

# Mind the Gap: 3.11 and the Information Vulnerable 格差に要注意 3.11と情報弱者

Shineha Ryuma, Tanaka Mikihiro

**Abstract** After the 3.11 triple disaster, massive information flooded the media. However, a comprehensive picture of the information ecosystem regarding 3.11 is yet to emerge. This article presents a quantitative analysis of a large amount of information and discourses concerning 3.11. In addition to gaps in information about damage and danger, we found that the areas most affected by the triple disaster had a greater number of people lacking access to vital information. These people were not only left behind during the first weeks of the catastrophe, but also thereafter, in the agenda for reconstruction.

**Keywords** 3.11, Media analysis, Information gap, vulnerability, class

		Iwate	Miyagi	Fukushima
Human damage	Death toll	5085	10452	3355
	Disappeared	1145	1297	5
	Evacuee (Evacuee to other prefecture)	37852 (1540)	97715 (7538)	91998 (52277)
Collapse of buildings/houses	Complete or Half	25023	237989	94226

**Table 1. Breakdown of damage (1)**

**Sources: Notification by local governments of Miyagi (Sept. 10, 2013), Iwate (Aug. 31, 2013), Fukushima (Sept. 20, 2013), and the Reconstruction Agency (Aug. 22, 2013). The number of deaths includes "3.11-related death" (震災関連死 Shinsai kanren shi).**

disaster of March 2011 (hereafter '3.11') are yet to come, the event has already generated an enormous amount of information and discussion, and created confusion in understanding the information ecosystem of the event. In disaster studies, a calamity of this type is regarded as a trigger for social vulnerabilities to rise to the surface. We also have to consider the social structure behind the disaster as summarized by Wisner et al. (2003), and as pointed out by several studies in the case of the Hanshin-Awaji earthquake of 1995, the "reconstruction" might reproduce the previous structural disparities. As emphasized by Beck (1992: 35), the "history of risk distribution shows that, like wealth, risks adhere to the class pattern, only inversely: Wealth accumulates at the top, risks at the bottom. To that extent, risks seem to *strengthen*, not negate class society." In other words, the weakest not only benefit less in normal times, they tend also to become the biggest risk receivers in situations of disaster or great hazard such as 3.11.

This article presents a quantitative analysis of a large amount of information and discourses regarding 3.11. First we have collected statistical data about damage from disasters and social conditions of the disaster-hit areas, issued by the local and national governments.<sup>1</sup> This procedure was essential to analyzing the basic information and thinking about 3.11. We focused on the 37 coastal municipalities that were worst hit by the tsunami, and we tried to sketch the scope of the damage according to areas and social situations damaged before 3.11.

While the full consequences from the triple

We then looked at the information flow concerning 3.11 in mass and social media. We draw on quantitative analysis, which includes a frequency analysis and a network analysis focusing on the co-occurrence of keywords (co-word), as well as a content analysis. Co-words and the network structure of co-words have been widely recognized as carriers of meaning and indicators of words in context (e.g. Callon et al. 1983, Braam et al. 1991, Stegman & Grohmann 2003). The method of co-word network analysis in this report depends on previous studies by Leydesdorff and Hellstein (2005, 2006), Salton's cosine as the similarity index (Salton & McGill 1983, Jones & Fornus 1987), the description of networks by Pajek (Batagelj & Mrvar 1998), the visualizations algorithm of Kamada and Kawai (1989), and Freeman (1979)'s definition of betweenness as the index of centrality.

To begin, we need to recall that the earthquake, tsunami, and nuclear accident caused enormous damage and destruction. There were more than 20,000 cases of deaths and missing as a result of the tsunami. Additionally, at this writing, due to the tsunami and the nuclear accident, there are approximately 290,000 evacuees who are spread all over Japan. In June 2011, the national government estimated total losses for buildings, lifelines, social infrastructure, agriculture, and other damage at about 16.9 trillion yen. The disaster generated over 25 million tons of rubble and general waste. **Rough sketch of damages and sites**



**Photo 1. Namie town, damaged by earthquake and abandoned after the Nuclear Power Plant accident (August 19, 2013)**



**Photo 2 Stranded Ship in the coastal area of Namie town (August 19, 2013)**

The three prefectures of Miyagi, Iwate, and Fukushima were most affected. Table 1 indicates differences of scale, range, characters, and spectrum of damage according to the area. For example, deaths in the Miyagi prefecture reached over 10,000. Iwate and Fukushima also had several thousand deaths. Drowning from the tsunami caused more than 90 % deaths; approximately 65 % of the victims were over 60 years of age (Cabinet Office 2011). There were also numerous

disappearances. This is an important feature of 3.11, which was unseen for example in the Hanshin-Awaji earthquake of 1995. In addition, a significant number of buildings collapsed because of the tsunami and earthquake; the coastline of towns for several hundred kilometers was literally wiped out. In addition, the nuclear accident led to a mandatory evacuation zone forcing thousands of people to leave their towns (particularly in the area of Futaba). While Miyagi prefecture registered a greater number of evacuees, Fukushima prefecture had a high proportion of evacuees outside the prefecture (see Table 1). Some people died on the spot for lack of quick rescue.<sup>2</sup> Almost three years later, many of the affected areas along the coast of the Tohoku region still present landscapes of desolation with cars and ships destroyed by the tsunami scattered about (Photos 1-2).

Table 2 shows a breakdown of the damage and social conditions of 37 municipalities on the coastline of the three worst affected prefectures (Miyagi, Iwate, and Fukushima). Local towns in this area feature aging populations, rely heavily on farming and fisheries, and are poorer than in metropolitan areas.

These municipalities, which were already lacking resources before 3.11, subsequently faced deeply indented coastlines with even more people living in narrowly habitable areas.

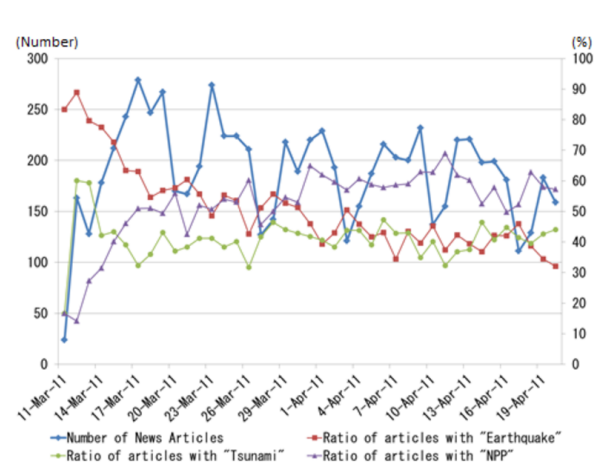
	Total population	Total number of houses	Population ratio under 15	Population ratio from 15 to 64	Population ratio over 65	Population ratio of primary industry	Population ratio of secondary manufacturing	Population ratio of tertiary industry	Area of municipality
Sendai	1045903	530660	13.4	68.7	15.5	0.1	11.7	88.2	784
Ishinomaki	160704	64870	14.2	64.7	25.2	1.9	25.4	72.7	556
Siogama	56490	23250	13.3	67.0	24.7	0.6	23.7	75.8	18
Kesennuma	73494	25670	14.2	63.4	28.5	2.4	26.3	71.4	333
Natori	73140	25820	15.0	62.4	16.2	0.1	21.5	78.4	100
Tagajo	62979	26810	15.6	68.8	15.2	0.0	18.9	81.1	20
Iwanuma	44198	17010	15.2	66.6	17.4	0.3	25.6	74.1	61
Higashi-Matsushima	42908	15450	15.3	64.8	20.6	1.6	22.7	75.7	102
Watari	34846	11520	14.3	65.8	20.7	1.6	38.2	60.2	73
Yamamoto	16711	5310	11.8	64.8	29.4	1.2	39.5	59.3	64
Matsushima	15089	5560	12.2	66.2	28.6	0.7	12.7	86.6	54
Shichigahama	20419	6650	16.1	68.2	18.8	1.5	24.6	73.9	13
Rifu	34000	11420	16.7	65.0	13.1	0.0	29.5	70.5	45
Onagawa	10051	-	12.7	62.0	32.0	2.1	34.3	63.6	66
Minami-Sanriku	17431	5540	15.0	62.4	29.5	3.4	32.7	63.9	164
Rikuzentakada	23302	8550	14.0	59.7	32.3	3.0	29.3	67.6	232
Otunato	40738	16590	14.6	62.7	28.8	2.7	27.2	70.2	323
Kamaishi	39578	18420	13.2	61.5	33.9	1.7	28.8	69.4	441
Otsuchi	15277	6130	14.1	63.2	30.8	2.4	34.1	63.5	201
Yamada	18625	7950	15.1	62.7	30.3	2.5	34.1	63.3	263
Miyako	59442	25010	14.2	63.7	29.1	1.7	24.0	72.2	1260
Iwazumi	10804	-	12.9	59.5	37.8	10.4	25.7	63.9	993
Tanohata	3843	-	15.0	62.2	33.2	4.2	34.4	61.4	156
Fudai	3088	-	13.6	64.8	30.3	8.6	26.4	64.9	70
Noda	4632	-	15.6	63.7	29.0	10.8	20.1	69.1	81
Kuji	36875	15810	16.7	64.2	25.2	3.1	28.3	68.6	623
Yono	17910	6650	15.3	64.7	29.1	8.2	27.7	64.0	303
Soma	15037	5500	15.2	62.7	24.4	1.2	38.2	60.6	198
Minami-Soma	70895	25050	14.6	62.9	25.2	1.6	30.7	67.6	399
Hirono	5418	-	15.5	63.7	23.0	1.0	41.4	57.6	58
Naaraha	7701	-	16.1	64.4	25.7	1.9	36.4	61.7	103
Tomoka	15996	6880	15.7	63.5	19.7	1.4	28.7	69.9	68
Okuma	11511	-	15.3	60.8	19.4	1.3	32.3	66.4	79
Futaba	6932	-	14.7	63.4	25.3	0.4	42.0	57.6	51
Namie	20908	7830	15.2	63.5	24.9	1.2	30.4	68.4	223
Shinchi	8218	-	15.1	62.7	26.6	3.7	38.4	57.9	46
Iwaki	342198	147740	15.2	65.0	23.2	0.9	27.2	71.8	1231

	Financial capability index	Municipal income per capita (1000yen)	Number of death	Number of destroyed houses	Death ratio	Ratio of destroyed houses	Area of flooded land	Ratio of flooded area	Ratio of population living in flooded area
Sendai	0.86	2786	704	68920	0.07	13.0	52	6.6	2.9
Ishinomaki	0.51	2108	3160	22603	1.97	34.8	73	13.1	69.9
Siogama	0.54	2218	20	3466	0.04	14.9	6	33.3	33.1
Kesennuma	0.43	1982	1007	10846	1.37	42.3	18	5.4	54.9
Natori	0.75	2491	911	3719	1.25	14.4	27	27.0	16.6
Tagajo	0.74	2627	188	4693	0.30	17.5	6	30.0	27.2
Iwanuma	0.8	2548	183	2301	0.41	13.5	29	47.5	18.2
Higashi-Matsushima	0.45	2114	1045	10833	2.44	70.1	37	36.3	79.3
Watari	0.59	2153	257	3501	0.74	30.4	35	48.0	40.4
Yamamoto	0.41	1964	670	3256	4.01	61.3	24	37.5	53.8
Matsushima	0.53	2068	2	1637	0.01	29.4	2	3.7	26.9
Shichigahama	0.61	2371	66	1189	0.32	17.9	5	38.5	44.8
Rifu	0.85	2920	49	637	0.14	5.6	1	2.2	1.6
Onagawa	1.41	2228	547	3276	5.44	-	3	4.6	80.1
Minami-Sanriku	0.31	1829	551	3299	3.16	59.5	10	6.1	80.1
Rikuzentakada	0.28	1766	1549	3341	6.65	39.1	13	5.6	82.5
Otunato	0.43	2023	337	3629	0.83	21.9	8	2.5	46.8
Kamaishi	0.51	2409	883	3723	2.23	20.2	7	1.6	33.3
Otsuchi	0.32	1737	800	3677	5.24	60.0	4	2.0	78.0
Yamada	0.28	1698	600	3184	3.22	40.1	5	1.9	61.3
Miyako	0.36	2297	420	4675	0.71	18.7	10	0.8	30.9
Iwazumi	0.15	1645	7	197	0.06	-	1	0.1	10.5
Tanohata	0.14	1510	14	270	0.36	-	1	0.6	41.2
Fudai	0.14	1816	0	0	0.00	-	1	1.4	36.1
Noda	0.18	1676	38	478	0.82	-	2	2.5	68.6
Kuji	0.39	2140	2	274	0.01	1.7	4	0.6	19.4
Yono	0.23	1616	0	26	0.00	0.4	1	0.3	15.3
Soma	0.56	2721	454	1692	1.20	11.3	29	14.7	27.6
Minami-Soma	0.65	2612	640	5657	0.90	22.6	39	9.8	18.9
Hirono	1.25	5641	2	0	0.04	-	2	3.5	25.6
Naaraha	1.12	4355	11	50	0.14	-	3	2.9	22.7
Tomoka	0.92	3939	19	-	0.12	-	1	1.5	8.8
Okuma	1.5	4835	76	30	0.66	-	2	2.5	9.8
Futaba	0.78	4608	30	63	0.43	-	3	5.9	18.4
Namie	0.47	2557	144	-	0.69	-	6	2.7	16.1
Shinchi	0.86	2845	108	548	1.31	-	11	23.9	56.8
Iwaki	0.7	2711	309	21044	0.09	14.2	15	1.2	9.5

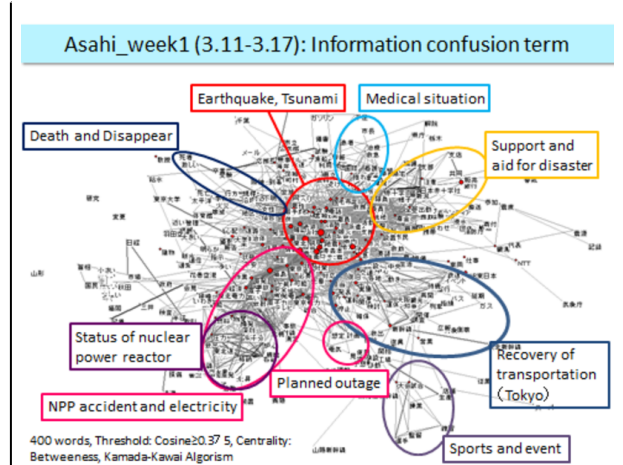
Table 2. Social structure and damage in 37 municipalities on the coasts of Miyagi, Iwate and Fukushima Prefectures. Sources: See Table 1.

### Gap of information as infrastructure

In addition to gaps in damage and social conditions, the information gap might be considered as one of the most significant issues of 3.11. The spread and access of the Internet enable us to make and use countless amounts of information, a situation that has been reinforced by the appearance of social network services such as Twitter, Facebook, etc. During a disaster, these tools offer a base for sharing information. But as several studies have noted, the myth of a "one hundred million middle class" (*ichi oku sōchūryū*) cannot be supported by a careful analysis of the disparities of media usage, for which the term "digital divide" only shows one aspect. For example, people with lower social capital use a mobile phone but not a Smartphone or they do not have a PC and despite sometimes playing role games online, they are light Internet users.<sup>3</sup> As another example, TV audiences are part-time workers. On the other hand, people with higher social capital hold Smartphones, they are users of tablet PCs and SNS, and so on.



**Figure 1. Time-lined change of number of news articles and appearance ratio of keywords (Asahi newspaper)**



**Figure 2. Keyword network of Asahi newspaper from March 11 to March 17, 2011**

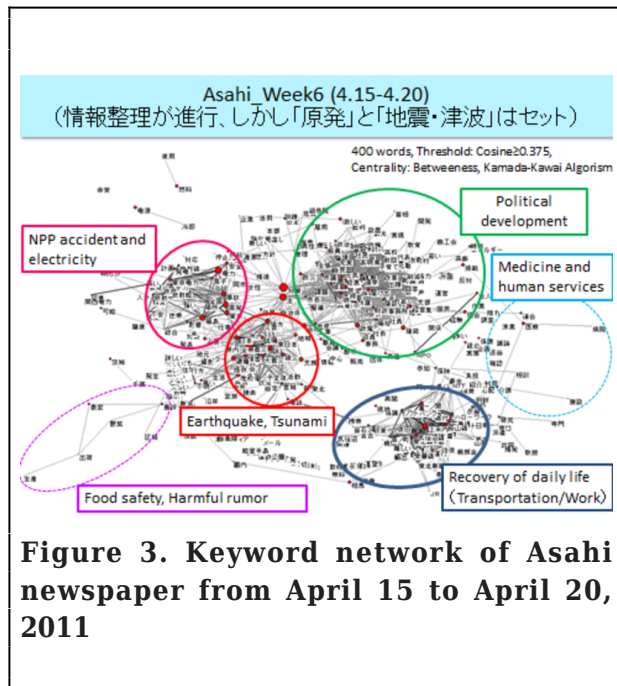
According to a government report on the current status of Japanese Internet usage (Sōmu-shō 2011), though the coefficient of use remains relatively high for the 60-70 age group (between 57 and 70%), it drops to less than 40% for those over 70, and less than 20% for those over 80 years old. While families with high annual income (over 6 million Yen) have a coefficient use of 80%, this drops to 63% for families earning less than 2 million Yen a year.<sup>4</sup> And of course the Tohoku region has a much lower score compared to metropolitan areas. The large majority of Internet users during the disaster and its immediate aftermath were thus in metropolitan areas, while the victims were unable to collect or send information effectively.

As a means to clarify the consequences of the gap of information for the victims of 3.11, we focused on newspapers, web news, blogs, and Twitter. Figure 1 shows the timeline change of article numbers and appearance of keywords in the Asahi newspaper: the appearance of the word "earthquake" gradually decreased as references to the nuclear accident increased. Looking at the 400 most frequently used keywords in each term from March 11 to March 17 (Figure 2), then from March 15 to March 20 (Figure 3), we can find a clear difference in co-word network that represents the degree of the organization of topics. During the first week of the disaster, there was a tremendous confusion of topics and agendas. Furthermore, the keyword cluster around "earthquake and tsunami" networks closely parallels a cluster around "Nuclear Power Plant accident and electricity." This trend is seen in all co-word networks each week. However, in the co-word network in the sixth week, this close relationship relaxed to some degree.

To evaluate the differences in appearance of topics among newspapers, we conducted a comparison of resonance of agenda, topics and argument between the "big four" Japanese



major national newspapers. After a content analysis and classification of arguments, we calculated the Spearman's Rank Correlation Coefficient (data not shown). The result shows a high correlation between newspapers, which means that there was a resonance of trends in topics. Concerning argumentation level, there was resonance between the liberal pole (Asahi newspaper and Mainichi Newspaper) and the conservative pole (Yomiuri Newspaper and Nikkei).



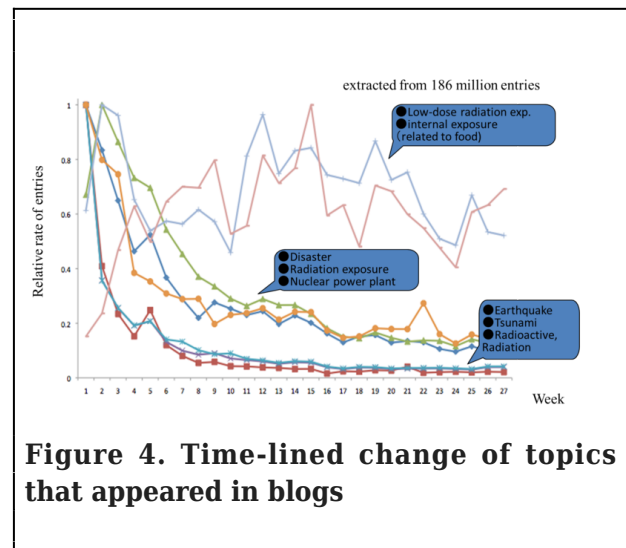
**Figure 3. Keyword network of Asahi newspaper from April 15 to April 20, 2011**

If we look at the trends in social media, Figure 4 shows a timeline change in contents uploaded in blog entries. As a result, after a rapid decrease of "earthquake" and "tsunami", the keywords "radiation exposure" and "nuclear accident" rapidly increased; however, interest in these new topics was not sustained. In summary, interest in the disasters and the nuclear accident has rapidly faded. The remaining and more stable interests have been about "low radiation exposure" and "internal exposure."

For an analysis of Twitter (Figure 5), we categorized a variety of topics such as "nuclear accident" and "nuclear power policy." In the

aftermath of the accident, tweets regarding the nuclear accident occupied over 10% of all tweets in Japan. However, by the third month after the accident, this had fallen to less than 2%.

Shortly after, in the Internet sphere, there was also a rapid fall in attention to the nuclear accident and 3.11 more generally. Compared to newspapers (Figure 6), web news showed a rapid decrease in topics on the disaster, while there was a simultaneous increase in "entertainment," "sports," "economics," and so on. Although this shift of central topics is common to each media outlet, the difference of degree between the media is clear. One interpretation of this is that as newspapers continued to cover the triple disaster more actively than web news, it sustained public interest. However, as mentioned above, we should not overlook the fact that topics on 3.11 in newspapers had also been mainly occupied by topics regarding "Nuclear Power Plant (NPP)."



**Figure 4. Time-lined change of topics that appeared in blogs**

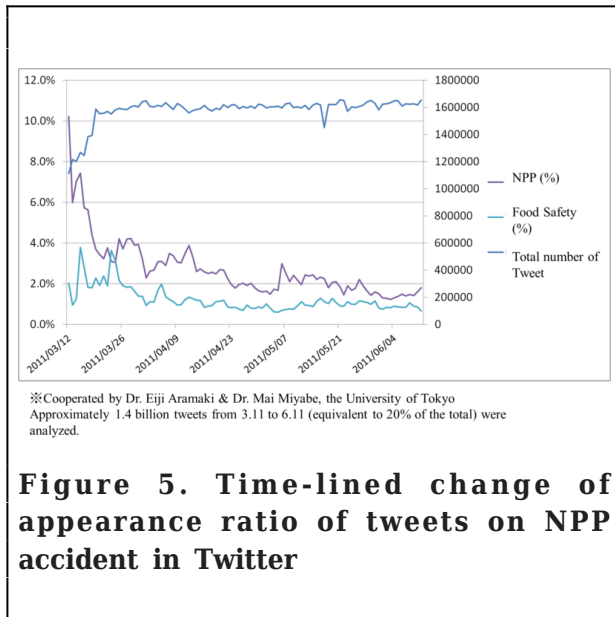
Our analysis suggested several trends in national newspapers: "Decrease of earthquake," "increase of NPP," and a dense co-word network between "earthquake and tsunami" and "NPP accident and electricity." The resonance of agenda and argument in different newspapers was also observed. Our

interpretation is that the nuclear accident played a strong, agenda-setting topic and smothered interest in "earthquake and tsunami." Then the topics on 3.11 themselves decreased rapidly (Figures 4-6).

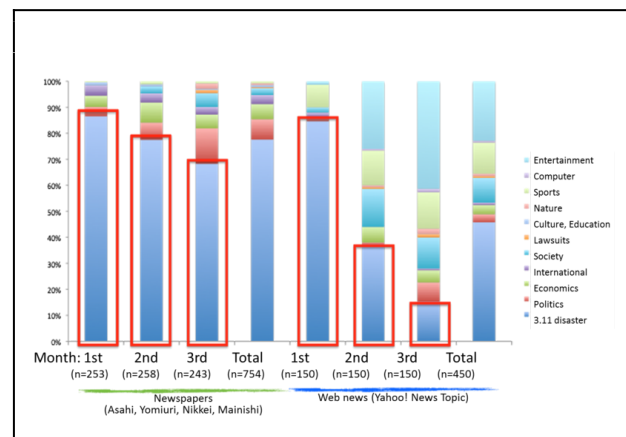
### Discussion: Disaster capitalism and "Reconstruction"

Our report shows significant "gaps" in damage and social conditions in devastated areas. These areas are primary industrial and aging societies. It is possible that local gaps of damage and social conditions caused a lag in reconstruction, like the Matthew effect. Furthermore, the vulnerability and gaps of damage, economy, and reconstruction connect gaps in the variety of resources, information, and access to power. Naomi Klein's bestseller *Shock Doctrine: The Rise of Disaster Capitalism*, which was translated and published in Japan in September 2011, looked at the examples of 9.11, the Iraq War, Hurricane Katrina, the Sumatra tsunami and other "disasters" to point out the gap structures that are spread, reinforced, and reproduced in the course of work, and for which the word "reconstruction" is mobilized as a mantra.

called attention to the risk of disaster capitalism in the context of 3.11, taking the case of the Great Hanshin-Awaji earthquake as an emblematic lesson. In the earthquake that hit the city of Kōbe in January 1995, 6,434 individuals died, an outbreak of fire caused the destruction of 7,035 houses and approximately 250,000 houses were seriously damaged. Tsukahara pointed out the two distinct forms of disasters: one was direct damage by earthquake and fires to humans and houses; another was the collapse of the local community and alienation of residents in the course of reconstruction and land readjustment. In the district of Nagata (downtown Kōbe), there were a large number of devastating fires which was ten times greater than that of other seriously affected areas. The damaged area was rapidly reconstructed, and the so-called "Miracle of Nagata" offers new and handsome buildings, streets with new shops, and a monument. Meanwhile more than 30,000 people had definitely left the Nagata area: while in October 1994, the population of Nagata had over 130,000, after the earthquake of January 1995, it rapidly decreased to 96,000. Although the population had somewhat recovered to approximately 108,000 by 1998, population decline continued to 101,000 by 2010. Even though the decrease started before the Hanshin-Awaji earthquake, it is clear that the decrease of population was accelerated by the urban planning launched after the earthquake.



**Figure 5. Time-lined change of appearance ratio of tweets on NPP accident in Twitter**



Following on Klein, Tsukahara Togo (2011)

**Figure 6. Comparison between media: time-lined change of appearance ratio of topics**

Statistics suggest the effect of the Hanshin-Awaji earthquake was worse for the poor, the elderly and the disadvantaged, i.e. the most vulnerable. Investigations have pointed out that about 70 % of the residents of Nagata had an annual average income under three million yen (Shinsai fukkō chōsa, 1997; Inoue 2008; Yoshii 2007). According to other studies on the Hanshin-Awaji earthquake (Iwasaki et al. 1999, Tanaka & Shiosaki 2008), before the earthquake most of the residents had their own home, but after the earthquake over 70% of those who came back in the area now lived in rented apartments because they could not afford to rebuild their house. As highlighted by Tsukahara, in the course of the "miracle reconstruction", there was a widening gap and alienation of inhabitants. In summary, reconstruction and land readjustment after the disaster are closely related with power and politics of economic and urban design.

We can expect a similar process in the case of 3.11. As a contribution to clarifying the social disparities that might be either reinforced or generated by the triple disaster of 3.11, we have chosen to examine the information gap. Previous media studies discussed and theorized the social function of media as "agenda setting," "agenda building," "attention cycle," and so on (e.g., MacCombs & Shaw, 1972; Entman, 1993; Scheufele, 1999). Our focus was rather directed at trends and discourses in the media sphere that affect social agendas and distribution of social resources, capital and public interest. Our hypothesis was that people needed access to a large choice of information and some media activity to participate in agenda setting and the rebuilding process. There were differences of power concerning information, and these differences were, at

least partly, defined by gaps of social conditions and damages. We can define those who have been alienated from agenda setting and rebuilding as *the information vulnerable*.

As we have shown, compared to urban areas, even before the event, the areas that were most affected by the triple disaster of March 11 had a much great number of the *information vulnerable*. It is obvious that after 3.11, compared to young city dwellers, older people in the devastated areas have had difficulty getting and using information. What is less easy to see is why the victims of the disaster tended to be those who could not collect or discuss information effectively. The information vulnerable were not only left behind during the first weeks of the catastrophe, but also thereafter, in the agenda for "reconstruction". In comparison with Hanshin earthquake which happened at a time when the diffusion of the Internet was only starting, the paradox is that despite the illusion of a greater distribution of information, we also discern greater disparities of access to relevant information.

In addition, there were gaps in the information taken up by the mass media. At least in national newspapers, interest was rapidly directed to the NPP accident, while in the electronic media the earthquake and tsunami faded into the background. Then, not only were victims of the tsunami relegated to a secondary role, but there was also a rapid decrease in media attention to the range of issues of 3.11. Comparative analysis between national and local newspapers would probably reinforce that analysis.

So far, we have not seen any social mobilization to reverse the balance of power between the most heavily damaged areas, with their comparatively poor and aging population, and urban Japan. We can therefore expect the information gap to widen and bring negative effects during "reconstruction." The phenomenon that needs to be addressed here is

much more than a "digital divide" between those who can "enjoy" Internet and its vast amount of information, and those who don't: if the existence of such a divide is now well accepted, we have yet to fully understand the myriad consequences for those affected by disasters such as big earthquakes and such a complex mix as 3.11.

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**Shineha Ryuma** and **Tanaka Mikihiro** have studied the media discourses regarding life-science, science journalism, and science & technology policy. They have published a book in Japanese on 3.11 (*The Disaster Vulnerable and the Vulnerable*) and a book chapter in *Science Information and Politics after the Disaster of March 11 in Japan* edited by Nakamura Masaki (see the full references in the list *supra*).

*Recommended Citation: Shineha Ryuma and Tanaka Mikihiro, "Mind the Gap: 3.11 and the Information Vulnerable," The Asia-Pacific Journal, Vol. 12, Issue 7, No. 4, February 17, 2014.*

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### Politics of Uncertainty

Yasuhito ABE, [Safecast or the Production of Collective Intelligence on Radiation Risks after 3.11](#)

### Notes

<sup>1</sup> We collected information from official issues, which were published by the Reconstruction Agency, the Cabinet Office, the Statics Bureau of the Ministry of Internal Affairs and Communications, and local governments of Miyagi, Iwate, and Fukushima Prefectures.

<sup>2</sup> For example, a surgeon who conducted autopsies of victims said several victims died from starvation after suffering leg injuries and receiving no help in the evacuated area around the plant. (Asahi-Shimbun, May 25, 2012).

<sup>3</sup> See: 中央調査社 (Central Survey Society), パーソナル先端商品の利用状況 (Current situation on the use of personal electronic commodities), April 2012: [www.crs.or.jp/data/pdf/ptg2012.pdf](http://www.crs.or.jp/data/pdf/ptg2012.pdf)

And: D.A. Consortium, スマートフォン・iPad・一般携帯電話に関する利用実態調査 2010 (Survey on the use of Smartphones, iPad and average mobile phones): [http://www.dac.co.jp/Contents/pdf/press/20100924\\_sp\\_research.pdf](http://www.dac.co.jp/Contents/pdf/press/20100924_sp_research.pdf)

<sup>4</sup> To be precise, the coefficient use is 70.1% for those aged 60-64, 57% for the group 65-69, 39.2% for the group 70-79 and 20.3% for those over 80 years old; 63.1%, for the families with annual income under 2 million Yen, 68.6% for those between 2 and 4 million Yen, 80% for those over 6 million Yen.

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