



H-Environment

H-Environment Roundtable Reviews

Volume 11, No. 5 (2021)
<https://networks.h-net.org/h-environment>

Publication date: October 7, 2021
Roundtable Review Editor:
Keith Makoto Woodhouse

**Toshihiro Higuchi, *Political Fallout: Nuclear Weapons Testing and the Making of a Global Environmental Crisis* (Stanford: Stanford University Press, 2020)
ISBN: 9781503612891**

Contents

Introduction by Keith Makoto Woodhouse, Northwestern University	2
Comments by Sumiko Hatakeyama, University of Pennsylvania	5
Comments by Stephen Macekura, Indiana University	8
Comments by Rachel Emma Rothschild, New York University Law School	11
Comments by Perrin Selcer, University of Michigan	16
Response by Toshihiro Higuchi, Georgetown University	21
About the Contributors	27

Copyright © 2021 H-Net: Humanities and Social Sciences Online

H-Net permits the redistribution and reprinting of this work for nonprofit, educational purposes, with full and accurate attribution to the author, web location, date of publication, H-Environment, and H-Net: Humanities & Social Sciences Online.

Introduction by Keith Makoto Woodhouse, Northwestern University

At a moment when so much life on Earth lurches toward interconnected disasters catalyzed by climate change, it is easy to forget how palpable fears of worldwide catastrophe were long before the Anthropocene became a familiar concept. During the Cold War the world lived in the shadow of both nuclear war and radioactive fallout. Nuclear annihilation was the ultimate nightmare scenario, but fallout—the atmospheric dispersion of radioactive particles from nuclear explosions and the harms such particles caused when they fell back to Earth—was the more immediate and in many ways the more serious concern. In *Political Fallout*, his rich and fascinating study of the politics of nuclear testing, **Toshihiro Higuchi** reminds us that global environmental crisis was an already familiar peril in the mid-twentieth century, and that the Cold War and climate change are conceptually interconnected through what Higuchi calls “the nuclear Anthropocene.”

Political Fallout looks at the early years of nuclear testing, from the Trinity test of 1945 to the 1963 signing of the Partial Test Ban Treaty (PTBT) by the United States, the United Kingdom, and the Soviet Union. Although this period predated Earth Day, the publication of *Silent Spring*, and several other conventional markers of an emerging environmental consciousness, Higuchi argues that the PTBT should be remembered as a treaty that “directly addressed a truly global, human-induced environmental issue” (2). The PTBT simultaneously limited the effects of fallout while sustaining the practice of nuclear testing, and Higuchi suggests that its failings as an arms control measure should be weighed against its significance as an environmental milestone.

Higuchi is most interested in nuclear fallout as a political and epistemic problem, one that required new approaches to assessing harms and benefits—what Higuchi calls “the politics of risk.” He traces this politics across different scales, from international diplomatic negotiations to local data collection. As politicians, scientists, and concerned citizens considered the effects of fallout the idea of broadly applicable standards for measuring risk crumbled. Local studies overturned universal conceptions of tolerable risk, and what was once seen as a negligible threat to any given individual came to be understood as an unacceptable danger to humanity as a whole. Higuchi has written a book that, like the study of fallout itself, delves into specific details in order to reach conclusions that hold global significance.

Sumiko Hatakeyama begins the roundtable with a useful summary of some of the main themes in *Political Fallout*, situating the book in relation to other key works as well as to recent events like the 2011 debacle at the Fukushima Daiichi Nuclear Power Plant. Hatakeyama focuses particularly on two related aspects of Higuchi’s work: the role of food in understanding risk and harm, and the often misleading use of averages in evaluating the seriousness of specific threats. In the wake of the

Castle Bravo nuclear test “atomic-bomb tuna” caused an international outcry, and varying levels of consumption of wheat, rice, and dairy products (and their relative absorption of radionuclides) led to questions about differentiated risk. That differentiation was crucial, Hatakeyama notes, in challenging the notion that “average risk” was a meaningful measurement. Hatakeyama pushes this idea even further, asking whether what she calls Higuchi’s “relatively bright image of the politics of risk” sufficiently accounts for the ways in which some people—like those involved in uranium mining and nuclear weapons production—did not necessarily benefit from the broader reforms and realizations that Higuchi narrates.

Stephen Macekura calls *Political Fallout* a valuable contribution to not just environmental history but also the history of the Cold War, the history of science, and the history of nuclear diplomacy. Macekura praises Higuchi’s work for its multinational perspective, its careful accounting of scientific opinion, and its interest in the relationship between high-level policymaking and on-the-ground social and political change. He also asks how we should understand one of the book’s central claims: that atmospheric testing and the Partial Test Ban Treaty contributed to an emerging environmental consciousness. Although the PTBT did include antipollution language, Macekura notes, it is difficult to say how earnest and how novel such language was. And while Higuchi is right to claim that the PTBT made the arms race more “sustainable” in the sense that it curtailed some of the worst effects of testing, Macekura suggests that narrow conception of sustainability glosses over many of the Cold War’s most environmentally damaging consequences.

Rachel Emma Rothschild focuses on Higuchi’s history of the idea of “acceptable risk,” and the practical and ethical questions concerning expert knowledge and democratic decisionmaking. It was scientific disagreements about what constituted a permissible dose of radiation—what Higuchi refers to as “epistemic divides”—that set the stage for the PTBT. The idea of a permissible dose was in part a useful fiction that stood in tension with both the linear non-threshold hypothesis, which suggested that it was impossible to determine a harmless amount of fallout, and with growing evidence of unequal exposure because of distinct diets. Rothschild finds Higuchi’s narrative fascinating and compelling, but she also notes how difficult it is to determine causation for something as complicated as an international treaty. Was the United Nations Scientific Committee on the Effects of Atomic Radiation crucial, as Higuchi suggests, or was it simply one factor among many, including grassroots activism and pivotal events like the Cuban missile crisis? Rothschild also questions the idea of an “antipollution norm,” to which Higuchi attributes some of the concerns about fallout held by Eisenhower, Kennedy, and Khrushchev. How normal and stable was such a view in the 1950s and early 1960s, she asks, and how can we know that world leaders subscribed to an environmental ethos that would be recognizable today? It is possible, Rothschild suggests, that the PTBT was a product of more prosaic and strategic motivations.

Like Rothschild, **Perrin Selcer** dives into what Higuchi calls “the politics of risk,” and in particular the ways that Higuchi takes some of the more abstract dimensions

of the sociologist Ulrich Beck's "risk society" and narrates them through complex and detailed descriptions of epistemic contests between different scientists, between scientists and national security bureaucracies, between the various nuclear powers, and between nuclear powers and nonnuclear states. In Higuchi's telling, Selcer explains, geneticists challenged the idea of a "tolerance dose" that U.S. nuclear officials claimed was completely safe, and those officials pivoted to a "permissible dose" that posed an acceptable risk. That shift from guarantees of safety to estimates of allowable hazards hid a troubling sort of accounting as well as searching debates among scientists, and revealed the ways in which scientific views of nuclear risks could be freighted with nonscientific judgments and assumptions. At the same time, it contributed to an erosion of authority among officials who hoped to reassure an increasingly nervous public. The politics of risk, Selcer agrees, are essential to understanding the history of nuclear diplomacy and radioactive fallout. But he wonders whether the risks posed by nuclear testing were a public health crisis as much as or more than an environmental crisis. Public health and environmental concerns have often been intertwined, but Selcer notes that fears about fallout focused exclusively on human bodies. What might the history of the PTBT teach us, Selcer asks, about framing climate politics in terms of public health, and about the wisdom of attempting to achieve environmental change through international treaties?

In his response, Higuchi addresses some of the larger questions raised by his work: the complex dynamics of transborder environmental issues, the necessary interconnections between national security and environmental risk, and what exactly we mean by "environmental."

Many thanks to all of the roundtable participants for taking part.

H-Environment Roundtable Reviews is an open-access forum available to scholars and non-scholars alike, around the world, free of charge. Please circulate.

Comments by Sumiko Hatakeyama, University of Pennsylvania

Toshihiro Higuchi's *Political Fallout* elegantly navigates through the entangled process of knowledge production about radiation risk. Through meticulous research using archival materials, periodicals, and other published sources, Higuchi examines the intersection between science, politics, and diplomacy and reconstructs the politics of risk that transformed the meaning of radioactive fallout: from a harmless side effect to an intolerable threat to humanity. By demonstrating the effectiveness of the Partial Test Ban Treaty of 1963 in its environmental objective, Higuchi argues that “the Cold War not only contributed to the escalation of atmospheric nuclear testing but also ultimately helped to mitigate its radiological consequences” (12).

The book joins Jacob Hamblin's *Arming Mother Nature* (2013), among others, in viewing nuclear/radiation history through environmental and humanitarian lenses. This is a timely contribution that provides a historical narrative to the current debates around nuclear disarmament, which have similarly reframed nuclear concerns as environmental and humanitarian issues. In January of this year, the Treaty on the Prohibition of Nuclear Weapons (TPNW) entered into effect, reflecting a major shift in the global perception of risk posed by nuclear weapons. The philosophy underpinning TPNW is one that sees any potential nuclear explosion—intended or unintended—as an environmental and humanitarian catastrophe. Furthermore, as we approach the tenth anniversary of the disaster at the TEPCO Fukushima Daiichi Nuclear Power Plant, it is important to rethink the environmental and humanitarian consequences of radiation hazard more generally.

In *Political Fallout*, Higuchi initially provides a familiar account of how nuclear states—namely the United States, the Soviet Union, and the United Kingdom—leveraged the invisibility and uncertainties of radiation risk to their advantage. By stressing the limited amount of radiation produced by nuclear testing, the nuclear powers defined radioactive contamination as a harmless phenomenon. They also emphasized the remoteness and isolation of the test sites, even though those sites were often home to Indigenous populations and “isolation...was an illusion” (19). In the eyes of these nuclear powers, the need for the uninterrupted development of nuclear weapons outweighed the need to properly address the numerous unknowns about radiation risk and redefine radioactive contamination outside the test sites.

However, what *Political Fallout* subsequently illustrates is the active engagement of different stakeholders in negotiating the redefinition of fallout hazards. By focusing on the receiving end of radioactive fallout, chapters 2 and 5 describe how the “atomic-bomb tuna” and “radioactive rain” facilitated a much more cautious attitude among the Japanese government officials and scientists when compared to the American counterparts. The significance of this cannot be underestimated given that Japan was a key U.S. ally “supposedly sharing the same security interest with the Americans” (117). Similarly, chapter 6 attends to community-based fallout surveys

in the United States and Britain: in Minnesota and Wales, concerned scientists, activists, and citizens systematically checked radioactivity in their food and drink and challenged the definition that the radioactive fallout was harmless. Higuchi offers a persuasive account of the process through which these efforts from below revealed the epistemic vulnerabilities embedded in the safety claims of the nuclear powers.

As I read through the chapters, I was struck by how food features prominently in Higuchi's account of the politics of risk. Works in environmental history—including Linda Nash's *Inescapable Ecologies* and Michelle Murphy's *Sick Building Syndrome and the Problem of Uncertainty*—have explored bodies as instruments that make risks and hazards perceptible. *Political Fallout* suggests that food—and as a corollary fishing and farming too—can also be a powerful analytic when studying environmental hazards. Higuchi vividly illustrates that food directs the attention of officials, scientists, and citizens to the dynamic and inevitable interplay between human activities and natural forces. Food makes it evident that humans are deeply embedded in the intricate web of ecosystems. Throughout *Political Fallout*, food and water are precisely what make global fallout perceptible to the public. The abstract notion of radiation risk suddenly became a concrete source of concern for Japanese people when it was reported that tuna were contaminated, and rains were radioactive. The deep connection between cities and seas also became apparent to the consumers in this process.

Intriguingly, food also destabilizes the process of knowledge production. In *Political Fallout*, food illuminates cultural biases that are often hidden in scientific investigations: in the UNSCEAR project, while the “Western” scientists focused on milk and dairy products in their proposal for the international standardization of fallout surveys, the Japanese delegation insisted that the investigation of oceanic and fish contamination could not be left out; the Minnesota scientists resisted the exclusion of wheat from their study because they knew wheat was an important part of the diet in the region. *Political Fallout*, perhaps unintendedly, reveals the generative power of food as a focus of study when examining the intersection between science, culture, and politics.¹

As someone with a profound interest in the tension between the population risk and individual risk of a particular hazard, I was also particularly interested in the attention Higuchi pays to how “the myth of the average” gets challenged and dismantled. Key to the renegotiation of the definition of radiation risk was the realization that the standards set based on the universal claim would not necessarily guarantee the safety of individuals when applied to a particular risk situation. In the community-based fallout surveys, scientists and citizens realized that the wind patterns, rainfall, soil characteristics, diet, and metabolism rendered some areas, foodstuffs, and individuals more contaminated than others. In fact, it

¹ Aya Hirata Kimura's *Radiation Brain Moms* is one of the works that looks at the issue of food safety as a way to analyze the complicated relationship between science, foodways, gender, and politics.

was precisely the awareness that the impacts of global fallout were unequally distributed among people and across regions that prompted different stakeholders to actively engage in the epistemic negotiations. Here, Higuchi offers an opportunity for readers to reflect on the relationship between popular mobilization and risk perception.

Overall, Higuchi provides a relatively bright image of the politics of risk, where those actually and potentially affected by the global fallout could successfully navigate through the epistemic negotiations by constructing victimhood. As I close my comment, it may be important to contemplate the question of who could participate in this socio-epistemic construction of victimhood and who may have been left behind by this “global environmental consciousness.” As Higuchi himself suggests, the redefinition of risk from the global fallout drove nuclear weapons tests underground. While this move substantially reduced environmental contamination, it simultaneously contributed to the systematic obstruction of the ongoing health and environmental effects of nuclear weapons production from the public view. While radiation hazards were substantially reduced for the majority of the global population, those engaged in uranium mining and nuclear weapons production, just to name a few, continue to suffer from the health effects of radiation. Might this suggest that there could be a whole realm of politics of risk, where victims continue to go unheard, or where sufferers cannot even be part of the process?

Comments by Stephen Macekura, Indiana University

It was an odd morning at the market. In the early hours of March 16th, 1954, amid the normal hustle and bustle of Tokyo's Tsukiji Fish Market, a group of men burst inside carrying a Geiger counter. They homed in on a rack of tuna from the fishing port of Yaizu. The counter chirped as they swept across the frozen fish. The men quickly but carefully picked up the "atomic-bomb tuna," as it came to be called, and buried it deep underground at a corner of the market. Tokyo police quarantined the building.

The tuna, it turned out, had been exposed to radiation a couple of weeks earlier. On March 1st, the United States military conducted the Castle Bravo test at Bikini Atoll in the Marshall Islands. The device tested was a 15 megaton bomb, a weapon with a thousand times the force of the bomb dropped on Hiroshima. The detonation generated the radiation that passed through the tuna, the Japanese fishermen out catching it, and all other living matter for hundreds of miles east of the explosion. The radiation gravely sickened the ship's crewmen, and even killed one of them. But it was the tuna that captured the national imagination in Japan. It made atomic fallout seem like a serious threat to public health in a way few imagined it had been. Distant tests by the superpowers were one thing, but the thought of kids eating radioactive fish from the dinner plate brought the Cold War home.

This disturbing anecdote is one of many illuminating stories in Toshihiro Higuchi's book. The tale of the atomic tuna cuts to the core of the mystery he solves. How did atomic fallout—initially deemed harmless by many experts and laypeople alike at the start of the 1950s—become a global environmental problem that policymakers in multiple countries sought to redress? Higuchi answers that question with a close and very detailed study of evolving scientific opinion in multiple countries (chiefly Japan, the United States, the United Kingdom, and the Soviet Union). He shows how scientists and activists shifted the definition of radioactive fallout "from a harmless phenomenon to an unacceptable hazard" (195). Political leaders seized on the shifting public opinion about risk to advance national security goals, which culminated in the surprising conclusion of the Partial Test Ban Treaty (PTBT) in 1963. Though historians and political scientists have often characterized the agreement as a check on the arms race, Higuchi argues that the PTBT also marked an early breakthrough for global environmentalism since the treaty contained language that identified fallout as a global environmental threat.

Political Fallout is a valuable contribution to the international history of the Cold War, the history of science, and multilateral nuclear diplomacy. The book is, at root, a careful and judicious history of the changing meanings attached to a concept—"fallout"—and how key individuals interpreted those changing meanings to influence policy. To tell such a story convincingly, a historian needs to demonstrate mastery of scientific opinion and foreign policy-making and grand strategy. Higuchi does both with great skill. His chapters take the reader through scientific reports,

fierce debates among experts (his discussion of the conflicting interpretations of fallouts from biologists and geneticists in chapter 3 is especially compelling), and through high-level diplomacy. His work is a terrific addition to the booming literature on science, expert politics, and the Cold War.¹

His book is also a marvelous example of how multinational perspectives can enrich our understanding of the Cold War. Higuchi explores scientists and diplomats across the United States, Japan, Great Britain, and the Soviet Union. He interweaves a careful study of scientific trends and debates, within each country as well as between nations, through a well-paced diplomatic and political history of how national leaders and policymakers responded to shifts in scientific and popular opinion over fallout. His final two chapters—which examine localized fallout studies in the United States and United Kingdom and the diplomacy over the PTBT, respectively—are models of how to link ground-up social and political change with thorough and measured analysis of the policymaking and treaty negotiation processes. Throughout the book, he balances his analysis with colorful anecdotes, such as the story of the “atomic-bomb tuna,” to illuminate how regular citizens interpreted and understood the major shifts in the perceived threat posed by fallout. Overall, I found his explanation for the shift in opinion over fallout and its contribution to the PTBT persuasive and compelling. The themes that Higuchi explores—the relationship between science and diplomacy, the connections between the Cold War and the Anthropocene—are broad enough to warrant a wide readership among historians.

One theme that calls for further study is that atmospheric nuclear testing contributed to a sense of global environmental crisis and corresponding environmental consciousness (4). Higuchi makes this case in part by highlighting the inclusion of “antipollution” language in the preamble to the 1963 PTBT (6). While the scientists he analyzes came to view fallout as a quintessentially global threat, it is not evident exactly how robust the “environmental consciousness” that emerged from fallout actually was. In the first place, geneticists were not the only scientists to begin to understand the world in distinctly global terms threatened by Cold War developmentalism or the superpower rivalry. Tom Robertson, Thomas Jundt, and Perrin Selcer, for instance, have shown how wildlife biologists, zoologists, and soil scientists had earlier constructed an emergent global environmental consciousness during the 1940s and 1950s that contributed directly and explicitly to environmental activism.² What, then, was distinctive about the fallout experts’

¹ See, for example, Audra J. Wolfe, *Freedom's Laboratory: The Cold War Struggle for the Soul of Science* (Baltimore, Johns Hopkins University Press, 2018); Naomi Oreskes and John Krige, eds. *Science and Technology in the Global Cold War* (Cambridge, MA: MIT Press, 2014); Jacob Darwin Hamblin, *Arming Mother Nature: The Birth of Catastrophic Environmentalism* (New York: Oxford University Press, 2013); and Joy Rohde, *Armed with Expertise: The Militarization of American Social Science during the Cold War* (Ithaca: Cornell University Press, 2013).

² Thomas Robertson, *The Malthusian Moment: Global Population Growth and the Birth of American Environmentalism* (New Brunswick, NJ: Rutgers University Press, 2012); Thomas Jundt, “Dueling Visions for The Postwar World: The UN and UNESCO 1949 Conferences on Resources and Nature,

contribution to environmental consciousness beyond the inclusion of vaguely environmental language in the 1963 treaty? And second, Higuchi's own analysis suggests that more conventional strategic motivations drove the thinking of national leaders—such as Nikita Khrushchev and John F. Kennedy—who supported the “antipollution” language in the treaty. The “three nuclear powers” that signed the PTBT, Higuchi writes, “still considered the agreement primarily from the point of view of national security rather than environmental health” (186).

So how should we understand the consequences of the story Higuchi tells for the history of environmental thoughts and politics? In the introduction, Higuchi suggests that by simply moving tests underground and limiting fallout, the PTBT made the arms race more “sustainable” (4). This phrasing is somewhat ambiguous. It highlights how the shift away from atmospheric testing limited the ecological consequences of the arms race, yet I worry that this small point is a bit misleading because it focuses on “sustainability” in only a narrow sense. Clearly—and this is admittedly beyond the scope of Higuchi's book—there were far more energy and pollution costs to the production of nuclear weapons than just their testing. Uranium excavation scarred landscapes and sickened workers and residents near major mines across the globe. And of course little else about the Cold War conflict was sustainable, from disastrous non-nuclear conflicts in countries such as Vietnam to the rampant fossil fuel use that sustained growth-oriented economies worldwide. While the Cold War and Anthropocene should indeed be told as intertwined rather than parallel stories—as Higuchi's book makes clear—it is important to stress that the manic militarism of the era and its toxic legacies did not abate after 1963, no matter how striking a nascent “environmental consciousness” may appear in retrospect.

The questions I pose here are a testament to Higuchi's stimulating book, which encourages readers to ponder how shifting scientific interpretations can influence political thought and activism. I hope the book will spark further study of the origins, evolution, and limits of twentieth century global environmental thought and politics. *Political Fallout* is a necessary inclusion in graduate reading lists for courses in international history, the history of science, environmental history, and the history of U.S. foreign relations. It is a book that readers of this list will find enjoyable and insightful.

and the Origins of Environmentalism,” *Journal of American History*, Vol. 101, No. 1, (June 2014), 44-70; Perrin Selcer, *The Postwar Origins of the Global Environment: How the United Nations Built Spaceship Earth* (New York, NY: Columbia University Press, 2018),

Comments by Rachel Emma Rothschild, New York University Law School

The problem of defining what constitutes an “acceptable” risk, and for whom, has plagued scientists and policymakers tasked with mitigating the health consequences of pollution. As countless studies have demonstrated, humans are notoriously terrible at understanding relative risks.¹ Risk reduction policies therefore raise difficult ethical questions about the extent to which scientists and regulators should make decisions for the rest of the population. If we believe that some degree of expert deference is warranted, how much does a society rely on specialized knowledge? Who gets to participate in scientific debates? These issues become even more challenging at the international level, particularly when one group of countries constitutes the “polluters” while the rest of the world is subjected to the environmental and public health consequences of their activities.

Radioactive fallout from nuclear weapons testing was the first, but certainly not the last, environmental pollution problem to pose such questions. As historians have shifted their attention from the great power politics of the Cold War to questions of human rights, science, and technology, the role of environmental pollution in shaping 20th century international history has received more scholarly attention. Toshihiro Higuchi’s *Political Fallout: Nuclear Weapons Testing and the Making of a Global Environmental Crisis* offers a welcome addition to this literature by focusing on how concerns about radioactive fallout influenced debates over nuclear testing during the early years of the Cold War. The importance of public fears about fallout in the negotiation of the 1963 Limited Test Ban Treaty, which banned above-ground nuclear explosions, is not an entirely unmined area of scholarship. Historians such as Allan Winkler have shown that American anxiety about the bomb rose dramatically after research in the late 1950s revealed increasing concentrations of radioactive isotopes in baby teeth and milk.² These studies spawned a mass U.S. movement of anti-nuclear activists and concerned women who campaigned against testing. Environmental historians have also broadened our understanding of the Cold War’s planetary effects through research on the wide-ranging ecological effects of atomic bomb detonations.³ What distinguishes Higuchi’s contribution is his focus on the role of scientific experts in Japan, the U.S., Britain, and the Soviet Union in attempting to define what constituted a “permissible dose” of radiation. Their failure to achieve a consensus on safe amounts of fallout exposure, in Higuchi’s telling, helped pave the way for a diplomatic accord limiting above-ground nuclear tests.

¹ For an excellent summary of the ways in which public risk perceptions can differ from those of experts, see Stephen Breyer, *Breaking the Vicious Circle: Toward Effective Risk Regulation* (Harvard University Press, 2009), pp. 35-38.

² Allan M. Winkler, *Life Under a Cloud* (Chicago: University of Illinois Press, 1999), p. 102.

³ See, for example, J. R. McNeill and Corinna R. Unger, *Environmental Histories of the Cold War* (Cambridge University Press, 2010).

In order to appreciate the scope of radioactive fallout and its resulting dangers, scientists depended on improved environmental surveillance systems. Higuchi explores the development of these monitoring efforts following the 1954 *Lucky Dragon* incident, in which radioactive ash from a U.S. nuclear test in the Marshall Islands sickened crew members aboard a nearby Japanese fishing vessel. The episode prompted Japanese scientists to investigate the spread of radioactive fallout beyond U.S. Pacific testing sites (50). These research efforts were a departure from earlier nuclear monitoring that had been driven more by intelligence demands than public health concerns (38-39). A similar change in approach happened within the U.S. Atomic Energy Commission (AEC) Division of Biology and Medicine, which saw an influx of funding for environmental research after the 1954 incident.⁴

Once these investigations revealed the dispersal of radioactive fallout around the planet, scientists and government officials were forced to confront how dangerous these exposures might be. Some of the most compelling discussions in the book examine subsequent debates between U.S. government scientists and their civilian counterparts over how to contextualize the risk of genetic damage from atomic testing. For example, Higuchi highlights an exchange between geneticist Alfred Sturtevant and John Burger, Director of the AEC's Division of Biology and Medicine, in which Burger encouraged Sturtevant to weigh the risks of fallout against preexisting background levels of radiation (73). In Burger's view, it seemed irrational to object to fallout from nuclear testing when humans were exposed to more radiation from natural sources. For Sturtevant, however, the question was not one of absolute risk, but of whether it was ethical to subject people to radiation risks without their consent and in service of an escalating arms race (75).

Accumulating evidence of genetic damage at even minute levels of radiation exposure compounded the difficulty in assessing the health and environmental risks of nuclear tests. Eventually known as the "linear non-threshold" hypothesis, this research suggested that there could never be a truly safe, harmless amount of fallout. Scientists both inside and outside the U.S. government agreed that the linear non-threshold hypothesis had a reasonable scientific basis but hesitated to "apply this knowledge to regulatory action" because of "its operational difficulty" (91). Higuchi describes how U.S. geneticists eventually came around to publishing a recommended "permissible dose" that would allow continued use of nuclear technology in medicine and for weapons security. For them, it was better to put forward a potentially arbitrary number rather than allow government officials to set a permissible exposure level without guidance from geneticists. As Burger had suggested, they ultimately chose a limit that accounted for the radiation typically emitted from medical technologies, with an additional allocation for exposures from nuclear weapons tests.

⁴ See Rachel Rothschild, "Environmental Awareness in the Atomic Age: Radioecologists and Nuclear Technology," *Historical Studies in the Natural Sciences* 43, no. 4 (September 2013): 492-530.

Higuchi exquisitely deconstructs the political and social assumptions behind the permissible dose concept in his examination of the United Nations' Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). Formed in the years after the *Lucky Dragon* incident, its original purpose was to create a consensus report on global levels and effects of radioactive fallout. Yet UNSCEAR's discussions helped expose some of the flaws in the concept of a permissible dose. Japanese scientists who attended UNSCEAR meetings insisted that any evaluation of what constituted a permissible dose must include rice consumption, rather than just Western diet staples like milk. UNSCEAR assessments later showed that Japanese citizens faced six times the radiation exposure of Western populations because of their rice intake, undermining the notion that atomic testing could be done in a "permissible" way for all populations. The historical analysis of UNSCEAR's meetings superbly illuminates how the intergovernmental group allowed scientists from outside the U.S. to reframe what constituted an acceptable radiation risk.

The book contends that UNSCEAR's final report on fallout hazards not only influenced the direction of scientific research on radiation exposure, but also helped persuade the U.S. and British governments to support a testing moratorium. While Higuchi's research does provide some support for this claim, it would have been worthwhile to examine UNSCEAR's report in the context of domestic developments in these countries around the same time. For instance, the book suggests that the UN meetings spurred a shift even among hardline nuclear proponents like scientists Willard Libby and Edward Teller, but it doesn't fully explore why they might have changed their tune, simply stating that there was "surprising flexibility of fallout hazard deniers" (133). And in an odd paradox, even as Teller apparently adopted a softer line with the Eisenhower White House on testing, he was lobbying for a government program called Project Plowshare that sought to use nuclear bombs for peaceful construction purposes.⁵ I wished the book had tried to reconcile this contradiction more explicitly, as it left me wondering how much historians should credit the UNSCEAR report with moving towards a cessation of above ground testing. Indeed, as Higuchi notes, an additional factor that brought the U.S. and Soviet Union closer to a test ban treaty was rising public opposition to fallout. How are historians to weigh the relative impact of international diplomatic efforts at the UN compared to this burgeoning private activism? And how important was the 1962 Cuban missile crisis, which receives relatively brief mention in chapter seven, to the U.S. and Soviet Union's receptivity to a testing ban? Perhaps all were necessary steps toward the 1963 treaty, but it would be useful to know what Higuchi thinks proved most impactful, particularly as concerns over fallout frequently "seemed to give way to the logic of national security" in the years leading up to the treaty's negotiation (170).

A lingering question the book leaves open is what precisely constituted the radioactive fallout "antipollution norm". Higuchi uses this phrase to describe

⁵ On Project Plowshare, see Scott L Kirsch, *Proving Grounds: Project Plowshare and the Unrealized Dream of Nuclear Earthmoving* (Rutgers University Press, 2005).

Eisenhower, Kennedy, and Khrushchev's concerns about fallout, and he argues that each leader at times viewed the test ban treaty as "an antipollution measure" (160-161, 185). But despite the book's persuasive evidence about the growing opposition to nuclear testing within the U.S. and Soviet governments, it seems a bit misleading to call these officials' concerns over fallout an antipollution norm. The term evokes a commonplace and entrenched ideology, which does not reflect the conflicting attitudes and policies towards radioactive fallout in the U.S. and Soviet Union that Higuchi so aptly details in the rest of the book. And it is unclear if Eisenhower, Kennedy, Khrushchev, or other members of their administrations ever used the word "pollution" to describe radioactive fallout. If they did not, how might we better understand the origins of their concern about fallout contamination? Higuchi provides one possible answer: the ethical problems with inflicting genetic damage on innocent third parties, which seems to have troubled Kennedy especially. But this is not quite an antipollution norm, nor is it necessarily a philosophy rooted in an environmental ethos. It would be interesting to hear more from Higuchi about whether, prior to Rachel Carson's infamous connection between radioactive fallout and chemical pollution in *Silent Spring*, similar ideas truly began to animate government policies on nuclear testing.⁶

Rather than a triumph of environmental ethics, the 1963 Limited Test Ban Treaty appears to have been the result of a dispassionate calculus that the public health costs of aboveground nuclear testing were no longer justified by the benefits to national security. U.S. geneticist Edward B. Lewis put the risk-benefit calculus in stark terms, explaining that "[e]ven if one considered the fallout from U.S. tests as 'acceptable' for American citizens, there would be no benefit for them from the Soviet tests . . . [y]et you're to weigh the benefits against the risks'" (174). The rewards from testing decreased even further once it became clear that underground detonations could provide national security benefits without leading to environmental exposures. For this reason, perhaps, all countries that went on to develop nuclear weapons were careful to conduct their testing in compliance with the Limited Test Ban Treaty (189).

A similarly straightforward resolution was less obvious for the other byproduct of atomic technology: nuclear power. Looming over scientific and political efforts to discern the risks of radioactive fallout was the potential use of nuclear technology for energy production. Higuchi mentions that the desire to develop nuclear power also drove research into what constituted a permissible dose of radiation, but governments appear to have struck a far different cost-benefit calculus compared to nuclear testing (58). The book thus offers a potential warning about how viewing certain activities as essential can distort our analysis of their risks, whether the

⁶ Rachel Carson, as Ralph Lutts put it, took advantage "of the deep-seated cluster of social concerns" surrounding fallout in order to bridge "the gap between the environmental movement and this new fearful vision of Armageddon." See Ralph H. Lutts, "Chemical Fallout: Rachel Carson's *Silent Spring*, Radioactive Fallout, and the Environmental Movement," *Environmental Review* 9, no. 3 (1985): 211-25, p. 222.

benefits contribute to national security or to economic development. Yet with considerable scientific evidence that there is no “safe” threshold for many pollutants, scientists and government regulators will continue to grapple with when a total ban makes sense and when some limited exposures are, ultimately, unavoidable.

Comments by Perrin Selcer, University of Michigan

As environmental historians may be tired of being reminded, the Anthropocene Working Group of the International Commission on Stratigraphy has proposed using radioactive fallout from atmospheric nuclear weapons testing as a marker of a new geologic epoch. The rationale is neither causal nor symbolic; atomic bombs didn't trigger an epochal shift and, the experts assure us, the criteria are purely technical (although perhaps they protest a bit too much). Radioisotopes simply happen to provide a globally distributed signal for future geologists to mark the mid-twentieth century's Great Acceleration. In *Political Fallout: Nuclear Weapons Testing the Making of a Global Environmental Crisis*, however, Toshihiro Higuchi shows that making sense of this particular crisis, which he dubs "the nuclear Anthropocene" is "crucial to understanding the entangled relationship between the Cold War and the global environment" (4).

The concept of the nuclear Anthropocene is not a central theme of Higuchi's story. *Political Fallout* is a wide-ranging but tightly argued case that anxieties over radioactive contamination motivated and shaped the Partial Test Ban Treaty (PTBT), which, therefore, ought to be understood as the first global environmental treaty. But I was struck by how different the "politics of risk" (which is the book's central thematic) of the nuclear Anthropocene were from the Anthropocene as conceived by prominent Earth System scientists such as Will Steffen and Johan Rockström.¹ Their Anthropocene is a world of tipping points, catastrophic regime shifts, nonlinear change, and thresholds. The threat of slipping across a threshold and entering a surprising and potentially uninhabitable new planetary state is intended to motivate political action in the present. In contrast, experts described the public health effects of the nuclear Anthropocene as what we now call linear non-threshold (LNT) risks (62); no exposure was risk free and no breakpoints in the correlation between increasing probability of injury and increasing dosage invested regulatory targets with the authority of nature. Do the "natural" thresholds of the Earth System provide environmentalists more leverage than LNT risk from radiation exposure?

Far too many factors complicate the question for any straightforward comparison, of course, but Higuchi's close analysis of the fallout controversy's risk politics demonstrates how important such framings are. Guided by Ulrich Beck's insights into modernity as a "risk society," Higuchi focuses on international struggles to define the parameters of the problem from the first nuclear explosions in 1945 to the signing of the PTBT in 1963.² Almost as quickly as the United States lost its monopoly over the atomic bomb, the governments of the three nuclear powers (the United States, Soviet Union, and Britain), lost their monopoly over defining the dangers of fallout. Rather than simply mirroring Cold War geopolitics, struggles over

¹ Will Steffen, Johan Rockström, et al, "Trajectories of the Earth System in the Anthropocene," *PNAS* 115: 33 (2018), 8252-8259.

² Ulrich Beck, *Risk Society: Towards a New Modernity* (London: Sage, 1992).

epistemic authority pitted scientists in the national security state against their own domestic experts; revealed a rift between the three nuclear powers and nonnuclear states; provoked competition between disciplines (e.g. genetics and nuclear physics); and, as we learn in a satisfying account of the long-deferred defeat of Lysenkoism in the Soviet Union, even restructured internal disciplinary politics. The politics of twentieth-century toxic risk and atomic bomb tests' contributions to global environmentalism are familiar, well-theorized terrain, but Higuchi's nuanced analysis of archival sources in Japan, Russia, the United States, Britain, and the United Nations integrates diplomatic, scientific, and environmental history to provide a definitive narrative of the origins of the PTBT.³ In the process, it succeeds in thoroughly historicizing Beck's "reflexive modernity." Society may have succeeded in recognizing the threat it posed to itself, but the path to acting on this knowledge was not a reassuringly direct feedback loop but rather a circuitous route full of surprising events, failed cover ups, contradictory agendas, and expedient decisions taken for other reasons. The politics of risk did not determine success in (partially) eliminating atmospheric testing, but it did structure opportunities that advocates of weapons testing and of the ban both sought to exploit.

Despite virtually unlimited resources, the nuclear powers proved incapable of controlling the politics of fallout. Their incompetence was on display in the problem of thresholds. In the wake of the terrifying success of the 1954 Castle Bravo thermonuclear test, the U.S. government issued confident reassurances that everyone not in the area of Bikini Atoll at the time had nothing to worry about. The Japanese government took this reassurance seriously. Following public outcry over the unfortunate fate of the Lucky Dragon fishing boat and the discovery of contaminated tuna caught in the path of the plume, it sought to shore up faith in the safety of this lucrative industry by monitoring the radioactivity of the fishery—only to discover these big predatory fish routinely exceeded safe levels according to (perhaps inappropriately) stringent criteria developed for workplaces, criteria chosen precisely because they were so reassuringly strict. Ironically, during the interwar years industry had developed these standards as a "tolerance dose" below which the average body was safe in order to keep workers on the job; thresholds invented to facilitate exposure ended up fueling controversy (Ch. 2, "Atomic-Bomb Tuna").

U.S. cold warriors repeatedly defined the problem in apparently reassuring terms only to find themselves trapped by promises they couldn't keep and logics that

³ Jacob Darwin Hamblin, *Arming Mother Nature: The Birth of Catastrophic Environmentalism* (New York: Oxford University Press, 2013); Nancy Langston, *Toxic Bodies: Hormone Disruptors and the Legacy of DES* (New Haven: Yale University Press, 2011); Laura J. Martin, "Proving Ground: Ecological Fieldwork in the Pacific and the Materialization of Ecosystems," *Environmental History* 23 (2018), 567-592; Michelle Murphy, *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers* (Durham, NC: Duke University Press, 2006); Linda Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowledge* (Berkeley: University of California Press, 2007); Brett Walker, *Toxic Archipelago: A History of Industrial Disease in Japan* (Seattle: University of Washington Press, 2011).

undermined their policies. Nuclear chemist Willard Libby, who led Project Sunshine, a global survey of strontium-90 fallout, confidently asserted that the negligible global increase in radioisotopes above background levels was so far below the tolerance dose that they posed no risk. But when Alfred Sturtevant and other leading geneticists with experience inducing mutations in laboratory experiments challenged the notion that any exposure was completely safe, the tolerance dose subtly but profoundly transformed into a “permissible dose.” The permissible dose defined “acceptable risk,” a concept that foregrounded the value judgments embedded in a technical standard. The nuclear states redefined the threshold as whatever was necessary to assure the acceptability of atmospheric testing.

What counted as a “permissible dose” depended on macabre cost-benefit calculations that balanced painful deaths from bone cancer and birth defects against freedom from communist tyranny (or capitalist imperialism). It forced anxious publics to reckon with reassurances that although fallout would lead to thousands of deaths, individuals had nothing to worry about. And it led to troubling existential calculations, such as the great Russian physicist, bomb designer, and anti-testing advocate Andrei Sakharov’s estimate that, “Nuclear tests conducted through 1958 would ultimately lead to a minimum of five hundred thousand excess deaths over a period of the order of the next eight thousand years.” Is that a massive or a vanishingly small number? To answer such a disturbing question, Sakharov, like many of his colleagues in the West, turned from statistics to “humanism as a moral compass” (129). Although Higuchi understandably concludes that this recourse served as an excuse for silence, I found it hard to disagree with the American geneticist who argued that on these questions, “The scientist’s views cannot claim greater attention than those of other citizens” (77). It shouldn’t take a nuclear physicist to know atomic bombs are bad—and if Edward Teller were one of your colleagues, you, too, might disclaim “following the science” as a guide to moral action.

As Sakharov’s case makes clear, individuals’ stances on the risks of nuclear fallout could not always be inferred from their institutional positions, and one of the book’s strengths is revealing how world leaders and famous scientists struggled to reconcile national security, public health, economic, and ethical calculations. But Higuchi argues that urgent warnings of eminent scientists failed to disrupt governments’ domination of the “relations of definition” of fallout’s risks until they were institutionalized. Ironically, the U.S. and U.K. governments initiated this institutionalization in order to shore up their credibility. After overselling the perfect safety of atmospheric tests, they commissioned studies of radioactive risk from the U.S. National Academy of Sciences, the British Medical Research Council, and the UN Scientific Committee on the Effects of Atomic Radiation. This ended up providing yet another example of a failure to resolve political controversy by throwing more science at it.⁴ Disagreements within and between the commissions

⁴ Daniel Sarewitz, “How Science Makes Environmental Controversies Worse,” *Environmental Science & Policy* 7 (2004), 385-403.

further undermined the governments' capacity to determine the definition of risk. The state had voluntarily committed itself to standards it could not meet and then inadvertently institutionalized its own dissenters.

With the politics of risk destabilized, it appeared anyone with a Geiger counter could enter the fray. Indeed, although the special horror attributed to radiation is associated with its invisibility, I was struck by its remarkable visibility. *Political Fallout* is replete with stories of accidental detection, of concerned scientists challenging the claims of superpowers by monitoring rainwater in rooftop buckets, and of citizens' groups performing low-budget safety checks of the food supply. Not only did these activities democratize the debate over fallout, but they proved that the risks were not evenly distributed. Wheat in Minnesota, rice in Japan, sheep in Wales: "hot spots" and "hot food" made vivid (and visceral) that state reassurances based on averages "with a hundred-fold spread are utterly meaningless when applied to individuals or small groups," as the physiologist leading the Minnesota study put it (149). The anti-nuclear weapons testing movement gained momentum when it was able to move the debate from the obscurity of global averages to particular bodies and places. Midwestern children and Asian citizens of nonaligned countries were each "innocent" in their own way; in combination, they put domestic and international political pressure on nuclear states to stop the fallout.

Reading *Political Fallout*, I found myself regularly wondering about other "innocent" bodies; for example, the workers in Richland, Washington and Ozersk, Russia unknowingly exposed to far higher concentrations of radiation at the leaky reactors that produced plutonium or miners in South Africa who inhaled uranium, trading life-years for a paycheck.⁵ After all, the tolerance dose with which this story began had been developed for workplace safety. Did the global risk politics of atmospheric testing drop these laborers out of their calculations in a sort of ethical rounding error? In the conclusion, Higuchi argues that they did. Indeed, the collateral damage spread further; by seeking atonement for the horrors of Hiroshima and Nagasaki, international experts demanded a complete cessation of the "worldwide, uncertain, and uncontrollable" risks of fallout, but "gave a license to higher exposures...necessary to reap the rewards of the nuclear age" in the energy and medical industries (197-8). Moreover, the "most important consequence of the redefinition of fallout" was to "obscure the suffering" of "atomic veterans" and bystanders in the vicinity of atmospheric tests (198).

Because the monograph frames the narrative as the road to the PTBT, we don't get to these unintended consequences of the fallout crisis until the conclusion's last pages. I would like to know more about how Higuchi sees his story intervening in the broader historiography of the origins of environmentalism. I endorse his point that the period from the end of WWII to the publication of *Silent Spring* gets short

⁵ Kate Brown, *Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters* (Oxford: Oxford University Press, 2013); Gabrielle Hecht, *Being Nuclear: Africans and the Global Uranium Trade* (Cambridge: MIT Press, 2012).

shift in potted histories of environmentalism. How does *Political Fallout* change the meaning of the story? What is the “nuclear Anthropocene’s” place in “the Anthropocene”? The idea of “the environment” was just taking shape in these postwar years and I wonder if “global environmental crisis” is the best frame for situating the fallout controversy.⁶ Would “global public health crisis” work better? The terminology of public health and environment are easily translated into each other, of course, and there is no question that tracking radioactive isotopes from fallout was essential to producing the contemporary understanding of the Earth System. But the experts and activists who raised the alarm over the effects of fallout focused squarely on radiation’s effect on human bodies. Did the attention to global fallout’s relatively minimal dangers distract from contemporary industry’s more acute toxic injuries or was it a critical component of raising reflexivity? Are there lessons on the value of framing risk in public health terms for today’s climate politics?

At least in part, environmentalism emerged out of a postwar movement for international peace.⁷ *Political Fallout* shows how activist experts entangled the environment and the Cold War by pitting “innocent” bodies against reckless national security policies. Higuchi is clear that the backlash over fallout was only one—perhaps necessary but far from sufficient—factor in the signing of the PTBT. The treaty fulfilled the superpowers’ desire to ratchet down Cold War tensions and was an expedient gesture towards disarmament with minimal effect on nuclear arsenals because of the success of past tests and the development of underground testing capabilities. Which leads to my final question: what does the history of this “first environmental treaty” suggest are the prospects for influencing global environmental change through international treaties?

⁶ Paul Warde, Libby Robin, and Sverker Sörlin, *The Environment: A History of the Idea* (John Hopkins University Press, 2018).

⁷ Perrin Selcer, *The Postwar Origins of the Global Environment: How the United Nations Built Spaceship Earth* (New York: Columbia University Press, 2018).

Response by Toshihiro Higuchi, Georgetown University

Writing a book is often a solitary undertaking, but reading a book is like a lively conversation with the author. When I finished writing *Political Fallout* after many years of preparation, I very much looked forward to connecting with readers as a first-time author. By the time the book came out in the spring of 2020, however, COVID-19 had turned the whole world upside down. Suddenly, all book exhibits of the annual academic meetings that I had planned to attend were cancelled, and the book talks that I was supposed to personally deliver became entirely virtual. I greatly missed the opportunity for thoughtful and engaging conversations about my book with friends, colleagues, and a wider audience, although I was fortunate enough to discuss my work through online events. That is why I was so thrilled and grateful when Keith Mako Woodhouse contacted me about this roundtable review and brought together some of the finest emerging historians in the field. I would like to thank all the reviewers for taking time in the midst of this global pandemic to read my book carefully and offer numerous insightful comments that help me to clearly see the book's achievements, its shortcomings, and areas for further research.

While the reviewers covered a wide range of topics and themes, their interests seem to converge on one fundamental question: was the story of global fallout really “environmental,” as I claim it to be in the book? Stephen Macekura invites me to clarify the specific ways in which the science and politics of fallout contributed to environmental consciousness beyond the vague language of the 1963 Partial Test Ban Treaty (PTBT). Perrin Selcer and Rachel Emma Rothschild both point out that the fallout controversy revolved almost entirely around its potential harm to humans, rightly wondering if it is more appropriate to call it a public health problem. Sumiko Hatakeyama helps me begin my response to these comments by illuminating the importance of food and drink as a material and cultural linchpin of the connection between humans and their surroundings in terms of environmental hazards. I would like to join this important thread of conversation to take up what the book has left off and continue my reflection on the significance of global fallout in environmental history.

As my reviewers note, the dominant framing of global fallout indeed centered on human health and therefore was hardly “environmental” in the usual sense of the word. Few involved in the fallout controversy worried about the impact of planetary contamination on nonhuman life or articulated an ethos that decentered humans as the sole object of concern. Equating environmental awareness solely with care and action for nature, however, carries the risk of overlooking its conceptual relationship to humans. As Etienne S. Benson has recently pointed out, the Western notion of environment always describes “a mutually constitutive relation between an entity and that which surrounds it—that is, a relationship in which each party not only influences the other but also in some fundamental way determines what

the other is.”¹ Indeed, *Political Fallout* follows the tradition of scholarship that examines health and disease as a key locus of connectivity between humans and their surroundings.² Global fallout, however, is no ordinary toxic material. Unlike those which are clearly injurious to exposed individuals, global fallout is so massively distributed in time and space that the excess risk of deadly diseases to an individual is vanishingly small.³ This paradox of scale, which is characteristic of vast, slow-moving environmental changes in the Anthropocene, made the question of harm distinctly environmental in Benson’s sense, because conceiving fallout as a hazard required a new imaginary of both humans and their surroundings in relation to one another.

First and foremost, fallout research radically changed the way we understand one of the ultimate surroundings: the Earth. Scholars have demonstrated how scientific studies on the worldwide dispersion and circulation of nuclear dust generated in atmospheric nuclear tests revealed our planet as a single, dynamic, and delicate “system.” This planetary vision, in turn, engendered the disorienting sense of human omnipotence and vulnerability, as it simultaneously fueled ambitions to control nature and fears about the catastrophic potential of such attempts.⁴ *Political Fallout* builds on these insights while reorienting the focus of analysis from the globalization of environmental knowledge toward its simultaneous localization. The distribution of fallout and its effects around the world was strikingly uneven precisely because fallout was a genuinely global phenomenon that interacted with a myriad of natural processes and human activities. *Political Fallout* illustrates the epistemic and political consequences of this paradox by showing how government officials and scientists in the US, British, and Soviet nuclear authorities sought to reassure the world about fallout on the basis of the estimated average, only to find their safety claims contested by the mounting evidence of “hot spots” and “hot food” around the world. This successful challenge to managerial globalism, to answer one

¹ Etienne S. Benson, *Surroundings: A History of Environments and Environmentalisms* (Chicago: The University of Chicago Press, 2020), 12.

² See, for instance, Michelle Murphy, *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers* (Durham, NC: Duke University Press, 2006); Linda Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowledge* (Berkeley: University of California Press, 2006); Christopher Sellers, *Hazards of the Job: From Industrial Disease to Environmental Health Science* (Chapel Hill: University of North Carolina Press, 1997); Brett L. Walker, *Toxic Archipelago: A History of Industrial Disease in Japan* (Seattle: University of Washington Press, 2010).

³ For the discussion of how the massive distribution of human impact on the environment in space and time complicates the ontological state of the human-driven phenomenon, see Timothy Morton, *Hyperobjects: Philosophy and Ecology after the End of the World* (Minneapolis: University of Minnesota Press, 2013).

⁴ For example, Jacob Darwin Hamblin, *Arming Mother Nature: The Birth of Catastrophic Environmentalism* (Oxford; New York: Oxford University Press, 2013); E. Jerry Jessee, “Radiation Ecologies: Bombs, Bodies, and Environment during the Atmospheric Nuclear Weapons Testing Period, 1942-1965,” PhD diss. (Montana State University, 2013); Joseph Masco, “The Age of Fallout,” *History of the Present* 5, no. 2 (2015): 137-168.

of Macekura's questions, is a notable contribution that fallout researchers made to environmental consciousness.

The same dialectic of globalization and localization also brought about a new and reflexive understanding of humanity in relation to global fallout. On one hand, geneticists played a key role in elevating the level of risk analysis from exposed individuals to the entire human race, both in the present and in the distant future. This genetic universalism was essential to overcome the paradoxical implications of the so-called linear non-threshold (LNT) hypothesis and recast global fallout as a hazard. The LNT hypothesis, which postulated effects as directly proportional to doses with no threshold level, suggested some theoretical risk of genetic damage from even the tiniest amounts of global fallout. But it also meant that the degree of risk was likely to be extremely small. Genetic universalism shifted the perception of this mixed concept of genetic damage because, while its risk was too small to bother a particular individual, it was statistically expected to produce large numbers of casualties when applied to billions of people. Moreover, it fueled persistent eugenic concerns after World War II about the slow but irreversible degradation of the human gene pool. Then, to return to Macekura's question, what distinguished genetics from other sciences in its contributions to environmental awareness was its notion of humanity as a single biological unit which was vulnerable to even the slightest environmental assault. This genetic perspective can also help to dispel a sense of bewilderment that Selcer expresses about the apparent lack of the notion of a "tipping point" in the nuclear Anthropocene. Unlike many Earth System scientists who tend to find sources of danger in the realm of nature, the geneticists involved in the fallout debates located a true cause of alarm in the perceived fragility of humanity's genetic heritage.⁵

Just as the global-scale environment had to be broken down to reveal the wide variability of radioactive contamination around the world, however, risk analysis also had to be localized in order to identify those who were disproportionately affected by fallout. While genetic universalism made it possible to recognize global fallout as a potential threat to humanity, it also possessed the danger of glossing over the inequality of fallout burdens in the world population. As Hatakeyama notes in her comment, here lies yet another notable contribution of the fallout controversy to environmental consciousness, as the discovery of contaminated food and drink around the world proved decisive in dismantling the myth of average in risk analysis. The contamination of milk with radiostrontium, for instance, put babies and children at the center of concern for Western women, whereas reports on radioactive rice in Japan fueled the sense of grievance among many Asians against the nuclear-armed Western powers. This disaggregation of humanity into risk communities transformed the issue of fallout into one of the first, yet largely forgotten, cases of global environmental justice.

⁵ For the useful discussion of the perspective of Earth System scientists, see Perrin Selcer, "Anthropocene," *Encyclopedia of the History of Science* (June 2021), accessed August 15, 2021. <https://doi.org/10.34758/zr3n-jj68>.

If the story of global fallout was indeed “environmental” in the sense that I have discussed so far, then how consequential was it? The reviewers seem to be decidedly skeptical in this respect. Macekura questions how robust environmental awareness arising from the fallout controversy actually was, pointing out that “more conventional strategic motivations drove the thinking of national leaders.” He also finds my use of the term “sustainable” to describe the outcomes of the PTBT as misleading, as he rightly reminds us that there is nothing sustainable about the deadly business of nuclear weapons. Likewise, Rothschild takes issue with the phrase “antipollution norm” to explain the changing course of government policies regarding nuclear testing, concluding that the PTBT was not a crowning achievement of environmental ethics but rather the product of a “dispassionate calculus,” with the public health costs of atmospheric tests outweighing their diminishing military utility. Similarly, Selcer notes that the backlash against fallout was a “perhaps necessary but far from sufficient” factor in the making of the PTBT, wondering what implications this international agreement holds for environmental diplomacy more broadly.

All the points made by the reviewers are well taken. I especially appreciate them holding me accountable for the slippery use of some words, which can confuse rather than clarify what I actually mean. I wholeheartedly agree with Macekura; hopefully the book makes it abundantly clear that the supposedly landmark nuclear arms control agreement actually wound up perpetuating the nuclear arms race as if it were “sustainable” by burying weapons testing underground and thereby concealing its enormous health and environmental costs from public view. I also fully endorse Rothschild’s thoughtful critique of the phrase “antipollution norm” as smacking of a universal and binding environmental ethics that simply did not exist in the case of global fallout. However, I still believe that the unacceptability of fallout did eventually become normative in a more modest sense, namely that the burden of scientific proof and moral suasion gradually but irreversibly shifted from critics to apologists.⁶ This is clear when it was most seriously in doubt. In announcing the resumption of atmospheric testing after the moratorium, Soviet premier Nikita Khrushchev and US president John F. Kennedy similarly justified their decisions as vital for national security but no longer disputed the undesirability of fallout. Although this rhetorical shift made no difference in policy outcomes, it strongly suggests that the idea of fallout as an unacceptable hazard had become dominant and powerful enough to compel national leaders to vigorously defend their decisions to go against such an idea. What might appear to be an unsentimental risk-benefit analysis on the part of policymakers, then, actually reflected this underlying normative shift. The same can be said about the continued enthusiasm that Rothschild notes among nuclear hawks in the United States for peaceful nuclear

⁶ The “soft” definition of norms discussed here is inspired by Nina Tannenwald’s useful discussion of the taboo surrounding the combat use of nuclear weapons. See Nina Tannenwald, *The Nuclear Taboo: The United States and the Non-Use of Nuclear Weapons since 1945* (Cambridge: Cambridge University Press, 2007).

explosions (PNEs). Far from contradicting their strategy of appropriating the growing backlash against fallout, Edward Teller and other advocates of PNEs typically planned such blasts either underground or in such ways to minimize contamination in order to promote nuclear earthmoving as safe and clean.⁷ Although the emerging social custom against fallout is not nearly powerful enough to override the logic of national security or the vision of technological modernity, it is nevertheless robust enough to reshape the code of conduct in the nuclear age.

The subtle yet complex ways in which the fallout controversy contributed to the PTBT, then, leads to my concluding thought on the treaty's implications for environmental diplomacy in general. A key takeaway from *Political Fallout* is that a diplomatic solution to a transborder environmental problem may critically depend on non-environmental factors. After all, the defining context of global fallout was the Cold War, whose transition from confrontation to coexistence ultimately made the PTBT politically possible. Moreover, the looming threat of nuclear war reinvigorated the ethical doctrine of humanism which, in turn, helped to recast fallout as an intolerable wrongdoing to countless "innocent bystanders" around the world. Although such a view was unmistakably anthropocentric, it was essential to mobilize world opinion in favor of an atmospheric test ban by reframing the planetary radioactive contamination from a lingering health concern to an acute moral crisis calling for prompt action. These and other findings of the book suggest that a successful environmental treaty requires the building of an ad hoc coalition of diverse actors and interests around a crossover policy issue. Such a diplomatic composite, however, also means that its success tends to be specific to the issue concerned and often comes at a steep cost, as shown by the paradoxical consequences of the fallout controversy that wound up concealing and justifying other environmentally destructive uses of atomic energy. The PTBT is therefore a cautionary tale about the power and limits of diplomacy in tackling a large-scale and wide-ranging environmental problem.

At the same time, Selcer's invitation to reflect more critically on what I call the "nuclear Anthropocene" has also made me realize that the strategic and environmental dimensions of the PTBT were not as analytically separate as I have made them appear in the book. Indeed, what is notable about the nuclear Anthropocene is, to borrow from Rob Nixon, the entangled production of spectacular and slow violence.⁸ On one hand, by the mid-1950s, a full-scale nuclear war had come to be widely believed as truly catastrophic due to its worldwide biological effects. In this sense, what we usually consider as a nuclear strategy became an environmental strategy designed to harness or contain such an imagined planetary catastrophe. The continuing nuclear buildup for this purpose, however,

⁷ Scott Kirsch, *Proving Grounds: Project Plowshare and the Unrealized Dream of Nuclear Earthmoving* (New Brunswick, NJ: Rutgers University Press, 2005); Dan O'Neill, *The Firecracker Boys* (New York: St. Martin's Press, 1994).

⁸ Rob Nixon, *Slow Violence and the Environmentalism of the Poor* (Cambridge, MA: Harvard University Press, 2011).

inevitably accompanied the widespread infliction of chronic and long-term radiation damage that many fallout researchers believed might ultimately maim or kill large numbers of people. The strategic and environmental considerations that co-produced the PTBT, then, did not belong to separate categories of concern but rather constituted two sides of the same planetary predicament. I hope that *Political Fallout* will offer a good starting point to further contemplate the entanglement of national security and environmental insecurity under the conditions of the nuclear Anthropocene.

About the Contributors

Sumiko Hatakeyama is a doctoral candidate in History and Sociology of Science at the University of Pennsylvania. She is also a member of Peace Boat, a Tokyo-based international NGO.

Toshihiro Higuchi is Assistant Professor of History at Georgetown University. His primary research interests lie in the international history of the nuclear age, with a focus on its scientific, technological, and environmental aspects. He also writes about the environmental history of modern Japan in the Pacific context. His publications include an award-winning book, *Political Fallout: Nuclear Weapons Testing and the Making of a Global Environmental Crisis* (2020) and “Radiation Protection by Numbers: Another ‘Man-Made Disaster,’” in *Learning from Fukushima*, ed. Edward Blandford and Scott Sagan (2016).

Stephen Macekura is Associate Professor of International Studies at Indiana University’s School of Global and International Studies. He is a historian of the twentieth century world, with a particular focus on U.S. foreign relations, political economy, and environmental thought and politics. His most recent book is *The Mismeasure of Progress: Economic Growth and its Critics* (Chicago: The University of Chicago Press, 2020).

Rachel Emma Rothschild is a legal fellow at the Institute for Policy Integrity at NYU School of Law. She holds a J.D., cum laude, from NYU School of Law, where she was a Furman Academic Scholar, and a Ph.D. in history from Yale University. Her book, *Poisonous Skies: Acid Rain and the Globalization of Pollution*, was published by the University of Chicago Press in 2019. She has recently begun work on a project that examines the past and present regulation of toxic chemicals.

Perrin Selcer is an associate professor in the History Department and Program in the Environment at the University of Michigan. During 2020-2021, he has been on leave with a Mellon New Directions Fellowship, which he is using to retrain in the paleosciences for his new project, “The Holocene Is History: Human Nature after the Ice Age.”

Keith Makoto Woodhouse is an associate professor at Northwestern University, where he teaches in the History Department and the Environmental Policy and Culture Program. He is the author of *The Ecocentrists: A History of Radical Environmentalism*.

Copyright © 2021 H-Net: Humanities and Social Sciences Online

H-Net permits the redistribution and reprinting of this work for nonprofit, educational purposes, with full and accurate attribution to the author, web location, date of publication, H-Environment, and H-Net: Humanities & Social Sciences Online.