

Sustainability Programming is an Ethical Obligation for Higher Education in the Environmental Century

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Abstract: Development of a sustainable relationship with our natural resources is an imperative for any meaningful quality of life as climate change poses the ultimate test of our adaptability as a species. The consequences of failing to respond will be catastrophic and irrevocable over a millennial time scale. During the environmental century, higher education has an ethical imperative to provide the foundation of a sustainable civilization. Higher education is broadly failing to meet this mandate. Most existing programs in environmental and sustainability science and studies provide inadequate training and lack budgetary autonomy equivalent to established academic units. Although many universities define sustainability through operational activities, the primary purpose of higher education is not operational sustainability -- it is teaching, learning, scholarship, and outreach. Developing the capacity for proactive adaptation will require us to examine how we conduct teaching and research across the spectrum of higher education institutions. Education and research for proactive adaptation to rapid ecological change affecting human and natural systems is necessary if we are to produce holistic managers to conserve our natural heritage. All undergraduates should acquire basic ecological and sustainability literacy. Teaching, learning, and scholarship for sustainability must become the highest priority in higher education. Collectively, faculty have the power to implement these reforms.

Keywords: Sustainability education, higher education reform, transdisciplinary, sustainability curriculum

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Humanity is at a crossroads. We face a greater risk to our ability to thrive than at any time since our exodus from Africa about 100,000 years ago, when our species had been reduced to an effective population of about 10,000. Recent projections indicate that world population will not stabilize, as once calculated by the United Nations, and could exceed twelve billion people by 2100 (Garland et al. 2014, *Science* 346). The World Wildlife Fund Living Planet Report (2012) estimates that over the next forty years, agriculture will need to produce as much food as produced in all of the previous 8,000 years. Estimates of the operating limits for our biosphere show that we have exceeded the limits of safety with respect to the extreme loss of species diversity and phosphorus and nitrogen loading, and we are in imminent danger of exceeding the limits for climate change and land-system change (Stefen et al. 2015. *Science* 347).

A child born today faces the prospect of living in a vastly diminished world unless we are able to make significant adjustments in our use of natural resources and bring new sources of energy rapidly online. Development of a sustainable relationship with our natural resources is an imperative for any meaningful quality of life as climate change poses the ultimate test of our adaptability as a species. The consequences of failing to respond will be catastrophic and irrevocable over a millennial time scale. Thus, I think it appropriate to refer to the 21st century as the environmental century.

The *real* problem with higher education

During the environmental century, higher education has an ethical imperative to provide the foundation of a sustainable civilization. In the period following WWII, universities in the United States strived to provide scholars with the resources and freedom to educate a generation of practitioners who could build an economy and win the arms and space races. Now environmental concerns are a greater threat than any political ideology or international competition for technological supremacy. Accordingly, it is time that our worldwide systems of higher education reallocate their resources to address this imperative. Put simply, we must make sustainability the central purpose of all higher education.

Higher education is broadly failing to meet this mandate. Often sustainability is interpreted to mean campus operational sustainability, and administrations focus primarily on issues such as recycling and reducing institutional dependence on energy derived from fossil fuels. Conveniently, this is also sound fiscal policy because the return on investment in operational sustainability often exceeds ten percent. Boards of trustees are kept happy, politically controversial issues related to sustainability can be sidestepped, and faculty primacy over the curriculum need not be disturbed.

But the primary purpose of higher education is not operational sustainability -- it is teaching, learning, scholarship, and outreach. To be sure, institutions must “walk the talk” with respect to sustainability, but more importantly they must integrate the scholarship of sustainability throughout the curriculum. Very few programs in the world are doing this in any meaningful way.

At most universities, environmental and sustainability programming is commonly funded and staffed on the marginal availability of resources from regularly budgeted units. The vast majority of these interdisciplinary programs lack administrative autonomy and sufficient resources to have status equivalent to established colleges and departments within the university. As my colleagues and I have documented (Vincent, Roberts, and Mulkey. 2015. *J Environ Stud Sci*, and Vincent and Mulkey. 2014. *Environ Dev Sustain*), traditional institutional organization does not support interdisciplinary and transdisciplinary education and research.

Data from the Center for Environmental Education and Research of the National Council for Science and the Environment show that this structural problem is widespread. Experts acknowledge that programs in environmental studies and sciences fail to prepare the holistic practitioners so desperately needed to solve complex environmental problems. We are replicating these same mistakes as we attempt to install sustainability studies and sciences in higher education.

These failures should come as no surprise when we examine the inadequate curriculum provided by these marginalized interdisciplinary environmental programs. Degree tracks are often created through an assortment of available courses drawn from mainstream colleges and disciplines at the university. There is often only a limited attempt to integrate knowledge in a capstone or synthesis framework. Lacking their own faculty, interdisciplinary environmental and sustainability programs must rely on faculty on loan from traditional units to provide such integration. Perhaps most troubling of all, environmental and sustainability degree programs may lack clearly stated goals and learning outcomes as a consequence of a lack of shared vision among the participating units.

The Unity College experiment

Shortly after arriving at Unity College in 2011, I asked the faculty and board of trustees to adopt sustainability science, as broadly articulated by the United States National Academy of Science, as the framework for all liberal arts programming. The pedagogy inherent in this body of understanding is transdisciplinary. This means that the faculty act as guides for students who use virtually universal access to information as they define problems and become knowledge brokers, finding the disciplinary information necessary to understand the development of solutions. It is my experience that undergraduates feel empowered by this process, and rigor need not be sacrificed. Transdisciplinary pedagogy is wholly consistent with developing and enhancing verbal, written, and quantitative literacy. Perhaps equally important is the normative competency that is acquired through understanding the complexity of these issues. Foundational to this approach is information literacy, which must be guided by the faculty.

The programming of sustainability science across the curriculum at Unity College has been only partially successful. This is because some faculty are possibly uncomfortable with this new approach or see themselves as effective with their existing pedagogy and teaching materials. Transdisciplinary sustainability programming has been embraced primarily by faculty who understand the power of universal access to information and who appreciate the effectiveness of engaging students deeply in the problem solving process. Such faculty tend to be earlier in their

careers, and it will be interesting to see this experiment play out as these early adopters mature in standing and influence.

There are pragmatic reasons to engage in curriculum-wide reform. Our experience at Unity College shows that students and their parents are looking for education in sustainability. Since adopting sustainability science as a framework, enrollment has surged to the point that the College is faced with the need to build additional facilities to meet demand. Institutions that are tuition dependent and seeing declines in enrollment might improve their bottom line by embracing the relevance of such programming. Important for student recruitment is the evidence that programs in sustainability result in practitioners whose jobs are relatively recession proof. The Brookings Institution 2011 study, *Measuring the Clean Economy*, shows that jobs in this sector continued to grow at an accelerating rate during the 2008 recession, at a time when jobs throughout the rest of the economy began to disappear.

Education and research for proactive adaptation

Although ecologists and conservationists have for many decades been aware of the progressive disruption of our biosphere, it is disturbing that our institutions and agencies are struggling to develop meaningful plans for adaptive management. Because widespread, rapid ecological change is upon us, we must be vigorously engaged in proactive adaptation. Although it is essential that we mitigate the causes of overexploitation and climate change, it is clear that if we do not develop sophisticated approaches to adaptation, our ability to mitigate will be damaged by the ongoing deterioration of our ecosystems. Mitigation and adaptation are synergistic and in many specific instances are one and the same process. Any hope of building resilience into our human and natural systems requires that we do both.

It seems logically axiomatic that proactive adaptation is far less disruptive and costly than is reactive adaptation. Had proactive adaptation been implemented a decade ago, impacts of the ongoing drought in California would be much more manageable and rationing might have been avoided. To the extent that they have not been managed for adaptation, the agro-ecosystems impacted by this drought will have less potential for carbon sequestration, and thus mitigation will be compromised. It is important to note that social scientists would be essential to such an effort because of the economic and social dimensions of agriculture.

The management challenges posed by the speed and degree of ecosystem change are manifold. Evidence has been accumulating for over three decades that species are responding to shifts in growing zones driven by climate change (e.g., Walther et al. 2002. *Nature* 416). When I was a wildlife student in the 1970s, I was taught that construction of nature preserves was the best approach to ensure the longevity of species. Clearly this approach will not suffice when species in these preserves are no longer viable because climate change has affected their ability to grow and reproduce. Without timely and thoughtful intervention, we can expect widespread transformation and even outright failure of species interactions and functional processes within ecosystems and preserves.

Developing the capacity for proactive adaptation will require us to examine how we conduct teaching and research across the spectrum of higher education institutions. Only a few

institutions are educating undergraduates across the curriculum for basic ecological literacy. Similarly, development of tools to manage dynamic change is nascent at our major research institutions. One such tool, habitat corridors connecting protected areas, will become increasingly important for supporting species migrating in response to climate change. To be effective, corridors must be integrated with the human footprint on the landscape, thus requiring understanding from the social and natural sciences. In addition, we must more fully understand the complex process of assisted colonization so that we can move species, especially plants, as their preferred habitat changes or degrades. Indeed, we must re-examine our understanding and definition of invasive species in this brave new ecology. These and many related concerns must become central to the process of educating a generation of adaptive managers. Unless we make the development of the tools for proactive adaptation a top priority in higher education, we stand to lose much of our natural heritage within a few decades.

Recommendation for transformation

I recommend that we make sustainability teaching, learning, and scholarship the highest priority in higher education. Certainly this will be challenging, and institutions of higher education are notorious for their inability to embrace change. Despite the reality of near universal access to information, many members of the faculty continue to teach in the same modality used a century ago. While conserving tradition and honoring history has heretofore served to ensure the continuity of civilization, it is now an impediment to its survival. Reform is urgent, and responsibility for it resides with faculty, administration, and fiduciary bodies. Each has a crucial role to play in redirecting the efforts of the academy to focus on this imperative.

The ultimate responsibility for the integrity and effectiveness of the curriculum rests with the faculty. While administration can provide powerful incentives, it is the faculty who must fully accept the ethical imperative of integrating sustainability programming throughout the curriculum. Few administrations or governing boards are likely to intervene to derail such a change when it originates with the faculty and is protected by the tenets of academic freedom.

It is my experience from over thirty years in the academy that faculty can be the the most conservative constituency within higher education. The primacy of academic freedom can be used as a shield to protect the status quo, rather than as a sword to promote needed reform. Once established in tenure track positions, many faculty members exhibit canalized thinking focused on grants, publications, and training graduate students. No matter how compelling the rationale, many do not feel at liberty to embrace progressive curricular change. Ultimately it is the faculty who are responsible for defining the processes leading to retention, tenure, and promotion for faculty participating in critically needed transdisciplinary programs. Although faculty appropriately blame administration for the failure to adequately provision interdisciplinary programs, it is senior faculty and leaders of professional societies who must recognize their responsibility to change the criteria for recognition and professional advancement in order to foster needed curricular reform.

Many members of the faculty do not know how to implement this new pedagogy and content, or they may see their particular discipline in danger of being marginalized by such efforts. Professional development can address this, and administrations have a responsibility to sponsor

training and convene a wider discussion about the relevance of an approach appropriate to the challenges of the environmental century. More importantly, such programming can be manifest in essentially every subject matter in the course catalog, even those courses that are seen to be the exclusive domain of the arts and humanities. Poetry, composition, art, and music can be exciting vehicles for transdisciplinary teaching and learning. The curriculum of the Classical and Hellenistic Greeks, which is the basis for the liberal arts model that we still employ, is necessary but not sufficient for teaching and learning in the Anthropocene.

Social science is also crucial to effective problem solving. Within the culture of the academy, social scientists have sometimes been treated as second class citizens relative to their cousins in the natural and physical sciences and engineering. Solving the complex challenges of the environmental century demands that social science faculty have a seat at the table and become central to development of effective programming and research.

Administration shares a large measure of responsibility for failing to fund transdisciplinary programs at the same level as autonomous established programs at the university. More importantly, few administrations have encouraged the integration of sustainability across the curriculum. Although unintended, this represents a wholesale failure of vision and leadership at a time when it is most needed. Most administrators are not familiar with the issues addressed by these programs, and thus they are unlikely to see them as mission critical. This incomprehension undermines administrators' ability to effectively manage an institution in an era when external forces can rapidly and dramatically affect costs and revenues. Typically, an administration will respond to fiscal challenges by cutting expenses. Sadly, it is the marginally budgeted interdisciplinary programs that are the first to be cut. In the environmental century, this is not only bad practice, it further relegates our ethical imperative to the margins. Administration and faculty alike must, without compromise, embrace the crucial need to produce graduates who can fully participate in the transformation of human civilization to more sustainably manage energy, materials, and ecosystems.

Governing and fiduciary bodies are perhaps the most weakly engaged in the process of reform. Boards of trustees or regents typically define their fiduciary duty exclusively in terms of the financial performance of the institution, but this is only part of their legal obligation. Governing bodies are also responsible for the ethical integrity of an institution, and thus they are required to engage with administration, faculty, students, and communities in development of high level strategic goals. It is fair to say that governing boards have largely failed to embrace sustainability programming as part of their obligation to ensure the ethical integrity of their institutional mission. It is my experience that the Association of Governing Boards has not provided its members with adequate background to understand these challenges. Indeed, many governing boards are only peripherally engaged in strategic development of their institution through approving plans delivered by the administration. The ethical framing for these plans is usually taken for granted.

Because governing bodies are the legal stewards of institutions, it is essential that members become much more fully informed and proactive about our ongoing planetary emergency. Members are often chosen for their access to financial resources, rather than their understanding of higher education stewardship or pressing sustainability challenges. I recommend that board

development efforts focus on acquiring members who understand the need for curricular change. At private institutions, it is usually the institution's chief executive and key members of the board who engage in recruitment of new board members. It is essential that awareness of sustainability become the most important of several qualifications for board membership. Because of term limits, with the right leadership, many boards can be transformed within about a decade.

Faculty as the agents of reform

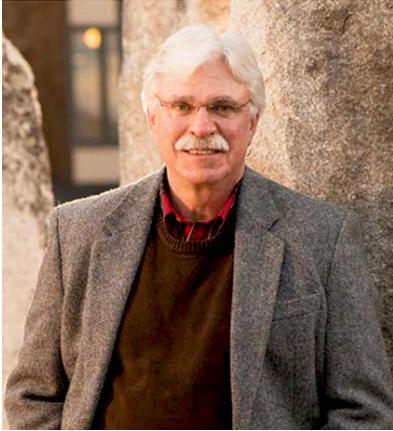
Hope without agency is delusion. Although governing boards and administrations appear to have most of the power, having now lived on each side of the administration door, I believe that the body with the greatest collective potential to change higher education is the faculty. Secondly, their influence on students can have a profound effect in moving the opinions of administrators and boards. Fortunately, there is widespread understanding of sustainability challenges among the ranks of the faculty. Now is the time for action, and action requires courage to engage the defenders of the status quo within the faculty ranks. Because we know that the status quo is unacceptable for our students' future, faculty must now convene and begin the difficult process of widespread curricular reform.

Some faculty will surely see my call for reform as a threat to their intellectual freedom. They can be reassured that it is very unlikely that such reform can be imposed on their personal teaching and scholarship. Pure research and intellectual endeavor are important, but I hope that my colleagues will embrace this opportunity to develop a new paradigm for the academy. Faculty are uniquely situated to effect this change. Surely it is possible to retain benchmarks for high quality scholarship, while focusing much of this scholarship on the pressing needs of the environmental century.

Speaking as a member of the faculty, I believe we are having the wrong conversation. We often live rather narrow professional lives, defining our worth in terms of publications, grants, and students. Although important, such individual achievements are far from being the only currency of relevance. Having been trained during the halcyon years of higher education following WWII, most of us have been afforded the highest privilege of civilization: we are paid to be intellectuals. We are asked to give back in the form of teaching, scholarship, and outreach. I suggest that we reframe the call that we be more accountable to society to have a first-principles discussion about the relevance of our work and the urgent needs of our constituents.

We should be asking how we can be of maximum service in this era of dire need. The purity of the intellectual endeavor will not be sullied by such an effort. Instead, developing a shared vision of our responsibility to embrace sustainability programming and scholarship will ensure that we are valuable and appreciated, and that our intellectual endeavors advance. Along the way, I believe that collectively we can, and indeed we must, provide the sustainable foundation for a renewed civilization.

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