

**DEVELOPMENT OF THE METHOD OF CLARIFYING THE
LIFE RECONSTRUCTION PROCESS BASED ON THE RANDOM
SAMPLED SOCIAL SURVEYS OF THE VICTIMS
RECOVERY AND RECONSTRUCTION CALENDAR**

Reo Kimura

Graduate School of Environment and Disaster Research, Fuji Tokoha University, Japan¹

Keiko Tamura

Risk Management Office, Niigata University, Japan²

Haruo Hayashi

Disaster Prevention Research Institute, Kyoto University, Japan³

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Abstract

Three major earthquake disasters that occurred in Japan formed the basis of our surveys of disaster victims, the Kobe (Hanshin-Awaji) Earthquake that struck on January 17 1995, the Mid-Niigata Earthquake that struck on October 23 2004 and the Chuetsu-Oki Earthquake that struck on July 16 2007.

Our research team conducted random sampled social surveys periodically (like fixed-point survey observation) in the areas affected by three earthquake disasters. We asked the victims using some scales that were developed for clarifying the long-term life reconstruction process. In this paper we discussed "recovery and reconstruction calendar" scale we developed for clarifying the process that earthquake victims undergo in rebuilding their shattered lives.

We have examined the generality of the process clarified by the proposed calendar concretely, based on results for the calendar in random surveys on the three earthquakes. We concluded that (1) the patterns of victims' behaviours are found, which were changed at the points of 10 hours, 100 hours (4 days), 1,000 hours (2 months), 10,000 hours (1 year) and 100,000 hours (10 years) after the event occurred, (2) the recovery and reconstruction calendar is highly reproducibility in clarifying the recovery and reconstruction process and (3) generalization can be recognized in this process in time phases after disasters despite differences in disaster size and mode.

¹ Address: 325, Obuchi, Fuji city, Shizuoka, 417-0801, Japan
Tel: +81-545-37-2030, E-mail: reo@fuji-tokoha-u.ac.jp

² Address: 8050, Ikarashi Nino-cho, Nishi-ku, Niigata city, Niigata 950-2181, Japan
Tel: +81-25-262-6115, E-mail: tamura@gs.niigata-u.ac.jp

³ Address: Gokasho, Uji city, Kyoto 611-0011, Japan
Tel: +81-774-38-4273, E-mail: hayashi@drs.dpri.kyoto-u.ac.jp

1. Introduction

A gigantic disaster not only caused physical damage to cities' development, but also had significant psychological and social impacts upon the bodies, minds, and lives of disaster victims, local community relationships, organizations, groups, and social systems. As a result of a major disaster, victims may sustain both person and material damage, and struggle to carry on with their ordinary lives as normal. The process for recovering everyday life while people and society adapt to a post-disaster environment is called the disaster process or life recovery/reconstruction process if the lives of people are brought into focus. If the disaster process is understood objectively, the situation and needs of victims and their society can be realized by answering the following questions, which problems occur for whom in what sequence, and how these problems can be solved.

2. Five time phases following the occurrence of the disaster

We have been studying the life reconstruction processes of victims of the Kobe (Hanshin-Awaji) Earthquake that struck on January 17 1995, and, in particular, how the disaster victims established new daily lives in the post-disaster environment. We conducted random mail surveys of the Kobe Earthquake disaster area in 1999, 2001, 2003 and 2005. In these surveys, we verified the hypothesis that the feelings and behaviours of disaster victims change during five periods of time that are separated by five time axes: the day of the disaster (10 hours), two to four days (100 hours) after the disaster, two months (1,000 hours), the one year (10,000 hours) and the 10 years (100,000 hours) after the disaster. [1]

These five stages are defined as follows:

I. Disorientation phase – a period in which victims suffer from the impact of disaster so severely that they have difficulty in orienting themselves in the new environment.

II. Acceptance of new reality phase – a period in which victims accept damage rationally and undertake to adapt themselves to a new society based on a new order.

III. Disaster utopia phase – a period in which life resembling primitive communism forms based on social values different from those of ordinary times because of the paralysis of social function such as lifeline services.

IV. Reentry to everyday life phase – a period in which victims undertake to reconstruct their lives due to restoration of social infrastructures such as lifeline services.

V. Reconstruction phase – a period in which the most of the victims and organizations believe that the impact of the disaster is reconstructed and the society in the impacted area is recovered (figure 1).

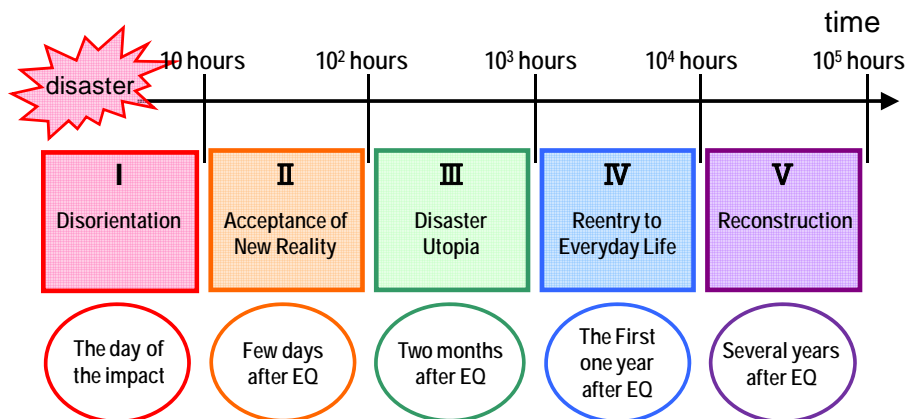


Figure 1. Five Stages after the earthquake

3. Implementation of Surveys

3.1. Three major earthquake disasters in Japan

Three major earthquake disasters that occurred in Japan formed the basis of our surveys of disaster victims, the Kobe (Hanshin-Awaji) Earthquake that struck on January 17 1995, the Mid-Niigata Earthquake that struck on October 23 2004 and the Chuetsu-Oki Earthquake that struck on July 16 2007. Table 1 shows the overview and figure 2 shows the characteristics of these disasters.

Table 1. Overview of three earthquakes

	The Kobe (Hanshin-Awaji) EQ in 1995	The Mid Niigata Prefecture EQ in 2004	The Chuetsu-oki EQ in 2007
Seismic Intensity (JMA)	7 (M7.3)	7 (M6.8)	Upper 6 (M6.8)
Impact Area	Density populated urban area (Hyogo prefecture)	Remote and isolated area among mountains (Niigata prefecture)	Local cities area (Niigata prefecture)
Casualties	6,437	68	15
Injuries	43,792	4,805	2,346
Housing Damage	about 650,000	about 120,000	about 44,000
Emergency Shelters	over 1,200	603	116
Evacuees	over 300,000	about 103,000	about 12,500
Temporary Housings	48,300	3,460	1,222
Public Collective Housings for victims (number of houses)	about 40,000	493	178

The Kobe (Hanshin-Awaji) Earthquake in 1995



- Severe damage to physical environment
- Severe damage to social systems
- Recover process took very long time
- Hard to construct the policies on the process of recover because never examined the process before

➔ Disaster in a density-populated urban area

The Mid Niigata Prefecture Earthquake in 2004



- Wreak havoc on public infrastructure
- Get several villages isolated in the rural areas (Communication, traffic, material flow were disrupted)
- Gather attention on Disaster related Death

➔ Disaster in a remote and isolated area among mountains

The Chuetsu-oki Earthquake in 2007



- Wreak havoc on individual properties
- Get some people doubly victimized by 2 EQ
- Spread harmful rumors about the damage of nuclear power plant
- Damage subcontract factory of national-wide enterprises and occur supply-chain disruption

➔ Disaster in local cities area

Figure 2. Characteristics of three earthquakes

3.2. Recovery and Reconstruction Calendar

Our research team conducted random sampled social surveys periodically (like fixed-point survey observation) in the areas affected by three earthquake disasters. (Table 2) We asked the victims using some scales that were developed for clarifying the long-term life reconstruction process. In this paper we discussed “recovery and reconstruction calendar” scale we developed for clarifying the process that earthquake victims undergo in rebuilding their shattered lives.

Table 2. Survey overview of three earthquake disasters

	Kobe Survey in Jan. 2003 and 2005	Mid-Niigata Survey in Mar. 2009	Chuetsu-oki Survey in Mar. 2009
Earthquake occurred in	17 January 1995	23 October 2004	16 July 2007
Surveyed Area	Areas where 7 on the seismic scale was recorded and gas was stopped + Kobe City Kita ward and Nishi ward	Areas in Nagaoka City, Ojiya City, and Kawaguchi Town, where 6 lower on the Japanese seismic scale was recorded	Areas in Kashiwazaki City, Izumozaki Town, and Kariwa Village, where 6 lower on the Japanese seismic scale was recorded
Surveyed person	Man and woman 20 years or older	Man and woman 20 years or older	Man and woman 20 years or older
Sampling	Sampled from resident register using stratified two-stage sampling (165 points, 20 residents per point)	Sampled from resident register using stratified two-stage sampling (69 points in Nagaoka City, Ojiya City, and Kawaguchi Town, 20 residents per point)	Sampled from resident register using stratified two-stage sampling (56 points in Kashiwazaki City, Izumozaki Town and Kariwa Village, 20 residents per point)
Number of surveyed persons	3,300 (in 2003), 3,300 (in 2005)	1,380	1,120
Number of effective answers	1,203 (in 2003), 1,028 (in 2005)	619	483
Rate of effective answers	36.5% (in 2003), 31.2% (in 2005)	44.9%	43.1%
Method of survey	Fill out questionnaire sent by mail and collect it by mail	Fill out questionnaire sent by mail and collect it by mail	Fill out questionnaire sent by mail and collect it by mail

We developed a recovery and reconstruction calendar for measuring overall reconstruction quantitatively for victims and stricken areas, clarifying the disaster process by ethnography interviews verified through quantitative examination. Milestones in recovery and reconstruction are mentioned in the social survey, questions ask when events happened and answers obtained. This set of procedures is called the recovery and reconstruction calendar. Table 3 shows questions. [1, 2]

Table 3. Items of recovery and reconstruction calendar

- Eleven items, which are milestones of ethnography survey findings as events marking restoration and reconstruction many victims experienced

- ① I understood the entirety of the damage.
- ② I felt safe.
- ③ I was prepared to have an uncomfortable life for a while.
- ④ Office/school have resumed.
- ⑤ Problem of housing was finally settled.
- ⑥ Personal financial situation was no longer influenced by the earthquake.
- ⑦ Everyday life settled down.
- ⑧ Local activity was restored.
- ⑨ I did not define myself as a disaster victim.
- ⑩ Local economy was no longer influenced by the earthquake.
- ⑪ Local roads were reconstructed.

4. Result of recovery and reconstruction calendar

4.1. Kobe earthquake

Figure 3 shows results of the 1995 Kobe earthquake disaster survey conducted in 2003/2005, eight/ten years after the earthquake. At 10 hours after the earthquake and disorientation phase, victims prepared to have an uncomfortable life for a while (the night of the day of the earthquake, 56.3%) and understood the entirety of the damage (on the morning of the day after the earthquake, 54.2%). Three weeks after the earthquake, they felt safe (50.1%). The percentage who answered office/school have resumed exceeded 50% one month (1,000 hours) after the earthquake when disaster utopia phase finished (54.1%) and 94.2% answered so 10 years after the earthquake (in the survey). Each percentage of those who answered everyday life settled down and problem of housing was finally settled exceeded 50% about half a year after the earthquake, which corresponds to reentry to the everyday life phase (55.3%, 52.2%). We supposed that many people felt that everyday life settled down by settling their housing problems.

The percentage of those who answered personal financial situation was no longer influenced by the earthquake exceeded 50% one year (10,000 hours) after the earthquake (59.2%). 76.9% answered so 10 years after the earthquake (at the survey). The percentage of those who answered I did not define myself as a disaster victim exceeded 50% one year (10,000 hours) after the earthquake (51.5%). 75.5% answered so in 2005 when the survey was conducted.

We also found that the number of respondents who felt local economy was no longer influenced by the earthquake exceeded the majority (52.6%) 10 years after the earthquake at the survey. In areas stricken by a catastrophic urban disaster, it can be seen that 10 years after the earthquake. The local economy had finally recovered from the earthquake's influence, indicating that response and measures would have to span up to a decade after a great quake to recover and reconstruct a modern society.

Although over 50% of victims no longer felt influenced, a look at individual life reconstruction suggests that over 40% still lived with the feeling that local society had not yet recovered from the disaster. This indicates the need for careful support in life reconstruction among individual victims for at least 10 years.

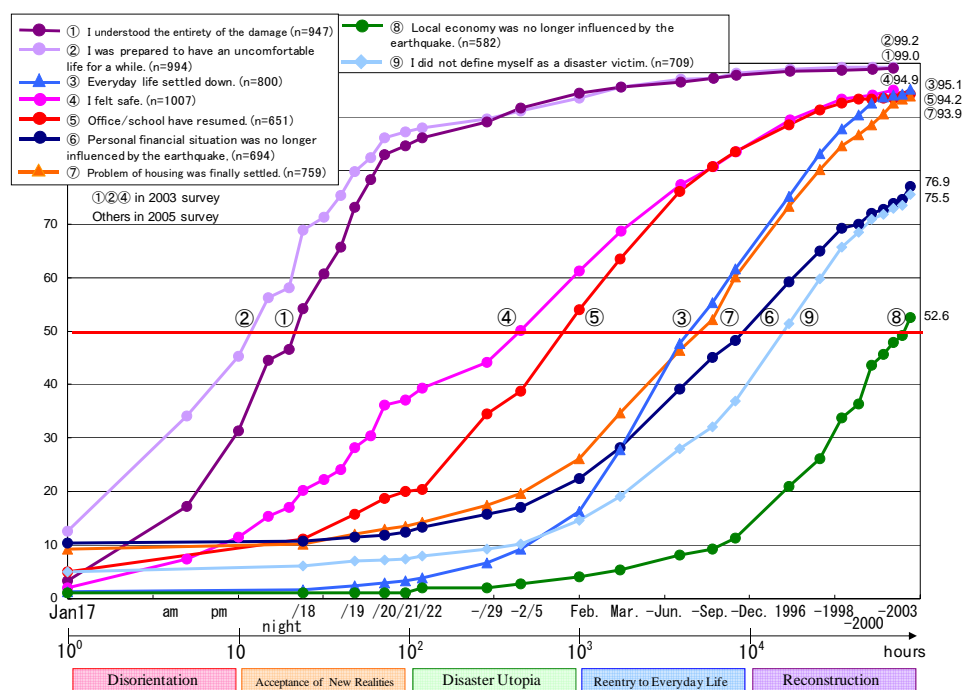


Figure 3. Recovery and reconstruction calendar (Kobe survey in Jan. 2003 and Jan. 2005)

4.2. Mid Niigata earthquake

Figure 4 shows the result of the 2004 Mid Niigata earthquake disaster survey conducted in 2009, five years after the earthquake. For I was prepared to have an uncomfortable life for a while, it took 10 hours (the day after the earthquake, 63.4%), which corresponds to the time for overcoming disorientation to understanding the disaster. It took a week for acceptance of the new reality phase to finish to understand damage (a week after the earthquake, 76.2%). It took more time to grasp the scale of damage, because the disaster occurred in a mountainous area far different than in the urban Kobe Earthquake. After two weeks, office and school began to resume rapidly and 51.7% answered that they had resumed two weeks after the earthquake.

For other questions, the percentage exceeded the majority of 1,000 hours after the earthquake when heavy winter snows began to melt in stricken areas. The percentage of those who answered I felt safe and everyday life settled and exceeded the majority in March 2005, about half a year after the earthquake (53.2%, 53.9%). From spring, the number of respondents who answered problem of housing was settled (about six month after the earthquake, 56.6%) and local activity was restored (six months after the earthquake, 58.4%) increased notably.

At one year after the earthquake, the numbers of respondents who answered personal financial situation was no longer influenced by the earthquake (about one year after the earthquake, 64.2%) and local roads were reconstructed exceeded the majority (66.5%). It took two years half until the percentage of those who answered I did not define myself as a disaster victim (about two years after the earthquake, 62.6%). It took three years half until the percentage of those who answered local economy was no longer influenced by the earthquake (about three years after the earthquake, 64.4%). Even at the time of the survey, about five years after the earthquake, the percentage of those who answered local economy is no longer influenced by the earthquake is 78.2%, and I did not define myself as a disaster victim is 82.2%, suggest that it will take much more time to restore local economy and individual lives.

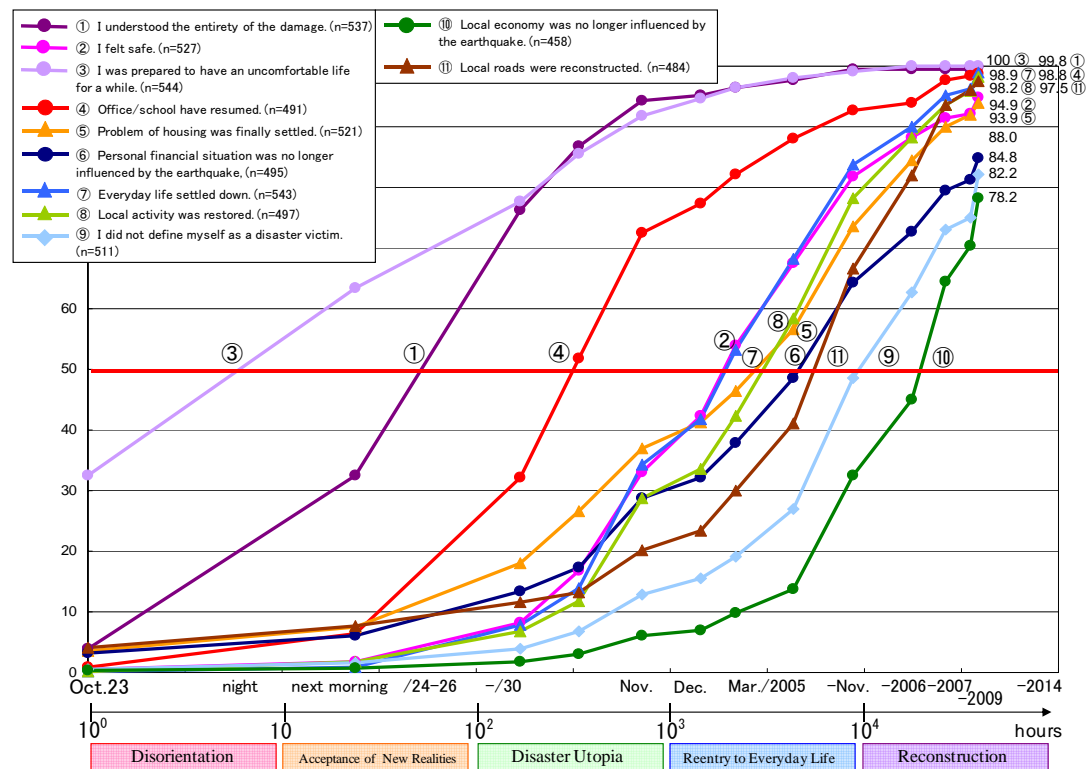


Figure 4. Recovery and reconstruction calendar (Mid Niigata survey in Mar. 2009)

4.3. Chuetsu-oki earthquake

Figure 5 shows the result of the 2007 Chuetsu-oki earthquake disaster survey conducted in 2009, one and a half year after the earthquake. At 10 hours after the earthquake and disorientation phase, victims prepared to have an uncomfortable life for a while (the night of the day of the earthquake, 69.8%). One week after the earthquake, they understood the entirety of the damage (one week after the earthquake, 80.4%) and two weeks after the earthquake, office/school have resumed exceeded 50% (two weeks after the earthquake, 54.4%). One month after the earthquake, they felt safe (55.5%). The percentage who answered everyday life settled down exceeded 50% two months when disaster utopia phase finished (51.5%).

In reentry to everyday life phase, problem of housing was finally settled exceeded 50% three months after the earthquake (51.7%). The percentage who answered personal financial situation was no longer influenced by the earthquake and local activity was restored exceeded 50% six months after the earthquake (57.1%, 59.1%).

The percentage of those who answered local roads were reconstructed exceeded 50% one year (10,000 hours) after the earthquake (59.6%). 82.2% answered so 1.5 years after the earthquake (at the survey). The percentage of those who answered I did not define myself as a disaster victim exceeded 50% one year (10,000 hours) after the earthquake (58.9%). 70.1% answered so in 2009 when the survey was conducted. We also found that the number of respondents who felt local economy was no longer influenced by the earthquake do not exceed the majority (48.0%) 1.5 years after the earthquake at the survey.

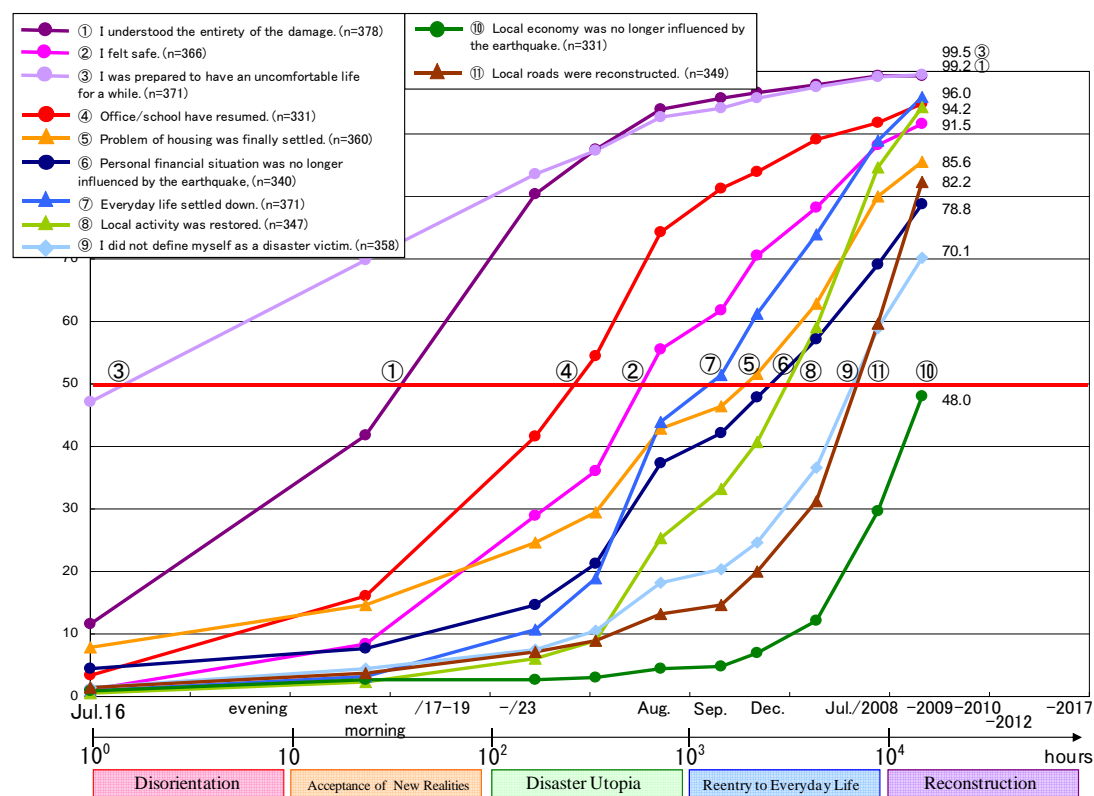


Figure 5. Recovery and reconstruction calendar (Chuetsu-oki survey in Mar. 2009)

5. Calendar reproducibility

To determine the calendar's reproducibility, whether the calendar could be understood by

respondents and answered similarly, other respondents sampled within the same surveyed areas were asked to answer the same questions multiple times.

Figure 6 shows results of overlapping 11 overlapping questions in surveys in 2006 and 2009 in the same areas surveyed in the Niigata Earthquake. Fine lines show results in 2006 and bold lines in 2009. We recognized many common points, for example, how the percentage of recovery and reconstruction rises in each item and the time when each item exceeds the majority.

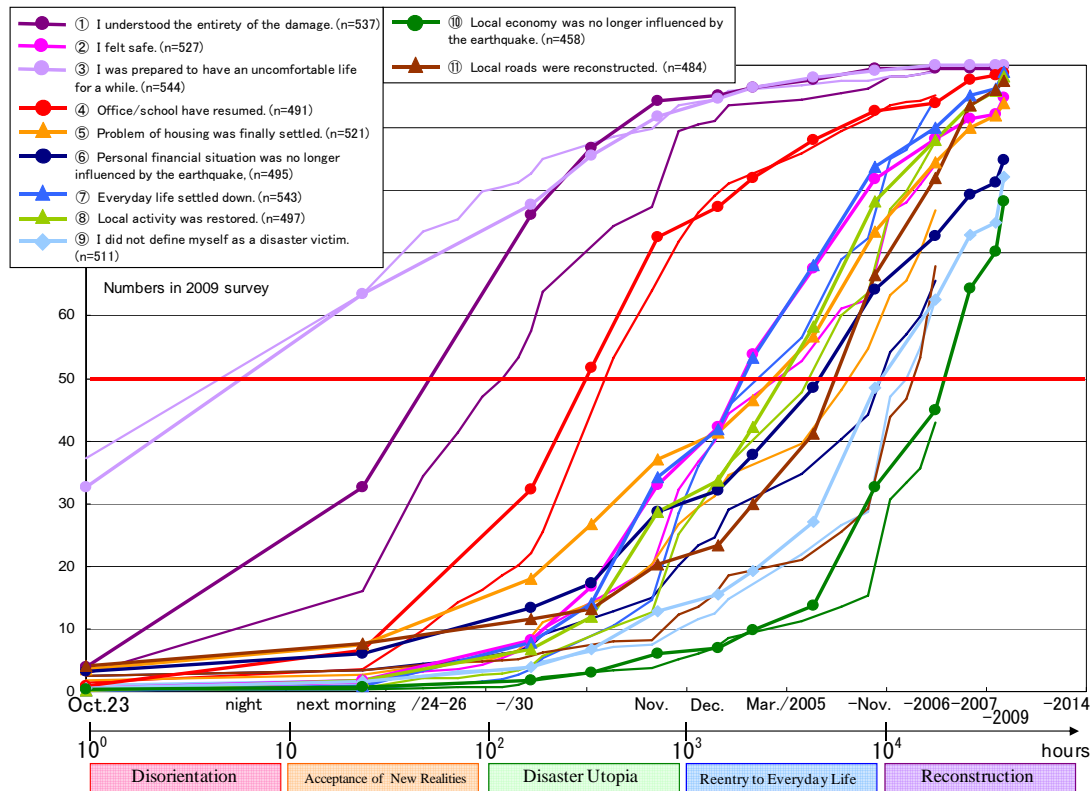


Figure 6. Recovery and reconstruction calendar

(Mid Niigata Survey; fine lines show results in Oct./2006 and bold lines in Mar./2009)

6. Comparison between the Kobe and the Mid Niigata earthquake disaster using recovery and reconstructing calendar

Reviewing the question of how multiple disasters can be compared and examined using the recovery and reconstruction calendar, we found that the recovery and reconstruction calendar in the Kobe Earthquake Disaster and that in the Mid Niigata Earthquake overlapped (Figure 7). In Fig. 7, fine lines with the letter K show results of the survey in the Kobe Earthquake and bold lines those of that in the Mid Niigata.

The process of life reconstruction in the Kobe Earthquake and in the Mid Niigata Earthquake showed many common elements despite is significant differences in damage scale and mode. For example, at 10,000 hours after the earthquake, the number of respondents who answered I did not define myself as a disaster victim exceeded the majority. This occurred about one year after either earthquake, so it appears important to take responses and measures against disaster for victims to return from emergency to ordinary life, setting the first anniversary as one objective. As for the item local economy was no longer influenced by the earthquake, the majority was exceeded finally about 10 years (100,000 hours) after the Kobe

Earthquake, while the local economy was rapidly reconstructed by the earthquake five years after the Niigata Earthquake.

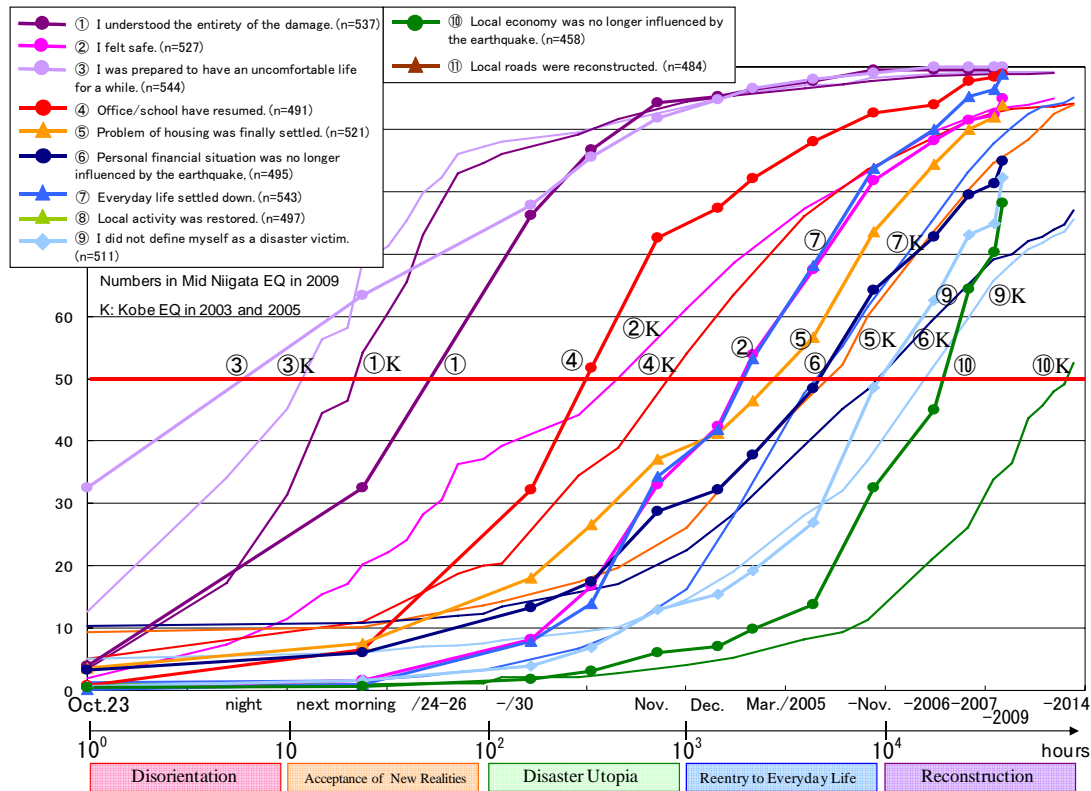


Figure 7. Recovery and reconstruction calendar

(Mid Niigata Survey; fine lines with K show results in Kobe and bold lines in Mid Niigata)

7. Further work

We developed a recovery and reconstruction calendar for measuring overall reconstruction quantitatively for victims and stricken areas, clarifying the disaster process by quantitative examination. We plan to improve the recovery and reconstruction calendar and to study milestones by asking ourselves three questions – how the process can be traced, how the recovery and reconstruction calendar can be used in small- and large-scale social surveys, and how results obtained using the calendar can be applied concretely in disaster response.

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Author Biography

Name:

Reo Kimura, Ph.D.

Affiliation:

Associate Professor, Graduate School of Environment and Disaster Research, Fuji Tokoha University, Japan

Brief Career:

1994-1998 School of Human Science, Waseda University, Japan

1998-2003 Graduate School of Informatics, Kyoto University, Japan

2003-2009 Assistant Professor, Graduate School of Environmental Studies, Nagoya University, Japan

2009- Associate Professor, Graduate School of Environment and Disaster Research, Fuji Tokoha University, Japan