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Disaster/Reconstruction Process in Otsuchi Town, Iwate Prefecture

Shin Nozaka (Waseda University) and Tatsuto Asakawa (Waseda University)

1. Introduction

The tsunami caused by the Great East Japan Earthquake heavily damaged Otsuchi town in Iwate prefecture. More than 10% of the 2010 population has passed away in many coastal districts, including central towns and districts (Fig. 1 displays the approximate locations of each district in coastal area of the town). Originally a small town, the population had declined to about 15,000 as of 2010, following its peak of around 21,000 in 1980. In other words, Otsuchi town is an example of a basic municipality with a small population size that suffered great damage from the disaster. In this paper, we clarify how Otsuchi town underwent reconstruction by 2019 in chronological order (① before the event, ② emergency evacuation, ③ refugee ④ provisional living, ⑤ recovery and reconstruction, and ⑥ the second half of reconstruction).

2. Regional Characteristics

2-1. Demographic and Industrial Structure

The population decline and aging in Otsuchi town have progressed since 1980. The population shrunk further following the earthquake (from a population of 15,276 on the 2010 census ⇒ a population of 11,732 on the 2015 census). Meanwhile, the percentage of population 65 or older has not changed significantly due to the high share of elderly victims (2010 census: 32%⇒2015 census: 34%).

Fig. 1. Approximate locations of each district in Otsuchi town

As for the industrial structure prior to the earthquake, fishing was the core industry until the 1970s. However, since the 1980s, the regulation on exclusive economic zone (200 nautical miles) under the United Nations Convention on Law of the Sea has made it difficult to promote an industry centered on fishing. Instead, the economy has come to rely on the marine product processing industry (10% of the total working population aged 15 or older in 2008) and commuting to other municipalities in Iwate prefecture, such as Kamaishi, where the Nippon Steel Kamaishi Factory and many related companies are located (37% on the 2010 census ->32% on the 2015 census) (Nozaka, 2016).[1][2]

After the earthquake, the proportion of people working in the marine product processing industry among those

[1] The number of people engaged in the marine product processing industry is calculated from the Fisheries Census, and the number of people aged 15 or over in the town as a whole is calculated from the National Census. Note that the aggregated years of the numbers used for the denominator and numerator are different.
[2] Calculated from the census.

15 and older declined significantly (2% on the 2018 census). Meanwhile, the share of those commuting to Kamaishi and other municipalities in the same prefecture has not changed significantly (32% in 2015); thus, commuting to other municipalities continues to be important to maintain the employment of local residents.

2-2. Data on Disaster Situation and Population Dynamics for Inundated Areas and following the Earthquake

Otsuchi town had the highest percentage of deaths and missing persons among the affected municipalities in Iwate prefecture, with a value of 8.4%. Seniors (70% of all fatalities and missing people were over 60), fire brigade staff, and administrative staff members were especially impacted. For example, 7% of all members of the fire brigade, and 8% of all members of the women's fire brigade, perished; their fatalities are similar to the overall average, despite their high disaster awareness. Damage to administrative staff was particularly severe, and 28 out of 50 officials (56%)—including the mayor— perished (Great East Japan Earthquake Verification Committee, 2014). Building damage was also tremendous; 3,717 buildings (65.3%) were completely destroyed or swept away. Business establishments also suffered immense destruction. For example, 87.6% member of the Otsuchi Society of Commerce and Industry were damaged (of which 91.0% were totally destroyed). The office of the Society of Commerce and Industry was also swept away by the tsunami.

Table 1 outlines the damage by district and the rate of population decline after the Great East Japan Earthquake and Tsunami. Coastal districts are above the thick black line, while inland districts are below it. The percentage of deaths and missing cases exceeded 10% in many coastal districts, with the exception of Kirikiri and Namiita districts. The number of completely destroyed building exceeded 60% (estimated). Significant trends in the rate of population decline were observed in Machikata, Komakura/Nobematsu (coastal area of Koduchi district), and Ando districts, dropping to approximately 30% of pre-earthquake disaster levels. To begin with, these three districts set up a wide-area disaster risk zone (locales where construction restrictions are placed for housing and accommodation) at the time of reconstruction planning, and were not able to create a large sector for moving to higher elevation within the district. This greatly reduced the inhabitable land area, which resulted in population decline[3]. Meanwhile, compared to other coastal districts (though strictly in

[3] More than half of the inhabitable areas in the Ando district were disaster-risk zones; the estimated population and number of households in those places were about 1,100 people (60.1%) and 450 units (60.4%), respectively. More than half of the inhabitable locales in Machikata district were disaster-risk zones; the estimated population and number of households in those areas were about 1,685 people (38.7%) and 680 units (38.4%), respectively.

Table 1. Damage by Area

Districts	A February 2011 population	B Number of deaths and missing persons	Percentage of deaths and missing persons (B/A)	C February 2011 households	D Completely destroyed buildings	Percentage of completely destroyed buildings (D/C)	E September 2019 population (Sakuragi and Hanawata only, April 2016)	Rate of population decline rate as of September 2019 (E/A)
Machikata	4483	668	14.9%	1853	1421	76.7%	1530	34.1%
Komakura/Nobematsu (coastal area of Koduchi district)	272	42	15.4%	110	107	97.3%	62	22.8%
Ando	1953	218	11.2%	824	535	64.9%	605	31.0%
Akahama	938	95	10.1%	371	230	62.0%	620	66.1%
Kirikiri	2475	100	4.0%	954	355	37.2%	1861	75.2%
Namiita	404	24	5.9%	143	53	37.1%	338	83.7%
Sakuragi-cho/Hanawada	1421	24	1.7%	579	176	30.4%	1544	108.7%
Sawayama, Gensui, Ogakuchi	3104	79	2.5%	1195	215	18.0%	3653	117.7%
Koduchi(inland area of Koduchi district)	499	3	0.6%	200	0	0.0%	1460	292.6%
Kanezawa	509	3	0.6%	179	0	0.0%	462	90.8%
Total	16058	1256	7.8%	6408	3092	48.3%	12135	75.6%

* For Sakuragi-cho and Hanawata, the calculation method has changed since 2017; the figures as of 2019 cannot be calculated.

Sources: Otsuchi Town Reconstruction Basic Plan (December 2011), Otsuchi Town Residents' Division (Basic Residents' Register)

relative terms), Kikikiri and Namiita districts had a lower percentage of deaths and missing cases within their population, proportion of completely destroyed buildings among their households (estimated), and rate of population decline relative to other coastal districts. In Kikikiri district, for example, approximately 60% of its inundation and disaster hazard areas were sandy beaches, paddy fields, and forested wilderness; it was estimated that they did not have residences there in the first place. Furthermore, the fact that both Kikikiri and Namiita districts were able to secure a relatively wide zone of relocation to higher elevation after the earthquake disaster was also likely a major factor. In Akahama district, notwithstanding the high percentage of deaths and missing cases in the population, and the proportion of completely destroyed buildings among their households (estimated), the rate of population decline was smaller than that of Machikata, Komakura/Nobematsu, and Ando districts. The following were major factors in the districts' reconstruction policies: ① the early start of Councile for Reconstruction and Town Development; ② content regarding the creation of a wide elevated area while maintaining safety; ③ the content supported with detailed evidence by coordinators and residents in the district; ④ powerful promoting actors; and ⑤ the content being consistent with the supporters' specialized themes (Kubota, Kurose, Kamijo et al., 2018). Furthermore, all inland districts saw an increased population, and many residents moved from coastal to inland districts.

3. Information on Regional Disaster/Reconstruction Processes

3-1. Stage of Disaster Occurrence based on the Situation before the Disaster (until before the event)

The fishing industry (which had been the region's core industry) had stagnated, and the rationalization of the Nippon Steel Kamaishi Factory had progressed since the 1990s. At the same time, administrative resources were increasingly restricted following the collapse of the bubble economy. Within this context, the establishment and development of regional groups have been a major pillar of regional promotion policy, and implemented so that the local community could carry out some of the public services normally provided by the government (Nozaka, 2016).

Under these policies, various local groups (e.g., community associations, traditional performing arts preservation associations, volunteer organizations for caring the elderly, non-profit organizations [NPOs] derived from youth divisions of the Otsuchi Society of Commerce and Industry, cultural activity groups derived from regional youth group liaison councils, and cultural activity groups derived from community center activities) were established, and interdisciplinary events involving diverse residents and regional groups were held. For example, industrial festivals headquartered by the Otsuchi Society of Commerce and Industry involved not only local industrial groups (such as the branch of Japan Agricultural Cooperatives and Japan Fisheries Cooperatives and local store associations), but also boards of education, councils on social welfare, and traditional performing arts preservation associations from executive committees.

3-2. Emergency Evacuation Stage (from March 11 to around March 13, 2011)

As seen in Table 1, many coastal districts suffered significant damage. This paper will explain what

kinds of people perished and under what situations using mortality survey results from Kirikiri and Ando districts, and survey results from the Otsuchi Proof of Life Project (Nozaka & Mugikura, 2018).

Local disaster prevention plans were reviewed and formulated in Kirikiri and Ando districts after the earthquake with support from experts outside the town. Questionnaire and interview surveys on morality of victims administered to community association staff and fire brigade members, , were conducted, in addition to surveys on evacuation behavior of survivors. The town as a whole also carried out the Proof of Life Project as a local government-commissioned project, whereby surviving families were asked about the victims' life histories and behavior during the earthquake. Tables 2, 3, and 4 outline the mortality survey and the Otsuchi Proof of Life Project.

Mortality survey results from Kirikiri and Ando districts show that a relatively high number of victims were killed in the narrow, relatively elevated area between the previous tsunami inundation zone and the tsunami inundation zone of the Great East Japan Earthquake (Fig. 2 and 3). Close to 70% of places of death were "home or near home" for both Ando and Kirikiri districts.

Table 2. Mortality Survey Results from Ando District

Item	Description
Survey purpose	・ Collect and analyze information on the evacuation behavior of victims in Ando district after the Great East Japan Earthquake, and use this information as a reference for future disaster prevention plans.
Survey method	1) Preparation of the list of deaths and missing persons ・ Compiled based on the Otsuchi list of victims (February 15, 2012) and the Ando district list of victims (July 31, 2011) of the Great East Japan Tsunami Earthquake. 2) Questionnaire survey (mail distribution and collection) ・ "Who," "when," "where," and "how" the victim was regarding their evacuation behavior were set as survey items. 3) Interview survey (interview method) ・ Carried out as a supplementary investigation of 2).
Survey subject	・ All members (22 total) of the Ando neighborhood disaster prevention planning review committee (members of the Ando neighborhood association) were included.
Distribution and collection status	・ Ando neighborhood association staff: distributed to 22 members (January 24, 2013). The number of respondents was 12 (February 22, 2013), and the retrieval rate was 55%. A supplementary survey via interview (June-August 2013) was subsequently conducted. ・ Response status (as of August 5, 2013) a)Number of listed victims: 234 b)Number of victims described as

Table 3. Mortality Survey Results from Kirikiri District

Item	Description
Survey purpose	・ Collect and analyze information on the evacuation behavior of victims in Kirikiri district after the Great East Japan Earthquake, and use this information as a reference for future disaster prevention plans.
Survey method	1) Preparation of the list of deaths and missing persons ・ Compiled based on the Otsuchi list of victims of the Great East Japan Earthquake (March 11, 2014). 2) Interview survey ・ Survey subjects were asked "when" and "where" all victims on the list were and what they were doing, and "how they perished" (went missing) while confirming safety and calling out to individuals from the time of the earthquake to the arrival of the tsunami.
Survey subject	・ All 17 members of the fire brigade in Kirikiri district at the time of the survey were included.
Survey timing and response status	・ Survey period: April to August 2013 ・ Response status (as of August 31, 2013) a)Number of listed victims: 97 b)Number of victims described as dead: 96 c)Mortality description rate (b)/a)): 99%

	dead: 222 c)Mortality description rate (b)/a)): 95%
Surveyor	・ Ando neighborhood disaster prevention planning review committee (representative: Inemitsu Sato) ・ Planning, compilation, and analysis of surveys: Laboratory of Urban Safety Planning (Representative: Tadahiro Yoshikawa)

Surveyor	・ Institute of Sociology, Faculty of Education, Iwate University (Mugikura Laboratory)

Table 4. Survey Results from the Ohatsu Proof of Life Project

Item	Description
Survey purpose	・ Collect and analyze information on the evacuation behavior of victims in Otsuchi after the Great East Japan Earthquake and their life stories up to the time of the earthquake, where the basis for that behavior can be inferred, and use the findings as a reference for future disaster prevention plans. ・ Help survivors of the earthquake in the event that they feel comfortable or organize their feelings by having them speak about their memories of the deceased. ※ During the advanced explanation of aims, family members of the deceased who struggled or chose not to speak when talking about the victim were not requested to do so.
Survey method	1) Preparation of the list of deaths and missing persons ・ Compiled based on the Otsuchi list of victims of the Great East Japan Earthquake (March 11, 2014). 2) Access to survey subjects ・ Family members of the deceased were introduced by Otsuchi town and local "maritime pilots" (e.g., chief temple priests, women's association members, community association members, commercial and industrial association members, reconstruction council representatives), and an advanced explanation of the aims was provided via interview. ・ Surveys were conducted with those who received an explanation of the aims and understood the survey. 3) Interview survey ・ Life histories of the deceased and their families until the earthquake, behaviors and situations before and after the earthquake of the deceased and their families (when, where, why, and what they were doing), and messages from survey subjects to the deceased were set as survey items. 4) Aftercare ・ Calling on survey subjects through local "maritime pilots" (e.g., whether they had an unpleasant experience) ・ Confirming the details of the record of the deceased from the survey subject based on survey records (including thanks) ・ Briefing among surveyors attended by counselors
Survey subject	・ Surviving family members affected by the earthquake (generally within the fourth degree of kinship from the deceased)
Survey timing and response status	・ Survey timing: September 2014 to May 2016 ・ Response status (as of August 31, 2013) a)Number of listed victims listed: 1285 b)Number of described victims: 544 c)Description rate (b)/a)) : 42%
Surveyor	・Otsuchi Proof of Life Project Executive Committee, Iwate University, Laboratory of Urban Safety Planning, Tokyo University Kubota Laboratory

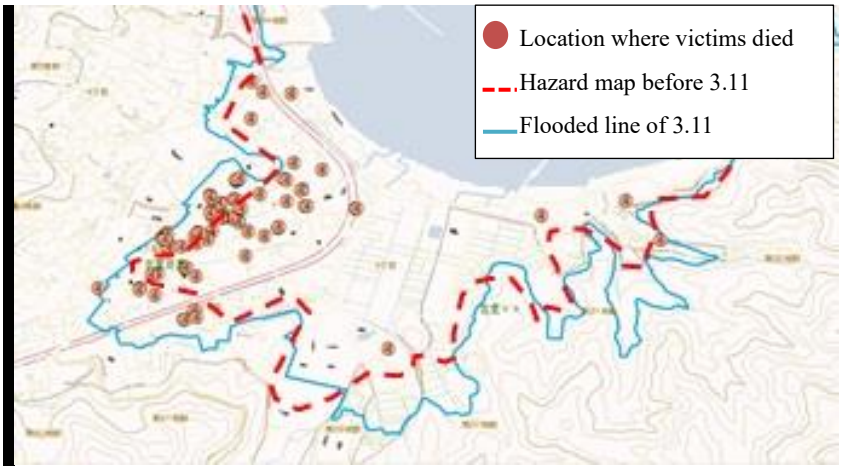

Fig. 2. Locations where Victims are Believed to Have Died in Kirikiri District
Source: Nozaka and Mugikura (2018)

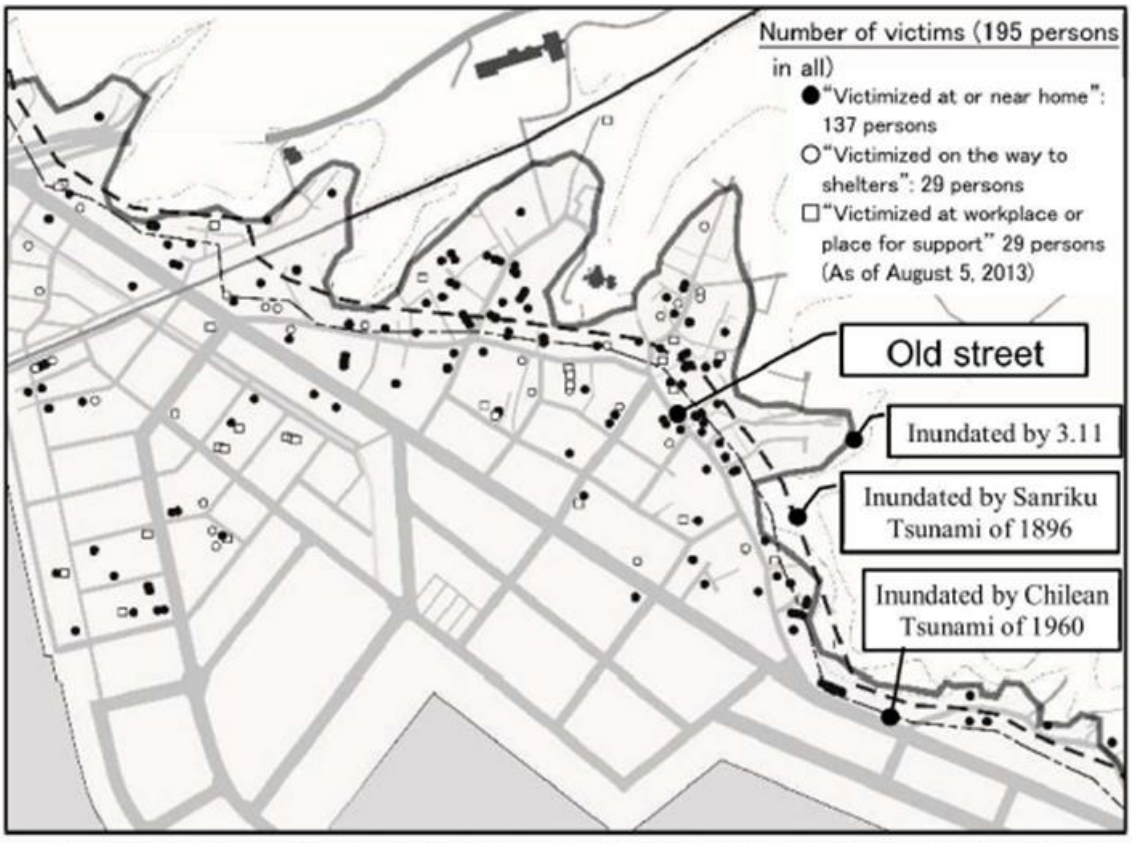

Fig. 3. Locations where Victims are Believed to Have Died in Ando District
Source: Yoshikawa (2015)

The following three behavior patterns can be indicated from the Proof of Life Project survey results, which were important factors contributing to victims' deaths.

First, there was a gap between risk perception and actual damage. In other words, people could not imagine where the actual tsunami was expected to arrive, or what its momentum would be, and were

not able to sufficiently escape after considering unsafe locations as evacuation destinations. For example, "They were going in and out of the house to look at the situation, and didn't think that the tsunami would come all the way to the house, which was far away from the ocean, so I think the three of them [along with his wife and mother] prepared to evacuate, turned the car engine on, and tried to evacuate" (the deceased was a 60-year-old man) (town of Otsuchi, 2017).

Second, either the individual or the family/relatives needed support, so they gave up trying to evacuate after considering the trouble they would cause in the evacuation center or moving there. For example, "[I] had thought that this was unlike any other earthquake and that we needed to evacuate, but my mother had knee pain and had difficulty walking, and [our home] was on an elevated area far from the ocean, so we stayed at home and watched the television, and decided to see what would happen [the surviving family member was also swept away, but was rescued and survived]" (the deceased was a 70-year-old woman) (town of Otsuchi, 2017).

Third, some victims were engaged in support missions (such as evacuation guidance) until the end. For example, "[once evacuating] she returned to the lowlands in Ando district to help with evacuation guidance since she was a member of the women's fire brigade. Afterwards, she once again evacuated at Ando Elementary School, but she couldn't leave the remaining people behind, and she went down to the lowlands despite everybody stopping her" (the deceased was a 60-year-old woman) (town of Otsuchi, 2017).

3-3. Refugee (from around March 14, 2011 to around August 2011)

At its peak on March 12, 7,448 people were evacuated (Mugikura et al., 2013). However, many designated evacuation sites/centers were damaged (Table 5) and spread across a wide area, including the inland areas within the town. Furthermore, the government office building was also damaged, so nearly half of the evacuation centers were primarily established by non-public institutions, and evacuation centers were set up in private offices, private homes, and temples (Table 6). For this reason, a major part of evacuation life was supported through the mutual assistance of residents in each district. Information collection and transmission capabilities—which are usually within the disaster management headquarters of the administration—were in large part complemented by support from outside the town. For example, home visit activities conducted by public health nurses from April to May 2011 involved surveys that combined questionnaires and the basic resident register. After the survey was completed, the survey team put information into the basic resident register; afterward, they returned it to the town (Murashima, Suzuki, & Okamoto, 2012). Evacuation centers were open until August 11, 2011.

Many medical institutions in the town were also severely damaged (including Otsuchi Prefectural Hospital); many residents also evacuated into limited spaces.[4] Thus, many residents evacuated outside of the town within a few days of the earthquake in the form of being taken in by their families and

[4] For example, the Central Community Center and Shiroyama Gymnasium in Machikata district has a capacity of 890 people, but received over 1,000 evacuees. Ando Elementary School in Ando district had a capacity of 180 people, but received over 800 evacuees (Great East Japan Earthquake and Tsunami Verification Committee, 2014).

relatives. For example, the disaster public housing resident survey, conducted by the authors in 2019 (total survey and response rate: 23%; Table 8 outlines the survey results) showed that 33% of respondents resided outside the town at least once following the earthquake.

Table 5. Damage status of designated evacuation sites/shelters (centers) due to the tsunami in six districts along the coast of Otsuchi

Districts	Evacuation site	Evacuation center
Machikata	2/4	5/6
Komakura / Nobematsu	0/2	1/1
Ando	0/6	2/3
Akahama	3/3	2/2
Kirikiri	0/8	1/4
Namiita	0/1	0/2

Table 6. Entities and locations of evacuation sites

Kinds of institutions	Actual number of established entities	Percentage of establishing entities
Towns and prefectures	23	53.5%
Private community organizations	11	25.6%
Shrines and temples	5	11.6%
Private land	4	9.3%
Total	43	100.0%

※ Source: Number of damaged facilities/number of designated evacuation sites and centers prior to the earthquake

※ All evacuees in Komakura/Nobematsu re-evacuated to Machikata following fire damage after the tsunami.

Source: Mugikura et al. (2013)

3.4. Provisional Living (from around August 2011 to around 2013)

1) Movement in Each District towards the Basic Reconstruction Plan and Afterwards

Otsuchi town created a basic reconstruction policy in September 2011, and the reconstruction vision was established by November through discussions at Councile for Reconstruction and Town Development in each district. Table 7 summarizes the reconstruction vision and its formulation process in several coastal districts in Otsuchi town. The reconstruction vision differs across districts. The movement of each district is mentioned in Table 7, and movement related to the entire town is described below.

Table 7. Comparison of Reconstruction Vision Formulation Process, Reconstruction Vision, and Subsequent Fluctuations and Responses by District

	Town as a whole	Machikata district	Ando district	Kirikiri district
Major reconstruction vision formulation process (reconstruction council status)	・ September 2011: Established basic reconstruction policy ・October 2011 – November 26, 2011: Regional reconstruction councils held once every two weeks ・ December 2011: The Great East Japan Earthquake and Tsunami Reconstruction Plan (Basic Plan) was formulated	・ Wide-area council was established. ・ The highest priority was given to determining the height of seawalls and embankments (residents expressed that they wanted to talk about shops and housing reconstruction) ・ Council chair: "the target area was wide, the problems examined were too large, and it was difficult to visualize" (town of Otsuchi, 2019)	・ Young people inside and outside the district moved starting in May 2011 (Higashino, 2012) ・ Sentiment for trapezoidal seawalls that are highly difficult to collapse, moving to higher elevation, development of evacuation centers/routes that can be safely used due to the large number of casualties seen. There were also dissenting opinions.	・ Investigations began through town-sponsored councils. Subsequent investigations were done among individuals familiar with one another at resident-sponsored councils. ・ With a common understanding of quickly progressing the project instead of fighting, opinions were brought to the council chair and requested by the town.
Reconstruction vision	・ Concept of the Basic Reconstruction Plan: "A 'beautiful town' with unique characteristics, and a view of the sea where you would want to take a stroll"	・ Central city areas with administrative functions and commercial districts like before the disaster. ・ Concentration of facilities on company land in the town of Suehiro (e.g., library, joint stores, sports facilities, tsunami tradition facilities, disaster public housing). ・ Large park (forest for requiem prayers) in the disaster risk zone	・ Seawalls + 14.5 m above residences centered on high ground. ・ Industrial land in lowlands ・ Construction of multi-purpose community centers with priority given to elevated lands (the former site of Ando Elementary was to be closed), and maintain the region's centripetal force by focusing on soft disaster prevention ・ Seek help of those outside the region (non-district residents can also join neighborhood associations).	・ Revitalization of sandy beaches, which are a symbol of the district ・ High seawalls for the safety of residents and tourists ・ Considering the aging population, building residential areas in the vicinity of national roads and not in elevated areas. ・ First promptly secure a residences. Then secure the community center.

2) Prominent Movements by a Variety of Actors

In the provisional living stage, various support systems and supporters came to Otsuchi town from outside. As a result, the rapid acceleration of changes that were already taking place in the region were seen in a variety of realms. For example, the industrial sector saw the development of commercial

clusters around Oshachi areas within Machikata district for the reconstruction of local shops; the cultural sector witnessed the concepts of a requiem prayer forest and Otsuchi town media commons; and education experienced consolidation and the closure of elementary and junior high schools. However, as discussed in part (5), the lack of flexibility led to cases where these efforts encountered snags or problems when entering the early stage of recovery/reconstruction, as rebuilding the daily lives of individual stakeholders began in earnest, and daily life strategies became divided.

3) Community Support for Temporary Housing

The provisional living stage is also when the local community became dispersed in the eyes of the residents. Households with seniors or those with disabilities were prioritized for their move-in into emergency temporary housing based on a lottery system; the local community and lifestyle prior to the earthquake were forced to change drastically at this point. The percentage of households living in emergency temporary housing (among all households in the town) peaked around 2013, and has gradually decreasing since then (August 2011: 32%, 2,039 households → January 2013: 38%, 2,059 households → August 2017: 24%, 1,166 households).

The University of Tokyo Institute of Gerontology—which was involved in the analysis of the survey results of the visiting public health nurses introduced in part (3)—organized activities at an early stage regarding community support for temporary housing. A workshop was held in October 2011 with community associations as part of "residential environment inspection activities" in order to gather residents in meeting places and lounges in each temporary housing unit to address problems in the current residential environment. Support was also provided to establish a council of community association representatives in temporary housing, so that residents' voices, heard through residential environment inspection activities, could be conveyed as regional voices. The residents' opinions, expressed through these activities, contributed to tangible improvements, such as the installation of paved streets, slopes in front of entrances, and extensions to eaves (Murashima, Suzuki, and Okamoto, 2012).

The support team from the University of Tokyo Institute of Gerontology subsequently began to focus on how voluntary actions (such as interaction events held in the meeting places and lounges of temporary housing units) could be conducted (Nitanai, Goto, Koizumi, & Ogata, 2013). In the town as well, temporary housing assistants have been stationed in meeting places and lounges in each temporary housing unit since FY 2012 to manage keys and usage schedules. In addition, temporary housing assistants were supposed to fulfill roles such as caring the temporary housing residents, giving feedback/providing information (door-to-door visits), and connecting those with lifestyle problems to associated institutions.

3.5. Recovery and Reconstruction (from around 2014 to 2017)

1) Prolonged Living in Temporary Housing and Diversifying Needs of Residents

Members gathering in meeting places or lounges became fixed by around 2014, and there was increased criticism of temporary housing assistants. In 2014 for example, there were no changes in terms of contractors accompanying the change in the project system, which placed temporary housing

assistants. When the town explained the policy of re-hiring virtually all former staff members without changing the contractors, there were reports that "a series of complaints about the actual working conditions were lodged, such as 'why can't we use meeting places or lounges on Saturday and Sunday, even where are multiple support staff members for a single meeting places or lounges,' and 'they don't even help us with removing the snow or weeds'" (Asahi Shimbun, February 19, 2014). Of course, the authors met residents who felt a sense of purpose and healing by participating in meeting places and lounges events, as well as residents who are happy to interaction with temporary housing assistants, in field surveys conducted during this period. However, with the diversification of needs by recovery and reconstruction phase, there were certainly limits to listening indirectly to residents' needs and intentions at meeting places or lounges, or from temporary housing assistants; such disparities, in their respective situations, were large for each housing unit.

Delays in Subsequent negotiations with landowners and reconstruction gradually prolonged living in temporary housing. A schedule for the reallocation of residential land—which was delayed by about one year in many areas—was displayed in November 2015 (data from Otsuchi Town Urban Development Division, November 2015). One reasons why the plan was delayed was that the town reflected the results of the residential reconstruction intention survey (conducted in March 2015) (Yoriuri Shimbun, October 23, 2015). The following can be guessed as a background factor of the change in housing reconstruction intentions: due to the dispersal of temporary housing in the town, the cost of mobility (e.g., attending to hospitals, commuting, shopping, etc.) increased compared to before the disaster, and savings were reduced, thereby making it difficult to predict the next phase.[5] The cost of self-reconstruction is also thought to have increased, as land prices soared in the town's inland areas (Nozaka, 2016).[6]

2) Failure of the Commercial Cluster Development Plan

Examination of the central commercial district around Oshachi began in earnest in FY 2015. However, this examination soon encountered problems. For instance, "shop owners wanting tenants are usually short of funds, and the schemes created by community development companies [which are the assumed operating company of shopping complex] do not succeed at all in a commercial situation. That being said, facility operations cannot be established if the tenant fees are lowered, risking an early closure of the facility. As a result, a situation where plans never materialized persisted" (Arata, 2017). Afterwards, at the end of FY 2015, the standard rent + common area fee was 70-75 thousand yen, and an average of 49.5 m^2 per lot, but shop owners reacted negatively, stating that "life was not possible under such conditions." Therefore, the Otsuchi Society of Commerce and Industry conducted an inspection of the rental facility for a restaurant being built in Kamaishi city. Findings revealed that the

[5] The *Otsuchi Mirai Shimbun* (December 27, 2012) includes an article on the outpatient status of seniors, stating: "I have my family take me when going to work, and I spend roughly 2,000 yen for a taxi when coming back home. There are free route buses, but these come once every three hours after commuting hours, and if the timing doesn't work, then it is difficult to stay at a provisional clinic without a waiting room." Hence, outpatient visits were a great burden for pensioners.
[6] Ogakuchi district recorded the largest rate of increase in land prices in Japan from 2012 to 2013 (September 2012: 17,400 yen → September 2013: 22,700 yen → January 2014: 28,300 yen).

plan of around 49.5 m^2 was too large, and that over 20 customers could be seated even with an approximately 29.7 m^2 store. Otsuchi Society of Commerce and Industry requested that Otsuchi town review the plan immediately after inspection, but this request was rejected. A public offering was made in FY 2016 with 70-75 thousand yen as rent and common area fees, but there were virtually no applicants, and the project eventually fell through.

Not even the chairman of Otsuchi Society of Commerce and Industry at the time knew why the request to review the plan was rejected. The very fact that no detailed explanation was provided to the chairman from the town regarding the reason for rejection indicated a lack of sufficient communication between the town managers (support staff members from outside the town at the time) and Otsuchi Society of Commerce and Industry. As seen in part (1), staff members (in addition to executives) in Otsuchi Society of Commerce and Industry played an important role before the earthquake in coordinating. Did this mechanism not work well at this time? There are two main reasons. First, the damage to the staff members in Otsuchi Society of Commerce and Industry was severe. The deaths of both the executive director and instructors (both from Otsuchi town) in particular were major impacts according to executive members (Individual A, interview, 2018). Second, the Otsuchi Society of Commerce and Industry began to focus on the management guidance of its members after the earthquake. Although the staff of Otsuchi Society of Commerce and Industry maintained contact points with members, and built trusting relationships through the planning and management of local events, there is a high possibility that these staff shifted to a new system without the know-how being sufficiently passed down during the chaotic time after the earthquake, and that there were few staffs who could play a coordinating role.

In this way, the concept of core town development in Machikata was forced to undergo major changes (Fig. 4).

Fig. 4. Plan of Commercial Clusters in Machikata as of March 2013

※ Green circles indicate plans whose areas were shifted or fell through, while light blue circles indicate plans that were downsized

Source: Added to Otsuchi Society of Commerce and Industry's commercial/industrial reconstruction plan review committee, 2013

3.6. Second Half of Reconstruction (from around 2018)

1) Current Status of Living in Disaster Public Housing

Table 8. Outline of Disaster Public Housing Survey in 2016 and 2019

Surveyor	2016: Planned and designed by Tetsu Mugikura, Tatsuto Asakawa, and Shin Nozaka, and inspected with students from Iwate University and Meiji Gakuin University. 2019: In addition to the above, researchers from Iwate University and Waseda University, and students from specialized colleges, participated in the survey.
Subjects	2016: All residents of disaster reconstruction public housing aged 18 years and over as of December 1, 2016 (419 units) 2019: All residents of disaster reconstruction public housing aged 15 or older as of August 1, 2019 (866 units)
Methods	Combined use of individual interview method (recorded by others) and mail collection method (recorded by individuals) (total number of surveys, individual forms)
Period	2016: Visiting and questionnaire distribution periods – December 9-12, 2016; questionnaire collection period – December 9, 2016-January 31, 2017 2019: Visiting and questionnaire distribution periods – August 8-11, 2019; questionnaire collection period – August 12-September 15, 2019
Major items	Change process in the place of residence after the Great East Japan Earthquake, concerns about living in public housing, types and frequency of visitors, food consumption, mental health, living conditions, participation in local activities, purpose of life, prospects for future housing, requests for support measures, and feelings of reconstruction in terms of self and town.
Response rate	2016: 24% (156 forms) 2019: 23% (291 forms)

As seen in part (5), the reconstruction of residences was postponed due to delays in reconstruction. All disaster public housing was completed by FY 2019. In that case, what were the residents' living status and attitudes? Findings of surveys on disaster public housing residents in Otsuchi town, conducted by the authors in 2016 and 2019[7] (Table 8 provides an outline) highlight that their personal sense of reconstruction improved over three years, but those who completed the reconstruction of residences had a low sense of reconstruction. The percentage of respondents whose degree of reconstruction was "half or less" was 70.2% in 2016, but 50.9% in 2019. Among disaster public housing residents in 2016, there were the following free-form responses: "I don't have much to look forward to. I'm just waiting for the end. Before the earthquake, my home was close to Otsuchi Station, and my grandson came to play. That was my purpose to keep living" (woman in her 80s), and "I'm calm when I take my medicine, but I want to die sometimes. Before the earthquake, I would go to the port at dawn and help the fishermen. I would get on the boats and help their fishery. I enjoyed receiving some fish as thanks for my help" (man in his 40s, physical disabled). These results suggest that some residents lost their motivation to live due to rapid and drastic changes in their lifestyles following the

[7] Please see Nozaka, Mugikura, and Asakawa (2018), Asakawa (2018), and Mugikura, Asakawa, and Nozaka (2017, 2018) for a more detailed analysis of the 2016 survey. The report of the 2019 survey (in Japanese) is scheduled to be published on the Internet.

earthquake. This tendency is seen in the proportion of respondents who chose "creating an environment where I can live in peace" (2016: 26.4% → 2019: 32.6%) coming in second to "reducing medical and nursing care costs and burdens" (2016: 65.1% → 2019: 67.8%) in response to the item of "support measures that should be implemented" (multiple-answer); and "transportation convenience" (2016: 15.6% → 2019: 20.9%) and "weak interactions between disaster public housing residents" (2016: 19.0% → 2019: 14.9%) in response to the item of "concerns when living in disaster public housing" (multiple-answer).

2) Examples of Budding Movements toward Reconstruction in the Region

There were some movements after reconstruction town development plans—which were important for the entire town—were downsized or failed. Local residents have objective views to their own values and lifestyles, and joined them with existing values to create a new lifestyle after the earthquake. Some examples are given below.

a) The Community Mutual Living Home: Nemareya[8]

The community mutual living home of Nemareya was opened at the Otsuchi Community Welfare Office, which was built as part of a subsidy project received from the Japanese Ministry of Health, Labour and Welfare by the specified non-profit corporation Workers Co-op. Its primary businesses are the following five elements: (1) day services for the elderly; (2) day services for children mainly from elementary to junior high school students; (3) temporary day support for families with members with disabilities; (4) production and sales of confectionery using locally produced foods (mainly assuming employment of people with intellectual disabilities); and (5) "Ochakko", tea salons (with gymnastics classes, hand foot care massages, and other events) that anyone can participate in. Other events are continuously held at this office, such as the "Otsuchi children's cafeteria," held by women in the neighborhood as volunteers, "Konai-kai," which creates spaces for local junior high and high school students who have tendency to have truancy issues to stay; and "shopping tours," where those who cannot drive by themselves carpool to go back and forth between commercial facilities in the town.

To verbalize the philosophy of this organization's activities, the following two concepts can be defined. The first is the low barrier between the supporting and supported sides, or in other words, the interactive relationship between the giving and the given. The "Otsuchi children's cafeteria" was initiated by students who were in junior high school when using the facility at the time, and it was women living near the facility who helped to realize this initiative. There is a relationship that does not set a boundary between those who support and those who are supported (the bystander and the participant); the representatives themselves are also in this relationship. Such relationships can ensure the inclusiveness of community welfare and consequently lead to sustained operations. The second is to "continue without being forced." Nemareya's activities span a wide range, and looking at only pamphlets, it seems that the burden on the parties concerned is large. If it was so, their activities were

[8] Based on the results of interviews with representatives (38 years of age at the time of the interview in 2019) and the pamphlets distributed within the town.

not sustainable. However, Representatives often said during interviews, "I only do what I can." This was made possible by the existence of a relationship that does not set boundaries between those who support and those who are supported (the bystander and participant), which was mentioned in the first philosophy of the activity. For this reason, the representative has also expressed that the above-mentioned relationship "should not be forced, and should be an adequate connection."

Since July 2019, when children's cafeterias started being held in public facilities in Machikata (at the cultural interaction center "Oshacchi"), they have been co-sponsored by "Minsei-jidou Iin" (volunteers who are commissioned to conduct welfare activities and child-rearing counseling) and the liaison council of "Shokuseikatsu-kaizen-suishinin" (volunteers who are commissioned to promote local residents' health throughout making their diet better) , through the council on social welfare. This will serve as a point of contact for activities by organizations that developed local health and new welfare activities before the earthquake.[9] It will be important to see how the relationship between the two activities will change in the future, and how their respective philosophies will affect each other.

b) Otsuchi "Arigato(Thank you)" Rock Festival (commonly referred to as "Ari-fes")[10]

Ari-fes is hosted by about 30 executive committees, mainly local residents in their 30s and 40s. The first festival was held in 2012 as a "thank you" to the international love that Otsuchi town received following the earthquake. Since then, it has clarified its policy on ensuring a free-admission handmade festival, and it was held every year until 2019 (suspended in 2020 due to the spread of the covid-19). There are three main reasons why the festival has continued.

The first is that they have been particular on it being a handmade festival led by residents. Although importance was placed on links with those outside the town, the fact that the final judgment criteria and decision rights related to the plan remained in the hands of the residents was likely a major factor. Major revenue sources for Ari-fes include sponsorship funds and profits from sales of goods, such as originally-designed T-shirts and towels. These goods and venues are designed by representatives. Many employees of local construction companies are on the executive committees of Ari-fes. The technology for building the scaffold for construction sites is used to assemble the stage.

The second reason was that the local community provided ongoing support. Local construction companies are important collaborators. For example, one company's president said, "Something must be sent out from Otsuchi town [since it is expected that reconstruction demand will decline in the future]. Do as much as you can" (Individual B, interview, 2018). In this way, the company provides support with sponsorship money every year to Ari-fes, and associations of local construction companies in the town lease private power generators. Against this background, there is also an expectation in industrial sector that Ari-fes would serve as a vehicle to transmit the area's voices outside of the town to other regions after the completion of reconstruction projects.

The third reason is that attempts to change the management methods of Ari-fes have been made

[9] From leaflets for July, September, and October-December of 2019, published on the cultural exchange center "Oshacchi" Facebook page (last accessed on May 6, 2020).
[10] Based on interviews with representatives of the executive committee (44 years old at the time of the hearing in 2018) and leaflets posted on the "Ari-fes" Facebook page.

every year in response to criticism from residents. There is always criticism of the festival, although it is held only once a year, due to (in the residents' eyes) unfamiliar music being played and participants with bizarre appearances being seen. The representatives have a reflexive attitude in response to this criticism, stating, "The genre [of the music], being the genre that it is, has never been in this town, and there are parts that stand out…this isn't a criticism [against the participants or supporters, or the residents]. This is the truth." As a result, new management methods for Ari-fes have been devised every year. For example, the ratio of performance genres may be adjusted. A wide range of performers of different ages (from infants to the elderly) and genres of music, such as playing drums by local nursery, hula dancing by local women, and dancing for local women's associations, have been included (from 2015 onwards).

The above introduces a number of activities conducted in the town by the younger generation in their 30s and 40s. They are trying to create a new local lifestyle that can blend into the local community, while being conscious of the connections with activities that older generations have continued in the area.

The residents of Otsuchi town have gone through repeated trial and error while experiencing massive damage by the earthquake, incorporating the rapid and immense entry of knowledge and values following it, and being supported (and at times swayed) by other people. There are residents who have been able to hold onto their own beliefs by objectively viewing their own values and comparing them. movements by various actors—who created new local lifestyles following the earthquake, which could blend in with local values from before the catastrophe—have (even now, after repeated trial and error) slowly taken form. Before these changes could be integrated into the town's future, is it possible to verbalize what was truly important in terms of rebuilding Otsuchi town and the mechanisms that support it? In other words, did a new local identity emerge?

4. Outcomes: Important Elements at Each Stage of the Reconstruction Process, as Seen from the Example of Otsuchi Town

This paper looked at the reconstruction process following the disaster that struck Otsuchi town. Important perspectives for understanding each stage of the reconstruction perspective, as seen from the content thus far, have been discussed. These include the following four elements.

The first perspective is whether there were disaster prevention measures during the Emergency Evacuation phase that combined with issues during the Refugee stage (e.g., operating designated evacuation facilities that can handle senior welfare, and protecting members' lives who manage evacuation center) and with local education during non-emergency periods (e.g., promoting the correct understanding of estimated risks in the region). Otherwise, disaster prevention measures during the emergency evacuation would be difficult to protect human lives.

The second perspective, during the Provisional Living– Recovery and Reconstruction phase, is to what extent local residents recognized what is important when rebuilding the region (=local identity) and could explain it to those who live both inside and outside the region. The level to which such a local identity is clear greatly influences the state of reconstruction. Differences in awareness began to

emerge, even among residents, once entering the Recovery and Reconstruction phase, based on each individual's daily life reconstruction strategies. In addition, various supporters came in droves, even during the Recovery and Reconstruction phase, when evacuation life came to a close to damaged regions, but it is not the case that all supporters properly understood the local culture. Furthermore, local documents were lost when the region was struck by tsunami or fire disaster, and it was difficult to remember the town's original appearance. At the very least, for future catastrophes, regional leaders need to be clearly aware of local identity, and prepare in advance a logic that can be explained.

The third perspective is that, during the Provisional Living– Recovery and Reconstruction phase, true daily life reconstruction cannot be achieved for affected people without organic links of the various lifestyle elements—not only residences or works but also traffic, purpose of life, mental healing. We are not saying it's needless to promptly rebuild residences and workplaces, and to ensure the infrastructure development or growth/operation of assembly halls for this purpose. However, pushing ahead on just these tangible issues does not produce a sense of reconstruction among residents.

The fourth perspective is, during Recovery and Reconstruction phase, paying attention to what kind of awareness residents obtained through the project process, instead of assessing reconstruction based on only the success or failure of reconstruction projects. It was predicted from the outset that many districts would undergo major changes in terms of regional appearance in the reconstruction plan. In a process where various reconstruction projects have failed, but residents have been able to once again become aware of local identity and the lifestyles that define themselves.

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