CULTURAL ANTHROPOLOGY

SUSPENDING NUCLEARITY: Ecologics of Planting Seeds after the Nuclear Fallout in Fukushima, Japan

HIROKO KUMAKI
Dartmouth College
https://orcid.org/0000-0001-7649-3524

In early autumn 2017, under a thick gray cloud, regional farmers, agricultural high school students, and university students, as well as volunteers from across Japan gathered in a large field in coastal Fukushima to plant rapeseeds. I joined as everyone made a long line along the length of the field. Together, we walked across the field with plastic containers full of rapeseeds. As we slowly made our way to the other side, we threw handfuls of seeds on the ground, stepping on them with our rubber boots, and pushing them into the soil. The laughter of high school students could be heard here and there, as the muddy clay soil trapped their boots. Birds started flocking behind us, eating up the seeds we had just planted. No one seemed to care. A drone, operated by a young man from the neighborhood, buzzed around, taking pictures and videos of the event.

After planting the seeds, we headed to a nearby community center, where the wives of the farmers were waiting. They served their guests warm pork vegetable soup, vegetable tempura, rice balls, and many other regional dishes, using harvests from their fields. As more than one hundred participants took their seats in the large gym, the farmers thanked them and discussed local efforts to begin farming again. Chatter filled the gym as participants commented on the regional flavor and enjoyed each other's company. At the end of the day, the farmers sent

CULTURAL ANTHROPOLOGY, Vol. 37, Issue 4, pp. 707–737, ISSN 0886-7356, online ISSN 1548-1360. *© American Anthropological Association 2022.* Cultural Anthropology *journal content published since 2014 is freely available to download, save, reproduce, and transmit for noncommercial, scholarly, and educational purposes. Reproduction and transmission of journal content for the above purposes should credit the author and original source. Use, reproduction, or distribution of journal content for commercial purposes requires additional permissions from the American Anthropological Association; please contact permissions@americananthro.org.* *DOI: 10.14506/ca37.4.05*

Figure 1. Planting rapeseeds in the former evacuation zone of Fukushima. Photo by Hiroko Kumaki.

everyone home with a souvenir—a bottle of salad dressing made with canola oil from rapeseed harvested from their fields the previous year.

Those familiar with Japan might see this as another experiential learning event popular among families, schoolchildren, tourists, and volunteers (Claus 2020; Lam 2020). Yet what made this event distinct was that it took place in an area once designated a mandatory evacuation zone after the Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Plant accident in 2011. As something taking place in what might be easily identified as a "nuclear" site, this event stood in stark contrast to activities emerging elsewhere in response to the nuclear accident.

During eighteen months of ethnographic fieldwork between 2017 and 2018, I observed increasingly divergent responses to the nuclear fallout emerging among different actors and communities in Japan as they sought to ensure their health and well-being. Some have evacuated afar and procured food from other parts of Japan, while others have returned to the former evacuation zones and actively circulated local produce. Among those who stayed or returned, some have sent their children to less radioactive environments on vacations, while others have organized activities to provide children with hands-on experience with their local ecologies.

The experience of environmental exposure has often been discussed with concerns for the management of biological health risks caused by toxic substances released into the environment. In Fukushima, the management of radiation and its health risks have stood at the center of public and academic concerns after the nuclear fallout. Evacuation, food safety, radiation monitoring, citizen radiation labs, thyroid cancer screening, decontamination, nuclear waste management, and health-recuperation projects have constituted the main sites through which the experience of the nuclear fallout and its health risks have been articulated and debated (Loh and Amir 2019; Morimoto 2019; Morita, Blok, and Kimura 2013; Polleri 2019; Sternsdorff-Cisterna 2018). In doing so, citizens, governments, and researchers have made the fallout and its effects visible and addressable as a "nuclear" issue, shaping the "nuclearity" of Fukushima (Hecht 2012).

However, some people, like the farmers discussed above, returned to their original communities in the former evacuation zone and actively produced and exchanged produce. These farmers had lost their land, homes, communities, and often their family members in the earthquake, tsunami, and nuclear accident. Being able to plant seeds and share harvests from their land—and to do so as a community—were activities central to the creation of a meaningful life after the nuclear accident.

This article presents an ethnographic analysis of what I tentatively call *Fukushima as ecologics*, exemplified in the act of planting seeds in the former evacuation zones. I discuss this in relation to *Fukushima as nuclearity*, through examples of decontamination projects by the government and health-recuperation projects by parents and NGOs. Both approaches are concerned with the well-being of the affected people and communities. Yet while nuclearity takes technoscientific and medical discussions of radiation and its biological health risks as main points of intervention, ecologics critically engages the socioecological arrangements that have been put in place through the nuclear fallout and ensuing recovery projects.

I offer "ecologics" as an analytic lens to bring to attention the ways in which the material, social, and moral ecologies have been negotiated and reorganized after the nuclear accident. Anthropologists have critiqued discourses of conservation, development, and environmental protection often grounded in paternalistic assumptions about the physical environment as independent and separable from the social. Instead, they have argued that the physical environment and the meanings associated with it emerge through intimately situated and shifting everyday interactions between human and non-human life (Claus 2020; Hirose 2011; Ogden 2011). In so doing, they have called our attention to the material, social, and moral

ecologies that are "in translation," constantly shaping one another as well as organizing society and its well-being (Satsuka 2015).

Ecologics shed light on the implicit and explicit ways of knowing and acting that shape socioecological relationships in projects of environmental remediation, economic recovery, and everyday life. Cymene Howe (2019, 2) has used ecologics as an analytic to understand the "other than human relations" that inflect energy politics, often analyzed solely in human terms. My intention here is different. I use *ecologics* to elucidate the socioecological arrangements that have shaped the lived experiences of the nuclear fallout, often discussed in biopolitical and political economic terms through an emphasis on nuclearity. I argue that life after the nuclear accident, particularly the experience of living with toxicity, cannot be understood without attention to the situated socioecological dynamics operating in the shadows of biomedical and market-based logics of well-being and recovery.

By moving beyond nuclearity and tentatively centering ecologics in its stead, I show that discourses and policies around nuclearity have privileged certain socioecological arrangements, particularly those that assume the separability of people and communities from their land in the face of radioactive contamination. By considering radiation as their locus of intervention, they have focused on biopolitical concerns for toxic exposure and political economic concerns for environmental remediation. The resulting emphasis on the removal of people and communities from their land or the replacement of their socioecological environments have made secondary considerations of the deep embeddedness of people's lives within and through lived ecologies. Ecologics challenges us to foreground these socioecological relationships to understand how life is constituted and well-being negotiated in the context of environmental exposure.

Yet nuclearity and ecologics are by no means mutually exclusive. They overlap, interact, and are transformed by actors across time and space. Those in the former evacuation zone negotiated both nuclearity and ecologics, shaping "partial boundaries" in ways that reflect their desire to open rather than close the possibility of socioecological relationships (Olson 2018). In doing so, they did not simply accept governmental claims of safety, nor did they celebrate toxic entanglements. Instead, they challenged assumptions about Fukushima that focused on radiation and its biological and economic risks. This focus, they argued, came at the expense of people, soil, and land that were considered readily removable and replaceable to contain the effects of fallout and to pursue large-scale, capital-intensive redevelopment projects. They resisted the imposition of a market logic of containment

and equivalence on their lives that increasingly alienated them from their place of living and relationships of care and mutual support.

SUSPENDING NUCLEARITY

Early in my fieldwork in the former evacuation zone, I began to reconsider the category of nuclearity. My research took place when mandatory evacuation orders were being lifted in the towns and villages near the nuclear power plant. There was a constant influx of journalists, television crews, and researchers who came to investigate life in the former evacuation zones. Many returnees faced interrogation from visitors who asked them about radiation and their return. These visitors often assumed radioactive contamination had rendered these places unlivable. It was not uncommon for returnees to refuse to engage with visitors' questions or to acknowledge their gaze. For example, in summer 2017, university professors from Tokyo specializing in public health visited a town that had been opened a year earlier. Around 20 percent of the residents had returned to the town. At a meeting with one of the returnees, the professors asked, "With radioactive waste piled up and without people coming back, is it possible to live here?" The resident kept an expressionless face and stated flatly, "You ask whether we could live here, but *we live here*."

After the nuclear accident, those who lived in Fukushima Prefecture suddenly found themselves living in a "nuclear" site. They had to orient themselves not only to radiation in their living environment but also to a gaze that could see their lives as nothing but nuclear. What does it mean to take this refusal of the external gaze seriously? What can we learn from the claim that "we live here," without considering residents to be uninformed or in denial?

Nuclear sites enact what Joseph Masco (2004) has called "mutant ecologies." The framing, narration, and management of exposure and its effects, as well as the temporal and spatial scales employed, are open-ended and indeterminate. Examining the history of uranium mining in Africa, Gabriele Hecht (2009, 2012) has argued that "nuclearity," or the status given to certain things and places as "being nuclear," is not universal, singular, or stable. Instead, nuclearity is shaped, unshaped, and reshaped unevenly across actors, time, and space. Governments, industries, and citizens all have high stakes in the ways nuclearity is shaped, affecting the ways damage from the fallout can be made visible and responsibility can be allocated.

Nuclearity has proven a useful analytical concept to illuminate the epistemic structures and political practices shaping the uneven ways of power distribution to

differentially confer the status of "being nuclear" across bodies, places, and things. Government, industry, and military science have rendered radiation, an already invisible and intangible substance, "twice invisible" by controlling whose knowledge counted and to evade responsibility (Kuchinskaya 2014). In turn, the challenge for citizens and scholars has been to reveal the epistemic and political forces that limit the ways in which nuclearity could be shaped and articulated, making public exposure visible and actionable (Brown 2019; Hecht 2012; Petryna 2002).

Studies of the nuclear accident in Fukushima show that nuclearity in Japan has been shaped mainly through what Hecht (2012) has called technological and medical nuclearity. International institutions, the government, and health practitioners have shaped the nuclearity of Fukushima through technoscientific and medical debates on how to detect radiation and assess the potential health effects caused by radiation exposure (FMU 2013; Fukushima Prefecture 2022a; ICRP 2020; Ministry of Environment 2017a, 2017b). In response, parents, citizen scientists, and advocates have learned the science of radiation, mobilized technologies to detect radiation, and worked with experts to interpret their findings. They have created alternative data on exposure in their bodies, food, and environment to address their concerns for potential health effects (A. Kimura 2016; Morita, Blok, and Kimura 2013; Polleri 2019; Sternsdorff-Cisterna 2018).

These practices, and the scholarship investigating them, have created a field of intervention around technical and medical concerns for nuclearity. In doing so, they have foregrounded the uneven consequences of the nuclear fallout and the allocation of political responsibility. Nevertheless, by highlighting technological and medical nuclearity, they have narrowed the scope of engagement, precluding considerations not only of other registers of nuclearity but also other ways in which life has been affected and negotiated in the ongoing aftermath of the fallout. This has naturalized discussions of the nuclear accident around technoscientific and medical understandings of radiation and its biological health risks, making the move to decenter nuclearity seem an unintuitive and unethical response.

The technoscientific and medical articulation of radiation and its health effects, however, rests on a double bind. On the one hand, it can prove a powerful tool to illuminate and manage how radiation affects bodies and environments. On the other hand, it can become the condition of possibility for those very risks, by delimiting the ways in which exposure can be understood, experienced, and addressed. Michelle Murphy (2017) has noted the "epistemic habit" of technoscience, which considers chemical relations at the molecular level and focuses on the damage that chemicals incur on individualized biological bodies. By isolating

chemicals and biological bodies as sites of interaction and effect, Murphy argues that technoscience has externalized the extensive violent relationalities that chemicals enact, becoming tools of industrialism, settler colonialism, and other forms of social injustices. Scholars and citizens are therefore challenged to "work with and against" technoscience to elucidate what has been externalized through such epistemic practices (Murphy 2017, 495).

To move beyond technoscientific engagement with the consequences of the nuclear fallout, those in the former evacuation zone have organized around *jimoto-gaku* (Yoshimoto 1995, 2008). Similar to the move to decolonize research, *jimoto-gaku* proposes the "study of one's hometown" in one's own terms. Like *chiiki-gaku*, or "regional studies," it is a practice that values local engagement and perspective. *Chiiki-gaku*, however, is often carried out academically to complicate the understanding of modern life that has become heavily articulated in terms economic activities by citizens of a nation. *Jimoto-gaku*, on the other hand, is carried out by community members as an alternative to academic studies, to achieve a renewed understanding of their life in the community, one that may have been overlooked by outsiders and taken for granted by community members.

Jimoto-gaku is grounded in the ontological differences between those who form part of a specific community and those who do not, who present divergent epistemological practices. A salient discourse that accompanies *jimoto-gaku* is the difference between "people of the soil" and "people of the wind," or locals whose lives are rooted in the specific place and outsiders who have a more fluid relationship with the place (Watsuji 1979; Tamai 1992). *Jimoto-gaku* acknowledges divergent ways in which knowledge is produced by these actors by virtue of their ways of being in the world—with one rooted in the soil and the other engaging from a distance. The approach originated in Minamata, the site of industrial methylmercury poisoning in Kumamoto, Japan, where traditional research carried out by outside scholars redefined the community through its damage, exposure, and deficiency. In response, community members practiced *jimoto-gaku* to ask what their community already has and to take ownership of their own understanding of the community.

Jimoto-gaku can be practiced by both people of the soil and people of the wind, whose distinctions are often not easily demarcated. Yet importantly, *jimoto-gaku* places people of the soil as its subject of research. The perspectives of the people of the wind prove valuable in so far as their engagements enable people of the soil to gain a renewed understanding of their own community and the practices they had taken for granted. *Jimoto-gaku*, therefore, combines the old and new,

the inside and outside, as well as the soil and the wind in ways that ultimately bring different epistemological fields together to generate new ideas, values, and relationships (Yoshimoto 2008).

Jimoto-gaku in Fukushima became an epistemic tool and a moral support for community members as they sought relationships and ideas that allowed them to envision a life worth living in the aftermath of exposure. Resembling the proposal by Eve Tuck (2009) to "suspend damage" in social science research, the move toward *jimoto-gaku* in Fukushima shows that what is at stake in residents' unease to engage with nuclearity is their unease with those who externalize their lived experiences and their socioecological well-being as damaged and impossible. My interlocutors' emphasis on ecologics suggests that for them, the question is not how damaged their biology or land is, how to make that damage visible, and how to contain it. Instead, it mainly concerns how to reorganize their socioecological relationships to live *well* in a world that no longer provides a promise of purity, separation, or containment, and worse, assumes their exposure (see Cho 2020; Fisch 2022; S. Kimura 2016; Morimoto 2022). The claim "we live here" states that life in the former evacuation zones remains meaningful in its own right, regardless of the presence or absence of radiation.

Practicing *jimoto-gaku* as a scholar of the wind, I have foregrounded the concept of ecologics in my analyses to examine health and well-being beyond radiation-body relations, and to address how life has been made meaningful and well-being has been articulated in the shadows of debates on technological and medical nuclearity. What follows is therefore not a discussion of whether Fukushima constitutes a "nuclear" site; it is not a consideration of how or to what extent radiation and its health effects have been made visible or invisible through divergent objectives and practices. Rather, through the lens of ecologics, I ask how we might work with and against nuclearity to understand the experience of people and communities affected by nuclear fallouts and environmental toxicity more broadly. If nuclearity constitutes a technopolitical category that allows us to see historical, technological, and political economic structures in place that unevenly distribute power and the status of being nuclear, "ecologics" names a sociocultural category to elucidate socioecological implications of epistemological, political economic, and everyday practices often relegated to the realm of the technobiological or remaining unaddressed.

I show that through *jimoto-gaku*, and the resulting emphasis on ecologics, my collaborators negotiated boundaries—not only against radiation and its harm but also against larger projects that affected their social and ecological well-be-

ing. Through a form of disaster capitalism historically observed in modern Japan, governmental and other projects around nuclearity have taken the disaster as an opportunity for redevelopment, expanding large-scale public projects in the name of reconstruction and recovery (Ikeda 2014; Klein 2008). Attention to ecologics shows that these projects have increasingly reorganized socioecological relationships in ways that advance the state's political and economic goals while bringing residents even closer to environments of exposure. While often organized in opposition to these projects, advocacy work around nuclearity had a similar effect of disregarding place-based relationalities important for the well-being of certain communities. In response, residents in the former evacuation zone enacted practices that evaded capture by forces that fragmented relationships of mutual support grounded in their land, memories, and communities.

FUKUSHIMA AS ECOLOGICS: Planting Seeds and Sharing Food

In the wake of the nuclear accident, as the news of radioactive contamination spread, one of the farmers from the mandatory evacuation zone recalled shedding tears for days, thinking he would never be able to grow crops again on his land. He thought everything was over for him and his community. For residents living near the nuclear power plant, many of whom farmed and fished, not being able to cultivate and harvest their land, rivers, and sea meant something more than losing their livelihoods. It meant the loss of a place-based social and ecological lifeworld nurtured through relationalities with their living environment.

Planting seeds on their land, rendered radioactive by the nuclear accident, has proven a way for those returning to the former evacuation zone to begin reestablishing their communities and their sense of security through their relationships to the land and to one another. These relationships were not only arranged in ways at once familiar to them but also in ways that responded to the rapidly changing socioecological environment following the nuclear fallout and its recovery projects. Understanding this dynamic requires a discussion of the centrality of place-based relationalities in the former evacuation zone, exemplified in the practice of cultivating and sharing food to build relationships of trust and care in the communities.

Osusowake is a practice of sharing gifts and bounties from the land as a way of cultivating social relationships. Before the nuclear accident, it was customary for community members to distribute, outside the market economy, seasonal fruits, vegetables, wild plants, wild animals, freshwater fish, and seafood harvested from their region to their families and neighbors. Such reciprocal food exchange has

historically been a common practice in rural Japan. Many households, regardless of their main occupation, would grow vegetables, rice, and fruits; gather mushrooms and wild plants; catch wild animals and fish; as well as cook not only for themselves but also for the purpose of *osusowake* (Embree 1939; Tanaka 2017; Tsing 2015).

The food exchange, which obligated reciprocation, defined who formed part of the community and provided a network of mutual support for community members. For example, Koyama-san, a returnee to the former evacuation zone, measured the level of acceptance she earned from the community through the *osusowake* that her neighbors brought for her. On return to her town, she opened a communal gathering space near the train station. Yet since she did not hail from that particular district of the town, initially, no one came by. She recalled that it took three months for her neighbors to bring her *osusowake*. Recently, she moved the gathering space to another part of the same district. Since she had already established her presence in the district, it only took her neighbors one month to respond. After a year, her gathering space always had boxes of fruits and vegetables brought to her by her neighbors. Koyama-san would divide them up and give them out to community members and visitors, extending the network of people who were part of the exchange. Unlike the townspeople, visitors would not be able to reciprocate immediately, if at all. However, Koyama-san hoped that the act of sharing might lead to ongoing relationships, in which the visitors would frequent the area and contribute something to the community in the future.

Since *osusowake* required ongoing commitment and openness, we can read its initiation by community members as a gesture signaling a willingness to establish reciprocal relationships of trust and care and, thus, relationships of commitment to one another's well-being. Once the chain of exchange began, community members put significant effort into maintaining these relationships. While one household could only carry out *osusowake* to a limited number of other households in the community, with the secondary and tertiary distribution of food, the network of exchange extended, creating a community held together by a sense of mutual belonging and responsibility. In the wake of disasters, for example, neighbors would visit one another to make sure everyone was safe and to deliver food and water to those in need. Failure to meet such expectations or to reciprocate could lead to a sense of disparity and even animosity (see Uchio 2013).

The distribution of foodstuffs also allowed for a shared experience of seasonal foods and an exchange of information about community activities. When people visited their neighbors to give out *osusowake*, they would make small talk

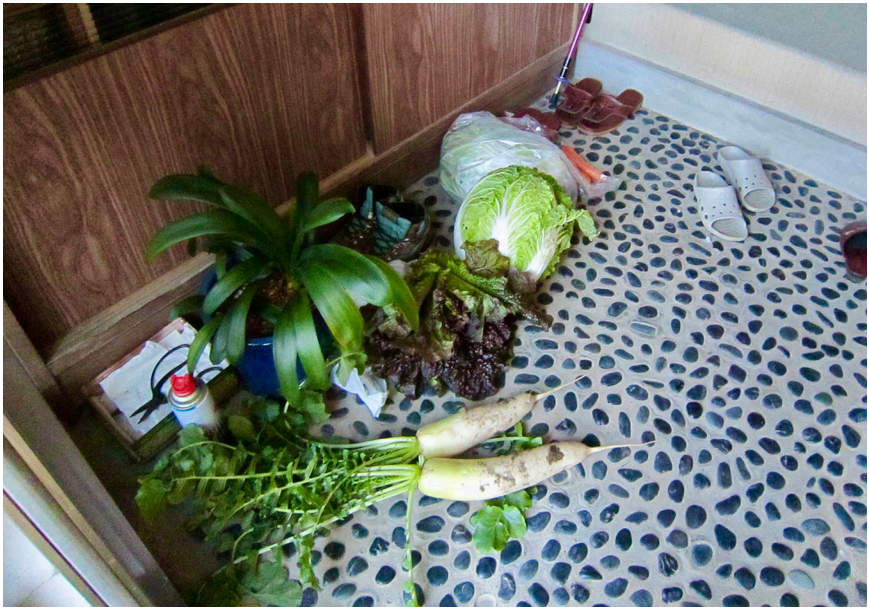

Figure 2. Vegetables brought by neighbors as *osusowake* left at the door. Photo by Hiroko Kumaki.

at the door or would be invited into the house for tea. During the chat, they discussed how they and others in the town were doing, expecting the information to be distributed further through networks of *osusowake*. This was one way in which community members made sure everyone was doing well and responded when something went wrong (see Nozawa 2015; Danely 2019). Becoming part of the community of *osusowake* therefore meant becoming part of the shared experience of flavors and rumors, as well as the network of support, all engendered by the residents' relationship to their land and its harvest.

Such place-based intimacy and relationships of trust and care collapsed in the wake of the nuclear accident. Evacuation physically removed community members from their land, and from one another, leaving unfulfilled obligations. The radioactive contamination of their land made it difficult to produce and acquire food considered safe for consumption. Moreover, governmental decontamination projects, discussed later in this article, scraped fertile topsoil from fields and gardens, making them unsuitable for food cultivation. Returning to their communities and planting seeds, and thus fostering the potential for *osusowake*, constituted a major step for community members that showed their strong desire to reestablish relationships uprooted in the nuclear accident.

In this context, radiation came to matter for community members mainly in their efforts to reestablish relationships with their land and with one another. As part of that effort, planting rapeseeds came to play a unique role in what the farmers called an "agricultural land revival project"—a project that showed the farmers' openness to experiment with their exposed environment.

After the nuclear accident in Fukushima, the farmers co-operated with an NGO from western Japan that had worked in Ukraine after the Chernobyl accident. In Ukraine, the NGO had partnered with a local university to revive abandoned agricultural land in the Zones of Exclusion. They carried out experiments and found that rape flowers can clean the soil by absorbing radiation. Radioactive cesium and strontium, both of which were dispersed into the environment after the nuclear accidents in Chernobyl and Fukushima, have similar structures to potassium and calcium, which plants use as nutrients. Rape flowers were more likely than other plants to mistakenly absorb radioactive particles from the soil as nutrients and fix them into their bodies. In the process, the plants cleansed the soil of radiation. The propensity of rape flowers to absorb radioactive particles from the soil allowed decontamination to take place without having to scrape off the fertile topsoil or introduce chemicals into it.

More important for the farmers, the NGO's research showed that rapeseeds could be used to make canola oil that was free of radiation. According to the NGO, rape flowers only absorbed radioactive particles that had dissolved in water. Since water and oil did not mix, radiation was not detected in the resulting canola oil. The farmers worked with the NGO to plant rape flowers to reduce radioactive particles in the soil and to produce canola oil from the seeds. In Ukraine, the resulting canola oil has been used as biodiesel fuel. In Fukushima, however, given the history of canola oil production and consumption in the region, the canola oil has been used as edible produce. The farmers collaborated with agricultural high school students in the community, who were at the rapeseed planting event, to craft recipes for salad dressing and mayonnaise using the canola oil. These products can now be found in grocery stores and roadside stations in coastal Fukushima (Kosakai, Ishii, and Hayashi 2017).

In not giving up their land, the farmers were not only protecting the potential of the land to produce something edible and marketable but also the potential for various forms of relationship based on their land. For example, just for the one-day rapeseed planting event, more than one hundred people gathered from across the community and country. For the farmers, the sharing of labor, food, and souvenir, within and beyond their immediate networks, denoted the promise that

the land still held, despite multiple forces that have worked against it. It was a way for them to reshape their communities, with new and old relations, in ways that made their lives, land, and food still worthy of engagement. Residents gradually cultivated vegetables, rice, and fruits, slowly re-establishing and shaping the food exchange networks and relationships of trust and care. Through such practices communities re-emerged in the former evacuation zones, giving them a sense of belonging and security.

As I later describe, community members still acknowledged and addressed concerns for nuclearity imbricated in these exchanges. For instance, the farmers engaged in rape flower cultivation took various steps to ensure that their products remained free of radiation. Rapeseeds harvested in the summer were carried directly to a citizen radiation lab run by one of the community members. There, farmers and volunteers meticulously removed any dust or pebbles mixed into the bucket of seeds, all by hand, before testing them for radiation. The seeds were then processed into oil and tested again for radiation, despite previous evidence that radiation was not detected from the final product. Such measures to manage radiation proved important for the farmers, as they enabled the food cultivation and harvests so central to creating communal relationships that kept residents safe and well.

The farmers' ecologics, which acknowledged their land as valuable and resourceful for their well-being despite radioactive contamination, resonates with what Indigenous scholars Erin Marie Konsmo and Karyn Recollet (2018) have described as "meeting the land(s) where they are at." In the face of the environmental destruction of their land, rather than insist on a "return" to an untouched state, Konsmo and Recollet propose "harm reduction" as a process of enacting mutual healing of various forms of life harmed by settler colonialism (Konsmo and Recollet 2018, 241). Harm reduction acknowledges life beyond pollution and survival by making kin, through harvesting and bringing water to harmed life. In doing so, it unsettles the settler-colonial logic of purity and ableism that have stigmatized Indigenous relationships with harmed life as less than ideal (Konsmo and Recollet 2018).

The ethnographic context I discuss here may differ in the political stakes engendered in Konsmo and Recollet's argument (Akasaka, Yamauchi, and Oguma 2011; Kainuma 2011; Kawanishi 2016). Yet the ecologics of planting seeds, harvesting, and exchanging food show a similar place-based ethos that engages the land and its life-forms "where they are at." Echoing the politics of *jimoto-gaku*, it shows the willingness to acknowledge and engage the land, its life-forms, and its

relationalities as valuable, even in their harmed state. Furthermore, it is a practice that alludes to what Michelle Murphy (2017, 497) has called "alterlife," or a "life already altered, which is also life open to alterations." By being open to experimentation with their land that has already been altered by nuclear fallout, the farmers enacted a logic of caring, healing, and making home in a place marked by radioactive contamination, making it worthy of engagement beyond discussions of nuclearity.

FUKUSHIMA AS NUCLEARITY: Governmental Decontamination Projects

The farmers' move to decenter nuclearity and focus on place-making contrasted and often conflicted with other responses that focused on technical and medical concerns for nuclearity. The following two sections discuss examples of responses that center on nuclearity, including decontamination projects led by the central and prefectural governments, as well as health recuperation projects led by parents and NGOs in Japan. Despite their inner divergences and oppositional stakes, both responses came into tension with those that engaged ecologics. While an in-depth engagement with both responses lies beyond the scope of this article, I discuss them briefly to elucidate the assumptions of nuclearity that have put them in tension with ecologics.

In response to the nuclear accident in Fukushima, the Japanese government focused on making the exposed environments re-livable and re-appropriable for its subsequent economic projects. Technical and medical articulations of nuclearity enabled the government to expand capital-intensive public works such as "decontamination projects" in the name of recovery. Decontamination projects are based on the idea that radiation can be separated from the environment and contained—to prevent harmful interaction with human bodies at the molecular level. Guidelines and brochures published by the Ministry of Environment outline that decontamination projects rely on three basic principles: to remove, shield, and keep radioactive materials away from inhabited areas (Ministry of Environment 2018). Echoing the epistemic habit of technoscience that molecularizes and individualizes chemical relations, these principles depict radiation as isolated particles that accumulate and flow through bodies and environments. As the waves emitted by these particles can potentially damage DNA, the particles need to be removed from the environment (Ministry of Environment 2017a, 2017b).

Despite the government's depiction of radiation as isolated particles, however, the project to remove radiation from the environment has become a massive

civil engineering project, with dire consequences for socioecological relationships. Once in the environment, radioactive particles became air, water, soil, plants, animals, and houses as they moved around and accumulated in ways specific to the material and social ecologies they interacted with. In this view, radioactive particles are expansively responsive and open to relationships with their environment, often in surprising ways. As such, decontamination projects often required the removal and cleansing of entire surfaces of inhabited areas. The topsoil of fields and gardens was scraped off, tree branches were cut, fallen leaves removed, and the surfaces of buildings, roads, ditches, and tree bark were doused with high-pressure water. Radioactive materials so removed from surfaces were placed in industrial bulk bags and temporarily stored in empty lots or abandoned fields to keep them away from living areas. The surface of the land was then replenished with soil brought from mountains elsewhere.

In the process, decontamination enacted not only a logic of containment but also one of equivalence. The government's response assumed that people, soil, and the various relationships that shaped the area as places of living could easily be replaced with something else. The word *soil* in Japanese is *dojō*, which also means "foundation." Decontamination projects removed radioactive soil, considering inconsequential decades of work and care that went into developing the very foundation of communities, their identities, and their well-being. Farmers often considered such socioecological arrangements as damaging as radiation, identifying the mountain soil introduced by decontamination projects as one of the major challenges in cultivating their fields after the nuclear fallout.

Moreover, as scholars have repeatedly shown, the so-called cleanup of nuclear sites did not mean the complete elimination of radiation from the environment (Cram 2015; Masco 2006; Morimoto 2019). Instead, it was about reducing the level of radiation to a "reasonable" amount to be tolerated by the public to enable further political economic activities (Kumaki 2021). In Fukushima, decontamination projects, through their logic of containment and equivalence, have opened these areas for further appropriation by the government and industry. Just as the nuclear power plant in Fukushima was owned by a company in Tokyo and produced all its electricity for Tokyo, decontamination projects have often been carried out by general contractors from the capital. Decontaminated fields have, in turn, been reappropriated for lucrative projects—as solar panel fields, robotic testing fields, and the like. The government's approach to the affected land, and the resulting socioecological arrangements, made it increasingly difficult to cultivate the kinds of relationships seen in the rapeseed planting event and *osusowake*.

FUKUSHIMA AS NUCLEARITY: Health Recuperation Projects

Like the farmers, advocates and parents in and outside of Fukushima Prefecture have also challenged governmental projects that declared the possibility of containment and safety. They presented counter-narratives to state-led accounts of the effects of the nuclear fallout—that exposure was reasonable—by acquiring knowledge about radiation, taking their own measurements, and creating alternative data around radiation and its health effects. However, in their effort to speak to governmental policies and interventions, their responses also emphasized technological and medical nuclearity. Against governmental claims of safety, their practices underscored the health risks of radiation exposure, encouraging separation from anything that had to do with radiation. Such practices were grounded in epistemologies and values that also assumed the separability and replaceability of people, land, and food, putting them in tension with those who resisted such socioecological arrangements.

One response that exemplified this trajectory were health-recuperation projects called *hoyō*, launched across Japan by parents and NGOs in the wake of the nuclear accident. *Hoyō* refers to practices of resting one's mind and body to recuperate one's health. *Hoyō* for children affected by the nuclear fallout in Fukushima can take different lengths and involve varied activities, from a daytrip to Yamagata to pick cherries, to a five-day study sojourn in Kyoto to learn its traditional culture, to a weeklong retreat in a remote island of Okinawa to experience the sea. These responses emulated ones to the nuclear accident in Chernobyl, where school children and their teachers were brought to less contaminated areas to spend a few months recovering their health. During that time, the children's bodies were given time to heal from constant radiation exposure, and the consumption of "clean" food helped their bodies excrete radiation that had accumulated inside. In Japan, while much money has been spent on projects of decontamination and the decommissioning of nuclear power plants, no state funding materialized for these activities. Without public support, the retreats ran for shorter periods, from a day to two weeks, which did not allow enough time for a significant decrease of radiation in the body. Nevertheless, these projects became an important locus of resistance against the government's performance of containment that was making radiation a "reasonable" part of ordinary life after the nuclear accident.

However, in their focus on monitoring and engaging food and places as potentially nuclear, these efforts reproduced a logic of replaceability of land and its produce. Here, the specificity of place and food mattered only in terms of how much separation from radioactive contamination it allowed. Outdoor activities had

Figure 3. Children gather to pick cherries as part of *hoyō* in Yamagata Prefecture. Photo by Hiroko Kumaki.

to take place elsewhere, in a less radioactive environment, such as under the auspices of health-recuperation programs. Food had to be procured from elsewhere or monitored each time to make sure it was safe. In addition to radiation labs, negotiations around food often took place in the market, where alternative and safer food was sought by carefully examining the labels on groceries that told consumers where they were produced. Any other meanings engendered by place and food became irrelevant considering this focus on radiation.

These practices imposed significant labor on the part of citizens as individual consumers, to ensure they kept safe under reasonable exposure. Enacting alternative ways of life detached from radiation was, therefore, often more available for those who conformed to an urban consumerist lifestyle, who were open to finding alternative food in grocery store shelves, and who moved elsewhere. Such consumerist engagement with nuclearity was not necessarily compatible with place-

based ecologics that took the land and foodways as integral to the ways of life and well-being of communities. As a result, those who focused on nuclearity to prevent radiation exposure often came into conflict with those who engaged Fukushima through ecologics, living and producing in areas marked by the fallout.

For example, an intense moment emerged in one of the towns the first fall after the lifting of the evacuation order. In this town, a few organic farmers had continued to grow rice after the nuclear accident, even before the area was reopened. By the time the evacuation order was lifted, radiation levels detected in the rice had fallen below the governmental standards of safety, meaning that the farmers were formally able to begin producing for the market.

At the time, Fukushima's prefectural government tested all bags of rice produced in the prefecture for radiation before they entered the market, and this rice was no exception (Fukushima Prefecture 2022b). Nevertheless, one of the consumers sent back the rice because they detected 5Bq/kg of radiation in it. The government's threshold for food was 100Bq/kg. Co-ops across Japan, which usually had a stricter limit, set a threshold of 20Bq/kg. The 5Bq/kg was an amount not detectable unless one had access to a high-quality equipment and/or tested the rice for longer periods of time for greater accuracy.

The farmers felt disheartened. If tested that strictly, they argued, many other products in the Japanese market would probably disappear from the store shelves. They guessed that an advocate must have purchased their rice solely for the purpose of measuring its radiation level. After the incident, they were no longer sure if they wanted to produce for the general market, especially if consumers saw their produce only for its radiation content because it was produced in the former evacuation zone. They could instead to focus on the local market where their product would encounter much greater appreciation.

"Do they want to *destroy* the farmers?" The farmers' neighbor had heard about the incident and felt livid. The farmers' dismay and the neighbor's anger implied that there was more to growing rice than just producing for the market to earn an income, or to produce something devoid of radiation. The epistemological and ontological differences articulated in *jimoto-gaku* put this incident into perspective. The consumer who had returned the rice was in search of a problem, namely, radioactive contamination, which rendered the rice meaningful only in terms of its radioactivity. The farmers, on the other hand, had cultivated the land over generations, and it had taken them years to revive their fields that had suddenly become irradiated by the nuclear fallout. For the farmers, the resulting rice was not just their product but also an integral part of who they were—something

that nurtured and acknowledged their history and existence. Denying those elements constituted an act of destroying them and their worth. Even though both sides were acting on their concern for health and well-being, these differences became an obstacle to their interaction and collaboration.

Over the years, many divides were created among communities, and even within families, based on how they engaged the nuclearity of the fallout and the ecologics that grounded their ways of life (see Gill 2013). An unfortunate structure emerged in which farmers were often criticized for their seeming valorization of life with radiation, while parents and advocates were criticized for their heavy engagement with nuclearity and their seeming disregard for place-based relationships. As a staff member at a health-recuperation project put it, the issue of radiation is deeply troubling and brutal because it gets at the bottom of fundamental values that shape what it means to be human and to live well. Denying any of the responses was equivalent to denying the core of one's being. As it became increasingly difficult to communicate their positionalities, many people in Fukushima refrained from talking about radiation altogether to prevent conflicts. Nevertheless, their divergent positionalities manifested in the ways they arranged their social and ecological relationships—what they ate, where they lived, how they dried their laundry, who they interacted with—further making any work across differences a major challenge.

NEGOTIATING PARTIAL BOUNDARIES

The long-term aftermath of the nuclear accident in Fukushima is often characterized as rigidifying divides between those who have made divergent decisions after the fallout. Tom Gill (2013) has shown through the case of Iitate Village that efforts to maintain the relationships between people and place after forced evacuation have led to divides among community members and the demise of the village, particularly as many sought to resume their lives and the community itself in another locale. As evacuation orders were lifted, the tension between nuclearity and ecologics was made salient to me in the ways those who returned took up the discourse of *jimoto-gaku* and called themselves "people of the soil" to distinguished themselves from the "people of the wind." As discussed earlier, this distinction did not only signify that the lifestyle of the "people of the soil" entailed more interaction with the land but also that their sense of the community's well-being hinged on its rootedness to the soil—its foundation. "People of the wind," on the other hand, were more mobile and had fluid relationships to the land and its people,

often grounding their ways of life and their well-being in the market economy (Nakazawa 2018).

However, the analytical and ethnographic distinction between those who engaged nuclearity and ecologics often blurred as people and communities moved through different places and embodied different socioecological relationships in the process of evacuation and return. In the negotiations and mutual transformations that have taken place among those in the former evacuation zone, it becomes clear that members of the community have moved beyond nuclearity in some practices but not in others. In their everyday lives, they engage both nuclearity and ecologics, constructing, negotiating, and transforming the interactive and partial boundaries against both radiation *and* harmful socioecological arrangements to keep them and their communities safe.

The practice of *osusowake* constitutes one of the sites in which residents in the former evacuation zone negotiated their divergent stakes and enacted partial boundaries through their interactions. Shimada-san, a man in his late sixties who returned to his town after the lifting of the evacuation order, told me that he sometimes received food from his neighbors that he knew remained off limits, like yuzu growing on trees in the neighborhood. Knowing that the *osusowake* was an act of care for him, especially as he lived alone, he did not question the neighbor about the fruit's origin or level of radiation. He just thanked the neighbor and accepted it. Later on, however, he threw the yuzu away, while still reciprocating the neighbor with something else. For him, what mattered in this exchange was not whether the yuzu was edible, but instead that his neighbor had thought and gifted it to him. He valued the relationship that came with the exchange and was willing to maintain it. He therefore privately addressed his concern for radiation, foregrounding ecologics in one aspect of his life by engaging in the exchange, while emphasizing nuclearity in another aspect by refusing to consume the yuzu.

A kindergarten in the former evacuation zone also negotiated partial boundaries as it addressed concerns for radiation and socioecological relationships. Each year, the kindergarten invited local farmers to teach children how to grow vegetables in the school garden. After the nuclear accident, they strictly monitored the levels of radiation in the harvest—radiation had to be undetectable for children to consume the food. This was not necessarily based on demands by the children's parents, but instead addressed potential criticisms from outside the community, from those who focused on the region's nuclearity and questioned the presence of a kindergarten in an irradiated area. The kindergarten's compromise was to plant vegetables known to absorb little radiation, such as cucumbers, lettuce, and toma-

toes; test the harvest for radiation; and share only the food that met their strict standards of safety. The farmers in turn acknowledged the health concerns for radiation that might prevent the children from enjoying certain harvests.

In addition to negotiations within the same community, individuals also shifted their stance as they evacuated from and returned to their communities. Sugeno-san, for example, is one of many who negotiated nuclearity and ecologics as an evacuee, a returnee, a farmer, and a parent of small children in the years following the nuclear accident. Sugeno-san was a dairy cattle farmer in his early-thirties. When his village was designated part of the mandatory evacuation zone, he left his cows in the village and evacuated to western Japan with his wife, pregnant at the time. When the government lifted the evacuation order in parts of the village, Sugeno-san returned with his father to restart dairy farming, but he left his wife and children in a nearby city.

Initially, Sugeno-san returned to the village with a strong sense of mission to perfectly contain radiation. He was concerned that if radiation was detected in his produce, the news would spread in the mass media and affect all farmers in Fukushima. On returning to the village, he was determined to strictly control and manage the environment, so as not to allow any radioactive contamination into his produce. Sugeno-san attended information sessions held by governmental officials that encouraged evacuated villagers to return and restart stockbreeding in the village. The officials repeatedly told the farmers not to produce food with radiation. They instructed the farmers not to let the cows eat dust or fallen leaves, not to let grasses grow on the soil not yet decontaminated, and not to let fallen leaves get into agricultural tools and machines.

Yet it soon became clear that the complete containment of radioactive contamination would prove impossible. To enact complete containment, Sugeno-san first asked the government to decontaminate his fields. Concerned with food safety, the government only decontaminated the crop-growing areas of the field, avoiding the footpaths around the field that the farmers would walk on. But Sugeno-san was using the fields to graze cows, and the cows did not distinguish between grasses growing in the field and those on the footpaths. To prevent cows from grazing in undecontaminated areas, Sugeno-san covered the footpaths with plastic sheets. However, the wind and wild boars tossed the sheets, and weeds would break though the plastic cover. The boars even broke through the wire fences he built to prevent them from entering the fields. What was more, the nearby river flooded after heavy rains, inundating the fields with radioactive water from the

mountains. Any attempt at creating indestructible boundaries and containing how radioactive contamination moved through ecologies and bodies faltered.

Figure 4. Plastic sheets covering the footpaths of Sugeno-san's field. Photo by Hiroko Kumaki.

At that point, Sugeno-san considered it an irony that the government was encouraging the recovery of stock farming in the village, which necessarily required intimate relationships with the irradiated ecologies, while imposing the impossible task of containment on the farmers when it came to their products. It was all the more troubling for him that such socioecological arrangements were not based on a concern for the farmers' well-being or their ways of life, but rather on a concern for radiation in the final product. That is, the government was only interested in rearranging the environment in ways that enabled the production of food that could be separated from its specific locality and circulated elsewhere, as if it were equally safe or even safer than products from other parts of Japan. He worried that such market-oriented ways of reorganizing social and ecological relationships would further marginalize farmers and their communities.

Sugeno-san gradually transformed his approach to emphasize the regeneration of a way of life grounded in the socioecological relationships of the village. In the process, like the farmers who planted rapeseeds, he became more experimental and open to relationships with the village environment and, therefore, with

radiation. Instead of micromanaging radiation, he thought it important to create a system in which he could produce from his land and then determine what produce might be radioactive. That way, he could make sure that those products did not enter the market and both experiment with his methods of production and receive compensation from the government for radioactive products. As long as the prefectural government and the general public insisted on the illusion of complete containment, he argued, no one could return to farm in the village and, more important for him, care for the land for past and future generations.

At the same time, Sugeno-san took a different stance as a father with small children. He talked at length about the dream he had of raising his children in the village, within the dense relationships it offered. Yet while he worked in the village and reestablished intimate relationships with the village ecology, he refused the same for his children. When it came to them, his response emphasized nuclearity. In line with the parents and NGOs that focused on separation from radiation, his family remained in a nearby city, and his children have never visited the village. Sugeno-san embodied this tension between nuclearity and ecologics as he shaped partial boundaries while moving across his place of evacuation, bureaucratic meetings, his fields in the village, and his new home outside the village.

ECOLOGICS OF HEALTH AND WELL-BEING

Figure 5. Children running around the rape flower maze in the former evacuation zone of Fukushima. Photo by Hiroko Kumaki.

As summer approached in coastal Fukushima, a sea of yellow rape flowers emerged in the area where the rapeseed planting event had taken place the previous fall. Children were running around a rape flower maze nearby, created by a man who had lost his family members to the tsunami disaster that preceded the nuclear fallout. As I stood in the middle of the flower maze, seven years after the disaster and almost two years after mandatory evacuation orders were lifted in the area, I could see governmental reconstruction projects looming on the horizon. Stretches of fields had been decontaminated and made into nuclear-waste storage sites, solar panel fields, and robotic testing areas. Massive sea walls were under construction along the coast, plans for which had barely been discussed with residents scattered across Japan due to evacuation. The spread of radiation and the ensuing projects had replaced residents' place-based relationships with political economic activities that made the land apt for further developmental projects. Carried out by major construction companies based in Tokyo, they foreclosed communal ties that could have been fostered through residents' engagement with their land, further obscuring the histories, memories, and relationships that had once animated this region.

Amid this change, residents who had returned to the region planted seeds and marked the land with flowers to express both their sense of mourning and that of healing from what had been lost in the earthquake, tsunami, nuclear accident, and ensuing reconstruction projects. Farmers cultivated rape flowers to decontaminate the soil and produce edible canola oil. They cultivated rice and seasonal vegetables to share and exchange in the communities. In doing so, residents rebuilt relationships of trust and care among themselves and their surrounding environment that had been torn apart by the nuclear accident and its aftermath.

Such patchworked sceneries of Fukushima have often been made recognizable and meaningful only as a nuclear site, particularly through discussions of radiation and its potential health risks. These frameworks have proved helpful in elucidating structures and practices that make radiation invisible and to make radiation matter for social injustice. Writing from the former evacuation zone, where my interlocutors engaged in *jimoto-gaku* and challenged such an approach, this article discussed the sceneries and experiences of those who have learned to critique, contest, and transform the boundaries between nuclearity and ecologics.

My interlocutors' insistence on their right to determine these boundaries gives us an understanding of other ways of imagining life and recovery after a nuclear fallout. For those in the former evacuation zone, for whom dense socio-ecological relationships made for an integral part of their well-being, projects that centered on separation from radiation were not always possible, nor were they

ideal. What seemed urgent was to work with and against responses that made these relationships difficult, if not impossible, and to acknowledge the residents' land and lives after the disasters as still worthy of meaningful relationalities, despite their harmed state. Thus, residents created interactive and partial boundaries against radiation, as well as practices and policies that foregrounded biopolitical and political economic objectives, with the aim of opening up, rather than foreclosing, relationalities with their living environment. The patchy scenery and practices surrounding the rape flower field embodied that response.

Practices of partial boundary making have been noted by scholars across nuclear sites, as well as at sites of environmental exposure more broadly (Alexievich 2006; Brown 2019; Masami 2017; Roberts 2017; Stephens 1995). They have shown that certain discourses and practices around toxic environments have made unrecognizable situated experiences of toxicity. What discussions of nuclearity and ecologics elucidate further is the divergent and conflicting logics that shape socioecological relationships in environments marked by toxicity, with consequences for the well-being of people and their communities. In Japan, selective engagement with the consequences of the nuclear fallout, particularly through medical and technological nuclearity, has coarticulated with biopolitical and political economic projects to marginalize socioecological relationships foundational for the well-being of those who returned to the former evacuation zone.

Furthermore, working beyond nuclearity reveals that governance practices that address medical and technical concerns for radiation have been co-opted by political economic projects, to rearrange socioecological environments in ways that furthered political economic appropriation. It shows a mode of disaster capitalism that implicates not only life itself but also increasingly "life-environmental relations"—or what Valerie Olson (2018) has called a shift from biopolitics to "ecobiopolitics." That is, a focus on nuclearity allows for a critique of state practices that aim to contain biological harm and protect citizens to a "reasonable" extent, while actually assuming citizens' exposure through projects that center on political economic redevelopment. Ecologics, in turn, challenges practices that rearrange not only life itself, but also socioecological environments through market-based logics, in ways that alienate people and communities from their place-based relationships and make them further appropriable for developmental projects. Everyday negotiations of nuclearity and ecologics imply that health and well-being after a nuclear accident have been shaped with and against political economic orders that have put citizens at risk not only biologically, but also socioecologically.

My interlocutors' willingness to open up and create partial boundaries therefore did not constitute an uncritical acceptance of the governmental and industrial narrative that life was safe in the former evacuation zone. Instead, such practices challenged a biopolitics that assumed and encouraged their exposure in the name of protection, as well as an ecobiopolitics that imposed a market logic tearing apart their relationships of mutual care and support. Residents in the former evacuation zone focused on making socioecological arrangements that protected them from political economic encroachments increasingly reappropriating their land, making them more vulnerable to environmental exposure and foreclosing the possibility of communal relationships that kept them safe.

Residents were, in other words, asking how to approach a collective condition of our time, that of living with exposure, without reproducing the market logic of containment and equivalence that landed us in this condition in the first place. By negotiating and revaluing nuclearity and centering ecologics, their responses ask us how we might acknowledge the act of planting seeds and of creating partial boundaries as an ethical and political act of meaningful "living" without letting radiation, the government, or the nuclear industry off the hook.

ABSTRACT

In the wake of the Fukushima Daiichi Nuclear Power Plant accident in 2011, radiation and its potential health effects have become a central concern, shaping debates on the nuclearity of Fukushima. However, residents living in the former evacuation zone often challenged the centrality of nuclearity to their experiences of the nuclear fallout. Taking seriously their efforts to move beyond nuclearity, this article elucidates their varied concerns for the ways in which social and ecological relations—or what I call "ecologics"—have been rearranged after the fallout in the name of their biological and economic well-being. By challenging practices that imposed market logics of containment and equivalence on their living environment, these residents enacted alternatives cultivating socioecological relations that facilitated trust and care in their communities. I argue that residents negotiated partial boundaries not only against radiation but also against socioecological arrangements that tore apart their relationships of mutual support and further reappropriated their land for political economic projects. [suspending nuclearity; ecologics; health and well-being; partial boundaries; Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Plant Accident; Japan]

要旨

東京電力福島第一原子力発電所事故後の被災地での生活は、放射性物質による汚染と健康への影響を中心に議論されてきた。本論文では、福島県の避難指示

解除区域で行った参与観察やインタビューをもとに、帰還した住民の原発事故後の考え方を考察した。その結果、住民の多くが、地域に降り注いだ放射性物質に注意を向けているだけでなく、これまで暮らしてきた土地や自然、人との関わり(ecologics)の中で現状に合ったより良い生活を模索していることが分かった。また、放射性物質による汚染に着目した外部からの関わりにより、原発事故の被害が明らかになり、責任を追求することが可能となった一方で、図らずも、開発主義が助長され、その土地に根差した生き方が疎外されてしまう側面をも持っていることを示した。公害、災害、環境破壊などの研究や政策においては、「被害」や「汚染」を検証する科学的・医学的視点だけでなく、ecologicsの概念を導入することで、住民がその土地やコミュニティとの関わりを再構築する過程で、健康を守りながらより良い生活を実現していく方法を見出せることが期待できる。[東京電力福島第一原子力発電所事故; 帰還住民; 健康; ecologics; 地元学; コミュニティ再生; 折り合い; 放射能汚染; 開発主義]

NOTES

Acknowledgments Special thanks to my interlocutors for sharing their lives with me. I am grateful to Chris Nelson and the anonymous reviewers for their generous engagement with the manuscript, as well as Kate Herman and Petra Dreiser for their thoughtful editorial guidance. At various stages of its development, this article has been inspired by conversations with Jonathan Alperstein, Charis Boke, Alexandria Casteel, Jennifer Cole, Sienna Craig, Kathryn Goldfarb, Grant Gutierrez, Norma Field, Michael Fisch, Andrea Ford, Susanne Freidberg, Maron Greenleaf, Sarah Kelly, Junko Kitanaka, Flora Krivak-Tetley, Joseph Masco, Alexander MacNeil, Yuki Miyamoto, Hirokazu Miyazaki, Jun Mizukawa, Ryo Morimoto, Atsuro Morita, Michelle Murphy, Alex Nading, Peggy O'Donnell, Laura Ogden, Stephanie Palazzo, Eugene Raikhel, Elizabeth Roberts, Michael Rossi, Geneva Smith, Nicolas Sternsdorff-Cisterna, Kaushik Sunder Rajan, and Tadashi Yanai. The responsibility for any remaining errors and conclusions is my own.

REFERENCES

Akasaka, Norio, Akemi Yamauchi, and Eiji Oguma
2011 *"Tohoku" Saisei: Sono Tochi o Hajimari no Basho e"* [Regenerating Tohoku: Making the land into a place of beginning]. Tokyo: East Press.

Alexievich, Svetlana
2006 *Voices from Chernobyl: The Oral History of a Nuclear Disaster*. Translated by Keith Gessen. New York: Picador.

Brown, Kate
2019 *Manual for Survival: A Chernobyl Guide to the Future*. New York: Penguin.

Cho, Jieun
2020 "Family in the Ruins of Nuclear Risk." *Anthropology News* website, April 29.

Claus, C. Anne
2020 *Drawing the Sea Near: Satoumi and Coral Reef Conservation in Okinawa*. Minneapolis: University of Minnesota Press.

Cram, Shannon
2015 "Becoming Jane: The Making and Unmaking of Hanford's Nuclear Body." *Environment and Planning D: Society and Space* 33, no. 5: 796–812. https://doi.org/10.1177/0263775815599317

Danely, Jason
2019 "The Limits of Dwelling and the Unwitnessed Death." *Cultural Anthropology* 34, no. 2: 213–39. http://doi.org/10.14506/ca34.2.03

Embree, John F.
1939 *Suye Mura: A Japanese Village*. Chicago: University of Chicago Press.
Fisch, Michael
2022 "Japan's Extreme Infrastructure: Fortress-Ification, Resilience, and Extreme Nature." *Social Science Journal Japan*. https://doi.org/10.1093/ssjj/jyac011
Fukushima Medical University Radiation Disaster Medical Center (FMU)
2013 *Hōshasen Saigai to Mukiatte: Fukushima ni Ikiru Iryōsha kara no Messēji* [Facing a radiation disaster: Message from medical practitioners living in Fukushima]. Tokyo: Life Science.
Fukushima Prefecture
2022a Fukushima Revitalization Station | Fukushima Prefectural Govt., Japan. https://www.pref.fukushima.lg.jp/site/portal-english/
2022b "Fukushima Ken San Mai no Hōshasei Busshitsu Kensa" [Inspection of radioactive materials in rice produced in Fukushima]. https://www.pref.fukushima.lg.jp/sec/36035b/kome-kensa.html
Gill, Tom
2013 "This Spoiled Soil: Place, People, and Community in an Irradiated Village in Fukushima Prefecture." In *Japan Copes with Calamity: Ethnographies of the Earthquake, Tsunami, and Nuclear Disasters*, edited by Tom Gill, Brigitte Steger, and David H. Slater, 201–33. Berlin: Peter Lang.
Hecht, Gabrielle
2009 "Africa and the Nuclear World: Labor, Occupational Health, and the Transnational Production of Uranium." *Comparative Studies in Society and History* 51, no. 4: 896–926. https://doi.org/10.1017/S001041750999017X
2012 *Being Nuclear: Africans and the Global Uranium Trade*. Cambridge, Mass: MIT Press.
Hirose, Shunsuke
2011 *Fūkei Shihon Ron* [Landscape as capital]. Tokyo: Rōbundo.
Howe, Cymene
2019 *Ecologics: Wind and Power in the Anthropocene*. Durham, N.C.: Duke University Press.
Ikeda, Kiyoshi
2014 *Saigai Shihon Shugi to Fukkō Saigai: Ningen Fukkō to Chiiki Seikatsu no Tame ni* [Disaster capitalism and "disaster of reconstruction": For humanistic reconstruction and regeneration of local life]. Tokyo: Suiyō Sha.
International Commission on Radiological Protection (ICRP)
2020 "Radiological Protection of People and the Environment in the Event of a Large Nuclear Accident: Update of ICRP Publications 109 And 111." ICRP Publication 146. Ann. ICRP 49 (4).
Kainuma, Hiroshi
2011 *Fukushima-ron: Genshiryoku Mura wa Naze Umaretanoka* [On "Fukushima": What brought forth the nuclear village?]. Tokyo: Seido-sha.
Kawanishi, Hidemichi
2016 *Tōhoku: Japan's Constructed Outland*. Translated by Nayan Guo and Raquel Hill. Leiden, Netherlands: Brill.
Kimura, Aya Hirata
2016 *Radiation Brain Moms and Citizen Scientists: The Gender Politics of Food Contamination after Fukushima*. Durham, N.C.: Duke University Press.
Kimura, Shuhei
2016 "When a Seawall Is Visible: Infrastructure and Obstruction in Post-Tsunami Reconstruction in Japan." *Science as Culture* 25, no. 1.: 23–43. https://doi.org/10.1080/09505431.2015.1081501
Klein, Naomi
2008 *The Shock Doctrine: The Rise of Disaster Capitalism*. London: Picador.

Konsmo, Erin Marie, and Karyn Recollet
2018 "Afterword: Meeting the Land(s) Where They Are At: A Conversation between Erin Marie Konsmo (Métis) and Karyn Recollet (Urban Cree)." In *Indigenous and Decolonizing Studies in Education: Mapping the Long View*, edited by Linda Tuhiwai Smith, Eve Tuck, and K. Wayne Yang, 238–51. New York: Routledge.

Kosakai, Maki, Hideki Ishii, and Kunpei Hayashi
2017 "Nanohana no Saibai to Natane Abura Seisan o Tsūjita Fukushima Hamadōri Nakadōri no Chiiki Saisei" [Regional regeneration of Fukushima Prefecture's coastal and inland area through the cultivation of rape flowers and production of canola oil]. *Fukushima University Journal of Commerce, Economics and Economic History* 86, no. 2: 55–64.

Kuchinskaya, Olga
2014 *The Politics of Invisibility: Public Knowledge about Radiation Health Effects after Chernobyl*. Cambridge, Mass.: MIT Press.

Kumaki, Hiroko
2021 "Reasonable Exposure: Nuclear Infrastructure and Technopolitics of Health and Well-Being." A Decade of Fukushima: Socio-Technical Perspectives on Surviving the Nuclear Age in Japan. Center for East Asian Studies, University of Colorado, Boulder. https://www.colorado.edu/cas/sites/default/files/attached-files/living_in_paradox_-_hiroko_kumaki_.pdf

Lam, Heidi K.
2020 "Embodying Japanese Heritage: Consumer Experience and Social Contact at a Historical Themed Park." *Journal of Intercultural Studies* 4, no. 3.: 262–79. https://doi.org/10.1080/07256868.2020.1751598

Loh, Shi Lin, and Sulfikar Amir
2019 "Healing Fukushima: Radiation Hazards and Disaster Medicine in Post-3.11 Japan." *Social Studies of Science* 49, no. 3: 333–54. https://doi.org/10.1177/0306312719854540

Masami, Yuki
2017 "Meals in the Age of Toxic Environments." In *The Routledge Companion to the Environmental Humanities*, edited by Ursula Heise, Jon Christensen, and Michelle Niemann, 56–63. London: Routledge.

Masco, Joseph
2004 "Mutant Ecologies: Radioactive Life in Post–Cold War New Mexico." *Cultural Anthropology* 19, no. 4: 517–50. https://doi.org/10.1525/can.2004.19.4.517
2006 *The Nuclear Borderlands: The Manhattan Project in Post–Cold War New Mexico*. Princeton, N.J.: Princeton University Press.

Ministry of Environment
2017a "Dai 2 Shō: Hōshasen ni Yoru Hibaku" [Chapter 2: Exposure from radioactive waves]. Unified Basic Material on the Health Effects of Ionizing Radiation (2017). https://www.env.go.jp/chemi/rhm/h29kisoshiryo/h29qa-02-19.html
2017b "Dai 3 Shō: Hōshasen ni Yoru Kenkō Eikyō" [Chapter 3: Health effects from radiation]. Unified Basic Material on the Health Effects of Ionizing Radiation (2017). https://www.env.go.jp/chemi/rhm/h29kisoshiryo/h29qa-03index.html.
2018 "Jyosen Jigyō Shi" [Document on the decontamination projects]. Editorial Committee on Decontamination Project Documentation, Ministry of Environment. http://josen.env.go.jp/archive/decontamination_project_report

Morimoto, Ryo
2019 "From Nuclear Things to Things Nuclear: Minding the Gap at the Knowledge-Policy-Practice Nexus in Post-Fallout Fukushima." In *Disaster upon Disaster: Exploring the Gap between Knowledge, Policy, and Practice*, edited by Susanna M. Hoffman and Roberto E. Barrios, 218–40. New York: Berghahn Books.
2022 "A Wild Boar Chase: Ecology of Harm and Half-Life Politics in Coastal Fukushima." *Cultural Anthropology* 37, no.1: 69–98. https://doi.org/10.14506/ca37.1.08

Morita, Atsuro, Anders Blok, and Shuhei Kimura
2013 "Environmental Infrastructures of Emergency: The Formation of a Civic Radiation Monitoring Map during the Fukushima Disaster." In *Nuclear Disaster at Fukushima Daiichi: Social, Political, and Environmental Issues*, edited by Richard Hindmarsh, 78–96. New York: Routledge.
Murphy, Michelle
2017 "Alterlife and Decolonial Chemical Relations." *Cultural Anthropology* 32, no. 4: 494–503. https://doi.org/10.14506/ca32.4.02
Nakazawa, Masao
2018 *Fukushima o Ikiru to Iu Koto: Barabara Harasumento o Koete* [To live Fukushima: Overcoming fragmentation harassment]. Tokyo: Honnoizumisha.
Nozawa, Shunsuke
2015 "Phatic Traces: Sociality in Contemporary Japan." *Anthropological Quarterly* 88, no. 2: 373–400. http://doi.org/10.1353/anq.2015.0014
Ogden, Laura
2011 *Swamplife: People, Gators, and Mangroves Entangled in the Everglades*. Minneapolis: University of Minnesota Press.
Olson, Valerie
2018 *Into the Extreme: U.S. Environmental Systems and Politics beyond Earth*. Minneapolis: University of Minnesota Press.
Petryna, Adriana
2002 *Life Exposed: Biological Citizens after Chernobyl*. Princeton, N.J.: Princeton University Press.
Polleri, Maxime
2019 "Conflictual Collaboration: Citizen Science and the Governance of Radioactive Contamination after the Fukushima Nuclear Disaster." *American Ethnologist* 46, no. 2: 214–26. https://doi.org/10.1111/amet.12763
Roberts, Elizabeth F. S.
2017 "What Gets Inside: Violent Entanglements and Toxic Boundaries in Mexico City." *Cultural Anthropology* 32, no. 4: 592–619. https://doi.org/10.14506/ca32.4.07
Satsuka, Shiho
2015 *Nature in Translation: Japanese Tourism Encounters the Canadian Rockies*. Durham, N.C.: Duke University Press.
Stephens, Sharon
1995 "Physical and Cultural Reproduction in a Post-Chernobyl Norwegian Sami Community." In *Conceiving the New World Order: The Global Politics of Reproduction*, edited by Faye D. Ginsburg and Rayna Rapp, 270–87. Berkeley: University of California Press.
Sternsdorff-Cisterna, Nicolas
2018 *Food Safety after Fukushima: Scientific Citizenship and the Politics of Risk*. Honolulu: University of Hawai'i Press.
Tamai, Kesao
1992 *Kaze no Nōto* [Note of the wind]. Tokyo: Kenko Shin Sha.
Tanaka, Kazuhiko
2017 *Wasurerareta Japanologisto: Embree Fusai ga Mita Nihon no Mura* [The forgotten Japanologist: The "Japanese village" the Embrees saw]. Fukuoka, Japan: Bouyousha.
Tsing, Anna Lowenhaupt
2015 *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton, N.J.: Princeton University Press.
Tuck, Eve
2009 "Suspending Damage: A Letter to Communities." *Harvard Educational Review* 79, no. 3: 409–28. https://doi.org/10.17763/haer.79.3.n0016675661t3n15
Uchio Taichi
2013 "Higashi Nihon Daishinsai no Kōkyō Jinruigaku Kotohajime: Miyagi Ken Minami Sanriku Chihō ni Okeru Hisaichi Shien no Genba Kara" [Initiating public

anthropology of the Great East Japan Earthquake Disaster: From the site of disaster relief activities in Minamisanriku, Miyagi]. *Japanese Journal of Cultural Anthropology* 78, no. 1: 99–110. https://doi.org/10.14890/jjcanth.78.1_99

Watsuji, Tetsuro

1979 *Fūdo: Ningen Gaku Teki Kōsatsu* [Climate: A humanistic study]. Tokyo: Iwanami Shoten.

Yoshimoto, Tetsuro

1995 *Watashi no Jimoto Gaku* [My study of hometown]. Tokyo: NEC Creative.

2008 *Jimoto Gaku o Hajimeyō* [Let's start a study of hometown]. Tokyo: Iwanami Shoten.