

metaphors of biological competition. They certainly have a normative dimension, one that survey respondents were quite able to detect and evaluate. This provides a cautionary tale of the consequences of our metaphoric choices. Metaphors can become self-reinforcing prophecies, in that our view of ourselves contributes to a view of the natural world that feeds back to strengthen that preexisting view, notwithstanding a presumed distinction between facts and values. Sustainability might require more responsible metaphors, including more careful consideration of the presence of prevailing cultural values.

IV

Engaging the Metaphoric Web

Even the best-intentioned reformer who uses an impoverished and debased language to recommend renewal, by his adoption of the insidious mode of categorization and the bad philosophy it conceals, strengthens the very power of the established order he is trying to break.

—Max Horkheimer and Theodor Adorno,
Dialectic of Enlightenment

We are all connected. Metaphor knows this and therefore is religious. There is no separation between ants and elephants.

All boundaries disappear, as though we were looking through rain or squinting our eyes at city lights.

—Natalie Goldberg, *Writing Down the Bones*

In previous chapters, we have discovered how the metaphoric web entangles science and society. Recognizing their entanglement, and not just with metaphors, numerous scholars have contended that morality ought to be central to scientific investigation. The historians Robert Young and Anne Harrington proposed a “moral science” and a “compassionate science,” respectively. Feyerabend endorsed ethics as an “overt judge” of scientific truth, and another philosopher, Columbia University’s Philip Kitcher, proposed a “responsible biology” in which ethical considerations are integral. Summarizing the need for a new form of science, the Canadian historian Stephen Bocking recommended that “a more democratic science is necessary in order to question directly the often unexamined imperatives embedded within science: to reshape the world, to impose a standardized perspective, to pursue efficiency above all else.”¹ These proposals are part of a more general trend toward citizen engagement in postnormal science, as mentioned earlier, which recognizes that science is not necessarily progressive and thus must be more accountable to society. Here I wish to examine how metaphoric choices might fit within such proposals for a postnormal and responsible science. How can environmental metaphors be true to both science and society, to both facts and values? I provide a broad theoretical perspective on such questions in this chapter, before examining two more case studies; then, in chapter 7, I address more specific questions about how responsible metaphorics, including citizen involvement, might operate in practice.

Numerous scholars have underscored the need for greater reflection on the social implications of scientific metaphors, as we saw in chapter 1, yet they may remain unaware that their efforts fall within the mandate of the field of critical discourse analysis. This field investigates the instantiation of power and

hence inequality through language and commits itself to bringing about social change. It recognizes the dialectic between objects in the world and concepts in our discourse: the language we use is shaped by the society in which we live at the same time that that society is shaped by the language used. It follows that those who control language have the potential to covertly dominate society by naturalizing particular ideas. Critical discourse analysis encompasses the subdiscipline of critical metaphor analysis, which focuses on the relation between metaphor and ideology in spoken and written texts; environmental and political themes are prevalent. The apposite field of critical ecolinguistics provides critical insights too by taking a broader perspective on the relation between language *systems*—rather than just words—and environmental issues.²

These critical studies emphasize that metaphors can be assessed in various ways, not only for their epistemic merits, but also, for example, for their social and environmental ones. Harré and his coauthors distinguished three ways to assess the adequacy of language with respect to environmental affairs. The first is *referential adequacy*, which questions whether a language has the “lexical resources to discuss a topic in sufficient detail, ‘sufficiency’ being relative to the task in hand.” This concerns whether linguistic resources are misleading, vague, or even nonexistent. Among other examples, they discussed the vagueness of the phrase *greenhouse effect* and Rachel Carson’s reframing of insecticides as biocides. They noted that advertisers add the prefix “eco-” to help sell their products, and they observed that some languages have a prefix that indicates harmfulness and permanence, one that we lack, along with words for “not biodegradable,” “a positive weed,” and others. More generally, English words promote commercial exploitation of the environment when they appear neutral but their connotations are

harmful (for example, *develop* and *resource*); when they give a pleasant name to something unpleasant (in euphemisms such as *improving nature*, *clearing*, *harvesting*, and even *global warming*); or when they give something neutral or even positive a pejorative slant (such as “overmature” trees).³

It is the two other types of adequacy that they discussed, however, that are more pertinent to this book. A language that is *socially adequate* should be “acceptable to a maximum number of speakers in the target community, promote social unity and intercommunication and cater to present as well as anticipated future social needs.”⁴ Their example is germane. They showed that the language used to accentuate the problem of human overpopulation includes terminology such as *population explosion* and *population bomb*. It follows that the proposed solution is *population control*, terminology that many people find jarring because it sounds too much like birth control and pest control. For some women, in particular, this terminology may raise concerns about whether they will lose responsibility for their bodies to external agents of control.

Finally, a language that is *environmentally adequate* should also “enable its users to talk about environmental matters in an informed manner and promote the well-being of its speakers and nonhuman nature.”⁵ This reflects the ultimate concern of this book, which is whether the metaphors we use in environmental science nurture sustainability. I assume that this category to a large extent subsumes the previous one, for if our language is to be environmentally adequate, it must also be socially adequate.

This proposal to evaluate the socioethical dimensions of environmental metaphors may seem quite radical and perhaps unfeasible—and we will examine the latter question in chapter 7. But it is not that much of an extension from what scientists

already do. I take it as a given that many environmental scientists are committed to environmental causes. In interviews with eighteen prominent ecologists, for example, sociologists found that “many . . . stated that they felt a desire to ‘save the planet’ or prevent environmental damage.”⁶ This finding echoes the call among scientists themselves for research that has greater relevance and thus influence. Or we could go further and, following Kitcher, assert that the primary objective of science should be the common good, one element of which is the environment. Either way, we have to expand the usual emphasis on epistemic dimensions of scientific terminology, where a metaphor would be abandoned only if it is unproductive or inaccurate. This is not enough in the domain of environmental concerns. We cannot just assume that the truth will set us free, not least because such truths are often couched in socially resonant language, but also because cognitive science shows that if data fail to fit people’s frame, they will reject the data rather than abandon the frame. Thus, we need to contemplate social and environmental dimensions and explicitly evaluate them where possible.

Westoby modeled reflection on scientific language along social and environmental rather than just epistemic lines. Although ecologists are taught to discriminate is from ought, he reviewed research demonstrating that nonscientists nonetheless look to ecology for moral and normative guidance about environmental issues; they see it as a secular religion. In response, he first recommended education about the alternative quasi religion of research and the distinction between science and morality, but he realized this may have limited capacity to resolve the tension between what academics and the public want from ecology. Recognizing that ecology has escaped from academic control so the “‘general-public’ meaning . . . will inevitably prevail as the language evolves,” he suggested that in

some contexts ecologists should adopt different words in their texts and courses as a defensive option. He concluded, however, by considering how they might instead engage rather than retreat by selecting “sound generalizations from which moral and aesthetic principles could be permitted to flow,” providing metaphor-rich examples such as biophilia, evolutionary machinery, and shifting mosaics.⁷ Despite the difficulty of selecting sound generalizations from among these and other options, I think his question directs us toward a more socially responsible form of biology. Although scientists will never find perfect metaphors, from both epistemic and social perspectives—or the royal road to sustainability—the intention to choose carefully may itself prove formative of a new relation between science and society. My intent here is not so much to suggest appropriate generalizations as to consider some of the themes by which we might evaluate environmental metaphors.

It is worth exploring briefly the consequences of taking Westoby’s ideas to a logical endpoint. People will continue to take broader meanings from science, in part because of feedback metaphors. Thus, like it or not, science interfaces with religion, though some would go much further and maintain that, as a meaning-making exercise for understanding the world, science is fundamentally religious. The Latin root of religion, *religio*, means “to bind,” and scientific insights can help us become bound to and to care for the world. If this is the case, we must explore this interface between religion and science. As the eminent English philosopher Alfred North Whitehead stated in 1925 in *Science and the Modern World*, “When we consider what religion is for mankind, and what science is, it is no exaggeration to say that the future course of history depends upon the decision of this generation as to the relations between them.”⁸ Metaphors help to form this relationship, so Westoby’s reflec-

tions provide a timely precedent for studies of their role and their significance.

I contend that the common good that we seek with our environmental metaphors is sustainability. This is what these metaphors are now called to do, to make the world meaningful to us. “To sustain” is to enable something to endure. Applied to the environment, the idea of sustainability involves our seeking a future in which the basic needs of humans are met, but without impairing (or destroying) the natural systems and species that support us. Nonetheless, sustainability is itself a difficult and contested concept, which raises questions about its referential adequacy. Without reviewing its history or the extensive debate over its definition, I side with recent authors who conclude that we can agree on many of its basic tenets and that even its ambiguity can be a source of creative tension between stakeholders.⁹ It still retains importance, though we must ensure that the concept ultimately accomplishes something.

We might aim to sustain in various ways. Metaphorically, sustainability may be the journey or the destination, and there are both many ways to journey and many possible destinations. Often, we hear of the model of a three-legged stool of sustainability, with its biological, economic, and social legs (the three P’s: people, planet, and profit). A major limitation of this model, however, is that it aligns with traditional disciplines and institutions, which may inhibit our ability to derive truly innovative solutions. It implies that we have separate legs rather than fundamentally interconnected elements. There is also a very real risk that the economic leg will predominate so that suddenly the stool is off-kilter. Perhaps we need to be doing much more, elevating the severity of the issue with metaphors that query whether our current actions and patterns are even survivable.

We can, I hope, agree on some of the core principles of

sustainability. These include its challenge to conventional thinking and its emphasis on context, equity, and interdisciplinarity. Each of these underlies my approach to linguistic socioecological sustainability, though some of this will not become clear until chapter 7. I seek language that challenges the status quo, in particular the idea that we just need to be more efficient to attain sustainability rather than making more radical adjustments in our thinking about the systems in which we are embedded.¹⁰ Methods of public participation must occur in local contexts, and they have much to do with promoting equity, by including not only diverse human perspectives, but also other species. And finally, I seek to break down the barriers between ecology and society that can prevent sustainability, which in particular means that we require insights from various disciplines. I also adopt sustainability here for the usual reasons that it is adopted: its flexibility and the extent to which many of us recognize and relate to it. Rather than certainty, it provides a vision of possibility. In that sense, sustainability progress is a journey that we embark on together rather than a specific destination.

Language and Worldview

Before continuing, I wish to draw attention to the underacknowledged relevance of language in seeking sustainability. Although I touched on this in chapter 1, it is quite pertinent to my overall argument, so I wish to deepen that discussion here. In seeking a more enduring relationship between humans and the ecological systems on which our well-being depends, we need to consider not only the direct relationship between humans and nature, but also the intermediary of linguistic representation. Humans operate to a large extent through linguistic symbols, which interpret the world in particular ways that have associ-

ated performative consequences. Metaphors, as I have shown repeatedly, provide a quintessential example through the large role they play in constituting our worldview.

To engage the metaphoric web, we have to appreciate the power of language as a means toward sustainability ends. We live in a sea of language, and thus we may forget its influence on how we traverse the waters of life. It is challenging for us to examine this linguistic link between ourselves and the natural world, for it is like fish reflecting on the water in which they have lived their entire lives. We cannot escape language to look at it. In response to this quandary, the quantum physicist David Bohm created an imaginary language, which he called the rheomode, to highlight the fragmentary Newtonian worldview created by ordinary language and the possibility of an alternative that more adequately reflects process-based modern physics.¹¹ Some critics would contend that this gives too much weight to a particular interpretation of quantum physics, perhaps proposing as an alternative that we experiment with less language altogether, as some mystical and contemplative traditions have done.

Instead, to understand the effect of our language, we might turn to the evidence provided by the thousands of other languages spoken around the world. We know from everyday experience with speakers of other languages that these languages differ from one another, but to what extent does this actually influence people's conceptual systems? Some linguists claim that language has a dramatic effect. In the noteworthy words of the American linguist Benjamin Lee Whorf, "We dissect nature along lines laid down by our native languages. The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds—and

this means largely by the linguistic system in our minds.” In its strong form, linguistic determinism, this effectively means that language determines reality. Through extensive argumentation and experimentation, this thesis has been largely discredited, though a weaker form that contends that language *influences* our perception, the thesis of linguistic relativity, has withstood at least some empirical testing.¹²

A recent review by the Stanford psychologist Lera Boroditsky, for example, demonstrates how language affects cognition about space, time, objects, and substances, thus suggesting that “the private mental lives of people who speak different languages may differ much more than previously thought.” Consider the case of grammatical gender, those languages such as French, German, and Spanish (unlike English), in which nouns are assigned a gender. Boroditsky conducted experiments showing that the grammatical gender given to an inanimate object causes people to think of it as having that gender. The results were as follows: “Asked to describe a ‘key’ (a word masculine in German and feminine in Spanish), German speakers were more likely to use words like ‘hard, heavy, jagged, metal, serrated, and useful,’ while Spanish speakers were more likely to say ‘golden, intricate, little, lovely, shiny, and tiny.’ To describe a ‘bridge,’ on the other hand (a word feminine in German and masculine in Spanish), German speakers said ‘beautiful, elegant, fragile, peaceful, pretty, and slender,’ while Spanish speakers said ‘big, dangerous, long, strong, sturdy, and towering.’” As another example, Russian speakers discriminate between dark and light blue with different words, and experiments show that they thus discriminate more rapidly between shades across these two color categories than within them (whereas there is no difference for English speakers).¹³ These and other examples reveal the intricate connections between language and thought.

Consider some of the partial ways that English structures the world. This exercise will exhibit features that might otherwise remain unexamined (except among linguists), thereby reminding us that the world is not a given, but that we perceive it in a particular way that is, to a variable extent, influenced by the language we speak. The sociologist Saroj Chawla, for example, asserted that the “linguistic and philosophical roots of our environmental crisis” lie in three features of the English language. First, English individualizes what are known as “mass nouns.” Individual nouns refer to items with a distinct outline, such as a car, a human, or a rock, whereas mass nouns “denote a homogeneous continua without implied boundaries,” such as water or coffee or beer. In English, we individualize mass nouns when we refer to a glass of water, a cup of coffee, or a mug of beer. We also delimit mass nouns within measurable categories, such as referring to the volume of a liquid in liters. Though such measurement has benefits, it simultaneously fragments rather than emphasizing the more holistic sense that all water is connected. Chawla proposed an implication of this: “As long as we think of the water in the home and the industrial waste water in the rivers or ocean as distinctly separate, it will be difficult to avoid water pollution.”¹⁴ On a related note, we stress biological classifications and scientific distinctions rather than the wholeness of life. If you imagine the difference between sitting in a forest, hearing the leaves high overhead rustling in the breeze, and thinking of the same forest in terms of board feet, you get an even better feel for the distinction.

Second, English allows us to count two types of nouns, both real and imaginary ones, even though the former are “perceptible spatial aggregates” (such as cars, humans, rocks), whereas the latter are “metaphorical aggregates” (such as happiness and well-being). Not all languages quantify the latter,

thereby attempting to “objectify and measure experience.” To the extent we do so, we may forget that what is meaningful may not be countable and that we may not need more of what is countable (money, possessions, and so on) to obtain those things that really matter.

Third, and finally, English relies on a fragmented three-tense conception of time. In speaking of past, present, and future, distinctions that other languages may ignore, we objectify time and it becomes quite linear, each unit (seconds or days or years) equal to every other and stretching both backward and forward into the distance. Chawla explained the result: “Years, centuries, and decades are nouns; they are pluralized and enumerated as if they are touch-and-see objects. In this way, subjective experience of real time has been lost.”¹⁵ One result of this conception is that we are hoodwinked by the ideology of progress, one that can exist only when we imaginatively place distant past and future time in front of us as if they exist in the same way as the present moment.

Chawla and others have concluded that English is ill-fitted for a sustainability ethic because it is quite fragmentary, emphasizing things rather than processes. There is no need to invent a new language, a rheomode, however, because other languages provide pointers. As a specific example, linguists have argued that the grammar of Niitsi’powahsin, the language of the Blackfoot peoples, is more consonant with the process-based worldview of modern physics cited above, not to mention its consonance with the worldview of many process philosophers and even major world religions such as Buddhism. To summarize: verbs dominate in Niitsi’powahsin, so “nouns seem to be verbalised out of existence.” Nature therefore becomes “a flux of processes.”¹⁶ This foregrounds relations over objects, providing a more ecological understanding that may be better suited to

giving precedence to our relation with our home planet—and to transforming this relation. The question is not so much whether this view is closer to the truth, for it is simply another way of conceptualizing experience, but whether we might adopt from an alternative model such as this one if it is more apt.

These language differences become all the more significant when one recognizes the extent to which English is the language of contemporary science, including environmental science.¹⁷ It follows that the limitations we have just seen greatly influence how we conceive of environmental problems; we see them largely as problems out there in the objects studied by science. The solution thus lies in science itself because it provides a better understanding of the facts of the matter. The worldview associated with English thereby reinforces the attitude of scientific realism, which tends to neglect all the other ways we could conceive of and relate to our experience. Again, the emphasis is on things, understood by reduction, rather than processes. We might agree to explore the world from diverse cultural starting points, but science too often becomes scientism, the belief that it is the one valid method of inquiry. Instead, different sources of cognitive diversity allow cultures to inhabit landscapes and settings in variable ways, and this leads to different metaphors that shape what is of interest to them.¹⁸ The Western scientific approach has both benefits and shortcomings, and in the interest of sustainability we need to draw on every source we can rather than relying so exclusively on science, a source that, in particular, has denounced the incorporation of values.

We might learn from those relations between humans and landscapes that have evolved over eons *in situ* and that do not require facilitation from natural science. For example, in his beautiful and brilliant ethnography of the Western Apache, *Wisdom Sits in Places*, Keith Basso, an anthropologist at the

University of New Mexico, described just such a place-based relationship. The local landscape of these peoples is densely packed with specific places whose place names (toponyms) invoke rich historical narratives. These narratives are not simply historical, "for as persons imagine themselves standing in front of a named site, they may imagine that they are standing in their 'ancestor's tracks.'" Thus, when an elder "speaks with names," it is "interpreted as a recommendation to recall ancestral stories and apply them directly to matters of pressing personal concern." These stories carry moral meanings that are "a call to persons burdened by worry and despair to take remedial action on behalf of themselves."¹⁹ At other times, when people act immorally, a storyteller "stalks" them with a tale told to a larger audience, though the perpetrators know it is intended as a lesson for them. It makes them think and inspires them to transform themselves or to undo wrongdoings. In this way, the landscape of the Western Apache is imbued with cultural meaning, a linguistic link that is essential to their culture.

Disconcertingly, linguists have disclosed a rapid loss of languages around the globe. As David Harrison of Swarthmore College stated in the opening line of *When Languages Die*, "The last speakers of probably half of the world's languages are alive today." There are only a few thousand speakers of Niitsi'powahsin, for example. Over 40 percent of the world's languages are endangered, a greater rate than among the planet's plant and animal species, the focus of conservation biology. But with language loss we are arguably losing much more, including "long-cultivated knowledge that has guided human-environment interaction for millennia. We stand to lose the accumulated wisdom and observations of generations of people about the natural world, plants, animals, weather, soil, and so on. The loss will be incalculable, the knowledge mostly unre-



Figure 9. The Kallawayas of Bolivia possess an exhaustive knowledge of Andean plants and their curative uses. Illarion Ramos Condori (pictured), an expert herbalist, is among fewer than one hundred people who still know the rapidly disappearing Kallawayan language and its unique plant taxonomy.

Photo courtesy of K. David Harrison.

coverable."²⁰ Much of this knowledge exists only in memory because many of these languages have not been written down. They contain intimate knowledge of particular places and the organisms living therein; as they disappear, we lose alternative ways of knowing, not just knowledge for pharmaceutical purposes (a common focus of bio-prospecting), but ways of being on the planet, entire phenomenological life worlds that might promote more sustainable ways of living (Figure 9). Specifi-

cally referring to metaphors, Peter Mühlhäusler, a University of Adelaide ecolinguist, bluntly stated, "As the boundary between literal and metaphorical is again language-specific and as access to reality in the sciences is achieved mainly by means of metaphor, a greater knowledge of non-Western metaphor systems could prove a significant asset." That might be an understatement, for with the loss of these languages, we lose alternative hypotheses for relating to our world. In conserving the natural world, we simultaneously maintain a rich source of metaphors, both poetic and scientific—reasoning that might seem circular, self-serving, and anthropocentric, but which instead manifests how our lives are much richer, both materially and symbolically, when we maintain as much as we can.

Evaluating Environmental Metaphors

Having reviewed the importance of language for sustainability, let us now consider some specific axes for evaluating environmental metaphors. As we do so, I hope that the four feedback metaphors I have chosen for this book will appear less ad hoc; they represent some of the great forces influencing our lives and ecological systems at present. Because of the complexity of the Earth as a large-scale system, we require one metaphor or another to conceptualize it. It is worth reemphasizing, in this context, that the metaphors we choose trade off differing benefits and costs from the perspective of sustainability. If we conceive of nature as a resource, for example, then we are likely to act toward it in that way, that is, assuming it is there for our use. In contrast, if we relate to nature as home, we may be more respectful and think more concretely about how we inhabit places. We earlier contrasted metaphors of mechanism versus personification. Clearly, differing metaphors provide significant

models for how to inhabit and act as earthly inhabitants. And I suggest later that we require not one metaphor but a suite of them to fully appreciate the complexities involved.²¹

In evaluating metaphors, I maintain that a critical question is whether they simply bolster the status quo or help us begin to question it. Scholars interested in the social efficacy of language commonly evaluate whether it empowers people and contributes to their freedom, what might be called "emancipatory discourse." For example, Otto Santa Ana, a scholar of Chicana and Chicano peoples at UCLA, seeks "insurgent metaphors" to contribute to their liberation in the United States. Environmentalists and environmental scientists concerned with the state of our planet face a challenge similar to his, so they would be wise to heed his conclusion: "If history is a succession of metaphors, then they are the principal instruments by which vocabularies are created to speak society into existence. Insurgent metaphors are tools to construct stronger vocabularies to speak this new society. To contest the current regime of discourse requires the creation of insubordinate metaphors to produce more inclusive American values, and more just practices for a new society." The challenge may be understood by thinking of existing metaphors as dominant memes with which we have been indoctrinated. Our challenge, then, is to "wake from this meme dream."²²

If environmental science is to contribute to a fundamental rethinking, we have to question many of the metaphors we adopt that represent the age. They are adopted in part because they are culturally prevalent and they sell, but in a sense they represent the lowest common denominator. Some critics thus declare that we need to shift our environmental metaphors. Among others, Richard Underwood, in 1971, called for a poetics of ecology that would provide more radical metaphors. He

felt that people had lost touch with the being of life, and that our metaphoric choices have contributed to the antagonism of man versus nature. He thus viewed the environmental crisis as one primarily of metaphor, its solutions to be found in new metaphors. A few years later, the feminist literary critic Annette Kolodny advocated reforming our language to affect our relation to the land. Though not focused on scientific metaphors specifically, her work is part of a broader feminist current that traces how the feminization of landscapes, as a virgin to be admired or conquered, a mother, or even a mistress, authorized the American colonists' destruction of it.²³

Such proposals for environmental metaphors cohere with aspects of green political thought that seek to base politics on something other than profit. Such thought endeavors to problematize the implicit bias toward industrialism in modern Western culture, especially if this habit is "ecologically irrational." In this context, one of the greatest political breakthroughs of environmentalism has been to sanction a new "forum for communication, a green public sphere. Even with its many internal differences and disagreements, the emerging green public sphere poses a challenge to the once comfortable framework of industrialist discourse." In this sense, ecology could become a "subversive science," as a result of not just the "shifting ground of particular findings, but from orienting metaphors that challenge the presuppositions of the administrative mind."²⁴

Questioning the status quo means more explicitly questioning our orthodox view of the environment. In particular, scientists have identified a number of problems for which we now seek largely technological solutions. This pattern may in part derive from the very root of the term *ecology*, the Greek *oikos*, for household, which implies that we might manage this home. This managerial framing, however, is reliant on science,

and it often remains unquestioned. Yet it has at least three limitations.²⁵ First, it trivializes the public's role, when its members are often the first to recognize environmental problems, especially in the form of nongovernmental organizations. Second, it inflates the role of science, overlooking the construction of facts and the presence of continual uncertainty. It assumes that we simply need to figure out all the pieces, scientifically, and then we can solve the problems, when in fact there are many circumstances in which science does little to resolve environmental controversies. Third, managerialism of this sort leads to standoffs between competing interests, conflicts that in some cases are entrenched by our initial framing of the situation. The upshot is that we emphasize management, a metaphor that speaks to a culture of control by the experts. To put this in context, it is worth noting that the Swedish language does not have a word for management, instead emphasizing a less control-oriented metaphor of caretaking. This raises the possibility that, as the sociologist John Maguire put it, "our modern managerial culture is itself the disease to which it claims to be the cure."²⁶ We might focus instead on enhancing relationships so that they are not so hierarchical, facilitating the ability of local people to solve their own problems with the assistance of science.

The dominant managerial approach to problem setting stresses a mechanistic and reductionist approach to finding solutions. As I discussed earlier, we commonly understand life as a mechanism, and biologists often seek mechanistic explanations in their research practices. Through this process, organisms may become merely machines (or perhaps parts within larger ecosystemic machines), so we act toward them as such. It is this move that we have to assess in a socioecological context. For example, researchers may feel little remorse in killing organisms because they are simply mechanisms (or automatons), like

a watch, and have no emergent property called life anymore. Biodiversity scientists often kill organisms to catalogue them, but they justify their doing so by placing abstractions about biodiversity and its mechanistic function above those concerning the value of individual lives—an ethic that relates in part to viewing these species as mere mechanisms rather than as valuable entities in their own right. One of the great ironies here is that we reduce these systems to Cartesian mechanisms, yet we then state that somehow this unpurposeful stuff does matter and must be conserved.

Speaking more generally, the Georgia Tech philosopher Bryan Norton provides important direction for assessing metaphors in the context of sustainability. He promotes a philosophy of adaptive ecosystem management, and as part of this he emphasizes the need for a postpositivist ecology. To a large extent, his vision is based on critiques of the fact-value dichotomy that parallel those in chapter 3, and he specifically draws on the example of self-reflexive ecological modelers who now carefully attend to the role of values in the construction of their models. They recognize that all models rely on human values and metaphors, that we can adopt alternative metaphors from which to develop models, and that the choice among them needs to occur in the context of broader public discourse. Not only that, but we can combine this interest in metaphors with a philosophy of adaptive management by “experimenting with different metaphors and ‘models’ to characterize a problem” in order to choose “appropriate models for communicating about, and working to solve, environmental problems.”²⁷ Although I fully endorse such an approach, I now turn to a particular critical axis for evaluating proposed environmental metaphors.

Connecting Nature and Culture

Although chapter 7 will consider in more detail how we might, in line with Norton’s proposal, incorporate local deliberation into the selection of metaphors, I wish to focus on a general theme for new metaphors here. This theme is by no means the ultimate answer, but I present it as a counterweight to the prevailing view. Specifically, I contend that we need to focus on whether the metaphors we adopt in environmental science tend to reinforce a problematic dichotomy between nature and culture. This dichotomy reflects those between science and society and between facts and values that we have considered earlier. Science studies the solid facts of nature; society deals with the shifty values of cultural and individual preferences. In the long run, we must overcome such thinking and the metaphors that contribute to it in the interests of sustainability. As many have claimed, in various voices, we must embrace a post-Newtonian ecology that integrates humans in nature.²⁸ New metaphors will assist us here, encouraging fresh ways of being that are facilitated by novel self-fulfilling prophecies. At the same time, they contribute to a reformulation and critique of the long-standing fact-value and science-society dichotomies.

We might begin by contrasting our metaphors with those found in other cultures. The risk here is to romanticize indigenous peoples when they are not necessarily more environmentally benign. Nonetheless, we can learn from them, not least in greater awareness that possibilities exist other than the one we live in. The English language tends to amplify and reify the distinction between nature and culture. This distinction is hierarchical and tied to analogous and parallel dichotomies between body-mind, emotion-reason, and woman-man. In contrast, some languages lack a word for nature. Some hunter-gatherers

take “the human condition to be that of a being immersed from the start, like other creatures, in an active, practical and perceptual engagement with constituents of the dwelt-in world.”²⁹ Such a view might remind us that in taking care of nature, we are taking care of ourselves.

Nurit Bird-David, a cultural anthropologist at the University of Haifa, for example, compared the humanity-nature metaphors used by tribes around the world, including sexual, procreational, adult-child and “relatedness” ones, drawing from the Cree, Bushmen, aborigines, and pygmies.³⁰ She showed how the Cree, when hunting, enact a sexual relation between hunter and hunted, and how the !Kung take on the persona of a namesake species. On the basis of these and other examples, she concluded that we in Western societies inhabit a subject-object frame: nature is a resource that we need to do something with. These tribes instead relate to nature within a subject-subject frame, their emphatic emphasis being on relation. Such a relation results in part from experiencing the land firsthand rather than relating to it abstractly and as a mere conceptual problem.

Another example will help highlight how our language separates us from nature, creating varied paradoxes along the way. In the context of the James Bay II hydroelectric proposal in northern Quebec, Canada, the geographer Randy Bertolas interviewed Vermonters, nonnative Quebecers, and native Cree peoples to uncover their understanding of the concept of wilderness. He was concerned that nonnative people would expropriate the land through their culturally specific definition. He noted, “Few things define the Cree more than their ties to the land and its animals and, not surprisingly, the Cree language contains no word or concept of land that is comparable to Western notions of ‘wilderness.’” Even though the concept of wilderness as an entity distinct from themselves was not known

to their culture, they nonetheless revered the wilderness itself. They tended to associate it with a state of mind, at the same time acknowledging its usefulness, whereas the other groups—especially Vermonters—were more likely to associate it with an absence of humans and human disturbance. Accordingly, for these other groups *wilderness* is an abstraction representing places that are valuable for their potential resources or as escapes, whereas it was the very sustenance and context of Cree lives—it made little sense to separate themselves from it, so they described it in much more personal ways. Ironically, Bertolas found that the Vermonters “perceived no discrepancy between their humanless conceptions of wilderness and their desire to visit it (thereby impacting it).”³¹ Yet such discrepancies are written into the very dualism between nature and culture that underpins so much of how we think about the environment.

Furthermore, we often frame environmental problems as ones related to nature. Hence, science becomes savior and solution, as if the problem really lies in what is “out there” in the objective world that we can approach through natural science, rather than “in here,” in our selves, in our social world, and in how we relate to the world. Environmental scientists are not necessarily trained in such “subjective” issues, for they are often taught to ignore humans entirely. It is a fundamentally realist view of the world, and though undoubtedly helpful at times, the aforementioned examples from other cultures may help us see that the world can be viewed in very different ways. We cannot just assume that social and sustainability benefits will follow from particular biologically framed problems and solutions, but instead need to interrogate where they might be limited.

As one example, many environmental scientists now spend their lives in front of a computer screen analyzing data and running models, unable to identify the organisms outside

their window or relate their life stories. Their focus on abstractions can contribute to a dichotomy between their concepts of the natural world and the lives of those who experience it on a daily basis. They emphasize the objective problems given priority within a small community of scientists. To the extent this is the case, such research will be limited because it underscores a tendency to think in generalities rather than the specifics of locales. And yet, many environmental scientists at the same time want to encourage a relation with a landscape from which they are in many instances quite divorced.

There is a tendency to believe that solutions must be based in Western science. Chaisson, for example, drew on cosmic evolution as a “powerful and true myth.” Numerous writers have critiqued such large-scale ideologies because they emphasize our particular way of knowing—our metaphors—and close us off to those of others. Philosophers, too, fall prey to this trap. In his discussion of multicultural environmental ethics, the philosopher Baird Callicott, from the University of North Texas, considered the case of the Siberian crane and its migration through regions inhabited by people who follow about half a dozen different religions.³² Presumably, these religions would come to different decisions about how to relate to and conserve the crane. Faced with the very general problem of how even to get some of these religions to speak to one another, let alone adopt a similar worldview, he recommended that they agree on a basic or universal environmental ethic, one that he adopted from the natural sciences. Specifically, he drew on the Epic of Evolution project as a scientific grand meta-narrative to be mediated through the diverse modes of religious representation, thereby giving the universal a local flavor. He presented little evidence, however, that it would appeal to people of these diverse religions. He acknowledged that it would need to be

popularized, perhaps learning from the success of religions through history in using resonant images to capture attention. Nonetheless, his solution is our worldview—not to mention that many scientists would debate its validity. Instead, I maintain that there will have to be negotiation all the way down, on all levels, and in local spaces (such as this Siberian crane case), rather than thinking we can decide on *a priori* universals.

If thought about more radically, metaphor can be very helpful here. It might seem surprising, but poets themselves have debated whether their perspective is sometimes too realist. In proposing a reformative metaphorical ethics, the English scholar and poet Adam Dickinson, for example, called into question that realist commitment, showing how metaphor can point us beyond language because it is the “articulation” between presence and absence, language and nonlanguage, and ultimately is and is not. He contended, “Things cannot be captured in idiomatic realist language games,” and thus metaphor is critical because it “subverts the totality of a realist perspective that argues for a proper linguistic representation of matter.” In other words, literal language cannot capture our experience, despite its giving the impression that it can do so. Metaphors are important because they remind us that many of the distinctions between domains that we assume may be misleading: “interpenetration and connectedness” are at least equally valid characteristics to consider.³³ In focusing on the literal, however, we emphasize how things are distinct, and thus set off one domain from another, the literal true representation from an aberrant metaphorical one.

From Dickinson’s perspective, metaphor thus becomes an epistemic tool of a different sort, one that reminds us of the fundamental interconnections between things. This extends across nearly all of the dualities we take for granted: fact-value,

science-society, literal-figurative.³⁴ In the current context, environmental metaphors might highlight the unavoidable entanglement of nature and culture, especially in the way that they describe nature through cultural lenses and culture through natural lenses. With metaphor we see one thing in terms of another, and the key question I attend to herein is whether we are choosing the right thing—a question usually asked solely along epistemic lines, but one that can also be asked more broadly. And in seeking metaphors of sustainability, one way to assess these other things is whether they enhance our sense of interconnection.

Seeking a Language of Connection

To reformulate our priorities toward sustainability, we have to focus on how we relate to other organisms and individuals. Here the life sciences can play a crucial role, as they have lately contributed to a reconsideration of who we are. Evolutionary and molecular biology have shown that we are connected to other species historically, and ecology that we are connected environmentally. Although these new views are still metaphorical, they contain lessons that could help transform our relation to one another and to other species. Many biologists have devoted themselves to communicating these findings and to conserving ecological systems, yet some of their language fortifies a dominant discourse that is actually counterproductive to their interests. A new relation to our planetary home may require a shift in worldview, and concomitantly, in our language. What metaphors might biologists invoke to communicate a new way of relating to the world around us? Which ones would be in the best interests of society and other species? I propose that biologists need to utilize language that reinforces an understanding

of how organisms are interwoven evolutionarily in the environment they create together. Metaphor provides an inroad to this understanding, so the ones we choose matter.

If the world is built on relationship, then we require language of connection. I wish to draw attention to two crucial elements of interconnection. First, we want the metaphors we use to connect us to the world, in particular the other-than-human world. Second, we want the metaphors we use to connect us with one another. These are critical elements of sustainability that metaphors can provide. By emphasizing relationship, such metaphors exemplify what has been called an ethic of partnership, as opposed to former ethics based on egocentrism, anthropocentrism, or even ecocentrism. This new ethic gives equal moral consideration to both the human and the nonhuman, thus balancing respect for biodiversity and cultural diversity.³⁵

Beginning with the former relationship, our connection with the world, Evernden argued that there is only one relationship that is “relevant to a discussion of man and environment,” and that is “the relation of self to setting.” He did not mean simple causal connection, but fundamental interrelatedness, which we will recognize only through fundamental questioning of the subject-object dichotomy on which much of how we approach the world is based. The result would be a deep-seated realization that discrete entities are illusory. He provided a number of examples to defend such a claim, including symbionts, colonial organisms, and the process by which independent chloroplasts were imported into plant cells and mitochondria into animal cells. Recent research on extrachromosomal elements suggests that horizontal gene transfer between separate individuals and even species—“Creatures can ‘infect’ each other with evolutionary transformations”—has been a common feature of life. Similarly, consideration of the human microbiome

project demonstrates that we may be more appropriately seen as a metagenome, as bodily ecosystems or superorganisms.³⁶ Ecology *can* be a subversive science, but only if its basic premise of interrelatedness is fully understood.

All these examples elide our skin boundary, which relates to the earlier discussion of how personification breaks down self-other boundaries. The fact-value dichotomy partly derives from assigning facts to external referents and values to internal ones, which relies on our projection of an intervening boundary between self and nonself. Although we may perceive an obvious boundary there—the skin, which undoubtedly exists—the question is whether there is any reason to highlight this boundary rather than the tremendous flux across it. Those of us inculcated in Western social values operate on the basis of this subject-object dichotomy, but, using studies of diverse peoples around the world, anthropologists have shown that such an individualistic view is in fact peculiar. As the American poet Mary Oliver put it,

I'm never sure
which part of this dream is me
and which part is the rest of the world.³⁷

The possibility that we are fully part of the world raises further questions about the contemporary dismissal of personification in science, especially when we do it anyway. The more critical issue may be the specific types of values we invoke with the forms of personification that we choose, given the long-term political and social implications of our metaphoric choices.

The Cambridge philosopher of science Mary Hesse once stated, “Rationality consists just in the continuous adaptation of our language to our continually expanding world, and meta-

phor is one of the chief means by which this is accomplished.” As we become more aware of interconnection through scientific exploration in both microscopic and macroscopic domains, we might adopt new metaphors that better communicate this sensitivity. Evernden concluded that the challenge for ecologists is that “many of the most significant arguments [in the environmental movement] cannot be handled by their lexicon,” but that does not have to be the case.³⁸ Instead, a new emphasis should be placed on interrelatedness. We are interrelated with one another in such a way that humans are part of the landscape rather than separate from it. This may seem like a subtle distinction, yet its implications are profound for our way of being in the world.

We often refer to the global environment, for example, yet this conception demonstrates some of the inconsistencies in our worldview. The word environment itself initially meant “that which surrounds,” but it too has evolved to reflect the nature-culture dichotomy. Now, when we refer to the global environment, we envision the environment as it surrounds our earthly globe. Yet this perspective can be taken only by a disengaged humanity, perhaps by the omniscient gaze of objective science. This gaze dominates our understanding of knowledge, reflected in the dominance of sight-based metaphors for knowledge in this book. This gaze belies an ontology in which the environment is external to us rather than one in which we are embedded, a life world. The globe metaphor may thus contribute to our environmental alienation, in contrast to the sphere metaphor that typified the cosmology of earlier Europeans and indigenous cultures and which allowed them to live *within* the world. As an explicit example, consider how the metaphor of biodiversity hot spots (not to mention hot spots for endangered languages)—and maps of such hot spots—implies that conservation

has to occur only in those special places on the Earth's surface, as opposed to everywhere.³⁹

To learn to embody such interrelation, we might adopt one of the spiritual practices used to develop kinship with the world. We can imaginatively adopt the identity of an earthworm to feel lowliness versus that of an eagle to feel freedom and spaciousness. These are metaphoric projections, yet ones that allow us to connect with other beings. I am not the earthworm, at one level, yet perhaps at another I am. I am that. This is that, in metaphor. To empathize with the world, perhaps it is more important that we learn to effect such metaphors in our own experience, rather than invoking our habitual response: "That is an object," where "that" is another living being, there for our exploitation or experimentation. We would then embody a subjective relation to it, rather than an objectified one.⁴⁰ It is perhaps on such subjective and empathic relations, rather than facts alone, that a new and enduring conservation ethic can be built.

Other scholars have proposed specific metaphors that might reform the nature-culture duality and hence our relation with the planet. John Ehrenfeld, executive director of the International Society for Industrial Ecology, for example, has proposed industrial ecology as "a new paradigmatic metaphor" that will help us attain sustainability through novel solutions to environmental problems. He highlighted how this metaphor is normative and beneficial because it derives from the metaphor of ecology, from which spring ideas of connectedness and other ecological principles. It encourages us to think of our industries and their processes as ecological systems; for example, in recognizing the role of detritivores, we would think about recycling as fundamental to society rather than an add-on. As a second example, Daniel Philippon, a scholar of English and ecocriti-

cism at the University of Minnesota, has promoted "island" as a new guiding metaphor to help break down the nature-culture separation. He reviewed how the theory of island biogeography has been used to compare the ecological functioning of oceanic islands to islands of remnant forest on the mainland, which both highlights ecological limits (for example, by allowing us to see "Earth Island" as a potential Easter Island) and reminds us of the importance of the connecting matrix between distinct islands.⁴¹ Each of these overarching metaphors has appeal, but they all tend to emphasize a single metaphor rather than promoting playful inquiry with diverse metaphors.

Turning to the second meaning of interconnection, we seek metaphors that connect us to one another. Just as we must keep in mind that the extinction of relationships between species may be just as insidious as the extinction of species themselves, the neglect of human relations in the context of the problems we face may be just as debilitating as the problems themselves. For example, environmentalist concern for mountain gorillas led to eviction of the Batwa pygmies from the Bwindi Impenetrable Forest National Park in Uganda in 1991.⁴² This was justified as a way to isolate the gorillas from human interference, motivated by a desire to maintain them as a crucial expression of biodiversity. But note that biodiversity here is separate from people and that the human agency actually responsible for gorilla decline was not questioned at all. It was assumed that humans have a malignant presence, always and everywhere, even though the Batwa had lived in that landscape for generations. Ironically, however, the people who remained were the environmental elite who had access, through specialized gear, to dehumanized landscapes with romanticized gorillas. It has since been realized that removing the Batwa was a mistake because their presence had reduced poaching and other

harms to the gorillas. If policy discussions had focused on how humans should interact with the natural world—the appropriate type of agency and associated metaphors—then the Batwa might not have been removed. Metaphors engender particular practices, and we cannot ignore how these practices influence the relationship among peoples.

We also need to reconsider our metaphors because language can contribute to direct conflict between peoples. My first example relates to the previous one. Some African governments have enacted “shoot-on-sight” policies over the past several decades to protect biodiversity in national parks against poachers, an approach that has been interpreted through the lens of a militaristic planning metaphor. The problem is that not all poachers are created equal: they may in some cases include impoverished women looking for small game or fish to feed their children. Violence against them reinforces cyclic patterns of violence in these parks and rests on a problematic contrast between personified wild animals and animalized poachers. The defense of biodiversity here relies on an us-versus-them duality that encourages militaristic opposition and escalating violence, including human rights abuses.⁴³

Sometimes such conflict occurs between different stakeholders involved in an environmental policy debate. Two interdisciplinary ecologists, for example, analyzed the language used by those arguing for culling versus translocation of hedgehogs from islands in the Outer Hebrides, Scotland. They found that the arguments of the two groups differed significantly; the former used scientific language to make a case for the benefits of a cull for local shorebirds, and the latter used more emotive language to emphasize the welfare of the hedgehogs. The media exacerbated this dichotomy, thereby fueling conflict between the groups and preventing them from exploring areas of

common ground. In another example, two communications scholars demonstrated that the 1988 Yellowstone fire debate was coined rhetorically with two archetypal metaphors—death and rebirth—that cohered with competing worldviews for park management, an ecological-holistic one (fire causes rebirth) versus a human-centered one (*Smokey the Bear*: fire causes death). In this context the metaphors “invented” alternative responses to the situation: the fire was seen as a crisis by those who viewed fire as death, but the crisis was not so apparent to those who saw it as a necessary part of a natural cycle followed by rebirth. In both these examples, a discussion of underlying metaphors and some “rhetorical jujitsu” might have helped reduce conflict in policy formation.⁴⁴

In summary, we require metaphors that connect people to both ecological systems and to other people. We cannot rely on stilted scientific language, but instead require resonant metaphors. We may need to promote our ideas, as discussed in the next chapter, though the deeper question remains: which values do we want to emphasize? It is this question I look at in the following two case studies, beginning with questions about the type of nature-humanity interaction encouraged by the metaphor and practice of DNA barcoding.

24. Sober, "Kindness and Cruelty in Evolution," 54.
25. Oyama, *Evolution's Eye*, 211; Margulis, "Words as Battle Cries," 673.
26. Rozzi et al., "Natural Drift." Also see Bunnell, "Attributing Nature with Justifications."
27. Dalai Lama, "Understanding Our Fundamental Nature," 78.
28. Proctor, *Value-Free Science?* 62.
29. Longino, "Gender and Racial Biases," 140–141. For Longino's full argument, see *Science as Social Knowledge*.
30. Midgley, *Myths We Live By*, 77; Putnam, *Collapse of the Fact/Value Dichotomy*, 32–33.
31. Proctor, *Value-Free Science?* 61
32. Lonergan, *Insight*, 545. On the relation among metaphor, model, and myth, see Livingstone and Harrison, "Meaning through Metaphor."
33. See the insightful discussion in Coyne, *Designing Information Technology*.

IV

Engaging the Metaphoric Web

1. Young, "Darwinism Is Social"; Young, "Darwin's Metaphor and the Philosophy of Science"; Harrington, "Science of Compassion"; Feyerabend, *Conquest of Abundance*, 247; Kitcher, *Science, Truth, and Democracy*; Kitcher, "Responsible Biology"; Bocking, *Nature's Experts*, 207. See also Douglas, "Moral Responsibilities of Scientists"; Douglas, *Science, Policy, and the Value-Free Ideal*.
2. For a review of critical discourse analysis, see Blommaert and Bulcaen, "Critical Discourse Analysis." On critical metaphor analysis, see Dirven, Hawkins, and Sandikcioglu, *Language and Ideology*; Dirven, Frank, and Ilie, *Language and Ideology*. For a classic example, see Chilton, *Security Metaphors*. Fill and Mühlhäusler's *Ecolinguistics Reader* provides an edited anthology for ecolinguistics and ecocritical linguistics.
3. Harré, Brockmeier, and Mühlhäusler, *Greenspeak*, 22. The discussion of words promoting exploitation follows Schultz, "Language and the Natural Environment."
4. Harré, Brockmeier, and Mühlhäusler, *Greenspeak*, 22.
5. Ibid.
6. Kinchy and Kleinman, "Organizing Credibility," 872. See also Takacs, *Idea of Biodiversity*.
7. Westoby, "What Does 'Ecology' Mean?"
8. Whitehead, *Science and the Modern World*, 181.

9. On the view of sustainability presented here, see Robinson, "Squaring the Circle?"; Kates, Parris, and Leiserowitz, "What Is Sustainable Development?"; Gibson, *Sustainability Assessment*. For an assessment of the term *sustainability* along the three axes of adequacy, see Penman, "Environmental Matters and Communication Challenges."
10. See, e.g., Walker and Salt, *Resilience Thinking*; Ehrenfeld, *Sustainability by Design*.
11. Bohm, *Wholeness and the Implicate Order*. For a technical discussion of whether English grammar, as represented in environmental science, is consistent with sustainability, see Goatly, "Green Grammar and Grammatical Metaphor"; Goatly, *Washing the Brain*.
12. Whorf, *Language, Thought, and Reality*, 213. Important recent collections on linguistic relativity include Gumperz and Levinson, *Rethinking Linguistic Relativity*; Gentner and Goldin-Meadow, *Language in Mind*.
13. Boroditsky, "Linguistic Relativity," 920. On Russian speakers, see Winawer et al., "Russian Blues Reveal Effects of Language."
14. Chawla, "Linguistic and Philosophical Roots," 254–255. Her paper suggests that these features of English are best shown through contrast with Amerindian languages, an argument fraught with generalization about these languages despite their considerable variation.
15. Ibid., 256. Also see Goatly, *Washing the Brain*, 324–325.
16. Goatly, *Washing the Brain*, 320, 315. Goatly's discussion of Niitsi'powahsin draws on Peat, *Blackfoot Physics*. Pertinent process philosophers include Henri Bergson, Charles Peirce, and Alfred North Whitehead. On Buddhism, see Macy, *Mutual Causality*.
17. Montgomery, "Of Towers, Walls, and Fields."
18. Harding, "Philosophies of Science."
19. Basso, *Wisdom Sits in Places*, 89–91.
20. Harrison, *When Languages Die*, 3, 17. For a critique of the metaphor of language "endangerment," see Hill, "'Expert Rhetorics' in Advocacy." The claim about Niitsi'powahsin comes from Goatly, *Washing the Brain*, 314.
21. For further discussion of how we might choose among metaphors, see Philippon, *Conserving Words*, 268–272. Also see the sage examination of metaphoric evaluation by Booth, "Metaphor as Rhetoric." On how economic metaphors suggest that Earth is a "welfare-producing machine," see Norton, "Beyond Positivist Ecology." On Earth as home, see Rowe, *Home Place*.
22. Santa Ana, *Brown Tide Rising*, 319; Blackmore, "Waking from the Meme Dream." On emancipatory discourse, see Janks and Ivanic, "Critical Language Awareness."
23. Underwood, "Toward a Poetics of Ecology"; Kolodny, *Lay of the Land*.

24. Torgerson, *Promise of Green Politics*, xi, 100.
25. This discussion is adapted from Grove-White, "Environmentalism: A New Moral Discourse." Also see Evernden, *Natural Alien*, 148–154.
26. Maguire, "Tears inside the Stone," 185. On the absence of management in the Swedish language, see Heberlein, "Wildlife Caretaking vs. Wildlife Management."
27. Norton and Noonan, "Ecology and Valuation," 673. See also Norton, *Sustainability*; Taylor, *Unruly Complexity*; Norton, "Beyond Positivist Ecology."
28. See, e.g., Boucher, "Newtonian Ecology and Beyond"; Bradshaw and Bekoff, "Ecology and Social Responsibility." There has been extensive debate about whether the loss of the idea of nature might undermine the justification for conservation. Thus, those who see humans as antithetical to nature would enforce the nature-culture duality; for discussion, see Jenkins, "Assessing Metaphors of Agency." For a critical realist theoretical framework that seeks to resolve this problem, see Carolan, "Society, Biology, and Ecology."
29. Ingold, *Perception of the Environment*, 42. For a review of nature-culture dualism in the context discussed here, see Frank, "Shifting Identities."
30. Bird-David, "Tribal Metaphorization." Also see essays in Ingold, *Perception of the Environment*.
31. Bertolas, "Cross-Cultural Environmental Perception," 100, 109. This discussion touches on the extensive debate about the social construction of nature; a classic paper on wilderness is Cronon, "Trouble with Wilderness." Also see responses such as Soulé and Lease, *Reinventing Nature*; Crist, "Against the Social Construction of Nature."
32. Chaisson, "Ethical Evolution," 271; Callicott, "Multicultural Environmental Ethics." On the cost of such large-scale ideologies, see Bellah, *Beyond Belief*; Toulmin, *Return to Cosmology*.
33. Dickinson, "Lyric Ethics," 39–42, drawing on Zwicky, *Wisdom & Metaphor*, a playful yet important exploration of how metaphor helps us understand the world.
34. Many scholars in science studies have attempted to subvert such dualities, but see in particular Haraway, *Modest_Witness@Second_Millennium*.
35. On partnership ethics, see Merchant, "Partnership Ethics and Cultural Discourse."
36. Evernden, "Beyond Ecology," 99, 95. On the microbiome, see <http://nihroadmap.nih.gov/hmp>.
37. Oliver, *Leaf and the Cloud*, 27. For a summary of the anthropological view, see Geertz, *Local Knowledge*, 59.
38. Hesse, "Explanatory Function of Metaphor," 259; Evernden, "Beyond Ecology," 102.

39. For further discussion of the global environment, see Berry, *Life Is a Miracle*; Proctor, "Environment after Nature," and Ingold, *Perception of the Environment*, chap. 12. On hot spots, see Carolan, "This Is Not a Biodiversity Hotspot."
40. See, e.g., Buber, *I and Thou*.
41. Ehrenfeld, "Industrial Ecology"; Philippon, *Conserving Words*. For reflections on the suitability of the island metaphor for fragmentation, see Haila, "Conceptual Genealogy of Fragmentation." For discussion of chaos as a guiding metaphor, see Fleming, "Can Nature (Legitimately) Be Our Guide?"
42. Jenkins, "Assessing Metaphors of Agency." Also see Guha, "Authoritarian Biologist"; Robbins, "Tracking Invasive Land Covers in India."
43. Neumann, "Moral and Discursive Geographies."
44. On the two case studies here, see Webb and Raffaelli, "Conversations in Conservation"; Hardy-Short and Short, "Fire, Death, and Rebirth." "Rhetorical jujitsu" comes from Beardsley, "Framing Biology." For further discussion of language conflict and potential solutions, see Schön and Rein, *Frame Reflection*; Lewicki, Gray, and Elliott, *Making Sense of Intractable Environmental Conflicts*.

V

When Scientists Promote

1. Väliverronen, "Biodiversity and the Power of Metaphor"; Collins and Kephart, "Science as News." A significant challenge is that biodiversity can be defined in so many ways, even among ecologists; see, e.g., Holt, "Biodiversity Definitions Vary within the Discipline."
2. Yoon, *Naming Nature*, 281–282.
3. Edge, "Technological Metaphor and Social Control," 136.
4. See Buttner, *Geography and the Human Spirit*; Fine and Sandstrom, "Ideology in Action"; Trudgill, "Psychobiogeography"; Nelkin, "Molecular Metaphors."
5. Fine and Sandstrom, "Ideology in Action," 27.
6. Barbour, "Ecological Fragmentation in the Fifties," 254; Fleck, *Genesis and Development of a Scientific Fact*. On Clements and Gleason, see Journet, "Ecological Theories as Cultural Narratives." On the hard core, as discussed by Imre Lakatos, see Klamer and Leonard, "So What's an Economic Metaphor?"
7. See, e.g., Yearley, *Sociology, Environmentalism, Globalization*.
8. Dawkins, *Selfish Gene*; Richards, *Human Nature after Darwin*, 165. In agreement or strong agreement with the statement were 12.8 percent of