Contamination and community support in the aftermath of the Fukushima disaster

Koji Itonaga

Bulletin of the Atomic Scientists published online 19 June 2014
DOI: 10.1177/0096340214539861

Bulletin of the Atomic Scientists

IT IS 5 MINUTES TO MIDNIGHT

Feature

Bulletin of the Atomic Scientists
0(0) 1–8

DOI: 10.1177/0096340214539861
http://thebulletin.sagepub.com

SAGE

Contamination and community support in the aftermath of the Fukushima disaster

Koji Itonaga

Abstract

The Japanese village of Iitate received some of the highest radiation exposures resulting from the disaster at the Fukushima Daiichi Nuclear Power Station, particularly on March 15, 2011. Iitate, which had previously been a model eco-village, is still heavily contaminated. The village's abundance of forested area not only makes decontamination difficult but may also cause re-contamination of areas after they are cleaned up. Before the accident, many households in Iitate had multiple generations living under one roof, but many families were forced to split up when they evacuated. Villagers are now living in dispersed housing or in temporary units constructed after the accident. Many villagers, particularly young families, have given up hope of returning to Iitate anytime soon. It will take decades for the radioactivity to naturally decay. In the meantime, the author proposes creating new settlements so that villagers can rebuild their lives and sense of community while retaining the right to return to Iitate. Villages torn apart by tsunami damage are being allowed to move to higher ground as entire communities; the author argues that Iitate and other villages devastated by radiation should have similar rights.

Keywords

contamination, evacuation, Fukushima, Iitate Village, radioactive, right of refuge, right of return

In 2010, Iitate was named one of the most beautiful villages in Japan. Its landscapes of forested mountains and gently rolling farmland were home to about 6,100 people, and the village was a model for integrating ecology, architecture, and design. The people of Iitate were planning their community around the theme of a "Madei life," using a word that in the local dialect means "respectfully and carefully." That all changed on March 11, 2011.

Iitate is no longer a pastoral village living in harmony with its natural surroundings. The 2011 accident at the Tokyo Electric Power Company (TEPCO) Fukushima Daiichi Nuclear Power Station spread radioactive contamination to a number of surrounding villages, including Iitate—centered approximately 40 kilometers to the northwest. On the evening of March 15, 2011, rain and snow fell on Iitate and contaminated the village with radioactive

material from the nuclear accident. With no evacuation instructions from the government, villagers who lived 30 kilometers or more from the nuclear facility continued to be exposed to radioactivity. Evacuation orders for Iitate finally came on April 22, but by then villagers had already received some of the highest exposures resulting from the nuclear accident.

With colleagues at Nihon University and the nonprofit organization Ecology Archiscape, I had worked to support the village administration for around 20 years. Through these pre-existing connections, we were able to form the Iitate Village Support Team only five days after the disaster. Since then, we have worked with local government and villagers to provide refuge and recovery advice to the village, carry out radioactivity and public opinion surveys, and develop a long-term plan for coping with the disaster.

Because Iitate still has a lot of contamination, many residents—young families in particular—have given up hope of returning to the village in the foreseeable future. It will take decades for the radioactivity in Iitate to naturally decay. Forest occupies more than three-fourths of the village area, making decontamination difficult, and many villagers do not trust the decontamination efforts that are currently under way. Since immediately after the disaster, I have argued for a long-term plan that includes creating some new settlements where villagers could safely rebuild their lives while retaining the right to return to Iitate. Such a plan would grant villagers dual residency in both Iitate and the new village, enabling the community—and individual families within it—to stay together.

A model village

Iitate sits an average of 450 meters above sea level, so it was not directly affected by the 2011 tsunami. The village has a total area of about 230 square kilometers and is nearly 75 percent forested. When the earthquake struck, the population was approximately 6,100 people, living in around 1,700 households. In the years before the disaster, villagers, researchers, and government officials had worked together to create a sustainable and ecological community.

For the period from 1995 to 2004, the local government made a 10-year Plan for the Quality of Life in Village, and gave every settlement within the municipality ¥10 million to carry out improvements and activities related to the plan (Iitate Village, 1995). For 2005 to 2016, a new plan was prepared around the theme "Madei life," aiming at a harmonious life with nature and agriculture (Iitate Village, 2005). In 2008, the local government began to implement plans to produce energy locally, beginning with a biomass-fueled boiler in a nursing home. I worked with a team that designed the Madei Living Center, an energy-saving model eco-house. Before the disaster, we had expected that the facility would be run by a newly established community-based nonprofit organization within five years.

Radioactive contamination

On the evening of March 15, 2011, after the air radiation dose in front of the village office was measured at 44.7 microsieverts per hour, my colleagues and I urged Iitate's mayor to hasten the evacuation of children and pregnant women. (For comparison, a single chest x-ray

delivers a dose of 50 to 100 microsieverts.) Some villagers were evacuated, but by the end of March they had returned—after a team of radioactivity experts commissioned by the village authorities and led by Syunichi Yamashita, vice president of Nagasaki University and an expert on thyroid cancers associated with the Chernobyl accident, advised that it was safe to do so.

The Iitate support team cooperated with Tetsuji Imanaka of Kyoto University, a nuclear energy researcher and member of the Nuclear Safety Research Group (an anti-nuclear power group), to conduct an aerial dose rate investigation and soil analysis across the whole village area on March 28 and 29, 2011. In the southern part of the village, closest to the nuclear power plant, the survey found radioactivity values of 30 microsieverts per hour (Imanaka et al., 2012). This level is comparable to contamination measured after Chernobyl. The team presented these unsettling findings to the village authorities, but the mayor refused to make them public, so the Imanaka team published them openly, and our support team also published them on the Ecology Archiscape website (Iitate Village Area Radioactive Contamination Investigation Team, 2011). The Imanaka team and our support team jointly organized the Iitate-mura Society for Radioecology (IISORA; http://iitate-sora.net/) study group in 2012 and are cooperating.

In April 2011, we requested urgent evacuation of Iitate residents and decontamination measures for the whole village (Iitate Village Support Team, 2011). The central government had only called for the evacuation of residents living within 20 kilometers of the Fukushima nuclear plant; residents living between 20 and 30 kilometers from the nuclear power plant were told to stay at home but indoors. On April 22, 2011, the government designated the 20-kilometer radius around the nuclear plant as a restricted area and prohibited entry except for people engaged in emergency response. At the same time, the government designated Iitate and other highly contaminated areas outside the 20-kilometer zone as "deliberate evacuation areas" and "evacuation-prepared areas in case of emergency." As of May 2014, residents were still not permitted to live anywhere in Iitate. On July 17, 2012, the village was divided into three zones ("zone in preparation for the lifting of the evacuation order," "restricted residence area," and "difficult-to-return zone."). The section of Iitate closest to the nuclear plant is an area where it is expected that residents will have difficulties in returning for five years or more (Ministry of Economy, Trade and Industry, 2013).

The central government asked Fukushima Medical University to conduct an initial exposure survey of residents of Fukushima Prefecture, to determine how much radiation they received during the first four months after March 11, 2011. Using the published data from the survey, Imanaka calculated that the amount of external exposure for Iitate villagers was about 3.6 millisieverts (or 3,600 microsieverts) on average (Imanaka, 2013). However, the results from the Imanaka team, together with an investigation that I assisted in the summer of 2013, suggest that the exposure of Iitate villagers during those first fourth months was 7 millisieverts on average, almost double the government's estimate (Imanaka, 2013).

Our July 2013 investigation studied contamination inside homes. In Iitate,

we measured five houses with different levels of radioactive contamination. We found values ranging from 0.2 to 3.8 microsieverts per hour. The average value of the ambient radiation dose rate was 0.7 microsieverts per hour on the floor of the first story, and the dose generally rose as we climbed higher inside the houses, reaching an average of 2.0 microsieverts per hour on the ceiling of the second story.

I took measurements of radioactive cesium inside and outside a house that was decontaminated as a model by the government in 2012, and found contamination of outdoor topsoil that had been replaced after the decontamination. This suggests that re-contamination from the surrounding land and forests may, in some locations, cause radioactivity to return nearly to previous levels—not only outdoors but also in the interior of homes. I examined the radioactive cesium contained in dust on the furniture and ceiling of the house, however, and found that the amount of radioactive cesium in this dust is relatively small, so dust is not the cause of the increased indoor radiation dose.

Despite this radioactive contamination, villagers are still allowed to return for short visits. There is an urgent need to investigate the pollution status of all housing in the village, decontaminate houses outside and inside, and repair the housing for radiation protection. After these measures are implemented, such short visits would be safer.

Immediately after the nuclear accident, the Iitate Village Support Team collected donations and set up a support room that operated in Fukushima City for the first year. Currently, relations between the support team and the local government are strained over differences in perceived radiation risks. However, the team continues to conduct surveys and to provide data to village authorities, villagers, and the media. The team's support activities since 2011 also include:

- Addressing radioactivity and health risks by offering study sessions, supporting the publication of record books that were distributed to villagers by the local nonprofit group Makenedo Iitate during the initial exposure period, and proposing radioactivity defense measures to reduce exposure in the homes of returning villagers.
- Helping villagers cope with refugee life by organizing public symposiums about life reconstruction, spring and summer camps for children and families, and a self-help group for concerned mothers.
- Holding workshops to develop plans for construction of a new settlement and a dual-residence system that would allow evacuated villagers and their descendants to live in temporary communities until radiation in Iitate has dropped to safe levels.
- Supporting cultural activities such as the establishment of art shops, community vegetable gardens, and a villagers' group that seeks to maintain Iitate's traditional food culture.

Divided communities and families

The 1,715 households that lived in Iitate before the disaster had fractured into 3,094 households by June 2012, and this household separation is still continuing. Before the accident, many Iitate villagers lived in houses with multiple

generations under the same roof. After the accident, 90 percent of Iitate households evacuated to Fukushima City and other municipalities within Fukushima Prefecture. About 20 percent of the downsized households created by the disaster now occupy nine temporary housing sites in Fukushima City or cities close to Iitate, and another 50 percent live in dispersed houses and apartments. Many young families are living in apartments in Fukushima City paid for by the prefecture. Many elderly Iitate residents, however, were assigned to the temporary housing areas, because these older residents evacuated later than the young families, after temporary facilities were constructed.

In early October 2011, the Iitate support team, supported by Makenedo Iitate, carried out a public opinion survey of villagers in temporary housing units. Forty percent of the respondents said they "want to come back to the village" and 70 percent "might move outside the village." Some elderly people said they did not want to return to a life in which children and grandchildren could not join them because of uncertain health risks. They wanted to live with their families and preferred to improve their present situation, away from their old homes, rather than become separated households.

The team carried out further surveys of villagers for two years after the accident. In October 2012, we surveyed all villagers and obtained responses from 1,366 people. More than 38 percent agreed that they would return home when the radiation levels dropped to 1 millisievert per year—the normal background level—but 21.9 percent said that they would "never return home." Only 2.4 percent agreed with the national government position that it would be safe to return at radiation levels below 20 millisieverts per year. What villagers want is a place where they can live in peace instead of as evacuees.

As to the question of how to decide when to return, the villagers indicated that they want some self-determination on this issue. Nearly 38 percent said that the decision to return should be decided by villagers' vote, and a further 33 percent said that the decision should be in consultation with villagers; only 12.4 percent said the local government should decide. If evacuation is prolonged, 37.9 percent wanted to continue living in the evacuation housing, 30.3 percent wanted to own a new home outside the village, and 17.3 percent wanted to live in new public housing for disaster recovery. Villagers have come to expect a range of measures from authorities: compensation negotiations with TEPCO and the national government; long-term health management measures, especially for children; thorough decontamination of the site; and creation of a reconstruction plan in close consultation with villagers.

Decontamination progress

The government-controlled decontamination of Iitate is proceeding slowly. As of January 2014, 4 percent of agricultural land and 9 percent of residential land in the village had been officially decontaminated. The surrounding forest within 20 meters of residential land will be decontaminated, but the expected completion has been deferred until 2016.

Immediately after decontamination, the radiation dose is reduced, but villagers have begun to understand that, after a while, the radioactive contamination may return. By the spring of 2014,

about 400 households seemed to be trying to get houses of their own in the municipalities where they found refuge. Young families, in particular, are beginning to demand stable lives in these refuges.

Although contamination measured in and around Iitate homes declined by more than 50 percent during the two years after the accident, 75 percent of Iitate is forested, and these areas are heavily contaminated with cesium-137, which has a half-life of 30 years. Decontaminating forests is not easy and should not be given priority by village authorities, in the support team's view. Instead, priority should be given to evacuating residents to safe places outside the village, and building new settlements there. The government should acknowledge that it is only safe to return in the long run, when radiation levels have decreased sufficiently.

Community resilience and long-term revival

In 1986, after the nuclear disaster in Chernobyl, the Kremlin enforced an evacuation plan with an iron hand in areas exposed to more than 5 millisieverts per year. In Japan, on the other hand, evacuation measures have been weak. The prospect of successfully decontaminating a heavily forested area such as Iitate is slight. Some wisdom and adjustment are necessary to acknowledge the long half-lives of some radioactive elements in relation to human life spans. Currently, the Iitate support team would rather improve the resilience of families and the community than to attempt a futile decontamination process that might further frustrate survivors if it is inadequate.

What is needed is a project to build new villages located away from radiation and close to employment opportunities. Each village should include a school, a nursery school, a space for festivals, a shared farm, and factory and market space—where it will be possible for villagers to re-create and develop both life and work. This unprecedented situation, in which whole communities have to recover from a nuclear disaster, requires a new set of standards.

When I first proposed the creation of some new small villages, immediately after the accident, villagers and village authorities showed little interest. After three years, some villagers are interested in this proposal. However, the top priority for many villagers is finding their own homes. It takes time and effort to develop new community residential areas, so villagers hesitate to get involved. They expect the local government to take the lead on planning, but local governments are giving priority to decontamination.

The official Iitate plan is for a thorough decontamination in the village, development of a central community center, public shops for tourism, and public housing for returning villagers. The Iitate village authorities intend to create a new "smart village" in the western part of Iitate. However, the opinion surveys clearly show that villagers, especially younger families, have given up hope of returning to the village anytime soon. They prefer to live together with their family members, other fellow villagers, and friends somewhere where they feel safe. Village authorities should develop an alternative revival plan with the villagers, and prepare some small, new alternative settlements elsewhere.

I have been supporting villagers who began operating shared vegetable

gardens on deserted farms near the evacuation apartments and temporary housing. Some former residents of Iitate wish to create new residential areas near their farmland in the western part of Fukushima City, and I have been involved in several talks about this immigration plan since 2013. However, the plan has not been implemented yet because of urban planning and policy issues in Fukushima City. Also, there is no support from Iitate authorities for an immigra tion plan.

A rural area in Date City, where there is temporary housing of Iitate villagers, is also a possible location for a new residential development. The Date City planning authorities are willing to discuss the idea, but developing a new residential area without the cooperation of Iitate authorities is problematic.

The three rights

Villagers displaced by the Fukushima disaster should have three rights: the right of refuge, the right to a new village outside the contaminated area, and the right of return to their original village in the future. The national government and TEPCO should negotiate the location of an alternative village, settle land lease arrangements, and pay for the building of houses. Villagers should be able to have two resident's cards: one for Iitate and one for the evacuee community.

The alternative village should be built as a model eco-village, based on renewable energy and traditional agriculture—a "Madei life." When villagers return to Iitate, this temporary village could become an ecological education center. In the meantime, the central government and TEPCO should lease the radioactively polluted Iitate land for 30 to 50 years and should pay the villagers lease charges. When the villagers are able to return, either after successful and permanent decontamination or when the natural half-life of radioactive elements has reduced the radiation to safe levels, the government should duly return the land rights to the villagers or their descendants. The central government should organize land-use meetings with the village administration and carry out decontamination and management of the land, and not turn these areas into dumping grounds for radioactive waste. Temporary visits to the village should be allowed for managing homes and properties, visiting family graves, or holding traditional festivals.

Japanese villages that were swept away by the 2011 tsunami are developing plans to move uphill, a little farther away from the sea. I also support those plans, which have earned the cooperation of local administrations and the central government. New homes are being constructed for tsunami victims, and it is expected that residential areas will be in place in 2015. Residents who were directly affected by the tsunami have won immigration rights at the community level.

In contrast, Iitate villagers who were radioactively contaminated by the nuclear accident have not won the right to immigrate to a safer place as a community. Land-use planning and public works for resilience must change to make this possible. The villagers of Iitate, whose homes and businesses were contaminated through no fault of their own, have a right to rebuild their lives together with their families and neighbors. This right should be incorporated in future planning, so that people whose lives are profoundly affected by a nuclear accident

can support each other and reclaim their communities.

Acknowledgements

I wish to thank the villagers of Iitate, the Iitate government office, members of Ecology Archiscape, my fellow researchers, citizens who contributed money in support of this work, and the students in my laboratory at Nihon University.

Funding

This research received some grant funding from the Ministry of Education, Culture, Sports, Science and Technology in Japan; the National Federation of Workers and Consumers Insurance Cooperatives; and financial support to the nonprofit organization Ecology Archiscape (www.ecology-archiscape.org).

References

Iitate Village (1995) The 4th Comprehensive Plan for the Quality of Life in Village.

Iitate Village (2005) The 5th Comprehensive Plan for the Quality of Life in Village. Available at: www.vill.iitate.fukushima.jp/groups/kikaku/jousetsu/gojisoukeikaku_vill.html.

Iitate Village Area Radioactive Contamination Investigation Team (2011) Interim report on radiation survey in Iitate Village area conducted on March 28th and 29th. April 4. Available at: www.ecology-archiscape.org/eas/english/pdf/Iitate-interim-report110404.pdf.

Iitate Village Support Team (2011) An urgent request concerning the set up of the planned evacuation zones for Iitate Village and related areas. Letter to Prime Minister Naoto Kan. April 17. Available at: www.ecology-archiscape.org/eas/english/pdf/20110417AnUrgentRequest.htm.

Imanaka T (2013) Assessment of the initial radiation exposure to residents in Iitate village up to evacuation after the Fukushima-1 NPP accident. Presentation to the Nuclear Safety Research Association, December 4. Available at: www.rri.kyoto-u.ac.jp/NSRG/etc/13-12-4NSRA_E.pdf.

Imanaka T, Endo S, Sugai M, et al. (2012) Early radiation survey of Iitate village, which was heavily contaminated by the Fukushima Daiichi accident, conducted on 28 and 29 March 2011. *Health Physics* 102(6): 680–686.

Ministry of Economy, Trade and Industry (2013) Areas to which evacuation orders have been issued. August 7. Available at: www.meti.go.jp/english/earthquake/nuclear/roadmap/pdf/20130807_01.pdf.

Author biography

Koji Itonaga is a professor of engineering, architecture, and city-rural planning in the College of Bioresource Sciences at Nihon University in Fujisawa City, Japan. He is president of the nonprofit organization Ecology Archiscape, which integrates architecture and landscape design with local ecosystems, history, art, and culture. Itonaga began working on sustainable development with Iitate Village in Fukushima Prefecture nearly 20 years ago. With colleagues at Nihon University and Ecology Archiscape, he formed an Iitate support team only five days after the March 2011 Tohoku earthquake and tsunami.