

# BARRY COMMONER AND THE SCIENCE OF SURVIVAL

The Remaking of American Environmentalism

MICHAEL EGAN



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# Barry Commoner and the Science of Survival

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## **Urban and Industrial Environments**

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# Barry Commoner and the Science of Survival

## The Remaking of American Environmentalism

Michael Egan

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## Preface

This book seeks to take a first step in filling a hole in the current literature on the history of American environmentalism since World War II. The biologist Barry Commoner is frequently invoked in works of environmental history, but little of substance has firmly situated his larger role in that history. During the 1970s, Commoner became famous for his Four Laws of Ecology, and many will recall his presidential campaign of 1980, but rarely is the context of Commoner's place in the history of American environmentalism properly appreciated. His influence on postwar science, environmentalism, and politics runs much deeper and is far more complicated than the literature suggests. This book means to engage with Commoner's social and environmental activism. In addition to being one of the most important environmental leaders of the postwar period, Commoner was a very able biologist who did groundbreaking work on the tobacco mosaic virus, free radicals, and genetic theory. While *Barry Commoner and the Science of Survival* concentrates on Commoner's use of science as a political tool, it does less justice to his scientific career outside the public arena; that important story remains to be written.

History, though, is an exercise in collaboration. We organize our thoughts and research in tandem with the intellectual generosity of others. In this way, I am indebted to more people than I could ever hope to acknowledge here. I must begin, however, with the protagonist of this story. In my first meeting with Professor Commoner, I asked a series of general and awkward questions that he very patiently answered. At the end of that meeting, he gave me a tour of the Center for the Biology of Natural Systems, then stopped me and said: "You're Michael; I'm Barry." I took it as a sign of acceptance. He also duly informed me—without a shred of self-consciousness—that I was tackling an excellent and important topic. He

was right. I hope that the following pages do justice to his career in the public spotlight, the trust he placed in me, and the amount of time he made available for me.

*Barry Commoner and the Science of Survival* began as a doctoral dissertation at Washington State University, where I found myself deeply interested in the relationships between science, environmentalism, and social justice. In a seminar, LeRoy Ashby encouraged me to pursue these questions in a research paper that turned out to be the substance of chapter 4. My instinct is that I have broken—at some point—every one of his “rules” for writing in this book—but, I hope, not the spirit with which they were delivered. The dissertation benefited from the careful and thoughtful comments provided by Ron Doel and Paul Hirt. I especially want to acknowledge Ron’s kindness and encouragement; while tirelessly offering comment and answering questions, he never wavered in his enthusiasm for the questions I was asking. He and Paul are my friends. Paul’s supervision of my graduate work and dissertation struck an excellent balance between teacher and one who strongly believed in my intellectual freedom and that I should chart my own path. He has seen more drafts of these chapters than he or I would likely care to count, and if his good direction is reflected in the pages that follow, then this book is a much better piece of work than I ever deserved to write.

This study has also benefited from the attention and care that Bob Brulle, Ben Cohen, Jeff Crane, Amy Crumpton, Andrew Duffin, John Hausdoerfer, Maril Hazlett, Linda Lear, Neil Maher, Kevin Marsh, and Laurie Mercier offered in insightful readings of various sections and chapters. In addition, for suggestions, conversations, and directions, I am grateful to Kevin Armitage, Sue Armitage, Mary Braun, Laurie Carlson, Arthur Daemrich, Matthew Eisler, Hilary Elmendorf, Sara Ewert, Michael Fellman, Dale Goble, Hugh Gorman, Denis Hayes, Sam Hays, Katie Johnson, Steve Kale, Peter Kuznick, Christophe Lécuyer, Jack Little, Alan Loeb, Tim Luke, Gregg Mitman, Cyrus Mody, Tammy Nemeth, Sheldon Novick, Bill Robbins, Philip Scranton, Thomas Seiler, Steve Shay, Adam Sowards, Jeffrey Stine, Heather Streets, Noël Sturgeon, Paul Sutter, Jay Taylor, Patricia Thorsten, Jessica Wang, Sylvia Washington, Charlie Weiner, Laurie Whitcomb, and Tony Zaragoza. What light this work does offer is amplified by the generosity of these colleagues and friends. I, of course, remain solely responsible for its enduring shortcomings.

At Washington State University, I was the recipient of the College of Liberal Arts' Boeing Graduate Fellowship in Environmental Studies and the Department of History's Claudius O. and Mary W. Johnson Fellowship. Both the college and the department were especially energetic in encouraging my studies and research. Similarly, my new colleagues at McMaster University have been most supportive and an Arts Research Board grant helped to defer some of the costs of the photographs. I am also grateful to archivists across the country for their help in locating documents: Kenn Thomas at the Western Historical Manuscript Collection at the University of Missouri-St. Louis; Patricia E. White at the Special Collections and University Archives at Stanford University; Lucia Munch at the AAAS Archives; and especially the genial staff of the Manuscript Reading Room at the Library of Congress. I should also make special reference here to Sharon Peyser of the Center for the Biology of Natural Systems, who assisted in coordinating my interviews with Professor Commoner and helped me to get access to a number of papers in their files. At MIT Press, Clay Morgan and Bob Gottlieb have been instrumental (and patient) in shepherding this work to its completion. I am especially grateful to three anonymous readers, whose comments were intellectually invigorating.

Finally, I have enjoyed the unfailing love of family, near and extended. My parents have been a constant source of support—moral and intellectual; my grandmother, a source of inspiration; and my brother and sister, companions. My children, Joshua and Jordan, served as wonderful distractions from work as well as poignant reminders of its larger significance. This work begins and ends with Janice: friend, partner, beloved.



In our progress-minded society, anyone who presumes to explain a serious problem is expected to offer to solve it as well. But none of us—singly or sitting in committee—can possibly blueprint a specific “plan” for resolving the environmental crisis. To pretend otherwise is only to evade the real meaning of the environmental crisis: that the world is being carried to the brink of ecological disaster not by a singular fault, which some clever scheme can correct, but by the phalanx of powerful economic, political, and social forces that constitute the march of history. Anyone who proposes to cure the environmental crisis undertakes thereby to change the course of history.

But this is a competence reserved to history itself, for sweeping social change can be designed only in the workshop of rational, informed, collective social action. That we must act now is clear. The question which we face is how.

—Barry Commoner, *The Closing Circle*, 300



# Introduction

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## The New Apparatus

You have to describe the country in terms of what you passionately hope it will become, as well as in terms of what you know it to be now. You have to be loyal to a dream country rather than to the one to which you wake up every morning. Unless such loyalty exists, the ideal has no chance of becoming actual.

—Richard Rorty

On 2 February 1970 *TIME* magazine incorporated a new “Environment” section. The editorial staff chose for that issue’s cover a haunting acrylic painting by Mati Klarwein of Barry Commoner, its appointed leader of “the emerging science of survival.” Commoner was set in front of a landscape half of which appeared idyllic and the other half apocalyptic, presumably suggesting the environmental choices facing humankind. The urgency of those choices was implicit. The decision to put the biologist from Washington University in St. Louis on the cover stemmed less from Commoner’s celebrity than from his relative ubiquity. As *TIME* editors hunted for their first cover story relating to the environment, they discovered that Commoner had lectured widely on a variety of environmental topics and had gained notoriety in sounding the alarm on environmental problems ranging from nuclear fallout and air pollution to water contamination and toxic chemicals in the city, on the farm, and in the home. In choosing Commoner, *TIME* acknowledged both the extent and the complexity of that crisis as well as affirming Commoner’s role as a key voice of dissent in the larger environmental discourse.

After World War II, the American popular imagination recognized the existence of an environmental crisis in the United States. Amid a period of high Cold War tension, Americans welcomed the “Age of Ecology,” the rapid expansion of legislation relating to environmental protection, and



the proliferation of popular publications lamenting the condition of the Earth's ecosystems, all of which pointed toward a specific and growing ecological fear. *TIME*'s devoting a cover story and a new section to the environment a couple of months before the first Earth Day (22 April 1970) tapped into a collective anxiety over the state of the environment that suggested, in Commoner's words, "a sign that the finely sculptured fit between life and its surroundings [had] begun to corrode."<sup>1</sup> For many, the popular genesis of the new ecology movement was the publication in 1962 of Rachel Carson's *Silent Spring*, which described—rather ominously—the potential of a "silent spring," one without birds singing. *Silent Spring* concentrated on the fact that chemicals designed to kill bugs—notably DDT—produced unforeseen environmental hazards and were often toxic to birds, fish, children, and small animals. But it also paved the way for a decade of effective criticism of American industrialism and helped shape the context of postwar American environmentalism.<sup>2</sup>

Indeed, World War II might be seen as a pivotal point in American environmental history, wherein Americans effectively sought to replace nature with human technologies.<sup>3</sup> This endeavor was fraught with unanticipated consequences, many of which were deleterious to the physical environment and human health. As a result of this transition, the scope and scale of environmental decline grew markedly. Commoner wrote in *The Closing Circle*: "The period of World War II is . . . a great divide between the scientific revolution that preceded it and the technological revolution that followed it."<sup>4</sup> That technological revolution led to an outpouring of polluting technologies, which contributed to what might be regarded as a tragic tableau of the Progressive Era fallacy that humans could infinitely shape and dominate the environment.

In addition to pesticides such as DDT, many other miracle chemicals became prominent and dangerous parts of the American landscape. Synthetic detergents quickly replaced natural soap until it was discovered that their suds did not break down, and thus polluted surface waters. The manufacture of plastics emitted dangerous chemicals into the environment. The disposal of these new synthetic products also resulted in problems because they were not biodegradable, and their incineration released dioxin and other poisons into the air and water before working their way into the food chain. Nuclear technology was perceived as a clean and viable energy alternative to coal, but its hazardous waste defied safe disposal. Increased de-

mands on agriculture led to greater dependence on synthetic fertilizers and pesticides, the runoff of which contaminated local waters. The dispersal of ammonium perchlorate, an additive used in rocket fuel and munitions since the 1950s, threatened the widespread contamination of groundwater. Flame retardants, known as polybrominated diphenyl ethers, were detected in alarming quantities in the milk of nursing mothers in the United States and Canada. The growing demand for high-performance automobiles led to greater fuel consumption—the fuel contained lead—and higher levels of carbon dioxide, and contributed to urban smog. Further, new methods of food production, continued urban expansion and suburban sprawl, and the nonchalant disposal of harmful waste materials all contributed to a variety of health and environmental problems locally, nationally, and globally. As Commoner warned in *Science and Survival*: “The age of innocent faith in science and technology may be over.”<sup>5</sup>

The historian Samuel P. Hays has argued that the impetus for popular environmental concern after World War II was the product of a desire on the part of a newly affluent middle class to enjoy a higher standard of living. His interpretation of the rise of environmentalism suggests that this newfound energy for protecting the environment was part of a history of consumption: environmental quality had become a desirable product. But Hays’s analysis overlooks the history of production during and after World War II (Commoner’s technological revolution), which provoked stern reaction from a much broader social base. Ironically, the technical decisions that went into producing the amenities that characterized the postwar era also precipitated the most significant threat to the physical environment in human history. The environmentalism that responded to that threat—as this study proposes to show—was never so homogeneously middle class or interested solely in a clean environment as a quality-of-life issue. Indeed, in many instances American environmentalism was reactionary and addressed much more pressing issues of survival. In Commoner’s environmental activism, a clean environment was rarely just a desirable commodity; it was a social necessity. So while a good deal of energy behind postwar environmentalism came from a growing interest in “the good life,” it is important that we also trace the response to the production decisions that introduced a host of new environmental hazards throughout the American landscape.<sup>6</sup>

Individually, and sometimes cumulatively, these new hazards galvanized the American public into action, frequently in agreement with Commoner’s

assertion. By 2000, a Gallup poll found that 83 percent of Americans were sympathetic to the goals of the environmental movement.<sup>7</sup> But the year after Rachel Carson's *Silent Spring* was published, the historian Arthur Ekirch, Jr., mused on the "paradoxical ability" of Americans "to devastate the natural world and at the same time to mourn its passing."<sup>8</sup> While Americans seemed to agree with the broadest goals of environmental protection, the Gallup poll also noted that only 16 percent were "active participants," whereas more than half of those polled were sympathetic but uninvolved. It was a recurring phenomenon. Within a couple of decades of the energy crisis that rapt the American consciousness during the mid-1970s, for example, American drivers had pushed gas and oil consumption to per capita levels higher than those prior to the oil crisis of the 1970s.<sup>9</sup> Hal Rothman has suggested that Americans are "halfhearted" environmentalists, reluctant to make the difficult choices that might alter their current lifestyles.<sup>10</sup> Americans are buying and consuming more plastics, emitting more toxins into the air, and encouraging wasteful industries that promote cost-efficiency over environmental responsibility. And the consequences of these decisions have hardly been benign. The nation's wild places are under siege by developers; sprawl has turned many American cities into wastelands; cancer rates have steadily increased, especially among children; more children are developing asthma and other respiratory diseases; carbon dioxide levels continue to increase; and Americans are still consuming a disproportionate and—many would argue—unsustainable share of the Earth's resources.<sup>11</sup> The environmental crisis, then, is two-pronged: the first is the objective hazards wrought upon nature and human health, and the second is the relative apathy of the American public to address it.

To make matters worse, in 2004, two young environmental writers, Michael Shellenberger and Ted Norhaus, proclaimed the "death of environmentalism." Reflecting on the environmental movement's failing efforts to confront global warming, they argued that modern environmentalism was incapable of responding to this new ecological crisis. According to Shellenberger and Norhaus, the American environmental movement's "foundational concepts, its methods for framing legislative proposals, and its very institutions are outmoded," and "what the environmental movement needs more than anything else right now is to take a collective step back and rethink everything."<sup>12</sup> While the leaders of national environmental organizations were energetic in their denials of Shellenberger and

Norhaus's claims, it was clear that the essay had landed a serious blow. The criticism that modern environmentalism was outmoded was not new, however. Seventeen years earlier, Commoner had argued that the environmental movement had lost its way and was failing to realize its promise. In a long piece in *The New Yorker*, Commoner reflected upon the progress of the American environmental movement: "The environmental movement is old enough now . . . to be held accountable for its successes and failures. Having made a serious claim on public attention and on the nation's resources, the movement's supporters cannot now evade the troublesome, potentially embarrassing question: What has been accomplished?" Commoner's response: Not enough. In spite of the groundswell of environmental concern that preceded and followed Earth Day, the state of the environment seventeen years later was not markedly improved. "The original thrust of the environmental movement," Commoner reminded his readers, "envisioned not an environment that was a little less polluted than it was in 1970, or holding its own against an expanding economy, but an environment free of mindless assaults on ecological processes."<sup>13</sup> So where did the movement stand in 1987? "The question is whether the movement's goal can be reached by the present spotty, gradual, and now diminishing course of environmental improvement or whether some different course must be followed."<sup>14</sup> Commoner had long been navigating such a different course.

This study charts the course of American values toward the environment since World War II, using Barry Commoner as a lens. Insofar as a coherent thesis directs, justifies, and coordinates the chapters that follow, it is that the growing recognition of an environmental crisis emerging during the post-war era fostered a restructuring of environmental activism defined by a novel apparatus. That apparatus consisted of the importance of dissent; the dissemination of accessible technical information; and the need for a more public discussion of environmental risk. The adoption of this apparatus and its effective use were the mechanisms of Commoner's science of survival—method and practice—and constituted the remaking of American environmentalism. The following narrative traces Commoner's efforts to develop an effective apparatus, its early successes in the 1960s, its ultimate defeat in mainstream environmentalism in the 1970s, and its more recent renewal or revival with the advent of the environmental justice movement.

One of Commoner's biggest obstacles involved captivating the American public and alerting them to the dangers inherent in environmental hazards. Indeed, he quickly discovered that initiating a public dialogue on social problems and risk analysis was particularly difficult in the state of Cold War conformity that emerged after World War II. Conformity stimulates and bolsters a tyranny of an unwitting majority, and allows little room for dissenting thought. In many respects, then, Commoner's challenge to the Cold War social conformity and his role as a public intellectual constitute his most significant contributions to American social activism. Commoner outlined the central tenets of his political activism in a commencement address titled "The Scholar's Obligation to Dissent," in which he discussed his social duty as a scholar:

The scholar's duty is toward the development of socially significant truth, which requires freedom to test the meaning of all relevant observations and views in open discussion, and openly to express a concern with the goals of our society. The scholar has an obligation—which he owes to the society that supports him—toward such open discourse. And when, under some constraint, scholars are called upon to support a single view, then the obligation to discourse necessarily becomes an obligation to dissent. In a situation of conformity, dissent is the scholar's duty to society.<sup>15</sup>

Because the postwar era was marked by a prevailing consensus and conformity—in no small measure a reaction to a decade of economic depression during the 1930s and then cultural uncertainty during World War II—the need for dissenting opinions had rarely been greater. Historically, however, dissent has rarely been easy. Because the very act of dissent upsets the delicate conformity upon which social stability is founded, conformists are frequently considered the defenders of social interests and dissenters are regarded as selfish individualists. But in *Why Societies Need Dissent*, Cass R. Sunstein argues that the opposite is perhaps more accurate. "Much of the time," he claims, "dissenters benefit others, while conformists benefit themselves."<sup>16</sup> Commoner's dissent, this first branch of the new apparatus, sought to create a forum in which questions and concerns might be raised.

Information and its dissemination were equally important. For a democracy to function properly, dissent and open discourse are vital, but these freedoms are not terribly useful if the public lacks the tools necessary to make informed decisions. Acknowledging this, Sunstein also notes that "conformity is often a sensible course of action. . . . One reason we conform is that we often lack much information of our own."<sup>17</sup> Providing in-

formation, however, was the scholar's primary mission. As Commoner asserted in his commencement address, "The scholar's duty is . . . not to truth for its own sake, but to truth for society's sake."<sup>18</sup> To that end, Commoner saw the public intellectual's role as vital to the moral glue that countenanced social progress. In effect, through this devotion to dissent, public intellectuals embodied "a self-appointed moral conscience of their society."<sup>19</sup> Their role, in Commoner's reading, was to translate and distribute widely to a lay audience the technical information that would assist in broader public participation in decision-making. During the 1950s and 1960s, Commoner was instrumental in building a science information movement, a movement of activist scientists who sought to provide accessible scientific information to an increasingly concerned public.

The final pillar in Commoner's apparatus was risk. As a biologist, Commoner applied his understanding of his social responsibility to questions of environmental risk. In the years following World War II, specialists had managed to reduce risk assessment to a series of statistics that measured hazards in parts per million (or parts per billion) and actuarial equations of what constituted acceptable social risk. These equations were designed to objectively determine the statistical threats to human health from newly introduced hazards. Environmental pollutants were noticeably harmful to human health at varying levels of exposure. Statistically, then, risk assessment calculated acceptable levels of risk based on a predetermined number of people (in a predetermined subset) experiencing specific health problems that could be related to their exposure to a specific pollutant. The problem, however, was that these kinds of evaluations typically do not account for the geography of race or class. Even within "acceptable" parameters of risk, some people, communities, or regions experienced disproportionate exposures to environmental hazards. Further, just as risk varies in space, it also varies over time; evaluations of acceptable risk were subject to change as new scientific knowledge became available and to changing public opinion. In *Uncertain Hazards: Environmental Activists and Scientific Proof*, Sylvia Noble Tesh shows that lay citizens interpret risk differently than experts and that statistical objectivity is rarely a criterion.<sup>20</sup> But here was the impetus for Commoner's dissent and his distribution of scientific information: even if it was not as scientifically quantifiable, the public deserved to participate in a credible forum on what constituted acceptable risk.

The history of the quantification and qualification of risk assessment, therefore, plays a critical role in this study. I submit that the modern environmental movement is engaged in a struggle to alter the manner in which risk is identified and assessed; in light of Shellenberger and Norhaus's recent diagnosis, it is a struggle the environmental movement is currently losing. In his seminal study of risk analysis, the sociologist Ulrich Beck argued that the production of wealth was inevitably connected to the production of societal risks. Because the postwar technological revolution had introduced a variety of hazards that defied easy solution, Beck argued that society had turned its attention from the production of goods to the management of those hazards and the social controversies that ensued. But by shifting society's focus away from production, a perpetual vicious circle emerged as new hazards continually presented themselves, thereby founding what Beck termed "risk society."<sup>21</sup> With respect to environmental concerns, these risks were manifested in threats to human health, the mismanagement or overexploitation of resources—or what economists might call natural capital—and the unforeseen social and environmental costs of technological progress. As Frederick Buell summarized the situation: "No longer does society need to deal only with social conflict resulting from the unequal distribution of environmental goods; it now has to cope also with the tensions and conflicts that come from the inequitable distribution of environmental bads."<sup>22</sup> To Commoner, questions of what constituted acceptable risk, who made that determination, and what groups of people were most susceptible to risk required fundamental revision. He insisted that these questions demanded public participation; scientific experts or policy makers had no moral authority to make these kinds of decisions unilaterally. What Commoner was advocating through environmental protest was a radical overhaul of how democracy and the governance of production in the United States worked.

Commoner's new apparatus challenged one of the central tenets of American technological progress: that expert management and technical expertise were apolitical. Following this powerful tenet, the history of the American twentieth century might profitably be read as a story of the rise of the modern technological nation. According to Thomas P. Hughes, Americans would see in that story "that not only their remarkable achieve-

ments but many of their deep and persistent problems arise, in the name of order, system, and control, from the mechanization and systematization of life and from the sacrifice of the organic and the spontaneous.”<sup>23</sup> The rise of the modern technological nation is characterized by the growing stock placed in expertise and the development of an “iron triangle” of government, industry, and science, which effectively limited the potential for open, democratic politics and public input.<sup>24</sup> “Leaving it to the experts” clearly constituted a shift toward unquestioning conformity and a related suppression of information. Commoner found this unacceptable. Such an “objective” approach ignored or downplayed public concerns and pressing social questions of what criteria and ethical standards should be used to regulate pollution and protect human health. Throughout his career, Commoner’s writings and activism pointed to the tension between expertise and the public interest; the two were not universally compatible.

Indeed, it is important to note that the science under debate throughout this study was—at the outset of the various struggles—rarely conclusive. As Commoner grappled with government and industrial scientists over the relative safety of fallout from aboveground nuclear testing or the potential hazards of mercury, existing knowledge and scientific data could not conclusively support either argument. To the extent that Commoner constituted a voice of caution in a world addicted to technological optimism and progress, he also presented a powerful critique of post-World War II expertise. That new technologies were introduced to the public and integrated into the marketplace before their safety had been fully established was, to Commoner, a palpably dangerous feature of the postwar technological revolution. Industrial scientists were exposing society to unanticipated risks and dangers.

However, pivotal to Commoner’s new apparatus was—paradoxically—the authority of science as a form of knowledge and as a rhetorical tool. Commoner never disputed science’s usefulness, but rather how it was used. And this is one of the more compelling features of postwar American environmentalism: Donald Worster has commented that “what is especially surprising . . . is that the campaign against technological growth has been led not by poets or artists, as in the past, but by individuals within the scientific community. So accustomed are we to assume that scientists are generically partisans of the entire ideology of progress . . . that the ecology movement has created a vast shock wave of reassessment of the scientist’s



place in society.”<sup>25</sup> For more than fifty years, Barry Commoner was at the vanguard of that scientists’ movement. Scientists were intellectual leaders, but they were also prominent actors in the debate over environmental policy. As much as the atomic bomb raised palpable concerns over the potential for social and environmental destruction, it also gave rise to a fierce moral debate within the broad scientific community that had spawned it. In the wake of the bomb, science had become politically interesting, and scientists had immersed themselves—often fractiously—in politics. A bitter disagreement broke out among scientists over how they should use their newfound social and political prestige. Connections between the social responsibility of postwar scientists and modern environmentalism exist within the framework of what values are inherently important to American society and how those values changed after World War II.

To properly understand Commoner’s role and radicalism and his emergence as a leading spokesperson in American environmentalism, we must start by recognizing the extent to which the technological leviathan against which he railed was firmly entrenched within the American popular imagination. Chapter 1 introduces the culture and context of consumer and technological enthusiasm after World War II, and examines the early postwar debates among scientists over their social responsibility, particularly in relation to the public discourse of risk. The detonation of the atomic bomb made it abundantly clear that scientists had uncovered forces that required considerable caution, and decision-making now demanded political and moral assessment just as much as it did scientific. Within the scientific community, Commoner and a small group of scientists sought to emphasize scientists’ responsibilities to the public. The historian Donald Fleming has called these younger activists “politico-scientists.”<sup>26</sup> The undercurrent throughout Chapter 1 examines the changing shape of American science in response to American technological optimism and the popular acceptance of the importance and centrality of technology to the modern condition.<sup>27</sup>

According to Fleming, one of the pivotal roles of the new politico-scientists was to serve as a kind of fifth estate. In addition to mediating between experts and laypeople, politico-scientists were dedicated to providing accessible scientific information to the public as a kind of highly specialized fourth estate. This responsibility came directly from Commoner’s apparatus, and was central to the politico-scientists’ belief that a

functioning democracy required an informed citizenry. The single most important case involving the science information movement—of which Commoner was the primary founder—was raising public concern over the hazards from atmospheric nuclear weapons testing. Chapter 2 relates Commoner's participation in the debate over nuclear fallout and explores the importance of information as a necessary tool for democracy and for environmentalism, as it helps to discern and define acceptable risk through social as well as scientific means.

Shedding light on the connection between science and activism is critical to our environmental understanding because it helps us to appreciate how scientists came to be among the intellectual leadership of the new environmentalism. Commoner would call the 1963 Nuclear Test Ban Treaty one of the first major victories for the modern environmental movement. For Commoner, the transition from opposition to nuclear fallout to environmental concerns such as fertilizers and air pollution was perfectly natural. Advocating a more holistic approach to science and health problems, he became one of the leading popular ecologists of the 1960s, marking the rise of modern ecology as a popular field of inquiry critical to identifying the social and environmental health of the American landscape. Chapter 3 recounts Commoner's adoption of popular ecology after the Test Ban Treaty and his focus on the dangers presented by the petrochemical industry. Moreover, whereas chapter 2 examined the importance of information, chapter 3 explores how the politico-scientists presented that information. Environmentalists borrowed one of their most effective rhetorical methods from the Puritan evangelists of the First Great Awakening (eighteenth century). As nature's prophets, ecologists would use their scientific status to insist that the world was on the brink of ecological destruction from a variety of human-induced causes. In so doing, Commoner and others capitalized on their authority as scientists, but also appropriated a field in which they had little formal training. By 1970, on the eve of Earth Day, *TIME* magazine would refer to the ecological messages as the new jeremiad, conflating ecology with environmental politics. The rhetoric of the jeremiad was particularly effective in making headlines and generating an audience for the necessity of greater environmental responsibility, but it also strongly associated the environmental movement (and ecology) with alarmist diatribes in order to drive people to environmental action.

The “Age of Ecology” and the jeremiads spawned by it that swept the United States in the 1960s—made popular by the Test Ban Treaty and Rachel Carson’s *Silent Spring*—helped raise the general ecological literacy of citizens and laid a path for subsequent environmental action that would lead to the first Earth Day in 1970. After deliberating on the significance of Earth Day, chapter 4 follows a particularly well-publicized debate in which Commoner contributed to a major rift in the environmental movement by engaging in a vociferous debate with Paul Ehrlich, another popular and charismatic ecologist, over the origins of the environmental crisis. The rift itself is historically significant for understanding the divisions within American environmental interests, the politics of environmental concern, and the breadth of environmentalism. Perhaps the jeremiad’s great failing was that it gave rise to a cacophony of voices and interests that diluted concern for the environment and deflected interest from pressing social issues relating to environmental degradation. The jeremiad’s tenor lent itself to singular explanations for environmental decline, and limited Commoner’s success in asserting that environmental problems could be addressed only in conjunction with poverty, civil rights, and peace.

During the euphoria of Earth Day, Commoner began to change his message from one of social activism to an increasingly blunt attack on the economic systems that gave rise to the environmental crisis. Indeed, the 1970s might be read as a decade of crisis. The decade began with the environmental crisis, which was followed in swift succession by the energy crisis—spurred by the OPEC oil embargo—and the economic crisis, which followed on the heels of the energy crisis. As analysts scrambled to make sense of these crises, Commoner pointed to the fact that they all derived from the same root cause. Chapter 5 examines the shock waves of the 1970s oil crisis and expands on the relationship between risk and economics. As Commoner boldly outlined in *The Closing Circle* (1971) and *The Poverty of Power* (1976), there was a clear enemy, and it was free market capitalism, which governed the means of production in socially irresponsible ways. It was not a new argument; to Commoner, the American economic system was complicit in diminishing the integrity of science after World War II.

The 1980s were a decade of mixed gains for environmentalism. The Reagan administration was overtly hostile to environmental interests, but in reaction to that, membership in environmental groups swelled and activists

found new ways to enforce important pieces of environmental legislation. For Commoner, the 1980s constituted a decade of returning to age-old foes: waste disposal, dioxin, and other toxic threats. What had become abundantly clear to him through his career was that Americans did not experience these threats equally. Chapter 6 discusses the relationship between poverty and environmental risk. As Commoner and numerous other observers noted, there was a direct association between one's socioeconomic standing and the extent to which one was exposed to environmental pollutants in the United States. Poor and disempowered communities were much more likely to suffer exposure to dangerous toxins. Commoner was one of many environmentalists to point to this disturbing link between poverty and environmental health. Environmental justice—the combination of social and environmental activism—has recently provoked divisions within American environmentalism which stem from a question of priorities. Rather than representing a direct threat to existing strands of the movement, however, Commoner saw environmental justice as a welcome expression of environmentalism's pluralism at the end of the twentieth century.

Commoner's active role in all of these issues helps us to understand the relationships between these disparate elements of environmental decline and the movement that sought to arrest that decline. Cumulatively, these chapters explain the relationship between Commoner's social and environmental dissent and his efforts to alert the American public. But his activism involved a complication of standard environmental concerns. To Commoner, environmentalism was intimately and inextricably linked to other social movements that collectively expressed a sense of disillusionment and disenchantment in postwar America. The consistent thread throughout these disparate movements was a struggle for social empowerment, particularly as it related to the postwar technological revolution. "Social guidance of technological decisions is vital not only for environmental quality but for nearly everything else that determines how people live: employment; working conditions; the cost of transportation, energy, food, and other necessities of life; and economic growth," Commoner wrote in 1987. "And so there is an unbreakable link between the environmental issue and all the other troublesome political issues. . . . Environmentalism reaches a common ground with all the other movements [civil rights, women's rights, gay and lesbian rights, antiwar, against nuclear power and for solar energy,

world peace, . . . the much older labor movement], for each of them also bears a fundamental relation to the choice of production technologies.”<sup>28</sup>

In gauging his successes and setbacks, *Barry Commoner and the Science of Survival* explores the significance of Commoner’s social and scientific activism. As a discipline built around the significance of empirical and reproducible data, science was supposed to be a self-correcting enterprise. Its self-correction was designed to enhance scientists’ grasp of scientific knowledge, but also to guard the larger public citizenry from the dangers of faulty science and its application. But if the environmental crisis was any indication, the watchdog had, in effect, inadvertently surrendered its bark. And to Commoner and his colleagues there was a clear correlation between recent technological mistakes and the erosion of the central tenets of open scientific endeavor. As he rightly noted in *Science and Survival*, one of science’s major duties to society is “prediction and control of human intervention into nature.”<sup>29</sup> The story that follows suggests that after World War II, American science failed to keep human well-being as its primary objective, but also that American science was the tool most relied upon to evaluate and resolve the environmental crisis. Commoner’s work to galvanize the public into action against numerous environmental problems tells an engaging story about dissent in America and the significance of a more public conversation about environmental health and risk.

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