SACRED BOVINES

THE POLITICS OF BIODIVERSITY-SPEAK

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Biodiversity and biophilia. Powerful watchwords of environmentalism. They seem to evoke in scientific terms the values of nature and of species conservation. Yet they also embody a curious irony. The concepts gain their persuasive authority from science, seen as objective and independent of values. Yet the concepts unmistakably promote a particular value: conservation. The popular appeal of these concepts seems to depend paradoxically on science being value-free and value-laden at the same time. That apparent duplicity is puzzling, but perhaps no accident.

The equating of environmental values with facts, as expressed in appeals to biodiversity and biophilia, is not uncommon. (It is touted widely in biology classrooms, I think.) Here, I want to challenge the assumption (this month's Sacred Bovine) that these two concepts are scientific, or justified by observations and evidence alone. I especially want to profile the origin of the terms, and the politics behind them. Alas, politics seem to prompt some persons to reject *all* environmental protections as so much sentimental "tree-hugging." If we wish to save the planet from biological ruin we need ecological science, but not because it depicts the inherent value of nature. Accordingly, I want to endorse an alternative for how biology teachers should approach environmental "values"—as unapologetically anthropocentric and selfish, and expressions of long-term prudence.

○ Biophilomania

The term "biophilia" originated with renowned biologist E. O. Wilson. Recognized first for his field work on ants, in 1975, he published his monumental *Sociobiology*, and later his Pulitzer Prize-winning *On Human Nature*. They ignited a firestorm of controversy about the genetics of behavior and inspired a generation of researchers. Alongside his research, however, Wilson has ardently advocated the conservation of nature. Recently, he helped launch a bold initiative to protect no less than half the planet as wilderness (Hiss, 2014; Wilson, 2016, 2017).

Integral to Wilson's conservation strategy was his 1984 book *Biophilia*. There he speculated on "an innate tendency to focus on life and life-like processes" (p. 1). He posited a hereditary need for spiritual encounters with nature, the "innately emotional affiliation of human beings to other living organisms." While framed nominally as a biological hypothesis, it "invites us to take a new look at environmental ethics" (Wilson, 1993, pp. 32, 38–39). That is, from the outset, the concept was intimately tied to conservation (Takacs, 1996, pp. 217–219; Wilson 1984, pp. 119–140; 1993, pp. 31–41).

Some philosophers—long seeking to justify the value of nature objectively—jumped on Wilson's bandwagon (Kellert & Wilson, 1993). Ethicist Stephen Kellert (1993) called biophilia a "biological imperative" (p. 60). But the argument has always been scientifically flawed. First, a hypothesis is speculative, not demonstrated fact. Wilson tiptoed around obvious counterexamples. Also, alternative explanations for why people value nature were never fully weighed. Later, Wilson hedged the whole biophilia issue by saying, "*if* it exists, *and I believe that it does*" (1993, pp. 31, italics added). "If," indeed. Belief and rationalization do not substitute for solid evidence. If the biophilic emotion was universal and "imperative," no one need argue for it. Wilson's bold claims about behavioral genetics were provocative back in 1978, but with the human genome now counted as twenty thousand or so genes, the era is past when one can propose willy nilly a gene for this or a gene for that. A genetic basis for biophilia now seems (more clearly in retrospect) sensationalistic and egregiously overstated. "What if" speculation ultimately contains very little justification.

Wilson's argumentative strategy fit a pattern—from the Paleo diet and Social Darwinism to sexist and racist screeds—of trying to *naturalize* ideology, or inscribe cultural norms into nature (Allchin & Werth, 2017). He did not just acknowledge that many people appreciate nature. He declared the disposition *universal and innate*. "Innate means hereditary and hence part of human nature" (Wilson, 1993, p. 31). He thereby tapped into intuitive impressions of nature as inevitable and unchallengeable, and perhaps even intentional. Biophilia, he said, is a "psychological phenomena that rose from deep human history" and thus is "resident in the genes themselves" (p. 40). That fostered an image that conservation was an essential part of our identity—to be betrayed only at a cost. But genes are *not* destiny. They do not define "identity" (Sacred Bovines, *ABT*, April 2005). Most human behavior is conspicuously flexible and *learned*, not genetically determined in any direct sense. Deep skepticism is thus warranted at the outset. There is no evidence for the purported biophilia gene(s). Over and over again, efforts to characterize human nature scientifically have collapsed later when their selective use of evidence became clear (Sacred Bovines, *ABT*, Feb., 2012). When science is inspired by cultural ideology, standards of evidence need to be exceptionally rigorous. We need to prevent easy bias and short-circuited justification. Philosophers especially need to be more attuned to the scientific dangers of the naturalizing

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error (for example, in Kellert, 1993, pp. 43, 44, 58, 60). Ambitious speculations are not demonstrated fact.

No one should discount that some individuals feel a deep emotional rapport with nature and value its preservation. Many (myself among them) stand in awe of nature. Scientists should certainly study how that attitude emerges, how it is learned, and how it can be nurtured (Keltner & Haidt, 2003). That might help us achieve the "reenchantment" that Wilson sees as critical to conservation (1984, p. 139; Mackenzie, 2008). But that does not warrant an idea of innate biophilia (recently assumed by a Sierra Club program, for example; Abrahamson, 2014).

○ The Very Term "Biodiversity"

The companion concept to biophilia is biodiversity. It, too, has a history. Public efforts to conserve nature have a long heritage, reflected, for example, in the establishment of Yellowstone as the first national park in the United States in 1872, and of the private Lüneburg Heath Nature Reserve in Germany in 1921. But specific attention to preserving species emerged later, notably in the landmark Endangered Species Act of 1973. The shift in focus crystallized in a National Research Council conference in 1986. That meeting helped identify the promotion of the value of biological diversity as an explicit goal. The label quickly became shortened to the glitzy sounding "biodiversity," a term that entered the scientific literature between 1988 and 1993 (Franco, 2013; Takacs, 1996, pp. 34–40).

"Biodiversity" was never intended as a neutral term. It did not just describe the collected variation in species. It embodied the ethos of many biologists who adopted it to express their environmental values: to *protect and preserve* those species. That posture of hybridizing science and values was common in conservation biology, which coalesced as a discipline in the 1980s. The new field was distinctive in attracting scientists who linked their research to explicit ideological goals, and often to political advocacy. As a term, "biodiversity" was always meant to convey a value of conservation. "Biodiversity shines with the gloss of scientific respectability, while underneath it is kaleidoscopic and all encompassing" of many values and interpretations (Takacs, 1996, pp. 34–99, quote on p. 99). For example, Wilson linked his concept of biophilia to advocacy for biodiversity, what he characterized as "the most harmful part of ongoing environmental despoliation" (1993, pp. 35–39). Scientists continue to try to establish an "objective" value of biodiversity. In a recent review, noted ecologist David Tilman and colleagues underscored the causal links between biodiversity and ecosystem functioning (Tilman et al., 2014). Decades of experimental ecology have demonstrated that a higher number of species leads to (and is not merely correlated with) an increase in several key ecosystem variables (Figure 1). First, diverse ecosystems exhibit greater primary productivity. That is, they convert up to twice as much solar energy into raw biomass. When species are complementary, it seems, an ensemble can use limiting resources more fully. Second, diverse communities are more stable through stressful conditions, such as drought, fire, excess nitrogen deposits, or herbivory. They are also more resilient to invasion by new species. Finally, diverse ecosystems promote nutrient cycling and storage, further amplifying the effects in the long term. Species diversity as a variable certainly matters to ecosystems. But that fact was transformed into a value in drawing the final lesson: "the preservation, conservation and restoration of biodiversity should be a high global priority." While these studies certainly document the *effect* of species diversity, they do not thereby justify any ultimate *value*. Productivity and stability as outcomes have no inherent ethical value themselves. Ultimately, the biodiversity label conveys a personal value, not a scientifically justified ethical principle.

Figure 1. Long-term, large-scale experiments at Cedar Creek Ecological Reserve in Minnesota have helped demonstrate that increasing the number of species has positive effects on ecosystem productivity, stability, nutrient storage, and resilience to invasion. But do such scientific studies justify biodiversity as an objective value? *(Usage of this image does not constitute endorsement by Cedar Creek Ecosystem Science Reserve or the University of Minnesota.)*

Indeed, appeals to biodiversity raise the question of why counting species seems to upstage the more general principle of "respect for life."

○ Whither Conservation?

In the politics of biodiversity and biophilia, scientific and ethical modes of justification become muddled, eroding the integrity of the nature of science. But how do we interpret the relevance of science to conservation, without confusing the independent processes for ascertaining facts versus values? The two realms of reasoning do interact, and students need guidance in that sometimes treacherous task.

The first step might be to articulate the values of nature and their justification. Where do they originate? For example, some environmental skeptics ask cynically, "What has nature ever done for me?," intended as a throwaway dismissal. Of course, answering this very question is precisely the point—and where the ecology unit in a standard biology course can prove its worth. Here, value is not gauged in some ill-defined abstraction of "nature" or in animal or species' rights (which are easily discounted), but squarely in the context of the individual's own well-being.

The list of tangible benefits, catalogued in the past two decades under the concept of ecosystem services, is impressive (Daily, 1997; Millennium Ecosystem Assessment, 2003). Start with food and material for shelter. Add fresh water and breathable air. And waste recycling. And sustainable biofuels. Other services are more indirect: for instance, the pool of genetic variation that supports the development of drugs, natural pest controls, and improved crops. The values are plain and human-oriented. However, ecology is needed to *inform* how the valued outcome depends on conserving nature. The justification here seems far less contentious than what some perceive as the self-indulgent spiritualism of biophilia.

Of course, by regarding nature only *instrumentally*—as a source of services—one might easily be tempted to view it as no more than an inexhaustible stockpile, to be blindly exploited. That view of conservation was certainly common early in the twentieth century. But ecological insight matters here, too. Namely, what sustains the system? Context is just as important. Ecology helps widen the view to other relevant factors. For example, it connects the groceries from the local store to farms around the globe, and thence to the pollinators that help sustain them. It includes the fertilizer runoff and the excess pesticides. It connects the trash bin to the landfill and hazardous waste facilities, their proximity to neighborhoods, and the long-term fate of hazardous chemicals. Ecology connects the water that flows freely from the tap to rivers and rain and the whole water cycle, and thus to weather systems and global climate change, droughts, and floods. It connects toilets to the sewage treatment plants, where managed populations of microfauna process it. Ecology lessons connect the air we breathe to the recycling of carbon dioxide and the global carbon cycle, linking us to forests around the world, algae in the ocean, and other carbon sinks. It connects the energy for heat, light, and cooling homes and workplaces—and for charging electronic devices—to the fossil fuels that largely generate it, and then to leaks from offshore oil wells and oil pipelines, to the wastewater of fracking, to the non-disposable radioactive waste of nuclear power plants. When properly understood, the prudent goal of sustainability becomes a monumental process. Nothing more than the conventional value of self-preservation applies. But science provides an eye-opening understanding of how it is achieved. Deep conservation of nature can no longer be dismissed as a frivolous enterprise based chiefly on sentimental values about animals.

Interconnectedness has always been a favorite theme in ecology. Only a small adjustment is needed for teachers to explicitly include agriculture, mining, land use, and other human activities as part of global ecosystems. This knowledge is potentially transformative. In our current culture, instant communications and Internet connectivity have fostered an expectation that information should have a sense of "here-now" immediacy. In this case, however, effective lessons in ecology embrace an extraordinarily large scope, in time, space, and complexity. They portray ordinarily hidden—but no less real—contexts. It is this shift in scientific knowledge and understanding, more than any shift in fundamental values, that seems critical.

The lessons of interconnectedness may extend even deeper, however. Many of the services that are vital to humans depend, ironically, on uninhabited areas of nature. For example, pollinators depend on undisturbed habitats. To sustain cultivated farms, paradoxically perhaps, we also need wilderness. To maintain a reservoir of genetic variation (for medicines and breeding), we must preserve different species without favoritism. Every species potentially matters, and habitat reduction anywhere takes its toll. Biogeochemical cycles span human and non-human realms, so we need a holistic approach to the atmosphere, oceans, and land. Ice sheets in the remote arctic regions, for example, may affect sea level and the residents of tropical island nations and of coastal areas around the globe. Excess fertilizer runoff from Minnesota can contribute to an anoxic Dead Zone in the far-away Gulf of Mexico and affect fisheries there.

Even when one views nature instrumentally, one cannot escape the relevance of undeveloped nature in every corner of the planet. At least, its role is more an empirical question than one of polling attitudes toward wildlife.

A more holistic view of humans and nature might prompt some concrete reflection. How much land is needed to feed each individual? How much green space for recycling oxygen? How much undisturbed habitat to sustain agricultural pollinators, food webs, fresh water, waste recycling, biofuels, and a storehouse of genetic variability? How much precautionary allowance is made for uncertainty? How does one prepare or plan ahead to accommodate the possibility of unexpected consequences (such as the past discoveries of the ozone hole or global warming)? (For a student activity, see Gallucci, 2017.) When addressing these questions, scientific study will contribute more to our judgment than vague yearnings for wildlife or biodiversity. Maybe Wilson's apparently outlandish proposal to preserve half the Earth as wilderness is justified—but from a purely selfish, ecologically informed and long-term perspective. Who knows?

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