated "critical dimensions" are interrelated, that it is unlikely to have success in one area and not in others. However, it is also evident that the task of achieving comprehensive change across all dimensions is immense, can only happen slowly, and, depending on the institution, will occur more quickly in some areas than others. A key indicator of long-term success for any sustainability initiative is the extent to which it has been institutionalized, whether through official policy, budgeting, or permanent staff positions. JMU is particularly strong in this area, having created positions and offices for forwarding the sustainability agenda.

Conclusions

Every institution committed to sustainability will find its own way of defining sustainability for itself. Few, if any, institutions have achieved transformation across all the "critical dimensions" outlined, while many have succeeded in a few areas. Most of the efforts to date, including those discussed in this chapter, are heavily oriented toward environmental initiatives. The emphasis is not on sustainability broadly defined, even while the term "sustainability" is often used in the rhetoric of reform.

Even if all the "critical conditions" are present, sustainability initiatives do not necessarily succeed, except in a few market niches. The two major factors controlling the structure and functioning of academia—disciplinary structure and economic forces—have moved very little toward sustainability. Academic disciplines continue to fragment and specialize, and faculty usually owe their allegiance to their subdisciplines, not their institutions.

Perhaps no obstacle is so great as the overpowering disincentives to sustainability built into the economy: both perverse subsidies and pricing that fails to distinguish between healthy (sustainable) and destructive economic activities. Many cost savings can be (and should be) achieved with eco-efficiency through conservation and sound ecological design (see the Campus Ecology study, Green Investment, Green Return, 1998). As long as sustainability confines itself to eco-efficiency and its appropriate market niche, it can meet with significant success. But an authentic reframing of the institution is difficult. To build a sustainable future the economy must change. Many academics are laying the groundwork for this needed "paradigm shift." At some point, the capacity to shift will intersect with the necessity to shift, and the new sustainability paradigm will crystallize as the dominant metaphor of higher education.

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