5

Radiological Risk Imposition as Environmental Violence

A Case Study of Nuclear Harms and the Limits of Legal Redress in French Polynesia/Māʻohi Nui

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Engaging Environmental Violence

In this chapter, I argue that examining nuclear legacies in French Polynesia can help us to think through the possibilities and limitations of the Environmental Violence concept in an age of causally complex and underdetermined harms that can remain latent for decades, if not generations. This type of environmental harm is not unique to nuclear weapons programs: nuclear power plant accidents, chemical toxins, and even greenhouse gas-induced climatic changes all fit into a similar framework. But nuclear issues are in many ways, as Ulrich Beck has argued, the paradigmatic case of our modern "Risk Society." In this chapter, I grapple with how we can think about risk in the context of environmental violence – and how careful attention to the case study of nuclear legacies in French Polynesia can help illustrate the descriptive, political, and legal challenges posed by environmental violence in the atomic age.

5.1 Introduction

Between 1966 and 1996, France detonated 193 atomic bombs in Polynesia [1]. Through 1974, these "experiments," or "tests," were conducted at or above ground level, with several detonations giving rise to short or long-range fallout that contaminated downwind communities and the broader Pacific. From 1975 onwards, in the wake of mounting international disapproval of French testing, France moved its Pacific testing program underground, becoming the first nuclear power to detonate nuclear weapons in the basaltic substrate of coral atolls.

Despite French assertions that the bombs detonated at Moruroa and Fangataufa atolls were "clean" and would have no impact on the populations or environment of the Pacific, weapons detonations came with an irreducible element of risk and unpredictable dispersion of radioactive harm. Technological limitations, worker

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inexperience, and human error contributed to accidents and meteorological misjudgments, with effects that proved lethal in the short, medium, and long term. While many of the victims of France's nuclear testing program were military and civilian employees flown in from metropolitan France, the harms associated with nuclear testing fell disproportionately on indigenous Polynesians – from the thousands of locally engaged workers who staffed test sites to those living in communities downwind of France's nuclear proving grounds.

The violence of France's nuclear testing program operated at several temporal scales and across a spectrum of causal certainty. In some instances, harms were explosive, direct, and irrefutable, such as when workers perished at the Moruroa test site from industrial accidents [1–4]. Yet many of the effects of the nuclear testing program were underdetermined and deferred. For many victims, the immediate effects of radiation exposures were anodyne, even imperceptible: villagers in downwind atolls held banquets amid radioactive fallout [4]; children played outside and walked barefoot in contaminated soil [4]; and community members ingested radionuclides through the food chain and by drinking water stored in open-air cisterns [4, 5].

In the years and decades that followed France's atmospheric detonations, many former test site workers and residents of downwind atolls wondered about a potential link between radiation from nuclear experiments and the cancers, birth defects, and fertility issues that seemed to emerge suddenly in their communities [2, 4, 6, 7]. Testimonies from workers and downwind communities speak to a sudden spike in congenital deformities and deaths from cancers in the wake of the installation of the French nuclear testing center, or Centre d'expérimentation du Pacifique (CEP) [2, 4, 6–9]. Some also noticed a rise in ailments that, while not radiogenic, bore a relationship to the construction and population influxes associated with French nuclear testing. Extensive destruction of coral over the course of military buildup, for example, caused an explosion of ciguatera fish poisoning that provoked unprecedented waves of illness, disability, and deaths tied to consumption of contaminated reef fish [9–12].

Efforts to come to terms with nuclear legacies in French Polynesia are hampered both by the inherent causal uncertainty surrounding the effects of exposure to ionizing radiation and by historical efforts by the French government and a certain subset of stakeholders in French Polynesia to downplay or actively obfuscate nuclear risks. In some cases, these information suppression efforts extended to the active intimidation and silencing of workers and community members [2, 8]. Information asymmetries allowed the French military to avoid certain measures that might have limited risks to workers and downwind populations and today complicate the documentation efforts of those seeking compensation from the French government for radiogenic cancers. In many cases, the data simply isn't

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there: The French ran just over 30 radiological monitoring stations throughout a territory comprised of five archipelagos and 118 inhabited islands at atolls, distributed across an area of ocean the size of continental Europe [13]. Such a network hardly provides a comprehensive picture of individual exposures.

This chapter explores how the history of nuclear testing and redress efforts in French Polynesia, or as many Polynesians prefer to call it, Māʻohi Nui,[1] can illustrate the descriptive, political, and legal challenges posed by environmental violence in the atomic age. In particular, I focus on risk imposition in and of itself (even in the absence of provable, measurable harm) as a form of environmental violence of particular salience in what Ulrich Beck has termed our modern "Risk Society" [14]. Environmental violence in the context of nuclear testing cannot be understood as separate from colonial contexts and forms of colonial violence. Max Liboiron has asserted that pollution should be understood as a form of colonialism, as polluters presume access to land that is not their own [15]. As indigenous groups in the Pacific have argued for decades, the offshoring of radiological risk to overseas territories, too, should be seen as a form of colonialism [16–20].

This case study focuses on two key strands of violence that characterized the French testing program in Polynesia[2]: (1) the French decision to emplace a nuclear testing center, and concomitant radiological risk, in Polynesia, far from France's metropolitan territory; and (2) the obfuscation of information and deliberate dissemination of disinformation regarding the risks of the French nuclear program, along with failures at various points to adequately protect workers and downwind populations. The colonial dynamics that facilitated this violence also undermined paths toward legal recourse – both prior to and during the period of testing, as individuals sought to contest France's right to test nuclear devices and, afterwards, as those with radiogenic cancers pursued avenues of compensation. Causal uncertainties inherent to radiological exposures and the information gaps and asymmetries either deliberately created or tolerated by French authorities continue to cause harm today by frustrating victim redress.[3] In theorizing "environmental violence," we should be attentive to the ways in which strands of ecological, (neo)colonial,

[1] Note on terminology: While the legal name for the territory discussed in this chapter is French Polynesia (or Polynésie française), the Tahitian name Māʻohi Nui is commonly used today both in the territory and by scholars seeking to draw attention to colonial dynamics inherent in the name "French Polynesia." While Tahiti Nui and Te Ao Māʻohi are also sometimes used to describe the five archipelagos that comprise French Polynesia, Māʻohi Nui has gained traction in recent years as an alternative to the appellation "French Polynesia."

[2] In paying attention to upstream actions and omissions as the locus of violence, I take my lead from Max Liboiron, who views environmental damage as a *symptom* of violence, rather than violence in and of itself, and locates violence in colonial land relations ([15], pp. 6–7).

[3] In the case of the French nuclear victim compensation law, for example, claimants have been rejected on the grounds that they presented insufficient documentation or because the administrative committee reviewing applications determined that claimants' exposures to ionizing radiation were, according to the data and models the committee relied upon, likely not the direct cause of claimants' cancers.

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epistemological, and juridical violence bleed into and reinforce one another in the context of causally complex, environmentally mediated harms.

This chapter proceeds in three sections. The first section examines the colonial context that drove the French to emplace nuclear risk upon French Polynesia and that shaped the experiences of Polynesian workers and downwind communities. The second section traces efforts by Polynesian and Pacific peoples to contest, through legal argumentation and diplomatic discourse, the French right to impose nuclear risk and low-level radioactive fallout on Pacific communities. In the final section, I explore twenty-first-century efforts to grapple with nuclear legacies, and I examine how the dynamics of risk, causal uncertainty, and insufficient data frustrate processes of victim compensation today.

5.2 French Bombs in Polynesia

Until World War II, France's South Pacific archipelagos had been distant imperial outposts of limited economic or strategic relevance [21]. In the wake of World War II, though, the islands came to take on new significance for French national interests. During a 1956 visit, Charles de Gaulle, then a private citizen, extolled the virtues of Tahiti's geographic remove in the context of the looming threat of nuclear war. He envisioned that the islands, "surrounded by the invulnerable immensities of the Ocean," could one day provide a crucial "refuge" [22]. Within 10 years, the significance to the geographic location of the islands had been inverted: The Tuamotu Archipelago would become the epicenter of France's own nuclear war–making capability, a place to offshore the risks associated with developing and fine-tuning France's nuclear deterrent.[4]

Mā'ohi Nui was not the first nuclear proving ground in the Pacific, nor was it France's first nuclear test site. The US Military conducted dozens of atmospheric nuclear tests in the Marshall Islands and Johnston Atoll [25–28] as well as over indigenous lands in the American West [29–31]. Great Britain tested a more limited number of nuclear weapons over indigenous lands in Australia [32–34] and in what is today Kiribati in the late 1950s and early 1960s [32, 35]. And France, before moving its nuclear program to the Pacific in the wake of Algerian independence, conducted atmospheric and underground nuclear detonations in the Sahara between 1960 and 1966, over and under lands inhabited by Tuareg communities [4, 36–38]. All nuclear powers conducting atmospheric tests, including the Soviets

[4] French efforts to entrench political control in the region were likely directly connected to nuclear and national security interests. Jean-Marc Regnault has shown, for example, that French generals were considering Polynesia as a potential nuclear site as early as 1957, a year prior to the 1958 referendum in which Polynesians voted to remain part of France [12]. Several scholars have explored the ways in which the French state sought to influence the referendum in favor of a "yes" vote ([21], pp. 340–341; [23], pp. 45–46, 73; [24], p. 211).

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and the Chinese, chose to impose nuclear risks and harms upon indigenous communities.[5] The infamous 1954 Castle Bravo thermonuclear test, which caused acute radiation injuries to downwind Marshall islanders living under US trusteeship and provoked fatal consequences for the crew of a Japanese fishing vessel, loomed particularly large in the minds of Pacific Islanders who objected to the creation of a new nuclear test site in the South Pacific.

French leaders engaged in a propaganda campaign, both within Polynesia and on the global stage, to stifle dissent by stating that the planned tests posed no risks to local populations or the wider region. In 1962, French Polynesian parliamentarians reacted to rumors of a final series of American atmospheric tests in the region by passing a resolution urging the French government to take a "firm stance" against any nuclear tests in the region that could pose even the slightest health risk to French Polynesians [39]. The French government, whose plans for a Pacific test center in the Tuamotu archipelago of Polynesia were already underway [12], responded by sending an expert to lecture Polynesians on the risk-free nature of nuclear testing. When France openly announced its intention to conduct tests in the region, leaders of Latin American states along the Pacific seaboard wrote to de Gaulle to express their concern over potential transboundary health and economic impacts. De Gaulle rebuffed these concerns by stating that the "the populations of Polynesia … as well as the land, sea and air fauna and flora, will actually incur no risk" [40].

Once testing began, French officials engaged in a theater of cleanliness, geared toward international observers, to defend their claims of "clean" – or "*propre*" – bombs. Military officers and high officials often made a show of jumping into the lagoon of Moruroa atoll in the wake of tests to prove they did not fear radioactive contamination. Testimonies from Polynesian workers, however, shed light on a different side of life on France's Pacific test sites. A worker interviewed by Greenpeace in 1987 stated that, when he worked on the atoll in the 1960s, he observed that the same French officials who bathed in the lagoon after tests would later shower in what he described as "special containers," using "special soaps and creams" [2]. The same worker also spoke about his experiences having to clean up giant piles of irradiated sea life projected onto the atoll in the wake of lagoon-level tests – working without protective clothing or a dosimeter. Other sources that mention workers coping with massive quantities of dead fish after tests [1] and that describe uneven landscapes of radiological protection among different categories of workers [7] lend plausibility to this account.[6]

[5] The Soviets conducted atmospheric tests in Siberia and modern-day Kazakhstan. Chinese tests were conducted in Western China at the Lop Nur site in Xinjiang.

[6] Some workers interviewed by Greenpeace in 1987 spoke to a racial divide in exposures, with Polynesians completing riskier tasks, with less protective clothing (see testimonies of Ruta and Edwin Haoa in in Testimonies). While these assertions are not readily corroborated with other sources, testimonies collected by Peter de Vries and Hans Seur spoke to varying standards of protective equipment based on whether a worker was employed directly by the CEP/CEA or by a subcontracting corporation ([7], p. 50).

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The divide between official French assertions of nuclear innocuity and the lived experiences of Polynesians was not limited to the test sites – downwind communities began to notice disturbing environmental and public health impacts beginning in the late 1960s. Residents would later recall the large quantities of dead fish, and even dead sharks, that washed up on their beaches in the late 1960s and early 1970s [7]. Mountaintops once rich with vegetation turned barren [7]. All of the horses on Mangareva, an island downwind of the test sites, died in the wake of the first set of nuclear tests [7]. And outbreaks of ciguatera fish poisoning, caused by coral damage due to military construction activities, sickened workers and downwind communities and significantly altered the economy and nutritional situation of the Gambier archipelago. For years, residents of Mangareva, the principal island of the Gambiers, were forced to decide whether to abstain entirely from fish – their principal source of protein – or to risk their health via successive exposures to the biotoxin accumulating through the food chain [8].

The situation in the Gambier archipelago also illustrates how the French knowingly exposed downwind populations to potentially dangerous levels of radioactive fallout. In July 1966, when the minister of French Overseas Territories and Departments arrived on the island of Mangareva, along with other French officials, in order to observe France's first nuclear weapon detonation, the Mangarevans threw them an elaborate welcome banquet [4]. The visitors did not linger long, however – a journalist would later explain that the French officials were swiftly and clandestinely evacuated by plane in the wake of the nuclear detonation, after the military recognized that a "non-negligible" level of radioactivity was descending on the island [4]. A scientific vessel that arrived at Mangareva several days later reported high levels of radioactivity found in plankton and fish, and 18 000 picocuries per gram of radioactivity in unwashed salad – a level equivalent to that registered in lettuce in the areas around Chernobyl the day of the accident. Despite these troubling findings, the French provided no warning to Mangarevan residents in the wake of the incident, and children continued to play barefoot in contaminated soil [4]. A French doctor, who produced a report of the visit, noted the lack of radiological awareness in the community: "The population is perfectly ignorant and doesn't show any curiosity. Father Daniel [the local priest and community leader] doesn't even know what fallout is" [4]. While the French erected rudimentary fallout shelters for certain downwind populations in later years, during periods of thermonuclear testing [2, 7, 9], insufficient protection and education of downwind populations about nuclear risks continued throughout the period of atmospheric testing.

The limited knowledge of downwind populations was not only a product of errors of omission, French officials also worked to actively silence workers who had borne witness to accidents and illnesses [2, 8]. Testimonies collected by activists and scholars in the decades after France's first nuclear test in the Pacific,

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notably those collected by Bruno Barrillot [4, 9], Hans Seur and Peter De Vries [7], Greenpeace [2], and the French Polynesian Commission of Inquiry into the consequences of nuclear testing [8], speak to French efforts to suppress information and intimidate those who shared eyewitness accounts. One former test site worker who witnessed a deadly accident, for example, later spoke to Greenpeace activists about the warnings he received afterwards to never divulge what he had witnessed. The French, he said, "told me I should watch my step … they said there could easily be an accident" [2]. The French also sought to suppress evidence of the epidemiological impacts of nuclear detonations, in at least one case going so far as to confiscate the diaries and notebooks of enterprising teachers and medical workers who sought to track public health trends in their communities [8]. This suppression of information, which extended to patchy and incomplete gathering of data on fallout and worker exposures, would both enable the continued myth of a "clean bomb" and frustrate future efforts to pursue redress.

Some Polynesians also experienced living under the threat of nuclear risk, with attendant anxieties, as a violation in and of itself. Robert Jacobs has written on how radiological risk and attendant uncertainties in the wake of civil nuclear disasters can take a psychological toll even in the absence of realized radiological harm. "The uncertainty of living one's life, of raising children in such a landscape of invisible risk," he wrote in the context of the aftermath of the 2011 Fukushima reactor meltdown, "takes a toll" [41]. Legal claims brought by Polynesians in the 1990s allude to the psychological toll of living with nuclear risk, with some individuals reporting that they decided not to have children because of anxieties over potential intergenerational health impacts [42, 43]. While there are no validated studies proving a link between radiation exposures and birth defects, the prospect and, in some cases, imputed incidence of intergenerational impacts of nuclear testing also weigh heavily on the minds of many cancer survivors, parents, and advocacy groups. Subjecting victim narratives to doubt, while evaluating causation during the compensation process, can also do harm: M.X. Mitchell has argued that the contested boundary between "risk" and "harm" in the wake of nuclear accidents and radiological exposures, in turn, "abandon[s] the victims completely to the judgments, mistakes and controversies of experts, while subjecting them to terrible psychological stress" [44].

The colonial context that brought nuclear violence to Polynesia also shaped avenues of legal recourse – both ex ante and ex post. The following two sections show how Polynesians and regional actors engaged with legal and political avenues to push back against France's right to bomb with impunity – first, in an effort to prevent and halt testing in the 1960s through the 1990s, and later, after 1996, in an effort to pursue meaningful redress for victims suffering from conditions caused by unnecessary exposures to ionizing radiation.

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5.3 Objecting to Risk Imposition: The Language of Rights

Over three decades of French testing, Polynesians and other Pacific Islanders pursued a wide range of strategies in contesting the French nuclear program, from grassroots organizing to filing claims in international fora. While some opponents emphasized Polynesians' rights as French citizens to be free from nuclear violence, others cited the UN Charter and regional human rights instruments to assert that France was violating its duties toward Polynesians under international law. Still others invoked the language of sovereignty to argue that the transboundary harms associated with French nuclear testing violated international law. While French military and political leaders, along with their French Polynesian political supporters, repeatedly asserted that nuclear tests were "clean" and posed no risk to local populations, various Pacific stakeholders expressed skepticism, arguing that if the bombs were truly so harmless, the French should test them over the Seine [45].

5.3.1 Rights of Citizenship

Technically speaking, those who stood to suffer the worst harms associated with France's nuclear testing program were French citizens with equal rights under the French Constitution. In 1946, following the adoption of the Constitution of the French IVth Republic, all indigenous residents of the Établissements français d'Océanie (EFO) were accorded French citizenship, and the islands' status shifted from colony to that of a "territory" within the "French Union." Article 72-3 of the Constitution of 1958 declares this equality explicitly, stating that "[t]he Republic recognizes as part of the French people populations of overseas territories within a common ideal of liberty, equality, and fraternity" [46]. And while France had submitted a filing regarding its Overseas Territories to the United Nations in 1946, as prescribed with respect to all states "administering non-self-governing territories" under Article 73 of the UN Charter, it pointedly refused to do so in succeeding years, maintaining that its overseas territories, now fully and directly represented in the French parliament, could no longer be considered non-self-governing [47].[7]

Yet residents of French Polynesia were hardly on equal footing with their compatriots in the metropole, despite their French citizenship. As Robert Aldrich and John Connell have argued, the French *territoires d'outre-mer* "were the former colonies under a new name" ([24], p. 80). These dynamics were laid bare when General de Gaulle effectively persuaded the Territorial Assembly of French Polynesia to accede to French testing in the Tuamotu archipelago, under the implied threat,

[7] Under Article 73 of the UN Charter, states must "recognize … that the interests of the inhabitants … are paramount" and "ensure … their political, economic, social, and educational advancement, their just treatment, and their protection against abuses" [47].

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according to the testimony of a former territorial politician, of imposing a military occupation upon the entire territory of French Polynesia if the local government failed to cooperate [48].

Polynesians were well aware of the colonial dynamics of selecting nuclear proving grounds. As John Teariki, Polynesian Député to the French National Assembly, wrote in 1966: "No government has hesitated to force other people – and preferably, small and defenseless peoples – to bear the most dangerous risks of its nuclear tests" [49]. The Americans, he continued, "reserve the heavy fallout of their largest bombs" for the inhabitants of the Marshall Islands; the English, "for the Polynesians inhabiting the equatorial islands near Christmas"; the Russians, "for some tribes of the Great North"; and the Chinese, "for Tibetans and Mongols." France reserved its fallout, Teariki stated, "first for Africans, and now us" [49].

Teariki refuted France's ongoing claims of the harmlessness of nuclear explosions, citing UN reports that found that the smallest dose of radiation could be toxic to humans and their descendants, and arguing that any augmentation of environmental radiation should be avoided. Teariki invoked the rights in asserting his opposition to nuclear testing, stating that the emplacement of the Centre d'expérimentation du Pacifique (CEP) in French Polynesia, "without the consultation of Polynesians, while it is their health and that of their descendants that is at risk," constituted "a grave violation of the contract that links us to France and of the rights recognized by the UN Charter" [49]. Teariki was fundamentally concerned with the latent harms of nuclear fallout – and, presciently, anticipated the anger that Polynesians would one day come to feel when suspecting that French testing was the root cause of their or their loved ones' radiogenic cancers. He closed his speech with "a humble prayer" that de Gaulle might apply in French Polynesia the pacifist principles that he claimed to espouse [50], so that future sufferers of leukemia and other cancers in Polynesia need not accuse France of being the source of their misery [49].

In the 1970s, Pouvanaa a Oopa, an influential and widely respected independence leader who was elected to the French Senate in 1971, again emphasized the French-ness of the overseas territory in arguing against the continuation of nuclear testing on grounds of equality between territory and metropole [51]. "The faithfulness of our population to the Republic and to France has been too often proven and tested for it to be brought into question," he stated, referring to Polynesian sacrifice of life and limb in the Free French forces during the World War II. "But to the senators of France and to French public opinion, we would like to say that we can no longer allow our territory to serve as the battlefield of nuclear experiments" [51]. Because the French senators would not accept such experiments taking place over metropolitan France, Pouvanaa argued, they should not allow such tests to take place in the "antipodes," either. French Polynesia's status within the French

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Republic, in Pouvanaa's view, should protect French Polynesians from bearing the burdens of nuclear testing so disproportionately.

5.3.2 Rights under the UN Charter

Other critics of nuclear testing questioned the right of France – and other nuclear powers – to test nuclear weapons over non-self-governing territories. A decade before France moved its nuclear testing program to the Pacific, Marshall Islanders had petitioned the UN Trusteeship Council asking for a cessation of US nuclear detonations, citing harms experienced by civilians on Rongelab and Uterik atolls in the form of burns, nausea, hair loss, and lowered white blood counts [52].[8] The petition spurred a series of anxious memoranda within the US State Department discussing whether nuclear testing might be viewed at the UN as a breach of the United States' obligations under its UN-mediated Strategic Trusteeship Agreement [53, 54].

In the early 1970s, some international actors similarly questioned France's right to conduct tests in a far-flung territory over which it asserted control, assessing whether such acts might violate the UN Charter. Fijian Ambassador to the UN Satya Nandan, for example, criticized the French decision to test in an overseas territory and argued that France had no right under the UN Charter to do so in a non-self-governing territory [55]. Representing a country that had recently gained independence from Great Britain, Nandan was acutely aware of the fact that French Polynesians themselves had no delegate at the UN. Nandan likened France's "defiant disregard of the pleas of the inhabitants of the region," and particularly France's disregard of "those of the small States and Non-Self-Governing Territories that are within nuclear fallout range," to the "attitude of an international bully showering its nuclear waste over one region after another" [55].

Nandan then made a legal argument that the tests should not be understood as being conducted on French territory at all. While France maintained that French Polynesia was part of France, rather than a colony, he argued in 1971 that, because French Polynesia was for all intents and purposes non-self-governing, France should be bound by certain duties of care in the treatment of its inhabitants [55]. Under Article 73 of the UN Charter, states administering non-self-governing territories must, *inter alia*, "promote to the utmost … the well-being of the inhabitants of these territories and … ensure … their economic, social and educational advancement, their just treatment and their protection against abuses" [47]. It was

[8] In May 1954, Marshallese petitioners appealed to the United Nations given the international body's pledge "to safeguard the life, liberty and the general wellbeing of the people of the Trust Territory, of which the Marshallese people are a part" [52].

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self-evident, Nandan argued, that the emplacement of a nuclear testing center, with all attendant risks, in the Tuamotus contravened the "sacred obligations" that bound France under Article 73 [55]. Claims of French Polynesia being part of France, he argued, "are like those of Portugal, which considers its African Territories to be a province of Portugal in order that it may continue to exploit them." French Polynesia, he stated, was being used as "a dumping ground for French nuclear waste in order to provide for the alleged security of Frenchmen in distant France" [55].[9]

5.3.3 Inherent Rights of Sovereignty

Nandan was not concerned only with the rights of French Polynesians. Suva, Fiji's capital, had experienced significant fallout in the fall of 1966, when prevailing winds carried the radioactive cloud westward across the Pacific [56, 57]. Fiji was one of numerous states in the Pacific region that could claim that French nuclear tests, and the transboundary harm they caused, infringed on its sovereignty and the rights of its citizens. Samoa, Tokelau, Tonga, Tuvalu, Niue, the Cook Islands, Aotearoa (New Zealand), and Australia also registered fallout over their territories [58]. And in 1973, the governments of Australia and New Zealand brought a high-profile case before the International Court of Justice (ICJ), seeking to prevent further French testing in the region [59, 60].

In their cases before the ICJ, Australia and New Zealand challenged France's right to test on the grounds that nuclear detonations and resultant fallout infringed on the rights of other sovereign states in the region [59–61]. While both complaints mentioned briefly the risks posed to inhabitants of French Polynesia, the substance of Australia and New Zealand's legal arguments centered on the alleged violation of the two countries' sovereign right to exclude radioactive particles from their own territories. Australia's memorandum, like New Zealand's, focused on the illegality of France's introduction of radioactive fallout into territory not its own – the high seas and the sovereign territory of neighboring states. Imposing even de minimis levels of risk on citizens of a foreign power was, in Australia's view, a violation of international law. Notably, Australia also argued that the tests imposed objective measurable harms in the form of elevated radionuclide counts and additional "psychological consequences" that should be considered harms in their own right. Even aside from measurable amounts of fission products in foodstuffs and the atmosphere, Australia argued, "populations are subjected to mental stress and anxiety generated by fear and this is a cause of injury to them" [59].

[9] Nandan was referring to the fallout from testing (and associated waste products), rather than the transportation and dumping of "nuclear waste" itself from metropolitan France. Those asserting that the tests were "clean," Nandan continued, "should test them in their own *metropolitan* territory" [45].

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In June 1973, the ICJ issued an interim protection order, stating that "the French government should avoid nuclear tests causing the deposit of radio-active fallout on Australian territory" [62].[10] France ignored this order and, in early August, detection devices throughout Australia began to register "fresh fallout." International leaders sharply criticized France's indifference to both the Partial Test Ban Treaty of 1963, which forbad atmospheric testing, and the interim order of the "highest international judicial body" [63–65]. Despite ostensible French disregard for international law, international censure did begin to weigh heavily on French parliamentarians [66]. The French government announced in 1974 the intention to move testing underground, in wells dug deep into the base of Moruroa and Fangataufa atolls. The ICJ ultimately declined to issue a final ruling on the legality of atmospheric French nuclear testing on the grounds that the issue was moot now that France had moved their testing program underground.

The ICJ's interim order, however unenforceable it proved in practice, is revealing in its endorsement of the principle that one of the inherent rights of sovereignty is the ability to exclude radionuclides from one's territory. The Court focused on the concrete harm of unwanted particulate matter itself, rather than the more fraught question of whether radioactive contamination could be definitively linked to future corporeal harms. Other states in the Pacific would soon seize on a parallel strategy in the multilateral domain, invoking their sovereign power to exclude nuclear-related vessels from their ports as a means for curtailing the operations of nuclear powers in the Pacific. The Nuclear Free and Independent Pacific Movement (NFIP), a transnational, Indigenous-led anti-nuclear movement that espoused twinned anti-colonial and anti-nuclear objectives, gained traction in the 1970s and 1980s, and helped drive the creation of a nuclear-free zone in the South Pacific via the 1985 Treaty of Rarotonga [67, 68].[11]

Despite this ongoing transnational campaign and high-profile activism by Greenpeace, resistance to nuclear testing *within* French Polynesia did not gain widespread traction until the mid-1990s. Civil society groups, such as Ia Ora Te Natura, organized protests during the early decades of testing [69], but Polynesians who objected to nuclear testing or questioned French testing in the 1960s, 1970s, and 1980s were generally associated with the independentist political party. During this period, to criticize the CEP was implicitly to criticize French Polynesia's role within Overseas France. Pro-independence candidates garnered only a growing minority of the vote – 15% in 1978, and 20% in 1981 ([24], pp. 212–213, 233).

[10] The Court, by a judgment dated June 22, 1973, granted interim measures of protection, but later, by its decision dated December 20, 1974, decided, in view of the unilateral engagement by France to discontinue the atmospheric tests, that the case was moot.

[11] Signed by 13 states and 11 territories in the region, the treaty prohibited the testing and storage of nuclear explosive devices within parties' territories, along with dumping of radioactive waste and the provision of any support to other states concerning the manufacturing or acquisition of nuclear devices.

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These parties failed to garner wider support in large part because the CEP had so transformed the economic landscape of the islands that a significant portion of the population was now dependent on associated jobs and government aid [21]. John Teariki himself commented in 1984 that independence "would be difficult now as the people aren't ready … The Tahitians live an unnatural life now. They live off imported goods, tinned food and other things. There would be struggles, unemployment, all possible things" ([24], p. 246). These dynamics shifted suddenly in the mid-1990s, when French resumption of underground testing after a three-year voluntary moratorium touched off a series of mass protests and riots [70]. With the support of international lawyers, a small cohort of Polynesians also looked to international organizations for potential avenues of redress, embracing the language of human rights in expressing their opposition to continued French testing in the region.

5.3.4 Human Rights

In 1995, President Jacques Chirac's announcement of French plans to renew underground testing after a three-year moratorium [71] sparked widespread outrage and grassroots anti-nuclear sentiment within French Polynesia on a level that had not yet been seen over 30 years of testing. Since 1975, all French nuclear experiments had been conducted underground, with much lower risk of fallout or contamination beyond immediate test sites. Yet for those protesting in 1995, the resumption of testing provided the impetus for airing grievances about the French testing program writ large – and gave rise to several legal claims that invoked human rights law to argue that the imposition of a nuclear testing program in Polynesia violated local people's human rights. These legal efforts show the way in which opponents of nuclear tests framed *risk imposition* itself as one of the rights violations associated with nuclear testing.

In the wake of Chirac's announcement, a group of Mā'ohi claimants and their lawyers objected to the French right to test under the European Convention of Human Rights (ECHR). Vaihere Bordes, a 46-year-old farmer living on Tahiti, and 18 other residents of French Polynesia filed a petition with the European Commission of Human Rights, seeking to enjoin further testing on the grounds that additional detonations would violate the ECHR [42]. Specifically, claimants argued that further underground testing would violate their right to life, their right to be free from inhumane and degrading treatment, their right to private and family life, and their right to be free from discrimination on the basis of race. A similar group of petitioners lodged a parallel complaint with the UN Human Rights Committee, alleging that the proposed tests violated their rights under the International Covenant on Civil and Political Rights (ICCPR) [43].

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The petitioners had already experienced harms directly linked to French testing. Some had worked at Moruroa and had been hospitalized for health problems related to their work there [42]. Others experienced repeated miscarriages and lost children to conditions they suspected were related to radiation. One childless petitioner stated that he did not plan to have any children, for fear that he would pass on congenital malformations [42].

In the context of the 1995 underground tests, plaintiffs drew attention to the way in which additional nuclear risk imposition itself caused cognizable harms in the form of stress, anxiety, and stigma. Plaintiffs argued that the announcement of the new series of tests had, in and of itself, already caused them harm in the form of psychological anguish,[12] echoing Australia's arguments before the ICJ in 1973 that living under radiological risk produced psychological harms. The claimants also argued that the continued use of Polynesia was tantamount to racial discrimination. Choosing a distant site in the Pacific, as opposed to sites in metropolitan France with more solid geological formations and closer to sites of materials production, they argued, served as evidence of discrimination on the basis of race. The only logical explanation for selecting Moruroa as the principal test site, they contended, was "the greater political acceptability of exposing a minority non-European population to risks generated by nuclear tests" [42]. According to petitioners, the imposition of the test site with attendant risks in Polynesia was a mark of stigma and discrimination and, thus, a cognizable injury. In addition to these claims tied specifically to the final set of seven tests, the applicants added that they had "suffered cumulative degrading and humiliating treatment" because the "Polynesian population lives in terror of the consequences of the numerous earlier tests and in fear of the potentially tragic consequences of the further series of tests" [42].

The Commission essentially ignored these claims about the psychological harms inherent in living in the shadow of nuclear testing and dismissed the case on the grounds that mere risk of harm insufficient grounds for legal recourse. Many of the legal claims in the petition hinged principally on prospective, rather than realized, harm: Claimants argued that the final planned series of tests could cause venting of radioactive material into the atmosphere; fracturing of the atolls under which tests were conducted; and contamination of the surrounding ocean food chain.[13] "Merely invoking risks inherent in the use of nuclear power, whether for civil or military purposes," the Commission stated, "is insufficient to enable the applicants

[12] The announcement fell on the 50th anniversary of the bombing of Hiroshima. Applicants argued that this timing caused them particular suffering, as it coincided with "extensive press, radio and television of the suffering endured by the Japanese population" [42].

[13] To support these claims, applicants cited the risk that additional tests would cause the atoll, which already had "as many holes as Swiss cheese," to fracture, along with creating risk of atmospheric fallout, marine pollution, and contamination of the food chain [42].

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to claim to be victims of a violation of the Convention, as many human activities generate risks" [42].[14] In a claim before the UN Human Rights Committee, petitioners argued that the proposed tests would "with some degree of probability" increase the incidence of cancer cases among inhabitants of French Polynesia and trigger ciguatera outbreaks [43]. Like the European Commission of Human Rights, the UN Human Rights Committee decided that the claimants were not "victims" according to the ICCRP, as hypothetical violations (in the absence of "real" and "imminent" consequences) were insufficient in showing harm [43].

Unimpeded by these and other unsuccessful legal challenges [72], France's final set of underground nuclear tests moved forward, but not without much international public outcry [73]. France's leadership justified the limited, final set of tests as a necessary precondition of the country's planned accession to the Comprehensive Test Ban Treaty (CTBT) [72]. But this context did little to tame public protests. For French Polynesians, the protests of 1995 were not just about the seven final tests, but reflected grievances built up over decades of French use of the territory as a nuclear proving ground. While the European Commission's and UN committee's legal analyses focused only on the foreseeable harm that might arise from additional underground tests, those most directly impacted by French nuclear testing in the Pacific knew firsthand of relatives, friends, and neighbors coping with health conditions and fertility problems that many considered a direct consequence of exposure to ionizing radiation. Many affected individuals had not spoken out previously because of the delayed onset of these conditions and because of the atmosphere of secrecy, intimidation, and information suppression that prevailed for decades.

That the European Commission and UN Human Rights Committee claimants' core legal arguments focused on prospective risk, rather than imminent harm, was their legal undoing. But these cases do provide a window into how affected populations could experience risk itself as a form of harm – in terms of the mental anguish associated with living under the shadow of nuclear testing and its embodied legacies and the more insidious stigmatic harm of discrimination. The disposition of these cases at the hands of the European Commission of Human Rights

[14] This was not the first time that international judicial bodies had debated whether risk of future harm could be considered tantamount to harm when deciding on appropriate judicial remedies. In *Soering v. United Kingdom* (1989), the European Court of Human Rights had found that forced extradition of an individual to a jurisdiction where he could be subject to unreasonable and degrading punishment violated the Convention. In *Beldjoudi v. France* (1990), the Court similarly found that deportation of a man to a country where he would run "the risk of having to live in almost total social isolation" violated the applicant's right to respect for his private life. The *Tauira* case brought by Bordes et al., the Commission found, was different. In order for an applicant to claim to be a victim in a situation in which the harm had not yet occurred, the opinion stated, he must "produce reasonable and convincing evidence of the likelihood that a violation affecting him personally will occur; mere suspicion or conjecture is insufficient in this respect." The 19 French Polynesian applicants, the Commission found, had not produced such evidence that the planned underground tests would affect them personally, or that the French had failed to take necessary precautions [42].

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and the UN Committee on Human Rights also helps to illustrate how the law rejected rights-based arguments seeking to prevent exposure to risk in the absence of compelling evidence that concrete and imminent harms would be suffered by claimants. Similar challenges of proving links between risk and harm apply when looking backward to assess whether nuclear testing can be considered the causal agent in harms suffered today.

5.4 Coming to Terms with Violence and Harms: The "Loi Morin" and the Politics of Redress

In the years that followed the final set of tests in the mid-1990s, increasing press coverage of nuclear contamination, individual litigation in French courts, and expanding victim advocacy organizations spurred a public reckoning with France's nuclear testing legacy. Since 2010, those who resided or sojourned in French Polynesia during the period of nuclear testing and later developed one of an enumerated list of radiogenic cancers – or their surviving relatives – have been eligible to apply for financial compensation under the French nuclear victim compensation law, known as the "Morin Law" after former Minister of Defense Hervé Morin [74].[15]

While nuclear compensation programs represent a partial victory for victims and their advocates, they also have a flattening effect on the conceptualization of nuclear harms. The Morin Law allows surviving family members to collect compensation on behalf of potential claimants who passed away from radiogenic illnesses, but it offers no redress for individuals with non-cancerous health concerns, who have dealt with miscarriages or fertility challenges, or who believe they have passed on genetic damage to subsequent generations. It also provides no compensation for those whose health and livelihoods were impacted by severe ciguatera outbreaks in the 1960s and 1970s and does not address the durable environmental and sociological consequences of nuclear testing.

The Morin Law has been mired in controversy since its enactment and has undergone a rapid succession of amendments that have shifted the playing field for those who believe themselves or their family members to be victims of nuclear testing [75]. One central controversy around the law concerns its treatment of the causal link between exposure to radiation linked to the French nuclear program

[15] To be eligible for compensation, an individual must have been diagnosed with one of 23 eligible cancers and must have been present at the Sahara testing center between 1960 and 1967 or in French Polynesia between 1966 and 1998. The law specifies that claimants are entitled to a "reparation intégrale," or full compensation, of the harms they suffered as a result. Awards, while not insubstantial, average just over €75 000 – a lifeline for some coping with medical costs and an inability to work, to be sure, but paltry compensation for lives lost [83].

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and the eventual development of a radiogenic cancer. While numerous studies have demonstrated a link between exposure to fission products and the development of certain cancers, it is virtually impossible to prove such a causal link at an individual level.

Under the law, if basic eligibility criteria are met, a claimant benefits from a "presumption of causality," even in the absence of proof that the nuclear tests caused his or her cancer [74]. The contours of this presumption of causality, though, have proved controversial, and numerous amendments to the law since its 2010 enactment have created a moving target for prospective claimants [75]. Between 2010 and 2017, 97% of claims were rejected by the French administering agency through a "negligible risk" loophole that allowed the committee reviewing claims to dismiss those where they found that exposure to ionizing radiation linked to nuclear testing likely contributed only "negligibly" to the claimant's risk of developing cancer [76]. In 2018, this negligible risk exception was replaced with an exposure threshold: Claimants meeting eligibility criteria could receive compensation if the committee determined that they could have been exposed to at least 1 mSv of ionizing radiation due to nuclear tests in any given year [77–79].[16] Decisions by France's top administrative and constitutional courts later extended a pure presumption of causation retroactively to cover applicants who submitted claims before 2018 [80–82]. These changes have provoked widespread confusion. While the claim acceptance rate rose from a paltry 3% to nearly 50% after the removal of the negligible risk exception, the claims process remains a source of controversy, in both metropolitan France and Mā'ohi Nui [83–85].

The French Atomic Energy Commission (CEA) and the French government more broadly continue to play a role in shaping public information about the effects of nuclear testing, making certain concessions while holding out against claims of widespread harm or culpability. In the wake of a March 2021 scientific and journalistic investigation showing that more than 90% of the population of French Polynesia was exposed above the 1 mSv threshold during the period of atmospheric testing [86], the CEA published its own book casting pollution as "limited" in an effort to take back control of the narrative [13]. And while French President Emmanuel Macron acknowledged during a July 2021 visit to Tahiti that France has "a debt" to French Polynesia for the collectivity's role in hosting nuclear tests, and acknowledged that we know today that the tests were not "clean," he also asserted, incorrectly, that members of the military did not lie to Polynesians and accepted the same risks as local populations [87]. The French Morin Law itself is enacted in such a way as to evade apologies or acknowledgments of French responsibility for the harms associated with nuclear tests. The compensation regime is framed as

[16] Matthew Breay Bolton and Max Liboiron have criticized this type of "threshold thinking" [15, 79].

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an act of "national solidarity" recognizing that the nuclear testing campaign could have produced some victims, but maintaining that the harms compensated under the law are not ultimately attributable to the French state [88, 89].

Historical and ongoing information asymmetries complicate efforts by victims to mount a case in favor of their compensation – and can be understood as part of the historical violence of the nuclear testing program, given failures to limit harm to affected populations. Surveillance among soldiers and civilians working at nuclear testing sites was uneven at best – and often particularly lacking for indigenous or minority workers. Downwind communities, from the predominantly white citizens of St. George, Utah to the indigenous Pacific Islanders on remote atolls, were generally, and often deliberately, kept in the dark about nuclear risks in the wake of tests – leading to external and internal exposures that could have been avoided. And even those fully aware of dangers who might have actively sought out ways to measure their past or ongoing exposures were forced to contend with a lack of adequate sensing technologies – especially for calculating internal exposures. Machines capable of determining levels of internal exposure lagged years behind the detonation of the first nuclear weapons and were often expensive, bulky, and available only to a select few. The full body counter was not available until 1964 and, even then, was impractical for large studies of internal radiation doses [41]. "Without such instrumentation," Robert Jacobs writes, "you cannot differentiate who in a group of people has internalized a particle and who hasn't" [41]. Internal exposures could vary based on happenstance (who inhaled which particle) and exposures through the food chain, creating uneven landscapes of radiological vulnerability.

Even for those who can prove exposure levels, the "slow violence" [90] of radiological harms makes definitively proving a causal link between level or chronic exposure and the development of disease in following years and decades nearly impossible in any given individual case. To this end, the introduction of doubt – about both initial levels of exposure and the causal link between exposures and disease – provides a critical tool in the arsenal of those seeking to deflect and undermine claims by putative nuclear victims. And, as Mary Mitchell, Holly Barker, and Barbara Rose Johnston have shown, being subjected to the judgments of lawyers and civil servants and invasive examinations by medical professionals can be experienced as a form of violation in and of itself [26, 44].

Contemporary challenges identifying the "true" victims of nuclear testing were hardly unforeseeable. In the 1970s, the Congress of Micronesia issued a report on the effects of the 1954 Castle Bravo incident, arguing that the "prudent assumption" in the case of those exposed on Rongelap and Utirik Atolls was that "all ionizing radiation to the patient is harmful" [26]. The committee thus concluded that "whether or not 'damage' can be proven is irrelevant, since it is a fact that

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exposure occurred and that, since exposure to radiation is harmful, then it is highly probable that damage did indeed occur" [26]. In this view, which parallels the legal arguments advanced by the government of Australia before the ICJ, the harms of nuclear testing should be registered at the level of the intrusion of unwanted radioactive isotopes, regardless of realized downstream health consequences. Yet, calculating levels of exposure, at an individual or local level, is complicated by insufficient historical instrumentation and systemic gaps in exposure data. So how does one go about pursuing redress when, at least in part by design, no reliable record of exposures exists?

In July 2021, French Polynesian President Edouard Fritch flew to Paris with a 20-person delegation to participate in a the "Reko Tika," or "Truth and Justice" round table with French ministers and high officials [91]. This official delegation was principally concerned with issues of declassifying nuclear archives, improving the compensation process for individual claimants, and securing French reimbursement of the costs taken on by the Polynesian social service organization in caring for cancer victims. Yet, while the official Polynesian delegation solicited input from civil society organizations and claimed to represent the grievances of all Polynesians, the Māʻohi Protestant Church and civil society organizations eventually pulled out of the process and declined to travel to Paris [92]. Oscar Temaru, President of the independentist Tāvini Huiraʻatira party, objected to the bilateral nature of the round table, refusing to participate in any discussion of the nuclear issues with the French state in the absence of UN arbitration [93].

On the morning of July 1, the independentist party Tāvini Huiraʻatira, the Māʻohi Protestant Church, and several civil society organizations organized the "Tahiti Nui Round Table" in Faʻaʻā as a counterpoint to the Reko Tika round table taking place a dozen time zones away in Paris [94]. The Māʻohi Nui round table organizers crystallized their grievances into two main buckets: first, the environmental and health impacts from radioactive contamination in Polynesia; and, second, the lies of the French State and consistent denial and minimization of nuclear contamination [95]. The Māʻohi Nui round table, thus, centered the dishonesty of the French government as a key element of nuclear violence.

Both round tables agreed that the status quo around nuclear legacies and compensation must change: The official delegation to Paris spurred an initiative to open up more archives related to the French nuclear program and helped lead to the allocation of additional resources from the French state to assist eligible claimants in submitting their compensation applications [96, 97]. The Faʻaʻā round table, which denounced the Paris event as illegitimate, called for more ambitious measures: a complete overhaul of the Loi Morin system and a Justice and Reconciliation Commission in Papeete, citing the example of the Republic of South Africa's management of post-apartheid reconciliation [94]. The group

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described the French nuclear program as being characterized by an "institutional lie erected to a systemic level," and emphasized the need for narrative justice. The enabling condition behind French lies, according to minutes from the July 2021 meeting, was that French Polynesia "has been an occupied country. And there is no democracy in an occupied country headed by an 'administrative power'" [95].

Today, as in the 1960s, French Polynesians continue to assert that France never had any right to detonate nuclear bombs in the Pacific. Yet, because of the liminal status of the archipelagos that comprise French Polynesia, or as the Tāvini party would describe it, Māʻohi Nui, Polynesians were compelled to endure cultural upheavals, radionuclide contamination, and varying degrees of ecological destruction in the service of France's nuclear deterrence force. The violence of risk imposition, which can be considered a form of "wastelanding" [29], was compounded by a secondary violence of tactics aimed at suppressing public knowledge and documentation regarding radiological risks and harms. The violence endured by Polynesians was at once grounded in deeper patterns of racialized colonialism and peculiar to the atomic age – a slow, environmentally mediated violence at once complicated and co-constituted by the maddening dynamics of radiological risk, uncertainty, and underdetermined causation.

5.5 Conclusion

In theorizing environmental violence, we should also pay attention to how legal status and degrees of political empowerment in colonial and postcolonial contexts shape global geographies of risk, violence, and harm. Ulrich Beck has written of the "systematic 'attraction' between extreme poverty and extreme risk" [14]. But financial affluence is not the only – or necessarily the most significant – factor in shaping community vulnerability and access to forms of redress. French Polynesians have borne the brunt of the harms associated with the French testing program in the Pacific because, between 1966 and 1996, they were considered by the metropole to be at once French and not French enough – objects, but not full subjects of French authority.

Examining nuclear legacies in French Polynesia can help us to think through the possibilities and limitations of the "Environmental Violence" concept in an age of causally complex harms that can remain latent for decades. This case study shows how complex causation makes environmental harm difficult to address through law, both ex ante and ex post. The emplacement of radiological risk on a population, in colonial contexts and environmental justice contexts more broadly, is a form of violence, not only because of the potential for embodied harm and the concomitant likelihood of psychological stress, but also because the dynamics of generalized risk often complicate, or even preclude, adequate redress.

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These dynamics are not unique to the victims of nuclear weapons programs. Nuclear power plant accidents, chemical toxins, and even greenhouse gas–induced climatic changes can all fit into a similar framework of latent and causally complex harms. Notably, in the Pacific, efforts to preempt harms from accelerating climate change and deep-sea mining follow a similar logic to historical attempts to prevent and halt nuclear testing. As with nuclear testing, the dispersion of benefits and harms in the context of twenty-first-century energy and mineral extraction fall along predictably colonial lines: Financial and security benefits accrue to the global North, while communities in the Global South and, in particular, small island states in Oceania, bear the brunt of harms. Even if one argues that the value of certain polluting industries outpaces their harm, any calculus of "balancing" should consider the fact that, under current international law, we lack effective mechanisms for compensating harms in full. The systemic obstacles to victim redress, whether political, doctrinal, or inherent to the causal complexities of environmentally mediated harms, should be understood as key elements of modern environmental violence.

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