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Lost Dogs, Last Birds, and Listed Species: Cultures of Extinction

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Abstract

Humankind is currently confronted with what some biologists call the sixth mass extinction of species in the history of life on Earth, and the first one triggered by humans. This essay places the narrative that usually accompanies scientific accounts of biodiversity loss in relation to the long tradition of environmentalist stories about the decline of nature. It demonstrates how elegiac and tragic story templates turn accounts of the decline of a particular species into tools for a broader critique of modernization processes, and explores an alternative, comedic narrative template that approaches extinction in the context of evolution, contingency, and experiment.

Species Extinction and the End of Nature

Environmentalism, broadly understood as a mode of thinking that emerged at the turn of the nineteenth century out of the resistance to industrialization and modernization, rests on a perception of nature as threatened by human intervention. From its beginnings, environmental awareness—as distinct from other perceptions of nature—derives from its encounter with the natural world a sense of decline and loss. While the precise causes and consequences of this deterioration have varied in cultural perception over time—from the enclosure of the commons, the construction of railroads and deforestation in the nineteenth to population growth, urbanization, and pollution in the twentieth century, and ozone depletion, climate change, and species loss the dominant risks of the last

few decades—environmentalism inside and outside of recognizable social movements and organizations has been associated with such “declensionist” narratives. In these narratives, the awareness of the imminent destruction of nature becomes intimately associated with a sense of its value and beauty, in a combination that goes a long way toward explaining environmentalism’s cultural investments in genres such as pastoral, apocalyptic narrative, and toxic discourse.

In our own historical moment, the rhetoric of decline has culminated in the trope of the end or disappearance of nature, which in various ways has come to form part not only of environmentalist perspectives, but also of theories of contemporary culture and society more broadly. The end or death of nature appears in the writings of historian Carolyn Merchant and environmentalist Bill McKibben, for example, but also in Bruno Latour’s analysis of modernity, Jean François Lyotard’s, Jean Baudrillard’s and Fredric Jameson’s theories of the postmodern, and Ulrich Beck’s concept of the risk society.¹ The idea has different implications and articulations in the work of these theorists, but what they share is a sense that humans today live in environments pervasively shaped by humans themselves, to the point where a natural realm outside the impact of human agency no longer seems to exist. For this reason, the Nobel-laureate chemist Paul Crutzen has labeled the contemporary era the “Anthropocene,” a term that has recently been taken up by economist Jeffrey Sachs and historian Dipesh Chakrabarty.² It refers to a time period in which humans are no longer just the biological agents that they have always been, but have become geological agents transforming the most basic structures of the planet. Climate change is the most obvious manifestation of the Anthropocene, since it reshapes even parts of the planet where humans have not yet set foot.

Biodiversity loss is the other major risk scenario associated with the Anthropocene. Extinction is of course a normal evolutionary process that has taken place for millions of years, as the counterpart

1. Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution* (San Francisco: Harper & Row, 1980); Bill McKibben, *The End of Nature* (New York: Anchor, 1989); Bruno Latour, *Nous n’avons jamais été modernes: Essai d’anthropologie symétrique* (Paris: La Découverte & Syros, 1991); Jean-François Lyotard, *Leçons sur l’analytique du sublime* (Paris: Galilée, 1991); Jean Baudrillard, *Simulacres et simulations* (Paris: Galilée, 1981); Fredric Jameson, *The Seeds of Time* (New York: Columbia University Press, 1994); Ulrich Beck, *Risikogesellschaft: Auf dem Weg in eine andere Moderne* (Frankfurt: Suhrkamp, 1986).

2. Paul J. Crutzen and Eugene F. Stoermer, “The ‘Anthropocene,’” *Global Change Newsletter* 41 (2000): 17–18; Jeffrey D. Sachs, “The Anthropocene,” *Common Wealth: Economics for a Crowded Planet* (New York: Penguin, 2008), pp. 57–82; Dipesh Chakrabarty, “The Climate of History,” *Critical Inquiry* 35 (2009): 197–222.

to the emergence of new species, and usually occurs at the so-called background level, roughly one species going extinct every four years. But currently, biologists estimate that we may be losing species at about 50 to 500 times the background level. If one adds to this figure species that may have gone extinct, but whose fate is not known with certainty, the extinction rate rises to 100 to 1,000 times the background level, due mainly to habitat destruction, invasive species, pollution, human population growth, and over-harvesting. While most extinctions over the past 500 years have been limited to island ecosystems, they have now spread to continents, in a sign of deepening crisis.³ Such mass extinctions are extremely rare; they have only occurred five times previously in the 3.5 billion years of life on Earth, and have of course never before been triggered by human agency. Usually, biodiversity took many millions of years to return to pre-cataclysmic levels.⁴ The sixth mass extinction, which we are currently undergoing, may eliminate up to 50 percent of currently existing animal and plant species, according to the predictions of some biologists. What the consequences of so large-scale a biological transformation might be is uncertain. They include the possible collapse of some ecosystems, the destruction of some of the foundations of food and energy economies, and the disappearance of medical and other resources for the future, as well as the disappearance of important cultural anchoring points and assets. Because of the magnitude of this threat, the United Nations declared 2010 the International Year of Biodiversity.

Since the 1960s, the concern over biodiversity loss has politically crystallized in the creation of so-called red lists, catalogs of endangered species that usually go along with legislation against the hunting or harvesting of such species, and against large-scale alteration of their habitats. Such lists now exist at the level of states, nations, and international organizations like the European Union, as well as NGOs, the best-known one being the Red List of the International Union for the Conservation of Nature (IUCN). Cultur-

3. Jonathan E. M. Baillie, Craig Hilton-Taylor, and Simon N. Stuart, eds., *2004 IUCN Red List of Threatened Species: A Global Species Assessment* (Gland, Switzerland: IUCN, 2004), pp. xxi–xxii; Edward O. Wilson, *The Future of Life* (New York: Vintage, 2002), p. 50.

4. Recent research on the mass extinction in the Late Permian, during which 80 percent of marine genera and possibly 90 percent of species in general disappeared, suggests that at least some taxa may have recovered more speedily than previously assumed. Arnaud Brayard et al. show that ammonoid cephalopods reached diversity levels that were higher than those in the Permian less than two million years after mass extinction; see Brayard, Gilles Escarguel, Hugo Bucher, et al., "Good Genes and Good Luck: Ammonoid Diversity and the End-Permian Mass Extinction," *Science* 325 (2009): 1118–1121. I am grateful to Don Maier for pointing me to this analysis.

ally, species loss has translated into a profusion of popular scientific books, travel writing, films, documentaries, photographs, paintings, novels, poems, musical compositions, and video games that address either the fate of individual species or the general panorama of decreasing biodiversity. Many of these works deploy the genre conventions of elegy and tragedy to construct narratives in which the endangerment or demise of a particular species functions not only as a synecdoche for the broader environmentalist idea of the decline of nature, but also comes to form part of stories that individual cultures tell about their own modernization. This essay examines how such stories engage the question of modern humans' relation to nature, and explores how a comic and satiric approach to extinction and modernity might change the underlying assumptions implicit in environmentalist rhetoric about biodiversity.

Many of the numerous books about the presumed sixth mass extinction are textbook examples of the rhetoric of decline. Popular scientific accounts of biodiversity loss as a global ecological, economic, social, and philosophical problem, such as Diane Ackerman's *The Rarest of the Rare* (1995), Richard Leakey and Roger Lewin's *The Sixth Extinction* (1995), David Quammen's *The Song of the Dodo* (1996), Martin Gorke's *Artensterben* (1999), Beverly and Stephen Stearns's *Watching, from the Edge of Extinction* (1999), Edward Wilson's *The Future of Life* (2002), and Terry Glavin's *The Sixth Extinction* (2006), many of which include considerations of species conservation and restoration ecology, are complemented by accounts that focus on the endangerment of a particular species such as Peter Matthiessen's *Tigers in the Snow* (2000), Tony Juniper's *Spix's Macaw* (2002), Brett Walker's *The Lost Wolves of Japan* (2005), or Tim Gallagher's *The Grail Bird* (2005).⁵ Some of these books take the form of global travelogues that paint horrific pictures of human misery and poverty, of governmental mismanagement and corruption, and of unbridled population growth, colonialism, and economic expansion. Those who kill

5. Diane Ackerman, *The Rarest of the Rare: Vanishing Animals, Timeless Worlds* (New York: Vintage, 1995); Richard Leakey and Roger Lewin, *The Sixth Extinction: Patterns of Life and the Future of Humankind* (New York: Anchor, 1995); David Quammen, *The Song of the Dodo: Island Biogeography in an Age of Extinctions* (New York: Scribner, 1996); Martin Gorke, *Artensterben: Von der ökologischen Theorie zum Eigenwert der Natur* (Stuttgart: Klett Cotta, 1999); Beverly Peterson Stearns and Stephen C. Stearns, *Watching, from the Edge of Extinction* (New Haven, CT: Yale University Press, 1999); Terry Glavin, *The Sixth Extinction: Journeys Among the Lost and Left Behind* (New York: St. Martin's Press, 2006); Peter Matthiessen, *Tigers in the Snow* (London: Harvill Press, 2000); Tony Juniper, *Spix's Macaw: The Race to Save the World's Rarest Bird* (New York: Atria, 2002); Brett L. Walker, *The Lost Wolves of Japan* (Seattle: University of Washington Press, 2005); Tim Gallagher, *The Grail Bird: Hot on the Trail of the Ivory-Billed Woodpecker* (Boston: Houghton Mifflin, 2005).

off the world's endangered species to eke out a living on the economic margins are portrayed alongside those who kill on an industrial scale and for large-scale profit, as well as those whose activities never targeted the endangered species but eliminated it as a side effect to some other cultural, economic, or political pursuit. In the vision that underlies many of these essays and books, only a last-ditch, large-scale conservation effort can save future generations from having to live in an utterly impoverished and homogenized natural world, with the plant and animal abundance of the past a mere memory to be visited in museums and viewed in documentaries.

There is no quibbling with some of the basic biological and ecological facts on which these accounts rely—the accelerated pace and widening scope of species extinctions, and the central factors that cause them. Yet enough uncertainties and open questions surround these facts that the narrative of nature's decline turns out to be one possible, but not the only conceivable way of telling the story of biodiversity loss. The difficulties begin with the notion of biodiversity itself, which is hard to define precisely. It pertains at the level of the ecosystem, of the species, and of subspecies variation, so that bare numbers of different species in a particular ecosystem can only give an incomplete picture of its biodiversity. Just how much biodiversity is necessary to sustain ecosystem functionality is unclear. Some biologists argue that ecosystems with a larger number of species are more productive and resilient than those with smaller numbers: a species-rich forest, for example, can regenerate more easily after a fire because there are more candidates for reoccupying the ecological niches resulting from the fire.⁶ Yet arctic or desert ecosystems are functional with a much smaller number of species than, for example, tropical rainforests, so that species count does not equate with ecological functionality in any simple sense.

Mere numbers are also insufficient because the questions of how closely related the species are and what ecological functions they fulfill need to be considered as well: an ecosystem with forty species of mice is arguably less diverse than one with ten kinds of insects, ten kinds of reptiles, ten kinds of birds, and ten kinds of mammals, mice among them, even though the species count may be identical. At the same time, species are not simply equal to one another from an ecological perspective: so-called keystone species occupy crucial positions in the food-web without which many other species would also be endangered and are, therefore, more important to conserve

6. Wilson, *Future of Life* (above, n. 3), pp. 108–109.

than others.⁷ For these reasons, species counts can yield only a partial measure of biodiversity.

Beyond such practical problems of accounting for biodiversity, one of its central difficulties lies in the way in which the concept blends ecological facts with value judgments. As David Takacs has shown, part of its force derives from the idea that scientific research on biodiversity might generate ethical guidelines, which would imply far-reaching political consequences for such investigations. Many biodiversity researchers are also impassioned conservationists, so that “objective” research and “subjective” engagement are not always as clearly separable as some (though by no means all) scientists claim. Indeed, some biologists overtly refer to a “moral imperative” that impels them to make their insights public, and to translate them into social and political principles.⁸ The difficulties, but also the potential of the biodiversity concept for redefining the relationship between humans and nature derive from this ambiguity.

The species concept itself raises a number of other problems. Species have been classified in terms of Linnaean taxonomy since the eighteenth century, yet contemporary biology has proposed a variety of different definitions. The most famous is undoubtedly Ernst Mayr’s “biological” species concept, which defines species in terms of their reproductive isolation—that is, the mating and reproductive behavior by means of which one species distinguishes itself from others. “Phylogenetic” definitions, by contrast, understand species as communities of the same evolutionary lineage that disappear when all their organisms die or when new species evolve from them. “Morphological” species definitions refer to physical characteristics that enable the distinction of different species, and sometimes these overlap with evolutionary species definitions. Some of these species definitions are more applicable to particular biological research objects than others: the biological species concept, for example, is difficult to use for fossil species whose mating behavior is unknown, and for species that do not reproduce sexually. The morphology and reproductive behavior of bacteria is so different from that of other taxa that biologists often recur to a “physiological” species concept

7. The notion of “keystone species” was introduced by biologist Robert Paine in 1966, who researched the impact of starfish on sea urchins, mussels, and crabs. For a detailed discussion of the varied criteria that go into species-conservation decisions, see Dan L. Perlman and Glenn Adelson, *Biodiversity: Exploring Values and Priorities in Conservation* (Malden, MA: Blackwell Science, 1997), esp. chaps. 2–4.

8. David Takacs, *The Idea of Biodiversity: Philosophies of Paradise* (Baltimore: Johns Hopkins University Press, 1996), p. 337.

based on metabolic processes. The rise of molecular genetics since the middle of the twentieth century, in its turn, has opened up new possibilities for the definition of species.⁹ Taxonomy, which had become a dusty and somewhat disdained sub-discipline in biology, has recently reemerged as an innovative area of research, partly due to the biodiversity crisis—but its new prominence has only served to highlight the lack of consensus regarding species definitions.¹⁰ Debates about species boundaries among biologists are often highly technical, but the questions they address are far from merely academic: most laws protecting endangered species presuppose at least an approximate consensus on the species concept to define what is to be preserved—a particular morphological type, a reproductive group, an evolutionary line, or a genome?

Assuming that this question could be satisfactorily answered, some biologists would still argue that it is misguided to structure conservation centrally around species. What matters, according to them, is not the conservation of species, but of populations—geographically specific groups of particular species. The extinction of populations precedes that of entire species, but is equally threatening for ecosystem services. “If the population of spruce trees in the canyon upstream from your house in Colorado is cut down, its flood protection service will be lost. That the same species of spruce has abundant populations elsewhere will be of little consolation as you struggle to keep your head above water while riding your house downstream,” biologists Paul and Anne Ehrlich quip.¹¹ By the same token, if bees were to disappear everywhere except in Italy, the species itself would not be extinct, but the consequences for agriculture would be catastrophic.¹² “Indeed, it would theoretically be possible to lose no more *species* diversity at all and yet, because of declines in *population* diversity, suffer such a steep decline in ecosystem services that humanity itself would go extinct,” the Ehrlichs assert.¹³ From this perspective, the focus on the conservation of species distracts us

9. For a detailed analysis of the history and recent developments of the species concept, see John S. Wilkins, *Species: A History of the Idea* (Berkeley: University of California Press, 2009).

10. For a survey of the history of and recent developments in taxonomy, see Quentin D. Wheeler, “Introductory: Toward the New Taxonomy,” in *The New Taxonomy*, ed. Quentin D. Wheeler (Boca Raton, FL: Taylor & Francis, 2008), pp. 1–17.

11. Paul R. Ehrlich and Anne H. Ehrlich, *One with Nineveh: Politics, Consumption, and the Human Future* (Washington, DC: Island Press, 2004), pp. 52–53.

12. Paul R. Ehrlich, personal communication, December 15, 2009.

13. Ehrlich and Ehrlich, *One with Nineveh* (above, n. 11), p. 53.

from the real problem of their geographical and ecological distribution.¹⁴

Difficulties surrounding the definition of species are compounded by the fact that the number of species currently inhabiting the Earth is unknown. About 1.8 million species have been identified and scientifically classified, about half of them insects, and several large-scale database projects such as the Encyclopedia of Life (EOL), the Catalogue of Life (CoL), and the Global Biodiversity Information Facility (GBIF) are currently underway to make knowledge about these species accessible on the Internet for researchers and conservationists. Such cataloging is by no means a simple task; for historical and political reasons, not all data about already-known species are readily available. But estimates of the total number of species on Earth are even more tenuous, ranging from a low of 3 million up to a high of over 100 million, with typical estimates between 10 and 40 million species. “The median of the estimates is a little over 10 million, but few experts would risk their reputations by insisting on this figure or any other, even to the nearest million,” Wilson observes.¹⁵ The divergence is in part due to very different assessment methods for different geographical areas and taxa. But clearly, humankind knows only a fraction of existing species, and it is fair to assume that species are constantly going extinct that humans have not had a chance to encounter and name.

Yet this limit on current knowledge also implies, paradoxically, that even though we live in an age of mass extinction, the number of species is steadily increasing—the number of known species, that is. Wilson points out that contrary to popular belief, the discovery of new species is a common occurrence, to the point where in some taxa such as insects, specialists can barely keep publications current with the new discoveries. Wilson himself has identified 341 new ant species, in addition to the 10,000 already known ones, and even in such well-explored taxa as flowering plants and birds, new species are constantly being added to the record.¹⁶ Some of the newly discovered species are so rare that they are almost immediately added to existing red lists. The incessant flow of new discoveries derives from

14. For more detailed discussions of population diversity, see Jennifer Hughes, Gretchen C. Daily, and Paul R. Ehrlich, “Population Diversity: Its Extent and Extinction,” *Science* 278 (1997): 689–692; and Jennifer B. Hughes, Gretchen C. Daily, and Paul R. Ehrlich, “The Loss of Population Diversity and Why It Matters,” in *Nature and Human Society: The Quest for a Sustainable World* (Washington, DC: National Academy Press, 2000), pp. 71–83.

15. Wilson, *Future of Life* (above, n. 3), p. 14.

16. *Ibid.*, pp. 16–17.

some of the same reasons that also cause biodiversity loss itself, such as the spread of human populations into as yet unsettled areas.¹⁷ It remains that even as the number of existing species is likely declining, the number of known species is undergoing rapid increase.

It is possible to argue, of course, that the total number of species is irrelevant for the problem of mass extinction. If a large enough number of species is threatened that entire ecosystems are at risk, it may seem pointless to ask for knowledge that is in practice extremely hard to achieve. In a metaphor that is often repeated in the literature on species extinction, this would be tantamount to asking how many books are archived in a library on fire. But this argument leaves two important aspects out of consideration. In terms of historical comparison and the stories we tell about nature's ascent or decline, total species numbers are a part of the picture. If it is difficult to ascertain such numbers for the present, the task is even more challenging for past periods, which in turn makes it more difficult to assess the upward or downward development of biodiversity unambiguously. Even if one approaches biodiversity as essentially an inventory of biological information, as the library metaphor suggests, it is hardly beside the point to ask what proportion of the total information is at risk. All the more so if the library is not burning down by accident, but because humans use the books to heat their homes—as is indeed the case in many parts of the world when one considers the library metaphor in all its implications.¹⁸

Questions of scale also matter for the stories we tell about biodiversity in other ways. Human perception and cultural understanding of species loss normally focus on the orders of magnitude closest to us, whereas processes at other scales often do not make their way into public consciousness. Wilson, in his book on the looming threats to current biodiversity, remarks at one point that “[u]ntrammeled nature exists in the dirt and rotting vegetation beneath our shoes. The wilderness of ordinary vision may have vanished—wolf, puma and wolverine no longer exist. . . . But another, even more ancient wilderness lives on. The microscope can take you there. We need only narrow the scale of vision to see a part of these woods as they were a thousand years ago.”¹⁹ He does not pursue the implicit

17. Natalie Angier, “New Creatures in an Age of Extinctions,” *New York Times*, 26 July 2009. <http://www.nytimes.com/2009/07/26/weekinreview/26angier.html>.

18. For a somewhat different analysis of the library metaphor, see Esa Väliaverronen and Iina Hellsten, “From ‘Burning Library’ to ‘Green Medicine’: The Role of Metaphor in Communicating Biodiversity,” *Science Communication* 24 (2002): 229–245, esp. pp. 235–237.

19. Wilson, *Future of Life* (above, n. 3), p. xvi.

suggestion that the narrative of nature's decline might not pertain at all scales of perception, or what a shift of scale might entail for our understanding of the state of nature. Yet other findings confirm that our knowledge of other species is unevenly distributed across different taxonomic levels. The 2008 edition of the most comprehensive and best-reputed red list, that of the International Union for the Conservation of Nature (IUCN), indicates that all of the 5,488 known mammal and 9,990 bird species have been evaluated for their endangerment status, but of 30,700 known species of fishes, only 3,481 have been assessed; of 950,000 insect species, 1,250; of 12,838 fern species, 211, and of 30,000 species of mushrooms, just one.²⁰ This partial knowledge does not of course afford grounds for optimism: since a substantial proportion of evaluated species counts as endangered, the overall panorama might well turn out to look even worse if additional species were assessed. Yet the numbers do indicate that our perception of species loss rests on very incomplete data.

Temporal horizons also play a role in this understanding of the current state of nature. Whenever biologists and journalists refer to the current biodiversity loss as the sixth mass extinction in the history of organic life on Earth, their intention is to characterize it as an irreparable catastrophe. But after each of the previous mass extinctions, biodiversity did eventually revert back to or even exceed pre-cataclysmic numbers of species, though the species involved changed. Without such upheavals—the demise of the dinosaurs, for example—*Homo sapiens* would not have been able to evolve to its current state. Admittedly, this process took many millions of years each time—a time horizon that is irrelevant to the concerns of humankind today—so it makes good sense to background this fact in current discussions of species loss. But many of the popular scientific essays and books on the subject attempt to dissuade their readers from a narrowly anthropocentric perspective, which would seem to allow room for other yardsticks by which to measure biodiversity and its future than current humans' horizon of expectation.

My argument so far has focused on biodiversity as humans encounter it in the natural world. Yet humans alter nature not only by putting other species at risk and causing their extinction, but also by creating new forms of biodiversity. While a detailed discussion of this topic lies outside the scope of this essay, it is worth noting that

20. Craig Hilton-Taylor, Caroline M. Pollock, Janice S. Chanson, et al., "State of the World's Species," in *Wildlife in a Changing World: An Analysis of the 2008 IUCN Red List of Threatened Species*, ed. Jean-Christophe Vié, Craig Hilton-Taylor, and Simon N. Stuart (Gland, Switzerland: IUCN, 2008), p. 17 (table 1).

humans have wittingly or unwittingly created an abundance of new variants, subspecies, and sometimes species. Practices of domestication, agriculture, and horticulture have generated innumerable new kinds of plants, as the thousands of currently existing apple, orchid, and rice varieties demonstrate. The use of gene technologies may accelerate and multiply such diversity in the future. But humans also alter species indirectly and unintentionally; for example, our harvesting of certain fish provides an evolutionary advantage for other fish with more undesirable characteristics, and our struggles against weeds by means of herbicides, and against bacteria by means of antibiotics, lead to the emergence of resistant varieties, while the original ones sometimes disappear. It is true of course that human-generated biodiversity is not exempt from decline: scientists, historians, farmers, and consumers have recently become increasingly concerned about the loss of historical varieties due to industrial-style agricultural production, with its attendant standardization. The creation of 1,400 seed-banks worldwide is testimony to the concern for preserving human-created biodiversity. Yet the possibility of such seed-banks itself foregrounds that human interventions in nature can by no means be characterized as invariably destructive of biodiversity.²¹

Accounts of species extinction in popular science and the media, therefore, frequently depend on complex concepts and underlying decisions on issues like definitions of biodiversity, scales of perception and taxonomy, or humans' biologically creative role that are analyzed and discussed in the scientific literature, but are often reduced to their simplest formulae in the public discussion. Many aspects of the narrative of biodiversity loss are not as firmly anchored in science as they appear. To say this does not by any means imply the constructivist argument that somehow the problem of biodiversity loss is just a product of biased environmental rhetoric; on the contrary, the current extinction of numerous plant and animal species is real, and it is equally incontestable that humans bear the responsibility for the majority of these extinctions. But these facts do not in and of themselves add up to the narrative of the decline of nature in the modern world such as it is often told in connection with biodiversity. The declensionist narrative is underdetermined by the facts—it is one possible but not the only way of translating them into story. The reason that this narrative template recurs so

21. For detailed explorations of these issues, see Stephen R. Palumbi, *The Evolution Explosion: How Humans Cause Rapid Evolutionary Change* (New York: W. W. Norton, 2001); and Michael Pollan, *The Botany of Desire: A Plant's-Eye View of the World* (New York: Random House, 2001).

frequently is that it not only has the force of at least two hundred years of environmentalist storytelling behind it, but also that species loss becomes a part of stories about the development of culture—the stories, that is, that particular cultures tell about their own development, particularly their modernization.

Species Extinction and the Critique of Modernity

Concerns about the current biodiversity crisis are usually articulated by means of a combination of scientific insights with story templates deeply rooted in Western cultures—most prominently, with the narrative of the decline of nature as a consequence of modernization. Many portrayals of species loss in magazine and newspaper articles, in popular scientific books, documentary films, photographs, paintings, novels, and poems, however, reflect on modernity in more specific ways. With mass extinction as a narrative backdrop, they focus on the fate of a particular species in such a way that its endangerment or extinction comes to form part of the cultural history of modernity. The endangerment of culturally significant species turns into a vehicle for the expression of unease with modernization processes or for an explicit critique of modernity and the changes it has brought about in humans' relation to nature.

The selection of species that come to symbolize the biodiversity crisis in public discussions usually follows well-established patterns. The species or group of species under threat is almost always an animal, while plants, which are equally affected by extinction, receive almost no attention. Among the animals, large mammals such as gorillas, tigers, pandas, whales, or white rhinos, and birds, particularly beautiful ones such as eagles, parrots, or woodpeckers, are the preferred objects of coverage, while reptilians, amphibians, and fish are mentioned far less frequently. Among invertebrates, only photogenic butterflies occasionally come into view; taxa such as worms, crabs, fungi, or bacteria usually remain invisible. Conservationists sometimes refer to the species favored by the media half-humorously and half-disdainfully as “charismatic megafauna,” or, more neutrally, “flagship species”—animal types whose immediate appeal to the broad public makes them good tools in campaigns to raise public awareness and funds for conservation issues. Many conservationists view these species with ambivalence. On the one hand, the focus on a single species that is selected for its obvious anthropomorphic qualities or its aesthetic appeal blocks from view other species lacking those qualities that may be more endangered or more crucial for ecosystemic functioning; indeed, it may hinder a real understanding of the more fundamental question of how ecosystems

work and what threatens their functioning. But on the other hand, public support for conservation efforts could often not be mobilized without flagship species.

Stories of flagship species often function synecdochically by pointing to broader crises in humans' interactions with nature. The first species extinction, historically speaking, that came to be seen in connection with human agency in general, and with modernization in particular, was that of the dodo, a large, flightless pigeon that inhabited the island of Mauritius and died out in the seventeenth century. Dutch sailors, who discovered this bird on Mauritius and smaller, neighboring islands, described it as unattractive in appearance and taste; nevertheless, hunting, the introduction of nonnative species, and peculiarities of the dodo's anatomy and behavior led to its extinction only a few decades after its discovery, with the last dodo sighting reported in 1662. The dodo looms large in many books on extinction because it was the first species whose end had to be clearly attributed to human intervention: it signals a historical turning point where the deadly consequences of the exploration and colonization of the natural world became visible.²² The dodo formed part of the astonishingly rich flora and fauna that colonization brought to the awareness of Europeans during the sixteenth and seventeenth centuries, a natural abundance that itself became one of the lures of the imperialist enterprise. Species extinction soon came to form part of this panorama, and European travelers and explorers sometimes expressed regret at the destruction of nature brought about by their own arrival. A case of "imperialist nostalgia" in Renato Rosaldo's sense—in this case, not a nostalgia for the cultures destroyed by colonization, but for the natural world.²³ The dodo's extinction, therefore, has turned into a recurrent symbol of the destruction of nature wrought by the imperialist expansion of European modernity—a destruction that, it should be added, also generated the first initiatives for conservation.

The story of the dodo lies at the heart of one of the best-known popular scientific books on species extinction, Quammen's *The Song of the Dodo* (1996). Quammen's account alternates between lists of extinct species and detailed analyses of individual cases. His case study of the dodo aims above all at showing that the demise of the last individual of a species, which can be due to quite contingent circumstances, is less ecologically significant than the factors that lead a species to become so rare that such circumstances can put it at

22. See Quammen, *Song of the Dodo* (above, n. 5), p. 277.

23. Renato Rosaldo, *Culture and Truth* (Boston: Beacon Press, 1993), chap. 3.

risk. In a telling non sequitur, however, he then proceeds to narrate precisely the death of the fictional last dodo:

Imagine a single survivor, a lonely fugitive at large on mainland Mauritius at the end of the seventeenth century. Imagine this fugitive as a female. She would have been bulky and flightless and befuddled—but resourceful enough to have escaped and endured when the other birds didn't. Or else she was lucky.

. . . Imagine that her last hatchling had been snarfed by a feral pig. That her last fertile egg had been eaten by a monkey. That her mate was dead, clubbed by a hungry Dutch sailor, and that she had no hope of finding another. During the past half-dozen years, longer than a bird could remember, she had not even set eyes on a member of her own species.

Raphus cucullatus had become rare unto death. But this one flesh-and-blood individual still lived. Imagine that she was thirty years old, or thirty-five, an ancient age for most sorts of bird but not impossible for a member of such a large-bodied species. She no longer ran, she waddled. Lately she was going blind. Her digestive system was balky. In the dark of an early morning in 1667, say, during a rainstorm, she took cover beneath a cold stone ledge at the base of one of the Black River cliffs. She drew her head down against her body, fluffed her feathers for warmth, squinted in patient misery. She waited. She didn't know it, nor did anyone else, but she was the only dodo on Earth. When the storm passed, she never opened her eyes. This is extinction.²⁴

Quammen here translates the demise of a species into narrative by focusing on a single specimen he envisions as female, which allows him to portray her in the well-worn elegiac clichés of the be-reaved mother and wife. At the same time, he conveys a sense of affection and bemusement for this imaginary last dodo through pathetic fallacy, by juxtaposing the grim weather and the bird's physical suffering with the situation of the species as an abstract entity. Ecocritic Greg Garrard has commented on Quammen's procedure by pointing out that his "elegy . . . shuttles uneasily between imaginative lament and ecological explanations with lists of species lost, exemplifying the problem of representing absence at such a scale."²⁵ Quammen's last dodo is both real and highly symbolic: real in that the extinction of its species and its anthropogenic causes cannot be wished away; symbolic in that she is entirely made up as an icon of regret for those dimensions of nature that are destroyed by modernization.

This function of the extinction story as a means of narrativizing unease over the consequences of modernization is even more obvi-

24. Quammen, *Song of the Dodo* (above, n. 5), p. 275.

25. Greg Garrard, *Ecocriticism* (London: Routledge, 2004), p. 156.

ous in the context of species that have died out much more recently. In the nineteenth century, for example, two endemic wolf species inhabited Japan: the Hokkaido wolf (*Canis lupus hattai*) on Japan's northernmost island, which died out in the late nineteenth century; and *Canis lupus hodophilax* (in Japanese, 狼 or オオカミ [ohkami]), which inhabited the central islands of Honshu, Shikoku, and Kyushu. The Honshu wolf was smaller than the Hokkaido wolf and wolves on other continents. The last individual died in 1905, and since only five museum specimens and eight pelts exist worldwide, it is not easy for the Japanese public to preserve an exact memory of this species. Yet in the decades after its disappearance, people again and again claimed to have sighted one of the wolves in what one might want to call the "ghost species" phenomenon—sightings that could never be scientifically confirmed.

Aside from a general unwillingness to accept the demise of a culturally significant species, two factors seem to contribute to these ghost sightings. Historian Brett Walker has pointed out that the species was referred to by two different terms before the introduction of Linnaean taxonomy to Japan: the already-mentioned オオカミ [ohkami], as well as やまいぬ [yama inu], wild dog or mountain dog. It is not clear whether these terms designated two different species that were amalgamated during the introduction of Linnaean taxonomy, or simply were two different ways of referring to the same species. Japanese biologists have suggested the possibility that some Honshu wolves may have mated with domestic dogs, which would not only make the retrospective differentiation of species more difficult, but would also result in similarities between Honshu wolves and twentieth-century domestic dogs that would account for the alleged sightings.²⁶

A different explanation emerges from the work of the anthropologist John Knight. The wolf is an important species in Japanese folklore and mythology, where it is sometimes associated with mountain-based Shinto shrines as a local manifestation of the transcendental or the divine. During Knight's research, Japanese informants frequently indicated that they believed the wolf had died out during the 1940s and '50s. The reason for this historical misprision is, according to Knight, rather obvious: contemporary unease about the modernization of Japanese society tends to crystallize around the transformations triggered in the aftermath of World War II by Western (mainly American) power; memories of the sustained wave of modernization that transformed Japan at the turn of the twen-

26. Walker, *Lost Wolves of Japan* (above, n. 5), chap. 1.

tieth century is a good deal paler in cultural memory. The Honshu wolf is, therefore, a clear example of how the extinction of a charismatic species is integrated into cultural history and becomes a symbol of cultural crisis, to the point where the biological and historical facts themselves are reinterpreted.²⁷

The case of the North American ivory-billed woodpecker (*Campephilus principalis*) follows a similar pattern as that of the Honshu wolf. This large woodpecker species used to inhabit swampy old-growth cypress forests in the southern United States. Never a very abundant species, it fell prey to wide-spread deforestation in the South during the first few decades of the twentieth century. Some photographs and a tape recording of its calls survive from the 1930s, and the ornithologist James Tanner published his classic book on this bird in 1942; the last confirmed sighting occurred in 1944.²⁸ Over the following decades numerous “ghost sightings” without definitive evidence were reported, as in the case of the Honshu wolf. In 1999, a graduate student claimed persuasively to have spotted a pair in the Louisiana swamps, but the ensuing intensive search yielded no results. Finally, in the spring of 2005, a team of seventeen scientists and experts at the Cornell Laboratory of Ornithology published an article in the journal *Science* to the effect that an ivory-bill had indeed been located in a remote part of Arkansas in early 2004, and had been seen and identified on seven occasions by experienced ornithologists and birdwatchers. A blurry four-second video showing the bird in flight and briefly perching on a tree stump was discussed and analyzed in minute detail.²⁹

This rediscovery caused a sensation in the birding world. The ivory-bill had long been something like the holy grail of birding, with some birdwatchers refusing to believe in its disappearance and obstinately searching for it. Many of the searchers claimed to be attracted by the ivory-bill’s striking appearance—its unusual size, its starkly contrasting black-and-white plumage complemented by a red crest in males, its light-colored bill and yellow eyes. Yet a different, slightly smaller woodpecker species that otherwise closely resembles the ivory-bill, the pileated woodpecker (*Dryocopus pileatus*),

27. John Knight, “On the Extinction of the Japanese Wolf,” *Asian Folklore Studies* 56 (1997): 129–159. Walker’s *Lost Wolves of Japan* also extensively explores the cultural meanings of the Honshu wolf.

28. James T. Tanner, *The Ivory-Billed Woodpecker* (1942; reprint, Mineola, NY: Dover, 2003).

29. John W. Fitzpatrick, Martjan Lammertink, M. David Luneau Jr., et al., “Ivory-billed Woodpecker (*Campephilus principalis*) Persists in Continental North America,” *Science* 308 (3 June 2005): 1460–1462.

is wide-spread in the United States, and while the two species are easy to distinguish for experienced birdwatchers, less expert observers can easily confuse them. Undoubtedly, many of the alleged sightings of ivory-bills in the late twentieth century were really glimpses of pileated woodpeckers. This possibility cannot even be excluded in the case of the Arkansas ivory-bill. Extensive searches after 2004 yielded no further sightings of the bird, and in 2006 the well-known ornithologist David Sibley and three other experts published a refutation of the original video interpretation in *Science*, arguing that it in fact showed a pileated woodpecker.³⁰ The alleged rediscovery has, therefore, become deeply controversial.

Yet the cultural resonance of the ivory-bill's fate remains nothing short of astonishing. Innumerable newspaper and magazine articles, six books, a documentary film, and a classical music composition demonstrate a public interest in this species that can hardly be reduced to a general investment in biodiversity.³¹ Lee Hyla's composition *Wilson's Ivory-Bill*, completed in 2000—well before the ivory-bill's alleged rediscovery—evokes in particularly striking manner the elegiac mood of loss, mourning, and longing for reconnection with a vanished natural world that this particular bird species triggers.³² The lyrics of this twelve-minute piece consist of an excerpt from the nineteenth-century naturalist Alexander Wilson's multivolume work *American Ornithology* (1808–14) that describes how Wilson captured an ivory-bill and took him to a hotel room from which the bird desperately tried to escape. Since the wild creature accepted no food from human hands, Wilson finally witnessed his death, with much regret for his untamed spirit. This text is sung by a baritone, accompanied by a piano and tape recordings of ivory-bill calls and

30. David A. Sibley, Louis R. Bevier, Michael A. Patten, and Chris S. Elphick, "Comment on 'Ivory-billed Woodpecker (*Campephilus principalis*) Persists in Continental North America,'" *Science* 311 (17 March 2006): 1555.

31. The books are Phillip Hoose's *The Race to Save the Lord God Bird* (New York: Farrar, Straus and Giroux, 2004); Gallagher's *Grail Bird* (above, n. 5); Jerome A. Jackson's *In Search of the Ivory-Billed Woodpecker* (New York: Harper, 2006); Geoffrey E. Hill's *Ivorybill Hunters: The Search for Proof in a Flooded Wilderness* (New York: Oxford University Press, 2007); Noel F. R. Snyder, David E. Brown, and Kevin B. Clark's *The Travails of Two Woodpeckers: Ivory-Bills and Imperials* (Albuquerque: University of New Mexico Press, 2009), and Michael K. Steinberg's *Stalking the Ghostbird: The Elusive Ivory-Billed Woodpecker in Louisiana* (Baton Rouge: Louisiana State University Press, 2008). Also in 2009, Scott Crocker completed his documentary film *Ghost Bird*, which is sharply critical of what he considers the ivory-bill hype. He interprets it as a symptom of a society that had already lost its grip on the distinction between fact and fiction during the Bush administration's war in Iraq.

32. Lee Hyla, *Wilson's Ivory-Bill* (CD, 2006).

knocks from the 1930s. The human and bird voices struggle with each other and drown each other out throughout the composition, whereas the fragmented contemporary piano score alternates with the bird's voice, seeks to imitate it, and joins it in genuine duets during the climactic moments. Hyla skillfully juxtaposes different historical moments—the beginning of the nineteenth century as a moment of biological abundance, the 1930s as the moment of extinction, and the contemporary era with its memories of the past—and combines the varied media of book, tape, and musical instrument so as to transcend the rupture between human and environment, to reestablish the connection with the past, and, at least acoustically, to reach beyond extinction. In *Wilson's Ivory-Bill*, the human and the ivory-bill voices can be heard together in a way that has become impossible in the real world. If Quammen laments the lack of any record of the dodo's song in his account, Hyla uses musical technologies symbolically to reverse extinction.³³

Books about the ivory-bill similarly foreground feelings of loss and mourning, even on the part of individuals who have never themselves laid eyes on the bird. Occasionally, they even express regret not only at losing this particular woodpecker species, but also, with the passing of time, the bird's last eye-witnesses. In an interview with author Tim Gallagher, for example, James Van Remsen, curator of birds at Louisiana State University's Museum of Natural Science, observes that "the number of people who have actually seen an ivory-billed woodpecker is down to two or three. . . . We are about to lose that contact. Pretty sad."³⁴ This comment rather strikingly echoes parallel concerns about the loss of connection to the twentieth-century past that were voiced during the 1990s in the context of World War II and the Holocaust. The analogy highlights that the ivory-billed woodpecker also points to a traumatic past, the history of large-scale ecological exploitation and deforestation of the American South in the first decades of the twentieth century—a history that William Faulkner famously fictionalized in short stories such as "Delta Autumn" and "The Bear" (1942).³⁵ More broadly understood, the historical memory of the large southern forests and their wildlife evokes the loss of a wilder and more beautiful America associated with the nineteenth century. In this respect, the loss of

33. Quammen, *Song of the Dodo* (above, n. 5), p. 262.

34. Gallagher, *Grail Bird* (above, n. 5), p. 126.

35. Both stories form part of Faulkner's novel *Go Down, Moses* (1942; reprint, New York: Vintage, 1991).

southern cypress forests and the ivory-bill signal the end of the nationalist myth of the United States as "nature's nation."³⁶

Questions of history and national and ethnic identity are also at stake in many other controversies over endangered or extinct species and their cultural representations. In Australia, current struggles over conservation issues often evoke the historical precedent of the Tasmanian Tiger or thylacine (*Thylacinus cynocephalus*), a dog-like marsupial with a striped body that died out around the middle of the twentieth century. Just when the species went extinct in the wild is unknown, and this uncertainty, as in the cases of the Honshu and the ivory-bill, has given rise to innumerable claims of thylacine sightings, without supporting evidence. The last captive specimen died in the Tasmanian Beaumaris Zoo in 1936, and without any further confirmed sightings in the wild, the species was officially declared extinct in 1986. Yet the thylacine's historical trajectory crucially differs from the Honshu's and the ivory-billed woodpecker's, in that this species did not go extinct as an unintended consequence of human activities; rather, the thylacine was deliberately hunted to extinction beginning in the late nineteenth century, since it was perceived—probably wrongly—as a threat to Tasmania's sheep agriculture. The infamous 1886 decree by which the Tasmanian state parliament awarded a £1 bounty for each dead thylacine resonates as a cautionary precedent in contemporary debates over conservation—a history of colonization and modernization whose repetition many Tasmanian and Australian environmentalists seek to forestall.³⁷ In this context also, the extinction of a species has become a fulcrum for debates over development and modernization.

In an international context, similar questions have arisen in environmentalist struggles over whaling. These confrontations have become particularly embittered politically when they touch on whaling practices that form an integral part of indigenous cultures and thereby raise fundamental questions about the rights of indigenous peoples in modern conservation efforts. The best-known case is undoubtedly the decades-long struggle over traditions of whale hunting in Scandinavia, Japan, and among the indigenous peoples of

36. For the paradigmatic analysis of this myth, see Perry Miller's *Nature's Nation* (Cambridge, MA: Harvard University Press, 1967).

37. The most detailed treatments of the thylacine are Robert Paddle's *The Last Tasmanian Tiger: The History and Extinction of the Thylacine* (Cambridge: Cambridge University Press, 2000); and David Owen's *Tasmanian Tiger: The Tragic Tale of How the World Lost Its Most Mysterious Predator* (Baltimore: Johns Hopkins University Press, 2004). Numerous other books and artifacts revolve around the thylacine and its extinction, many of which Owen alludes to in his chapter on the cultural marketing of the species.

North America.³⁸ In this context, the conflict over whale hunting on the part of the Makah, who inhabit the Olympic Peninsula in Washington State, attracted particular public attention in the late 1990s. The Makah have hunted gray whales for 1,500 years, and the Neah Bay Treaty of 1855, which created the Makah Reservation, explicitly granted them the right to hunt whales and seals. In the 1920s, however, they abandoned whale hunting because of the increasing scarcity of whales. This meant that by the 1990s they could no longer point to a continuous tradition of whale hunting, which would have entitled them to an exemption from the International Whaling Commission's 1986 moratorium on whale hunting. At the end of complex negotiations involving the Makah, the National Oceanic and Atmospheric Administration (NOAA) of the United States, which de-listed gray whales from being endangered in 1994, and the International Whaling Commission (IWC), which had to adjudicate competing demands from the United States and Russia, the Makah obtained permission to resume whaling, and hunted their first gray whale in 1999. Their hunt, however, was accompanied by wide-spread protests on the part of animal rights activists and environmentalists, both at sea and on the Makah Reservation, and these were followed by litigation that soon brought this resumption of tribal traditions to a halt.

The incident exemplifies the confrontation between two different perspectives on history and modernization that arises in conflicts over endangered and extinct species. Indigenous groups are often unwilling to abandon millennia-old traditions because of an ecological crisis that in most cases was not triggered by their activities, but rather by the large-scale hunting and fishing methods of industrialized nations. Environmentalists, who usually also reject these methods, sometimes wish to return to a pre-modern past that they erroneously imagine to have been free from violence and the exploitation of nature, and they sometimes consider even moderate forms of natural exploitation unacceptable in the current state of the environment. Extinction, in this case, becomes the political fulcrum at which different critiques of modernity—the indigenous one and the environmentalist one—collide.

In all of the cases I have mentioned here, narratives of the decline of nature and tragic and elegiac modes of storytelling are mobilized in the context of extinct and endangered species as a way of reflecting on particular histories of modernization, and in many cases of

38. Glavin gives a good overview of the whale-hunting debates in chapter 6 of his *Sixth Extinction* (above, n. 5); my brief summary here of the Makah controversy follows his account.

articulating resistance to the forms this modernization has taken. Such extinction stories function as a means of representing turning points in human cultural histories, in which the loss of a particular species stands in both for a broader sense of the vanishing of nature and the weakening of human bonds to the natural world. As these stories unfold, part of human identity and culture itself seems to be lost along with the disappearance of a nonhuman species—and since this human identity can be projected more easily onto animals than onto plants, this explains in part why plants figure so rarely in extinction narratives. Cultural representations of extinction, therefore, often blend biological and cultural concerns: worries about the future of nature on one hand, and on the other, hopes that a part of one's own identity and culture might be preserved or revived if an endangered species could be allowed to survive or an extinct one be rediscovered.

Comedies of Extinction and Survival

The underlying cultural significance of extinction stories partly explains why environmentalist discourse has found it difficult to envision biodiversity loss outside the genre registers of elegy and tragedy, in terms that would enable the imagination not so much of the end of nature as its future. It may be interesting to remember, in this context, that one of the first critical works to engage questions of ecology and literary form, Joseph Meeker's *The Comedy of Survival* (1974), argued that tragedy, with its focus on the irreversible fall of a human being, has an inherently anthropocentric bias, whereas comedy, with its emphasis on regeneration, the passage from one generation to the next, and more generally on playful behavior that Meeker considers part of humans' evolutionary heritage, relies on a more ecological architecture: "Comedy is a celebration, a ritual renewal of biological welfare. . . . Literary comedy depends on the loss of equilibrium and its recovery. Wherever the normal processes of life are obstructed unnecessarily, the comic way seeks to return to normal."³⁹ The idea that a particular literary form has ecological implications independently of its content or its cultural uses seems too essentialist from the viewpoint of ecocriticism today, especially since it leaves unanswered the question why tragedy has played so much larger a role in environmentalist discourse than comedy. But taken as a suggestion that might shed light on certain cultural contexts rather than as a general principle, Meeker's claim helps to explain the persuasive force of extinction stories in which the charis-

39. Joseph Meeker, *The Comedy of Survival: Literary Ecology and a Play Ethic*, 3rd ed. (1974; reprint, Tucson: University of Arizona Press, 1997), p. 16.

matic animal, in a loose sense, comes to replace the human of high social standing who undergoes a tragic fall. It thereby also raises the question whether a comic narrative about species extinction might be possible.

Models of such an alternative mode of storytelling are not easy to come by, but at least one book on extinction manages to convey its conservationist substance in a comic rather than an elegiac mode: Douglas Adams and Mark Carwardine's *Last Chance to See* (1990), a collaboration between the author of the science-fiction comedy *The Hitchhiker's Guide to the Galaxy* and a zoologist.⁴⁰ Based on a BBC radio series the two aired in the late 1980s, it describes a series of journeys around the world to visit endangered species of various kinds. Adams, as the first-person narrator, humorously recounts the vicissitudes of air, land, and sea travel, encounters with other tourists, and confrontations with local bureaucracies. Seen through his eyes, much of the human world is unpredictable, hard to understand, even harder to control, and completely irrational. So is the natural world, which presents itself to him as persistently surprising, bizarre, dangerous, beautiful, different, and difficult to account for in rational terms. Instead of asking how a once abundant species becomes rare and then extinct, as Quammen does, Adams wonders how certain species ever managed to survive. In this vein, he muses on the habit of the megapode, a nonendangered bird species he encounters in Indonesia, and its idiosyncratic habit of incubating eggs by stashing them in a painstakingly assembled mound of rotting vegetation whose internal temperature it carefully monitors, rather than simply sitting on the eggs in the way other birds do. The sheer inefficiency of the procedure delights him because, surprisingly, it reminds him of his own pointless though ingenious uses of modern technology: "I have a well-deserved reputation for being something of a gadget freak, and am rarely happier than when spending an entire day programming my computer to perform automatically a task that it would otherwise take me a good ten seconds to do by hand. . . . [The] megapode has a very similar outlook on life," he declares happily.⁴¹ Adams here preempts any post-hoc explanations of animal behavior by way of evolutionary adaptation processes and foregrounds instead the spectacular lack of adaptation in human and nonhuman behavior alike.

40. Douglas Adams and Mark Carwardine, *Last Chance to See* (New York: Ballantine, 1990). In 2009 the BBC produced a television series under the same title, in which Carwardine revisits some of the locations and species earlier explored in the radio show and book. Adams, who died in 2001, is replaced by Stephen Fry in this series.

41. *Ibid.*, p. 38.

It is precisely this inefficient, irrational unadaptedness of the natural world that makes it attractive and worth preserving for the narrator—the sheer unlikelihood of it ever having made it to the present day in the first place. This is nowhere clearer than in his account of the kakapo, a highly endangered flightless New Zealand parrot:

The booming noise [of the males' mating call] is deep, very deep, just on the threshold of what you can actually hear and what you can feel. This means that it carries for very great distances, but that you can't tell where it's coming from. . . .

The female kakapo can't tell where the booming is coming from either, which is something of a shortcoming in a mating call. . . . Some of [the] other noises get heard in the later stages of courtship. The chinging, for instance . . . is very directional and can help any females that have been aroused by night after night of booming (it sometimes goes on for seven hours a night for up to three months) to find a mate. This doesn't always work, though. Females in breeding condition have been known to turn up at completely unoccupied bowls, wait around for a while, and then go away again.

It's not that they're not willing. When they are in breeding condition, their sex drive is extremely strong. One female kakapo is known to have walked twenty miles in one night to visit a mate, and then walked home again in the morning. Unfortunately, however, the period during which the female is prepared to behave like this is rather short. As if things aren't difficult enough already, the female can only come into breeding condition when a particular plant, the podocarp for instance, is bearing fruit. This only happens every two years. . . .

The males therefore get extremely overwrought sitting in their bowls making noises for months on end, waiting for their mates, who are waiting for a particular type of tree to fruit. . . . The net result of all these months of excavating and booming and walking and scarking and being fussy about fruit is that once every three or four years the female kakapo lays one single egg which promptly gets eaten by a stoat.⁴²

At this point Adams most explicitly articulates his approach to evolution and extinction: "So the big question is: How on earth has the kakapo managed to last *this* long?"⁴³ Like his account of the megapode, his description of the kakapo is studded with references to contemporary technology—the males' mating call resembles a subwoofer, their mating behavior the eccentric customs of the British motorbike industry—suggesting again that the idiosyncrasies of the sociocultural realm mirror and extend the contingencies of ecology and evolution.

42. *Ibid.*, pp. 117–119.

43. *Ibid.*, p. 119.

This use of analogies does not imply that Adams's account is politically uncritical or always light-hearted. His account of a visit to Zaire comments with cutting satire on the useless bureaucracies and the mindless dictatorships that colonial rule left behind. And his seemingly easy, anthropomorphic identifications with animals turn up startling differences of perception and cognition as often as humorous similarities. The description of the kakapo, especially in comparison with Quammen's account of the last dodo, highlights that the conservationist message in *Last Chance to See* ultimately relies on neither scientific reasoning, nor a sense of moral obligation, nor the elegiac investment in the last individuals of a species (though all of these do occasionally occur in the book), but rather on an essentially comic awareness of the utterly contingent events, habits and bodies it took to produce both humans and nonhumans in their present forms.

Adams's humorous perspective on species endangerment and extinction ultimately suggests a different understanding of the relationship between modernization and nature than most accounts that rely on elegiac or tragic templates. Rather than a well-functioning natural realm disrupted by the advent of modern society, *Last Chance to See* implies a view of nature and culture as parallel and intersecting histories of experiments that continually succeed and fail. Extinction is the signal of a failure that should be prevented whenever possible; yet the failure of one experiment also becomes the point of a departure for new ones. The urgency of biological conservation remains, in other words, but it is grounded in a different narrative about the evolution of life forms and humans, especially modern humans, place in it. Adams and Carwardine's account highlights that in the last instance, the imperative to conserve biodiversity does not derive from science, but from a human commitment to value biological otherness. In this way *Last Chance to See* points to an understanding of extinction not only as narrative endpoint, but as the possibility of new beginnings—not the end of nature so much as its continually changing futures.