

International Seminar on Population Resettlement by Antioquia Presente in Medellin

## **Urban Recovery after 2011 Great East Japan Earthquake and Tsunami**

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### **1. Post-tsunami recovery strategies in Sanriku Coastal Areas after the 1933 tsunami**

***Keywords:***

*land use regulation, relocation to higher land, 1896 Sanriku Tsunami, 1933 Sanriku Tsunami, transition of housing location, urban recovery strategy*

***Context:***

Land use mitigation is one of the most certain strategies to avoid future tsunami disaster. Sanriku Coastal Area, one of the most tsunami-prone areas in Japan located in the north part of the main land, had been seriously damaged by the catastrophic tsunamis in 1896, 1933, and 1960 before the 2011 Great East Japan Earthquake and Tsunami. Japanese Government prepared resettlement space on the higher ground for the victims after the 1933 Great Sanriku Tsunami.

***Before:***

Fig.1 illustrates the transition of housing location after the 1933 tsunami in Hongo District, Iwate Prefecture (Muraio and Isoyama, 2012). Because of the relocation strategy, there is almost no building as of 1948 except in the higher place provided by the government. However, it is recognized that many buildings had been gradually constructed in the vulnerable lower lands in the twentieth century.

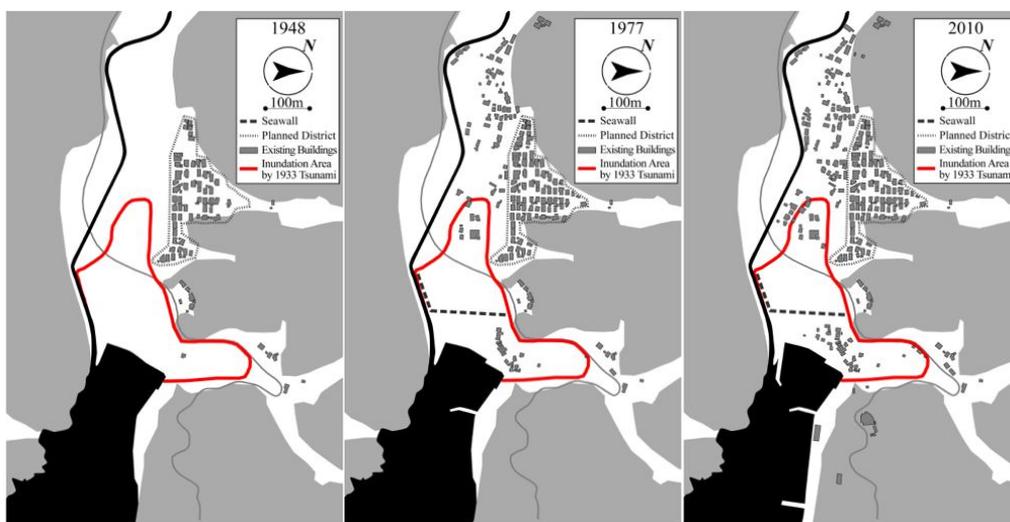


Fig.1 Change of housing location in Touni Village (1948-2010) (Muraio and Isoyama, 2012)

*After:*

The 2011 tsunami attacked the district and washed away hundreds of construction in the lower lands again as shown in Fig.2. On the other hand, the houses on the higher resettlement provided by the government after the 1933 tsunami survived the destructive tsunami.



Fig.2 The building damage situation in Hongo by the 2011 Tsunami (left) with pre-tsunami situation (right) (GSI, 2011)

***Good practices:***

The fact that the resettlement on the higher ground provided by the post-tsunami recovery planning and policy after the 1933 tsunami was not damaged by the latest tsunami evidences the importance of land use mitigation for tsunami disaster reduction. This successful experience in the tsunami-prone coastal area should be come down to the future.

***Problems:***

Although the government developed the safer resettlement for the residents after the 1933 tsunami, many people started living in the vulnerable lower lands or returned to the original tsunami-prone sites until 2011. According to the previous research<sup>1</sup>, this unfavorable situation can be seen in several districts in Sanriku Coastal Area. It is because of lack of tsunami risk recognition,

convenience, or inherited lands. The recovery planning and policy for the land use regulation was efficient to reduce tsunami risk in a sense, but it was not mandatory strategy to keep people living only in the safe place.

## **2. Business Continuity Planning after the 2011 Great East Japan Earthquake**

### ***Keywords:***

*Business Continuity Planning, Business Continuity and Resiliency Planning, post-disaster recovery*

### ***Context:***

Business Continuity Planning (BCP), which is also called Business Continuity and Resiliency Planning (BCRP), “identifies an organization’s exposure to internal and external threats and synthesizes hard and soft assets to provide effective prevention and recovery for the organization, while maintaining competitive advantage and value system integrity (Elliot, et.al, 1999)”. The importance that an organization has a kind of continuity planning preparing for disaster management had been pointed out since the 1995 Great Kobe Earthquake in Japan.

### ***Before:***

The Cabinet Office released “Business Continuity Guideline –For disaster reduction and

improvement of disaster management for business in Japan” in 2005. It directed organizations how to make their post-disaster management planning as shown in Fig.3 and encouraged them to review it with a checklist. Then it was updated in 2009. Thus, the concept of BCP had widely disseminated among Japanese companies before the event on March 11, 2011.

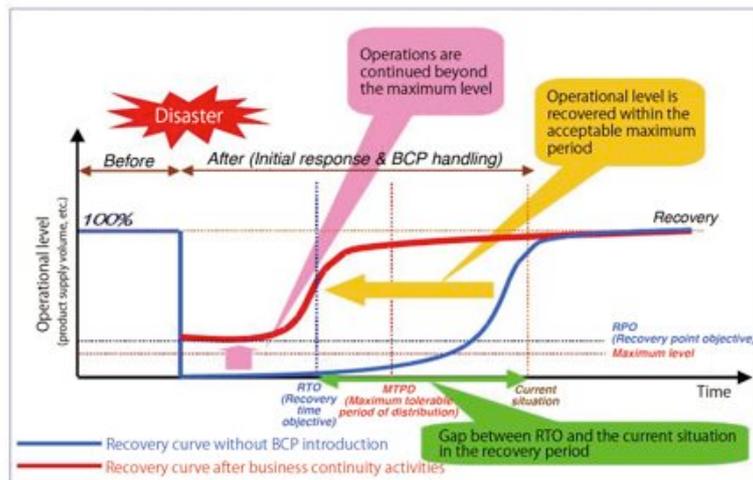


Fig.3 Concept of BCP (Cabinet Office, 2005)

**After:**

The 2011 Great East Japan Earthquake and Tsunami influenced the companies located in the damaged areas more or less. Teikoku Data Bank conducted surveys about BCP situation of organizations in April 2011 and February 2012. According to the report the BCP situation of 10,713 organizations after the event can be summarized as follows:

- (1) The ratio of the companies who were interrupted their business by the event was 64.5% (6,911 organizations). It was mostly because of the difficulty of procurement affected by the damage to suppliers.

(2) 72.9% of the discontinued companies had recovered their business within three months after the event. 6.5% of them, especially 9.2% in the four damaged prefectures (Iwate, Miyagi, Fukushima, and Ibaraki), had not carried on business yet as of February 2012.

(3) The most conducted action for preparedness was setting emergency network (55.0%), followed by pluralization of suppliers (38.0%), and multi-backup information system (33.8%).

(4) As of February 2012, 10.4% of the total organizations had own business continuity planning, and 50.8% of them did not have the plan though they knew BCP. It means that the ratio of the organizations that have BCP increased by 2.6%, and the ratio of the organizations that know BCP increased by 24.3% compared with the situation in April 2011 (Table 1).

Table 1 Making situation of BCP (Teikoku Databank Ltd., 2012):

	Done	Know but undone	Not know	Unknown
Apr. 2011	837 (7.8%)	3,150 (29.2%)	5,139 (47.7%)	1,643 (15.3%)
Feb. 2012	1,116 (10.4%)	5,446 (50.8%)	2,660 (24.8%)	1,491 (13.9%)

***Good practices:***

Oil Plant Natori is an industrial waste company in Natori City, who collects and recycles waste oil to sell as clean recycled fuel. The company released its BCP in January 2011.

It re-opened on March 18, 2011 after one-week interruption by the event. They had refined the waste oil by themselves and sold it to a trading partner until their two factories were seriously

damaged by the tsunami. Instead of the self-refine, they entrusted it to another company out of prefecture as they had prepared since before the tsunami. Then they were able to continue the business even though the tough situation just after the event. Their quick recovery was also very supportive to the city because they devoted themselves to clean the debris around the damaged coastal area. That is a successful case of having BCP.

***Problems:***

Some companies had made BCP before the disaster, but not all BCP functioned well after the event because of lack of feasibility.

Secondly, it was more difficult for shrinking business or medium-sized and small companies to quickly recover.

Thirdly, a small business that had worked in small surrounded area was very hard to survive the destructive situation because the clients were limited and they were also damaged in the catastrophic situation.

Finally, BCP which had dealt with only individual situation of a company did not efficiently function because lack of the idea of supply chain.

**3. Post-tsunami recovery for risk reduction after the 2011 Great East Japan Earthquake and**

## **Tsunami**

### ***Keywords:***

*urban recovery strategy, land use regulation, relocation, concentration, avoiding, slowing, steering, blocking, compacted terraces and berms, reinforcement*

### ***Context:***

Post-disaster recovery should be a significant process to recreate a new society with disaster reduction systems for the future. The coastal areas in Tohoku Region had experienced several huge tsunamis in its history and made efforts to mitigate damage by tsunamis until the twentieth century. However the latest tsunami on March 11, 2011 attacked them again and washed away the residential areas. Every district examined and decided its recovery plan according to the situation, and they are considering how to realize their new towns against some problems.

### ***Before:***

Government developed some inland resettlements for the victims by the 1933 Sanriku Tsunami, but houses increased in the lower areas in front of the ocean to be washed away. The death toll including missing people went up 21,000 as of March 26, 2013.

*After:*

The number of damaged municipalities by the tsunami was sixty-two, and forty-three municipalities released their post-tsunami recovery plans to mitigate future damage by tsunamis as of May 2012.

According to a survey for 208 damaged districts conducted by Ministry of Land, Infrastructure,

Transport and Tourism, the post-tsunami recovery plan can be classified into five types as shown in

Fig.4. Those recovery plans basically consist of four mitigation systems: (1) relocation as land use mitigation system, (2) levee to block tsunamis, (3) compacted terraces and berms to avoid, slow or steer tsunamis, and (4) tsunami mitigation design for facilities. They can be classified into five types as follows (Fig 4.7):

- A. Relocation (127)
- B. Concentration (6)
- C. Compacted terraces and berms (19)
- D. Relocation and compacted terraces and berms (18)
- E. Reconstruction on the original site with facility reinforcement (38)

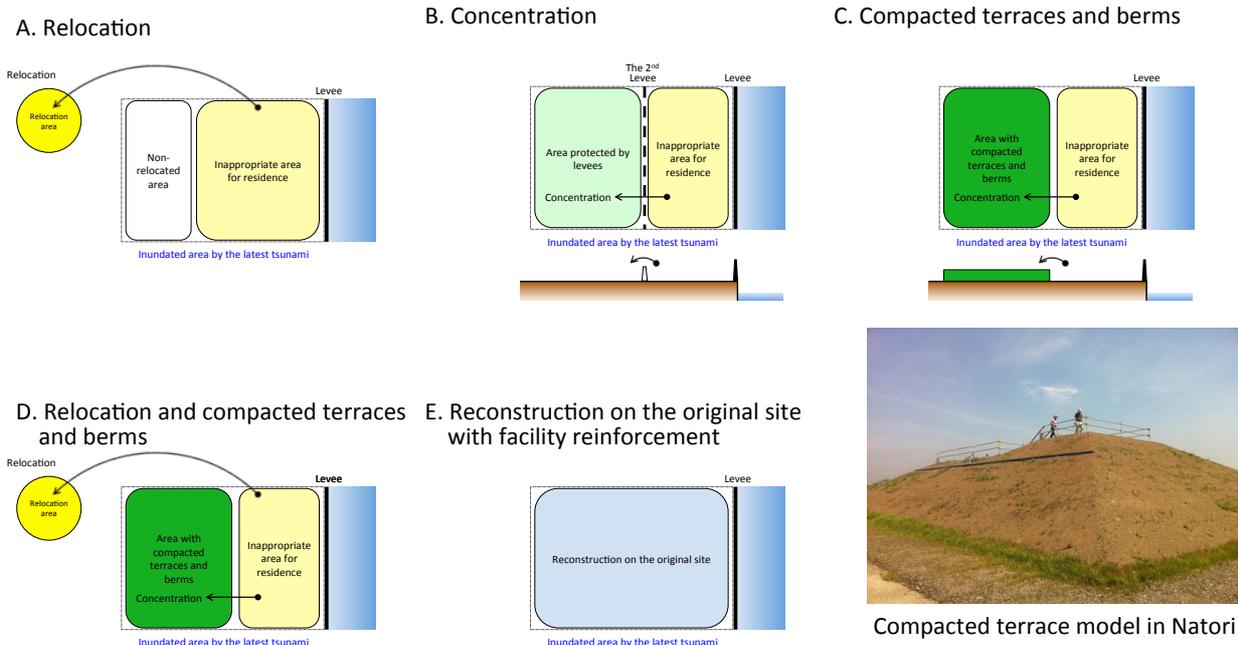


Fig.4 Regional urban recovery types proposed after the 2011 Great East Japan Earthquake and Tsunami (Ministry of Land, Infrastructure, Transport and Tourism, 2012)

**Good practices:**

Every damaged district devised its recovery plan that enables to reduce future tsunami risk based on the past experience in Japan. Especially the public involvement has been recognized as a significant factor to make a recovery plan since the 1995 Great Kobe Earthquake.

**Problems:**

Now that the damaged municipalities have announced the recovery plans, each local government needs to realize it. However, more or less, they have several difficulties to make them concrete projects according to the regional situation. The following are examples:

- Disagreements between governments and residents in terms of destruction of a beautiful piece of scenery by levee construction, or adequacy for safety
- Shortage of available land for relocation
- Shortage of construction materials and workers because the damaged area are too large
- Construction cost, etc.

#### **4. Comprehensive post-tsunami recovery after the 2011 Great East Japan Earthquake and Tsunami**

***Keywords:***

*post-tsunami recovery projects, tsunami simulation*

***Context:***

In order to support local governments to arrange proper regional plans for tsunami disaster reduction, Japanese Government provided “Tsunami Disaster Estimation Manual” and “Guideline to Strengthen Tsunami Disaster Management in Local Plan for Disaster Prevention” in 1997, followed by “Tsunami and Tidal Wave Hazard Map Making Manual (2004)” and “Guideline for Management of Tsunami Evacuation Buildings (2005).”

**Before:**

Considering the above guidelines, the local governments in the damaged areas had developed their own disaster management systems according to regional condition. However, the 2011 earthquake off the Pacific coast of Tōhoku was more than expected, and some management systems couldn't work well.

**After:**

Each municipality did two types of tsunami simulation depending on the occurrence possibility in order to make recovery plans for resettlements. Japanese Government<sup>12</sup> prepares some projects in

Fig.5 to support them to realize the plans.



Fig.5 A glance at recovery projects after the 2011 Great East Japan Earthquake and Tsunami

## 5. Future Recommendations as a Conclusion

- Relocation to higher land from waterfront area as a post-tsunami recovery strategy should be carried out with land acquisition by national/local governments' purchase to avoid future private usage of vulnerable waterfront space.
- More concrete situation should be estimated to make BCP including network that is indispensable for keeping supply chain.
- Reinforcement of buildings is quite essential to reduce building collapse risk. In order to promote it, setting quantitative goal and education are significant.
- Pre-disaster recovery planning worked well in Mano District in Kobe after the 1995 Great Kobe Earthquake as well as Tokyo after the 1923 Great Kanto Earthquake. Making Pre-disaster recovery planning is an important process to reach an agreement to have a future vision of the district among the local government and residents. Sharing the future vision prior to a disaster may avoid an emotional conflict at the stage of making or realizing its post-disaster recovery plan.
- Estimation of available resource as well as disaster damage estimation in advance is necessary to implement reconstruction activities. It should be considered by national, local, and community level according to damage level.

(Note: this written material is extracted from *HFA IRIDeS Review Preliminary Report Focusing on 2011 Great East Japan Earthquake* provided by International Research Institute of Disaster Science, 2013 at <http://irides.tohoku.ac.jp/hfa/>)