Chapter 2
A Political History of Extinction

Abstract In the 1870s, an estimated 60 million bison (also known as buffalo in the United States) roamed the Western plains of North America, though by the early twentieth century only 541 documented animals remained. In 1905, President Theodore Roosevelt, himself an avid hunter, called the extirpation of the buffalo a tragedy for the natural world, and the era of organized environmentalism and preservation began. Today, in yet another significant turn in environmental science and politics, bison are subject to the high-tech interventions of the biotechnological age. The story of the bison illustrates every important stage in the development of American environmental politics: deliberate efforts to weed out the abundant species in the 1800s, followed by its allegorization in the mid-twentieth century and then efforts to restore the original herds through high-tech reproduction today. This chapter begins with that story as a precursor to analyzing the cultural path of the idea of extinction as it moved from the rarefied worlds of philosophy and science to the chaotic and messy domain of politics. It begins with a brief discussion of extinction debates in the Enlightenment era then analyzes the development of nature conservation from the Progressive Era to today. The chapter concludes with an introduction to the new politics of hope that is embedded in the idea of de-extinction through the use of advanced biotechnologies.

> *Species and groups of species gradually disappear one after another, first from one spot, then from another, and finally from the world.*
>
> – Charles Darwin (1859)

2.1 From Eden to Extinction. . . and Back Again?

It must have been magnificent, the American wilderness prior to the arrival of human beings. Charles Darwin had observed in the 1840s that "it is impossible to reflect on the changed state of the American continent without the deepest astonishment. Formerly it must have swarmed with great monsters; now we find mere pigmies, compared with the antecedent, allied races" (Glasgow Herald 1845). Indeed, the North American continent during the Pleistocene teemed with majestic megafauna, including the giant sloth, American lion, giant condor, Columbian mammoth and dire wolf. The Clovis people, the ancestors of most Native Americans, arrived on

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the continent during the Pleistocene, approximately 12,600 years ago (Raff and Bolnick 2014). Today, scientific debate continues over whether these first arrivals were primarily responsible for killing off the megafauna or if the blame should be placed on climactic change, disease outbreaks, or impact from an asteroid (or some combination of the four factors). In 1492, Christopher Columbus was the first European to discover America. For the early European settlers who followed, the continent seemed to stretch out forever and to contain an inexhaustible supply of food, resources and formidable natural vistas. As Leo Marx (2012) argues, from "Jamestown in 1607 to the closing of the Western frontier in 1890, the encounter of white settlers with what they perceived as wilderness—unaltered nature—was *the* defining American experience" (p. 8).

The sheer number of animals alive on the continent in Darwin's day is itself astonishing to us now. In his time, the skies and glades of the United States would have been lush with passenger pigeons and Carolina parakeets and the forests with megafauna such as the California Golden Bear, Merriam's Elk, and the Banks Island Wolf (all extinct by the 1920s). Well into the nineteenth century, over 60 million bison roamed the Western plains, making them the single biggest herd of land animals in the world. John Filson had written in 1784 of " 'the amazing herds which. . . fill the traveller with amazement and terror' " (Portman 2011).

Native American tribes traded bison skins for knives, firearms and tobacco. By 1850, however, killing bison (Fig. 2.1) became a key tool by which white settlers sought to conquer the Native American populations and to starve the plains Indians into surrender by eliminating his principle source of food (Congressional Quarterly 1967). Construction of the Union Pacific Railroad in the 1860s accelerated the virtual extirpation of the bison. Between 1870−1875, at least 2.5 million bison were killed per year, in order to clear spaces for the railroads, domesticated cattle herds and new settlements. By 1883, approximately 10,000 bison remained, these numbers eventually reduced to a remnant herd of 541 though the ongoing predation of both Cree Indians and white hunters in North Dakota.

The bison story exemplifies the contrast between the Edenic landscape of the pre-European American continent and the effects of the rapid industrialization that accelerated in the mid nineteenth century. As Joshua Johns (1996) argues, "two primary views of the wilderness were contested: the wilderness either contained savagery and temptation which threatened the authority of the community or it represented a new Garden which could flourish with the proper cultivation by the European settlers." A century before the highly visible environmental movements of the mid-twentieth century emerged, the tension between preservation and progress had already become a defining trait of the American worldview. In 1905, for example, President Theodore Roosevelt and conservationist William Hornaday responded to the seemingly imminent extinction of the bison by creating the American Bison Society to push for restoration of the species. Only thirty years earlier, a newspaper article, reflecting the influence of Social Darwinism on the culture at that time, had predicted that, "railways and hunters are crossing and recrossing every trail of these animals, and they're being crowded out with the same certainty as are the redskins. Neither buffalos or Indians are creatures of civilization; and the struggle against them seems

Fig. 2.1 Bison grazing, circa 1900. Library of Congress, LC-USZ62-20138, http://catalog2.loc.gov/

to be irrepressible" (Daily Evening Bulletin 1873). Yet by the turn of the twentieth century, the American President, himself an avid hunter, had concluded that "the extermination of the buffalo has been a veritable tragedy of the animal world" (National Park Service n.d.) and the era of organized environmentalism had begun.

Today, in another significant turn in environmental science and politics, bison are subject to the high-tech interventions of the biotechnological age. In 2012, for example, a purebred baby bison born at the Bronx Zoo was the much-anticipated consequence of transferring the genetic material of a Yellowstone bison (one of two remaining herds in Yellowstone National Park which can be traced to the original American bison) to a surrogate commercial bison (Moscowitz 2012). Tod Hansen, director of the Animal Reproduction and Biotechnology Laboratory at Colorado State University, stated that " 'this is a great achievement to add to our list of accomplishments....We can use these genetics so they can go into other herds. The project will serve as a model for mitigating diseases... in genetically valuable bison' " (Phys.org 2012). Such purebred bison will likely be transferred to the American Prairie Reserve, a restoration project that seeks to cultivate and preserve an authentic prairie landscape on a 3 million acre site in Montana.

The story of the bison illustrates every important stage in the development of American environmental politics: deliberate efforts to weed out the abundant species in the 1800s, followed by its allegorization in the mid-twentieth century and now efforts to restore the original herds through high-tech reproduction today. This chapter begins with that story as a prelude to analyzing the idea of extinction as it travelled

from the rarefied worlds of philosophy and science to the chaotic and messy domain of politics. The next section continues with a discussion of the debate about extinction in the Enlightenment era then proceeds in the third section to review major political events in the development of nature conservation and environmentalism in the twentieth century. The fourth section focuses on the discourse of environmental catastrophe that begins to take hold by the 1980s, exemplified by the urgency surrounding pleas for global intervention to mitigate climate change and halt the biodiversity crisis. The chapter concludes with an introduction to the new politics of environmental hope embedded in the idea of de-extinction.

2.2 Fossils and Frontiers: Debating Extinction During the Enlightenment

The founding of the United States intersected with the height of the Scottish Enlightenment. For example, it is apt that the Declaration of Independence and Adam Smith's *The Wealth of Nations* were both released to the world in 1776. The early founders of the United States were generally men of science and reason and many of them engaged directly with the learned debates swirling in their day around questions of extinction, evolution, and geological time. Thomas Jefferson (1743–1826), in particular, was fascinated with collecting the bones of the American mastodon (Fig. 2.2) and believed that the Lewis and Clarke expedition (1804–1806) would uncover evidence of living mastodons in the western United States (Thomson 2011). Jefferson seriously doubted that extinction occurred, arguing in 1787 that "such is the economy of nature that no instance can be produced of her having permitted any one race of her animals to become extinct; of her having formed any link in her great work, so weak as to be broken" (Monticello.org n.d.). Jefferson turned out to be wrong, of course, but in his era the idea of extinction remained extraordinarily controversial within science and philosophy. Western science had been heavily influenced by Aristotle's classical notion of the Scala Naturae, along which the natural world and its species could be arranged on a single continuum, progressing from the lowest orders to the highest. By the medieval period, the Scala Naturae had morphed into the influential idea of the Great Chain of Being. This belief held that everything in the universe was placed in a divinely sanctioned hierarchical order, determined by its relative mixture of spirit and matter. Things that were mostly matter, such as rocks and minerals, occupied the lowest rungs of the ladder and were succeeded by plants, animals, humans and angels. At the very top of the ladder was God (Melani 2009). The strong philosophical and religious commitment to the idea of the Great Chain of Being made extinction unimaginable for most people at this time, even those committed to science (Barrow 2011, p. 429).

It was only in 1796 that Georges Cuvier (1769–1832) firmly established the fact of the extinction of species (Ladle and Jepson 2010, p. 98). Cuvier had already been profoundly influential in developing the fields of comparative anatomy and palaeontology and among his most famous fossil findings were those of the American

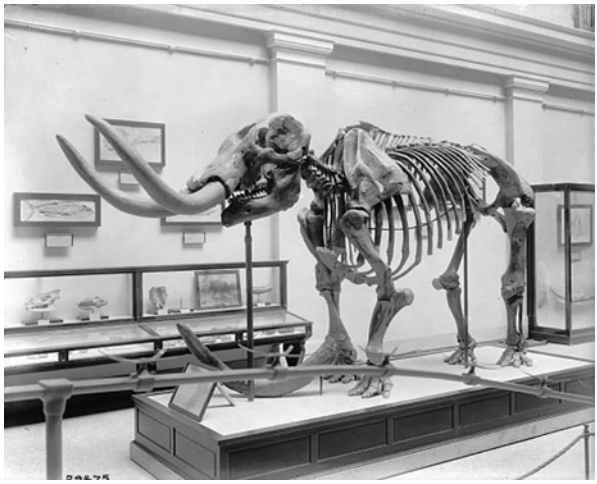

Fig. 2.2 American Mastadon, Palaeontology Hall, Natural History Museum, circa 1917. Library of Congress, 29475 or NHB-29475, http://catalog2.loc.gov/

mastodon (*Mammut americanum)* and the Megatherium (a giant prehistoric sloth whose remains were excavated in Paraguay). He also expanded Linnaean taxonomy by grouping classes into the higher classification of phyla and was among the first to conjecture that reptiles, rather than mammals, had dominated the Earth in the prehistoric era. In 1796, reading a research paper at the Ecole Centrale du Pantheon, Cuvier presented work on fossils that established that African and Indian elephants were different species and also that the mammoth (*Mammuthus primogenus)* must be extinct.

Yet not even Cuvier could see in his time what Charles Darwin would see in his, only 50 years later. Cuvier explicitly rejected the idea of evolution, proposing instead, in his 1813 Essay on the Theory of the Earth, a catastrophist thesis which theorized that new species were created periodically after great floods. By Cuvier's reasoning, species were created de novo after each major catastrophic event; they did not progressively evolve over time. Cuvier's work is nonetheless instrumental to this story since, "by the 1830s, when Charles Darwin entered the scene, the factuality of extinction was not in question. What remained open was the correlation of the extinction of species with geological change" (Herbert 2005, p. 58). That species adapt, compete and disappear over spans of geological time is one of the most crucial and profoundly influential insights of Charles Darwin's *On the Origin of Species* (1859). Despite ongoing debates within contemporary science about the exact mechanics of the process, the theory of adaptation by natural selection now constitutes central dogma in biology and molecular genetics (Cartwright 2000). The philosopher Daniel Dennett has likened Darwin's idea, which is so absolutely essential to contemporary Western society and science, to a "universal acid; it eats through just about every traditional concept and leaves in its wake a revolutionized world-view" (Dennett 1996, p. 63).

Following Darwin, Walter Rothschild developed the first systematic account of extinction, elaborated in his lecture "On Extinct and Vanishing Birds," delivered

at the 4th Ornithological Congress in 1905 (Ladle and Jepson 2010). Five years earlier, Hugo de Vries, Carl Correns and Erich von Taschermak had established the foundation for the field of molecular biology via their rediscovery of Gregor Mendel's great work on inheritance patterns in plants. The subsequent synthesis of Mendel's findings with Darwin's theory of natural selection, bolstered by further breakthroughs such as T.H. Morgan's theory of the chromosome and the work of R. Fisher, J.B.S. Haldane and S. Wright on population genetics, inaugurated the modern age of genetics. By the Progressive era, despite the dangerous detour of the eugenics period (Bashford and Levine 2010), the scientific foundations of extinction were firm enough that the issue could be recast as a political problem, subject not only to inexorable natural laws but to the interventions and choices made by societies.

2.3 The Politics of Extinction in the Progressive Era

In the late nineteenth century, the question of extinction begins to shift from the elite realms of philosophical and scientific debate to the chaotic domain of politics. In 1872, the United States created the world's first national park, Yellowstone Park, covering parts of the states of Wyoming, Montana and Idaho. By 1890, Sequoia National Park and Yosemite National Park had both been established in California. The Lacey Act (1900) was the first to protect wildlife and regulate its killing and sale and was followed quickly by the formation of the National Association of Audubon Societies for the Protection of Birds and Animals in 1901. This rapid proliferation of environmental legislation, civic associations and national parks reflected the particular intellectual influence of John Muir and Gifford Pinchot. Both men were highly respected scientists. While each cherished the American wilderness, Muir and Pinchot, respectively, came to symbolize the tension between unaltered nature and sustainable use in ways that persist today. John Muir placed intrinsic value on nature, arguing that "everybody needs beauty as well as bread, places to play in and pray in where nature may heal and cheer and give strength to body and soul alike" (Muir 1912). He was no dreamy idealist, however. In that same article, written in response to the controversial proposal to dam the Hetch Hetchey Valley, Muir excoriated "these temple destroyers, devotees of ravaging commercialism, [who] seem to have a perfect contempt for Nature, and, instead of lifting their eyes to the God of the mountains, lift them to the Almighty Dollar." Gifford Pinchot, in contrast, is often referred to as the "father of sustainable use." He believed that a balance had to be struck between economic growth and conservation, but he stressed that wise use of America's natural resources provided the key to both national security and extraordinary prosperity. For Pinchot, "the object of our forest policy is not to preserve the forests because they are beautiful... but [for] the making of prosperous homes. ... The first great fact about conservation is that it stands for development" (Pinchot 1910).

Muir and Pinchot's worldviews remain essential touchstones in American environmental politics. Despite the ongoing friction between the two worldviews, once

extinction becomes understood both as a process that adheres to discoverable natural laws *and* as a problem that can be exacerbated by human beings via unrestrained development, the way is paved for the emergence of today's existential preoccupation with both climate change and the biodiversity crisis. Robin and Carruthers (2011, p. 3) remind us that Charles Darwin "put history into biology with his daring idea that nature was not immutable, it was—in fact—history, exhibiting change over time." What is significant about the early twentieth century is the way in which human beings begin to write themselves into the history of nature, begin to recognize and respond to the ways in which modern societies damage and distort the natural laws elucidated by Charles Darwin and Alfred Russell Wallace. The corollary to Robin and Carruthers's insight is that Darwin, having put history into biology, also forces us to consider not only the past and the question of how we got here but the future and whether and how nature (and human beings) can survive.

Wilderness and the damage man was doing to it was the shadow side of the general social and political optimism of the Progressive era. By the 1920s, observers had begun not only to notice the decimation of species (particularly large mammals) but to connect the destruction to something perhaps inherent in the Western mindset. For example, when Viscount Allenby spoke before the British House of Lords in 1929 about the disappearance of African fauna, he argued that "civilised man goes out and upsets the whole balance of nature with his rifle. . . . The modern tourist-hunter in a hurry will shoot sometimes just for fun (United Kingdom House of Lords 1929, p. 633). Earlier, in the Royal African Society's learned journal, E. Buxton referred to African wildlife as an Imperial asset and raised the question of how future generations would judge those allowing the slaughter to continue (Buxton 1921, p. 279). In the *Journal of Mammalogy*, H. Carey begins with a roll call of already extinct and endangered American species such as the pronghorn antelope, prairie hen, heath hen and passenger pigeon, before shifting to an impassioned plea for nations to recognize a collective international interest in saving African wildlife. Drawing upon the then-salient influence of both the League of Nations and the Russian Revolution of 1917, Carey ends with a call for a wildlife preservation campaign that is "militant, unified [and] international" (Carey 1926, p. 78).

The statements above reflect the culture of their time in ways that may sound jarring to us today. Nevertheless, they are a crucial pivot from the belief that the elimination of "exotic" species in the colonies was an inevitable consequence (and prerogative) of Empire to a nascent awareness that nature and wildlife would vanish forever without political interventions on a national and international scale. Despite the lingering cultural biases in their work, the new environmental worldview signalled by observers such as Buxton and Carey represents a radical re-framing of the extinction problem, one that bridges the nineteenth and twenty-first centuries. The same rough pattern of events and intellectual developments repeated throughout Australia, New Zealand and Western Europe in this timeframe. As a key example, to be discussed at length in chapter five, an essay on the disappearance of Australia's thylacine equated the zoological history of the nineteenth century with the word "extermination" and compared the slaughter of the natural world to Omar's destruction of the Alexandrian library in the Classical Age (Renshaw 1905, p. 216).

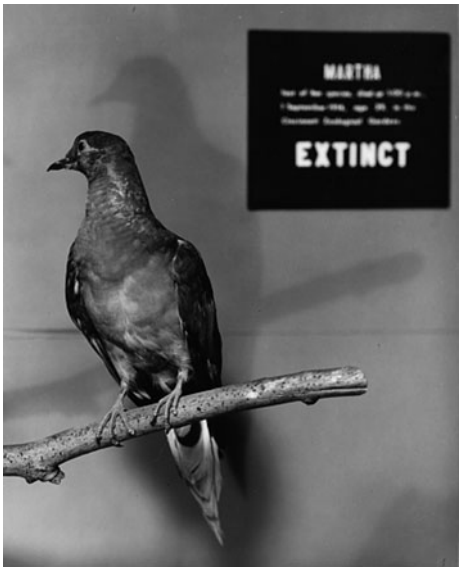

Fig. 2.3 Martha, a Passenger Pigeon. Smithsonian Institution Archives, SIA2010-0612 and MNH-917, http://www.si.edu/

In the United States, the passenger pigeon became the paradigmatic twentieth century symbol of man's new responsibility towards wildlife, both because of the immensity of its initial numbers and the rapidity with which shooting it for food and sport decimated the species. Like the bison, passenger pigeons originally flourished in such numbers as to seem inexhaustible. James Audubon estimated in 1813 that, in one season, one billion birds must have flown over the Ohio River in Louisville, Kentucky. Within a century of Audubon's observations, the multitudes had been reduced to a lone passenger pigeon named Martha, who died in 1914 at the Cincinnati Zoological Gardens before being shipped in ice to reside in perpetuity at the Smithsonian Institution in Washington, DC (Fig. 2.3). The last confirmed sighting of a passenger pigeon in the wild had occurred in 1900. While researching this book, I came across an old copy of Allan W. Eckert's *The Silent Sky: the Incredible Extinction of the Passenger Pigeon* (1965) at the Lawson-McGhee Public Library in Knoxville, TN. The book was shelved in non-fiction, as per its classification, and does include the historically documented events in the extirpation of the passenger pigeon. Yet the book is written in the style of a novel. In the fifty years between the death of Martha and the publication of this book, the story of the passenger pigeon's demise became an American allegory, rendered deftly and evocatively by Eckert. The last sentence of the book closes with a scene of irremediable sadness, as a young boy who has received a BB-gun for Christmas goes out to shoot birds in his backyard and carelessly kills the last wild passenger pigeon. Eckert speculates if "in that fractional instant before he died, the old passenger pigeon may have heard the gust of wind which swept through the tops of the trees with a sound not unlike the murmur of a million distant wings" (Eckert 1965, p. 239).

2.4 Spaceship Earth: Twentieth Century Environmentalism

In 1965, the same year that Eckert eulogized the passenger pigeon, the United States Congress held hearings on The Wilderness Act. One expert witness recalled Aldo Leopold's observation in the *Sand County Almanac* that, "for one species to mourn the death of another is a new thing under the sun. We, who have lost our pigeons, mourn the loss. Had the funeral been ours, the pigeons would hardly have mourned us. In this fact, rather than in nylons or atomic bombs, lies evidence of our superiority over the beasts" (Leopold 1949). The cataclysmic events of the Great Depression and World War II had temporarily reduced the salience of wilderness preservation in the 1930s and 1940s, though President Franklin Roosevelt's New Deal did provide important opportunities and resources to pursue large-scale restoration projects. The Tennessee Valley Authority (TVA), for example, worked with farmers to improve cultivation techniques, replant forests and improve wildlife habitat. The Civilian Conservation Corps (CCC), which began operation only 37 days after Roosevelt took office, was another very successful New Deal program. Often referred to as "tree troopers" or "soil soldiers," the approximately 3.5 million men employed by the CCC built an estimated 13,100 miles of foot trails, planted between 2 billion and 3 billion trees, restocked 972 million fish in America's streams and ponds, and developed 800 state parks. The CCC ended in June 1942, as America shifted towards war-time industrial production following the Japanese attack on Pearl Harbor and the economy reached almost full employment. The need for men to join the War effort as soldiers took precedence in this timeframe (Fletcher (2010).

The conservationist momentum of the Progressive era accelerated again after World War II. By the early 1960s, books such as Rachel Carson's *Silent Spring* (1962) presaged an increasingly public dimension to what had been largely scientific and policy-oriented discussions within relatively elite circles. The book appealed to a general audience and alerted the public to the potential dangers of DDT (dichlorodiphenyltrichloroethane), an insecticide then being promoted for use for farm crops. President John F. Kennedy responded to the furor around the book by having his Science Advisory Committee review Carson's major findings. Public and media attention to environmental issues also began to extend from the chemical industry to the nuclear power industry, species extinction, water pollution and urban blight.

One of the most iconic symbols of the nascent environmental movement was the image "Earthrise," a photograph taken of the earth over the lunar horizon by the manned Apollo 8 space mission in December 1968. A quote attributed to the British astronomer, Sir Fred Hoyle (1915–2001), asserted in 1948 that "once a photograph of the Earth, taken from the outside, is available, a new idea as powerful as any in history will be let loose" (Brand 1982, p. 430). Twenty years later, this first image of the Earth, small and beautiful, floating within an infinite universe, did seem to encourage a shift in perspective from hubris to humility. In the documentary *The Shadow of the Moon* (2007), Mike Collins, an Apollo 11 astronaut who is among the few to have actually seen Earth from a distance in orbit, reflected that "oddly enough

the overriding sensation I got looking at the earth was, my god that little thing is so fragile out there." The metaphor of Spaceship Earth, which David Deutsch (2011) criticizes today as highly inaccurate in a technical sense, reverberated emotionally and politically throughout the 1960s and 1970s by directing our attention to the Earth as both fragile and finite. Indeed, the metaphor even reached the upper echelons of the United Nations, when the then-Secretary General U Thant commemorated Earth Day 1971 with the words, "May there only be peaceful and cheerful Earth Days to come for our beautiful Spaceship Earth as it continues to spin and circle in frigid space with its warm and fragile cargo of animate life" (West 2014).

2.5 Climate, Catastrophe and Conservation Biology

The optimism engendered by the image of Earthrise in 1968 co-existed uneasily with a sense of imminent catastrophe that also begins to permeate the environmental movement by the late 1960s. In 1967, the American cultural critic and conservationist John Wood Krutch wrote, "a case could certainly be made out for the contention that modern man as a race has a death wish. Otherwise, he would not be marching so resolutely toward literal extinction" (McClung 1993, p. 252). The year 1968 represented the apex of the Cold War nuclear arms race between the United States and the Soviet Union, prompting the signing that year of the Treaty on the Non-Proliferation of Nuclear Weapons (effective 1970). The idea of the potential mutual assured destruction (M.A.D.) of the planet due to Cold War political machinations animated the international environmental movement. Moreover, mass market books such as *The Population Bomb* (Erlich and Erlich 1968), which predicted mass starvation in the 1980s due to over-exploitation of the natural environment, and *Future Shock* (Toffler 1970), which focused on the dislocation caused by rapid social and technological change, amplified the sense that both the environment and man's place in it was spinning wildly out of control.

The mainstreaming of the environmental movement by the 1970s was the most visible success of 1960s activism. For example, President Richard Nixon signed significant federal legislation such as the *Clean Air Act* (1970), the *Water Pollution Control Act* (1972) and the *Endangered Species Act* (1973). At the same time, fueled by the new rhetoric of pending catastrophe, segments of the movement begin to take on a much more militant character, as seen through the formation of groups such as Earth First in 1979. In addition, as Benjamin Bühler notes, as "the whole discussion in the 1970s takes it as a given, that the limitations of economical growth is the most important issue" (Bühler 2011). The uneasy but workable co-existence between the worldviews of Muir and Pinchot that defined the Progressive Era thus begins to fragment by the early 1980s into a starkly rendered and mass media exacerbated partisan war between environmentalists on the side of nature and corporations on the side of profit. President Ronald Reagan's New Federalism was partly a response to the sluggish economy of the late 1970s and a bloated federal bureaucracy. Nevertheless, both economic and political retrenchment from environmental preservation

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