



Living Apart Together: Local Governments and Citizen Radiation Measuring Organizations After Fukushima

JOKE KENENS

BIEKE ABELSHAUSEN

TURCANU CATRINEL

INE VAN HOYWEGHEN 

*Author affiliations can be found in the back matter of this article

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ABSTRACT

Since the Fukushima nuclear accident, dozens of citizen radiation measuring organizations (CRMOs) continue to observe the nuclear fallout in Japan. Their activities intersect on a regular basis with those of the Japanese government. Recognizing the different policy levels involved in radiation measuring, this paper studies the relations between local governments and CRMOs. We examine how civic and governmental infrastructures initiated in the wake of the Fukushima accident (dis)engage with each other. We link these infrastructures with pre- and post-Fukushima socio-technical imaginaries. By doing so, we explore whether and how CRMOs challenge and reconfigure political culture in post-Fukushima Japan. We conclude that CRMOs and local governments have established themselves as separate infrastructures, living and operating in the same environment, yet apart in the majority of cases. We identify obstacles and opportunities for citizen engagement in the emergency and recovery process after a nuclear accident, and contextualize CRMOs within citizen mobilization after Fukushima. Document analysis, fieldwork, and interviews with CRMOs, local governments, and the Fukushima prefectural government make up the basis of our study.

CORRESPONDING AUTHOR:

Joke Kenens

KU Leuven, BE

joke.kenens@kuleuven.be

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INTRODUCTION

2021 marks the 10th anniversary of the Fukushima nuclear accident. In daily life, the reminders of the nuclear fallout are gradually disappearing. Nuclear waste in temporary storage is being relocated, and the evacuation orders are gradually lifted in most of the affected areas. Nevertheless, the aftermath of the accident is measurable to this day. Dozens of citizen science initiatives, active throughout Japan, observe the nuclear fallout in the environment and its consequences for residents. In the past decade, these Citizen Radiation Measuring Organizations (CRMOs),¹ initiated in the wake of the Fukushima disaster, have established themselves as a civic infrastructure (Morita et al. 2013) and exist next to a governmental infrastructure that monitors radiation levels. Although the relations between these two infrastructures have been the topic of previous academic research (Igarashi 2012; Tokyo Gakugei University Center for the Research and Support of Educational Practice 2016; Kimura 2016, 2017; Polleri 2019, 2019b; Ando 2019), detailed inquiries into the relations between local governments and citizens after the Fukushima nuclear accident remain scarce. Research into citizen-state relations at this governmental level is nevertheless relevant considering the important role of local governments in the reconstruction policy after Fukushima, and their proximity to citizens. Such studies offer further insight into science-state-society relations in a post-disaster context.

Taking Morita et al.'s research (2013) as our starting point, we consider how CRMO civic infrastructure relates to governmental infrastructures in the aftermath of the Fukushima Daiichi accident. Emphasizing the shockwaves and the change that the Tōhoku tsunami, the earthquake, and the Fukushima nuclear accident engendered within Japanese society, we understand infrastructures as relational, socio-technical ecologies (Edwards et al. 2013; Star and Ruhleder 1996; Casper and Morita 2015; Gupta et al. 2015). To study the (non)interactions between civic and governmental infrastructures, we place these infrastructures in relation to a shift in socio-technical imaginaries (Jasanoff and Kim 2009) following the Fukushima accident. Socio-technical imaginaries refer to “collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects.” (Jasanoff and Kim 2009, p.120). We argue that in the wake of the Fukushima disaster, the pre-Fukushima imaginary, which promoted nuclear energy based on the unlikelihood of a major accident (Morita et al. 2013; Kingston 2012), lost prominence, and focus shifted to a post-Fukushima imaginary, which promulgates visions of reconstruction

and revitalization, testifying to Japan's resilience after a nuclear accident.

As socio-technical imaginaries evoke a fictional future, they require resources, policies, publics, science, and technology to be steered into the desired direction (Jasanoff and Kim 2009). As such, they offer sites to study a political culture, namely the particular ways in which science, politics, and public knowledges are linked in a nation (Jasanoff 2005; Begemann et al. 2018). By connecting civic and governmental infrastructures with socio-technical imaginaries, we study how CRMOs were constructed as a civic infrastructure following the Fukushima accident, and how civic and governmental infrastructures (dis)engage with each other against the background of these imaginaries. Drawing on the Science and technology studies (STS) concept of political culture (Jasanoff 2005; Begemann et al. 2018), we examine whether and how CRMOs challenge and reconfigure the linkages between technology, state, and knowledge in post-Fukushima Japan (Callon and Rabeharisoa 2007).

To this end, we analyze field notes and interviews conducted in February–March and November–December 2018 with 14 CRMOs, 4 local governments in Fukushima and Tochigi Prefectures, and the prefectural government of Fukushima. Next to these interviews, a written response from a local government in Fukushima Prefecture and documents, including policy documents and brochures, published by the Japanese government and CRMOs, make up our analysis. The first author conducted interviews with CRMO members based on snowballing. Following the Fukushima accident, Japan counted more than 70 active CRMOs (Kimura 2016). Although their number has dwindled over the years, more than 30 organizations remain active today (Minna no Data Site 2018; Kimura and Kinchy 2019). The CRMOs involved in this study measure radiation in air, soil, food, and/or human bodies, and are selected on the following criteria: location (with particular focus on Fukushima, Tochigi, and Miyagi Prefectures); years of operation (CRMOs originating from before and after the Fukushima accident); and grassroots characteristics (citizen driven and initiated). This resulted in 14, rather diverse CRMOs selected for our study. While all CRMOs were active at the time of recruitment (2017–2018), two of them have become dormant in the meantime. All CRMOs mentioned in this study are embedded in their respective localities and organize their activities regionally, with the exception of one international CRMO. Ethical approval was obtained from the Ethics Committee of the University of Leuven. Each interviewee gave oral consent at the start of the interview. All interviews were transcribed and analyzed thematically using Nvivo to map the relations between CRMOs and governments. To guarantee the anonymity of participants

involved in this study, we describe the geographic location of the CRMOs and the municipalities.

In the following section, we first consider the making of a post-Fukushima civic infrastructure (Morita et al. 2013) and highlight how the pronuclear socio-technical imaginary played a role in the upsurge of CRMOs. Thereafter, we discuss local governmental and civic infrastructures, placing their (dis)engagements within a shift of imaginaries. Finally, we reflect how civic and governmental infrastructures relate to each other in post-Fukushima Japan and how CRMOs do politics when engaging with governmental infrastructures.

CONSTRUCTING CIVIC AND GOVERNMENTAL INFRASTRUCTURES IN POST-FUKUSHIMA JAPAN ESTABLISHING A POST-FUKUSHIMA CIVIC INFRASTRUCTURE

Japanese citizens have been measuring radiation for many years. Some of these organizations work independently, such as the Citizens' Nuclear Information Center (CNIC), a pioneering citizen-driven organization that provides an alternative source of information relating to nuclear energy for the Japanese society. Other organizations collaborate with local governments (Ando 2019; Nakachi 2008). These cooperative relations help citizens to secure funding and a venue to organize themselves. While the Chernobyl accident (1986) mainly mobilized mothers concerned about food security of foreign products, Fukushima set in motion a diverse movement of citizens, urging fathers, mothers, farmers, and grandparents to start monitoring radiation (Ando 2019). As the tsunami of 3/11 flooded the Fukushima Nuclear Power Plant, the socio-technical imaginary of a safe, clean nuclear energy, which had permeated Japan since the 1950s, crumbled. It temporarily exposed the systematic exclusion of public involvement in the decision-making process and the technocratic ways in which knowledge production supported the pronuclear policies of what is referred to as the “nuclear village” (*genshiryoku mura*), a close-knit network of pronuclear institutional and individual actors (Hirakawa and Shirabe 2015; Morita et al. 2013; Kingston 2012). For decades, the presence of the nuclear village shaped nuclear safety governance in Japan, which was largely influenced by a zero-risk culture (Suzuki 2011). This culture placed emphasis on the robustness of the technical design of nuclear plants and accident prevention, rather than on improving mitigation measures (IAEA 2015).

Consequently, risk governance lacked independence and was not properly set in place (IAEA 2015). The Fukushima accident laid bare problems in the implementation of emergency response plans due to, amongst other problems,

a lack of a clear allocation of roles and the responsibilities of different actors, notably between local and central governments, between the national government and TEPCO (Tokyo Electric Power Company), and between the Japanese government agencies (IAEA 2015; GOJ 2011, Suzuki 2011). Taking note of these shortcomings, the new regulatory framework developed after the Fukushima accident includes local governments and residents in the reconstruction process after the triple disaster of 11 March 2011 (Kikuchi 2020; Saito 2021). Central to this framework are the Basic Act on Reconstruction in response to the Great East Japan Earthquake (Basic Act 2011), the Act on Special Measures for the Reconstruction and Revitalization of Fukushima (Fukushima Act 2012), and the Act on Special Measures concerning the Handling of Environment Pollution by Radioactive Materials Discharged by the Nuclear Power Station Accident Associated with the Tohoku District—Off the Pacific Ocean Earthquake That Occurred on March 11 (Special Measures Act 2011).

Despite the new regulatory framework, the Fukushima nuclear accident deeply severed trust in governmental and scientific institutions, accentuating gaps between Japanese citizens and the government (Morita et al. 2013; Morris-Suzuki 2014; Hirakawa and Shirabe 2015). It also gave momentum to the construction of a “civic infrastructure” (Morita et al. 2013, p.78). In their work, Morita et al. (2013) describe how the close-knit governmental infrastructure supporting the imaginary of a safe nuclear technology, accelerated a feeling of distrust amongst the Japanese public, causing a rift between citizens and authorities. Since citizens regarded government's data and information as co-opted by a pronuclear agenda, the failure of the pre-Fukushima socio-technical imaginary, and the ensuing distrust became important drivers for citizens to collect data from a “truly independent position” (First author's translation, interview with CRMO member, Fukushima Prefecture, 2018).

Building on the civic infrastructure constructed after the nuclear accident in Chernobyl, and using their own equipment or borrowed devices, citizens stepped in to fill in the data and information gaps (Morita et al. 2013). At times, this coincided with the appropriation of infrastructures originally configured to support a pronuclear imaginary. In an interview, a CRMO member in Tokyo narrates how he first started to measure, borrowing a *hakurukun* device (interview with CRMO member, Tokyo, 2018; MEXT 2011). The Ministry of Education, Culture, Sports, Science, and Technology (MEXT) had initiated the *Hakurukun* project (the “Measure buddy” project) long before the Fukushima accident to educate children on radiation, and provided Geiger counters to measure air dose rates for free (Committee for the creation of a supplementary reader

on radiation 2011; Kamata and Watanabe 2000). Yet, by taking in hand the *Hakarukun* Geiger counter, adults used the device to assess safety, thus contributing to the establishment of a post-Fukushima civic infrastructure.

As the civic infrastructure grew, citizens created alternatives to institutionalized ways of monitoring and measuring radiation. Thereby they questioned and challenged the governmental infrastructure, which had long sustained its monopoly on radiation measurement (Morita et al. 2013). By referring to the Bastille, a notorious prison in French history, a member of an international CRMO elaborates how his organization displaced government's control over radiation measurements through citizen science:

“I feel like [our] way was more just to say, well, here is this Bastille, a big wall and there's something inside it and we're just saying “Oh look the ground shifted!”, and we're here, on the important valuable ground and what you thought was important and valuable is not as valuable as you thought. [...] [W]e are in the best position to tell you and introduce you to this new landscape of information and citizen science.” (Interview with CRMO member, Tokyo, 2018)

Recognizing the development of a civic infrastructure, the Japanese government published guidelines, including “A guideline to measure radiation at schools and other sites” (Japanese Atomic Energy Agency 2011), and booklets, notably “A consolidation of fundamental data (*kiso shiryō*) on health effects and other topics inflicted by radiation,” (MOE 2012), to educate and inform citizens on radiation measuring methods (See also MOE 2017). Yet, by the time CRMOs became operational, months had passed, as they needed to raise sufficient funds, to obtain measurement equipment (often from abroad), to secure a venue, and to gather the necessary knowledge to operate the devices. In our pool of CRMOs, most organizations (with the exception of three pre-Fukushima CRMOs), were created several months after 3/11: the earliest in April 2011, five between June and November 2011, four in 2012, and the latest in 2014. Meanwhile, the Japanese government had already passed new legislation, announcing a transition from the emergency to the recovery phase (IAEA 2015; Fukushima Act 2012).

In the following section, we discuss the transition from emergency to recovery, highlighting the development of the socio-technical imaginary surrounding Fukushima's reconstruction and revitalization. Next, we place local governments as “agents of infrastructuring” (Trauttmansdorff and Klimburg-Witjes 2020) within the

post-Fukushima socio-technical imaginary, and examine how CRMOs as a civic infrastructure interact with local governments.

LOCAL GOVERNMENT'S RESPONSIBILITIES IN POST-FUKUSHIMA RECONSTRUCTION AND REVITALIZATION

In response to the triple disaster of March 2011, the Japanese government issued the Basic Act (2011) and the Fukushima Act (2012) (see also previous subsection, Establishing a post-Fukushima civic infrastructure). These acts promote a “smooth and prompt reconstruction from the Great East Japan Earthquake and revitalization of vibrant Japan” (2011) and endorse Japan's resilience after a major nuclear accident. A short video entitled “Mirai 2061” or “Future 2061” sponsored by Fukushima Prefecture (2018), captures this imaginary of reconstruction and revitalization by projecting a modern, tech-savvy Fukushima Prefecture that has overcome 3/11 (Figure 1) (Schreurs 2021; Sato 2017).

Similar to the idea advertised by the pre-Fukushima imaginary, the post-Fukushima imaginary predicts a bright future for Fukushima. This vision intersected our fieldwork in exhibitions on the construction of windmills and in train stations, where billboards set out the blueprint for Fukushima's green future. The push forward is resonated in catchy slogans, such as “Let's fight, Fukushima” and “Let's support Fukushima,” urging consumers to buy local produce. However, the single direction chosen by the Japanese government leaves little space for citizens to voice concerns over long-term effects, and cuts short the debate on safety standards (Slater et al. 2014; Hirakawa and Shirabe 2015; Kimura 2016).

Although the pre-Fukushima imaginary continues to exert influence on Japanese society (Polleri 2019b), a noticeable shift took place. Before the Fukushima accident, the imaginary on nuclear energy was built on the unlikelihood of an accident, justifying government's monopoly and the exclusion of public scrutiny (Morita et al. 2013; Kingston 2012). However, Fukushima has proven the fallacy of this safety claim. Hence, the post-Fukushima imaginary centers on reconstruction through, for example, decontamination, validating Japan's resilience after 3/11. To support the socio-technical imaginary of reconstruction and revitalization, the Japanese government adopted a plan to reduce nuclear debris in the affected areas (Special Measures Act 2011; MOE 2018). The division of responsibilities in areas without an evacuation order is clear: the Ministry of Environment (MOE) formulates the basic policy, sets standards, and subsidizes decontamination; municipalities in the Intensive Contamination Survey Area (92 municipalities in 8 prefectures; see also Figure 2) are



Figure 1 Screenshot of the musical video “Mirai 2061,” available at the Youtube channel of Fukushima Prefecture. Behind the two dancing main characters, futuristic buildings are displayed. Source: <https://www.youtube.com/watch?v=mLOeF2pW978> (Last accessed 15 July 2021).

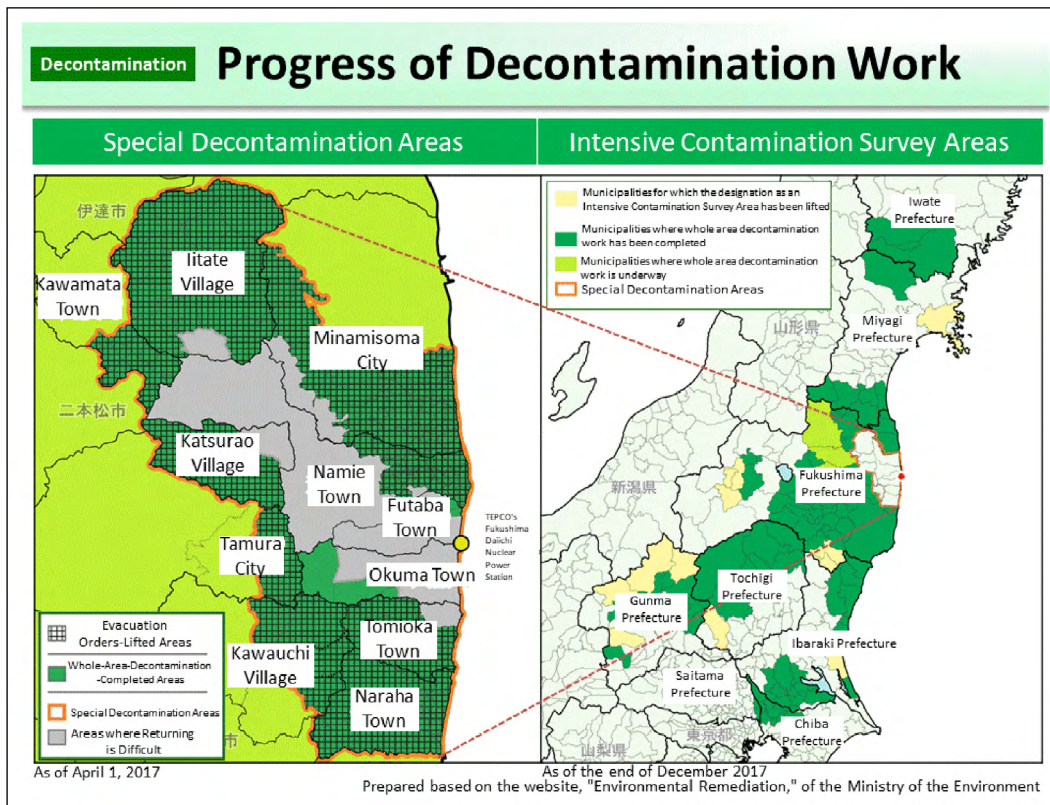


Figure 2 Map displaying the status of the Special Decontamination Areas and Intensive Contamination Survey Areas in 2017. Source: MOE 2018. Progress of decontamination. Available at <https://www.env.go.jp/en/chemi/rhm/basic-info/1st/09-01-05.html> (Last accessed 15 July 2021).

responsible for its local implementation; and the prefectural government coordinates among municipalities (Special Measures Act 2011; MOE 2018). This approach conforms to a Japanese disaster management and recovery approach that charges municipalities with the removal of debris after disasters (Umeda 2013; Isozaki et al. 2020). Nevertheless, it was the first time that local governments became an important infrastructure in a post-nuclear disaster recovery framework, gaining responsibility to assess the status of contamination, to develop a decontamination plan in consultation with the MOE, and to execute this plan accordingly (Isozaki et al. 2020).²

As such, local governments took responsibility for a crucial part in the reconstruction and revitalization plan, and contributed to the realization of the post-Fukushima imaginary. This position differs much from the role municipalities played in the immediate aftermath of the Fukushima accident. All city officials participating in this study described the difficulty to get a hold of the situation at the time of the disaster. Lacking knowledge, information, and measurement equipment, they seemed hardly prepared for a nuclear accident. This strained the citizen-municipality relations (Ishida 2019). During an interview, a city official in Fukushima's coastal area describes an encounter with a local resident:

“It’s like I explained before, we didn’t have measurement equipment at the time, so we had no grasp [of the situation], we didn’t even know what was going on. [...] We had no other way but to communicate directly [to the citizens] everything what was being reported on television, or what the mayor and such ordered and instructed us. We couldn’t do anything more. [...] There was a man at the evacuation center I was at, who showed me what was on the television and told me [...] “you (*omae*) [in a rude undertone] take your responsibility and take us all to a safe location!” (First author’s translation, interview with city official in Fukushima prefecture, 2018)

Currently, this official works at a department charged to measure radiation and to decontaminate if necessary. Since the accident, a metamorphosis has taken place at the local government level. This change is most apparent in the setup of new departments dealing with radiation and/or decontamination. Hence, through the Special Measures Act (2011), local governments not only constitute part of the governmental decontamination infrastructure within the Intensive Contamination Survey area, but have also become “agents of infrastructuring” (Trauttmansdorff and Klimburg-Witjes 2020), designing

and implementing the decontamination plan for their respective municipality (Special Measures Act 2011; Fukushima Act 2012).³

Because municipalities set out the decontamination plans within the Intensive Contamination Survey area, they decide whether and how decontamination is conducted. Consequently, decontamination policies vary regionally and are embedded within their local contexts. Therefore, local governments exert considerable influence on the environment in which CRMOs are active. Considering that all CRMOs in this study (except for one international CRMO) concentrate their activities regionally, their day-to-day operations cross paths with local governments’ policies regularly. In the following section, we examine in depth the relations between CRMOs as civic infrastructure (Morita et al. 2013), and local governments as governmental infrastructure. To this end, we also consider the influence of other regulatory and social constructs, including the divide between private-public property.

INTERACTIONS BETWEEN CIVIC AND GOVERNMENTAL INFRASTRUCTURES DECONTAMINATION POLICY: BETWEEN POLICY GUIDELINES, FRICTION, AND APPRAISAL

The previous section described how municipalities in the Intensive Contamination Survey area became part of a governmental infrastructure, expediting recovery and reconstruction after Fukushima. This situation poses opportunities for local governments to attune their policies to local circumstances, but can weigh on citizen-municipality relations, potentially creating rifts between citizens and local governments. Such is the case in a city, renowned as a tourist site in the western part of the Fukushima prefecture. Here, the city adopted a “no-decontamination-is-necessary” policy (First author’s translation, interview with CRMO member, Fukushima Prefecture, 2018). However, local CRMO members read in this policy the prioritization of economy over public health:

“[The] city is as I told you before, a touristic site. And since it’s located more than 100 km away from the nuclear accident, it was said that this was a safe place. In the beginning the mayor of this town said “we will not decontaminate here.” And so they didn’t, because if they would decontaminate, the tourists would no longer come back, and at the time, I think it was 2013, the tourists were coming back. The mayor said that he would not decontaminate out of concern that people may think that this city is dangerous too, that the products from this area, an agricultural area,

are also dangerous. I knew the mayor and I said to him, “it’s better to do it [decontaminate]. If you do this, then you can invite the tourists reassuring them (*anshin*), we would also be able to raise children with a peace of mind (*anshin*). But the mayor at the time said ‘There is no need to do such a thing.’” (First author’s translation, interview with CRMO member, [Fukushima Prefecture, 2018](#))

When news spread that decontamination of a number of sites had nevertheless taken place, trust in the local government deteriorated. Poor communication of this information by the municipality to the community and to the local CRMO prompted the CRMO to make an urgent request for information to the city (Interview with CRMO member, [Fukushima Prefecture, 2018](#)). Following the city’s unresponsiveness to CRMO’s requests, relations stagnated, causing a rift between the CRMO and local government.

Nevertheless, decontamination policies can foster relations of mutual recognition between local governments and CRMOs. The following excerpt narrates a conversation between a CRMO member and two civil servants. The city, located in the center of Fukushima Prefecture, sits in a mountainous area, making decontamination of parks on mountain flanks precarious. By comparing policies in other areas, the CRMO member shows his appreciation of local government’s efforts:

CRMO member: [This] city did the follow up [decontamination], but for example Koriyama did not do it, Iwaki neither. [...] Minami Soma also did it, but it’s pretty [tough]. Follow-up [decontamination] is in the end mostly on voluntary basis. [...]

City official 1: “I am grateful that you praise our work, the parks, the ones I mentioned earlier...

CRMO member: “You decontaminated them with great attention to detail. [...]”

City official 1: “However in the mountains..”

CRMO member: “Nevertheless you did them [parks in the mountains], which is great.”

City official 1: “Yes, but deep in the mountain was, you know, still not how we would like it. We would like to decontaminate further, but there is not much more we can do, but the places where children play, the parks..”

CRMO member: “They are important.”

City Official 1: “And we have mostly decontaminated the areas where children play.”

CRMO member: “I completely agree with you.” (First author’s translation, interview with city officials and CRMO member, [Fukushima Prefecture, 2018](#))

Notwithstanding the potential bias due to the joint discussion between the CRMO member and the local government representative, the conversation above illustrates how the CRMO member evaluates positively the city’s efforts to decontaminate by comparing policies and measurement data. It shows how a decontamination policy can draw citizens and local government closer.

Before local governments draft a decontamination plan, they need the national government to set a standard for decontamination. Several months passed before guidelines, recommendations, and the Special Measures Act (2011) were promulgated after the Fukushima accident ([Umeda 2013](#)). In the absence of a governmental standard, a city in the Tochigi Prefecture started decontamination on its own initiative, generating a venue for the local CRMO and local government to align their activities:

“Yet, by the time the government decided upon decontamination methods etc, it was December 2012. I don’t remember which one was first, the government or the citizen [group], but as a town, we cannot operate without a standard, because then we don’t know what is right (*tadashii*). [...] We started decontamination of schools, day-care centers and other facilities for children in 2011, a little before the government gradually started publishing its standards. We went ahead, prioritizing the analysis of the surface soil condition, based on information from citizen groups etc. Amidst the little information we had, this seemed to us the most efficient way [...].” (First author’s translation, interview with city official in Tochigi Prefecture, 2018)

This collaborative climate was, however, short-lived because of, in part, the election of a new mayor, disagreement over the involvement of citizens in decontamination works, and the establishment of an official governmental policy (Interview with CRMO member, Tochigi Prefecture, 2018).

RADIATION DATA: SAFETY (ANZEN) VERSUS A SENSE OF SAFETY (ANSHIN)

The majority of the CRMOs interviewed in Fukushima, Miyagi, and Tochigi Prefectures share their measurement data with the local government, either at one point in time or on a regular basis. Some CRMOs also report hotspots, areas with elevated radiation levels, directly to local officials, requesting that the local government takes protective measures. On the basis of these requests, municipalities may check those measurements on scene, determining the source of radiation and a course of action. Yet, even when municipalities are willing to look into the requests, time and money constraints curtail municipalities’ ability to

respond. Explaining how he deals with these requests, a city official, active in the central part of Fukushima Prefecture, expresses feelings of impediment and limitation:

“In the end, the government sets out these guidelines. Everything costs money, so we must draw a line somewhere. [...] Yet as a local government we take the stance of the citizen, not that of the government. Because we look at things from their perspective, it is cause for quite some frustration on our side (*hagayui*), when we cannot do certain things, or we cannot do things a certain way. Citizens really are the victims of this accident. Since they are the victims, we should to some extent be more considerate [of their standpoint].” (First author’s translation, interview with city official in [Fukushima Prefecture, 2018](#))

Similar elements, notably a lack of money, means, and time, pop up in a different conversation with a civil servant working in the coastal area of the Fukushima Prefecture. To illustrate the restrictions he encounters, he draws a square and in its middle a circle ([Figure 3](#)). The circle, he explains, represents the spot where he measures. Next, he draws multiple crosses around the circle, illustrating the spots

where citizens want to know the radiation level. Yet, his measurement tells him only about the radiation within the circle. Feeling impeded by time, other assignments, and a lack of equipment to address all areas, he expresses the limits of his ability to monitor radiation as a local city official (Interview with city official in [Fukushima Prefecture, 2018](#)).

Besides providing direct contact points between citizens and local officials, the municipalities in this study also offer a renting service of measurement devices to citizens.⁴ Though this service is free of charge and provides a means for citizens to collect real-time air dose measurements, the number of devices is limited and citizens must return the device after a limited period (Interview with CRMO member, [Fukushima Prefecture 2018](#)). This service exists next to a widespread network of white monitoring posts, subsidized and maintained by the national government, which continuously display the air dose rate at 1 meter height (as long as the solar panels channel enough energy). These monitoring posts are part of an extensive monitoring grid, comprising different measurement devices and methods (NSRA 2018).

Although the Japanese government has made considerable efforts at different government levels to make radiation visible, the question is how long these efforts will continue. With decontamination drawing to an end,

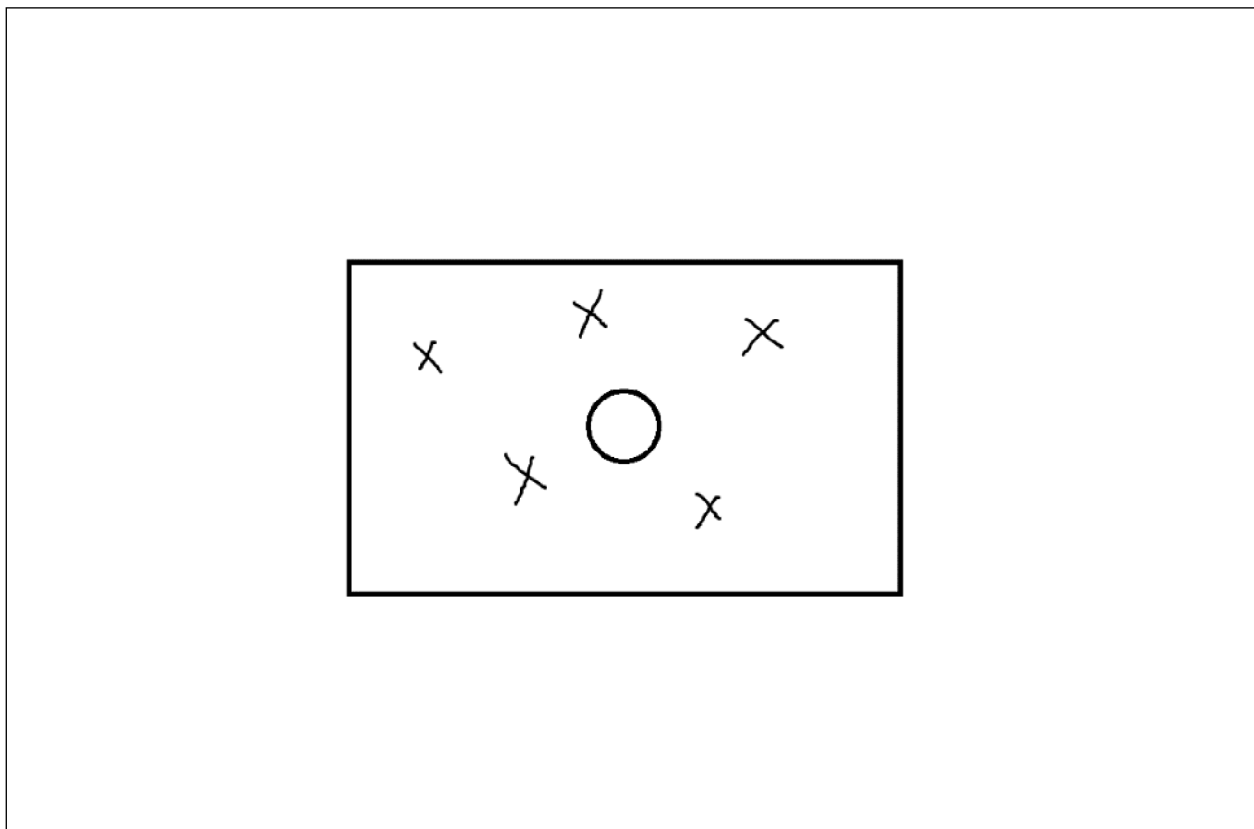


Figure 3 Using field notes, we redrafted the picture the city official drew.

decontamination departments are gradually downsizing (Interview with local official, [Fukushima prefecture, 2018](#)) and plans are made to remove monitoring posts ([The citizen association requesting the continued stationing of monitoring posts, 2018](#)). The imaginary of reconstruction and revitalization urges a push forward, while memories of contamination fade. Contrary to this imaginary, CRMO civic infrastructure asserts the need for continued radiation monitoring. This need attests to the different realities that CRMO and governmental data each constitute ([Kimura 2016](#)). While governments map radioactivity on large scales, local CRMOs are better equipped to tailor their measurements to individual problems (Interview with member of Citizen Science Initiative Japan, Tokyo, 2018). Without the funds or personnel to examine vast areas, CRMOs attend to measuring the objects of concern, including food, clothing, soil, and urine, paying attention to provide information from person to person ([Kimura 2017](#)). This focus on *seikatsu* or living ([Morris-Suzuki 2014](#)) is also evident in a soil contamination map created by Minna no Data Site (MDS), a network of independent CRMOs. To accumulate data, MDS opts for Becquerel instead of Sievert as a measuring unit. Both Becquerel and Sievert express radiation contamination. Sievert projects an estimation of the health effects of the received radiation dose and is used by the Japanese authorities to communicate results from the aerial monitoring. Unlike Sievert, Becquerel exhibits the actual contamination of soil ([Minna no Data Site 2018](#)). By employing Becquerels, MDS substantiates its concern for safety, or *anzen* in Japanese, and questions the reconstruction and revitalization imaginary.

While CRMOs use their data to stress issues of *anzen*, city officials in three cities and civil servants at the Fukushima prefectural government identify *anshin* or “a peace of mind” as one of the main purposes of citizen data during interviews ([Sternsdorff-Cisterna 2015](#); [Teoh 2016](#)):

“Indeed, I think that measuring by themselves and being able to see the radiation levels, gives them [citizens measuring radiation] the most relief (*anshin*), rather than the data that the city or the national government publishes, measuring by themselves, being able to check themselves, gives the best sense of relief (*anshin*). I don’t think of this as a bad thing.” (First author’s translation, interview with city official in [Fukushima prefecture, 2018](#)).

In this quote, a mismatch between the purpose of CRMO data surfaces through the difference between *anzen* and *anshin*: *anzen* is a scientific, objective expression of safety; *anshin* resides in the subjective feeling of safety and in risk perception ([Sternsdorff-Cisterna 2015](#); [Teoh 2016](#)). Due to

its subjective nature, it allows city officials to question the “*hōkōsei*” or intention of CRMO data (First author’s translation, interview with city official in [Fukushima Prefecture, 2018](#)). For government officials, who conceive that CRMOs hold a different agenda than that of the government, CRMO data hold a different value than governmental data. This produces an asymmetrical relationship between CRMO and government data, establishing two separate infrastructures.

TE GA TOKONAI TOKORO: PLACES MY HAND CANNOT REACH

Even though city officials cast doubts upon CRMOs’ intentions, they see value in CRMO data. Recognizing their own limits, some officials acknowledge how citizens’ data could potentially complement their data:

“The city conducts its own measurements as a city. However no matter how hard we try, lacunas occur in our monitoring. They [citizens] are covering these areas for us. I think in some respect they [citizens] are helping us. There are places we overlook if we do it by ourselves, so citizens help us to measure in detail.” (First author’s translation, interview with city official in [Fukushima Prefecture, 2018](#))

Especially when it comes to private land, city officials see value in the CRMOs’ approach. As representatives of the local governments, officials experience difficulties entering these places; they need to ask for permission to conduct radiation measurements and to decontaminate private land, and they are obliged to follow official regulation and documents. Therefore, officials often label these places as “hard to reach” (*te ga todokanai tokoro*, literally: places my hand cannot reach; First author’s translation, interview with city official in [Fukushima Prefecture, 2018](#)). Because they measure in response to requests from the local population, CRMOs, who can work without regulatory restrictions or demands are in this sense freer to move around.

Notwithstanding this sense of freedom from regulations, CRMOs experience constraints, too. Especially when it comes to public land, CRMO members confront barriers that prevent them from conducting radiation measurements. A member of a CRMO in the Miyagi Prefecture explains:

“I was told that if you collect [soil samples] from parks etc., you have to inform the government. Otherwise, it’s considered stealing, if you do it without telling. This became a serious problem. For example, for my first project, I wanted to measure school lunches. So, the school canteen lady, and mothers secretly brought me school lunches,

because they were worried. [...] However, when I made the results public, I was told ‘Mister, you better stop measuring. Your measurement lab will be put out of business.’ ‘Please stop this, it’s risky. It will be considered stealing, if you continue measuring, because you are forbidden to bring school lunches outside [the school] according to the school lunch law.’” (First author’s translation, interview with CRMO member Miyagi Prefecture, 2018)

Before CRMOs can collect samples on public grounds, including schoolyards, they must negotiate with the city and the board of education to gain special permission. In a coastal town in Fukushima Prefecture, a CRMO was granted permission to collect dust samples to monitor radiation levels by networking and building favorable relationships with the city (Interview with CRMO member, *Fukushima Prefecture*, 2018). Though they have tried to gain authorization from other cities in Fukushima Prefecture, they failed and collided with “the different mindsets” that exist within Fukushima prefecture (Interview with CRMO member, *Fukushima Prefecture*, 2018). By referring to a more open state of mind in coastal areas (Interview with CRMO member, *Fukushima Prefecture*, 2018), as compared with inland Fukushima Prefecture, the CRMO member illustrates some of the difficulties CRMOs face when reaching out to local governments to establish cooperative relationships between CRMOs and municipalities (Interview with CRMO member, *Fukushima Prefecture*, 2018). Moreover, this remark draws attention to cultural identities and particular political and social contexts when examining citizen-state relations. In the following section, we discuss further these relations based on the data presented above.

DISCUSSION AND CONCLUSION

In the above analysis, we linked the construction of a post-Fukushima civic infrastructure with the failure of a pronuclear socio-technical imaginary (*Jasanoff and Kim 2009*). As the imaginary of a safe, clean, and cheap energy source started to crumble following the Fukushima accident, a new vision for Fukushima prefecture, highlighting reconstruction and revitalization, surfaced. While the pre-Fukushima imaginary remains influential in Japan, the post-Fukushima vision instigated the creation of novel governmental infrastructures, such as the Reconstruction Agency and departments at municipalities responsible for the monitoring and removal of nuclear debris. Our study showed how the civic infrastructure constituted by CRMOs crosses paths with governmental infrastructures at multiple occasions and at different government levels.

By connecting civic and governmental infrastructures with pre- and post-Fukushima socio-technical imaginaries, we traced how they relate to these imaginaries and how imaginaries influence and contextualize interactions between the two infrastructures.

Particularly in the post-accident recovery phase, the vision of reconstruction and revitalization presses citizens and governments to move forward and to turn the accident into a memory. Yet by asserting the continued presence of radioactive particles in the environment, in food products, and in humans using scientific methods, the civic infrastructure creates misalignments with governmental data and constitutes an alternative, additional layer to interpret the reality of the Fukushima disaster and the recovery process (*Kimura 2016*). This politics of layering (un)intentionally reopens questions about safety and reconfigures the timeframe in which to place the Fukushima accident, hence sitting at odds with the forward-driven post-Fukushima socio-technical imaginary (*Kimura and Kinchy 2019; Kimura 2016*). By bringing into focus the personal catastrophes, concerns, and needs, it moreover questions whether a government is adequately equipped to deal with a disaster of such scale.

When considering governments on a local level, interactions between CRMOs and government officials are manifold and diverse, situated in local contexts, and intertwined with imaginaries of reconstruction and recovery, and with national regulations, standards, and policies. Our cases show how city officials and citizens align and misalign, creating friction and, in some cases, opportunities for cooperation. Within the reconstruction and revitalization imaginary, local governments have gained considerable authority, becoming part of the governmental infrastructure and establishing themselves as agents of infrastructuring. Yet our analysis demonstrates that they are caught up in an uneasy position. While local governments assist the reconstruction and revitalization of the affected areas in line with government policies, they are committed, at the same time, to the local community. In an interview, a civil servant summarized his situation by commenting, “We are residents too.” (First author’s translation, interview with city official in *Fukushima Prefecture*, 2018)

Most local officials recognized the potential of CRMO data to complement governmental monitoring of radiation contamination. Yet, our cases indicate that the civic and local governmental infrastructures live together, but apart. They share the same realm, notably the local, but exist as separate infrastructures, making long-term collaborative examples rare. Several elements, including local politics, may account for this situation. Below we highlight two other elements. First, although the CRMOs in this study had contacted their local municipalities, officials were rarely

aware of their existence and/or had limited knowledge about their activities. Second, with the exception of one case in the Tochigi Prefecture, no other local government had based their policy on citizen data. While they recognize the benefits of a CRMO infrastructure, city officials see the value of CRMOs' data in *anshin*, thus in reassuring concerned citizens, rather than *anzen*, or assessing safety. By doing so, officials limit the extent to which CRMO data can feed into governmental actions, delineating instead the role of CRMOs as addressing individual risk perceptions and providing emotional support (Kimura 2017b; Polleri 2018). Thereby, they limit sites for potential collaboration, and consolidate CRMOs as a separate infrastructure. Moreover, such evaluation depoliticizes CRMO data and narrows the implications of civic data, hampering public debate on the policies and science behind the socio-technical imaginary of recovery and revitalization (Kimura 2016).

While the sample of CRMOs mentioned in this paper does not allow for a comprehensive evaluation of all (non) interactions developed between local governments and CRMOs in post-Fukushima Japan, our study suggests that Japanese CRMOs engage in such interactions from a pragmatic standpoint. They help CRMOs to protect the community, for example by gaining permission to measure on public ground. Although the CRMO infrastructure offers potential for citizens to hold municipalities accountable for the proper execution of their decontamination policy, for example by reporting hotspots, several researchers express concerns regarding the mobilization of grassroots organizations to normalize post-disaster situations and to assert Japan's resilience after the 3/11 events (Polleri 2019; Kimura 2017a; Mirowski 2017). It also remains unclear whether the CRMOs involved in this study aim to mobilize citizens and knowledge to question post-Fukushima policy and Japan's political culture on a local, prefectural, and national level (Callon and Rabearisoa 2007; Jasanoff 2005). Nevertheless, this paper recognizes that this ambiguity can potentially be productive, as it encourages overcoming dichotomist approaches to evaluate citizen-state relations and stimulates the exploration of diverse ways of coexisting in post-disaster situations.

In this regard, the political agenda of other citizen initiatives, including litigations against TEPCO and the Japanese state, and "The citizen association requesting the continued stationing of monitoring posts," is more prominent. This latter association, initiated by citizens in 2018, petitions against the national government's announcement to remove 2,400 monitoring posts from the Fukushima prefecture (with the exception of the 12 most affected municipalities). They argue that "these devices [monitoring posts] are important to the people living in Fukushima to know changes in radiation levels" (The

citizen association requesting the continued stationing of monitoring posts, 2018). In order to make their argument heard, they appeal to local governments to align with residents by publicly handing over their requests to mayors and city officials, and by mobilizing the image of the concerned mother to express the relevance of their petition (Interview with CRMO member, Fukushima Prefecture, 2018). Thus far, this organization succeeded in making the national government withdraw its plans (Iwama and Araki 2019). This demonstrates how citizens can utilize local government infrastructures to gain political leverage to alter national policy and to challenge the political culture in Japan. Considering that the majority of interviewed CRMO members are involved in legal actions and/or the above-mentioned citizen association, it also places CRMOs in a broader context of civil movements initiated after the Fukushima accident and hints at the interrelatedness of citizen activities. By highlighting these connections, we aim to open up debate and encourage future research to study various pathways for citizens to participate and/or challenge emergency response and recovery policies.

DATA ACCESSIBILITY STATEMENTS

The dataset generated and analyzed during the study presented in this paper is not publicly available due to privacy restrictions, but some data are available from the corresponding author on reasonable request.

ETHICS AND CONSENT

Participants cited in this paper consented to having their views included in the research study. To guarantee anonymity of the participants, we deleted names and detailed personal and geographical information that could reveal the location of the organization in which they are active. An approval from the Social and Societal Ethics Committee (SMEC), KU Leuven was granted for this research (Nr. G- 2018 02 1110).

NOTES

- ¹ In her work, Kimura (2016) makes use of CRMO to describe food monitoring activities by citizens after Fukushima. In this paper, we apply the term to describe all citizen radiation monitoring activities, hinting at the Japanese term *shimin hōshanō sokuteijo*, which translates as citizen radiation measuring organization.
- ² A full overview and detailed description of the decontamination policy and its implementation is provided in the Special Measures Act and the MOE report on decontamination (MOE 2018).
- ³ The Fukushima Prefectural Government offers an overview of the decontamination in the prefecture. This information

can be accessed via the following website: <https://www.pref.fukushima.lg.jp/site/portal-english/en02-01.html>. For more concrete examples, see for instance the website of Koriyama city and Nihonmatsu city (only accessible in Japanese): https://www.city.koriyama.lg.jp/bosai_bohan_safecommunity/shinsai_hoshasentaisaku/4/index.html (Last accessed 8 July, 2021); <https://www.city.nihonmatsu.lg.jp/page/dir002645.html> (Last accessed 8 July, 2021).

- ⁴ At some sites, D-Shuttle, a device to monitor personal dose rate, is also available for borrowing. Some cities, like Iitate, offer a food measurement stop, where residents can bring food samples to check for the presence of radioactive particles.

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COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHORS CONTRIBUTIONS

The manuscript of this paper is based on interviews, fieldwork and literature research conducted by the first author. During the analysis of the research results, Catrinel Turcanu, Bieke Abelshausen and Ine Van Hoyweghen, the co-authors of this article, helped to interpret the research results, to structure them, and to embed them in a theoretical framework. A Japanese native speaker has checked the Japanese translations provided in this paper.

AUTHOR AFFILIATIONS

Joke Kenens
KU Leuven, BE

Bieke Abelshausen
VUB, BE

Turcanu Catrinel
SCK CEN, BE

Ine Van Hoyweghen  orcid.org/0000-0002-9402-2918
KU Leuven, BE

REFERENCES

- Act on Special Measures concerning the Handling of Environment Pollution by Radioactive Materials Discharged by the Nuclear Power Station Accident Associated with the Tohoku District – Off the Pacific Ocean Earthquake That Occurred on March 11 – Basic Principles (Tentative translation). November 11, 2011. Available at http://josen.env.go.jp/en/framework/pdf/basic_principles.pdf [Last accessed 3 February 2021].
- Act on Special Measures for the Reconstruction and Revitalization of Fukushima.** 31 March 2012. Act No. 25, Available at <http://www.japaneselawtranslation.go.jp/law/detail/?id=2582&vm=04&re=02> [Last accessed 3 February 2021].
- Ando, T.** 2019. *A history of the movement to abolish nuclear energy, Chernobyl, Fukushima and thereafter* [In Japanese]. Tokyo: Iwanami.
- Basic Act on Reconstruction in response to the Great East Japan Earthquake.** 24 June 2011. Act No. 76. Available at <http://www.japaneselawtranslation.go.jp/law/detail/?id=2434&vm=2&re=02> [Last accessed 3 February 2021].
- Begemann, S, Perkins, E, Van Hoyweghen, I, Christley, R and Watkins, F.** 2018. How political cultures produce different antibiotic policies in agriculture: a historical comparative case study between the United Kingdom and Sweden. *Sociologia Ruralis*, 58(4): 765–785. DOI: <https://doi.org/10.1111/soru.12206>
- Callon, M and Rabeharisoa, V.** 2007. The Growing Engagement of Emergent Concerned Groups in Political and Economic Life. *Science, Technology & Human Values*, 33(2): 230–261. DOI: <https://doi.org/10.1177/0162243907311264>
- Casper, BJ and Morita, A.** 2015. Infrastructures as Ontological Experiments. *Society for Social Studies of Science*, 1: 81–87. DOI: <https://doi.org/10.17351/ests2015.007>
- Committee for the creation of a supplementary reader related to radiation.** 2011. How to measure radiation? [In Japanese], October 2011. Available at https://www.mext.go.jp/component/b_menu/other/_icsFiles/afieldfile/2011/11/04/1313005_03_2.pdf [Last accessed 3 February, 2021].
- Editorial Committee for the Paper on Decontamination Projects Ministry of the Environment (MOE).** 2018. Decontamination Projects for Radioactive Contamination Discharged by Tokyo Electric Power Company Fukushima Daiichi Nuclear Power Station Accident, March 2018. Available at http://josen.env.go.jp/en/policy_document/pdf/decontamination_report1807_01.pdf [Last accessed 13 July 2021].
- Edwards, P N, Jackson, SJ, Chalmers, MK, Bowker, GC, Borgman, CL, Ribes, D, Burton, M and Calvert, S.** 2013. Knowledge Infrastructures: Intellectual Frameworks and Research

- Challenges. Ann Arbor: Deep Blue, May 2013. Available at <http://hdl.handle.net/2027.42/97552> [Last accessed 15 February 2021].
- Fukushima Prefecture.** 2018. MIRAI 2061, 18 February 2018. Available at <https://www.youtube.com/watch?v=mLOeF2pW978> [Last accessed 3 February 2021].
- Government of Japan (GOJ).** 2011. Nuclear Emergency Response Headquarters, Report of the Japanese Government to the IAEA Ministerial Conference on Nuclear Safety: The Accident at TEPCO's Fukushima Nuclear Power Stations, 12 September 2011. Available at <https://www.iaea.org/report-japanese-government-iaea-ministerial-conference-nuclear-safety-accident-tepcos-fukushima-nuclear-power-stations> [Last accessed 15 February 2021].
- Hirakawa, H and Shirabe, M.** 2015. Chapter 4 Rhetorical Marginalization of Science and Democracy: Politics in Risk Discourse on Radioactive Risks in Japan. In: Fujigaki, Y (ed.), *Lessons from Fukushima: Japanese Case Studies on Science, Technology and Society*, 57–56. Switzerland: Springer International Publishing. DOI: https://doi.org/10.1007/978-3-319-15353-7_4
- Igarashi, Y.** 2012. *The format of [anshin] we all decided upon – One year in Kashiwa searching for the local consumption of locally produced goods in post 3.11* [In Japanese]. Tokyo: Akishobo.
- International Atomic Energy Agency (IAEA).** 2015. The Fukushima Daiichi accident Report by the Director General, August 2015. Available at <https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1710-ReportByTheDG-Web.pdf> [Last accessed 15 February 2021].
- Isozaki, H, Kanai, T and Ito, M.** 2020. *Hornbook Local Government* [in Japanese]. Kyoto: Hukuju Shuppan.
- Iwama, O and Araki, A.** 2019. The withdrawal of the removal of monitoring posts by Nuclear Regulation Authority; In Fukushima anxiety spreads [In Japanese]. *Mainichi Shimbun*, 29 May, [Online access at <https://mainichi.jp/articles/20190529/k00/00m/040/171000c> last accessed 15 February 2021].
- Japanese Atomic Energy Agency.** 2011. A guideline to measure radiation at schools and so other locations [in Japanese], 26 August. Available at https://www.mext.go.jp/component/a_menu/other/detail/_icsFiles/afieldfile/2012/09/06/1305069_2.pdf [Last accessed 3 February 2021].
- Jasanoff, S.** 2005. *Designs on nature: science and democracy in Europe and United States*. Princeton: Princeton University Press. DOI: <https://doi.org/10.1515/9781400837311>
- Jasanoff, S and Kim, SH.** 2009. Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea. *Minerva*, 47(2): 119–146. DOI: <https://doi.org/10.1007/s11024-009-9124-4>
- Kamata, M and Watanabe, C.** 2000. Radiochemical Experiment with Natural Radioactivity (IX) Radiochemical Experiment using spring water with charcoal activated and a / survey meter “Hakaru-kun II” [In Japanese]. *Science and Society*, 48(8): 524–527.
- Kikuchi, M.** 2020. Changing dynamics of the nuclear energy policy-making process in Japan. *Environmental Policy and Governance*. DOI: <https://doi.org/10.1002/eet.1922>
- Kimura, A.** 2016. *Radiation Brain Moms and Citizen Scientists: The Gender Politics of Food Contamination after Fukushima*. Durham: Duke University Press. DOI: <https://doi.org/10.1515/9780822373964>
- Kimura, A.** 2017. Citizen Science in Post-Fukushima Japan: The Gendered Scientization of Radiation Measurement. *Science as Culture*, 28(3): 1–24. DOI: <https://doi.org/10.1080/09505431.2017.1347154>
- Kimura, A.** 2017a. Fukushima ETHOS: Post-Disaster Risk Communication: Affect and Shifting Risk. *Science as Culture*, 27(1): 98–117. DOI: <https://doi.org/10.1080/09505431.2017.1325458>
- Kimura, A and Kinchy, A.** 2019. *Science by the People: Participation, power and the Politics of Environmental Knowledge*. Chicago: Rutgers University Press. DOI: <https://doi.org/10.36019/9780813595115>
- Kingston, J.** 2012. Japan's Nuclear Village. *The Asia-Pacific Journal*, 10(37): 1–23.
- Ministry of Environment (MOE), National Research and Development Agency.** 2017. *Q&A: A consolidation of fundamental data on health effects and other topics inflicted by radiation* [In Japanese]. Tokyo: Ministry of Environment.
- Minna no Data Site.** 2018. *Compilations of a Radiation Map of 17 Prefectures and cities + analysis* [In Japanese]. Tokyo: Minna no Data Site.
- Mirowski, P.** 2017. Against citizen science. *AEON*, 20 November. Available at <https://aeon.co/essays/is-grassroots-citizen-science-a-front-for-big-business> [Last accessed 10 December 2021].
- Morita, A, Blok, A and Kimura, S.** 2013. Environmental Infrastructures of Emergency: The Formation of a Civic Radiation Monitoring Map during the Fukushima Disaster. In: Hindmarsh, R (ed.), *Nuclear Disaster at Fukushima Daiichi: Social, Political and Environmental Issues*, 78–96. New York: Routledge.
- Morris-Suzuki, T.** 2014. Touching the Grass: Science, Uncertainty and Everyday Life from Chernobyl to Fukushima. *Science, Technology and Society*, 19(3): 331–362. DOI: <https://doi.org/10.1177/0971721814548115>
- Nakachi, S.** 2008. *Environmental monitoring for citizens* [in Japanese]. Osaka: Art Works.
- Polleri, M.** 2018. Risk is Your Business: Citizen Science after Fukushima, 10 December 2018. Available at <http://>

- somasphere.net/2018/risk-is-your-business.html/ [Last accessed 15 February 2021].
- Poller, M.** 2019. Conflictual Collaboration: Citizen Science and the Governance of Radioactive Contamination after the Fukushima Nuclear Disaster. *Social Studies of Science*. *American Ethnologist*, 46(2): 214–226. DOI: <https://doi.org/10.1111/amet.12763>
- Poller, M.** 2019b. Post-political uncertainties: Governing nuclear controversies in post-Fukushima Japan. *Social Studies of Science*, 50(4): 567–588. DOI: <https://doi.org/10.1177/0306312719889405>
- Saito, H.** 2021. The Developmental State and Public Participation: The Case of Energy Policy-making in Post-Fukushima Japan. *Science, Technology & Human Values*, 46(1): 139–165. DOI: <https://doi.org/10.1177/0162243920905000>
- Sato, K.** 2017. Japan's Nuclear Imaginaries Before and After Fukushima: Visions of Science, Technology, and Society. In: Ahn, J, Guarnieri, F and Furuta, K (eds.), *Resilience: A New Paradigm of Nuclear Safety: From Accident Mitigation to Resilient Society Facing Extreme Situations*, 207–218. Cham: Springer Nature. DOI: https://doi.org/10.1007/978-3-319-58768-4_15
- Schreurs, MA.** 2021. Reconstruction and revitalization in Fukushima a decade after the “triple disaster” struck: Striving for sustainability and a new future vision. *International Journal of Disaster Risk Reduction*, 53: 102006. DOI: <https://doi.org/10.1016/j.ijdr.2020.102006>
- Slater, D, Morioka, R and Danzuka, H.** 2014. Micro-Politics of Radiation: Young Mothers Looking for a Voice in Post-3.11 Fukushima. *Critical Asian Studies*, 46(3): 485–508. DOI: <https://doi.org/10.1080/14672715.2014.935138>
- Sternsdorff-Cisterna, N.** 2015. Food after Fukushima: Risk and Scientific Citizenship in Japan. *American Anthropologist*, 117(3): 455–467. DOI: <https://doi.org/10.1111/aman.12294>
- Suzuki, T.** 2011. Deconstructing the zero-risk mindset: The lessons and future responsibilities for a post-Fukushima nuclear Japan. *Bulletin of the Atomic Scientists*, 67(5): 9–18. DOI: <https://doi.org/10.1177/0096340211421477>
- Teoh, Z.** 2016. Food Safety in the Aftermath of Fukushima: Who can Consumers Trust? *Zeitschrift für Japanisches Recht*, 42: 111–136.
- The citizen association requesting the continued stationing of monitoring posts.** 2018. Appeal [In Japanese], 16 April 2018. Available at http://monitoringpost.blogspot.com/p/blog-page_2.html [Last Accessed 9 February 2021].
- Tokyo Gakugei University Center for the Research and Support of Educational Practice.** 2016. *Collection of documents Radiation measurement by citizens and the local government and school meals: A record by Koganei citizens of 30 year Chernobyl and 5 year Fukushima* [In Japanese]. Tokyo: Tokyo Gakugei University Center for the Research and Support of Educational Practice.
- Trauttmansdorff, P and Klimburg-Witjes, N.** 2020. Making Europe through Infrastructures of In/Security. Notes from a virtual workshop, 14 December 2020. Available at <https://blog.sts.univie.ac.at/2020/12/> [Last accessed 3 February 2021].
- Umeda, S.** 2013. Japan: Legal Responses to the Great East Japan Earthquake of 2011. The Law Library of Congress, Global Legal Research Center. Available at <https://www.loc.gov/law/help/japan-earthquake/Great-East-Japan-Earthquake.pdf> [Last accessed 3 February 2021].

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