How to Support Social Resilience in Tsunami-Devastated Communities: Iwanuma Case Study

Camille Cosson

PhD Student, Department of Design and Architecture, Kyoto Institute of Technology, Kyoto, Japan
camicosson@gmail.com

Abstract: *This paper describes the post-disaster reconstruction in the Tohoku region after the 2011 earthquake. Nine years have passed since the Great East Japan Earthquake and Tsunami occurred, and many efforts have been made since to rebuild the devastated territories. Some Japanese architects and urban planners have seen the recovery as a window of opportunity to aim for more resilient cities. Nevertheless, building disaster-resilient communities remains a challenging task. This short paper presents the initiatives made to improve refugees' social conditions in disaster-relief housing, using the case study of Iwanuma's relocation project. Concluding remarks suggest that many efforts have been made to improve the social aspect of disaster-relief housing in Japan, for example through the development of community spaces or the pursuit of friendlier dwellings.*

Introduction

On 11 March 2011, an unprecedented 9.0 magnitude earthquake shook Japan, shortly followed by a devastating tsunami. The northeast coast of Japan was severely hit, with more than 500 square kilometres flooded (mainly in Fukushima, Iwate and Miyagi prefectures). The nuclear accident in the Fukushima nuclear power plant resulted in the evacuation of the nearby population for an undetermined amount of time (Sabouret 2012). This mega-disaster caused severe human casualties, with more than 16,000 victims and 3,000 people recorded as missing. The 330,000 homes that were wiped out led to nearly 550,000 refugees without a home (Pelletier and Fournier 2012). Also referred to as the Great East Japan Earthquake or 'GEJE' (Santiago-Fandino 2017), the March 2011 disaster was a crucial turning point for Japanese society, and for architecture and urban planning as well (Igarashi and Yamazaki 2014; Itō 2012). Indeed, some Japanese architects and urban planners consider these territories in which everything needs to be rebuilt as a chance to start over. They suggest taking this opportunity to reconsider urban models and aim for more resilient cities.

This short paper describes architects' efforts to improve refugees' social conditions in disaster-relief housings. Although the reconstruction of the Tohoku region has attracted academic attention, it has principally been studied from an engineering viewpoint (Gokon and Koshimura 2012; Koshimura and Shuto 2015; Nagamatsu 2018). Hirano (2013), however, pointed out the dilemma of having to ensure both protection and sustainability after the March 2011 disaster. Jonas (2015) presented a study of Shibitachi (Miyagi) that followed the town's reconstruction over the course of three years. Onoda et al. (2018) furthered these findings, using their on-site experience to discuss the actual status and challenges of reconstruction work five years after the disaster. To the best of our knowledge, this literature has, however, not addressed the challenges these territories are facing with housing reconstruction.

This research focuses on the actions to support social resilience in tsunami-devastated communities. The methodology combines an investigation of reconstruction policies and planning documents with on-site visits. The author visited several disaster-relief housing neighbourhoods in Miyagi prefecture in September 2018 in order to make photographic documentation and observations from the most direct sources. Among these projects, we selected Iwanuma's collective relocation project to illustrate the challenges for the local development of disaster-relief housing.

Supporting social resilience in public housing

A public housing system in response to natural disasters

Japanese public housing is related to the natural disasters that have struck the country over history. In 1923, the Kanto earthquake destroyed a significant part of the country's capital, the urgent need to provide housing for refugees prompted the introduction of the first policy on disaster-relief housings. In 1951, the government enacted the first law on public housing, using means-testing as a principle criterion (Asanuma-Brice 2012). As a result of various government policies, public housing is now divided between two entities. The *kōei jūtaku*（公営住宅）are managed on the local level by municipalities or prefectures, while the *kōdan jūtaku*（公団住

宅) are managed on the national level by the Urban Renaissance Agency (UR 都市再生機構 *toshi saisei kikō*) (Asanuma-Brice 2019).

In the immediate aftermath of a natural disaster, victims can find refuge and assistance first in emergency shelters. Refugees stay there for a few months before being gradually relocated to temporary accommodations (仮設住宅 *kasetsu jūtaku*). These dwellings, made from prefabricated buildings, are narrow and vulnerable to weather conditions; the refugees are living in poor conditions. When the time comes for permanent reconstruction, many questions arise, especially concerning 'post-disaster public housing' (災害公営住宅 *saigai kōei jūtaku*). Post-disaster public housing (災害公営住宅 *saigai kōei jūtaku*) is a low-rent housing system provided by local governments. It is funded by the national government to provide a stable life for people who have lost their homes after a disaster.

Following the 1995 Hanshin-Awaji earthquake, researchers noticed the emergence of various social problems among victims who had been relocated to these public dwellings, mainly due to the social isolation of residents (Tanaka et al. 2009). The consequences highlighted by researchers range from alcoholism to unemployment and even to suicide (Ogino 1998). Based on these findings, it has been shown that in order to reduce the vulnerability to depression and its related risks among relocated victims, it was necessary to avoid social isolation. In order to do so, it would be necessary to provide meeting places and encourage the creation of community networks within relocation projects (Onoda et al. 2018). Experts, researchers, and architects then seek solutions to improve the disaster victims' quality of life by providing housing in a community-friendly environment to enhance communication and exchange between residents. The following sections will illustrate these innovations with the study case of Iwanuma's post-disaster housings.

Iwanuma's collective relocation project

Iwanuma (岩沼市) is a medium-sized town in Miyagi Prefecture located south of Sendai Airport, with a population of about 40,000. In the 2011 disaster, the tsunami spread to the lowlands, flooding nearly half of the city's total area. The municipality is suffering from extensive damages. There are nearly 180 victims and more than 4,200 houses damaged by water (Iwanuma City 2011). The fishing villages that were located on the seashore have been completely devastated. However, the new territorial resilience policies prohibit construction in areas considered too vulnerable. It is urgent to find a solution to relocate the inhabitants of these communities.

Among the strategies offered by the central government, the city of Iwanuma recommends that the six villages concerned (Ainokama 相野釜, Fujisome 藤曽根, Ninokura 二野倉, Hasegama 長谷釜, Kabasaki 蒲崎 and Shinhama 新浜) opt for collective relocation. In this reconstruction plan, the people affected move collectively from a risk area to a new safe residential site (Ubaura 2018). The at-risk area is referred to as the 'Relocation Promotion Zone' and residents are allowed to sell their land to the government, which offers them two options. The first option is to buy land in the new residential area and build a new house on their own, and the second option is to apply to move into public housing. The Iwanuma project is even more complicated as the relocation involves six previously independent localities combined in a new district, mixing private land and public rental housing. Nevertheless, the inhabitants reached an

agreement and accepted the collective relocation project. In March 2012, only one year after the disaster, the city submitted its first reconstruction project and obtained the authorities' approval (Reconstruction Agency 2012).

The town has managed to acquire former agricultural plots at the edge of an existing district (Tamaura) to attach an extension named Tamaura-nishi (*Nishi* meaning west in Japanese). The new district is being built in an already developed area and, therefore, already benefits from infrastructures and services (school, transport, services). The municipality launched the project with the institutions and then decided to leave the project's development to the inhabitants through a Council for Urban Planning. Since the relocation involves six villages, it was decided that each of them would have three representative members on the Council (one elder, one woman, and one youth). Therefore, an eclectic team of 18 inhabitants was assisted by three professionals (a landscape designer, an urban planner, and a housing specialist[1]) to guide them through the various stages of drawing up the master plan. Between June 2012 and December 2013, the members officially met 28 times, to discuss and decide on the district's urban blueprint (Shinkenchikusha, 2016). Furthermore, the architects involved in the reconstruction of public housing were also selected by the residents after a design competition and a public presentation. This type of comprehensive participatory process is a rare case in Tohoku's reconstruction since its complex implementation has in some cases resulted in time-consuming projects. However, in Iwanuma, the decisions were quick and efficient, and the project was officially inaugurated in January 2015.

## The improvement of post-disaster public housing

The protection of local communities

The members of the Council (in charge of planning the new district) were keen to maintain the community ties that are important in these villages, which are primarily composed of senior citizens. Their priority has been to ensure people from the same village are moved to the same area of the neighbourhood. Avoiding the scattering of community members prevents situations of isolation, which are particularly risky for disaster victims (Asanuma-Brice 2012; Onoda et al. 2018). The Tamaura-nishi district was divided into six zones (one for each village), mixing private and collective housing.

---

[1] Mikiko Ishikawa for landscape, Yasuaki Onoda for urban planning and Yoshihide Sanbe for housing policies.

Figure 1: Iwanuma's relocation project
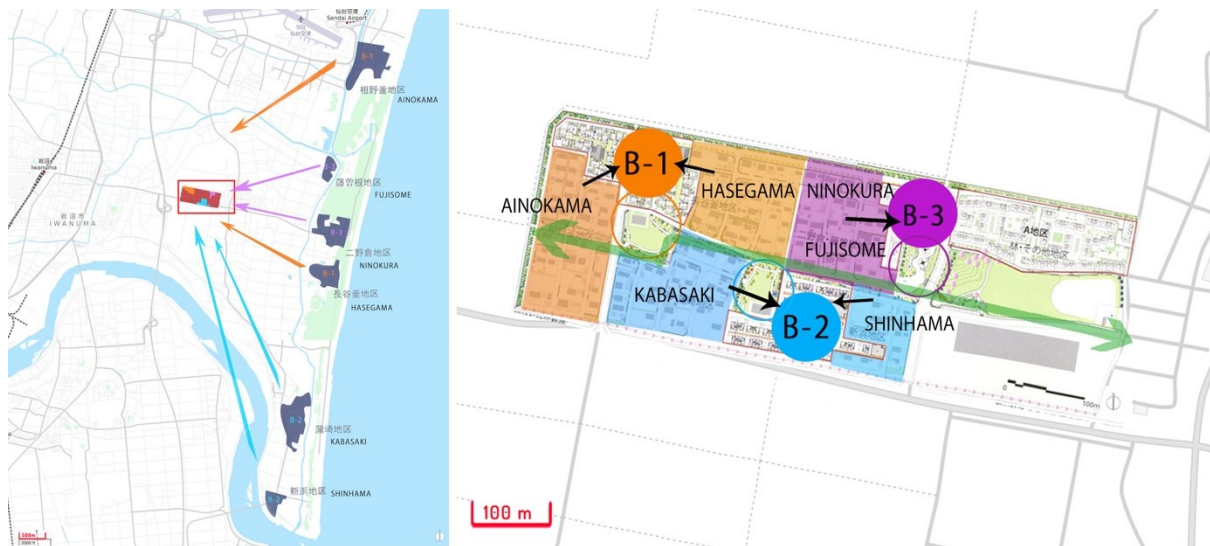
*Six coastal villages were relocated to Tamaura-nishi district; the zoning of the neighbourhood delimits the location of each village and the post-disaster public housing buildings (B1, B2, B3).
Source: Author, using the Chuo University Ishikawa Laboratory.

The three public housing projects placed in the contact zones are intended for the residents of the two adjoining villages. The idea here is to combine two villages to form a 'cluster'. The three clusters are each provided with a park and a meeting place (集会所 *shūkaisho*) for the residents. These spaces are designed to welcoming places for residents to organise meetings or neighbourhood events: 'Public housing for the people of the village would be distributed among these clusters, with each site connected to each cluster as part of a community.' (Onoda et al. 2018)

The implementation of a 'community's cluster' by combining meeting spaces and parks

Scattered communities and cramped living conditions do not enhance social cohesion in temporary housing complexes (仮設住宅 *kasetsu jūtaku*). Toyō Itō and his colleagues of Kysin-no-Kai started conceiving friendly places where the inhabitants could meet and share convivial moments (Itō 2012). That was the origin of the 'Home-for-All' project (みんなの家 *minna no ie*), with the installation of community spaces in the *kasetsu jūtaku* settlements after the disaster of 2011, which later expanded to be used in various contexts (Itō 2018).

The first Home-for-All was built in Sendai with the financial support of Kumamoto Artpolis.[2] Many other Home-for-All were later built all-around Tohoku on the initiative of architects with the patronage of various Japanese and foreign companies. According to Toyō Itō, these devastated areas are an excellent opportunity for architects to take a new stand. He claims that

---

[2] The Kumamoto Artpolis (KAP) is a project of Kumamoto Prefecture that aims to improve culture through architecture and urban planning

despite the modest size of the Home-for-All buildings, it nevertheless questions the essential role of architecture in our modern era and beyond (Itō et al. 2013).

Nonetheless, during the final phase of Tohoku's reconstruction, the use of Homes-for-All disappeared and was replaced by another community space called the 'meeting space' (集会所 *shūkaisho*). Unlike the Home-for-All, which often comes with a kitchen, tatami mats, or a living room in order to provide conviviality to the residents, the *shūkaisho* are more utilitarian, offering only a large room with a few sitting spaces, like in Tamaura-nishi. The municipalities handle the construction, and the architects are not directly involved in the development of these community spaces.

Moreover, the Tamaura-nishi neighbourhood also offers 'soft mobility' and greenery. The dwellings are served by a central pedestrian area called the 'Green Road'. Accessible by gently sloping ramps, the 'Green Road' runs through the entire project. These pedestrian paths create an inclusive environment that leads to the community's cluster - composed of a park and a 'meeting place' (集会所 *shūkaisho*).

Figure 2: 'Soft mobility' and greenery in Tamaura-nishi district

*The 'Green Road' inside the neighbourhood, the central pedestrian promenade, and the 'community's cluster'.
Source: Author, 2018.

A specific characteristic is attributed to each space in order to define it. Thus, the westernmost park (in zone B1) named 'Igune Parc'— referring to a specific type of tree in the region of Tōhoku—is mainly intended for relaxation and the contemplation of nature. The 'Bōsai Park'— Bōsai stands for risk prevention—is intended to strengthen disaster prevention due to its central location in the heart of the district (zone B2). On the east side (zone B3), the 'Kodomo Park' offers a playground for the young children.[3] These three parks are connected by a green promenade that crosses the district from east to west, facilitating easy mobility. At the eastern end of the site, there is a large green area with a water reservoir, located behind the commercial zone. As a symbol of the reconstruction and community spirit of the Tamaura-nishi

---

[3] *kodomo* means children.

neighbourhood, this area was designed to host community events and festivals such as *Hanami*[4] and other local celebrations.

The pursuit of friendlier dwellings

As explained above, social problems appeared after the victims of the 1995 Hanshin-Awaji earthquake were inadequately relocated. In this context, an adaptation of the 'living access' housing model was implemented in several reconstruction projects carried out in Tohoku. This type of dwelling was first tried out in the 1980s by the Urban Renaissance Agency. The typology reversed the standard north-south disposition according to three morphological principles: placing the common alleyway to the south, adjoining the living room so that it would also face south, and ensuring that the bedroom is located to the north to guarantee privacy (Igarashi and Yamazaki 2014).

Drawing on these morphological principles, Yasuaki Onoda has adapted a new version of the 'living-access' housing model. A south-facing public area is designed to foster dialogue between residents, where the entrance of the dwellings is placed. The living room is adjacent to this south facade to enhance connections to the outside, while private spaces requiring privacy are set back on the north face (Shinkenchikusha, 2016).

Figure 3: The 'living access' model

*On the left, the 'living access' scheme; on the right, an example of a unit based on the living access type of dwelling in the Tamaura-nishi district.
Source: Author, based on Shinkenchikusha, 2016.

---

[4] *Hanami* 花見 literally, "looking at the flowers" is a traditional Japanese custom of appreciating the beauty of flowers, mainly cherry blossoms (*sakura*), when, from late March to early April, they are in full bloom.

The post-disaster public housing units built in Iwanuma became the role models both for their time-efficient construction and for the quality of the dwellings, which are a first attempt to implement the 'living access' housing model. Figure 4 is an example of Iwanuma's dwelling designed by the Urban Architectural Planning Partnership (UAPP) in the B1 zone. This project includes a total of 44 detached houses built of wood, and the units followed Yasuaki Onoda's principles. The dwellings were created from a layout dividing the space into four zones. The bathroom and kitchen make up a quarter of the area and are located in the northern part. The living spaces are placed in the southern part and open onto the shared outdoor terrace that connects to the central 'Green Road'.

Concluding remarks

Despite Japan's harsh environment and its long history of disasters, the concept of resilience may not necessarily hold the same meaning as in Western culture. However, in the aftermath of the 2011 disaster, the policies implemented by the government sought to establish resilient territories. The overwhelming dominance of the central government has imposed severe conditions on the small municipalities. Consequently, some of them did not necessarily have the technical or financial resources to comply with the standards and carry out these policies properly. Nevertheless, each local government took into account its physical, economic, and social resources and then determined how to pursue the objective of resilience set by the government.

One of the difficulties encountered by the municipalities during the reconstruction process was the thorny issue of community. Learning from 1995's flaws, the necessity of offering meeting places to strengthen exchanges between residents was acknowledged. In order to prevent social withdrawal and isolation of the refugees, the post-disaster public housings built after 2011 systematically offer community spaces like a 'meeting place' (集会所 *shūkaisho*), or 'Home for All' (みんなの家 *minna no ie*). The implementation of new morphologies in these dwellings, such as the 'living access' housing model, are different proposals made by the architects in response to this social issue. However, the designers' vision might differ from what is applied in practice, as the inhabitants' needs may be slightly different from what the architects had envisioned in their original idea. Although community networks have been recognised as helpful, if not essential, in the disaster recovery process, recreating a community from scratch seems complicated.

For these reasons, Iwanuma's relocation project can be said to be successful because it has achieved the objective of protecting the community that was already there. By simply avoiding the scattering of residents during the relocation process, the city managed to maintain the community's existing close ties instead of struggling to create new ones. On the other hand, even if these first attempts to create community-friendly housings have not yet been a resounding success, they nevertheless demonstrate the commitment of architects to improving the lives of refugees. Since 1995, much effort has been made to improve disaster-relief housing in Japan, especially with regard to the social aspect of housing. The improvement of disaster-relief housing is always an ongoing process, and there will be further enhancements in the future that will learn from past mistakes.

Acknowledgements

References

Asanuma-Brice, C. 2019. *Un siècle de banlieue japonaise: au paroxysme de la société de consummation.* MētisPresses. ed, vuesDensemble. Genève.

Asanuma-Brice, C. 2012. 'Les politiques publiques de logement face à la catastrophe du 11 mars.' *Ebisu Études Japonaises* 47: 205–214. DOI: https://doi.org/10.4000/ebisu.445

Gokon, H., S. Koshimura 2012. 'Mapping of Building Damage of the 2011 Tohoku Earthquake Tsunami in Miyagi Prefecture.' *Coastal Engineering Journal* 54 (1): 1250006-1-1250006–12. DOI: https://doi.org/10.1142/S0578563412500064

Hirano, K. 2013. 'Difficulties in Post-Tsunami Reconstruction Plan Following Japan's 3.11 Mega Disaster: Dilemma Between Protection and Sustainability.' *Journal of JSCE* 1 (1): 1–11. DOI: https://doi.org/10.2208/journalofjsce.1.1_1

Igarashi, T., R. Yamazaki (eds.) 2014. *3.11 igo no kenchiku: shakai to kenchikuka no atarashii kankei.* Dai 1-han. ed. Gakugei Shuppansha, Kyōto.

Itō, T., 2018. *HOME-FOR-ALL and Beyond (みんなの家、その先へ).* LIXIL Shuppan, Tōkyō.

Itō, T. 2012. Ano hi kara no kenchiku. *Shūeisha shinsho.* Tōkyō: Kabushiki Kaisha Shūeisha.

Itō, T., K. Inui, S. Fujimoto, A. Hirata, N. Hatakeyama 2013. Koko ni kenchiku wa kanō ka =: Architecture. possible here? "home-for-all". *Shohan.* Tōkyō: TOTO Shuppan.

Iwanuma City 2011. *Iwanuma City Earthquake Reconstruction Plan Grand Design-Reconstruction of Love and Hope (岩沼市震災復興計画グランドデザイン 〜愛と希望の復興)*
https://www.city.iwanuma.miyagi.jp/bosai/fukko/seibi/documents/grand.pdf

Jonas, M. 2015. *Contested terrains. Re-building – or building back better? Observations of three years of working in Shibitachi.* Japan: Miyagi, Tohoku.

Koshimura, S., N. Shuto 2015. 'Response to the 2011 Great East Japan Earthquake and Tsunami disaster.' *Philosofical Transactions of the Royal Society A Mathematical, Physical and Engineering Sciences* 373 (2053): 1-15. DOI: https://doi.org/10.1098/rsta.2014.0373

Nagamatsu, S. 2018. Building Back a Better Tohoku After the March 2011 Tsunami: Contradicting Evidence. Pp. 37-54 in Santiago-Fandiño, V., S. Sato, N. Maki, K. Iuchi (eds.).

The 2011 Japan Earthquake and Tsunami: Reconstruction and Restoration: Insights and Assessment after 5 Years. Springer International Publishing, Cham. DOI: https://doi.org/10.1007/978-3-319-58691-5_3

Ogino, M. 1998. *Fissures: Kobé, 17 janvier 1995, le séisme--, Passage.* Paris: Editions de la Villette.

Onoda, Y., H. Tsukuda, S. Suzuki 2018. Complexities and Difficulties Behind the Implementation of Reconstruction Plans After the Great East Japan Earthquake and Tsunami of March 2011. Pp. 3-20 in Santiago-Fandiño, V., S. Sato, N. Maki, K. Iuchi (eds.). *The 2011 Japan Earthquake and Tsunami: Reconstruction and Restoration: Insights and Assessment after 5 Years.* Springer International Publishing, Cham. DOI: https://doi.org/10.1007/978-3-319-58691-5_1

Pelletier, P., C. Fournier 2012. *Atlas du Japon: après Fukushima, une société fragilisée.* Autrement, Paris.

Reconstruction Agency 2012. *Outline of the Project to Promote the Relocation of the Disaster Prevention Group in the Tamaura West Area of Iwanuma City (岩沼市玉浦西地区防災集団 移転促進事業の概要について).* https://www.reconstruction.go.jp/topics/20120803iwanumashi.pdf

Sabouret, J.-F. 2012. *Mars 2012: Un an après Fukushima, le Japon entre catastrophes et resilience.* FMSH-PP-2012-01, mars 2012. https://halshs.archives-ouvertes.fr/halshs-00681154

Santiago-Fandino, V. 2017. *The 2011 Japan earthquake and tsunami: reconstruction and restoration.* New York: Springer Berlin Heidelberg, New York.

Shinkenchikusha (ed.) 2016. *Shūgō jūtaku no atarashii bunpō: higashi nihon daishinsai fukkō ni okeru saigai kōei jūtaku = New germination of Japanese housing complexes; post-disaster public housing on the reconstruction from the Great East Japan Earthquake.* Shinkenchiku Bessatsu. Tōkyō: Shinkenchiku-sha.

Tanaka, M., C. Takahashi, Y. Ueno 2009. 'The Relationship between the Actual Conditions of "Isolated Death" Occurrences and Residential Environment in Disaster Restoration Public Housing.' *Nihon Kenchiku Gakkai Keikakukei Ronbunshu* 74 (642): 1813–1820. DOI : https://doi.org/10.3130/aija.74.1813

Ubaura, M. 2018. Changes in Land Use After the Great East Japan Earthquake and Related Issues of Urban Form, Pp. 183-203 in Santiago-Fandiño, V., S. Sato, N. Maki, K. Iuchi (eds.). *The 2011 Japan Earthquake and Tsunami: Reconstruction and Restoration, Advances in Natural and Technological Hazards Research.* Springer International Publishing, Cham. DOI: https://doi.org/10.1007/978-3-319-58691-5_12