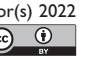
Article

D Society and Space

EPD: Society and Space
2022, Vol. 40(4) 706–725



DOI: 10.1177/02637758221102156
journals.sagepub.com/home/epd


Sustaining empire: Conservation by ruination at Kalama Atoll

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Abstract

Joined to the Hawaiian Islands by ocean currents and winds, Kalama Atoll (named Johnston by the United States) emerges from the sea 825 miles southwest of Honolulu. Over a period of 165 years, in furtherance of the U.S. imperial project, Kalama has been rendered both conservation frontier and island laboratory for an extraordinary amount of nuclear, biological, and chemical weapons. This article examines U.S. imperial governance at Kalama, an unincorporated U.S. territory, and how military ruination of Kalama has produced new military natures that call for observation and protection. Introducing a rubric of "conservation by ruination," we highlight how a coalescing of toxic destruction and conservation efforts functions as a continuous geopolitical claim to the atoll, and how imperial formations at the atoll are weaved through technoscientific and multispecies assemblages. In essence, what is conserved in conservation by ruination is not wildlife, habitats, or nature, but empire itself. Kalama is a post-apocalyptic cyborg assemblage of bleached coral skeletons and radioactive debris, dioxin-laden leachate and crazy ants; a cacophonous ecology of weathered concrete and rusted metal, inhabited by seabirds and steadily dissolving into the sea. But it is also an atoll that remains connected to the islands and peoples of Oceania, and which is neither lost, small, isolated, or ruined. We therefore end the article by speculating on restoration of this atoll whose imperial formations capture not only its spaces, but also its futures.

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Keywords
Geopolitics, imperialism, military environmentalism, ecology, conservation, toxicity, chemical warfare, Oceania

Introduction

Linked to the Hawaiian Islands by ocean currents and winds, Kalama Atoll emerges from the sea 825 miles southwest of Honolulu fringed by shimmering reef (Lobel et al., 2012).[1] The atoll has been the ground beneath several nuclear test disasters, thousands of gallons of leaked Agent Orange, and the incineration of over 2000 tons of nerve agents. Its coral has been blasted with dynamite and its waters contaminated with nuclear debris and dioxin. Over the decades, the atoll has been a welcome respite to thousands of seabirds as well as thousands of stationed military personnel, many of whom have since suffered from various cancers and neurodegenerative diseases. Today, the atoll remains an unincorporated territory of the United States, closed to public entry and administered as a National Wildlife Refuge by the United States Fish and Wildlife Service. For the last 10 years, it has been an ecological war zone for "Crazy Ant Strike Teams" (CAST) on six-month deployments to eradicate the invasive Yellow Crazy Ant and conduct wildlife surveys. Kalama is a place where nesting seabirds will take over an abandoned golf course, where sharks suffer from birth defects, and where, after 100 years of dredging, bombing, leaking, and pollution, a pregnant rat is viewed as a threat.

In this article, we examine what role Kalama has played, and continues to play, for U.S. imperialism in the Pacific. As such, Kalama is no exception. Many islands and atolls of Oceania have been claimed for toxic weapons testing and/or extraction that has colonized, displaced, and sickened Indigenous populations (see for example Johnston and Barker, 2008; Kuper, 2019; Teaiwa, 2014). As Maclellan (2019) has documented, these imperial endeavors depend(ed) on racist ideas of Indigenous populations as sub-human.

We argue that siting the most dangerous, destructive, toxic, and controversial activities of the U.S. military on an island hailed as a unique wildlife sanctuary is not a curious discrepancy or inherent contradiction. Rather, we argue, this conflation stakes a very effective geopolitical claim to an ecology and its futures. Seeking to understand how the weaving together of conservation and toxic destruction functions as imperial governance, we introduce the rubric of "conservation by ruination." Through this, we examine how, on Kalama, conservation and ruination become more than the sum of their parts – the two together produce a colonization of the atoll and its inhabitants where the excess created by ruination and conservation working in tandem overdetermines and thereby geopolitically grips the atoll in an extraordinary fashion. As an imperial-geopolitical tool, conservation by ruination captures not only a certain space, but also its futures. Importantly, neither ruination nor conservation are static strategies on the atoll. In this article, we examine how their conflations have changed over time and how this continuous shapeshifting has cemented a tenacious, or as Stoler (2016) calls it, durable, imperialism that has never loosened its grip on the atoll.

As imperial governance, conservation by ruination operates through technoscientific-multispecies assemblages, which is to say that it is characterized by technological and scientific activities that in turn incorporate myriads of different species for its continued function. Imperialism at Kalama is a multi-species endeavor, where management and

scientific knowledge about non-human species commingles with military technological experimentation to comprise and sediment the imperial formations of the atoll. Because especially seabirds have been the main objects of conservation efforts, and because, as we shall see, it was the guano from these same birds that initially spurred U.S. empire in the Pacific, birds were from the onset both facilitators and victims of U.S. empire, in such a way that U.S. empire would have been different were it not for seabirds nesting on atolls across the Pacific (see also Martin, 2018).

From Kahoʻolawe to Bikini to Guåhan, islands across Oceania are no strangers to imperial governance and its long wake of destruction to secure territory for U.S. empire. Our analysis, and the rubric of conservation by ruination, offers a valuable lens for the complexity of how imperial formations traverse and settle across the Pacific.

The island laboratory

Imperial states use islands as "exceptional spaces where sovereign power is present and yet absent," and which rely upon "the productive blurring of onshore and offshore, internal and external, inside and out in reconfigurations of sovereignty" (Mountz, 2014: 5). In this fashion, islands have become central nodes of U.S. power throughout the globe, their small size masking their political weight. By colonizing islands, the U.S. was able to project power while still committing to the disavowal of territorial expansion during the Cold War (Oldenziel, 2011):

> The islands in US domain have been critical nodes in multiple global networks. Home to capital-intensive, low-labor-intensive technologies, islands have helped to nurture America's self-image as a post-colonial, post-imperial power in the era of decolonization and globalization. (Oldenziel, 2011: 14)

The ways colonized tropical islands functioned as laboratories and spaces of biological and industrial experimentation informed Euro-American modernity and the conservation movement (Grove, 1996). Because of their imagined smallness and isolation, islands have been used as testing grounds and laboratories for a harrowing array of destructive and toxic experiments; what Wesley-Smith (1995) in the context of Pacific Islands has called the "laboratory rationale." As a "settler colonial ideation" (Bahng, 2020) the laboratory suppresses island histories and Indigenous presences (DeLoughrey, 2013). Through a long-standing colonial understanding of the island as a hermetically sealed and ultimately disposable laboratory tied to a promise of remoteness and relative enclosure (Bahng, 2020: 52), the oceanic colonialism of the U.S. "enacted a state of exception to appropriate an enormous portion of the Pacific to detonate hundreds of deadly weapons, rationalized by the misconception of island isolation" (DeLoughrey, 2013: 169). For a misconception it is. For example, the dispersal of global nuclear tests is estimated to have caused over four hundred thousand unequally distributed cancer deaths worldwide in what has been labeled "radioactive colonialism" (Masco, 2006: 27). As many Oceanic scholars, most prominently Epeli Hauʻofa (1994) have highlighted, Oceania is a boundless sea of connected islands rather than a vast ocean interspersed by small, remote islands. In this view, the Pacific Ocean is not a boundary that divides and separates islands and its peoples but rather the fabric of relations that form a community of life. However as DeLoughrey (2013: 168) writes, this construction of the isolate links American militarism to American environmentalism. The very idea of an ecosystem that could be studied and

managed as an enclosed entity came about with the profound destruction taking place at atolls in Oceania:

> Counterintuitive though it may seem, ecosystems are not the preexisting casualties of environmental degradation, but came into being simultaneously with the large-scale destruction of environments. Violence made ecosystems manifest. And yet, as part of the work of naturalizing ecosystems, ecologists repeatedly deemphasized their fieldwork and its attendant contingencies. (Martin, 2018: 569)

Also, as suggested in the quote above, and as we will return to later, the scientifically legitimized idea of naturalized ecosystems functions to depoliticize imperial activities.

Conservation by ruination as imperial governance

Our concept of ruination is inspired by Ann Laura Stoler's (2008) work on imperial debris. Under a rubric of "imperial formations," Stoler (2008: 194) views empire as relations of force and processes of becoming, and ruin "as an active process, and a vibrantly violent verb." Stoler (2008: 194) encourages attention to how imperial formations "persist in their material debris, in ruined landscapes and through the social ruination of people's lives," and suggests (2008: 203) that analyses of imperial formations should look to imperial ruins "not necessarily as monuments but as ecologies of remains open to wider social topographies."

We conceptualize conservation as a spatial and political practice of demarcation and control of spaces in which wildlife, habitats, biodiversity, resources, or more broadly nature, are protected (Adams, 2020). Such protected areas establish jurisdictions and borders that define exclusionary rights, are often implemented by powerful actors, suffered by groups with less power, and enjoyed by yet another set of players, namely tourists and scientists (Vaccaro et al., 2013). Conservation "has a predilection for coercive methods in the exercise of biopower" (Adams, 2020: 795; see also Biermann and Mansfield, 2014). As a type of territorialization, conservation came about with modern (western) notions of the state, as a "by-product of regimes of survey and partition under imperial and later national regimes of statehood" (Adams, 2020: 789). As such, conservation is often linked to imperial governance (Barton, 2002; Grove, 1996). For example, Guha (1997: 18) describes "green imperialism" in which "the interests of the tiger are consistently elevated over the interests of the tribal." Under the rubric of "coercive conservation" Peluso (1993) details how state protection of resources depends on militaristic management techniques, including coercive exclusion, and how conservation policy prescriptions are imperialistic, especially when they embrace the conflation of conservation and military practice. Present-day conservation has also been linked to global security and counter-insurgency efforts (Duffy, 2016; see also Kajihiro, 2020).

Efforts to preserve the natural environment that involve (forceful) exclusion of local, civilian, and/or Indigenous populations have been labelled "fortress conservation" (Harris, 2014: 391; Sand, 2012; Siurua, 2006: 73), which is a "practice of exclusion" (Brockington, 2015). According to Vaccaro et al. (2013) the fortress conservation model emerged with colonialism and its "remote authoritarian institutional control." Mei-Singh (2016: 697), focusing on Kaʻena Point on Oʻahu, describes "carceral conservationism" as "conservation measures that partition land and living space with the stated aim of resource protection while in actuality criminalizing existing populations in order to displace them."

Imperialism and conservation efforts also converge when conservation and military spaces overlap. Vast areas of land with restricted human access due to military use

become "de facto conservation zones" (Kajihiro, 2020), also labelled "conservation by serendipity" (Coates et al., 2011: 465). As an example of this, a 2012 Ecological assessment of Kalama atoll, ordered by the U.S. army, states that the military protects the birds because it keeps unwanted humans and non-humans from populating the atoll:

> Because of man's interference, an estimated 90–99% of the seabird populations of the Pacific have been destroyed (Steadman, 1995, 1997). Johnston Atoll has served as a highly productive, safe nesting area over the years because the military presence has kept tourists and leisure sailors away, and prevented the introduction of predators such as cats or rats. (Lobel et al., 2012: 9)

The ecological characteristics of such "military landscapes" and the ways in which militaries embrace environmental or conservationist ideas and practices, are discussed under the rubric of "military environmentalism" (see Davis, 2007; Durant, 2007; Havlick, 2018; Kuletz, 2001; Lawrence et al., 2015; Martini, 2015; Sanders, 2009) or "military ecological governmentality" (Kajihiro, 2020: 405).

Under this theme, Havlick (2014) writes about "opportunistic conservation," where habitat and wildlife goals are shaped or constrained by the lingering presence of prior military uses, and where conservation represents an effort to turn the material challenges of dealing with military infrastructures or hazards into meaningful measures to protect plants, wildlife, and habitat. Hence, militaries hold on to former bases or training areas by converting them into conservation spaces, and environmental discourse and practice is "deployed to justify military control of substantial chunks of national territories" (Coates et al., 2011). Critiqued for being a way of "greenwashing" harmful environmental and cultural impacts of military activities (Havlick, 2018; Kajihiro, 2020), military environmentalism is a way of legitimizing control over land, and military aims are advanced by showcasing the ecological value of militarized environments (Coates et al., 2011). Importantly, it is enshrined in law that these places are kept unanimously available to the military (Harris, 2014). As Harris (2014: 388) writes "Calls to (re)settle, civilianize, or even renounce sovereignty over, that is, decolonize – islands like Wake, the Johnston Atoll, and Midway are neutralized now that the islands are enclosed in a conservationist casing."

In conservation by ruination, conservation is premised on the simultaneous destruction of a place; ruination implicitly demands rescue. In Havlick's description (2007: 156), places that are viewed as so contaminated and dangerous that they cannot support economically productive activities may be redeemed as conservation areas, with the added benefit of relaxed remediation standards and reduced cleanup and liability costs. The process of militarization can then employ arguments about habitats and biodiversity (Havlick, 2007). The 2012 ecological assessment of Kalama states that "Today, Johnston Atoll provides an excellent example of how military operations can be compatible with the ecosystem and both can thrive together successfully" (Lobel et al., 2012: 2). Havlick (2007: 153) coined the term "ecological militarization" to describe this discourse of military compatibility with the environment (see also Havlick, 2018; Lawrence et al., 2015). In this idea, a place was saved precisely by ruining it.

With conservation by ruination, conservation only happens insofar as it complies with or serves the interests of empire. As Harris (2014: 391) notes, the environmental benefits of military activities only ever happen as by-products. The ruination of a place by toxic contamination and its designation for conservation enacts a ban, and the military's embrace of environmental care is part of its geopolitical claim, which is also a claim to master nature itself, where care for ecologies and species is part of maintaining control over terrain and events.

We are not the only ones to notice an interdependency rather than contradiction between militarism or imperialism and conservation. As Coates et al. (2011: 468) write:

> What makes the relationship between sites of biodiversity and toxicity of military lands particularly intriguing is that, far than being distant from one another, they are often adjacent and sometimes interdependent.

Martin (2018: 585) writes that "the proving grounds became an originating landscape of conservation and restoration." And Bahng states that

> Nuclear experimentation in the Pacific is not only an example of US militarization profiting from the disposability of Pacific Islanders; it also becomes the occasion for deepening US presence in the Pacific under the guise of aid, protection, and environmental remediation. (2020: 49)

Referring to Guåhan, Kuper (2019) describes how military conservation and endless mitigation efforts shrouded in doubt upholds military hegemony. Kuper (2019) labels this "sustainable insecurity," a rubric which has inspired the title for this article. Similarly, Feffer et al. (2009) describe President Bush's rush to conserve large areas in the Pacific as "Marine Protection as Empire Expansion."

In sum, we introduce conservation by ruination to describe a productive imperial technique for exerting control over space and life itself. What is in essence conserved in conservation by ruination is not wildlife, habitats, or nature, but empire itself. Empire is made sustainable, as in able to last for a long period, through appealing to sustainability, as in efforts to conserve natural resources.

Methodologically, we heed Stoler's (2008, 2016) work on imperial governance and imperial formations. To Stoler, imperial formations are ongoing, and how they function, their differentiated effects, and who is most affected by them, often escape recognition (Stoler, 2016). She therefore encourages history writing that evades smooth continuities as well as abrupt epochal breaks, but which attempts to "capture the uneven, recursive qualities of the visions and practice imperial formations have animated, what they have both succeeded and failed to put in place" (Stoler, 2016: 6). Inspired by Foucault's method of genealogy, Stoler aims at colonial histories of the present that capture "the hardened, tenacious qualities of colonial effects; their extended protracted temporalities; and, not least, their durable, if sometimes intangible constraints and confinements" (Stoler, 2016: 7). Examining the imperial formations at Kalama, our extensive collective foray into policy documents, reports, academic and popular culture books and articles, Hawaiian newspaper archives, Facebook groups, and YouTube videos has been undertaken to understand how changing conflations of ruination and conservation have functioned to enact a continuous geopolitical claim of the atoll and its waters.

In what follows, we describe conservation by ruination as changing imperial formations of technoscientific-multispecies assemblages at Kalama through five main areas, namely (1) claims of sovereignty under guano imperialism, (2) terraforming of the atoll, (3) tests of toxic weaponry of mass destruction, (4) storage and disposal of chemical weapons, and finally (5) more-than-human toxicity in the form of poisonous ants and poisoned sharks. We conclude the article with speculations on Kalama's futures.

A frontier of guano imperialism

While Oceanic voyagers may have been the first to visit Kalama, they did not leave historical documentation or archaeological traces of settlement prior to sitings by 18th-century European explorers. In 1807 Captain Charles James Johnston of the HMS Cornwallis charted and named the two islands of the atoll "Johnston" and a smaller one "Cornwallis" (Amerson and Shelton, 1976).

The 19th century international scramble for new sources of guano generated inter-imperialist competition over Kalama. Prior to the invention of synthetic nitrogen fixation, guano was a rare natural source of nitrogen, a critical ingredient in fertilizer and gunpowder (O'Donnell, 1993; see also Teaiwa, 2014). Seabirds, whose social habits produced dense guano deposits on islands uninhabited by humans, were drawn into an expanding assemblage of industrial agricultural producers, resource extraction entrepreneurs, indentured workers, and scientific researchers. Under the 1856 Guano Island Act, US prospectors staked guano claims to more than 100 "uninhabited" islands in the Pacific and Caribbean, including Kalama (Burnett, 2005; O'Donnell, 1993). The San Francisco-based Pacific Guano Company claimed Kalama for the United States in 1858. Three months later, Samuel Allen, captain of the schooner Kalama, staked a rival Hawaiian Kingdom claim to the island which he named Kalama. The Hawaiian Kingdom later decided not to press its claim with the United States (Amerson and Shelton, 1976). Kalama was 1 of 10 islands retained by the United States after its guano deposits were exhausted and remains an unincorporated territory of the United States. The US foray into guano collection has been called "the stirring of American Empire in the Pacific Ocean" (O'Donnell, 1993).

Terraforming a military cyborg landscape

In the early 20th century, Kalama re-emerged from obscurity with the expanding U.S. military presence in the Pacific and the growing influence of the U.S. conservation movement and its associated scientific institutions. America's 1898 flurry of imperial expansion and pivot to a geopolitics of sea power spurred the development of military bases across the Pacific region. Kalama took on new importance as a part of this emerging military apparatus in the Pacific, where docks, seaplane runways, fueling stations, and radio and cable facilities formed vital transportation and communications links for commercial and military activity (Naval History and Heritage Command, 2018). Scientific researchers with their multispecies interlocutors were crucial actants of these transformations.

In 1923–1924, the Bureau of Biological Survey and the Bishop Museum, with US Navy support, embarked on the "Tanager Expedition", a series of five biological surveys of the Northwestern Hawaiian Islands, Kalama Atoll, and Wake Atoll. The fourth expedition, accompanied by a naval convoy, completed surveys of Kalama and Wake (Olson, 1996). The expedition's findings led President Coolidge to establish the "Johnston Island Reservation" in 1926.

In 1934, President Roosevelt placed Kalama under the administration of the Navy, while maintaining its status as a bird refuge under the Department of the Interior (U.S. Fish & Wildlife Service, 2017). This imbrication of military and conservation missions would continue to be a central feature of Kalama's administration over the years. The military promptly began a series of massive terraforming projects on Kalama beginning with the

dredging of the coral reef to create seaplane runways and channels for boats (Naval History and Heritage Command, 2018).

Beginning in 1939, the Navy awarded a $1.13 billion construction contract to a consortium of eight companies to build a vast network of military bases at 28 locations stretching from California to the Philippines (Naval History and Heritage Command, 2018). The newly created land presented exploitable frontiers for military commanders and engineers, conservation scientists, introduced flora and fauna, and seabirds.

Embracing the discourses of island isolation and systems ecology, conservation researchers recommended using Kalama to experiment with various ecological engineering projects, including the captive rearing and reintroduction of certain species, such as Laysan and Black-footed Albatrosses. A Nature Conservancy researcher went so far as to suggest, in eugenics-tinged prose, that Kalama be used as a conservation laboratory where failed species experiments could be eradicated:

> The area's isolation offers a tremendous laboratory for the investigation of species dynamics . . . which could be enhanced through deliberate manipulation. Parts of the islands might be devoted to the intentional introduction of a large array of terrestrial biological species. Oceanic barriers would make control of the experimental design quite extraordinary and would protect against the sorts of deleterious consequences that frequently accompany exotic introductions in mainland areas. It would be possible to eradicate given species or even whole floras or faunas with relative ease if it became advisable. In this respect, Johnston Atoll may provide an absolutely unique opportunity to obtain information on maximum community diversity, competitive interactions in a large species array, etc., which could be arrived at by no other means. (Robert Jenkins, in Amerson and Shelton, 1976: 365)

In 1940, as conservation officials heralded the "Johnston Island National Wildlife Refuge," cranes widened and deepened the channel created five years earlier and used the spoils to enlarge the island. A year later, Roosevelt established the "Johnston Island Naval Defensive Sea Area" and "Johnston Island Naval Airspace Reservation." From the crushed sun-bleached skeletons of corals, military planners created new land, nodes in a network of military bases across the Pacific. These environmental changes radically altered marine biota, leading to spikes of ciguatera toxins in reef fish due to algae blooms:

> Research into ciguatera poisoning on JA commenced in 1951 with a reef fish survey by Halstead and Bunker to investigate frequent poisonings of the civilian workers. They found that near half of the fishes at Johnston Atoll were toxic. In the years following, the Johnston Atoll clinic reported cases of ciguatera poisoning by island residents after eating fishes caught in the lagoon. (Lobel et al., 2012: 31)

Here, military terraforming produces toxicity, which leads to new research opportunities involving multiple species. This initial reef fish survey in turn prompted a series of biological surveys by the University of Hawai'i from 1963 to 1964 (Lobel et al., 2012: 4). Some have speculated that reef dredging with dynamite may have "stunned" sea turtles, some of which were seen being eaten by large sharks (Balazs, 1985). The series of dredge and fill projects completed in 1964 expanded the area of "Johnston Island" from 46 to 625 acres, increased "Sand Island" from 10 to 22 acres, and added two artificial islands, the 25-acre "Akau" (North) and 19-acre "Hikina" (East) (Lobel et al., 2012). As a result of these changes, 93 percent of Kalama is today artificial land (National Research Council, 2002: 6).

Former Air Force engineering program environmental branch chief for the Pacific region Mark Ingoglia, who worked for extended periods at Kalama, described the following:

> As they constructed it, you know they just threw anything in there that, like if they had an old jeep, that they didn't need, they just throw, bury it in, it's part of the reef, you know. So there's all kinds of stuff down there. When we started doing the hydrological investigations and putting borings in to see what contaminants were in the soil profiles, it's not really soil, its dredged coral and sand, we hit tanks with fuel in them, we hit jeeps, we hit car tires, we hit stuff we didn't know what it was. (...) The drill would get stuck. Sometimes you could barely get the drill out, it would take all day to get the drill out. (Interview with authors in Honolulu, 25 January 2022)

As Haraway (2016: 15) writes, a cyborg is a coupling of organism and machine. To engineer Kalama, its living coral body was demolished, pulverized, and remade as a geographic cyborg of new land grafted onto natural forms and military logistics, a synthetic ecology enmeshed with conservation, prosthetically enhanced lethal military capabilities, and imperial geopolitics.

Producing cold war post-apocalyptic toxic ecologies

Cast as a remote and territorially ambiguous site within U.S. imperial formations, Kalama became an epicenter of fevered nuclear and biological weapons testing which resulted in serious and widespread contamination. This in turn helped to maintain the island as an exceptional space of national security, ecological sensitivity, and contamination hazards.

From 1958 to 1975 Kalama was used as a site for U.S. atmospheric and high-altitude nuclear tests. Four failed tests showered the island with radioactive Plutonium, Uranium, and Americium (Mitchell, 2020; Rademacher, 2016). Contaminated coral was bulldozed into the lagoon. Later, the remaining contaminated concrete, metal, and coral was buried on the island under a cap of compacted crushed coral dubbed "Mount Pluto" for the Plutonium buried there (Rauzon, 2016). The 1958 Teak nuclear test blast blinded hundreds of monkeys and rabbits on monitoring aircraft (Rauzon, 2006), while in later tests, seemingly extraordinary measures were taken to protect seabirds:

> An elaborate water sprinkler system was installed on the original portion of Sand Island to protect the birds living there. In addition, other protective devices were used, including smoke pots placed upwind as a shade screen and aerial flares to divert the birds' attention from the flash of the blast itself. (Amerson and Shelton, 1976: 46)

Here, ruination and conservation are mutually constitutive. However, birds were also manipulated to curtail their disruptive agency: bird strikes pose a constant threat to aircraft and therefore need to be kept away from runways. The source of the valuable resource that once inspired the initial colonization of the island became a threat to military operations: Birds can be missiles as well as guano factories (Farnsworth, 2020; MacLeod, 2001). These efforts at once aim to naturalize birds to a military ecology and nuclear weapons to the island's ecological assemblage.

Between 1962 and 1973 the Department of Defense conducted a series of classified biological and chemical weapons experiments codenamed Project 112/Project SHAD, or Shipboard Hazard and Defense (National Academies of Science, 2016; Rauzon, 2016). In this regard, military planners were concerned that the release of biological agents over large ocean areas could kill birds or worse, spread diseases to human populations. In 1962, the

Army and Navy therefore recruited scientists from the Smithsonian Institute to conduct the Pacific Ocean Biological Survey Program (POBSP) on remote Pacific Islands to better understand the biology of sea birds in the region and mitigate safety concerns (MacLeod, 2001). Smithsonian scientists accepted the military's offer of funding, logistical support, and access to restricted areas. In exchange they shared their findings with the military while being left in the dark as to what these findings were used for, and were sworn to secrecy about the military dimensions of the project (MacLeod, 2001; for a similar case see Rainger, 2000). In this instance birds were more than simply vectors for disease; they were a medium for bringing the interests of conservation scientists and bioweapons engineers into alignment.

Operation Shady Grove, a subseries of Project 112, included 25 trials conducted in the Pacific Ocean. In 1965, approximately 100 miles southwest of Kalama Atoll, the U.S. military exposed ships and military personnel to *Pateurella tularensis*, the bacterium that causes tularemia, *Coxiella burnetti*, the bacterium that causes Q fever, and tracer *Bacillus globigii* which can be pathogenic and has typically been used as a simulant for anthrax due to its similarities herewith. Aerosolized fluorescent particles of zinc cadmium sulfide, in which the cadmium component is associated with lung cancer, were used as tracer in all of the trials (National Academies of Science, 2016). Tug crews who participated in Shady Grove spent some time in Kalama Atoll (National Academies of Science, 2016). During the operation, barges loaded with rhesus monkeys were deliberately placed in the aerosol with Q fever and tularemia. The monkeys were doused and taken to Kalama. Half of them died (Rauzon, 2006). In addition to these non-human bodies, about six thousand human bodies, many unknowingly, were exposed to various chemical substances as part of Project 112 alone (National Academies of Science, 2016).

Starting with the 1923–24 Tanager expedition, there has been an ongoing symbiosis between military ruination and a scientific community making careers through investigating its effects. Here again, an example of the laboratory narrative of smallness and isolation:

> Johnston Atoll is unique to begin with because of its small size, extreme isolation, long (25 to 100,000,000 years) geological and evolutionary history, tremendous constancy of its oceanically buffered environment (remarkably small variation of landscape and practically all climatological variables), recent history of human disturbance and alteration, great changes in species composition resulting from colonization by introduced organisms, and, not least, by the amount of scientific research and data collection which has gone on there. (Robert Jenkins, in Amerson and Shelton, 1976: 362)

As Davis (2007: 132) writes, "military activities do not just destroy nature, they also actively produce it." These new natures, created partly through destruction by military technologies, demand new scientific knowledge production, interventions, and monitoring, which in turn produce new political economies of conservation science enmeshed with imperializing processes and resources:

> Table 3 lists the 51 families, 109 genera, and 127 species of vascular plants that have been identified from the four islands at Johnston Atoll. This number is remarkable, for in 1859 Brooke (ms.) noted only two plants and in 1923 the TANAGER-WHIPPOORWILL expedition found only three species of vascular plants (Christophersen, 1931). By 1946, 27 species were recorded from Johnston Island (Fosberg, 1949), and by 1954, 43 species occurred there (Newhouse, 1955). By 1963, 77 species were known from both Johnston and Sand Islands

> (POBSP, 1964). The three plant species recorded by 1923 probably reached the atoll through natural means either by water currents, air, or birds. A few species found since possibly also arrived via these same ways, but the majority of the remaining 124 species has been man-made introductions. Some of these introductions were intentional, others came as stowaways or adventives. (Amerson and Shelton, 1976: 51)

These evolving assemblages interpellated environmental scientists who were called upon to study, mitigate, and manage the changes brought about by processes of imperial formation. As Martin (2018: 567) writes "the Cold War science that destroyed nature simultaneously made it available for study."

Conserving and managing a toxic wasteland

During the 1970s, needs arose for the U.S. military to dispose of its various chemical weapons stockpiles. A 1969 leak of the nerve agent VX in Okinawa injured 24 US military personnel and prompted the governments of Japan and Okinawa to demand that the United States remove all chemical weapons from the island (Mitchell, 2019). By 1971, Operation Red Hat commenced: The entire Okinawa stockpile, consisting of the blistering agent HD (mustard gas) and the nerve agents VX and GB (sarin) was shipped to Kalama, which became one of the United States' six chemical weapons graveyards, receiving stocks from as far away as Germany and the Solomon Islands (US Environmental Protection Agency, 2016).

Similarly, when the U.S, discontinued use of Agent Orange in 1970, the 1.5 million gallons of the tactical herbicide stored in various locations across Vietnam "became a sharp logistical thorn in the military's side" (Martini, 2015: 112). In 1972, Agent Orange stockpiles were transported via Okinawa to Kalama, where the aging barrels leaked into the environment and exposed military personnel and civilian workers to chronic health effects. These stockpiles were in 1977 incinerated aboard a special ship in a "burn zone" about 100 miles from Kalama (Martini, 2015).

During this period, workers carried rabbits as biological alarm systems that could alert of any so-called "leakers" in bunkers of stored chemical weapons. In response to a comment on Facebook from someone stationed at Kalama in 1983, a veteran working on Kalama in 1998/1999 wrote:

> It makes me happy to finally connect with the predecessors of the downrange area. I can only imagine the stress you guys were under using rabbits for air monitoring. I was tasked to open barrels for inspection prior to disposal 1998/1999. Nothing but dust. (Johnston Atoll Facebook group, 8 April 2020)

To this, a third army employee, stationed on the atoll at the height of chemical weapons and Agent Orange storage, answers the following:

> I was one of three Vet Techs who took care of the Animal Monitor Colony (the rabbits) in '75–'76. They were the only form of detection at the time. We lost no rabbits; there were no leakers. (Johnston Atoll Facebook Group, 8 April 2020)

As with Agent Orange, the deteriorating stockpile of chemical munitions on Kalama posed a growing human health and environmental contamination hazard. With the passage of the

Marine Protection, Research, and Sanctuaries Act of 1972 which banned at-sea disposal of chemical munitions, the Army decided to incinerate its stockpile on-island. A disposal operation of this magnitude, technical complexity, and hazardousness had never before been attempted (Mitchell, 2020). Built in 1985 and operating from 1990 to 2000, the Johnston Atoll Chemical Agent Disposal System (JACADS) destroyed 2031 tons of chemical agents, 6.4 percent of the 31,496 tons in the original US chemical agent stockpile (National Research Council, 2002: 8). During the development of JACADS, the DoD initiated a coral reef protection program, lessons from which were developed into a guidance document for the DoD worldwide (Lobel et al., 2012: 24); again, Kalama was a laboratory for military environmental governmentality.

A Kalama veteran who arrived at the atoll in 1990 and later got cancer describes how he thinks he might have gotten poisoned:

> The guys working in the red hat area, whenever I went down there it always seemed like they were trying to contain a leaker in one of those bunkers. (...) So I was right there in front of the bunker with a leaker, without a mask on. (...) I would spend a lot of my time in the water. Unfortunately, I didn't know that when it rained, contaminants would wash into the water from where the AO spill was. (...) When they had those Thor missiles, they pushed those contaminants into the lagoon as well, and nobody warned anyone. (Patriot Radio Network, 2020)

Similarly, a Facebook user writes that "we have lost a number of coworkers who were on Island during the JACADS project to cancers of various types and we miss them" (Johnston Island Facebook Group, 7 November 2018). Here, distinctions between victims and perpetrators in assemblages of human and non-human bodies are blurred. As another example of this kind of blurring, while birds were carefully studied and protected, they were also enlisted as test bodies, akin to the rabbits mentioned earlier, to make sure human bodies were safe:

> Being a top level predator (fish eater), seabirds make a good, sensitive indicator of the health of the surrounding environment - more sensitive than man since they are much smaller. Scientists expect to see a problem occur in the birds before it appears in man, as occurred with DDT contamination. Monitoring seabirds during the incineration process provided a "coal-mine-canary" that could assure people that the operation was safe. (Lobel et al., 2012: 10)

Again, conservation becomes indistinguishable from ruination in the ways seabirds and other species have helped to maintain and legitimize imperial control of the atoll.

Ruination made Kalama a perfect sacrifice zone in which chemical weapons could be made to disappear, at least to outside observers. In the circular logic of conservation by ruination, the toxic post-apocalyptic ecologies that resulted from these programs became the justification for ongoing environmental remediation and conservation measures (for engagement with the differentiating motivations of conservationists, see Kiik, 2018).

While the closure of JACADS in 2003 resulted in the US Fish and Wildlife Service assuming management of the National Wildlife Refuge, the Air Force retained title to the land, which reserves its option to resume operations on Kalama at a future time if needed. As mentioned, conservation by ruination also refers to the use of environmental conservation as a way to bank land for possible future military needs.

More than human toxicity

In 2010, just five years after the army had completed removal of infrastructure from the atoll, large colonies of so-called Yellow Crazy Ants were discovered on Kalama (Rash, 2020). The conservation scientist who discovered the ants says:

> I knew we had to do something, or the ants would take over the entire island. We've interfered and fucked up the ecology of these islands so much over the decades. We couldn't just leave the refuge to die. (quoted in Opar, 2015)

With conservation by ruination, environmental degradation is the raison d'être for a continuously changing but nonetheless permanent conservation regime. To eradicate the ants, so-called Crazy Ant Strike Teams consisting of five volunteers were deployed in six-month increments. Teams were assisted by Bayer chemical with "expert ant killing advice and sample baits," and the budget for a CAST team lists US$70,000 for pesticides, more funds than for their plane tickets and food combined (Eradication of Yellow Crazy Ants on Johnston Island, 2011; see also Peck et al., 2017). In laboratory fashion, the first teams worked on finding the best concoction of bait and poison to target the ants, and with two consecutive teams a year over the next decade, the ants were finally declared eradicated in 2021, after ant sniffing dogs had been deployed to Kalama and didn't find any (Vicente, 2021a, 2021b). During this decade, the conservation teams have provided a friendly, civilian, environmental face to an ongoing imperial presence, preventing trespassing and "invasive species," keeping the atoll off limits.

In the proposal for the initial CAST project, a rat sighting caused alarm:

> Johnston has been celebrated as being rat-free for decades. However, in October 2010, one week after an illegal visit by a vessel, a rat (Rattus rattus) was caught on a camera trap. We have expanded the monitoring to include chew blocks. The rat has not been seen again, but the devastation that could be caused by even one pregnant rat necessitates close monitoring to catch any increase as early as possible. We will continue monitoring for rats and if detected to deploy traps and bait stations in the area. We will continue to work with the Coast Guard and sailing associations to stop the illegal trespass by private vessels. (Eradication of Yellow Crazy Ants on Johnston Island, 2011)

After a hundred years of dredging, bombing, leaking and polluting, a pregnant rat is cast as a threat to the (birds of the) atoll.

In the narratives from CAST members and visiting journalists, the contamination of Kalama is prominent. One team member describes Kalama as having "a very post-apocalyptic feel," and describes how team members "are told not to dig in the ground or create too much dust to reduce exposure to any toxins remaining in the soil, and are advised not to eat any of the island's coconuts or fish due to bioaccumulation of contaminants" (CASTaways in Paradise, 2017). The ongoing effort to eliminate the ants was cast in war rhetoric, routinely described as a battle, as the teams "combat a malicious ant species bent on world domination" (Schuler, 2017). The ants themselves have also been described in (chemical) war rhetoric:

> Yellow crazies don't bite or sting, and they aren't much to look at. But what they lack in size they make up for with chemical weaponry, namely formic acid. Plentovich says that when enough of them start spraying at once, the air turns acrid and will burn your nose. (Bittel, 2015)

Nesting seabirds, and especially their chicks, are vulnerable to the formic acid anywhere not covered in feathers. Ant attacks produce horrific deformities in the unprotected bills, feet, and eyes of birds:

> Bedraggled feathers, misshapen beaks, missing toes, shrinking eyeballs . . . some chicks are so wounded by the ants' acid that their nostrils grow closed and skin covers the eyelid entirely. (Bittel, 2015)

Furthermore, because seabird colonies driven away by ants can no longer replenish guano, "it's like [the ants are] spraying acid on the island's supply chain, too" (Bittel, 2015).

These descriptions of the ants' impacts on chicks and ecologies recall the effects of Agent Orange on human bodies and environments in Vietnam and Laos to this day, even though the toxicology of formic acid and dioxin differs (see for example Black, 2021). Similarly, the ants' characteristics of being highly invasive and making "supercolonies" are comparable to U.S. imperial formations. And finally, the biochemistry of the neonicotinoids used to eradicate the ants is comparable to that of the nerve agents the US military incinerated on the atoll. Here, conservation by ruination has become its own battlespace, temporally superimposed on the toxic landscapes of U.S. imperial wars over the last century. In her work on the durability of imperial formations, Stoler (2016: 26) touches upon history as recursion: "marked by the uneven, unsettled, contingent quality of histories that fold back on themselves and, in that refolding, reveal new surfaces." It is not about repetition or mimetics, but "partial reinscriptions, modified displacements, and amplified recuperations" (Stoler, 2016: 27). Imperial formations, in other words, are characterized by what she labels "strange continuities", which is to say that colonial histories unfold and change by partially folding back on earlier practices. At Kalama, history folds back on itself in layered toxicities woven through decades of changing technoscientific-multispecies assemblages.

Conservation by ruination highlights the relationship between biopolitics and necropolitics, where producing and protecting certain forms of life also relies on techniques of death (see also Biermann and Mansfield, 2014). Throughout its history, the birds of Kalama have been the top priority for conservation efforts. Any threats to these birds (military technicians exempted), can be eradicated to secure their refuge. In contrast to the birds, species that have not been prioritized for protection on Kalama include sharks, who have nonetheless played a role in the atoll's imperial formations, most notably via a place known as "the shark chute" on the western tip of Kalama. In Facebook groups commemorating being stationed at Kalama, a common motif for photos is shark fishing at this place. The shark chute is also mentioned by the CAST who continue a decades-long practice of dumping garbage there daily:

> Every night after dinner has been eaten and dishes have been clean, two of us head to the Shark Chute with the slop buckets. We gator (use the ATV) to the Western most part of the island to dump our slop. The bucket contains salt water: from washing dishes, campsuds: soap for dishes, and food scrapes. (. . .) We dump the buckets and the fish come for their dinner. (Dudzik, 2014)

A journalist visiting the atoll with an incoming CAST cohort mentions that the dumped food scraps "attract fish, and the fish attract tiger sharks" (Opar, 2015).

Not surprisingly, the shark chute is toxic to sharks, because the western-most tip of the atoll is contaminated with dioxin from spilled Agent Orange. This is suspected to have caused observed birth defects in shark embryos around the atoll:

> Bioaccumulation of dioxin in Johnston shark muscle tissue is higher than dioxin in muscles of sharks reported in other studies (San Francisco). The sharks and their prey are attracted to the food disposal site near a dioxin contaminated area. Sharks may be spending more time in this area and therefore feed on more contaminated fish than would be expected, possibly explaining the high dioxin tissue concentrations. Contaminants were also measured in muscle tissue and embryos of two sharks that had developmental defects. One adult shark was missing a gill arch on one side while another shark contained an embryo with a deformed vertebral column. A third shark contained an embryo that had ceased developing at the four-cell stage. The extent to which these abnormalities normally occur is unknown. (Lobel et al., 2012: 34)

Chemical weapons are thereby part of the trash that has been dumped at the shark chute for decades. Embryo abnormalities have also been observed in Damselfish around the atoll:

> This PCB contamination was derived from old transformers and other electrical equipment which were dropped in the lagoon long before environmental awareness and laws were in effect. A significant residue-effect relationship was found between total PCB concentration and embryo abnormalities. The occurrence of embryo abnormalities was positively related to fish PCB concentration. (Lobel et al., 2012: 36)

Here, the politically neutral scientific gaze absolves any accountability in relation to imperial formations by assuming that accountability for past ignorance, "long before environmental awareness and laws were in effect" is irrelevant. The function of these assemblages is highlighted by what Goldberg-Hiller and Silva (2011: 433–434) describe as a continuous shapeshifting of neocolonial empire:

> The ecological state attempts to bury responsibility for the settler state's own destruction of land and animal habitat in scientific management, ostensibly providing a neutral, disinterested maintenance of natural life forms. (. . .) ecological management understands the natural environment as self-regulating in a manner that effaces human history - the history of imperial destruction of former uses of the land.

At Kalama, the scientific gaze functions to depoliticize ruination through impartial ecological descriptions, which ultimately serve military aims.

Conclusion: Kalama futures

Treating sites as key points of access to imperial logics rather than dismissing them as exceptional or marginal, Stoler (2016: 21) suggests that writing new colonial histories can teach us new things about colonial governance. Current academic attention given to uninhabited, unincorporated territories of the United States is sparse, or views them from a purely environmental angle. The stakes of what occurs in and around these islands are

multifaceted and multiscalar: Neither spatially nor temporally isolated, the footprints of the imperial present can be traced to these places. Paying minute attention to what dominant discourse says is just a speck of land in the middle of the ocean, we emphasize that U.S. geopolitics depend on these "small specks" of land and suggest that coinciding, productive ruination and conservation is an essential geopolitical apparatus for maintaining imperial control; in Kalama and elsewhere in the Asia/Pacific region.

According to Goodyear-Kaʻōpua (2018: 93), militarization and settler colonialism are "as much about projecting futures as they are historical processes." This is also the case for conservation by ruination: It captures not only the spaces, but also the futures, of Oceania. All representations of the future are political, and we must consider the politics of various representations of the multiple possible futures that are opened or foreclosed by actions in the present (Goodyear-Kaʻōpua, 2018: 85). To Goodyear-Kaʻōpua (2017), Indigenous futurity is counter-hegemonic, seeking to actively protect possibilities of multiple different futures. As Stoler writes:

> Making connections where they are hard to trace is not designed to settle scores but rather to recognize that there are unfinished histories, not of victimized pasts but consequential histories that open to differential futures. (2008: 195)

With sentences such as "Johnston is an atoll with a past and we're helping write the future" (CASTaways in Paradise, 2017), several members of CAST are simultaneously oriented towards the past and future of Kalama atoll:

> Due to dwindling ant numbers, CAST XIII has the opportunity to begin planning and potentially implementing restoration efforts across the island. (…) It goes without saying, we, as CAST XIII, are extremely excited to be spearheading this new direction and are eager to have an impact on the legacy of Johnston. (Schuler, 2016)

This begs an important question: the restoration of what? What future and legacy of the atoll are these conservation teams hoping to achieve? Insofar as restoration efforts remain engrained in the imperial governance of conservation by ruination, restoration efforts at Kalama will become yet another mode of sustaining U.S. empire in the Pacific. Scholarship and advocacy work focusing on decolonization in Oceania must be critically attuned to talk of restoration or remediation, as these are often a continuation of colonialism rather than its undoing. Conservation by ruination overdetermines an atoll with two illusions: (a) that conservation and ruination are the only two possible options for what to do or not do with it, and (b) that these options can be separated such that one could choose between them. Decolonization efforts must break free from this impasse: What needs to be restored at Kalama is Indigenous Oceanian sovereignty.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Gitte du Plessis wishes to acknowledge funding from the Academy of Finland (grant no. 322254).

Note

1. In 1858, representatives of the Hawaiian Kingdom claimed and gave the name Kalama to the atoll, also known as Johnston. While we have not found Indigenous names for Kalama which precede the 1807 naming of Johnston, we choose to use Kalama throughout this paper as a political statement to prioritize Kanaka ʻŌiwi's claims and to emphasize Kalama's relationship to islands and peoples of greater Oceania.

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