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The Kashiwa co-expertise experience in Japan after the Fukushima Accident

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Abstract

This chapter examines a co-expertise process in Kashiwa City, Chiba Prefecture, following the 2011 Fukushima Daiichi nuclear power plant accident. Despite being 200 km from the plant, Kashiwa became a radioactive hotspot, threatening local agriculture. A Round-Table project launched in July 2011 brought together local stakeholders, including farmers, consumers, retailers, restaurant chefs and a non-profit organisation responsible for measurements of radioactivity to address contamination concerns of the local population. Led by a sociologist, the project employed social science insights to overcome initial conflicts. A survey of kindergarten parents was carried out in autumn 2011. The results and interpretation of the survey provided an important perspective for farmers to positively reconsider the significance of the Round-Table and to actively participate in the dialogue. The farmers realized that consumers were not the "enemy," but rather potential good customers for local farmers, and that measurement by the citizens/consumers themselves was the way to proceed. As a consequence, the Round-Table developed an independent measurement protocol with a 20 Bq/kg standard for food products after several months of deliberative discussions between the various stakeholders. Radiological protection was integrated into everyday marketing of produce, directly sold to consumers. This case demonstrates how social science expertise can effectively address stakeholder conflicts in contaminated areas. By respecting consumer autonomy while restoring farmer dignity, the initiative avoided social fragmentation and enabled economic recovery for local agriculture, offering valuable lessons for post-disaster community reconstruction.

Introduction

One of the major social and economic challenges of a nuclear disaster, as illustrated after the Fukushima Daiichi Nuclear Power Plant accident (FDNPP), is the problem related to primary industries, e.g., agriculture and fishing (Schneider et al., 2021). Significant radiation protection measures have to be taken at all

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levels including the Nuclear Regulatory Authority (Nirasawa et al., 2021) and conflicts of interest may arise among stakeholders, such as consumers, retailers, and producers, over the radiological quality of agricultural, forestry, fishery, and other products from the land.

To address this problem, ICRP recommends implementing a co-expertise process, with a focus on Dialogue as the major means to confront and reconcile views of stakeholders in contaminated areas. ICRP also recommends that relevant stakeholders and representatives of the general population should be involved in the decision-making processes (ICRP, 2009, 2020). The experiences not only from the Fukushima accident, but also from the Chornobyl accident previously, have shown that foodstuff produced in contaminated areas may be perceived differently by the population living inside the affected areas than by those living outside, and therefore in-depth dialogues at national and local levels are needed. However, dialogues at the national level between residents with different interests and local identities were not adequately conducted in Japan after the nuclear accident. Nevertheless, some dialogue meetings with local residents and experts, as well as farmers and fishermen, did take place in various forms in Fukushima Prefecture between 2011 until now. The ICRP Dialogue Initiative and later on the Fukushima Dialogue are good examples (Lochard et al., 2019).

After the accident, many places were contaminated with serious consequences for local agriculture outside of Fukushima Prefecture, the center of the nuclear disaster. This was particularly the case in Kashiwa City, Chiba Prefecture, in the suburb of Tokyo. Farmers were confronted with radioactive "hotspots" and placed in the similar position as producers of the contaminated areas of Fukushima Prefecture. The residents of the city of Kashiwa, are a very mobile population with little attachment to the area. Moreover, because of their mobility and advanced commercial development, they have many options for buying foodstuffs, and therefore benefit from a situation similar to consumers in areas of Japan that escaped contamination. Therefore, dialogue with these consumers in the Tokyo suburban community required a different format to what was practiced in the farming community of Fukushima Prefecture.

In this chapter, the author describes how the practice of co-expertise with dialogue between consumers and farmers was organized in Kashiwa City (Figure 1) and discusses the implications for radiological protection resulting from this unique situation. Unlike many examples of co-expertise processes involving radiation protection experts, the Kashiwa project is remarkable and original because it was led by a sociologist — in this case, the author of this article. His insightful analysis of the situation of the various stakeholders, based on sociological theory, allowed them to shift their positions and break the deadlock they were experiencing. Overall, this endeavor demonstrates the value of involving experts from social sciences and the humanities in co-expertise processes.

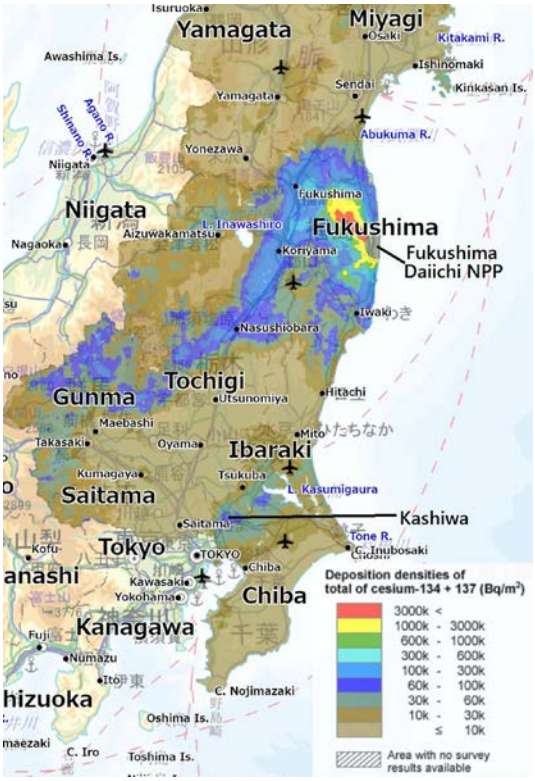

FIGURE 1. Geographical distribution of the fallout of Cs-134 + Cs-137 according to the results of airborne surveillance carried out by Ministry of Education, Culture, Sport, Science and Technology, Japan, September 2011. (From MEXT, with the author having made some additions).

1. The Round-Table project in Kashiwa city

Located only 30 km and 40 minutes by suburban train from central Tokyo, Kashiwa City in Chiba Prefecture is the largest commercial center in the north-eastern part of the Tokyo metropolitan area. It is a popular suburb for the young generation, with a population of approximately 400,000 residents that has more than quintupled during the past 50 years. In addition, it is a leading urban agricultural area focused on the production of vegetables for the Tokyo market, including the largest production of turnips in Japan. In Kashiwa City, the momentum for "local production for local consumption" began to develop among residents in the 2000s, and a citizens' group has been organizing a monthly local vegetable market since 2010. The author of this article, who is both a city dweller and a sociologist by profession, has been a core member of this group.

After the FDNPP accident due to the heavy rainfall on March 21st, 2011, the area around Kashiwa City became the worst radioactive hotspot in the Tokyo metropolitan area, despite being located approximately 200 km away from the damaged FDNPP (see Figure 1) (Fukuda et al., 2013; Ishida and Yamazaki, 2017).

Immediately after the FDNPP accident, having no equipment in widespread use to measure radioactive contamination of agricultural products, the citizen's group wondered if it was acceptable to organize a market to sell local vegetables without first confirming their safety. And around that time, heated Internet discussions over whether or not people should eat food from the nuclear disaster-affected area accelerated, and the author and colleagues realized that one of the worst aspects brought about by the nuclear accident was the fragmentation of the community. But it was also thought that in Kashiwa, where the distance between consumers and producers was close, it would be possible to avoid this fragmentation by having the consumers themselves communicate directly with producers and confirm the safety of agricultural products with their own eyes.

Based in this idea, a dialogue named the "Round-Table for Safe and Secure Kashiwan Products for the Kashiwan People" was launched in July 2011, with the aforementioned citizens' group serving as the organizer. Various local stakeholders were invited to become involved in this dialogue, which included four local farmers, two retailers, two restaurant chefs, three consumers, including women of childbearing age who had already been actively transmitting information about local radioactive contamination, as well as a local non-profit organization (NPO) in charge of radioactive measurements (Figure 2).

FIGURE 2. The author and citizen volunteers collecting soil samples for the Round-Table project (photo Y. Igarashi).

After months of discussion and deliberation, the Round-Table established the protocol of radioactive measurement as follows. First, using a battery-powered simple scintillation measuring system, five samples of soil taken from the four corners and center of every farm growing at least one vegetable, were collected to identify the most radioactivity contaminated spots on the farm. Using this soil data and some other soil characteristics, such as potassium concentration, soil type and texture, the vegetables with the highest contamination levels on each farm were identified. Then, these vegetables were picked and brought to the measurement institute managed by the NPO for more detailed examination by a NaI scintillation detector. In March 2012, only vegetables with a total Cs-134 and Cs-137 content below 20 Bq/kg, according to this testing protocol, began to be published on the Round-Table's webpage for each product and each farmer. This value was chosen at a meeting, based on measurement results and practical reasons concerning the detection performance of measuring instruments, as a compromise acceptable to stakeholders. The process was transparent, with the collaborative participation of various Round-Table members as well as volunteers recruited at public awareness events, including the buffet shown in Figure 3, which received media coverage.

Figure 3. The buffet event held in April 2012, featuring vegetables from farmers participating in the Round-Table's measurements (photo Y. Igarashi).

The Round-Table's project as a civic activity ended in December 2012 after the measurement of 15 farmers' farmlands and a total of 49 vegetable items were completed. At the end of this period, a farmer's market operator, who was a member of the Round-Table, decided to continue this project to measure farmland soils as his own business.

A preliminary report on the Round-Table was first published as a general book in Japanese (Igarashi et al., 2012) and then presented at several international

conferences on sociology and radiological protection (Igarashi, 2014, 2016). In addition, a paper co-authored with Ryoko Ando on the contributions of social scientists in dialogue initiatives was published (Igarashi and Ando, 2021): this forms the basis of Section 2 below.

2. The role of dialogue between stakeholders and the contribution of sociology

The Round-Table project did not get off to a smooth start. During the first three or so monthly meetings, the atmosphere among the various stakeholders who had gathered was so gloomy that they were reluctant to openly express their point of view. What resulted from this deadlock was a dialogue among stakeholders, which is positioned as the first step in the co-expertise process (ICRP, 2020). This section describes two points where relying on sociological insights in the process facilitated dialogue.

First, it is important to note that the results and interpretation of the kindergarten parents' survey conducted in the autumn of 2011, provided a significant positive impact on the Round-Table participants, especially the farming members. Based on the assumption that the parents of kindergarten children were the most concerned about internal radiation exposure among the youngest children and the most sensitive about Kashiwa vegetables, a questionnaire survey was conducted with 439 parents of three kindergartens selected from the northern, central, and southern parts of Kashiwa City.

The results of this survey, which had a response rate of over 90%, were quite interesting. At the time, as many as 62% of respondents were reluctant to buy local produce after the nuclear accident. In fact, there was a significant tendency for respondents who were enthusiastic consumers of local produce before the accident to be reluctant to buy it after the accident. The reason for this observation is quite convincing: the original customer base for local vegetables is those who value freshness and safety, not the price. After the accident, the evaluation of safety has been reversed. In addition, there were several respondents who commented that they felt sorry for the farmers in Kashiwa, but that they were not willing to buy local vegetables at that time.

The most frequent answer to the question about the most reliable people for measuring agricultural products was "universities and specialized measuring institutions" (50%), followed by "citizens/consumers" (23%), and if "own measurement" (7%) is added to the above, the percentage reaches 30%. Conversely, trust in government (15%), producers (2%), and retailers (2%) was not as high (Igarashi et al., 2012).

When these results were presented and discussed with over 100 local farmers at a seminar at a direct sales office participating in the Round-Table, their attitude toward the Round-Table changed dramatically. In short, they realized that "noisy" consumers were not the "enemy," but rather potential good customers for local farmers, and that measurement by the citizens/consumers themselves was the way to proceed. Then, they had come to appreciate that the Round-Table and the four farmers participating in it were pioneers in this initiative.

For sociologists, designing and interpreting surveys that can generate valid findings from citizens' attitudes is a very basic skill. In the Kashiwa case, the involvement of a sociologist in the co-expertise process could have provided an important perspective for farmers to positively reconsider the significance of the Round-Table and to actively participate in the dialogue.

Secondly, it is important to note that insights and understanding through sociological theory about the nature behind the producer-consumer conflict structure played a decisive role in facilitating the dialogue. At the beginning of the Round-Table's launch, some producer members perceived "noisy" citizens as "the enemy" and consumers, including the organizers, were frustrated by producers' initial reluctance to conduct independent measurements with more scrutiny than the tests conducted by the authorities from the city of Kashiwa.

The reason why the producers were reluctant to take independent measurements was related to the concerns from the other producers. Even in suburban areas like Kashiwa, unlike most residents who commute to Tokyo, farmers live and farm in communities where residences and livelihood are integrated. If they were the first to conduct independent measurements and high levels of radioactivity were detected, it would have a negative impact on agriculture throughout the northern part of Chiba Prefecture. Kashiwa farmers were worried that, in the worst case, they might be blamed for their "thoughtless" behavior in the community and not even be able to farm and live on the land they had lived on for generations. It was only after hearing the words of one farmer, who had been measuring ambient dose rates late at night in secret with a borrowed Geiger Muller counter, that consumers and restaurant members understood what needed to be taken into consideration by the Round-Table.

What tormented farmer members at the time was not so much the malicious warning that flooded the Internet, such as "farmers don't sell poison!", but the easy advice from consumers who were superficially sympathetic to them: "You can stop farming in around Kashiwa, so why don't you go to some wasteland in Western Japan and farm?" The residents of suburbs like Kashiwa, who are a mobile population and loosely attached to their communities, did not understand the difficulties of leaving the land that farmers have inherited from generation to generation, nor the intricacies of an agriculture optimized for the microtopography and microclimate of each farm.

These episodes revealed that the perception gap between producers (farmers) and consumers in semi-urban areas regarding the feeling of belonging to the community was latent even before the nuclear accident and underpinned the conflict of interest between stakeholders. To understand this perception gap, it is helpful to recall a theoretical analysis by Zygmunt Bauman, one of the leading social theorists in the study of globalization, who argued that "the access to global mobility" was the main factor in creating stratification in contemporary society (Bauman, 1998). Based on this theory, we can understand that the essence of the conflict of interest on foods from contaminated areas lies in the gap between consumers, who are physically mobile and can easily move around to choose vegetables in supermarkets, and producers, who find it extremely difficult to farm and make a living apart from their land.

In this way, the pessimistic atmosphere at the beginning of the Round-Table gradually dissipated as all participants realized how differently their views were depending on their occupation and position, even though they lived in the same community. Then they reconciled their different perceptions of the community and shared the consideration they should have for each other. The members of the Round-Table, who had initially been in a pseudo-conflict due to "harmful rumors," gradually formed a shared vision of Kashiwa's situation and the actions the Round-Table should take by recognizing their differing societal positions through dialogue.

The fieldwork skills or interactive ability (Collins and Evans, 2007) of sociologists regarding the discourse of people from diverse backgrounds, considering their social contexts and interpreting them by adding information from theoretical frameworks, was widely used in the Kashiwa Round-Table project. This practice provides an important example of the contribution that sociologists can make to the stakeholder dialogue recommended by ICRP (ICRP, 2020). This contribution, which has been highlighted in the post-nuclear recovery of the community and in which the involvement of experts from various fields, including social scientists, is also recommended (Schneider et al., 2019).

3. Local project: understanding radiation protection as an everyday activity?

In November 2011, after the initial stalemate situation had improved, the Round-Table began to establish its vision and goals, and to discuss details about possible local projects to reconcile producers and consumers. To ensure the economic independence of farmers in the contaminated territory, a communication strategy towards consumers was necessary (ICRP, 2009).

(ICRP, 2009). One of the most promising methodologies was to appeal to the emotional support of people for the affected areas as well as to disseminate scientific facts. Indeed, it had been found that by reducing consumers' anxiety about radiation, their feeling of support for the affected areas increased, which promoted the purchase of foods produced in Fukushima Prefecture (Kudo and Nakayachi, 2014; Hori et al., 2017). In other words, the term "Eat and Support", widely known in Japan, is a very popular expression that encourages trade-offs on social risks by making consumers aware that their overly precautionary choices may hinder the recovery of the affected areas.

However, even though the Round-Table was often reported in the media as an "eat and support" activity, the vision of its members was not self-defined as a project to only support Kashiwa farmers. During the Round-Table, it was confirmed that the aim of this activity was for the various participating stakeholders to target their own interests: for the farmers, it was a question of "brand their own vegetables and gain consumers loyalty", while for the latter, it was about "regaining their civic pride in Kashiwa, where fresh, local vegetables are close at hand".

More importantly, the Round-Table was a very steady and low-key activity as part of local production for local consumers. Although often misunderstood

by media, the Kashiwa Round-Table project did not aim to become a national benchmark for the safety of contaminated vegetables. A concrete goal of the Round-Table was set to connect consumers who originally wanted to buy local vegetables, whose existence was revealed by the results of the questionnaire survey described in Section 2, with producers who wanted to sell directly to the local market. At the same time, the project also took advantage of Kashiwa's geographical advantage of physical proximity between consumers and farmland, and established a policy of involving consumer volunteers in the measurement process, starting from the point where they check the production site of vegetables. The name of the project's web page: "Find Your Farmer", is precisely the articulation of this goal.

The Round-Table's policy did not adopt an approach aimed, on the one hand, at convincing consumers based on scientific arguments concerning the risks of radiation, and, on the other hand, at advocating support for farmers. In other words, the Round-Table decided to publish the list of products of individual farmers that had reached the independent standard value of 20 Bq/kg based on quality assured radiation measurements but without going further into scientific discussions. This position was important because it meant that the project was less likely to get caught up in the heated "safety/danger" debate on the Internet.

The realistic goal of the Round-Table was not to "educate the consumers with scientific accuracy", but to draw their attention to the results in order to recognize and sympathize with the farmers' efforts. In this approach, which aimed to locally widen the circle of conviction and empathy, if there were consumers who were not convinced by the measurement protocol and the results, it was not because they were "ignorant of science" but because they were just "customers who were not interested" at that point. That is, there was no need to convey a message that could be perceived as pressure to conform, thus avoiding the psychological reactance i.e., a negative emotional reaction of people generated by a threat or loss of freedom (Steindl et al., 2015).

Importantly, this policy was an approach that was easily understood as an extension of reasonable marketing very oriented towards direct sales to consumers by the small-scale farmers who participated in the Round-Table. First, for small- scale farmers, it was not necessary that all consumers accept and purchase the vegetables they produced. What mattered to them was that there were private customers and restaurateurs who sympathized with their approach to farming and appreciated the value of the vegetables they produced. Studying the mechanisms of radioactive material transfer, closely monitoring radioactive contamination of one's own farmland and vegetables, and communicating this information to customers, were not very different from their everyday marketing activities i.e., trying to gain loyal customers by cultivating high quality vegetables or reducing the use of agrochemicals. In this approach, while the quality and safety of their products and their way of farming, including radiological protection, was promoted as an attraction, the personal autonomy of consumers in making risk judgments was fully respected. At the same time, they regained their dignity as farmers by understanding that a nuclear accident is not an irreversible disaster, but as a difficult but solvable situation calling for personal

efforts to understand its reality through measurements of the contamination and by applying a process of quality assurance and marketing, adapted to a context of radioactive contamination perceived as unfair.

After the Round-Table project ended in Kashiwa, the author of this article interviewed 17 people involved in the agriculture and fisheries industries in Fukushima Prefecture, many of whom had similar ideas and approaches (Igarashi, 2018). By incorporating radiological protection and communication as part of the current marketing strategy, this pragmatic approach addressed ethical issues. This avoided social fragmentation and psychological reactance, particularly significant in a society like Japan, where consumers have diverse values and many choices in a highly developed distribution system.

4. Radiation protection culture in a competitive market environment

The Kashiwa Round-Table, redefined radiation protection objectives and as part of its marketing efforts, agreed to adopt a unique approach that often deviated from scientifically recommended measurement protocols and benchmarks.

First, it is necessary to explain in detail once again how the independent standard of 20 Bq/kg, which is set extremely low in terms of international scientific recommendations, was determined. It needs to be emphasized that the very low independent standard was not adopted because the Japanese provisional regulatory value of 500 Bq/kg after the FDNPP accident or the standard of 100 Bq/kg applied to general foods since April 2012 were too high.

At the first meeting in July 2011, the Round-Table members confirmed and adopted the "as low as reasonably achievable" principle recommended by the ICRP, which is the cornerstone of the radiological protection system, and they came to fully understand that there should be different standards to aim for, depending on the contamination situation of the target area, the characteristics of the target products, and the social aspects such as the range of choices available to the local consumers.

In this context, for the vegetable farmers in Kashiwa, who had repeatedly conducted pilot measurements, 20 Bq/kg was a standard that would allow them to be confident that their farms would not produce vegetables contaminated above this level, even if it was an outlier result. On the other hand, for members from the consumer community, 20 Bq/kg was an acceptable standard even for their "zero-risk" oriented friends, and for supermarket owners and restaurant chefs, it was a standard they could explain to their customers as perfectly OK compared to other production areas.

In other words, the 20 Bq/kg was established as a compromise by the participating members of the Round-Table, based on the marketing perspective of how to get consumers to choose vegetables from low-level contaminated areas in competition with vegetables from other uncontaminated production areas. So, referring to the independent standard adopted by the Round-Table, it should be emphasized that the important aspect was not the value of 20 Bq/kg itself, but

the process to reach agreement on this value after several months of deliberate discussions between the various stakeholders.

Another unique and essential aspect of the Round-Table's project is the measurement protocol for each individual farm, which combines soil and vegetable measurements, as described in Section 1. This is also quite different from the approach to food radioactivity measurement, which is usually done by sampling tests. This is because the Round-Table members agreed that the standard food radiation protection approach, which takes market dilution into account, is completely inadequate for the marketing they were aiming for.

In October 2011, there were sensational media reports that there was a "hot spot" in Kashiwa City. The fact that sales at the Round-Table members' farmers market had fallen the most after this media coverage indicated that many consumers in Kashiwa were not satisfied with sampling tests and wanted to be assured that the vegetables in front of them had really been grown in safe soil. And the producers participating in the Round-Table were farmers who wanted to sell their vegetables to local consumers on a face-to-face basis, without going through the market, and they considered it important to meet these needs in order to regain trust in the safety of local agricultural products and their competitiveness against other production areas.

Thus, with the goal of avoiding "outliers", the measurement protocol decided upon by consensus among the Round-Table members was to specify the spot in each farmland with the highest risk of contamination, and the basic principle of this specification was a quick soil measurement. However, it is not only soil contamination that determines the level of radioactive contamination of agricultural products, but also soil texture, pH, and potassium concentration in the soil. In particular, the deficiency of potassium in the soil, which results in the uptake of radioactive cesium as a chemical surrogate, is an important factor, and records of fertilizer application to their own farmland are important to determine this. Therefore, in addition to measuring the soil in the center and four corners of the farmland, the NaI scintillation detector was used to measure vegetables grown in spots that could be assumed to be high-risk based on information obtained from the farmers, such as where rainwater tends to accumulate in the farmland, which areas have sandy or acidic soil, and whether there was a history of failure to apply fertilizer in a particular area.

In this sense, the Round-Table's measurement protocols were continually updated by measuring their individual farms with farmers participating in the project who were fully aware of the conditions of their farmlands. The co-expertise process that determined the Round-Table's own measurement protocol can be evaluated as beginning with the basic policy agreed upon by the sociologist facilitation and then becoming more precise with the addition of the expertise of the farmers.

In addition, it should also be emphasized that Kashiwa was a slightly contaminated area that did not require long-term radiation protection measures for the health of its residents. Therefore, from the beginning, the Round-Table was considered to be a time-limited project until the residents' concerns about local vegetables were resolved to some extent, and it was not intended to embed a culture of radiation protection in the community over long periods of time.

The Round-Table in Kashiwa had reconciled the interests of many stakeholders and adopted a measurement protocol and standard appropriate to local situations. In these ways, the Kashiwa experience is an interesting case that demonstrates the feasibility of implementing a dialogue among stakeholders to realize the strategy recommended by the ICRP. While they were certainly far from typical scientific recommendations, they were nevertheless part of an optimization process (ICRP, 2009, 2020), with the goal of reestablishing residents' loyalty for locally grown vegetables in a competitive market environment, where vegetables from all over the world were available to consumers. And this case may also demonstrate the possibility of developing a co-expertise process that involves diverse professionals, including those from the social sciences, in order to achieve the goals required there in the light of the characteristics of each community.

Conclusion

This chapter has shown the effectiveness of the Round-Table project, launched immediately after the Fukushima Daiichi nuclear power plant accident, which took the form of a dialogue to reconcile consumers and farmers in the city of Kashiwa. They discussed at length the implications of the exceptional situation created by the accident and, in an atmosphere of trust, established appropriate local rules to empower all stakeholders and improve the situation.

There is no doubt that the Fukushima Daiichi nuclear power plant accident (FDNPP) severely undermined trust in the government, scientists, and food safety in Japan. Given the post-nuclear accident context and the structure of trust within Japanese society, where generally the level of trust is low (Yamagishi, 1998; Inoguchi, 2002), it seemed strategically appropriate to engage a dialogue between farmers and consumers based on measurements to ensure some objectivity in the process. This approach broadened the circle of belief and empathy for the visible products of "your farmer," based on personal trust. It also restored general trust in food produced in the areas affected by the nuclear disaster through the accumulation of this personal trust.

It is clearly necessary to aim for reconciliation involving consumers and producers after a nuclear accident, both in the areas seriously affected by contamination and beyond. Dialogue plays a crucial role in this reconciliation. An important lesson from the Kashiwa co-expertise process was that local and national governments, as well as international expert groups must recognize that their role in the post-nuclear accident reconstruction phase is not only to directly create large-scale dialogue opportunities, but also to support initiatives such as the Kashiwa Round Table, which expand small circles based on personal trust. While the Round-table approach did not resolve the entire agricultural problem in the area affected by the nuclear disaster, it demonstrated its effectiveness and success on a small scale.

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References

Bauman Z. (1998) *Globalization*. Cambridge: Polity Press.

Collins H., Evans R. (2007) *Rethinking Expertise*. The University of Chicago Press.

Fukuda K., Kutsuna N., Terada T., Mansournia M., Uddin M., Jimbo K., Shibuya S., Fujieda J., Yamamoto H., Yokohari M. (2013) Radiocesium contamination in suburban forests in Kashiwa city, Chiba Prefecture. Jpn. J. For. Environ. 55(2):83-98. In Japanese.

Hori J., Makino M., Horii T. (2017) The structure of consumers' buying intentions regarding fishery products made in Fukushima Prefecture after the 2011 earthquake off the Pacific coast of Tohoku. Jpn. J. Exp. Soc. Psychol. 57(1):42-50. In Japanese.

ICRP (2009) Application of the commission's recommendations to the protection of people living in long-term contaminated areas after a nuclear accident or a radiation emergency. ICRP. 111. Ann. ICRP. 39(3).

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. 146. Ann. ICRP. 49(4).

Igarashi Y., Anzen Anshin no Kashiwa-san Kashiwa-sho Entakukaigi (2012) *Collectively Designed Shape of Security*. Tokyo: Aki-Shobo. In Japanese.

Igarashi Y. (2014) Is it possible to overcome social gap through coproduction? In: XVIII ISA World Congress of Sociology, July 13-19, 2014, Yokohama.

Igarashi Y. (2016) Challenges to overcome social gaps through coproduction: Kashiwa's practical experience as a radioactive 'hotspot' after 3.11. In: IAEA Technical Meeting on Radiation, Health and Healing, March 9-11, 2016, Fukushima.

Igarashi Y. (2018) *Nuclear Accident and "Food"*. Tokyo: Chuo-Koron-Shinsha. In Japanese.

Igarashi Y., Ando R. (2021) Between expertise and local people: experiences in radiation risk communication. Annu. Rev. Sociol. 34:1-9. In Japanese.

Inoguchi T. (2002) Broadening the basis of social capital in Japan. In: Democracies in flux: the evolution of social capital in contemporary society (R.D. Putnam, Ed.), pp. 359-392. Oxford University Press.

Ishida M., Yamazaki H. (2017) Radioactive contamination in the Tokyo metropolitan area in the early stage of the Fukushima Daiichi Nuclear Power Plant (FDNPP) accident and its fluctuation over five years. PLoS One. 12(11):e0187687.

Kudo D., Nakayachi K. (2014) Reputational risk caused by Great East Japan Earthquake: a study on consumer factors leading to restrained buying. Jpn. J. Soc. Psychol. 30(1):35-44. In Japanese.

Lochard J., Schneider T., Ando R., Niwa O., Clément C., Lecomte J.F., Tada J.I. (2019) An overview of the dialogue meetings initiated by ICRP in Japan after the Fukushima accident. Radioprotection. 54(2):87-101.

Nirasawa T., Tsubokura M., Murakami M. (2021) Changes in radiation protection measures after the Fukushima Daiichi nuclear accident: evaluation of meeting minutes of the Nuclear Regulation Authority, Japan. Radioprotection. 56(2):153-160.

Schneider T., Maître M., Lochard J., Charron S., Lecomte J.F., Ando R., Kanai Y., Kurihara M., Kuroda Y., Miyazaki M., Naito W., Orita M., Takamura N., Tanigawa K., Tsubokura M., Yasutaka T. (2019) The role of radiological protection experts in stakeholder involvement in the recovery phase of post-nuclear accident situations: some lessons from the Fukushima-Daïchi NPP accident. Radioprotection. 54(4):259-270.

Schneider T., Lochard J., Maître M., Ban N., Croüail P., Gallego E., Homma T., Kai M., Lecomte J.F., Takamura N. (2021) Radiological protection challenges facing business activities affected by a nuclear accident: some lessons from the management of the accident at the Fukushima-Daiichi Nuclear Power Plant. Radioprotection. 56(3):181-192.

Steindl C., Jonas E., Sittenthaler S., Traut-Mattausch E., Greenberg J. (2015) Understanding psychological reactance. Z. Psychol. 223(4):205-214.

Yamagishi T. (1998) *The Structure of Trust*. University of Tokyo Press. In Japanese.