

“Use Them All”

James Engell, ACS Environmental Meeting, June 2, 2010

Thou art no slave
Of that false secondary power by which
In weakness, we create distinctions, then
Deem that our puny boundaries are things
Which we perceive, and not which we have made.
To thee, unblinded by these outward shows,
The unity of all has been revealed;
And thou wilt doubt with me, less aptly skilled
Than many are to class the cabinet
Of their sensations, and in voluble phrase
Run through the history and birth of each
As of a single independent thing.
Hard task to analyse a soul, in which,
Not only general habits and desires,
But each most obvious and particular thought--
Not in a mystical and idle sense,
But in the words of reason deeply weighed--
Hath no beginning.

William Wordsworth, *Prelude* 1805, Book II, ll. 220-37

“Both Lisa and I have discovered that using one discipline to address the environment is not going to work. You have to use them all.” William D. Ruckelshaus, first Administrator, EPA, 1970-73, 1983-85, speaking with current EPA Administrator Lisa Jackson on “Living on Earth,” broadcast through Public Radio International (April 16, 2010).

“The ongoing explosive growth of knowledge, especially in the sciences, has resulted in a convergence of disciplines and created the reality, not just the rhetoric, of interdisciplinary studies.” Edward O. Wilson, “On General Education at Harvard,” 2004.

“‘Interdisciplinary’ is a ladder-like word created by humanists to climb out of a hole they never should have fallen into in the first place.” Wilfred Cantwell Smith, scholar of comparative religions and of Islam, in conversation, c. 1988.

I'd like to dedicate these remarks to F. Gene Hampton, my first mentor in environmental studies. He taught me in 1966 at Shawnee Mission High School in Overland Park, Kansas, and was one of the first biology teachers to adopt advanced curricula in that state, repeatedly standing up for the teaching of evolution. Remarkable for that time, four years before the first Earth Day and before the sweeping national legislation on air, water, and endangered species that marked the first environmental movement, he convinced the school district to buy land adjacent to the high school for an ecological field station, where he would introduce classes and anyone else who was interested to the basic tenets of ecology and what was then not yet called conservation biology. That year my father died, suddenly, and Gene Hampton helped me through a difficult personal year, as well as opening up new avenues of intellectual promise and curiosity. Since that time he has won numerous awards, including Kansas Teacher of the Year, and forty-four years later we're still in touch. A lot of what I do today would not have been possible without him. That land he convinced taxpayers to buy was, the last time I checked, still being used for ecological and environmental purposes, despite the fact that it's now worth huge sums of money, with headquarter office parks of Yellow Freight and Sprint not far away.

What, after all, is a mentor? Where, even, does the word come from? Right off the bat, it's interesting to note that its origin is female, from the goddess Athena, a goddess of wisdom. Even though the general historical record of ancient Greece gives little play to the role of women in knowledge or public affairs, the mythological and

literary record of that civilization tells another story entirely, perhaps because it is older and deeply embedded in earlier practices. Athena transforms herself into a man whose name is Mentor, and Mentor serves as a teacher to Telemachus, the son of Odysseus, while Odysseus is away all those twenty years, coming back, slowly coming back, to his home of Ithaca. Mentor isn't a major character in Homer's poem but he becomes absolutely central in a later work by the French writer Fénelon, *Télémaque*. That educational and narrative text, hugely popular and widely translated, formed part of the western canon for well more than a century. If we're mentors, we owe our name to a forgotten literary work of once great influence, and we have a lot to live up to: Mentor is wise, has a capacious mind, tenacious memory, and loves connections between different kinds of knowledge. In short, he, or rather She, because he is actually Athena, is interdisciplinary! Mentor or Athena has more characteristics worth noting: Mentor takes care of the young, protects and nurtures the young, partners with but doesn't smother them, and Mentor is loyal over a period of time decades long. Mentor reestablishes peace and accord when Odysseus returns; that is, Mentor runs institutional interference and is willing to play academic politics. All that we mean by the word "mentor" comes from an ancient story retold three centuries ago, now passed out of most memories, but as relevant as ever.

Who are we here? To put our feet on the ground, let's together look at ourselves, simply at the descriptions of post-doctoral fellows in this program of mentoring. These phrases, these labels, these fields, simply did not exist a generation ago--some not even a decade ago. And yet they are anchored in the specific world of observed phenomena:

“environmental restoration,” “cultural geography,” “conservation biology” (thought to originate with a conference in this country that founded the journal by that name, but actually there was already such a discipline and publication that had been given that name in Europe—showing simply that independent groups often do discover, independently, the need for the same kind of study), and “ecological economics,” perhaps a natural combination, since the two words have exactly the same origin, ancient Greek for “house.” “Environmental justice” and “environmental health”: just a few weeks ago President Obama received a report that argues we have drastically underestimated the influence of environmental factors on cancer rates. For instance, people living near the Port of Los Angeles have a 60% greater chance of getting cancer than other residents of Los Angeles, and their cancer rates are increasing while those in surrounding areas are decreasing. Many fellows yoke together science or the results of science with questions of public policy and government, politics in the widest sense, which Aristotle calls the master science.

Thinking about what is interdisciplinary means that we rethink what the concept of a discipline is, too. Let’s hazard a general definition, which may not sound like chemistry or French literature, but we need to be wary of old boundaries. A discipline, rightly defined with respect to environmental study and, in many ways, with respect to all natural and human activity, is itself a collection and fusion of various other disciplines but then trimmed and focused and, as it were, endlessly deepened in order to address particular aspects of a total environmental reality that actually is a continuum. In truth, a discipline then has no absolutely clear or definite borders and *can have none*. It has

instead zones of contact, multiple interfaces. In these respects, a single discipline may be said to be like a character in a play: distinct, individual, identifiable, with a given name, developing over time, sometimes perhaps in disguise, yet on the whole clearly one actor, but ultimately meaningless and without any true identify or interest unless witnessed in its dramatic interaction with all other characters, with facts and actions not of its own making, and in its own actions with discernible effects on other characters and on the course of unfolding dialogue and dramatic events.

It's natural then, that many fellows are not mentored singly but by "co-mentors" or even a "team" of mentors.

This is the experience of so many people now in environmental studies. In 2004 I taught a summer course at the University of Colorado on environmental visions in the United States, from Lewis and Clark down through Thoreau, Louis Agassiz, Teddy Roosevelt, and Rachel Carson. I could not have taught it alone, but was joined by Glenn Adelson, a conservation biologist who now heads the environmental studies program at Lake Forest College in Chicago, and Patty Limerick, who was director of the Center of the American West at the university in Boulder. Together, we could make each one of us feel adequate. Alone, I would have been an embarrassment. This summer, starting on line and then in August in Tokyo, I teach as part of a seminar for college students from nine North American and Asian colleges on the subject of sustainability with an emphasis on biodiversity to coincide with the U.N.'s year of biodiversity. Again, flying solo would be impossible. We have a marine biologist, a terrestrial biologist, and an environmental

economist from, respectively, the U.S., Singapore, and Beijing. Interdisciplinary often means international, too, in scope of study if not in actual participants.

It has always seemed important, especially when dealing with college students but also with specialized graduates, to get excited about big questions first. Edward O. Wilson suggests that the way to teach any subject, especially a complicated one, one with many interconnections, is precisely *not* by starting with one small corner and then another and another, trying, as it were, to master a jig saw puzzle by emptying the box and looking straight away at the individual pieces to try to fit them together. What an ideal way to get discouraged and bored. Wilson says, “If I learned anything in my 41 years of teaching, it is that the best way to transmit knowledge and stimulate thought is to teach from the top down. Address questions” such as “the nature and origin of life, the meaning of sex, the basis of human nature, the origin and evolution of life, why we must die, the origins of religion and ethics, the cause of aesthetic response” and “then peel off layers of causation as currently understood, in order to teach and provoke, and in growing technical and philosophically disputatious detail.” The way to approach the puzzle productively is to get the big picture first, look for the corner pieces, ask tough questions and examine large problems—take a long look at that complete picture on the cover of the box, get students excited about what the big questions and problems are, and *then* drill down into more detail. Most young people, given a *chance*, and given some enthusiastic support, will instinctively ask the hard questions and want to see a sense of connection.

And environmental studies are by no means alone in this endeavor, for in human matters no complex issue that has historical roots, contending parties, pressing problems, and controversy over solutions can possibly be addressed by one discipline. For example, race relations and civil rights in this country are not simply a matter of law, they're also a matter of history and custom, of housing, employment, representation in literature and art, demographics, ethics, and multiple other dimensions. The same can be said for the relations of women and men. African-American Studies, Women's or Gender Studies, and so, Environmental Studies. These are comparatively new areas, but there are earlier ones: American Studies (c. 1930s), the humanities themselves ("litterae humaniores"), with "humanities" mentioned in English as early as Henry Nelson Coleridge's Preface to his uncle's work *On the constitution of Church and State* (1830, Preface 1839). The word scientist dates back to only about 1840 or at earliest the 1830s, yet "the arts and sciences" as an older phrase is simply recognizing the absolute necessity, at any point in the trajectory of learning and research, of the joining, mixing, and fusing of disciplines (arts + sciences = "culture"). Shape-shifting names keep track of developments within that larger, constant necessity: biology and chemistry develop biochemistry and molecular biology, or, more recently, chemical biology. English literature as a field is only about 125 years old. The godparent of them all in the Western World is called "The Classics," which doesn't denote a discipline as such in the usual sense, but instead the interdisciplinary study of literature, history, philosophy, art, archaeology, ancient science, politics, you name it—including ancient environmental observations and work—it is simply The Classics.

All this is to say that we're doing something both new, in many cases embryonically new in its particular knowledge, but also something with a very long pedigree, very old DNA in the form of its organization. The individual disciplinary structures and demarcations of the modern college and university date back little more than a century. It makes perfect sense to redraw them, constantly, as has always been the case. And the more that knowledge *accelerates*, a verb applied to the accumulation of knowledge first in the later eighteenth century, the more that this redrawing takes place—or should take place--at an accelerating pace as well.

Let's move away from these larger considerations for a moment. I want to give one example how all this plays out in a real-world situation, and please excuse the fact that it comes from personal experience. My grandfather, who worked as an electrician in the deep anthracite coal mines of northeast Pennsylvania, who saw men die in the mines, and who himself died of an environmental disease, black lung, and my uncle, built a little cottage on a small, spring-fed lake not far from Wilkes-Barre. My aunt and uncle spent summers there and later my aunt lived all year around. What a place for interdisciplinary environmental concerns! In the last forty years there has been concern with septic systems, sewer systems, local, county, state, and federal regulation of wetlands, lakes, and sanitation, a Nature Conservancy audit of rare plant species, a local college buying land for a biological research station, relocation of beavers, increasing self-restraint concerning powerful motorboats, worry over runoff from lawn fertilizers and also from herbicides used to clear brush from the high-tension power lines up the side of the mountain, power lines that come from the Susquehanna Steam Generating Plant ten miles away, which by the way, is the official name for the nuclear plant that PPL runs on that

river, the introduction of copper sulfate into the lake to decrease algae growth, fights over zoning, concern over fish stocks, the alteration of a cranberry bog, and changing patterns in migratory and all-year bird populations. In short, take up any little system of life, take any couple of hundred acres (that's all that lake really is), and actually understanding, let alone managing and caring for it, including when to leave it alone, requires multiple kinds of knowledge, multiple activities, natural networks, social networks, and now virtual networks of communication.

Now a word for everyone but the hardest of hard-core materialists and fatalists. All people of faith—of *any* faith—keep time for worship or prayer, or for meditation, holy rest, or holy rites: those times are not intended to be *separate* from other hours of the day, other days of the week, nor separate from any split-second of living consciousness. They are intended to infuse and interfuse all those other hours, days, weeks, and seconds of existence. If we are people of faith, again, of any faith, let us consider how that faith plays out with knowledge, for faith is a discipline, too, and is intended to be radically interdisciplinary with everything else. Religion and environmental studies are, in certain ways, natural allies. Stewardship is a term of faith and a term of conservation, of sustainability. Those schools and colleges founded and still related to communities of faith, however thoroughly secular their curricula appear, have good reasons to pursue aspects of environmental study.

In humane letters, in literature and history, one particular kind of research and writing requires an awareness of several disciplines and kinds of knowledge, especially if

its subject is a person of encompassing intellect. In the humanities, biography is often the most interdisciplinary of undertakings, particularly if you have as your subject someone such as Newton, Rousseau, Rachel Carson, Michelangelo, Margaret Fuller, Samuel Taylor Coleridge, Charles Darwin, or Beatrix Potter. A life lived in any manner except the most routine and narrow of directions—and even then it can still be said—a life lived is the nexus of habits and actions that in practical terms draw upon the results (perhaps not always the direct knowledge of, but the results of) numerous bodies of knowledge and many disciplines. {Websites for Capra, Potter, Wilson, Carson}

In cultural and social analysis, the food we eat, the clothes we wear, the cars we drive (or choose not to drive), the homes we buy, medicines we take, these conscious and unconscious choices are the bedrock result of decades and even centuries of agriculture, breeding, engineering, research, and application that involves just about every human endeavor.

For the ultimate result of our aggregated knowledges shapes the conduct of life itself, and human conduct now affects profoundly every other species and every ecosystem on Earth (see Vitousek et al., “Human Domination of Earth’s Ecosystems”). Is our conduct progress? More knowledge doesn’t necessarily make it so. The conduct can be damaging and, the more knowledge and energy possessed, the more damage can be done. With its technological sophistication, deep water oil drilling seems potentially more catastrophic than drilling in shallower waters, which seems more risky than drilling on most land areas. In the trade-offs between sophistication and simplicity, is the winner so easy to identify? It’s one thing to say that we no longer can make stained glass as it was crafted eight centuries ago, and can no longer cast bronze as well as certain earlier

cultures: these are losses in artisanal and aesthetic areas. It's another thing to say we no longer have the knowledge or means to recreate the biodiversity in seeds that many cultures once, and not so long ago, enjoyed. What we can grow is mainly no patented wonder but the result of a few thousand years of human patience, experiment, wisdom, and preservation. Nature loves diversity; corporations often prefer monocultures. We might improve what we've inherited—we should—but improvement can carry costs, can drive down diversity. Was high fructose corn syrup an improvement? It's sweeter and cheaper than sugar. But is it an advance in nutrition and in health?

The point is simple, so much so that it's simply overlooked. As the conduct of our lives is the arrow point of a complex set of interacting disciplines and their meshed applications, so the improvement of that conduct can come *only* from an awareness how those disciplines interact, and at times an imaginative projection of how new knowledge and new disciplines might interact, finally then judged as desirable or not according to a set of values and beliefs themselves subject to change. Can one do such imaginative projection? The filmmaker Frank Capra, who had received a science education, made a film in 1958 "The Unchained Goddess" with serious talk of global heating:

<http://www.youtube.com/watch?v=0lgzz-L7GFg>

Capra also made a 1938 film "You Can't Take It With You" that included an intense scene about solar energy and its necessity.

In "Why Environmental Studies?" the opening essay of the anthology that I and three other editors finished two years ago, we claim that what we are all engaged in means nothing less than "to re-envision liberal education in the arts and sciences" (4). I

believe that more strongly today than ever. While we each pursue distinct paths in research and teaching, their combined profile significantly redraws the meaning of a liberal education, it actually *becomes* one, and this is why it is so important to cultivate in colleges that are liberal arts or as they should more properly be called liberal arts *and sciences* colleges. Capra, Carson, Potter, Wilson: all these individuals evince interests in the arts and sciences; Wilson recently decided it was worth his time to write a novel, *Anthill*.

Now it's time to talk a little institutional turkey. What we are doing can face institutional hurdles, structural impediments, skeptics and even enemies. It certainly does where I teach. What do we do about those? The whole traditional set up of departments can be a barrier. Appointments are usually made through departments, occasionally jointly, but my experience is that for every department you add to an appointment, the appointment process and desired result becomes harder by the exponent of 2; a dual appointment is four times as hard to make as a single one in a department; one that involves 3 departments seems about 8 times as difficult. Budgets are allotted on a regular basis to departments. Other programs are often on soft money, sufferance, or special grants that have no permanent existence. And the Development Office might not recognize too much beyond a well-worn menu of fund-raising opportunities. If you're doing "Environmental Studies" then, as one of my fellow professors said with supreme confidence and slight distaste, you could be doing anything, it's so broad, and anyway, he added, in genuine surprise, "what's English literature got to do with *that*?" We need to

reform and realign our disciplines, but we also need to reform and reshape our very institutions. This is hard work, it's lobbying, it's academic politics, it's leadership. If I've learned anything about this process, it's that you've got to stick your neck out or, to change metaphors in mid-stream, you've got to be the squeaky wheel. It's not easy for faculty who don't have tenure or who are in a permanently untenured post to do this. So, it's up to tenured professors to take a stand and make the case. About a year ago at a lunch I heard Paul Ehrlich say he didn't want his office to be next to the office or lab of another biologist. And that the worst thing would be for his office to be right next to another biologist who was doing work similar to his own. Instead, he envisioned an office building or corridor where he'd meet a bright person from political science across the hall, bump every day into another from cultural studies down to the left, take coffee with an historian to the right, and see a nanotechnologist in physics and engineering not far away.

Every once in a while comes along a compatriot who can spoil things, too, someone who talks the interdisciplinary game but doesn't take the risk to do it, or who makes it an entirely theoretical enterprise, or worse. Let me be explicit. I've sat in meetings with folks who know a lot about biogeochemistry and energy resources, a lot more than I do, and who can analyze what happened at Copenhagen seven different ways. But I've also heard a couple of those same people scoff at the local food movement and satirize farmers' markets. There are also the academically minded who, having got hold of one idea, interdisciplinarity, then turn that into a discipline itself, with lots of subfields, e.g., versions of intradisciplinary, co-disciplinary, multi-disciplinary, etc.

The good news is, that despite institutional hurdles, and despite the ungodly amount of extra energy and labor it takes to run an interdisciplinary program and to do interdisciplinary, high-quality team teaching, it *is* happening more and more. *Academic Impressions* reports that in 2009 alone, “more than 100 majors, minors, or certificates were added . . . in energy and sustainability-focused programs at colleges nationwide.” Environmental education is working its way to the place in college curricula where it should be, I mean, as part of the requirements for general education or the core program of what a college expects every student will study or be exposed to, a graduation requirement.

And it’s no shame to note that interdisciplinary education in the environment, in energy, and in sustainability, leads to jobs. That’s not a pipe dream, it’s happening. The jobs are tremendously varied, and they’re increasing. This doesn’t sully the ideal of a liberal education as one that refuses specific vocational training. It confirms it. Because environmental studies can be and are inflected in so many ways—conservation, health, law, teaching, industry and business, engineering, basic scientific research, government and public policy—environmental studies favors no one vocation or profession.

What we need is a relevance that is not personally selfish, a consciousness of connectedness and, as Gus Speth of the Yale School of Forestry & Environmental Studies urges, a new environmental *movement*, one that has a home in colleges and universities and where its student advocates are not demonstrating against or arguing with faculty and administrators but where we are all more or less on the same side. This means a

willingness to face controversy, and at times a willingness to compromise. It means changing teaching, changing the academic profile of institutions, changing ourselves, and even redefining what it means to be human. Just as there is what Paul Ehrlich and Andrew Beattie call in their wonderful book *Wild Solutions, How Biodiversity is Money in the Bank*, a natural internet of connection between creatures in ecosystems, a co-evolution, often a symbiosis, and an interdependence, so we need to bring our virtual internet to bear on all that, ultimately creating a new human internet, a network of colleagues and friends who will join us.

It's more than the connection of one body of knowledge with another and then another; it's the connection of one group of people, one community, with another, the networks of nature echoed and replicated in transformed networks of people who study and teach them. Can we become once again, as it were, indigenous with a nature that we ourselves are changing and can change in a growing number of ways? What kind of balance can we reach?

In these remarks, I've been a cheerleader rather than a leader. Especially while we're in Texas, it's good to recall what Ross Perot said: "The activist is not the person who says the river is dirty. The activist is the person who cleans the river up." We and many like us, our natural sisters and brothers, if not our biological ones, embark on a project to alter the orientation of science, realign the goals of public policy, and redefine what it means to be human, and humane, in this new millennium. Yet, there's no millenarianism about the task. If it's visionary, it's also mundane, at home with plankton and dirt and government microfilm as much or more than with any armed vision of some transcendent ideal. It's nearer to bats than angels.

Humans now dominate Earth's ecosystems, and so our public policies, from local zoning to international agreements, become a proxy policy of nature, until, that is, natural events revoke those policies because they cannot be sustained. If our policies ignore natural laws and developments of evolution over eons, if they disregard Barry Commoner's four laws of ecology (everything is connected to everything else, everything goes somewhere, nature knows best, and there is no free lunch), or if they attempt to repeal or to veto those laws, then we're in for a long period of legislative gridlock and decline that will, in the end, make Congress inside the beltway appear like a child's sandbox. And, of course, the first to be hit, and those hit hardest, will be the poor.

Any new mission for the academic world, any reconsideration of what it means to be human, any movement to alter human values, is informed by the arts *and* the sciences, by what was once the synonym of "culture" before that word came to mean anything we practice, including the culture of unsustainability. New facts and insights gained through research, research whose potential is open to every connection, informs our mission and movement. Because of what we do and to what we dedicate ourselves, already we're something different than what we would have been. We've already changed ourselves; we're changing our students, mentors, colleagues, friends, and children. This redefinition doesn't happen overnight. As with any progressive movement that achieves lasting impact, it must work for decades, many decades, before prejudices are diminished, practices alter, habits change, and the world is transformed. Remember how long Athena, a.k.a. Mentor, persisted with Telemachus.

To such a task, each one of us is radically inadequate. A true movement has never been and never will be made out of a single discipline or narrow knowledge. That

seems exactly why we're gathering together, fellows and mentors, but also, in spirit, our students and colleagues, even, we hope, our administrators, granting agencies, alumni, donors, and friends. Let us help one another.