Getting a Feel for Life: The Subversive Science as an Ethical Science

Jake Greear, Johns Hopkins University
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Ecology has long been understood as an ethical science, but we have differing accounts of how ecology might be ethically productive or why it is potentially ethically transformative. In this paper I draw upon Foucault's analysis of "alethurgic forms" to examine an often overlooked aspect of the politics of the natural sciences, concerning how the ecologically enlightened individual constitutes herself or himself as a subject of truth, i.e. as one who accesses, displays, or speaks the truth about the environment. Using this lens I survey prominent 20th century thinkers who bridge science and ethics in the field of ecology: principally, Leopold on "Thinking Like a Mountain," E.O. Wilson on "biophilia," and Naess on "deep ecology." In these authors and others, I argue that we can find two distinct depictions of the ethical "moment" of ecology: a dominant account of conversion whereby the scientist comes to see the truth of the whole system, and a less apparent but perhaps more promising one in which the practices of making ecological knowledge entail the multiplication of piecemeal affective ties to the biosphere.

"To the ecological field-worker, the equal right to live and blossom is an intuitively clear and obvious value axiom." - Arne Naess

"Done with fish." - John Laroche

Fifty years ago Paul Sears dubbed ecology "the subversive science" suggesting that this particular branch of the natural sciences carried with it uniquely political implications. This paper aims to contribute to a general revisiting of the notion of ecology's subversiveness, and specifically the question of how and why ecology can be conceived as subversive. My suggestion here is that we can make sense of the politicality of ecology by reading the "subversive science" as an ethical science--that is, as a branch of science bearing a unique potential for ethical transformation of the knowing or knowledge producing subject. From this perspective ecology would be subversive because *doing* ecology--the practices of learning or

making ecological knowledge--can not only inform but also generate, energize, or transform ethical regard for “the environment.”

Any science, including ecology, might be said to be pertinent to ethics and politics in an ancillary way. For example, ecology may reveal causal connections that had been hidden--between wetlands and water quality for example--thereby making us care about wetlands because we already cared about water quality. But here I mean to articulate a more subtle but also more substantial way in which scientific ecology is imbricated with ethics: not merely as a means of informational enlightenment for ethical subjects, but rather as a set of practices that is itself constitutive of ethical subjectivities. On this view, the ecological approach to studying the natural world could, for example, create a love of swamps that is not reducible to a transposed preference for clean water. It might even bring forth a distaste for pesticide use that cannot be traced to a pre-existing love of the birds that would be harmed by such use. Rather we might understand such affects as springing from emergent sources immanent to the set of embodied epistemic practices that comprise scientific ecology.

In what follows I aim to elucidate the “subversive science” as an ethical science in this sense. Centering on Aldo Leopold’s famous essay, “Thinking Like a Mountain,” I suggest specifically that within the accounts of 20th century scientific eco-critics we can discern two ways of conceiving the ethical “moment” of ecology. One is a wholistic version entailing a kind of “conversion” whereby the scientist experiences and ethical transformation in coming to see a higher-order truth inherent to a whole system. The other is less often clearly articulated, but suggests the production of ecological-ethical subjectivity through the multiplication of piecemeal affective ties to the parts and pieces of the biosphere.

wholistic ecology and Leopoldian ethics

Leopold's "Thinking like a Mountain" remains one of the most influential statements in environmental ethics, and is perhaps the most widely read account of an ecological conversion experience. In this very short essay Leopold tells how he first came to recognize the value of a "varmint," and thus the value of nature writ large:

> We were eating lunch on a high rimrock, at the foot of which a turbulent river elbowed its way. We saw what we thought was a doe fording the torrent, her breast awash in white water. When she climbed the bank toward us and shook out her tail, we realized our error: it was a wolf. A half-dozen others, evidently grown pups, sprang from the willows and all joined in a welcoming melee of wagging tails and playful maulings....In those days we had never heard of passing up a chance to kill a wolf. In a second we were pumping lead into the pack....We reached the old wolf in time to watch a fierce green fire dying in her eyes. I realized then, and have known ever since, that there was something new to me in those eyes - something known only to her and to the mountain. I was young then, and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters' paradise. But after seeing the green fire die, I sensed that neither the wolf nor the mountain agreed with such a view. (1949, 138-9)

From this profound experience, Leopold learns a secret "known only to the wolf and the mountain." Essentially though, the secret is a scientific insight: that wolves are a "keystone species" in this particular ecosystem. Without them the balance is broken, deer multiply unchecked, and the land suffers. But Leopold's essay lends a moral force to this insight. If the

reader first identifies with the naive, trigger-happy young Leopold, we soon come to share in the moral outrage reflected back at us in the fierce green eyes of the murdered wolf. But ultimately Leopold grounds the righteous indignation he calls forth in his readers in a realization that it is not merely against this mortal wolf that we have sinned. It is against a more venerable, older, more incontestably objective personage: the Mountain--that is, the ecosystem, the "land organism," and by extension Nature itself. Set against the partial perspectives of the deer, the pine, the coyote, the cowman, or the hunter, it is the *mountain*, in Leopold's telling, that offers the one true perspective: "Only the mountain has lived long enough to listen objectively to the howl of the wolf" (1949, 137).

Leopold's Mountain is a character that stands in here for an idea, already well established in Leopold's time, that nature forms a coherent total system or manifests a transcendental principle. It would be hard to overestimate the importance of this idea to environmental ethics. Perhaps American transcendentalism is the most apparent source of ecocriticism's wholistic vision. In an age of universal grand narratives and world-spirits, the transcendentalism of the early nineteenth century looked to a capitalized "Nature" and cleaved to a spirituality not far removed from Christian monotheism. No less important to contemporary environmental thought, however, is scientific ecology, which developed the concept of the "climax community" along with the more colloquial ideas of the balance of nature, and the more esoteric but still surprisingly resonant notion of "Gaia."

Donald Worster's expansive study of the history of ecology chronicles the emergence of the idea of the "pristine ecosystem," which becomes a scientific homologue of a transcendental or teleological nature. In its early development, ecology sought to explain the inter-relationships

among organisms--specifically plants--according to some overarching pattern, principle, or law. Early attempts pegged certain aspects of observed plant communities in various regions to intersecting axes of temperature, altitude, and rainfall.[1] Eventually, many ecologists settled upon the idea that for any given place, with its macro-patterns of rainfall and temperature, there corresponded a discoverable ideal biotic formation--the climax community. These ecosystems represented the pure will of *place*, before or beyond the machinations of humanity: the old-growth hardwood forest of the great eastern North American woodlands, the mature tall-grass prairie of the southern plains grazed by bison, or the relatively homogeneous stands of redwoods or Douglas fir on the well-watered temperate regions of the Pacific coast. If disturbed by a natural disaster or human meddling, the biota would progress, the theory goes, through various stages of "succession" towards this particular configuration of species as its final equilibrium, or climax community.

The notion of the climax community was political from the very beginning, since it posits an order that includes and thus potentially *implicates* humans. Ecology's chief scientific finding is that we just are, demonstrably, part of a community of life. Hence, what we do affects the larger web of life, and what befalls the web befalls us. The more systematic and orderly this *oecos* is, the more it is incumbent upon humans to care for it. Moreover, the environment is not only a complex system that we depend upon, but also a system made up of living things, similar to us, which can suffer, perish, and go extinct. So the normative dimension of ecology always teeters between the "anthropocentric" conservation of resources for human use and the "ecocentric" preservation of natural otherness. Either way, though, ecology lends itself to

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[1] The fact that plants were the first objects of study for ecology may suggest a certain sense in which plants have been seen as more "natural," i.e. predictable, than animals.

normative discourse--if not one that directly addresses itself to moral consideration of non-humans, then at least one connecting ecological health with "public" (i.e. human) health. In either case, it falls upon ecology to locate the *logos* of the *oecos*--that is, the laws or logics that biotic processes obey, the proper unit or level of ecological analysis, and thus the "subject," so to speak, of ecological health. If forests, meadows, and marshes are not merely the disastrous, messy result of the blind strivings of innumerable weeds and varmints, then what are they? Ecologists have never really settled the matter. Where, for example, does an ecosystem start and stop? Limited symbiotic associations? Whole watersheds? Regional biomes? The planet itself? Most ecologists, in fact, would happily admit that an ecosystem is not a *thing*, per se, so we need not charge ecosystem science with a fallacy of reification. Nonetheless, the notion of the climax community became a guiding concept and thus pegged the *oeco-logos* to the notion of a community of organisms, and in principle suggested a whole and proportionally optimal arrangement, where each organism has its proper place.

Leopold's Mountain gives personality this central ecological-ethical concept, and he becomes its medium if not its ventriloquist. The essay deserves its remarkable reputation, if only because it accomplishes so much in so little space. By making the story of his encounter with a wolf ultimately a story about a mountain, Leopold subordinates an ethical quandary about wolves, men, horses, and guns to the scientific concept of the ecosystem, while co-opting the affective force of a death to transpose the ecosystem concept into a moral law and placing himself, through the simultaneous depth and breadth of his rimrock conversion experience, in a position to articulate this environmental ethical truth.

science as a technique of the self and ecological affects

As an ecological allegory, “Thinking Like a Mountain” exemplifies an often overlooked aspect of the politics of the natural sciences, concerning what Foucault called “the relationship between the subject and truth” (2011, 3). Foucault suggests two distinct ways of situating the analysis of scientific or philosophical discourses of truth. The first would be an epistemological analysis: analysis of “the specific structures or forms by which we can recognize a discourse is true.” While acknowledging the importance of such an analysis, Foucault wished to set this usual mode of philosophical analysis to one side, focusing instead on how social subjectivity is negotiated through one’s relationship to the truth. “Rather than analyzing the forms by which a discourse is recognized as true, this would involve analyzing the form in which, in his [sic] act of telling the truth, the individual constitutes himself and is constituted by others as a subject of a discourse of truth, the form in which he presents himself to himself and to others as someone who tells the truth” (2011, 3).

In this sense, scientific practices themselves could be analyzed alongside other ecological techniques of the self such as byodynamic farming, walking in the wilderness, or calculating your carbon footprint. They could be analyzed, that is, as ways of conjuring up, understanding, presenting, and composing one’s self within a field of human and non-human relations. While Leopold’s conversion experience is not explicitly related to his scientific practice, we infer that the episode took place while he was employed as a field biologist for the U.S. Forest Service. We suspect, moreover, that Leopold very likely would not have gleaned this profound lesson

from the wolf and the mountain that day without the benefit of his scientific training.[2] Arne Naess, in his famous lecture inaugurating the "deep ecology" movement, confirmed this connection between the fieldwork of the ecologist and a certain kind of bio-ethical enlightenment. "The ecological field-worker" he attested, "acquires a deep-seated respect, or even veneration, for ways and forms of life. He reaches an understanding from within, a kind of understanding that others reserve for fellow men and for a narrow section of ways and forms of life. To the ecological field-worker, the equal right to live and blossom is an intuitively clear and obvious value axiom" (Naess 1970, lecture). By speaking in terms of an "axiom" susceptible to "understanding," Naess echoes Leopold, suggesting an aesthetic and an ethic with a special relationship to an objective truth. Specifically, Naess's kind of ecocentric egalitarianism finds support in the truth of the ecosystem as a wholistic order. The higher order of the ecosystem suggests the isonomia of the innumerable parts. Every species, if not every individual, has its place, its niche, and thus a natural and discernible basis for value.

It was precisely this aptitude for seeing the whole system, "the great pattern of life and environment," that was cited by Paul Sears in 1964 when he proclaimed the exceptional status of ecology as a "subversive science." Ecology, in this understanding, is subversive because it calls into question all our discrete and particular acts by showing their eventual relation to a larger order. Ecology tells us "you can't [any longer] do just one thing." "When you try to pick out anything by itself," as Muir had already said a half century earlier, "you find it hitched to everything else in the universe" (1998, 110). The deep ecology tradition of Leopold and Naess gives us a wholistic version of this insight. It is what Timothy Morton has called "the ecological

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[2] Without addressing Leopold's epiphany, Daniel Botkin reports that Leopold's understanding of predator-prey populations dynamics on the Kaibab Plateau in Arizona came from a paper written by wildlife biologist D. I. Rasmussen. (Botkin, 1991)

thought": the one great fugitive ecological truth that we imagine could lead to the consciousness shift from which all things green and good and sustainable would flow, if we could only finally grasp it by its right handle and think it truly and deeply enough (Morton, 2010).

But ecological thoughts are not thoughts alone; they are also practices. Or, if you like, they are bound up very closely with practices, and with events and material circumstances, as well as with the bodies of practitioners. It is not incidental that Naess specifically linked his transformative ecological thought to the field and fieldwork. Indeed "the field" is what first delineated ecology from biology, botany, and zoology. Few *field* biologists would deny that they are in some wise ecologists. Digital modeling, lab experiments, and statistical analysis remain important techniques for ecologists, but the historical impetus of ecology runs the other direction. Ecological science has its roots in the Euro-American naturalists of the eighteenth and nineteenth centuries. They were taxonomists largely, who ventured into the wilderness to collect specimens.[3] However, ecology proper begins when naturalists such as Gilbert White, Thoreau, and Darwin brought their scientific methods out into the meadows, lakes, and woods to discover the higher order of the field itself. Ecology is a science, but it is the science that took the pressed and pinned specimens out of the desiccated collections of the Enlightenment naturalists, back out into the field, into the "environment," returning them to their context and reanimating them within the grand biotic symphonies of which they were properly a part.

In *The Genealogy of Morals*, Nietzsche provides a portrait of the traditional ideal type of the scientist: a kind of modern ascetic, turning away from the body, the passions, and the will, in the sole service of truth, suppressing any animal affects and aversions that might impede clear

[3] Although walking in nature became something much more than a naturalist's jaunt for Thoreau, he nonetheless was fully ensconced in this tradition. He outfitted his top-hat with interior shelving for bringing home specimens.

vision and pure reason. There is, near the heart of modern science, a grave and stoical kind of heroism that ultimately gestures towards an ideal of disembodiment. Nietzsche found this ideal of disembodiment reflected, ironically, in the very physiognomy of the scientist. "Physiologically," Nietzsche writes "science rests on the same foundation as the ascetic ideal: a certain *impoverishment of life* is a presupposition of both of them--the affects grown cool, the tempo of life slowed down, dialectics in place of instinct, seriousness imprinted on faces and gestures" (1967, 154). Even an ideal of chaste reason and disembodied observation needs to be enacted, performed--and like any performance, this one needs its sets and props, its specific accouterments, and material circumstances: starched white lab coats; controlled, walled, aseptic spaces; standardized equipment, hard surfaces, inert materials, et cetera.

If this ascetic ideal is the dominant image of the modern scientist, ecology posits a distinctly different figuration of the scientist and of scientific practice, one entailing a distinctive version of what Foucault termed the "relationship between the subject and truth." A rather more Aristotelian ideal, perhaps, than the Platonic version critiqued by Nietzsche. Take, for example, the account of philosopher of science Robert Frodeman, who contrasts ecological "field science" with physics, chemistry, and astronomy, the usual paragons of scientism which proceed by laboratory work: instrumentation, computation, experimentation. Nominally, Frodeman's focus is actually on geology as the *sin qua non* of field science, but it is telling that in his expansive redefinition, "geology" turns out to be ecology *par excellence*: "Taken at its word," he writes, "[geology] would provide a complete *logos* of the planet the Greeks called Gaia: synthesizing geoscientific research with poetry and nature writing, and combining these with geopolitical considerations of issues such as resource depletion, pollution, and climate change" (150-1).

Ecology's totalizing object of study is reflected in the wholistic experience of the fieldworker, which Frodeman relates: "Science in the field proceeds at a different rhythm. Outside, in the open air, the scientist is exposed to the elements. Rather than working in the controlled experience of the lab, the field scientist is immersed in a constantly changing sensorium that promotes and sustains the wonder and serendipity of experience. The walls--conceptual and physical--that isolated the lab scientist are now gone, as the field scientist passes through a shifting frameless flow of events" (154). What guarantees subjective proximity to truth here is not the suppression of bodily affects but the total exposure of the body to the panoramic sensorium of the field. It is the field ecologist who overcomes the artifice of walls and the falsity of boundaries and partialities to imbibe through every pore a whole truth of the lived and living world.

The ecologist's movement, actual and metaphorical, from the abstractions and partialities of books and laboratories to the wholistic immediacy of the field resonates with the idea of a transcendent order. Indeed, it was the idea of a transcendent classificatory schema that first ignited Muir's passion for "the field"--a passion that was at once scientific, aesthetic, and ethical. A botanist friend had showed Muir the "hidden" resemblances between a locust tree and a pea plant, evidence of their close phylogenetic connection in spite of their greatly divergent forms. As the botanist explains: "Man has nothing to do with their classification. Nature has attended to all that, giving essential unity with boundless variety, so that the botanist has only to examine plants to learn the harmony of their relations." Muir describes the conceptual-aesthetic gestalt shift that followed: "This fine lesson charmed me and sent me flying to the woods and meadows in wild enthusiasm....Now my eyes were opened to their inner beauty, all alike revealing the

glorious traces of the thoughts of God, and leading on and on into the infinite cosmos....my eyes were never closed on the plant glory I had seen" (Muir 1997, 139).

Ecology is "deep" in part because the production of a body of ecological knowledge is concomitant with the production of ecological subjectivities. But the production of ecological subjectivity can be figured in two different ways. In one sense, the production of "the ecological subject" entails en-meshing the individual within a discourse with direct bearing on the social/ political world--I have such and such carbon footprint, or I am ecologically at risk due to where I live, my income level, my consumption habits, et cetera. Political theorists inspired by Foucault's studies of "governmentality" have illuminated these connections between "bio-power" and "eco-knowledge."[4] What has been less explored--at least in the realm of environmental politics--is the imbrication of ecological power/knowledge with desires and affects. However, if ecology as a science is never wholly separable from ethics and politics, this is not only because ecological discourse discloses the radical interconnectedness of human actions, but also because the production and reproduction of such discourses generates affects, which may energize different comportments towards the non-human world. In his studies of Victorian sexuality, Foucault found that the production and communication of knowledge entailed not only social relations of power, but also the production and shaping of pleasures and desires.[5] Ecology doesn't take human pleasures as a primary object of study as did the Victorian

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[4] See especially the work of Timothy Luke and Arun Agrawal.

[5] Plato's *Phaedrus* is an early indication of the general affinity that persists between *Sophia* and *Eros*. But see specifically Foucault's *History of Sexuality Volume I*, 36-49. The figure of the scientist-ascetic described by Nietzsche might seem to belie any such connection, but affections are at work here as well. As Nietzsche well knew, there exists, prevalent in his time and surviving into ours, a zeal for cold rationality and methodical rule-following that is a passion in the fullest sense.

scientia sexualis; nonetheless, the accounts of environmental scientists similarly suggest that the making of knowledge always entails the expression, cultivation, and production of affects.

Scientific procedure may give rise to a cold indifference towards its objects, as is sometimes alleged. It may tend to reveal natural entities as mere resources, as a numerical standing reserve, as Heidegger feared. It may even generate aversions and abhorrences in some cases. But scientific practices and the discourses they propound also forge attractions, affiliations, and fascinations. The study of complex biotic interconnections proves particularly fertile in this regard. Eco-tourists and amateur naturalists suggest that you don't have to be a professional scientist to have the ecological experience of the field. Nor do the affects generated through scientific fieldwork necessarily require first-hand experience. The work of ecologists over the last century has led to a global fascination with certain biomes--coral reefs, antarctic glaciers, and of course "the rainforest." In revealing the Amazon as the "lungs of the world" ecologists have simultaneously created the ecological planet's greatest erogenous zone.

Ecology, in other words, is not only an alethurgic form--not only a set of procedures that expound a body of knowledge and a discourse of truth about the environment--but also and at the same time an ecocritical practice with a normative bent. Life scientists who shirk their fieldwork are thus doubly suspect characters. Note the language used by Lynn Margoulis, discoverer of endo-symbiosis and proponent of the Gaia hypothesis, in dismissing one of one of her detractors: "He seldom deals with live organisms. He computes and he reads. I suspect that it's very hard for him to have insight into any group of organisms when he does not deal with them directly. Biologists, especially, need direct sensory communication with the live beings they study and about which they write" (Margoulis 1995, 131). The main takeaway is that this lab scientist's

conclusions are not to be trusted, but the subtext is that he also lacks a certain sympathy and solidarity with the *bios* itself. He doesn't love slime molds enough to get down and dirty in the field. And he doesn't go to the field enough to truly get a *feel* for Life.

the ethos of an oecos without a logos; non-wholistic ecology and its affects

If we understand science not only as a discursive regime of truth, but also as a technique through which identities and embodied subjectivities are produced, it seems far from coincidental that the "biophilia hypothesis"--the assertion that humans are naturally attracted to and care about living things--was formulated not by a psychologist or psychiatrist, but by E. O. Wilson, a Harvard biologist at the top of his field and the world authority on ants. This is not to cast doubt on the sincerity of Wilson's own biophilia. Quite to the contrary, Wilson's love of life would seem to be overdetermined in its sincerity. *Life,* in the first place, has been particularly good to Wilson. But more to the point, it seems we love what we *know*--we love our pursuits--as innately as we love the marvelous complexity of carbon-based life forms. An instructive difference is discernible, though, subtle as it may be, between the ecological affects attested to by Leopold, Naess, and Muir--with their affinity for harmony, coherence, and wholes--and Wilson's biophilia, which rather amounts to a generalized and somewhat inchoate affinity for the stuff of life. This difference is important because in it we can begin to see another way of understanding how ecology as a science may be ethically generative.

If it is in some sense real, the biophilia phenomenon suggests a kind of magnetic attraction to the organic that is not predicated on coherence and synthesis. Perhaps a life spent in

the field exploring the inter-connected complexities of the bios *can* be profoundly transformative, but it does not always lead to the same aesthetic and ethical insights. Not everyone is called to think like a Mountain. And, as Margoulis writes of Wilson's hypothesis, "there is no simple biophilia, no unconditional love for members of other species. Some men love racing cars and, indeed, may be attracted to the curvaceous bikini clad women advertisers portray with such cars. We are attracted to bright colors, as well, an attraction whose application to painted automobiles comes along after the evolutionary crucial biophilia of primates to trees with brightly colored fruits. So not only is our love for life impure, not only do we have mixed feelings towards other life-forms, but our affection is also changeable, plastic." (Margoulis 1993, 347) Indeed, if we all in some sense share a general affinity for life, it often gets expressed in rather more monomaniacal ways, often bleeding over into the inorganic and the technological as well. Some of the most ardent environmentalists are in love with specific field sites, certain species, even individual plants or animals. Julia Butterfly adopted a single redwood tree. Janisse Ray, in *Ecology of a Cracker Childhood,* wanted to cradle the pine flatwoods of middle Georgia in her arms. Timothy Treadwell, Herzog's *Grizzly Man,* loved bears enough to live with them until death did them part. Susan Orlean's *The Orchid Thief* chronicles the intense fascinations of orchid hunters, some of whom went to their dismal deaths in search of specific varieties. John Laroche, the subject of Orlean's book, was obsessed by turns with fish and mirrors before becoming an orchid fanatic.

Perhaps it isn't biophilia that is universal, but philial connectivities in general. And the proliferation of stray affinities with the parts and pieces of our increasingly artifact-ridden biosphere may, in fact, be a better affective basis for environmental politics, activism, and ethics

than identification with a transcendent principle or a totalizing entity. This would be a tinkerer's way of caring for the environment. Thinking like a mountain suggests either a principle of inaction and non-involvement--"let nature take its course"--or leads to attempts to maintain or re-create an idealized wilderness in a state of supposed pre-historic perfection. Over the past few decades many conservation and restoration ecologists have called both approaches into question. Daniel Botkin's *Discordant Harmonies* (1990) was the first book-length articulation of this change in ecological thinking. Botkin detailed how the practical challenges faced by scientists engaged in biodiversity conservation efforts have actually been running counter to received wisdom (and received science) about the balance and order of nature for some time--particularly challenging the notion of the climax ecosystem. Botkin surveys several case studies to show how even untrammeled ecosystems are characterized less by balance and stability than by unstable configurations undergoing non-linear change that often defy prediction. With the natural background itself behaving so unnaturally, it becomes very difficult in some cases to sort out the ecological effects of humans from those of non-human agents of environmental change. Not only is it too late in most places to really "leave things be," but even without us things are more apt to become otherwise than to *be* as they are, even at the ecosystem level.

Perhaps the most compelling depiction of this "unnaturalness" of the natural world is provided by the famed "nature writer" Barry Lopez. In *Arctic Dreams*, Lopez depicts the fascinating strangeness of what we may be tempted to regard as the last great untouched wilderness. By global standards, arctic ecosystems are non-diverse, composed of a relatively small number of species. Populations within these species are given to wild fluctuations from year to year and decade to decade. The arctic is a place of great swarms, vast migrations,

population explosions, and epic die-offs. Partly, these peculiarities are a result of extreme conditions. The trophic structure of arctic ecosystems are top-heavy. Plants' lives here are fleeting and their bodies are small. This is an animal's world, and the animal life here is precariously rigged atop a small and unreliable photosynthetic base of support. The arctic is also set apart by its ecological age. Lopez points out that "the ecosystem itself is only 10,000 years old, the time since the retreat of the Wisconsin ice. The fact that it is the youngest ecosystem on earth gives it a certain freshness and urgency" (Lopez 1986, 37). Humans were part of the story from the beginning, following the retreating glaciers northward with an advance guard of intrepid ice age mammals. In short, the arctic ecosystem, if we can call it that, is probably best understood as post-apocalyptic biotic assemblage composed entirely of invasive exotic species. Disturbance is the norm here.

Ecologists have suspected that bio-diversity is closely correlated to the metastability of an ecosystem. And both seem to be correlated to ideal temperature and moisture conditions. Therefore tropical rainforests are extremely diverse, and thus, as the theory goes, stable. This theory helps explain arctic ecology. However, as Botkin has pointed out, recent studies have found far more instability than had been expected even in extremely diverse tropical ecosystems.[6] Moreover, even if virgin rainforest were uniquely stable, the majority of the world's ecosystems today would have more in common with the arctic--they are heavily altered and replete with exotic species, invasive and otherwise. It is therefore worth considering what an ecological ethic fit for the arctic would look like. Thinking like a tundra doesn't work quite as

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[6] See Botkin 1990, 62-6.

well as thinking like a mountain. And an ice shelf, it seems, wouldn't know what to think even if it could.

I think this is what makes Lopez such a compelling and distinctive voice in the nature-writing genre; his prose tends to center on celebrations of individual species and meditations on specific encounters, rather than thematizing an immersion in a surrounding world, or a timeless wilderness experience, or looking for a transcendent principle or a totalizing order. *Arctic Dreams* is a series of chapter-sketches about caribou, musk oxen, narwhals, and polar bears. Lopez's approach suggests a re-reading of Leopold's allegory, which would dwell on the question of the wolf without supposing that the mountain's objective viewpoint will guide us out of the ethical dilemma. Lopez, in fact devoted a whole book to wolves, *Of Wolves and Men,* which treats the Leopoldian land ethic as one moment in a long and fraught love-hate relationship between *Canus lupus* and *Homo sapiens.*[7] Lopez communicates his deep admiration for wolves, but he does not provide or apply a systematic wildlife ethic. Nor is his admiration for wolves based on any predetermined function or place within a larger order. It seems to be based rather more on wolves' capacities and their individuality--their tendency to do things that remain mysterious and unpredictable to biologists, ecologists, and perhaps mountains alike. "Wolves," he is at pains to tell us, "are extraordinary animals."

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[7] In contrast, the wolf of Leopold's allegory is typical of a certain idealized and objectified notion of "wildlife." The category of wildlife tends to exclude pets and pests, as well as non-native, feral, and domesticated animals. Animals as "wildlife" behave according to instinct and laws of nature. Wildlife behavior that disturbs us is explained as aberrance from the natural and normal behavior of a wild animal filling its proper niche. When a pack of coyotes attacked and killed a person in Canada in 2008, a wildlife biologist was quoted in the papers explaining that the animals must have mistaken their victim for "a deer or some other prey animal." These kinds of preposterous statements offered by scientists, which accord animals so little agency and individuality and vastly under-estimate their intelligence and powers of perception, reflects a discourse that prefers to think of non-human life as "natural" in the sense of being law-bound, thus constructing "wildlife" as a ready object for scientific understanding. A post-natural wildlife ethic might begin by asking what it would take to love mice, roaches, feral pigs, lab-rats, and feedlot cattle. If people in post-industrial countries such as U.S. need to re-learn how to live with free-roaming wolves and bears and other large animals that have been brought back from the brink of extinction, trying to think and feel differently about "pests" may be the best first step.

In the winter of 1976 an aerial hunter surprised ten gray wolves traveling on a ridge in the Alaska Range. There was nowhere for the animals to escape to and the gunner shot nine quickly. The tenth had broken for the tip of a spur running off the ridge. The hunter knew the spur ended at an abrupt vertical drop of about three hundred feet and he followed, curious to see what the wolf would do. Without hesitation the wolf sailed off the spur, fell the three hundred feet into a snowbank, and came up running in an explosion of powder. (1978, 3)

Wolves vary their hunting techniques, share food with the old who do not hunt, and give gifts to each other. They can live for a week without food and travel twenty miles without breaking stride. They have three systems of communication--vocal, postural, and olfactory....they spend a good part of their time playing with their young and playing with each other. I once saw a wolf on the tundra winging a piece of caribou hide around like a Frisbee for an hour by himself. (1978, 4)

They will travel together ten or twenty miles a day, through the country where they live, eating and sleeping, birthing, playing with sticks, chasing ravens, growing old, barking at bears, scent marking trails, killing moose, and staring at the way water in a creek breaks around their legs and flows on. (1978, 12)

An environmental politics based on plural affinities with certain animals, places, processes, or phenomena should not proceed at the expense of an appreciation for inter-relationships. But ecological interdependence itself does not suggest a solid basis for environmental ethics. Current environmental ethical discourse actually manifests its own quasi-symbiotic ecology of conditional norms, none of which turns out to be ultimate and each of which supports the others. Sometimes biodiversity is the greater good that the stability of the system is supposed to serve. In other cases, conserving the stability and balance of nature is said

to be the reason why we should value biodiversity. Sometimes it is the "ecosystem services" provided to humanity by a working biosphere that seem to be the ultimate goal of conservation. But just as often maintaining the *beauty* of the ecosystem is implied to be paramount. Even Leopold's famous ecological-ethical axiom displays a plurality of ends, which may not necessarily entail one another: "A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise" (1949, 262).

The Field, it seems, has no singular guiding logic, reason, or truth to impart to the ecological fieldworker. The environment, the *oecos*, we might say, has no proper *logos* after all. But sometimes when we attend closely to words we find that they are wiser than we are. Etymologically, "*ecology,*" like all words, is itself rooted in practical language games. The Greek root *logia/logos* originally comes from the proto-Indo-European root "*leg,*" which meant to pick out, or to collect, especially associated with collecting wood and bundling sticks. ("Lignin," the scientific name for wood fibers, is related.) Later, the word apparently became associated with picking out words, and perhaps "collecting things," in a sense, *with* words. "*Logos*" owes part of the semantic power it accrued to the fact that somewhere along the way it became a word for "word." And as such it tells us something about words, ideas, and truths themselves: they are collectivities made of collectivities--this is the insight Derridean deconstruction performs--and they are intrinsically connected to our physical bodies and the projects through which we are involved with the material world. Ecology, as the *logos* of the environment, is not made up out of thin air, but neither will it ever build (or synthesize) a solid edifice from scratch, from bare facts, from incontestable laws and principles. Ecology, like all discourses, is ultimately an un-refereed game played within a shifting and intervening

background. Ecologists are in the business of taking apart and recollecting words and things, and ecological knowledge can always be reconfigured no matter how tightly it is bundled.

Ecology so approached would be, to appropriate Claude Levi-Strauss's famous distinction, more like tinkering than engineering. Levi-Strauss made much of this distinction in arguing that science is born of the never-quite-achieved ideal of starting from whole cloth, raw materials, and master plans--ordering our experiences from the ground up, so to speak.[8] Western philosophy, in its earliest beginnings, turned away from the reiteration of mythical creation stories to concern itself with divining the primary principle or substance that underlies all else: water, fire, earth, atoms, numbers... Levi-Strauss contrasted this cosmological approach with a widespread "pre-scientific," or non-scientific, "undomesticated" mode of thought--sometimes called "totemism." But his aim in *Pensée Sauvage* is to stress how the latter nonetheless shares a great deal with scientific thought. The crucial difference, according to Levi-Strauss, is that this "undomesticated thought" always picks up in the middle, and proceeds from existing concepts, categories, and metaphors that are "laying around."[9]

Environmental philosophy has often criticized modern techno-science for forcing the natural flux and flow of nature into the numerical sameness of laws and statistics, or reducing the experience of the whole to a narrow view of its parts. But Levi-Strauss's analysis of extra-scientific regimes of experience and knowledge suggests that thinking outside of the modern techno-scientific box would not mean re-inhabiting the environment as a seamless background of

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[8] It is very interesting in the context of Levi-Strauss's meditations on this point to note that classicists have recently traced the roots of Hellenistic philosophy and the Greek concept of *phusis* to the advent of monumental architecture in Dark Age Greece. See particularly *Anaximander and the Architects* by Robert Hahn.

[9] To the extent that this distinction may characterize a historical "moment," it would be one that predates even the advent of Greek philosophy in the West. The monotheisms of early Near Eastern states share more with modern science than they do with Levi-Strauss's "*pensée sauvage*"--not, perhaps, in content, but in form.

flux and flow. Nor, certainly, would it mean seeing the percept purely, without the imposition of theories, meanings, and significations. Thinking beyond what Heidegger called the scientific "world picture" might rather mean embracing the ongoing project, without beginning or end, without foundation or *telos*, of orienting and reorienting ourselves within in an evolving world of indeterminate relations through the continual transformation of contingent schema that are at once cultural, conceptual, and practical.[10]

Ecology so approached would indeed be a potentially subversive science--subversive even of science itself--but not exactly in the way it was first understood to be by figures like Muir, Leopold, and Naess. Environmentalism's traditional expectations of science have to be critically hedged in this regard. Scientific ecology cannot provide the answers to environmentalism's ethical dilemmas in the way that Leopold's famous allegory suggests. But this does not mean that ethics and aesthetics can or should ever be separated from environmental practice and discourse. Michael Crichton famously criticized environmentalism for being a

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[10] This is, in fact, seems a fairly good description of most sciences as they is actually practiced, even if it is not the way science sometimes presents itself and is popularly understood. Science has long prided itself on the notion that it discovers primary properties and transcendent laws--the fundamental truths of things in themselves. Ironically perhaps, this ideal has led us to a suite of scientific practices that actually amount to a particular kind of tinkering, one that is highly instrumentally effective. The animating ideal was needed, perhaps, to realize modern scientific achievements. However, as Levi Strauss suggests, the scientist as an intellectual "engineer" seems to never quite achieve the ideal of starting with perfectly suited tools and raw materials (1962, 19). As sociologists of science inspired by Latour and others have noted, the many truths science has discovered, as amazing and useful as they are, remain, like all truths, metaphorical. Contemporary scientific practice, moreover, mostly serves the purpose of research and development for industries and states, and ultimately cares far more about *whether* A statistically does B to C than it does about *why* this is the case.

And yet, the ideal of science as the pursuit of the primary properties of entities and the transcendent order of nature remains as seductive as it is elusive. I think we can see this seductiveness playing out most clearly at two far-flung points in contemporary science: in the fields of particle physics and ecology. At the Large Hadron Collider under the Swiss Alps our ablest technicians are still in hot pursuit of the most fundamental truth of nature-as-substance. However, post-Newtonian physics has been famously uncooperative with the idea of nature as a realm of substance with fundamental properties, and the most recent advances in the field show no sign of easing the anxieties of Einsteinian realists. Instead of beings-in-themselves physicists have shown us a universe of relational capacities and "beings-for."[9] If physics has been the site of the pursuit of nature as a foundational ur-substance, what is of more primary interest to us here is the field of ecology, which I have tried to show has been a primary site of the modern pursuit of nature in its other scientistic guise: as a wholistic transcendental order.

religion.[11] Crichton's observation is not altogether incorrect, but the critique is off target, as he simply reproduces the dogmatism he attacks by suggesting instead that environmentalism "should be a science." In fact, environmentalism is and should remain intricately entangled both with scientific practice and discourse and with ethics, politics, art, and religion. Environmental science, even the subversive, relational science of ecology, is incapable of ultimately answering the normative questions out of which it partly arose and into which it ever further entangles us. And yet scientific ecology is not merely an instrument of ethics; its ongoing practices of negotiating these corporeal and conceptual entanglements are also and at the same time productive of affects and attachments that can be crucial for environmental ethics.

Kantian philosophy has become representative of the compelling idea that to be faithful to reason we must think ethics, science, and aesthetics in rigorous isolation from one another. From this perspective--which may or may not be truly faithful to Kant's own nuanced understanding of the matter--the ethical action happens wholly in the purity of the intellect, in the reasoned realization and dispassionate application of the moral law. Kantian ethics is a laboratory ethics--a purely mental precipitate--a clarified spirit of the highest proof distilled and isolated from the messy witch's brew of embodied experience. It is a kind of ethic that awaits the realization of the Right as a eureka! moment--a crystal bullet of morality between the eyes. But even in Kant's own time, philosophers such as Hume, Smith, Rousseau, and Schiller were suggesting that such conceptual separations were unproductive, even empirically unsupported. On this opposing view, good and bad acts issue from virtuous or ignoble dispositions, which

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[11] I take these quotations from Michael Crichton's "Remarks to the Commonwealth Club," San Francisco, September 15, 2003.

entail good and bad affective states. Such dispositions and affects, moreover, are cultivated through prior action and experience.

The importance of praxis for environmental ethics implies this same critique of the rarefied Kantian image of ethical action. If care of the self is an ethical pursuit, then the moment of ethical action is not primarily in an instant of realization, nor even the consistent application of a moral principle. Rather, ethics happens in the ongoing conscious transformation through embodied practices of layers of experience in ways that fashion and modulate the relations that compose one's life--generating deeper wellsprings of generosity, for example, or opening ourselves outward to new, more encompassing "fields" of ethical regard. Science, I believe, has a role to play in environmental ethics so understood. Not by discovering or proving a sociobiological basis for ethical feelings toward nature, as E. O. Wilson would do, and not by revealing a transcendent order that demands to be upheld, as Leopold's allegory suggests, but by multiplying and intensifying affective connectivities.

postlude: a tinkerer's environmentalism

Leopoldian deep ecology looks for a pure presence within the phenomenal world that would ground perception and ensure an ethically clarified vision. It requires a metaphysical physicality, a transcendental immanence; it finds it in the figure of the Mountain, and for good measure ties it to the absolute event of death--the death of a wolf. Rather than the slow work of an ongoing practice of the self, here is an instantaneous conversion experience. In Leopold's allegory we have the ghostly outline--or better, the material approximation--of an abstract transcendental Kantian formula, imported into the immanent "field" of experience as an embodied conversion experience that reveals an axiomatic ethical truth.

My critique of Leopold's essay is aimed at illustrating these theoretical connections. It does so, however, at the risk of doing some injustice to Leopold's broader thought. This one short essay does not exhaust the richness of Leopold's thinking. (And in any case I would hasten to add that *Thinking Like a Mountain* has done more political good than harm.) For one thing, Leopold himself suggested tinkering as a model of ecological practice, writing elsewhere in *A Sand County Almanac*, "To keep every cog and wheel is the first precaution of intelligent tinkering" (1949, 190). In this brief precautionary statement, Leopold diverges from his injunction to think like a mountain. With a little bracketing of authorial intent, we could in this way read into Leopold's seminal Almanac two different ways of approaching environmental ethics and practice.

But then, the difference between the imagery of tinkering and the imagery of the mountain in *A Sand County Almanac* may be seen less as a contradiction than as a productive

tension. Leopold's career rode the tail end of the "wilderness craze," which had gripped U.S. popular culture in the early twentieth century, during which time "preservationists" had distinguished themselves sharply from "conservationists." But Leopold marked an important shift away from this schism in the burgeoning environmental movement. He did not repeat the anthropocentric conservationism of his mentor Gifford Pichot. But neither did he follow in Muir's footsteps by seeking rapture in the loneliest wildernesses. Instead, Leopold bought a used-up Sand County farm and made a hobby of restoring its fertility and biodiversity. As William Cronon has pointed out, Leopold was the first prominent voice in the American conservation movement to suggest that humans, through a careful kind of agricultural practice, could actually make the land healthier, or even, in a certain sense, make the land *more* wild (Cronon in Hott and Garey 1991). In this sense Leopold departed not only from conservationism but also from preservationism, and he is the predecessor of eco-agriculturalists like Wendell Berry as much as he is of deep ecology.

In this pivotal capacity I think we see Leopold the intelligent tinkerer, and Leopold the tinkerer, I would suggest, ultimately has more of value for contemporary environmental thought than Leopold the medium of the omniscient mountain. Ecology since Leopold's time has increasingly suggested tinkering as a model of the evolutionary processes of species and ecosystems, and even of individual organisms. Nature itself, according to the cellular biologist François Jacob, "is a tinkerer and not an inventor" (1977). In this sense the messy imperfections of the tinkerer's projects, the eternal confusion of ends and means, the lack of a total plan or a clear beginning or endpoint, would in fact be the apogee of bio-mimicry. Rather than thinking like a mountain we should tinker like a tundra.

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