Tending the Tree of Knowledge

Building bridges among the disciplines

Book Review by Seth Dunn

As the widely dreaded senior essay approached during my final fall in college in 1992, I decided to write about the historical roots of climate change science, and how it was shaping and in turn being shaped by the emerging global warming debate. But I encountered an unexpected roadblock: I could not find an advisor for the project in the department of history (my primary major); and in the environmental studies department (my second major) I faced resistance from one of my supervisors — a geologist who was then a "greenhouse skeptic." After some effort, I finally gained the support of the environmental studies program director, and the reluctant patronage of a foreign policy historian.

Consilience: The Unity of Knowledge
by Edward O. Wilson
New York: Random House
408 pages, $14.00 paper

My research began in the geology library, where I tracked down the findings of scientists examining the "geosphere" — climatologists, oceanographers, and other *earth* scientists looking into the rising atmospheric concentration of carbon dioxide and its relation to an observed rise in global surface temperature. But to understand the implications of a changing climate for humans and other forms of life, I had to move next door to the biology tower, where I explored the work of ecologists and other *life* scientists who study the "biosphere." Both groups are now working together furiously at the boundary of the geosphere and biosphere, attempting to study the Earth as a dynamic, whole system — and to assess the consequences of tampering with it.

Next I found myself trudging to the other end of campus to the history and rare books archives, where I sifted the minds of Archimedes, James Lovelock, and others who foresaw the need to understand our planet as a unified entity. Finally, I needed to examine whether the interaction of science and policy on previous international environmental issues — ozone layer depletion, in particular — might shed some light on the ongoing interplay of climate politics and science; this took me once again across campus, to the social science and forestry school libraries. The journey was a simultaneously exhilarating and frightening experience, and taught me a lesson in environmental problem-solving: there is no clear, simple way forward, and some may think your route wrong, so follow your inner compass of curiosity and dance between the disciplines — and try not to accumulate too many overdue book fines.

My foray into writing a senior essay is a microcosm of the cross-disciplinary collaboration now taking place on climate change and other key environmental issues: endocrine disruptors, desertification, the resurgence of infectious diseases, deforestation, growing disparities in resource use. The need to better comprehend and develop approaches for solving these problems is pulling together researchers from what may appear to be far-flung fields: virology, philosophy, anthropology, toxicology, and oceanography, to name merely a few. To understand the risks of climate change, for example, we must integrate the knowledge of paleoclimatologists, epidemiologists, and wetlands ecologists; to reduce them, we must pool what is known by welfare economists, engineers, and hydrogen scientists.

This "jumping together" of facts and theory across disciplines — christened "consilience" by scientific philosopher William Whewell in 1840 — is the subject of

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Edward O. Wilson's latest book. Bridging knowledge between fields in both the humanities and the sciences is not merely an intellectual exploration into human nature, writes the Pulitzer Prize-winning Harvard professor: it is the sword that can cut the Gordian knot of global environmental threats confronting our species. These long-term problems, population growth, the loss of biodiversity, accelerating climate change, will appear insoluble and remain intractable if we do not attempt consilience by connecting the seemingly disconnected.

In this book Wilson turns from his background in entomology to epistemology, exhuming the philosophical and scientific roots of our planetary plight. The dean of biodiversity begins his quest with Enlightenment thinkers such as Sir Francis Bacon, Isaac Newton, and Galileo Galilei. To them, linking the sciences and humanities was the greatest enterprise of the mind. But scholarship today, says Wilson, is characterized by an "ongoing fragmentation of knowledge." Enlightenment thought is relevant now, as many of our real-world dilemmas require us to integrate information from wide-ranging disciplines. Bringing light to the some two billion rural poor who lack electricity, for example, necessitates an understanding of climate, energy technology, economics, finance, and local culture.

To illustrate this point, Wilson draws environmental policy, ethics, social science, and biology as four separate quadrants in a box. Intuitively, we think of these domains as connected. But "each stands apart in the contemporary academic mind," says Wilson, with its own practitioners, languages, and methods.

Without the ability to integrate and synthesize disparate data, the more unstable and disorienting it becomes to move closer to the intersection of these disciplines. We need a road map to guide us — to point out the ethical reasoning for sound environmental policy, the sociological basis for ethical reasoning, and the biological underpinnings of our social behavior. Raised as a devout Christian, Wilson stresses the need to pay closer attention to the "deep springs of ethical behavior." By exploring the biology behind ethics, "we should be able to fashion a wiser and more enduring ethical consensus than has gone before."

One pertinent example is the inability of governments to come up with effective policies for protecting the world's disappearing forest reserves. The ethical guidelines that prevail today largely disregard our knowledge of ecology. And the diverse environmental goods and services provided by forests — watershed and disease protection, non-timber forest products, and carbon storage — are only beginning to be translated into the language of economics. Lacking the ability to accurately value forests, we continue to cut them down at record rates.

Designing sound forest and other environmental policies will "depend on the ease with which the educated public, not just intellectuals and political leaders, can think around these and similar circuits, starting at any point and moving in any direction." Yet few college students, opinion shapers, or policy makers are equipped to address the relation between science and the humanities, and its importance for human welfare. And few, if any, of humanity's pressing problems — ethnic strife, arms buildup, poverty, overpopulation, and environmental disruption — can be solved without consilience. "Only fluency across the boundaries will provide a clear view of the world as it really is, not as seen through the lens of ideologies and religious dogmas or commanded by myopic response to immediate need," writes Wilson.

Indeed, the majority of today's political leaders, public intellectuals, media interrogators, and think-tank gurus are, so to speak, undisciplined in interdisciplinary thinking. Most are trained exclusively in the social sciences and humanities, and their analyses, however well intentioned, stem from a wisdom base Wilson labels "fragmented and lopsided." How qualified to advise on environmental policy are White House economists preoccupied with the near-term economic and political system — annual growth rates, four-year election cycles — but untrained in maintaining the environmental life-support systems within which all economies and polities are embedded? A balanced perspective requires a bridging of disciplines, not studying them solely in distinct pieces. This will not be easily accomplished, Wilson acknowledges. But consilience promises to increase the diversity and depth of knowledge, and improve the state of the species and its environment. "I think it inevitable that we will accept the adventure, go there, and find out."

Wilson leads the reader on a fast-paced tour across a diverse and often difficult landscape extending from the history of ideas to cutting-edge science. He summons the spirit of Bacon, who "informs us across four centuries that we must understand nature, both around us and within ourselves, in order to set humanity on the course

of self-improvement." Bacon, in his call for shifting away from rote learning and toward engagement with the world to reach "unified learning," also reminds us that interdisciplinary, environmental education is not so new an idea. This concept has, however, become an urgent necessity today; as environmental educator David Orr has observed. The discipline-centric education that enabled us to industrialize the Earth may not necessarily help us to heal the damage this industrialization has caused.

Newton, Galileo, and others responded to Bacon's call for empirical thinking, setting in motion the scientific revolution that gave rise to the Enlightenment — called by historian Isaiah Berlin "one of the best and most hopeful episodes in the life of mankind." By the nineteenth century, however, interest in unified learning had been diminished by the explosion in knowledge resulting from the reductionist approach, what Wilson calls "descent to minutissima." The spirit of the whole was sustained by a few, notably Alexander von Humboldt, who preferred nature's interrelationships to narrow specialization (see Aaron Sachs, "Humboldt's Legacy and the Restoration of Science," *World Watch*, March/April 1995). But by and large the trend was toward specialization, and in breaking reality into smaller pieces we have become deficient at putting the pieces back together, and thus in viewing the big picture.

In Wilson's eyes, the rift between science and the humanities has now reached its extreme: many in the humanities have reached a post-modernistic delusion that we can know nothing, while scientific reductionism has convinced some that we can know everything. In 1959 the Oxford physicist C.P. Snow wrote that the polarization between the sciences and the humanities "is sheer loss to us all — to us as people, and to our society. It is at the same time practical and intellectual and creative loss." But we must now update Snow's observation to include environmental loss, such as biological impoverishment, climate disruption, and other large-scale human disturbances that arise from what he called "the overspecialization of the educated elite": humanists who cannot understand the ecological implications of their behavior, and scientists who neglect the social ramifications of their discoveries.

The way to end Snow's culture wars and unite the two branches of learning, Wilson argues, is "to view the boundary between the literary and scientific cultures not as a territorial line but as a broad and mostly unexplored terrain awaiting cooperative entry from both sides." The social science best poised to bridge this gap may be economics, but this discipline needs an infusion of psychology and biology if it is to better understand why people lean toward and act upon certain preferences. Why, for example, do people not buy energy-efficient products even when it is "cost-effective" for them to do so?

In contemplating the environmental basis of our existence, Wilson believes we are "still primitives compared to what we might become." Hunter-gatherers and college-educated urbanites alike are aware of fewer than one in a thousand of the kinds of organisms that surround them, and know very little about the biological and physical processes that create air, water and soil. Naturalists spend lifetimes uncovering minute fragments of ecosystems, leaving little time to step back and look at the larger system. By understanding our terrain and the human relationship to that terrain more completely, Wilson asserts, we can "arrive home in the world for which the evolution of our brain prepared us … Now, with the sciences and the arts combined we have it all."

To the author, overpopulation and the destruction of the environment are at the forefront of global problems grounded in the idiosyncrasies of human nature. "A very Faustian choice is upon us: whether to accept our corrosive and risky behavior as the unavoidable price of population and economic growth, or to take stock of ourselves and search for a new environmental ethic." Humanity, "a household living giddily off natural capital," considers itself exempt from the laws of ecology, and in so doing risks reducing Earth to a wasteland, and humanity to a threatened species — a risk that is "enough … to change thinking about human self-preservation fundamentally."

Our many troubling ecological trends would seem to shore up the author's expectation of a twenty-first-century environmental bottleneck — one that could cause the unfolding of a new type of history driven by environmental change, or perhaps the old kind of history: the collapse of civilizations, like Mesopotamia or the Mayans, that overstepped their carrying capacities. Population control and technological advance can help us squeeze through this bottleneck, but the single greatest obstacle to environmental realism is our ecological myopia, best seen in the failure of economic systems to

incorporate benefits provided by natural systems and the costs of resource-depleting or environmentally damaging behavior. Wilson's religiosity resurfaces here, in his appeal for a "powerful conservation ethic" and to the responsibility of "preserving the Creation by taking as much of the rest of life with us as possible."

There are encouraging signs of movement toward consilience. Scientists, social scientists, and humanists are crossing the cultural divide to discuss "thinking ecologically," environmental history, and the human dimensions of global change. Through Trojan-horse reformers like Herman Daly, ecological economics is becoming less of an oxymoron. Orr's Oberlin College has broken ground for a new Environmental Studies Center. Church and faith groups are becoming activists on issues of climate change, corporate environmental responsibility and the endangered species. At Wilson's Harvard University, the Center for the Study of World Religions has created a Forum on Religion and Ecology to focus on the role that Eastern and Western religions can play in contributing to environmental debates and in shaping public policy initiatives.

But we are territorial creatures, and have yet to fully evolve the critical trait of interdisciplinary altruism. The disconnect between environmental science and policymaking – between what must be done and what is done — is especially evident in the international climate talks (in Kyoto, scientist Robert Watson wondered aloud whether those negotiating language related to forests even knew what a tree looked like). International organizations like the World Bank (Daly's former employer) are struggling mightily and with mixed results to figure sustainability into their neoclassical, market-based worldviews. Echoing Wilson, U.S. Vice President Al Gore recently wrote of "the politics of scientific illiteracy" that impedes public support for stronger action on environmental problems. On most colleges and university campuses, environmental studies programs remain rare or endangered species — where they exist at all.

Ethics is, as the author asserts, everything, and our progress toward more integrated learning may reflect our ability to recognize, and act upon, our moral responsibility to the future. An environmental ethic can, however, be encouraged not only by eco-preaching, but also by conveying to others the pure joy of jumping across intellectual boundaries that are barriers only in the all-too-modern mind. In the end, we may each need to experience in our own way what Wilson did as an undergraduate studying natural history: an Ionian Enchantment, or the belief that "when we have unified enough certain knowledge, we will understand who we are and why we are here."

Such is the unspoken sentiment of this illuminating and important work, which ends with a personal act of consilience, the author blending his inner Baptist and biologist in a summation that is at once thundering moral sermon and cool scientific appraisal.

> *To the extent that we depend on prosthetic devices to keep ourselves and the biosphere alive, we will render everything fragile. To the extent that we banish the rest of life, we will impoverish our own species for all time. And if we should surrender our genetic nature to machine-aided ratiocination, and our ethics and art and our very meaning to a habit of careless discursion in the name of progress, imagining ourselves godlike and absolved from our ancient heritage, we will become nothing.*
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