

**An Evaluation of Tsunami Tradition Media for Human Casualties Reduction
- Case of Iwate and Miyagi Prefectures on
the 2011 Great East Japan Earthquake and Tsunami -**

S. SATO¹, Y. HIRAKAWA², M. OKUMURA³, F. IMAMURA⁴

¹ *International Research Institute of Disaster Science, Tohoku University, Sendai, Miyagi,
<ssato@irides.tohoku.ac.jp>*

² *Graduate School of Engineering, Tohoku University, Sendai, Miyagi,
<hirakawa@tsunami2.civil.tohoku.ac.jp>*

³ *International Research Institute of Disaster Science, Tohoku University, Sendai, Miyagi,
<okumura@irides.tohoku.ac.jp>*

⁴ *International Research Institute of Disaster Science, Tohoku University, Sendai, Miyagi,
<imamura@irides.tohoku.ac.jp>*

ABSTRACT

Since the return period of a huge tsunami is longer than human life span, it is generally difficult to carry on the tradition of tsunami disaster experience. Therefore, in Japan especially tsunami prone areas, tsunami tradition media such as monuments, memories, oral tradition, place-name, tsunami stone, disaster remain, song, painting, ceremony, etc. have been designed to transfer memory and learned lessons. However, the effect of tsunami tradition media to disaster reduction has not quantitatively clarified ever. The present study tried to evaluate them and to judge whether correspondence relationship between human casualties and tsunami tradition media are there, by focusing tsunami monuments and place-name in the 2011 Great East Japan Earthquake disaster.

INTORODAUCTION

Since the return period of a huge tsunami is longer than human life span, it is generally difficult to carry on the tradition of tsunami disaster experience. Therefore, it is important not only to remember individually of tsunami disaster also to make methods which intent the experience beyond generations and disaster education by executing the methods.

In Japan especially tsunami prone areas, monuments, memories, oral tradition, place-name, tsunami stone, disaster remain, song, painting, ceremony, etc. have been designed to transfer memory and learned lessons. We define the tangible and intangible objects as “tsunami tradition media.” In ethnology and historiography, details of some tsunami monument and ceremonies have cleared (Kitahara et al., 2012). However, previous works just discretely and

qualitatively studied the background and spatial distribution of the tsunami tradition media. The major roles of these tsunami tradition media are “Don’t forget the tsunami disaster experience” and “No casualty as much as possible.” However, tsunami tradition media for human casualties’ reduction has not been clarified in a quantitative way.

The principal aim of this study is to clear quantitatively tsunami tradition media for human casualties’ reduction by a numerical evaluation of relationship between human damage and the media in the 2011 Great East Japan Earthquake disaster. Especially, this paper reports the primary analysis focused place-names and tsunami monuments.

DATA

Tani (2012, 2013) published Fatality rates of each small region at 2011 Great East Japan Earthquake and Tsunami. In this research, we analyzed based on the number of deaths described by Tani (2012). Since the data of Nodamura, Fudaimura, Iwaizumicho, Tanohatamura, and Yamadacho is provided by only town unit (cities, towns, and villages), we analyzed that region by town unit.

We obtained the information of place name stem from Tsunami by some published books. In some publish books which the subject is a relationship between disaster and place name, there are 5 books that refer to place name and disaster about the Disaster-affected Area (Endo (2013), Dazai (2013), Dazai (2012a), Dazai (2012b), Tanikawa (2013), Kusuhara (2013)). We found 106 place name stem from Tsunami, and they are broadly categorized two types, 1) place-name stem from Tsunami episode, 2) place-name stem from “sound” related to flood disaster including Tsunami.

We obtained the information of Tsunami monuments from “Tsunami damage and Tsunami monuments information archive” published by the Tohoku Regional Bureau of MLIT. Tsunami traces including Tsunami height and inundation range, Tsunami records kept by past literatures, historical spots of Tsunami including monuments, and street location from highways of Edo period to current roads are provided in that archive. The data of Tsunami monuments was obtained from “Tsunami Digital Library”.

ANALYSIS

Generalized linear model regression (binominal distribution) of these variables were conducted and final results was presented in Table 1. The dependent variable is number of casualties, the response variable is each population in unit areas, and independent variables are log transformation - maximum tsunami inundation, presence or absence of tsunami monument, place-name derived from tsunami or not. In model 1, model fitting covered all area. In model 2, model fitting covered only area which have more than 12,000 people because the effect of broad area was omitted.

Table 1 Relationship between tsunami casualties, tsunami hazard and tsunami tradition medias (GLM)

	Independent variables	Estimated coefficient	Std. Error	Standardizing Coefficient	z value	Pr(> z)	esidual devianc	AIC	R
	(Intercept)	-4.939	0.025		-200.034	0.000			
Model 1	Maximum tsunami Inundation (log transformation) **	0.499	0.013	0.436	39.844	0.000	25564	27328	0.176
	presence or absence of tsunami monument	-0.011	0.023	-0.004	-0.474	0.636			
	place-name derived from tsunami or not **	-0.382	0.021	-0.125	-18.619	0.000			
	(Intercept)	-4.870	0.025		-197.57	0.000			
Model 2	Maximum tsunami Inundation (log transformation) **	0.543	0.012	0.473	43.55	0.000	22512	24239	0.180
	presence or absence of tsunami monument **	-0.369	0.025	-0.121	-14.85	0.000			
	place-name derived from tsunami or not **	-0.319	0.025	-0.102	-12.66	0.000			

** p<0.01, * p<0.05

RESULT AND DISCUSSION

Maximum tsunami inundation as hazard and place-name are statistically significant variables in model 1. And, tsunami inundation as hazard, place-name and tsunami monuments. AIC of model 2 is lower than model 1 and is residual deviance of model 2 is lower than model 1. These result may appear that tsunami monument and place-name as tsunami tradition medias reduce casualties in the 2011 Japan disaster.

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