

# Impact Analysis of Designating Disaster Risk on Land Prices of Tourist Regions

Ryusuke Adachi<sup>1</sup>, Yasmin Bhattacharya<sup>2</sup> and Hitoshi Nakamura<sup>1</sup>

<sup>1</sup>Department of Architecture and Environment Systems, Shibaura Institute of technology

<sup>2</sup>SIT Research Laboratories, Shibaura Institute of Technology

## 1. Introduction

The Great East Japan Earthquake and the large scale disasters in the years following it, have affected many tourist regions in Japan. Thus recently, disaster preparedness has been of concern not only for tourism-oriented facilities that welcome tourists, but also for those who visit the region as tourists.

Different levels of risk zone classification (yellow, orange, red in order of strictness of the measures implied on the area) can be designated depending on the likely risk of the area in question. However, to date there are only limited number of areas that have been designated as high risk zone (i.e. red) due to fear of it impacting land and property values near where such risk zones may be designated. This concern is especially high in regions where nature-based tourism (coastal and mountainous) is the primary industry of the region as people fear that the inflow of tourists may also decrease if the risk is publicized as part of the designation process.

As such, this work sets out to investigate whether such concerns are valid. We use the hedonic regression approach to consider the whether any impact from risk zone designations have been observed on land prices in the past. We find that while an area's value may be affected by the presence of risk, it is not necessarily impacted by the designation of the risk zones. This implies that designating risk zones is likely to provide more benefits (in terms of better disaster preparedness in the long run) than any expected losses the residents might presume.

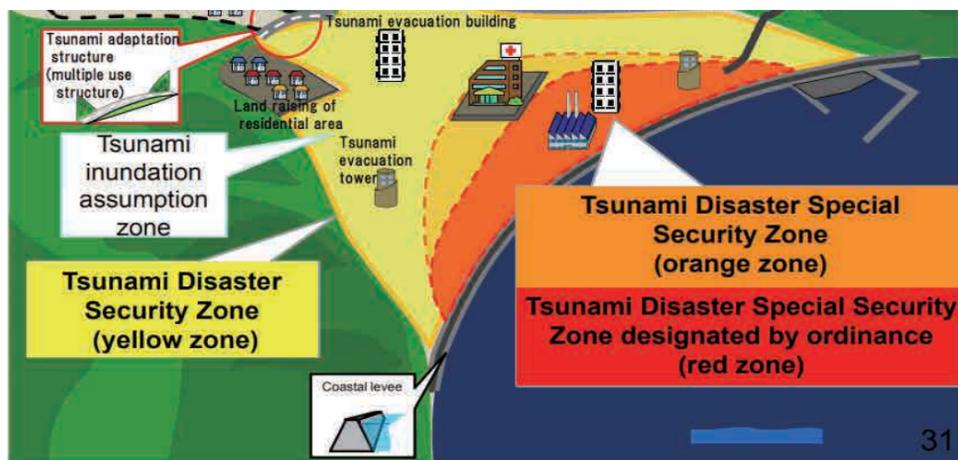


Fig 1-Concept diagram of integrated prevention strategy for Tsunami countermeasures

## 2. Study area

In this study, a tourist area designated as a disaster security zone was defined as the target area. Specifically, the four areas of Toi district (Izu City, Shizuoka Prefecture), Atagawa district (Higashi Izu Town, Shizuoka Prefecture), Enoshima (Fujisawa City, Kanagawa Prefecture), and Sengokuhara district (Hakone Town, Kanagawa Prefecture) were selected out of these. Two areas in Shizuoka Prefecture are designated as Tsunami disaster security zone, and two areas in Kanagawa Prefecture are designated as Landslide disaster security zone.

Among them, Toi district (Izu City) is the only designated Tsunami disaster special security zone in Japan (March 2018), and is attracting attention as an advanced area for tsunami disaster countermeasures for both tourism and disaster prevention. In this article, I will focus on the work done in the Toi district among the four districts.

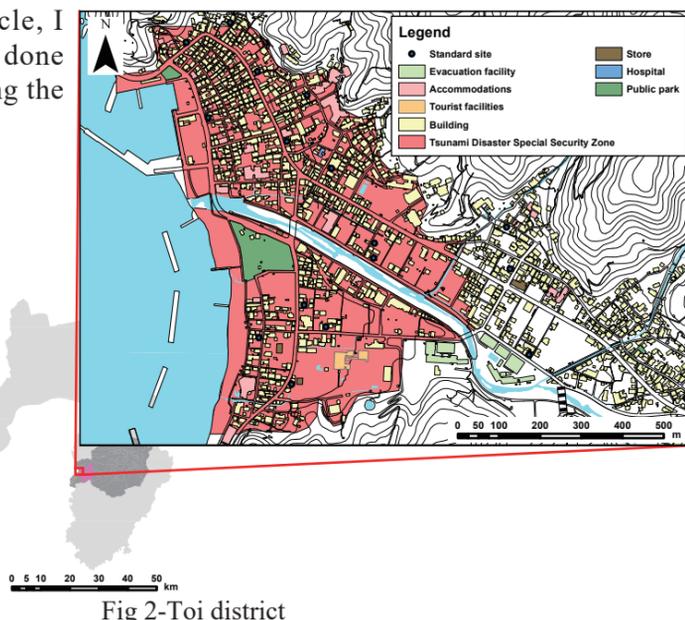


Fig 2-Toi district

## 3. Method

The hedonic regression approach is a technique that can analyze price differences due to changes in the environment and social capital by estimating land price functions. In this analysis, Road Rating is used as it indicates the estimated value of land per square meter of standard residential land facing the road, which is used as the basis for assessed values of lands. In this analysis, we tried to explain land prices using the variables mentioned below.

Table 1-Definition of the variables

Variable	Description
BUS STOP	Distance to bus stop
SCHOOL	Distance to school
PARK	Distance to park
TOURIST FACILITIES	Distance to tourist facilities
HOSPITAL	Distance to hospital
STORE	Distance to Supermarket or convenience store
COASTLINE	Distance to coastline
ELEVATION	A height above sea level
FRONTAGE ROAD	Width of a major frontage road
FLOOD DEPTH INTO ZONE	Probable flood depth of tsunami =1 if tsunami disaster special security zone

In the Toi district, the property tax price is getting lower every year. Referring to the graph, it can be seen that since 2011, when the Great East Japan Earthquake occurred, the rate of decline in road rating prices inside the tsunami disaster special security zone area is higher than the rate of decline outside the area. The fact that the price in the area had begun to decline even before the designation of disaster risk zone indicates that actual tsunami risk, rather than zone designation, is likely to be the main cause for property value decline in these areas.

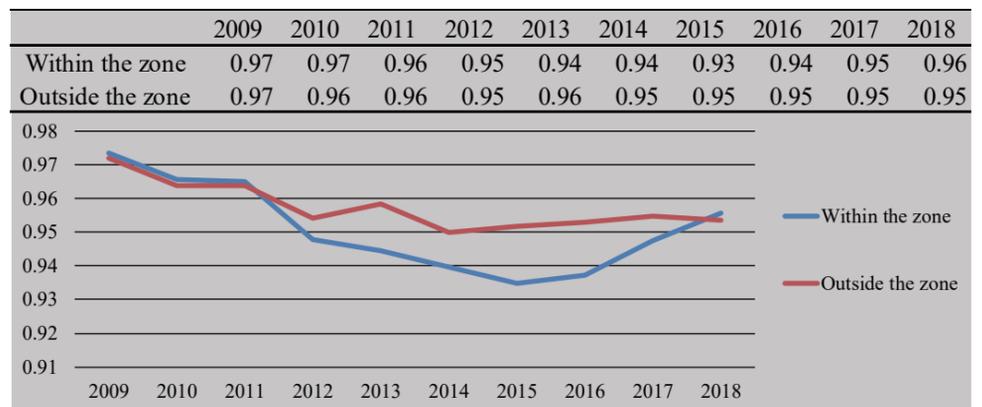


Fig 3-Price change rate in Toi district

## 4. Results

Table 2-Results

Regression Statistics				
Multiple R	0.73			
R Square	0.53			
Adjusted R Square	0.36			
Standard Error	2352.33			
Observations	16			
Variable	Coefficient	Standard error	t Stat	P value
BUS STOP	-10.55	18.16	-0.58	0.57
COASTLINE	17.77	8.57	2.07	0.06
ELEVATION	-1139.86	550.75	-2.07	0.06
FRONTAGE ROAD	576.01	357.22	1.61	0.14

After doing correlation analysis and checking for multicollinearity, out of the variables in Table 1, those presented in table 2 were selected as the best predictor variables for the hedonic analysis. As a result of the hedonic analysis, it was found that in Toi district, the higher the altitude and the farther the distance from the coast, the lower the land price. In the Toi district, it was not recognized that the designation of the disaster security zone had an impact on the decline in land prices.

The same analysis was performed for the other three districts as well, and similarly no relationship between land prices and the designation of the disaster security zone was found in any region.

## 5. Conclusions

Based on the outcome of our study, in areas with high disaster risk in tourist areas, it is recommended to actively designate disaster risk zones and promote infrastructural development that balances tourism and disaster prevention through land-use and building regulations.

## Contact

Ryusuke Adachi  
e-mail : me18002@shibaura-it.ac.jp

