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## **Individual Self-help Housing Reconstruction with Relocation: Transformation of Built Environment after the Great East Japan Earthquake**

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### **Abstract**

**One of the characteristics of housing recovery after the Great East Japan Earthquake is that survivors are required and willing to relocate in order to reduce the risk of tsunami. The key project strongly driven by the government sector is collective relocation to mountainside area. Aside from this project, it can be confirmed by authors' field survey and mapping analysis that scattered individual self-help housing reconstruction with relocation has transformed the urban structure and built environment dramatically which triggers urban sprawl and peoples' isolation from community. By analysing this phenomenon scientifically, it can be said that we cannot only rely on government-controlled planning "projects" but need planning technique to "guide" individual housing reconstruction along with developing multiple pre-and post-housing recovery models for the next mega disaster.**

### **Keywords:**

Housing recovery, relocation, buyout, land use planning, the Great East Japan Earthquake

**Abstract Reference Number: 4**

### **Introduction**

The Great East Japan Earthquake of March 11, 2011 killed almost 18,000 people and the following tsunami washed away more than 300 villages along the coast in the north-eastern part of Japan. Government policy for tsunami risk reduction not only heightens coastal levees but also asserts land use control that covers approximately one third of the tsunami inundated area (Masuda 2015). Land use control is implemented by the buyout of private properties and collective relocation projects in which government develops new residential areas in the mountainside. Aside from this project, authors have confirmed by several years field surveys and mapping analysis that individual self-help housing reconstruction with relocation has been increasing and scattering in coastal towns.

Post-disaster recovery is a process of restoring survivors' livelihood and enhancing resilience of society. One of the characteristics of housing recovery after the Great East Japan Earthquake is



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that survivors are required and willing to relocate in order to reduce the risk of tsunami. The authors set research questions based on two perspectives: human-centered recovery and spatial planning perspective. The former includes "Why did individual survivors decide to relocate?", "How did they decide where to relocate?" and "How did they evaluate their own decision?" The latter includes "How did the aggregation of individual self-help housing reconstruction with relocation transform urban structure and built environment?"

The methodology of the study is as follows. Nine municipalities along the coast were selected as case studies, all of which have a high percentage of housing and tsunami inundated damage. The authors identify the newly constructed building after tsunami by comparing the "Residential Map" published before and after tsunami which features the names of each building and residence including the name of household head. We converted this analog information to digital information through the use of geographical information system (ESRI ArcGIS ver.10). After identifying more than 4000 newly constructed buildings in nine municipalities, the authors distributed questionnaires on-site where new building are concentrated. 310 out of 988 responded to the questionnaire and the authors conducted additional interview surveys among the questionnaire respondents (N= 40 households).

### **Collective Relocation by government-planned projects**

Picture 1 shows the collective relocation project site in a mountainside area overlooking the sea. It is true that this project is effective for tsunami risk reduction, but the problem is that it requires time to finish developing land to start survivors' housing reconstruction. The National government planned 5 years (2011-2015) as a period of intense urban planning project implementation; however, the expected progress percentage by the end of FY 2015 is 41% in Iwate Prefecture and 53% in Miyagi Prefecture. Many people participating in the project are still waiting to reconstruct their housing for the last three and a half years since March 11, 2011. Several local newspapers report that local government faces a difficult decision on re-examination of the plan how much lot has to be developed in collective relocation project.



Picture 1. Group relocation project site in the City of Ofunato, Iwate Prefecture (May 2015 by author)



Transformation of the built environment by individual housing reconstruction with relocation

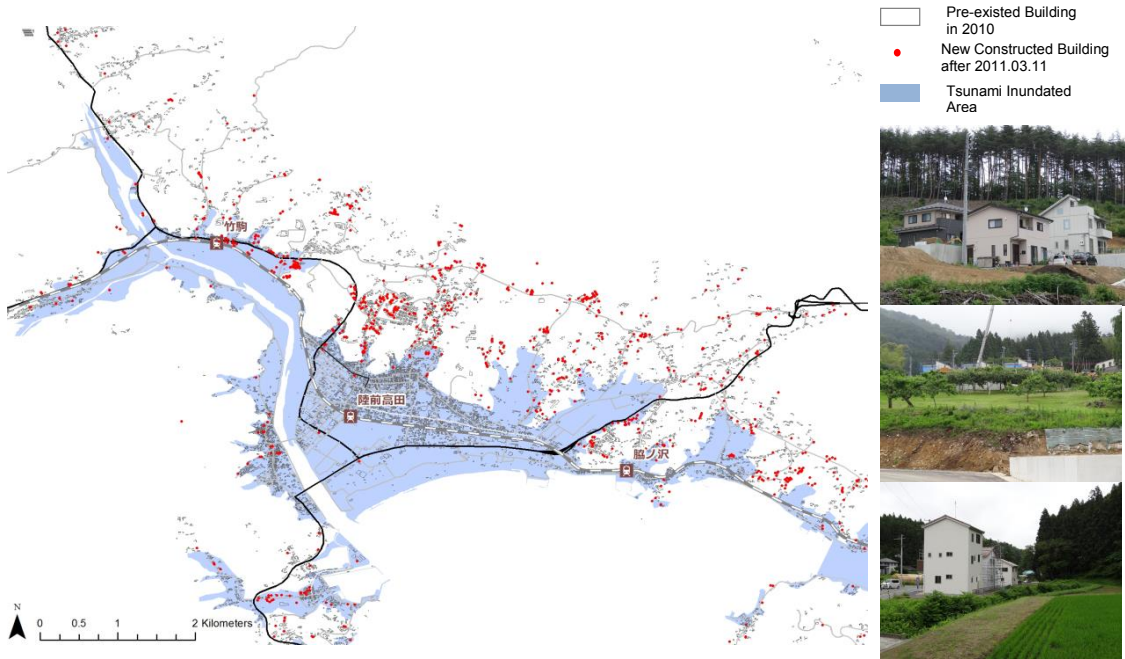


Figure 1 Newly Constructed Buildings after 3/11 in the City of Rikuzentakata, Iwate Pref.

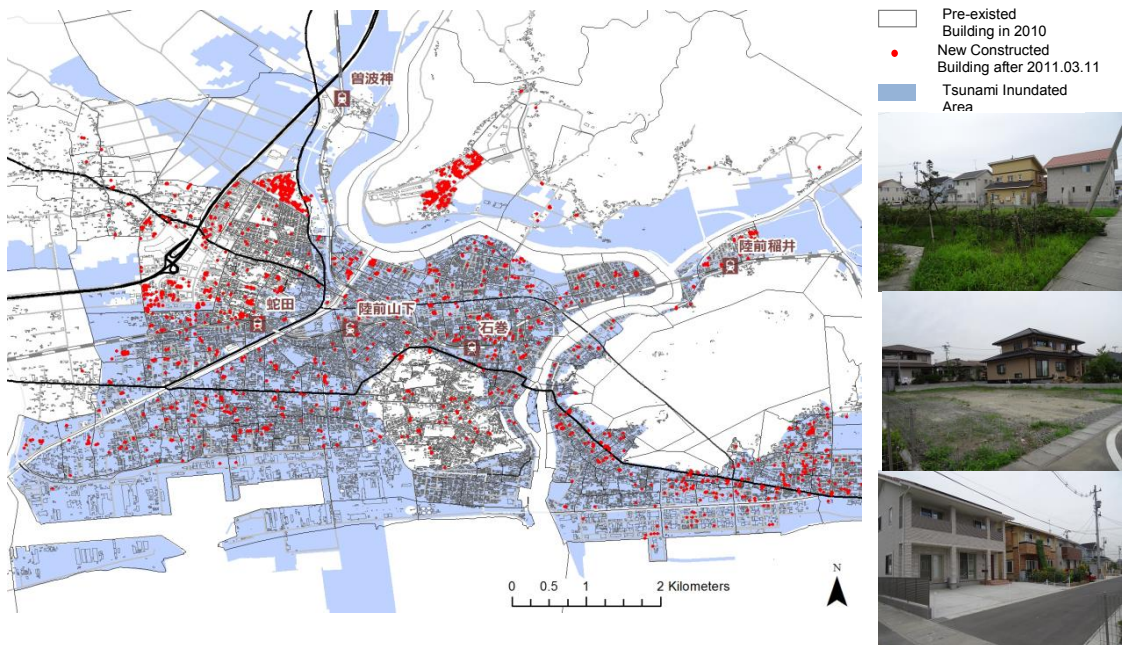


Figure 2 Newly Constructed Buildings after 3/11 in the City of Ishiomaki, Miyagi Pref.



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Figure 1 shows "individual self-help housing reconstruction with relocation" in the City of Rikuzentakata, Iwate Prefecture. Individual survivors developed rice fields, agriculture land and forest as residential land to reconstruct their housing. New buildings are dotted along the existing roads and the borderline of tsunami inundated area. New buildings are scattered citywide, and the footprint of the living area is expanding which can be called urban sprawl. The populated area has expanded inland away from coast line.

Figure 2 shows "individual self-help housing reconstruction with relocation" in the City of Ishinomaki, Miyagi Prefecture. New building has been constructed inserting into pre-existing settlement which is categorized as infill development type that did not expand the urban footprint. This is totally in contrast with figure 1 in which new building is constructed in a non-residential area. It is difficult to find a wide range of residential settlement in the city of Rikuzentakada. New building construction concentrated area in Ishinomaki is where there used to be rice fields and agriculture land that was developed before the 3/11 tsunami through the land readjustment project: a method whereby an irregular pattern of agricultural land holdings is re-arranged into regular building plots and equipped with urban infrastructure such as roads and open space. The existing vacant lots in pre-developed residential area enables absorption of new individual housing reconstruction after tsunami when demand for inundated residential land has dramatically increased.

### **Individual survivors' decision making process**

What kind of characteristics do individual relocated survivors have? More than 90% of their housing experienced severe damage by tsunami. None of them are required to relocate by government land use control. Approximately 60% of respondents' land was designated as hazardous zone which restricted building, however, more than 20% can reconstruct their housing on their previous lot but not decided to because they are willing to relocate because of tsunami experience.

When and why did individual survivors decide to relocate? Almost 70% of the respondents decided to relocate before local government has finalized the post-disaster recovery plan. 46% of the respondents decide to relocate within a half a year and 68% within one year. This indicates that prolongation and the contents of government-driven planning projects did not give influence for 70% respondents. It is considered that the expectation of the project delay deepened survivors' resolve to take priority for speed in order to reconstruct their housing as early as possible.

How did they decide where to relocate? There are various options for survivors about where to relocate. The top reason for selecting where to relocate is "To decrease the risk of tsunami" (73.9%). The next reason is "Find the land by chance" (31.6%). This indicates that they did not weigh options for where to live in a hurried manner. Subsequent reasons consisted of almost 30% which are "near where they live before tsunami", "convenient for daily shopping" and



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“affordable land”. This proves that they selected the land by affinity, convenience and affordability.

How did they evaluate their own decision to relocate? What kind of social contact with community has decreased? “Visit neighbor’s house each other” (41.6%), “Lending of goods and sharing food” (32.7%), and “Go shopping and enjoy leisure” (31.9%) which are deeper relationships. More than 40% of the respondents are “very satisfied” and “satisfied” with their livelihood, and more than 70% are willing to continue living in the new area. However, based on interviews, what people regret the most is loss of peoples’ connection and destruction of their prior communities from before tsunami. Survivors did finish constructing their housing but there are many people who feel isolated in old and new communities.

### **Conclusion: Pre- and Post-disaster Housing Recovery planning model for next mega disaster**

This paper shows the decision-making process of individual self-help housing reconstruction with relocation and how it transforms the built environment and urban structure after massive tsunami.

It proves that the aggregation of individual self-help housing reconstruction with relocation has significant influence for the transformation of urban structure. There are cases that trigger urban sprawl, low-density development, destruction of natural environment, and expanding of footprint all of which are physically and economically unsustainable for a de-populated region. Spatial distribution of individual self-help housing reconstruction with relocation is inconsistent with local government post-disaster recovery plans through collective relocation projects. Even though four years has passed since the tsunami, the further drop-off from government-driven projects might increase because of ongoing project delay. However, does this mean that local government must try to involve all survivors in government-driven projects? The answer is no. The decision-making and action by survivors are so resilient that they find the land and reconstruct their housing by themselves without waiting for government plan and assistance. After a mega disaster, it might be almost impossible for the government sector to control and plan all survivors’ housing recovery. We cannot only rely on government-controlled planning "projects" but need planning techniques to "guide" individual housing reconstruction.

What we have to develop is pre-and post-disaster housing recovery models with spatial planning perspectives for the next mega disaster. Pre-disaster housing recovery includes the regeneration of residential areas with social attractiveness and open space to receive peoples' post-disaster relocation before the next hazard strikes. This planning is not only for disaster risk reduction but also includes developing urban images and visions with comprehensive planning. Stakeholders are not limited to government sector but the private sector which has already starting residential area development in mountainside for the next tsunami hit area by the Nankai Trough Earthquake, magnitude 8-9, which has a 70% chance of occurring within the next 30 years. The

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suggested action after disaster includes providing housing reconstruction assistance subsidies to provide incentive for survivors to promote infill development. Spatial planning and guidance by utilizing survivors' resilience is required for post-disaster housing recovery to achieve sustainable recovery.

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### Author's Biography



Tamiyo Kondo, Ph.D, is an Associate Professor at the Graduate School of Engineering, Kobe University. Her areas of expertise include housing policy, community-based planning and post-disaster housing recovery. She has been studying long-term housing recovery after Hurricane Katrina since 2005 and the Great East Japan Earthquake since 2011. Major papers can be downloaded from <http://www.tamiyokondo-lab.jp/achievement.html>