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The New Jeremiad

If you can see the light at the end of the tunnel you are looking the wrong way.
—Barry Commoner

Due in no small measure to opposition to nuclear weapons testing from groups such as the St. Louis Committee for Nuclear Information, the 1960s became the Age of Ecology. In the early 1960s, synthetic pesticides quickly joined radioactive fallout as poisons known to be ubiquitous in the environment. By the end of the decade, the Santa Barbara oil spill and flames bursting from the Cuyahoga River in Cleveland spurred further public recognition of the postwar environmental decline and culminated in the first Earth Day, during which more than 20 million Americans took to the streets in protest and celebration. To many Americans it had become abundantly clear that the postwar landscape had been subjected to unparalleled environmental threats and that they were raising their families in a dangerous environment. As Adam Rome notes, "The insights of ecology gave countless citizens a new appreciation of the risks of transforming nature."[1]

If Commoner's activism against aboveground nuclear weapons testing contributed to the establishment of a link between the scientific community and a burgeoning environmental awareness, the 1960s helped to foster connections between those two institutions and the peace movement. The Vietnam War and the environmental crisis were both products of a dangerous technological logic. As Rome wrote, "In Vietnam, Americans destroyed towns to 'save' them; at home, Americans degraded the environment to make 'progress.'"[2] Another element of the public concern over nuclear weapons dealt quite practically with the dangers of nuclear war. While fallout constituted a legitimate domestic threat, the prospect of

global war using nuclear weapons raised questions about the nature of civil defense, which had become a major industry in the late 1950s and early 1960s. People built fallout shelters in their suburban backyards, the very ones that their postwar affluence had made affordable. At school, American children futilely practiced atomic bomb drills by huddling under desks, and *Nuclear Information* saw fit to devote entire issues to questions of civil defense. This all led to a growing dissatisfaction with the ominous and omnipresent threat of war.[3]

Between such concerns over fallout and pressures of war readiness should the Cold War turn hot, links between the environmental movement and the peace movement were perhaps inevitable. Both seemed to demonstrate a relative disillusionment with American policy and its neglect of public participation. These connections became all the more apparent as the Vietnam War dragged on and became one of the most controversial events of an already controversial decade. At the heart of this connection was a more holistic critique of American social structures, which found its energy in leftist political thought. "Since the age of seventeen," Commoner recalled, "I was concerned with racial discrimination, labor problems, unemployment, so I didn't have to make a leap from environmentalism to the Peace Movement." Loath to see himself as strictly an environmentalist, Commoner insisted that his environmentalism was intimately related to a broad swath of other social issues, including peace, civil rights, and greater public control over the free market system.[4] Of his efforts to arrest aboveground nuclear weapons testing, Commoner declared: "Personally, I was not an environmentalist. What I was doing was . . . dealing with a hazard to people that happened to go through the environment, and sure it goes through the air, and gets in the grass and the cows eat it, and so on. It became clear after a while that this was something called ecology."[5] The environment became less a place or concept associated with nonhuman, organic life, and more one in which humans were participant organisms.[6]

Increasingly, as broader understanding of the risks of nuclear fallout galvanized concerns over environmental health, critics began to suggest that the emerging environmental crisis was the result of the pressures imposed on nature by the capitalist system. Another leading thinker and writer of this new strand was the anarchist social theorist Murray Bookchin. Writing under the pseudonym Lewis Herber, he published *Our Synthetic Environment* in 1962, arguing that the "pernicious laws of the market place are

given precedence over the most compelling laws of biology."[7] Bookchin had been drawn to the postwar environmental crisis through his work on chemical additives in foods and—as Commoner had through his opposition to nuclear testing—had come to recognize that the postwar technological revolution had exacerbated a host of public health concerns and chronic diseases, such as heart disease, cancer, and asthma.[8] In his next book, *The Crisis in the Cities,* Bookchin identified the environmental crisis as a predominantly urban problem, again emphasizing the social elements of environmental deterioration.[9] Published a year after the groundbreaking 1964 Wilderness Act, *The Crisis in the Cities* made it clear that the new environmentalism had branched markedly from the more established conservation movement.

The philosopher Herbert Marcuse shared Commoner's and Bookchin's more holistic critique. In *One-Dimensional Man,* published in 1964, Marcuse described the postwar order as one driven by a militarized, waste-oriented economy. According to Roderick Nash, Marcuse believed that "capitalism . . . reduced both nature and people to raw materials with strictly utilitarian value."[10] Marcuse's subsequent call for "the liberation of nature" echoed his earlier criticisms of the unequal characteristics inherent in science, technology, and the capitalist system that organized them.[11] To radical leftists such as Bookchin, Marcuse, and Commoner, environment, peace, civil rights, labor, and feminism were inherently and consistently linked to each other: each consisted of a part of a larger critique of capitalist modes of production and power, and the unequal distribution of wealth and welfare. Pollution and the exploitation of public resources to generate private wealth were expressions of social inequity that would later galvanize the environmental justice movement that sought to blend social and environmental issues in its activism. To Commoner and other political radicals of the 1950s and 1960s, environmental health and equity were necessary components of a broader program of interests that sought to promote social progress, and their activism derived from the same social reform impulses that motivated the civil rights and peace movements.

For the first time, the 1960s moved these disparate movements in concert with each other, and in the process drew on and altered older thinking about the relations between people and the natural world. Prior to the 1960s, social concerns—the disparity of wealth distribution, the importance of public health and hygiene—were not widely considered

environmental issues. "Environmentalism" in earlier centuries concentrated on nature protection and natural resource management. For the Romantics and naturalists in the eighteenth and nineteenth centuries, nature protection was an exercise in aesthetics. Industrialization was seen as a threat to nature's pristine or sublime aesthetic, but these concerns often had little proximity to the sociopolitical world of their surroundings, much less the health concerns with respect to urban squalor. Indeed, we might recognize modern strains of environmentalism in the activities of the early Jacksonian era urban reformers, but in antebellum America, their work was rather distantly removed from naturalism and nature protection.[12] Indeed, early interest in nature was distinctly personal or individual, rather than a social or communitarian effort to protect nature. Nature and civilization were perceived to be mutually exclusive notions, separated by the machine and reinforced by the growth of technological optimism that followed the Civil War.[13] By the time Americans welcomed the dawn of the twentieth century—the American Century—their blind faith that they could indefatigably exploit and reorganize nature to suit their interests was so ingrained that nature and culture were made to seem completely separate. Progress, efficiency, and utilitarianism became Progressive era catchwords. To the majority of Americans, human ingenuity maintained the confident air that nature could be completely and continually reshaped to suit human needs and interests.

During the nineteenth century, Transcendentalists from Ralph Waldo Emerson to John Muir incorporated an ethical dimension into nature protection rhetoric, arguing that Americans had an ethical duty to preserve God's creation and that nature itself had an intrinsic value beyond human use. In 1851 Thoreau had exulted that "in Wildness is the preservation of the World," and a generation later, Muir declared that wild nature possessed divine and mystical powers of inspiration and redemption, themes which would be secularized and reaffirmed for the post-World War II American public through the ecologist Aldo Leopold's seminal book, *A Sand County Almanac*.[14] While anti-industrialization acquired some following with the rise of the Industrial Revolution, it was not until the twentieth century that advocates of nature protection developed an appreciation for public health and human welfare as integral to an environmental ethic. In linking public health to environmentalism, health specialists such as Alice Hamilton were echoing the sentiments of urban

health reformers from the mid-nineteenth century, but enjoyed the benefit of being able to demonstrate more completely the environmental effects of nineteenth-century urbanization and the Industrial Revolution.[15] Early twentieth-century nature preservationists also pointed to the dark plumes from smokestacks and resource depletion as too high a price for "progress." Over the course of the twentieth century, the social and the environmental began to discover their contemporary political partnership.[16]

During the 1960s a shift in environmental focus was completed from affirming life to fighting for survival in the wake of fallout and other poisons, which precipitated a transition from experiencing nature as an individual exercise to one that was necessarily social and communal. The intellectual expansion from aestheticism to a broader sense of environmentalism was a slow process, marked most noticeably by the human relationship with the physical environment, transforming from a private relationship or retreat to a decidedly public engagement, which preached inclusiveness in government, in courtrooms, and in classrooms. Just as the human body became a concentrated site of environmental decline, the environmental experience and the struggle for environmental protection became unmistakably social. Whereas Thoreau and Muir encouraged developing an intimate relationship with the nonhuman world, their efforts had been based on escaping civilization. To more socially oriented environmentalists such as Commoner, social and economic dependence on continual technological progress meant that escape from civilization was no longer possible, and that the more critical project was to integrate that intimate relationship with the nonhuman world *into* civilization. It was a project begun at the beginning of the twentieth century by Progressive era conservationists such as Gifford Pinchot, but after World War II, the battleground had changed markedly. Seeking to entice conservationists to the larger environmental struggle, Commoner noted in a 1966 paper, "The conservation movement was created in the United States to control [nineteenth-century industrial assaults on natural resources]. The same thing is happening today, but now we are mortgaging for future generations not just their lumber or their coal, but the basic necessities of industry, agriculture, and life itself: air, water, and soil. This is the new and larger task for the conservation movement."[17] This time, the stakes were much higher; one could not escape nuclear fallout by escaping civilization. Rather, it was time to confront civilization's unbridled development.

In this respect, Rachel Carson's *Silent Spring* might be regarded as the marriage of the aesthetic impulse with the more recent social environmentalist one, thereby constituting the dawn of the Age of Ecology. In *Silent Spring,* Carson, a confirmed nature lover most happy listening to birdsong and exploring tidal pools for marine life, blended her deep-seated appreciation for nature's splendors with an organized attack on the industrial invasion of new technologies. She deftly and convincingly outlined the technological shortcomings of the pesticide industry and the unforeseen risks about which Americans had not been consulted. "Lulled by the soft sell and the hidden persuader," she argued, "the average citizen is seldom aware of the deadly materials with which he is surrounding himself; indeed, he may not realize he is using them at all."[18] Just as pollution was beginning to garner public attention, thanks in no small measure to the fallout question, Carson demonstrated that health and the environment—and humans and nature—were intimately and inextricably linked. She had accurately charted for the popular audience an environmental ethic and, according to Maril Hazlett, "vested it in the human flesh: if humans did not treat nature more wisely, then they too risked death from the long-term effects of persistent chemical pesticides."[19] In so doing, Carson introduced human physiology as a topic for environmentalists to consider. "There is also an ecology of the world within our bodies," she asserted in *Silent Spring.*[20] Just as this interpretation of ecology demanded that science examine the bigger picture, Carson—like Commoner, Bookchin, and soon Marcuse—insisted that scientists and activists should adopt a more holistic scope of what constituted an environmental problem. Environmentalism shifted from Romantic sentiment to a social practice in harmony with the rise of popular ecology, and ecologists emerged, according to Donald Worster, "as the guardians of fragile life," their science ready to subvert the mainstream values that deemed humans dominant over nature. Ecology had become the subversive science.[21]

Like Commoner, Carson was exceptionally critical of science and the powers of shaping environments that it had assumed. "The 'control of nature' is a phrase conceived in arrogance," she boldly stated, "born of the Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man." This outdated assumption, Carson warned, would inevitably result in an environment hostile to all life. "It is our alarming misfortune," she continued, "that so primitive a science has

armed itself with the most modern and terrible weapons, and that in turning them against the insects it has also turned them against the earth."[22] But the intellectual foundations of twentieth-century science were not only hubristic; they were also dangerously misguided. As Carson noted in the serialized version of *Silent Spring,* which first appeared in *The New Yorker,* industrial science was corrupt, and the rapid rise of the pesticide industry after World War II suggested a new era "dominated by industry, in which the right to make money, at whatever cost to others, is seldom challenged."[23] Science was indisputably important, but it needed to be responsibly harnessed.

Industrial scientists did not take such criticisms lying down. The chemical industry mounted a vehement attack against Carson's work. Prior to *Silent Spring*'s publication in book form, the pesticide manufacturer Velsicol Corporation threatened a lawsuit if Houghton Mifflin published the book. In a letter to Houghton Mifflin, Velsicol charged that Carson's attack on the chemical industry portrayed American business interests in a negative light, and her critique risked reducing "the use of agricultural chemicals in this country and in the countries of western Europe, so that our supply of food will be reduced to east-curtain parity." Not only was *Silent Spring* inaccurate and libelous, Velsicol contended, but Carson was a Communist sympathizer.[24] Attacks against the book persisted after its publication, and Carson was summarily dismissed by her critics as a Communist, a hysterical woman (and often both), or as a woman embittered by her own—ultimately losing—battle with cancer and wholly incapable of understanding the scientific nuances of the pesticide industry.

In much of her language and her personality, Carson was a relatively conservative or reserved person, but behind her love for nature in *Silent Spring* rested a damning indictment of industrial capitalism. "For the first time in the history of the world," she charged, "every human being is now subjected to contact with dangerous chemicals, from the moment of conception until death." This was more than a lament at the loss of nature's aesthetic value; it was a distinct declaration of war that sought to bring together conservationists, outdoor recreationists, antitechnologists, public health advocates, and urban reformers. And it worked.[25]

Silent Spring's success was not lost on Commoner. "It was," he recalled, "the first evidence that there was a wide affinity for environmentalism

among the American public."[26] Its popularity in serialized form in *The New Yorker* and its subsequent sales as a book made it perfectly clear that the Age of Ecology had begun and that the American public was anxious to learn more about the introduction of human-made health hazards into the environment. Concurrent with the publication of *Silent Spring* and the realization of the Nuclear Test Ban Treaty came a significant threshold at which Americans increasingly resisted environmental risk. The growing recognition that humans were susceptible through the flesh to the same invasions by industrial toxins as the landscape resulted in ever-rising standards of what constituted "acceptable risk." This shift in environmental values was most easily recognized in the growing opposition to aboveground nuclear testing, the 1961 thalidomide scare in America, the popular acceptance of *Silent Spring,* and the subsequent proliferation of campaigns to protect human and environmental health.

Another feature of *Silent Spring's* success not lost on Commoner was the validation of his science information movement as an effective activist tool. *Silent Spring* warned the public against leaving decision-making to experts or specialists. Much like Commoner, Carson was uncomfortable with the suggestion that science and specialists had all the answers. Indeed, both Commoner and Carson demonstrated that the common trend of "leaving it to the experts," a product of the Progressive era that persisted after World War II, was dangerously flawed. Commoner warned in *Science and Survival:* "The notion that . . . scientists have a special competence in public affairs is . . . profoundly destructive of the democratic process. If we are guided by this view, science will not only create [problems] but also shield them from the customary processes of administrative decision-making and public judgment." This was more than just a warning; Commoner insisted that such a misuse of science was so pervasive and the technical nature of information was so inaccessible to nonscientists that there already existed an "apparently insuperable barrier between the citizen, the legislator, the administrator and the major public issues of the day."[27] Carson was equally vociferous in insisting that dangerous technologies were being hidden behind complicated scientific jargon designed to confound public scrutiny. Parallel to Commoner's own advocacy, Carson insisted that responsible science was science made accessible and public, open to criticism and dialogue, and serving public rather than private interests. "We live in a scientific age; yet we assume that knowledge of science is the prerogative of only

a small number of human beings, isolated priestlike in their laboratories," she stated in her 1952 National Book Award acceptance speech. "This is not true. The materials of science are the materials of life itself. Science is part of the reality of living; it is the way, the how and the why for everything in our experience."[28]

As with the debate over nuclear fallout, what was needed was clear, accessible science that the public could understand. At its most fundamental level, *Silent Spring* adhered to the principles of public information and translated science for the lay reader. Avoiding technical language, Carson presented the dangers of pesticide technology to the nonscientist in a compelling manner, making science accessible but also breaking down the boundaries between science and sentiment as a means of humanizing her argument. That *Silent Spring* raised public awareness and galvanized citizens to action is testament to the power of public information. In many respects, Carson's famous debate with industry scientists over the relative safety of DDT mirrored Commoner's struggle against fallout, which preceded it. Carson even drew on public concerns about radiation to advance her own argument, citing the buildup of strontium-90 in human bones and referring to chemical pollutants as the "sinister and little-recognized partners to radiation in changing the very nature of the world."[29] Later in *Silent Spring,* Carson continued: "We are rightly appalled by the genetic effects of radiation; how then, can we be indifferent to the same effect in chemicals that we disseminate widely in our environment?"[30] Indeed, Carson held the Committee for Nuclear Information in high esteem. In a 1963 letter to the committee, she wrote, "I have long admired your organization and have repeatedly referred to it as a model when I am asked about setting up a similar organization for the study of pesticide problems."[31]

Applying the principles of scientific information to environmental problems other than nuclear testing was a project Commoner had envisioned prior to the success of *Silent Spring,* and the Test Ban Treaty provided the context for that kind of transition. In introducing the May 1964 issue of *Nuclear Information,* the editor, Virginia Brodine, claimed that *Nuclear Information* was living up to its long-held intention to diversify the range of information it presented by moving beyond questions of nuclear technology. Brodine noted that the public's ignorance or confusion regarding scientific problems extended to "the use of chemical compounds for pest extermination; it is [also] true of the discharge of the

wastes from our urban, industrial civilization into the air and water; just as it is true of many of the uses of nuclear energy."[32] In August 1964, Brodine told subscribers that *Nuclear Information* "outgrew [its] old name when we began to include other subject matter in addition to nuclear information." With that issue, *Nuclear Information* became *Scientist and Citizen.* The new name, she continued, "reflects our broadened interests and represents the purpose that has guided us from the first issue in 1958: To bring together the citizen who needs information and the scientist who has a responsibility to inform."[33]

The leading article in the August 1964 issue was "Water Pollution in Missouri," by the chemist James R. Whitley, which considered a number of kinds of water pollution, from mining runoff to urban waste disposal.[34] Water pollution had become a source of particular environmental concern when the fish kills on the lower Mississippi River in November 1963 gained national attention after the Louisiana Division of Water Pollution turned the investigation over to the U.S. Public Health Service. While there had been fish kills on the lower Mississippi in late fall the previous three years, the scale of the 1963 kill was alarming. Five million dead fish floated to the surface of the river, blocking the intakes to regional power plants and threatening public drinking water. "The bodies of turtles floated on the waters," *The New Republic* reported. "Tough 150-pound garfish and catfish weighing 70 pounds surfaced too weak to move. Crabs lay along the banks. Thousands of cranes and robins lay dead."[35] By April 1964, Public Health Service biologists had traced the fish kill to minute amounts—roughly half a microgram per gram of blood, .40 to .56 parts per million—of the pesticide endrin, which had entered the Mississippi from a Memphis waste-treatment plant owned by Velsicol, the same company that developed endrin and that had tried to prevent *Silent Spring*'s publication.[36]

The discovery not only further validated *Silent Spring* among skeptics—"How does Rachel Carson look now?" a reporter asked Public Health Service officials in Mississippi; "pretty good" was the response—but also served as occasion for greater public education on the fragility or vulnerability of the biosphere.[37] Disposal of chemicals designed to kill insects poisoned large numbers of fish and simultaneously threatened or potentially threatened drinking water resources in Arkansas, Mississippi, and Louisiana. The very low levels of endrin that had precipitated the massive fish kill in the Mississippi also sharpened and emboldened the ecological

message. The high sensitivity of fish to various kinds of water pollution demonstrated in grand form the potential risks of pollution to humans. Public Health Service warnings concerning pollutant hazards to urban residents whose water came from the river ran rampant through the media and prompted the 1964 introduction of a Clean Water Bill in the Senate, sponsored by Senator Abraham Ribicoff of Connecticut and signed into law by President Lyndon Johnson in 1965.[38]

Momentum was very definitely on the environmentalists' side, and Commoner sought to capitalize on it. In "Fallout and Water Pollution—Parallel Cases," which appeared in the December 1964 issue of *Scientist and Citizen,* he compared the problems related to water pollution with his early work on fallout, and drew on the success of the fallout struggle to suggest that the lessons learned in that protest might be applied to the control of other contaminants. Problems of water pollution, Commoner noted, were similar to those of radioactive fallout insofar as both were "the unwanted result of the union between modern scientific knowledge and intense social demand for [the] use" of the technologies that produced them. At the same time, however, accurate assessment of the two problems could substantively contribute to remedying the bigger problem that linked them. Scientists and citizens working together, Commoner contended, needed "to learn how the objectivity of scientific investigation and the judgments of public opinion, properly interrelated, have now brought [nuclear] contamination to a halt."[39] Here was the lesson that needed to be more broadly applied to other environmental struggles.

In the wake of *Silent Spring* and the fish kills on the lower Mississippi, chemical pesticides became an important organizing issue for Commoner and other environmental scientists. Rachel Carson had been effective in articulating grounds for a passionate opposition to pesticides in addition to her scientific argument, which had made that issue pivotal to the growth of 1960s environmentalism. But pesticides were only a small part of a complex range of substances based on carbon chemistry and produced by a colossal petrochemical industry that over time became the target of a concerted campaign. Petrochemical products were distinctive in their use of purified raw materials found in petroleum and their energy-intensive chemical reactions with chlorine. The environmental problems posed by the production, use, and disposal of petrochemical products

such as pesticides, fertilizers, detergents, PCBs, CFCs, and plastics varied, but cumulatively they dramatically changed the context of environmental protest. Since the petrochemical industry was "uniquely capable of producing materials not found in nature," Commoner noted in *The Closing Circle,* its products threatened the environment with "intrusion[s] into the ecosystem of a substance wholly foreign to it." Frequently these intrusions were of materials, such as plastic, that entered the market at expanded and unprecedented levels. The annual production of American plastics in 1960, for example, exceeded 6 billion pounds, and its growth curve rose more steeply than the Gross National Product between the end of World War II and 1965.[40] What to do with all this plastic presented a new problem; it did not break down in nature. "It therefore persists as rubbish or is burned—in both cases causing pollution."[41]

Broader awareness of the hazards of DDT—another petrochemical—resulted in heightened expectations from the public as to what constituted acceptable risk. In effect, the hazards of these new technologies constituted more imminent threats on a much larger scale. Commoner's main argument was that any amount of pollution could be expected to cause some damage, and that it was often nearly impossible to predict the extent or consequences of that damage. "Whenever the biological system exposed to a possibly toxic agent is very large and complex," he wrote in 1964, "the probability that any increase in contamination will lead to a new point of attack somewhere in this intricate system cannot be ignored."[42] The only way to prevent environmental deterioration as a result of toxic pollution, he contended, was to eliminate pollution from the environment; it could not be successfully managed.

Another important feature of the campaign against the petrochemical industry was control over its products' entry into the marketplace. Once integrated into the economic system, their removal was, on a practical level, next to impossible. "The costs of correcting past mistakes and preventing threatened ones are already staggering," Commoner lamented, "for the technologies which have produced them are now deeply embedded in our economic, social, and political structure."[43] The rapid rise of detergents synthesized from organic raw materials present in petroleum represented an alarming example of this trend. Like many other industries, the energy-intensive petrochemical production of domestic cleaning materials experienced revolutionary growth and transition in the decade fol-

lowing the end of World War II. With the expansion of suburban living spaces and home ownership came greater demand for materials with which to clean those homes and their amenities, marked most notably by the shift from organic soaps to synthetic detergents.

Detergent itself is an adjective and synonym for cleansing; soap, therefore, is a detergent. Synthetic detergents ultimately replaced organic soap because soap possessed some disadvantages that helped promote synthetic detergents as leading cleansers. In hard water with high mineral content, soap tended to form a deposit which did not wash away as readily as it did in softer water. In contrast, detergents were mixed with a variety of additives designed to soften hard water and ensure a more consistent clean without any deposit. Synthetic detergents had been invented during World War I in Germany, and were introduced into the United States marketplace by Procter & Gamble in 1933. Their sales, however, were limited by their exorbitant cost; in 1934, detergents cost four to five times as much as soap. As with DDT, World War II created a market for synthetic detergents. Synthetic detergent's displacement of laundry soap coincided with World War II because the U.S. Navy sought a cleanser that could be used effectively in saltwater. Further, this increased production of synthetic detergents made their price more competitive; in contrast, soap's raw material, fat, was dependent on agriculture, and its quality, availability, and price subsequently varied. In 1946, Procter & Gamble introduced Tide, "which was to initiate a revolution in the U.S. detergent industry." By 1953, synthetic detergents had replaced soap as the top-selling product by weight in the United States; in 1958, 72 percent of all detergents produced were synthetic, and they constituted more than 90 percent of all household packaged cleaning products.[44]

By the late 1940s, however, unprecedented levels of foam at sewage treatment plants, and even in rivers and lakes—some of which were sources of domestic water supply—were reported all over the United States. Only after billions of pounds of detergents were in use annually was it discovered that they constituted a serious environmental pollutant. "One aspect of this technological triumph received no attention in the research laboratories," Commoner explained, "the effects of dumping a huge amount of new synthetic substances (about 3.5 billion pounds per year in the United States in 1960) down drains into waste disposal systems."[45] Unlike soap, detergents resisted bacterial decay and accumulated in surface

waters, resulting in foam coming from household faucets and other drinking water sources. Because they did not break down, detergents effectively choked water system bacteria. "The bacteria that act on organic wastes must have oxygen," Commoner stated in 1966, "which is consumed as the waste is destroyed. If the waste load becomes too high, the oxygen content of the water falls to zero, the bacteria die, the biological cycle breaks down, the purification process collapses, and the water becomes a foul and murky mess."[46] Synthetic detergents were typical of numerous other examples of how the approval and use of new technologies preceded any clear consensus of their impact on the environment and human health. Commoner wryly observed that such consequences were a natural symptom of our economic system, "since the purchases of detergents—and the consequent profits—result from their effectiveness as cleansers and not from their behavior in waste systems."[47] The historian William McGucken noted the paradox that "achieving human cleanliness entailed fouling the environment."[48] By the middle 1960s, the detergents scare had largely subsided after industrial scientists determined that their early detergents were synthesized from petroleum derivatives composed of branched molecules that were not biodegradable. Later detergents consisted of unbranched molecules that bacteria could break down. But to Commoner it remained "useful to ask why we got into trouble with the old detergents, and what we can learn from past difficulties to avoid new ones."[49] To Commoner, the problem was essentially a repetition of other environmental problems: detergents "were put on the market before their impact on the intricate web of plants, animals, and microorganisms that makes up the living environment was understood."[50]

Commoner's bone of contention with the synthetic detergent industry was the same as his objection to the earlier unquestioned assault on the environment by nuclear weapons testing: discoveries in the physical and chemical sciences failed to take into account their impacts on the life sciences. As he noted in *Science and Survival,* "Since the scientific revolution which generated modern technology took place in physics, it is natural that modern science should provide better technological control over inanimate matter than over living things."[51] Whereas ecology endorsed a more holistic understanding of the environment, industrial science worked in a more reductionist manner. In "The Integrity of Science," published in 1965, Commoner illustrated the dangers of this kind of reductionist approach,

noting that the Soap and Detergent Association had admitted that no biological field tests had been conducted to determine how detergents would interact with the natural ecosystem.[52] "The separation of the laws of nature among the different sciences is a human conceit," Commoner concluded. "Nature itself is an integrated whole."[53] This disparity between the physicochemical sciences and the biological sciences was a direct consequence of the American science policy that followed World War II, as government funding supported nuclear physics and industry supported developments in the petrochemical industry. As the technological revolution raced ahead, few stopped to consider its impact. But to conclude that industrial science simply failed to do its biological homework is to miss the point. Paul Hirt argues that whereas ecologists promote "awareness of environmental limits to abundance," specialists—such as government silviculturalists or industrial chemists—strive precisely to "overcome limits and create greater abundance."[54] This emphasis on maximizing production invariably came at the expense of environmental health and sustainability. The new environmentalism insisted that new technologies needed to be governed by what was known—and cautious of what was not known—about life and its environment. In effect, this constituted a call for greater scrutiny in risk analysis.

Responding to this perceived need, Commoner opened his Center for the Biology of Natural Systems at Washington University in 1965. He outlined its role as an effort to "adapt our science to the urgent need for understanding the natural biology of the environment and so help to preserve the community of life from extinction at the hand of man."[55] Such an endeavor was urgently needed and critical. "Too often, today, we fail to perceive this system as a complex whole," Commoner lamented in *Science and Survival*. "Too often has this blindness led us to exaggerate our powers to control the potent agents which we have let loose on the environment. Only too often in the recent past has our unperceived ignorance led to sudden hazards to life—contamination of our streams with powerful but poorly understood biochemical agents; pollution of the air with powerful but poorly understood radiation."[56] By the later 1960s, Commoner's Center for the Biology of Natural Systems would engage with another poison that was infiltrating both air and water systems at an alarming rate.

In addition to his role as messenger, Mercury was the Roman god of commerce and was responsible for escorting the dead to the underworld.

After World War II, this dual role might have been perceived to be rather fitting, given the relative ubiquity of mercury use in industry and the severe health hazard it posed. Elemental mercury had been known to be toxic since Roman times, but its presence as an environmental pollutant dramatically increased after World War II from fossil fuel emissions—especially from coal-fired power plants—its use in paints and fungicides, its role in the production of chlorine in the chlor-alkali process, and its part in lithium enrichment for use in thermonuclear weapons.[57] As mercury use increased, so did the number of human ailments associated with it. In 1947, the "pink disease" that afflicted infants in the United States was connected to the use of mercurous chloride—calomel—in teething powders.[58] A little more than a decade later, a rash of cases of mercury poisoning related to the use of mercury compounds in fungicides used to treat flour and wheat occurred in Iraq (1960), Guatemala (1963–1965), and Pakistan (1969). In the late 1950s, the irresponsible dumping of mercury-contaminated waste into local waters resulted in widespread and high-profile poisoning tragedies in Minamata, Japan; hundreds of people were killed and as many as 20,000 were poisoned.[59]

Indeed, mercury pollution or contamination presents an especially poignant example of how the industrial processes after World War II emerged to create new, dangerous, and often unanticipated environmental problems. While mercury is a naturally occurring element and present throughout the environment, it rarely occurs independently in nature without human intervention. Rather, it is trapped in coal and other mineral deposits, and freed into air, soil, and water through such human activities as waste incineration and coal combustion. According to a 1997 Environmental Protection Agency report, coal-fired power plants in the United States were the predominant cause of mercury pollution in the environment.[60] The environmental hazard posed by mercury stems from an organic and lipid-soluble form of the element called methyl mercury, which is present in mercury vapors. Preventing mercury releases was especially difficult in manufacturing because whereas other toxic metals, such as lead and cadmium, were easily trapped with the fly ash in incinerator control systems, mercury was so easily vaporized that most of it passed through the control system, "out the incinerator stack, and into the air."[61] Once it escaped from the factory, methyl mercury accumulated in water and entered

the food chain; unlike most elements of radioactive fallout, methyl mercury is almost entirely absorbed by humans' digestive systems.

In 1997, the Environmental Protection Agency estimated that about eighty-seven tons of mercury were deposited annually in the American environment, and that electrical power plants built from the 1940s to the 1970s were responsible for a sizable amount of those emissions.[62] While this number may appear somewhat inconsequential compared with the tonnage of other toxic substances released into the environment, studies indicate that a mere gram of mercury was sufficient to render fish from a twenty-acre body of water unsafe for human consumption.[63] Much as trace amounts of endrin were responsible for the fish kills on the Mississippi, mercury threatened similar hazards to fish and to humans. Summarizing the postwar recognition that mercury was polluting the environment on an unprecedented scale, Commoner observed: "That waste mercury would move through the aquatic ecosystem and accumulate in fish came as a sudden, unpleasant surprise."[64]

As mercury vapors billowed out of power plants and found their way into streams and lakes and up the food chain toward fish, and ultimately Americans' dinner tables, the ingestion of mercury became a prevalent source of mercury poisoning. Documented symptoms of mercury poisoning are widespread, ranging from psychological effects—such as irritability, anxiety, and depression—to sensory and motor effects—including loss of sensation in extremities, loss of hearing, abnormal reflexes, slurred speech, and the loss of fine motor coordination. More serious exposures to mercury also result in convulsions and seizures, comas, and death. As with radioactive fallout, children are generally at more risk than adults.[65]

After World War II, mercury became a widely used element in the manufacture of synthetic chemicals. In the late nineteenth century, it was introduced into chemical manufacturing to take advantage of its special electrical and chemical properties, and became a central tool in the manufacturing of chlorine. Chlorine was originally the unwanted by-product of the electrolytic chlor-alkali process; by the late nineteenth century, alkali was in high demand from manufacturers of glass, soap, paper, and textiles, but, according to Martha Moore Trescott, "markets had to be *created* [for chlorine], as with almost all of the products introduced by the electrochemicals industry."[66] Invention was the mother of necessity. During World

War I, chlorine was used as a war gas on the battlefields in 1915. The military industry quickly made more chlorine-based chemical weapons, including mustard gas.[67] After World War I, the petrochemical industry replaced the electrochemical industry that preceded it, and by the late 1920s and early 1930s, new organochlorine products began to appear, most notably polychlorinated biphenyls (PCBs), developed by Monsanto in 1929, and chlorofluorocarbon (CFC) refrigerants, introduced by Du Pont in the early 1930s.[68] In 1937, DDT's insecticidal qualities were discovered, and increased production of polyvinyl chloride (PVC) plastics, first marketed in 1936, ensured that chlorine manufacture remained profitable in the decades that followed World War II.

From being an unwanted by-product, chlorine became indispensable to the synthesis of organic chemicals, which were necessary in the production of the raw materials needed for new synthetic fibers, pesticides, detergents, plastics, and rubber, prompting Commoner to assert in *The Closing Circle* that "mercury poisoning is a feature of the 'plastic age.'"[69] Just as chlorine was essential to the manufacture of organic chemicals, mercury was critical to the manufacture of chlorine. To make chlorine, an electric current is passed through a salt solution via a mercury electrode. The biologist Joe Thornton notes that typically, "Most mercury is recycled, but significant quantities are routinely released into the environment through air emissions, water discharges, products, and waste sludges. [During the twentieth century], chlor-alkali production [was] the largest single source of mercury releases to the environment."[70] Between 1946 and 1969, Commoner noted, "Mercury consumption for this purpose has increased—by 3,930 per cent in the twenty-five year postwar period."[71]

While chlorine production was the second most prevalent source of mercury pollution after coal-fired power plants, mercury also found its way into the environment in unnaturally large quantities in a number of other ways. In *The Closing Circle,* Commoner showed that mercury use in mildew-resistant paints had grown 3,120 percent.[72] Mercury poisoning was typically associated with the Mad Hatter, a character made popular in Lewis Carroll's *Alice in Wonderland,* because mercury was used in the making of felt hats.[73] After World War II, mercury maintained its close connection to occupational hazards. Indeed, the first complaint that the Occupational Safety and Health Administration addressed under the 1970 Occupational Safety and Health Act pertained to levels of worker expo-

sure to chlorine and mercury at an Allied Chemical Corporation chlor-alkali plant in Moundsville, West Virginia.[74]

By 1969, *Scientist and Citizen* had changed its name to *Environment*. Within a decade, Ralph Lutts notes, "What began as a mimeographed newsletter about fallout had turned into one of the nation's major sources of environmental information," and Commoner, whose face would appear on the cover of *TIME* magazine the following year, was widely recognized as one of the icons of the new American environmentalism.[75] In May 1969, *Environment* published a special issue devoted to mercury in the environment. The lead article, by the *Environment* editor Sheldon Novick, examined mercury in pesticides and fungicides. Whereas countries such as Sweden and Japan had banned the mercury pesticides and other means through which mercury might contaminate food, Novick expressed concern that in the United States there was "almost no information available about the extent of mercury contamination of food and of the general environment."[76] In "Birds Give Warning," Göran Löfroth and Margaret E. Duffy reported on the adverse effects of using Panogen, a fungicide containing methyl mercury, in large quantities. Commenting on cases in Sweden and Japan, they noted that birds were being poisoned after eating treated seeds or rodents who had eaten treated seed. Once again, toxic chemicals were extending their reach beyond the uses for which they were intended.[77]

"All this reminds us of what we have already been told by advertising . . . that we are blessed with an economy based on very modern technologies," Commoner would observe in *The Closing Circle*. "What the advertisements do not tell us—as we are urged to buy synthetic shirts and detergents, aluminum furniture, beer in no-return bottles, and Detroit's latest creation—is that *all this 'progress' has greatly increased the impact on the environment.*"[78] Moreover, it contributed to a growing public sentiment that the technological optimism that immediately followed World War II was over—or, worse, had been a fallacy all along. Still, environmentally hazardous products flooded the market, and still American consumers rewarded companies that could offer the lowest prices, regardless of their products' environmental effects. So while awareness of environmental protection was growing across the United States, Americans continued to make only token and selective changes in their behavior.

It was within this context that the modern science of risk analysis was formulated. "In view of the large and unknown risks involved in multiple

insults to the integrity of the environment," Commoner told the National Industrial Conference Board in 1966, "prudence suggests the withdrawal from our surroundings of as many synthetic pollutants as possible."[79] If risk analysis was designed to determine the potential threat of a new hazard, this new approach to environmentalism insisted that that new hazard not be introduced before the risk could be more fully and publicly assessed and considered. The basic idea was to prevent environmental damage until the benefits of a new technology could be weighed against its potential costs; waiting until a new technology was introduced into the environment was invariably too late. Commoner worried about the manner in which environmentalists typically found themselves reacting to existing problems rather than participating in preventing their introduction and proliferation.[80]

Throughout his campaign against aboveground nuclear testing, for example, Commoner was at the helm of criticisms directed toward the Atomic Energy Commission's rather insular treatment of risk analysis. Uncertainty in science and a perceived urgency in developing a national security agenda prompted the approval of numerous nuclear weapons tests on American soil that, later, would be recognized as a tangible health hazard to American citizens. While in some quarters the Cold War confrontation justified the risk involved in testing, decisions that put the military-industrial complex in firm control of the arms race relegated public input to the periphery. Calculating risk of this nature was not an equation that could be concocted by experts, but rather a question of social values and ethics that required far greater public participation. Using the Mississippi River fish kill as an example, Commoner claimed that "the very presence in the Mississippi River of substances known to be toxic to fish at low concentrations and to mammals at higher concentrations must be regarded as a definite risk to any biological population exposed to it. The only feasible way to judge the significance of this contamination is to estimate the risks, compare them with the benefits associated with the use of the pesticides, and strike a balance between risk and benefit that will be acceptable to the public."[81] By the mid-1960s, Commoner was beginning to recognize that risk analysis was the vital bridge across the great divide that separated the postwar technological revolution and the rising tide of ecological awareness.

When Commoner appeared on the cover of *TIME* in 1970, he was touted as the Paul Revere of ecology, the signaler of imminent danger. Within the

article, he was also part of a group of ecologists whom *TIME* called the "new Jeremiahs." That Commoner should be labeled both "the Paul Revere of ecology" and a new Jeremiah—patriot whistleblower and harbinger of doom—in the same *TIME* cover story suggests some of the ambiguity and popular misunderstandings surrounding the emerging environmental movement, but it also implies the centrality of his role and message within a broader American cultural history. As the Paul Revere of ecology, Commoner, no stranger to environmental conflict and controversy, gained recognition as a messenger raising the alarm of the environmental crisis, and also as one of the founding fathers of the contemporary environmental movement.

The American Jeremiah—who engaged in a mode of public exhortation that sought to marry social criticism and spiritual renewal—has been a persistent figure in American intellectual history. In its original iteration, the American jeremiad sought to illuminate the relationship between religious apocalypse and the imminent Revolutionary War. In its twentieth-century incarnation, the jeremiad took on an ecological flavor, determined to draw the attention of Americans toward the great divide between environmental apocalypse and the need for a revolution in how they conceived of the environment and their place in it. In tones of biblical grandeur, the environmental crisis suggested that the Judgment Day was nigh. Sacvan Bercovitch described the jeremiad as an intellectual common ground for spirituality and revolution. With reference to the American Revolution, he argued that "the meaning of revolution was emphatically and unequivocally progressive."[82] Revolution promised a spiritual renaissance. In a sense, the *TIME* characterizaton of the new ecologists as the logical heirs of the American jeremiad made perfect sense because they were effectively trying to incite a spiritual revolution within the American population to refocus its principles around a more ecologically sustainable mode of life.

The jeremiad form foretold decline and doom, and was a popular method of revitalizing the social and spiritual mission. Just as the original Jeremiah's dire predictions warned of the destruction of Jerusalem, the new Jeremiahs warned of the ongoing destruction of the Earth's ability to sustain life; both lamented the human fall from grace and saw the human condition and attempts at redemption as almost hopeless. But while the jeremiad's message foreshadowed despair, there lingered a glimmer of hope to which audiences were meant to cling. This was a compelling rhetorical

trick. Like the eighteenth-century evangelical leaders of the Great Awakening, Commoner and the other Jeremiahs aimed to lead their audiences to despair, but then redeem them through the narrowest of hopes. In publicly lamenting environmental decline and the dangers of postwar technological decisions, Commoner was very consciously adopting this powerful rhetoric to strengthen the urgency of his message. "*Any* change imposed on [the environment] for the sake of some economic benefit has a price," he wrote in *Science and Survival.*

> For the benefits of powerful pesticides we pay in losses of birdlife and fish. For the conveniences of automobiles we pay in the rise of respiratory disease from smog. For the widespread use of combustible fuels we may yet be forced to pay the catastrophic cost of protecting our cities from worldwide floods. Sooner or later, wittingly or unwittingly, we must pay for every intrusion on the natural environment.[83]

This was the jeremiad. Human folly had created an environmental crisis, the latter-day flood. The Second Coming was at hand, and humanity would need to seek redemption. But, in traditional jeremiad form, Commoner brought his audience back from the abyss. "We are still in a period of grace, and if we are willing to pay the price, as large as it is, there is yet time to restore and preserve the biological quality of the environment."[84] That price, he implied, involved a rejection of many of the technological products and production methods that significantly threatened human health.

Like any social movement, environmentalism was based upon a kind of moral persuasion that vigorously sought support through a variety of means. The jeremiad was a way of guilting people into behavioral change. Its success could be calculated by the popularity of the environmental leaders who adopted it. Popular scientists such as Commoner, Paul Ehrlich, René Dubos, and the ecologists LaMont Cole, Eugene Odum, and Kenneth Watt all used a rhetorical approach that mimicked previous jeremiads. Further, *Silent Spring* had been attacked for this kind of alarmism. In a particularly critical review in the *Saturday Evening Post, Newsweek*'s senior editor, Edwin Diamond, had blamed Carson for creating "a big fuss . . . to scare the American public out of its wits."[85] Even before the 1962 publication of *Silent Spring,* the apocalyptic warnings of environmental writers—particularly those who came from the scientific community—did to a certain extent emphasize the gloomy consequences of irresponsible environmental actions. Two highly influential environmental books from 1948 both tended toward the environmental jeremiad in their rhetoric. In

Road to Survival, William Vogt linked his jeremiad to the foibles of American free enterprise, which was divorced from biophysical understanding and social responsibility, and "must bear a large share of the responsibility for devastating forests, vanishing wildlife, crippled ranges, a gullied continent, and roaring flood crests."[86] In contrast, Fairfield Osborn firmly believed that free enterprise was inherently capable of correcting its own systemic abuses, but he, too, descended into a jeremiad in *Our Plundered Planet,* exhorting Americans to be cautious of "technologists [who] may outdo themselves in the creation of artificial substitutes for natural subsistence." The only proper approach, Osborn contended, was to accept "the necessity of cooperating with nature."[87]

Not surprisingly, the prospect of nuclear Armageddon spurred popular fiction and cinema. Nevil Shute's *On the Beach* and Walter M. Miller's *A Canticle for Leibowitz* are among the great literary works of the horrors associated with the nuclear age, while Stanley Kubrick's *Dr. Strangelove* brought the terrors of atomic holocaust to the silver screen.[88] Even Linus Pauling's 1957 petition for a nuclear test ban—written in Commoner's Washington University office—adopted the tone of a jeremiad in warning against potential dangers of not controlling nuclear weapons, culminating in "a cataclysmic nuclear war."[89] Late in 1960, the ecologist Paul Sears sent Chauncey Leake a document titled "A Statement of Conviction About Overpopulation," asking him to present it to the AAAS board. The document, signed by thirty-eight Nobel Prize winners, contained a similar ominous tone, warning that "unless a favorable balance of population and resources is achieved with a minimum of delay, there is in prospect a Dark Age of human misery, famine, under-education and unrest which could generate growing panic, exploding into wars fought to appropriate the dwindling means of survival."[90] Sears's 1935 classic on soils, *Deserts on the March,* was also imbued with gloomy prognostication for the future.[91]

Carson, therefore, had not exactly opened the floodgates, but as *Silent Spring* gained widespread attention, the jeremiad grew louder and bolder. To the most stringent of Jeremiahs, the end of history was indeed at hand. Garrett Hardin lamented the "tragedy of the commons," in which natural resources were being depleted with no chance of being replenished, and warned about the dangers of population growth in much the same tone as Paul Ehrlich would in his 1968 bestseller, *The Population Bomb*. In 1972, the Club of Rome, a group of highly esteemed MIT scientists, projected

that "if the present growth trends in world population, industrialization, pollution, food production and resource depletion continue unchanged, the limits of growth on this planet will be reached within the next hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity."[92] But while the siren calls of the new jeremiad brought considerable attention to the environmental cause, the project over the next decade would be to decipher the different messages in the jeremiad and make sense of environmental decline in America.

The environmental jeremiad became a powerful form of rhetoric wielded by a select group of charismatic politico-scientists who came to be recognized as the shamans of the spring.[93] Their knack for public engagement was instrumental in their relative success; these were not awkward lab scientists in lab coats, but articulate spokespeople advocating that ecological awareness was essential to human survival. The rise of the environmental jeremiad also marked an important development among the politico-scientists. Not only was the jeremiad politically engaged, it also demonstrated the development of a new language that was better suited to its audience. This development was absolutely critical to the growing public interest and literacy in ecology, and the urgency of the jeremiad. Ehrlich, in particular, was adept at offering such cataclysmic warnings both in his writings and in interviews. In one particularly famous interview that appeared in *Look* magazine the day before Earth Day, Ehrlich said: "When you reach a point where you realize further efforts will be futile, you may as well look after yourself and your friends and enjoy what little time you have left." For Ehrlich, in reference to overpopulation, "that point for me is 1972."[94] According to the journalist Stephen Fox: "In his endless round of lectures, interviews, and TV appearances, Ehrlich—with his thundercloud visage and deeply resonant voice—seemed the very personification of the Voice of Doom."[95]

Ehrlich was convinced that overpopulation had become such a significant problem that by 1968 it was already too late to prevent disaster. "The battle to feed all of humanity is over," he began in *The Population Bomb*. "At this late date nothing can prevent a substantial increase in the world death rate."[96] According to Ehrlich, famine and devastation were inevitable. Part of his success in *The Population Bomb* was this apocalyptic—jeremiad-like—tone that forced his readers to consider the issue of global overpopu-

lation. After condemning humanity to damnation, Ehrlich offered a modicum of hope. "Many lives could be saved," he suggested, "through dramatic programs to 'stretch' the carrying capacity of the earth by increasing food production. But these programs will only provide a stay of execution unless they are accompanied by determined and successful efforts at population control."[97] He founded Zero Population Growth, an organization promoting smaller families in the United States, and outlined the necessity for population control in his 1968 bestseller. *The Population Bomb* was an immediate success. Over three decades later it was still the most popular environmental book ever published, selling over 3 million copies in the first decade.[98] *The Population Bomb* was well written, which contributed both to its commercial success and to its persuasiveness. Ehrlich was committed to promoting the authority of science to combat the environmental crisis, and his ability to communicate his position effectively helped his cause. Readily adopting the role of Jeremiah allowed Ehrlich to promote the scientist as the intellectual and moral leader in the fight against the environmental crisis.[99] This authority gave even greater immediacy and significance to his message. The success of the book, his subsequent popular appearances, and his felicitous public speaking style made Ehrlich an instant celebrity, and his position all the more popular.

But while this energy propelled American environmentalism to new heights, it also provoked some interesting tensions surrounding the appropriation of scientific disciplines. Professional ecologists found their discipline under siege by political activists. Peter J. Bowler observes that "many people now see ecology as a science whose subject matter must necessarily lead its practitioners to side with environmentalists. The very word 'ecological' has come to denote a concern for the environment."[100] During the 1960s, ecology became a commonplace feature of the American lexicon; Commoner, Ehrlich, Carson, and other "ecologists" became household names; and shortly after Earth Day, Commoner would present his "Four Laws of Ecology."[101] Ecology and environmental politics evolved to the point that they were almost inseparable in the public imagination, and central to the new social project of ingraining environmental values into the popular American consciousness. Indeed, to these champions of ecology, ecology was more than just a tool for implementing environmental values; ecology, they asserted, would *inspire* environmental values.[102]

But few of these popular scientists—Commoner among them—had had any formal training in ecology. For Commoner and others, ecology was an idea masked in the authority of science rather than a science in practice. Stephen Bocking writes: "In contrast to assumptions that ecology provides a holistic view of nature, in practice ecologists focus on nutrient and energy flows, or on predation and competition, applying perspectives that can be highly reductionistic. . . . What is especially striking, then, in the ecology invoked by non-ecologists, is that while it trades on the authority of science, it does not correspond to ecology as practiced by scientists."[103] Why was Commoner so successful at co-opting ecology? In part, because he was outside the discipline, he was likely well positioned to recognize ecology's social significance and better able to synthesize—even beyond recognition—its principal tenets to make them accessible to a larger audience.[104] But Commoner and Ehrlich were also exceptionally charismatic and already had an eager audience. They had a pulpit from which they could expound upon this modification of the popular ecological gospel. Even if they did not hold up scientifically, the interconnected webs of life that characterized popular ecology were evocative, provocative, and effective in drawing out the environmental jeremiad on the fragility of life while also implying a level of scientific authority.[105]

Nevertheless, the frequent adoption of the jeremiad came at some cost to the environmental movement and to the scientific authority from which it drew. As the sociologist Deborah Lynn Guber notes, "By downplaying environmental progress and by using exaggerated doomsday warnings to motivate public awareness and concern, the environmental movement has sacrificed its own credibility by giving in to the politics of chicken little."[106] The political scientist Walter A. Rosenbaum warned that too much publicity and too many dire warnings posed the danger that "Americans may become desensitized to the problem or begin to suspect that the constant emphasis exaggerates the issue."[107] Moreover, through the use of the environmental jeremiad, Commoner and others were contradicting the guiding principles of the science information movement; whether it was precipitated by their rhetoric or the visible state of environmental decline, the public came to see these popular scientists as prophets. Commoner fought this—it was, ironically, another instance of a lay audience turning to expert authority—but the public was enraptured with the compelling ecological rhetoric presented by these charismatic scientists, many of

whom did not subscribe to the tenets that had driven Commoner's own commitment to science and social responsibility.

According to the critic Charles Rubin, another of the consequences of the jeremiad was the acquisition of a "public taste" for largesse and omens of ecological disaster. Citing Carson's *Silent Spring* and Commoner's *The Closing Circle,* Rubin argued that writing on environmental issues became

> the intellectual equivalent of a gothic romance, with a large cast of characters, involuted relationships, and a lurking menace. But the public's ability to appreciate the delicate balances and interrelationships of political and social structures has undergone a corresponding debasement, evident in rampant sloganeering, shameless emotionalism, and mindless panic and pessimism whenever "what is wrong with our society" comes under discussion. In this realm, only the crudest morality tales satisfy. Carson and Commoner have alerted us to matters that may well demand our attention. But they have done so at the cost of our ability to give that attention in a thoughtful way.[108]

But to suggest that Commoner and Carson were responsible for creating a context for "rampant sloganeering" and "shameless emotionalism" is more than a little misguided. In articulating their critique of industrial practices, they impressed upon the public the gravity of the situation, grounded their concerns in scientific evidence, and presented them in a style that adhered to their faith in the power of public information. By the 1960s, there were also scientific bases for environmental concern; Carson's fears about pesticides were certainly justified by the Mississippi River fish kills, for example. Further, Commoner and the other ecological scientists contended, the longer society ignored their warnings, the more jeremiad-like they would—by necessity—become.[109]

Indeed, to Commoner and the other Jeremiahs, the state of the environment—from air pollution to soil and water contamination—combined with consumerism as the prevailing public characteristic, warranted a little public alarmism. "We have compiled a record of serious failures in these recent encounters with the environment," Commoner insisted in a 1966 address based heavily upon work that appeared in *Science and Survival.*

> This record shows that we do not yet understand the environment well enough to make new intrusions on it, on the large scale that is now possible, with any reasonable expectation of accurately predicting the consequences. But we can ignore the biology of the environment—and tolerate our present ignorance of it—only at our peril. Pollution by detergents, pesticides, herbicides, radioisotopes, and smog is dangerous, in my view, because it represents a blind intrusion into aspects of the

complex biology of the environment which are still poorly understood. Apart from their known hazards these pollutants represent a huge gamble. The odds are unknown, but the stakes are enormous.[110]

Here, in a nutshell, was the significance of risk analysis. Surely the stakes—human health and the health of our environment—were too high to justify ignoring the potential risk of forging ahead without greater recognition of the extent and the impact of those intrusions.

Indeed, Commoner's activism was carefully calculated. He had learned during his undergraduate years at Columbia in the 1930s the importance of finding a rational way of approaching problems and of publicizing them.[111] Distinct from other jeremiads, Commoner's method was more deliberate and more premeditated, and, perhaps, less overtly jeremiadic. In his prose, Commoner maintained a calm tone designed to engage his readers rather than incite them. His main priority remained a deep-seated belief that access to information constituted a vital form of public empowerment. The necessity of public participation and the perceived political power of an informed citizenry became his standard theme. If the jeremiad moved Americans toward numbing fear of environmental problems, then it was hardly the right technique to promote public participation.

Or maybe it was. There was certainly a time in which the jeremiad was exceptionally persuasive—as evidenced by Ehrlich's mainstream celebrity—and scientific information relating to the environment was unquestionably dire. The environmental momentum cultivated in the 1960s became the central focus of the greatest environmental celebration in human history. At its core, Earth Day paid homage to the ecological imagination, made public its declarations of the importance of more sustainable industries and lifestyles, and sought to educate the American public in achieving these new goals. Earth Day was a teach-in and, in that guise, a prime example of the power of public information. Just as ecology preached a more holistic approach to environmental problems, Earth Day appealed to a more inclusive sense of movement. Issues of clean air, clean water, and safer foods were not concerns over which the new social environmentalists held any kind of monopoly; these issues also appealed in many ways to the conservative, silent majority, who had been alienated by much of the 1960s social activism. In fact, Earth Day and subsequent environmental activism illustrated some of the difficulties of bringing divergent interests under the same tent. The more people sought to identify with

environmentalism, the more difficulty arose in trying to define the movement or to reconcile different priorities. Was environmentalism about natural resource conservation? Public health? Wildlands protection? And even within these disparate categories, rationale for their defense varied significantly. If Earth Day was a celebration of environmentalism's ascendance, it would also mark the beginning of the rifts that would divide the movement.

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When Scientists Disagree

We have met the enemy—and he is us.
—Pogo

No singular event more amply illustrates the promise and the chaos of modern environmentalism than the first Earth Day. According to Harold Sprout, "Not since the Japanese attack on Pearl Harbor has any public issue received such massive support in all the news media, local as well as national."[1] The organizers of Earth Day sought to define the celebration as a "commitment to make life better, not just bigger and faster, to provide real rather than rhetorical solutions" to the environmental crisis.[2] As broadly as possible, Earth Day intended to demonstrate the extent to which American values regarding the environment had changed—particularly in relation to the increased rejection of American standards of acceptable risk—while also articulating the scope of this cultural shift in American society.

Earth Day also reaffirmed Commoner's connections between peace and environmentalism. The Vietnam War was still very much a source of fractious sentiment in the United States, and antiwar activists were prominent among the Earth Day celebrants. Balloons and banners across the country boldly stated, "war is the worst pollution," "war is not healthy for children and other living things," and "Earth—love it or leave it."[3] An Earth Day commentator trying to assuage differences between antiwar and environmental activists concluded that "most people don't want the world to go up in smoke—or under in smog."[4] Commoner was far more explicit in making the connection. In an Earth Day talk at Brown University, he charged that the herbicide attacks on Vietnamese forests and agricultural fields constituted "the first ecological warfare conducted by the U.S. since