The Sustainability Professional

On the Record with Stephen Mulkey, President of Unity College

Sustainability is taking many forms at higher education institutions throughout the United States—it is housed in environmental centers, it is sprinkled throughout the disciplines as a side focus, or, as is the case at a small liberal arts school in rural Maine, it is reshaping how the college operates. Unity College recently exemplified this notion, and made some waves in the process, with its board of trustees voting to divest the college endowment from fossil fuels. For his part, Unity College President Stephen Mulkey describes how sustainability is the core mission at his school, his reasoning behind this unshakable commitment, and why the arts are integral to inspiring the next generation to greatness.

Sustainability: The Journal of Record (SJoR): Could we start with your background and how it has informed your view on sustainability today?

Dr. Mulkey: Up until now, my experience has been at Research I universities. My doctorate is from the University of Pennsylvania, and I was a tropical forest ecologist for about 20 years, affiliated with the Smithsonian. I worked in Central and South America, mainly on gas exchange, and I developed a secondary portfolio around climate change. At one point in the early 2000s, I was riding down a road in eastern Amazonia and looking at miles of ecological devastation and I asked myself seriously, What are you doing this for? Why are you here?

I had foundation grant support and a lab full of graduate students, and my career was working. But frankly, my research was not that critical to the issues that we are facing. I knew what was causing the ecological transformation of this landscape, and the results of my work would only minimally address these issues. In general, the problems of the southeastern Amazon are related to land use change, climate change, and poor management. Wildfire and drought are serious issues in this region.

I am quick to note that there are researchers who we really want to continue doing research because what they are studying is so critical to planetary well-being. What I was doing was honorable and useful, but I was largely collecting more bricks for the edifice of knowledge. It was not getting to the heart of the matter quickly enough. So I focused my work on helping to build interdisciplinary environmental programs within higher education. I saw my role as to help ensure that we would have appropriately trained environmental professionals.

SJoR: It would be great to hear from you about the difference between interdisciplinary and transdisciplinary models in sustainability education. Are there good examples you could point to?

Dr. Mulkey: I feel like interdisciplinary programming in the environmental sciences and environmental studies has largely failed. There are some isolated examples of success. For example, I think Stanford is a good example and Arizona State is moving in the right direction. There is the Bren School of Environmental Science and Management at University of California-Santa Barbara, and there is the Nelson Institute at University of Wisconsin. These are all very interesting and potentially very powerful manifestations of interdisciplinarity. Of course, the Yale School of Forestry and Environmental Studies has largely failed. There are some separately trained environmental professionals. By and large, however, the interdisciplinary model has not been a success because the disciplinary silos have prevented the exchange of information and resources. It is clear that most institutions are not ready to tear down these silos, and this is why a new model of delivery, the transdisciplinary model, is needed. Unity College is taking the development of mixed-discipline training to a whole new level.

SJoR: What characteristics are necessary to make transdisciplinarity a success?

Dr. Mulkey: What is powerful about transdisciplinarity is that it transcends the barriers of the disciplines but does not require new administrative structures. It has been almost 10 years since sustainability science became identified as a framework. It is not something you can call a field or a paradigm. It is a framework. It is a new way of curriculum delivery.
It does not change the name of your degrees. It does not change the name of the courses. Instead of an interdisciplinary model, where you have all the different disciplines sitting around the table trying to address a problem and taking a long time to learn how to speak to one another, transdisciplinarity endows the student as the central agent, or the knowledge broker. The goal of the sustainability science framework is to train students to acquire the knowledge they need to develop a solution.

The transdisciplinary process is problem-oriented and a solution is the objective. Faculty act as curators of knowledge and train students to move fluidly among the different disciplines. I firmly believe that you can do this at the undergraduate level as well as the graduate level, and it obviates the disciplinary silos. This approach will work as long as faculty are agreed that this is to be the model for delivery.

SJoR: How have you begun to introduce this model?

Dr. Mulkey: It is important to note that in many respects, teaching sustainability is what Unity College has always done. Last January the faculty unanimously endorsed sustainability science as the framework for the entire academic programming at Unity College. We are a liberal arts institution, which begs the question, where are the humanities in this? My answer is that they are the foundation. The humanities and arts are central because we need to have people who are fluent in ethics and communication, and are able to engage in critical thinking and identify logical fallacies. Ethics is especially important because of the ethical ambiguity and complexity of many environmental issues, a prime example of which is climate change. The humanities encompass the fields where these core competencies are developed.

I am a scientist and have been my entire career. But, I know that the humanities are one of the most valuable things that we can give to students in the undergraduate curriculum. Let me give you an example. When I was at a much larger institution, I learned of a study where employers were asked what the institution could be doing better to educate their future employees. In response, they told us our students were smart, and that they worked hard, but they did not communicate or think clearly when solving problems. The humanities provide the first line of attack for addressing these deficits.

SJoR: Is that type of employer feedback typical?

Dr. Mulkey: The evidence suggests that this is typical of university education. Employers are hungry for students who have communications literacy, fluency with ethics, and skills in management. One of the things I worked on at a previous university was the creation of six professional science master's degree tracks. One of the tracks was in sustainability science. Part of this new curriculum required a two-semester sequence in management for scientists, taught in the College of Business. Colleges of business know how to teach management, and we should be using these programs to produce students who can enter the workforce with these critically important skills. So we partnered with them to develop that curriculum.

SJoR: How are you applying this model at Unity College?

Dr. Mulkey: I wake up in the morning living and breathing the mission of Unity College. This is who I am. I took the job to do something rather than to be something. In accord with the faculty, the board of trustees voted unanimously to endorse sustainability science as our academic framework. This is a strong endorsement for change, and the students are looking around and saying, Wow, what is this thing, and how is it going to work? We are just in the beginning stages of it. So, ask me a year from now how well we have integrated this mode of delivery throughout our instructional portfolio. I see its major implementation occurring in the upper division courses.

It is experiential. It is problem-based, solution-focused. It is transdisciplinary in that it teaches the student to be the agent in the problem-solving process, and it is grounded in the humanities in that it gives them the fundamental skills of communication and ethical context. My goal is to move the dial as fast and as far as possible. It only makes sense for Unity College to do this if we can be a national leader. So our goal is to be out front and to be an example. Unity College is arguably one of the best places to do this because of our long tradition of experiential programming and history as an environmental college.

SJoR: You are coming from a smaller liberal arts school. Do you think this framework can exist at other higher education institutions?

Dr. Mulkey: I am absolutely convinced the big Research 1 universities can do this if they choose to. I would also go one step further and say that all institutions of higher education have an ethical obligation to make sustainability education the primary mission of higher education. Not one of the primary missions, but the primary mission—because, literally, our survival depends on it.

SJoR: It is refreshing to hear such an unequivocal statement. What current evidence do you point to in backing this up?
Dr. Mulkey: There is a recent and sobering graph that I’ve come across (Figure 1). It is a log-log plot of rate of CO$_2$ change over time and rate of temperature change, developed by Andrew Glikson at Australian National University. For the last 25 million years, we have a pretty good idea of what those data are for each of the paleoclimatic events, such as the Paleocene-Eocene Thermal Maximum and the various events in which CO$_2$ increased and temperature went up. If we plot on the same graph the CO$_2$ increase since the Industrial Revolution and the temperature increase that has accompanied it, we see that the human-caused climate change is at the most extreme part of the graph. We are at the highest rate of CO$_2$ rise, and we are close to being the highest rate of temperature change. It is a very compelling image, and Glikson points out that it provides evidence that since the Industrial Revolution, we have changed the concentration of CO$_2$ at a rate faster than any event in the previous 65 million years. This is especially profound when you realize that much of the temperature change is still in the pipeline. There is a 30- or 40-year time lag because the heating of the oceans delays the full effect of radiative forcing on atmospheric temperatures.

SJoR: What does this mean for how climate change will affect us during this century?

Dr. Mulkey: The first thing you can conclude from this graph and many other lines of evidence is that the pace of change that we have been led to expect is much slower than what will likely occur over the next 50 years. The pace of change will accelerate. Secondly, there are going to be profound and fundamental changes in biological communities—ecosystems, communities, biomes—we will see ecosystems develop that have never before existed. In the temperate regions, the climate zones are moving north faster than the regeneration time of the dominant plants in most ecosystems, especially forests. Well, how did those trees end up in the particular climate zone where they are? They had thousands of years to migrate and acclimate post-Pleistocene as the glaciers receded. We are asking them to do the same trick again within a few decades. That is not going to happen. So the integrity of these biological communities will be threatened as climate change begins to reshuffle the distribution of growing regions. I regard

Since the Industrial Revolution, we have changed the concentration of CO$_2$ at a rate faster than any event in the previous 65 million years.

**Fig. 1:** Comparison of mean global temperature rise rates during the Cainozoic, including the K-T impact events, the 55.9 Ma PETM hyperthermal event, end-Eocene freeze and formation of the Antarctic ice sheet (34-32 Ma), Oligocene, Mocene and end-Pilocene, thermal rises, glacial terminations, Dansgaard-Oeschger cycles, the 8.2 kyr event, intra- Holocene events, and Anthropocene climate change. (Mocene - 16 Ma, Oligocene - 25 Ma, Pilocene - 3 Ma, Eocene, Mocene, PETM, K-T Impact, 20-6 kyr, 245-240 kyr, 3.35-3.25 kyr, 1.89-2011, D-O)

These data are derived from analyses of other papers and they represent averages. (See References for full citation information.) The averages were maximum rates read from sections of graphs in the referenced papers.

Source: The geological scale of climate change by A. Glikson (unpublished).
this as an ecological imperative that is poorly studied and underrepresented in the public awareness. Even those who are very aware of climate disruption and what it means are often not aware of the ecological implications. Much will be lost. How much depends on what we do now.

The third thing that climate disruption implies is that many of our preservation and conservation tools from the 20th century are inappropriate. Putting up a fence and a sign saying, “This is a preserve,” is inappropriate because the climate zone for that ecology is moving. So, what is going to be there in 50, 60 years? We just barely have the tools to begin to make those projections. We must get better at understanding this kind of change if we are to manage these biological communities.

**SJoR: If our preservation models are no longer in sync with our environment, what should we instead be doing?**

**Dr. Mulkey:** This reality will force us to focus on processes rather than species. Saving individual species will occur mainly as the climate zone for managing for ecological processes. We are going to have to focus on what an ecosystem is and what it does, and maintaining it so that the ecosystem services that we and other organisms rely on continue to be available.

Another major reality of the acceleration of change is that our food production systems are under imminent threat. As the pace of change ramps up, you can expect the need to design adaptation within our food production systems to increase. We must begin to acquire this understanding now, and we must begin to do the research that allows us to anticipate what to plant as rapid change ensues.

Sustainability is not a nicety. I do not see it as something that a liberal arts institution or a Research-I institution should consider as one of their programming options. I see this as an obligation to the generation of students who are in college today. If we are not doing it, in 20 or 30 years this generation of university and college leaders is going to look in the mirror and say, Look what we should have done and did not do.

**SJoR: How can this truly connect with university leadership and how can they lead the change?**

**Dr. Mulkey:** The main issues that keep us from going where we need to go are the autonomous budgets of the disciplinary silos and the barriers that this implies. These silos must come down, meaning that the colleges within any given university must release a large measure of their budgetary power so that faculty and students can easily work across disciplinary boundaries. Our education systems are nowhere near where they need to be, and yet we are arguably the best in the world.

Throughout all of this, I do not mean to emphasize doom, but I do mean to convey a strong sense of urgency. We have to quit having purely academic discussions about what constitutes good pedagogy. Just do it. Build a new approach and fix it as you go along. Imagine for a moment: What if we structured education around real problems from the real world brought to higher education by cities, NGOs, or agencies? What if we did that? Students would not be engaged in mere exercises. Such would provide profound incentive for the students to engage with a problem with the intention of developing a solution. I would also argue that we need to flip the classroom. We should get the content out of the classroom and deliver it through some other modality such as the web—use classroom time for experiential and for problem-solving engagement.

**SJoR: How do you explain the value proposition of your sustainability mission?**

**Dr. Mulkey:** We, as administrators, are university presidents, are very much concerned with defining the value of higher education. What is the value proposition of higher education? What do we have to sell the public? Why would a student come to a little place in rural Maine to go to an environmental college? Well, I assert that there is no higher value proposition than preparing this generation for the sustainability challenges of this century. That is the value proposition, and I can think of none more compelling. Moreover, the jobs are there now, and they are going to keep coming. Just look at the Brookings Institute 2011 study of the sustainability economy, _Sizing the Clean Economy_ (Figure 1).11

---

**Fig. 2:** The Clean Economy Compared with Other Sectors of the U.S. Economy

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Millions of Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biosciences</td>
<td>1.4</td>
</tr>
<tr>
<td>Fossil Fuels</td>
<td>2.4</td>
</tr>
<tr>
<td>Information Technology</td>
<td>4.8</td>
</tr>
<tr>
<td>Producing</td>
<td>2.7</td>
</tr>
<tr>
<td>Clean Economy</td>
<td></td>
</tr>
</tbody>
</table>

11. Sustainability is not a nicety. I do not see it as something that a liberal arts institution or a Research-I institution should consider as one of their programming options. I see this as an obligation to the generation of students who are in college today.
The jobs are there, and I think we need to be much more explicit about linking our education programs to those jobs. It sounds facile, but it really is an issue of making sure that we are marketing ourselves effectively and that when students look at us, they see the payoff at the end of the pipeline. They need to see that there is a future in learning about sustainability science. This is not a one-way trip to the woods to hug a tree. This is a future that is very sophisticated, and it is based on understanding material and energy flows. Education programming in sustainability can be part of the salvation of higher education. It not only will serve an institution well, it will serve humanity.

SJor: We have been talking about the environmental and climate components of sustainability, and the term is now taking on a lot more issues including social justice and inclusivity. Is that going to be part of your mission as well?

Dr. Mulkey: Yes, because environmental justice is necessary for the success of sustainability. To be effective, sustainability must be the shared investment of all sectors of society. If you look at where the greatest impact of climate change is occurring, it is in those countries that have had the least responsibility for it and who have the smallest capacity to adapt. I think that the developed nations of the world have a very real responsibility to support those countries and regions that have limited capacity for adaptation. Because environmental justice is foundational to sustainability, I am convinced that the humanities and the social sciences are the underpinning of everything we do. If we are not bringing students to a rich understanding of what it means to be an obligate social species, then whatever we are doing with sustainability science is largely moot.

References