

## **SOCIETAL IMPLICATIONS OF GREAT HANSHIN-AWAJI EARTHQUAKE DISASTER OF JANUARY 17, 1995**

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### **ABSTRACT**

A brief overview of what happened during the first month after the Hyogoken-nambu earthquake of January 17, 1995 is given in terms both of the emergency responses initiated and the societal impact. For emergency responses, formal organization responses are discussed in reference to "Saigai taisaku kihon-ho (the Fundamental Disaster Management Law)" and "Saigai kyujyo-ho (the Disaster Relief Law)". Using the Kobe Fire Department as an example, search and rescue efforts as well as fire suppression activities are reviewed. The post-quake emergence of a voluntary building damage assessment program is discussed. In terms of the societal impact, the deaths and injuries caused by this earthquake, provision of shelters and related housing measures are discussed. The early restoration planning initiated by Kobe City also is briefly introduced.

### **1. INTRODUCTION**

At 5:46 am on January 17, 1995, an earthquake of a magnitude of 7.2 (JMA) hit the southern parts of Hyogo prefecture and Osaka prefecture, the areas most affected were towns in northern part of Awaji Island, as well as the cities of Kobe, Ashiya, and Nishinomiya in Hyogo Prefecture. It heralded the worst earthquake disaster experienced in Japan since the 1923 Kanto earthquake, which killed more than 120,000 people. As of February 22, 5,424 people had died and 2 persons were still missing due to the calamities caused by this earthquake. Even more than one month after the earthquake, exact statistics had yet to be compiled on the number of persons killed, which has been the most reliable statistic in disasters that have occurred in Japan. This is indicative of the severity of damages done by this earthquake, and it would have been unethical to bother disaster workers with inquiries for research purposes. In discussing the social implications of this devastating earthquake, there is a well established format for types of topics, "Emergency Responses" and "Societal Impact"<sup>1)</sup>. We here give a brief overview of what happened during the first month after the earthquake based on public information related to emergency responses and societal impact<sup>2)</sup>.

### **2. EMERGENCY RESPONSES**

#### **2.1 Formal Organizational Responses**

The Fundamental Disaster Management Law (Saigai taisaku kihon-ho), the basic law for Japanese disaster management systems enacted in 1961, states that the heads of municipalities (eg. mayors) are responsible for emergency responses when a disaster occurs or is expected to occur within their jurisdiction. The mayor is required to set up an "emergency responses office" for

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**KEYWORDS:** Emergency responses, Organizational responses, Mortalities, societal impacts

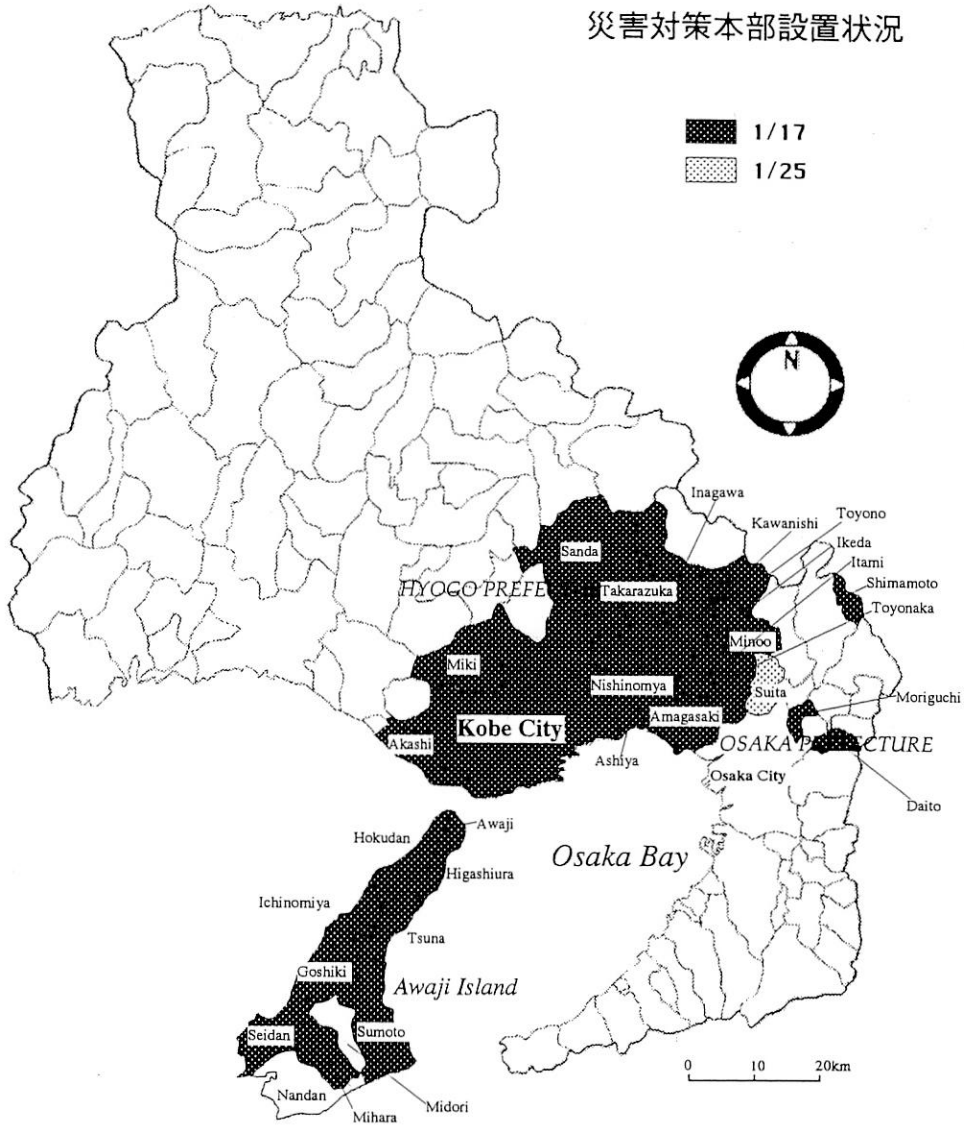


Fig. 1. Municipalities that Set up Disaster Response Offices after the Earthquake of January 17, 1995

organizing disaster responses. The prefectural and national governments are required to take both supervising and supporting roles for each municipality affected. The spatial distribution of the municipalities which set up emergency response offices in response to the Hyogoken-nambu earthquake is shown in Fig.1. Within a few hours of the earthquake, emergency response offices had been set up formally in all of the most severely affected municipalities and in many neighboring municipalities as well.

In the United States, a presidential declaration is important for the provision of various types of disaster aid as prescribed by the "Robert T. Stafford Disaster Relief and Emergency Assistance Act". The Japanese equivalent is the Disaster Relief Law (Saigai kyujyo-ho) enacted in 1947 and revised in depth in 1962 on the enactment of the Fundamental Disaster Management Law (Saigai

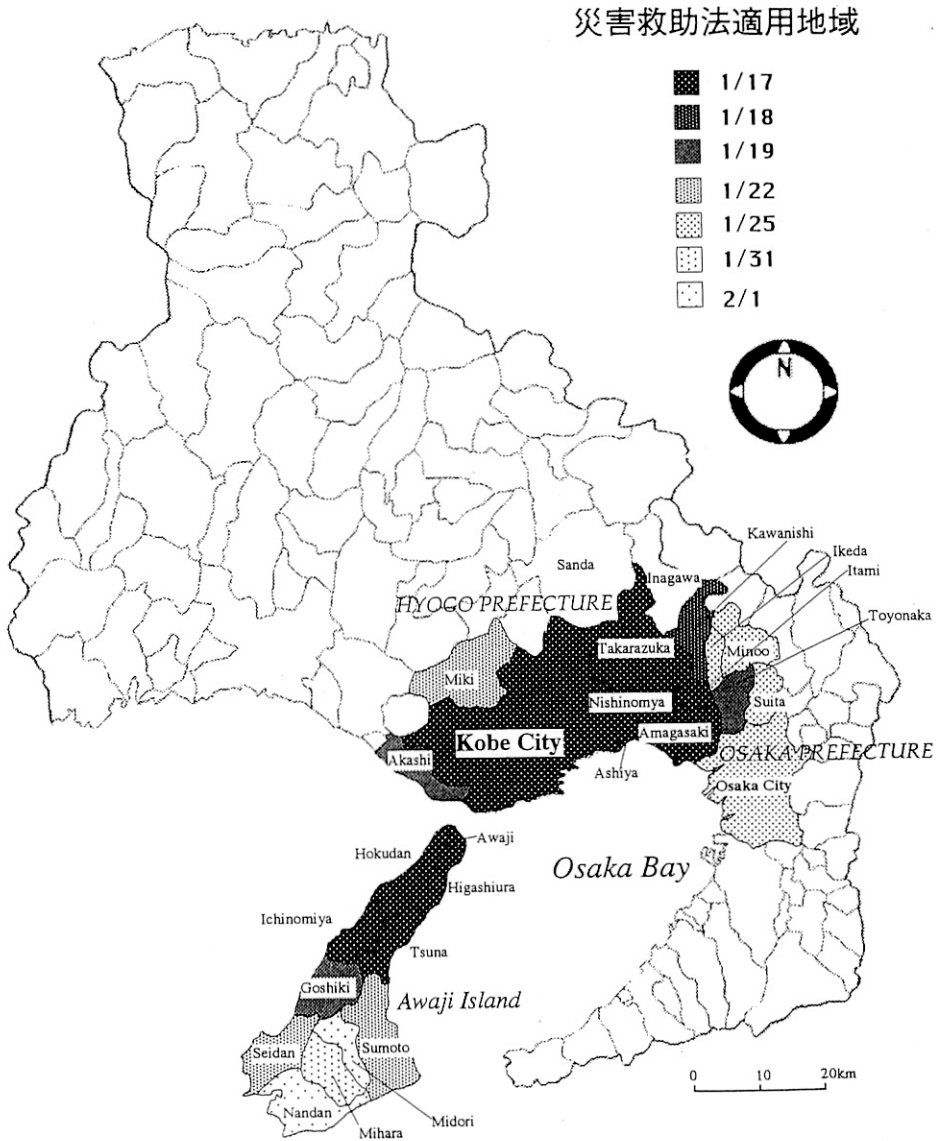


Fig. 2. Municipalities in which the Disaster Relief Law Was Applied after the Earthquake

taisaku kihon-ho). According to this law, the governor of the prefecture which has disaster-affected municipalities within its jurisdiction is responsible for providing the following disaster aid to victims in the municipalities at the expense of prefectural government:

- 1) Shelters and temporary housing
- 2) Food and water
- 3) Clothing, blankets, and other daily necessities
- 4) Medical and maternity care
- 5) Search and rescue parties
- 6) Emergency repairs to damaged housing
- 7) Financial support for the resumption of occupations

- 8) School supplies
- 9) Burial services
- 10) Other good and services considered by the governor as necessary

Fig. 2 gives the chronological history and spatial distribution of the application of the Saigai kyujyo-ho after the earthquake. The area of application was extended over time as the severity of the damage done became clear. Noted that it took about two weeks before the law could be applied to the last two municipalities on Awaji Island.

A comparison of Fig. 1 and Fig. 2 shows there is no definite "disaster area declared" in Japanese disaster management, unlike the United States. For the most affected municipalities (eg. Kobe city), there would be no doubt that disaster aid should be given this municipality. But, for some municipalities located on the fringe of spatial distribution, the situation varied. For example, the Saigai kyujyo-ho was not applied to Sanda City, in which no one was killed by the earthquake, even though a disaster response office was set up there on January 17. There are several other municipalities like Sanda City. In contrast, the law was applied to those municipalities which did not set up disaster response offices, eg. Osaka City and two towns on Awaji Island. These ambiguities as to the definition of "disaster area" may cause distributive injustices in both response and recovery processes. This problem should be noted as an important issue to be considered in the immediate future.

## 2.2 Search and Rescue/Fire Suppression

In the United States, all emergency calls go to 911. In Japan, there are two numbers; 110 for the prefectural police department and 119 for municipal fire departments. Fire departments are responsible not only for fire suppression, but for ambulance and paramedical services, as well

Table 1. Responses made by the Kobe Fire Department January 17 through 31

Day	Fires	Ambulance Dispatches	Search & Rescue	Rescued alive	Successful Rescue (%)	Mutual Aid Personnel
1/17	110	264	604	486	80.5	800
18	14	335	452	120	26.5	1,990
19	15	366	408	89	21.8	2,367
20	8	472	238	14	5.9	2,434
21	5	416	121	7	5.8	2,238
22	3	449	37	5	(13.5)	2,124
23	6	456	12	2	(16.7)	1,806
24	3	376	5	0	0.0	1,608
25	9	333	5	0	0.0	856
26	3	319	4	1	(25.0)	560
27		312	2	0	0.0	415
28		302	0	0	-	345
29		245	0	0	-	320
30		253	0	0	-	283
31		247	3	0	0.0	289
Total	176	5,145	1,891	724		18,435

as search and rescue operations. Let us look at Kobe City to see how the Kobe Fire Department responded from January 17 through 31 to the enormous needs created by the earthquake 3).

At least 35 fires ignited simultaneously in Kobe City right after the main shock. Strong ground motion caused the immediate collapse of thousands of old wooden houses thereby trapping many persons inside the debris. Kobe Fire Department received 6,922 calls on the first day, as compared to the 1994 average daily number of calls which was 436. Because of the assistance of mutual aid and the Self-Defense Force, Kobe Fire Department could concentrate on fire suppression activities.

Search and rescue efforts peaked on 19th and 20th and these operations saved 620 people in total. The number of people rescued alive, however, had drastically decreased on Day 4. The ability to mobilize search and rescue efforts within the first 72 hours after an earthquake therefore appears to be decisive factor for the success of search and rescue operations. It must also be noted that voluntary search and rescue efforts that were initiated by the disaster victims themselves during the first few hours after the earthquake at all disaster sites saved many people.

### 2.3 Building Damage Assessment

Right after the Northridge earthquake, the building damage assessment system that have been developed in California based on the lessons learned from the 1989 Loma Prieta earthquake proved successful. In Japan, Shizuoka and Kanagawa prefectures had developed similar assessment systems before the earthquake of January 17, 1995, but no such system existed in the Hanshin- Awaji area at the time of the earthquake. In two weeks after the earthquake, under the leadership of Professor Tsuneo Okada of the University of Tokyo and others, a systematic voluntary effort was organized among registered architects who functioned as assessing of building damage at damage sites to aid the local municipalities.

## 3. SOCIETAL IMPACT

### 3.1 Deaths and Injuries

According to the Hyogo Prefectural Police, 5,424 persons had been killed and two persons were still missing as of 23:45 on February 22, 1995. Fig. 3 shows the spatial distribution of the people killed<sup>4</sup>) and Fig. 4 shows the mortality rate for each municipality calculated in terms of the number of the dead per 1,000 population. Six districts had high mortality rates: Higashinada, Nada, Nagata, and Suma wards of Kobe City, and Nishinomiya and Ashiya cities. All are high density residential areas, and this is reflected in the effect of the time of day when the earthquake occurred. Had it occurred sometime later when commuting was in full swing and businesses opening, more mortalities would have occurred in the central districts of Kobe City and in transportation systems such as expressways and railways.

The Hyogo Prefectural Police investigation of February 9 showed that 89 % of total mortalities occurred within a very short period after the earthquake because of suffocation and/or contusion due to the houses collapsing, and that 10% of them were due to death by fire. The mortality rate was disproportionately high for senior citizens, about 43 % of the total mortalities consisted of persons more than 65 years old.

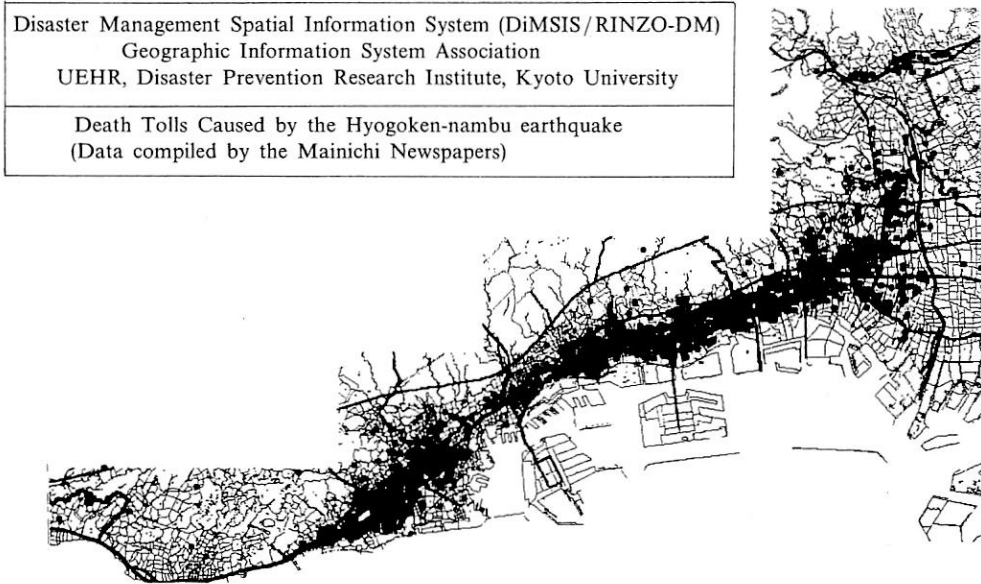


Fig. 3. The Spatial Distribution of Persons Killed by the Earthquake of January 17, 1995

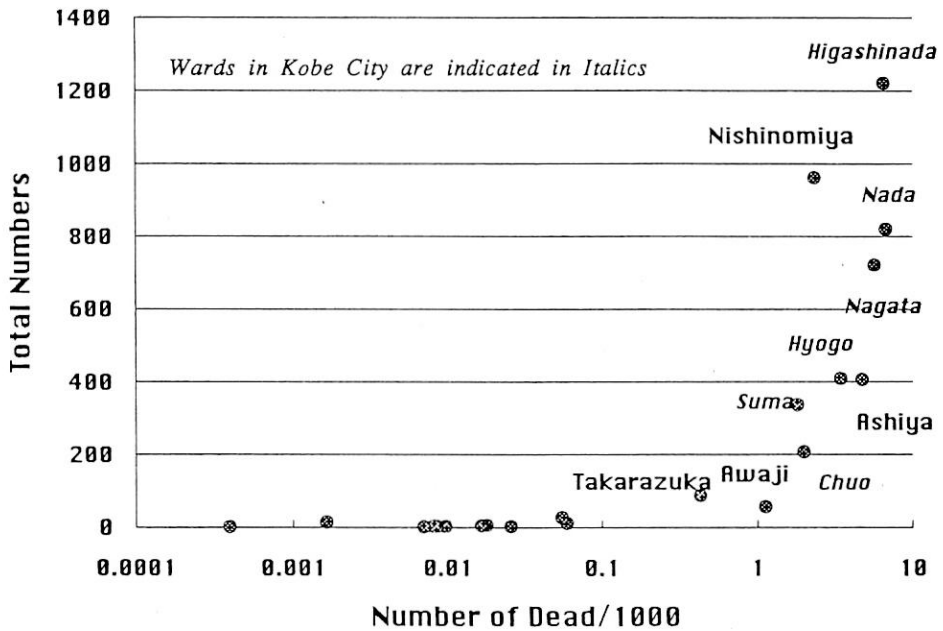


Fig. 4. Mortality Rates for Various Areas

### 3.2 Shelters and Temporary Housing

Approximately 1,000 shelters eventually were set up using various facilities, and these accommodated a maximum of 320,000 disaster victims. Disaster victims used all types of facilities available in their vicinity. For example, the Ashiya City Hall unexpectedly became the shelter for

some 1,000 people who occupied the floors and hallways so that disaster workers in Ashiya City had problems of space for their operations. Efforts were made to expel these refugees but were unsuccessful. Classrooms and schoolyards became typical shelter sites. In Kobe City, about 150 schools (out of a total of 345) have been used as shelters, and teachers in Kobe City have been actively involved as project managers in the operation of shelters. Even though school facilities were still being used as shelters, all schools in Kobe City were scheduled to be reopened for classes by February 24th.

For those who lost their homes in the disaster, the biggest concern is to secure temporary housing units for them to live in for at least the next two years. In order to provide temporary housing for those who need it, the Japanese national government has already ordered 30,047 housing units to be built in Hyogo and Osaka prefectures by the end of March. In Kobe City, the first 82 families moved into temporary housing on February 15th.

Besides the provision of temporary housing, several other housing measures have been set in motion. Housing Loan Corporation, a subsidiary of the Ministry of Construction as of February 2, had set up a plan that included the loan markedly reduced interest rates for those in the disaster area (Fig. 5). Fig. 5 shows the disaster area designated by the Housing Loan Corporation. As of February 6, the Ministry of Justice has applied the Emergency Land and Building Lease Control Act in order to protect and reconcile the interests of those living in disaster area (Fig. 6). This also is an example of the lack of a unified definition of what constitutes a "disaster area", that is, there is no unified law which covers all the processes necessary for the recovery from the disasters. More research on this issue is needed.

### 3.3 Early Recovery Planning

On February 7th, Kobe City established a "Reviewing Committee for Restoration Planning of Kobe City". It consisted of 27 members with various types of expertise necessary for the establishment of guidelines for the restoration plans. This committee has three working groups whose roles are to review the disaster vulnerability of Kobe City from the perspectives of 1) urban infrastructures, 2) urban safety standards, and 3) urban lifestyles.

## 4. CONCLUDING REMARKS

Even with the passing of more than one month after the Hyogoken-nambu earthquake, recovery from the disaster that is caused was far from complete. The entire scope of this disaster has yet to be fully appreciated by all the sectors of people in the disaster area - the victims, the disaster workers, and the disaster researchers. What have been reported here must be treated as a brief, rudimentary reconnaissance report. The tentative conclusion that can be drawn from this report are

- 1) The earthquake disaster management programs adopted in Japan have relied heavily on engineering mitigation of disasters. Because this engineering approach has proved successful during the last half century, the false conviction arose that there would be no major disasters caused by severe earthquakes.
- 2) The lesson learned from the Great Hanshin-Awaji earthquake Disaster is that Japanese engineering did not perform as well as we expected for two reasons: a) the existing engineering mitigation was not strong enough to prevent a cataclysmic disasters, and b) the preparedness for post-disaster crisis management was only barely adequate.
- 3) As a result, there was lack of coordination among the organizations responsible for disaster management in a number of areas.
- 4) A more balanced disaster management system in terms of mitigation and preparedness must be established as soon as possible.

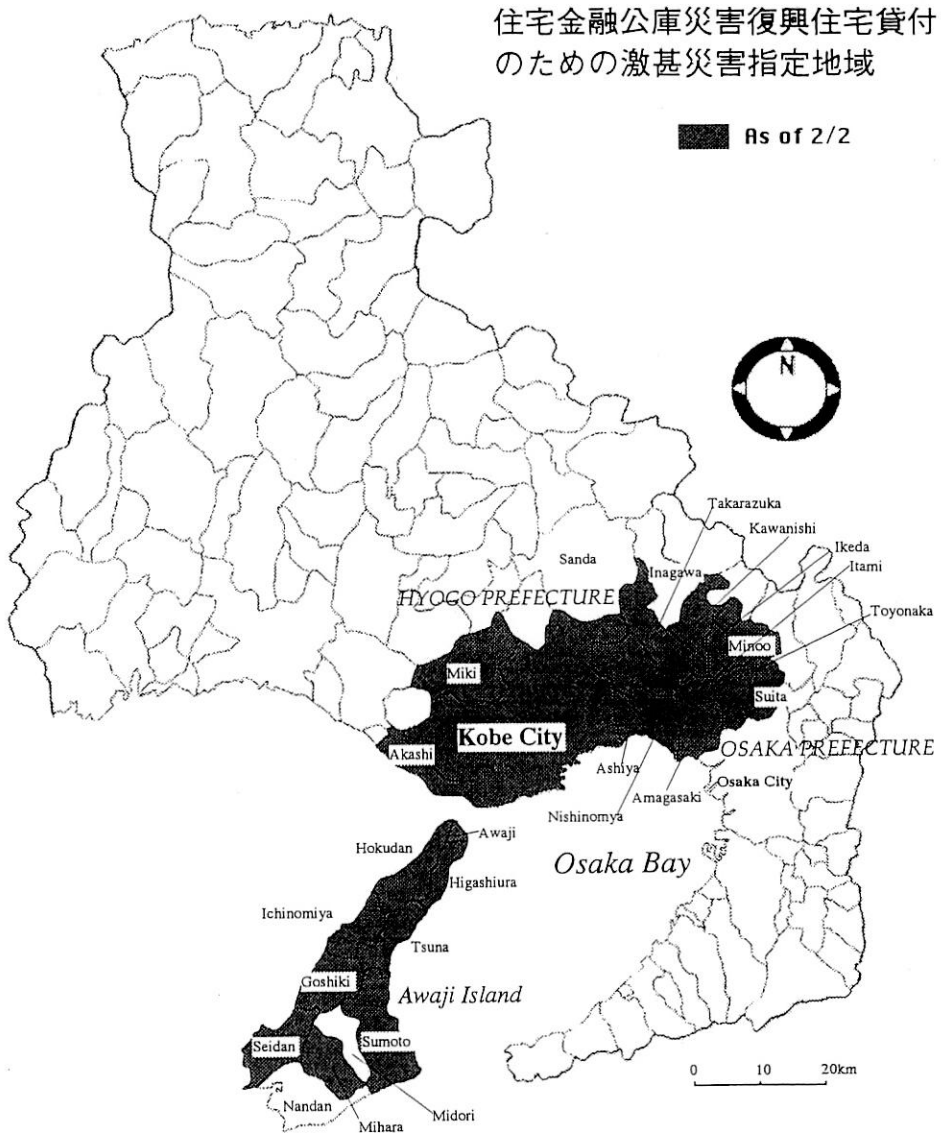


Fig. 5. Disaster Area as Designated by the Housing Loan Corporation, A Subsidiary of the Ministry of Construction



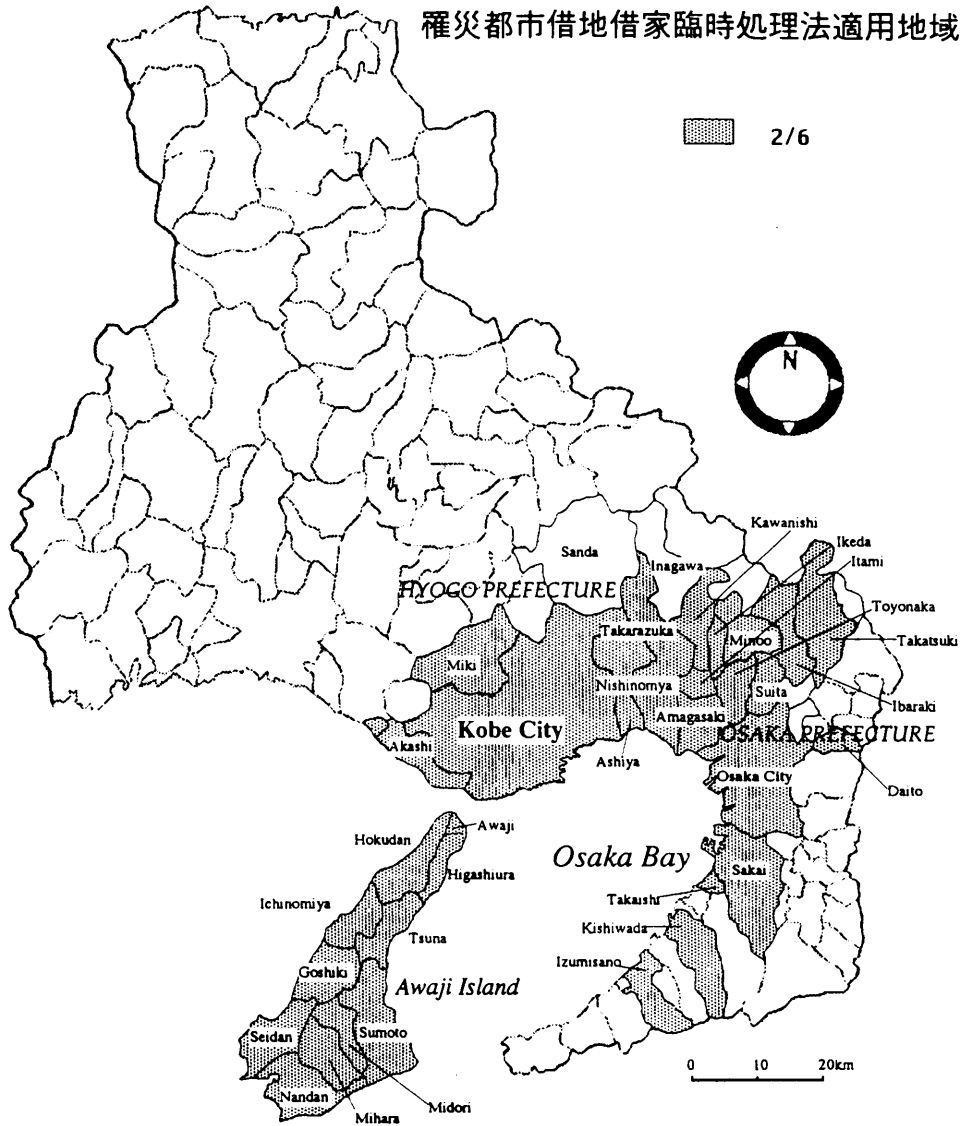


Fig. 6. Disaster Area as Designated by the Emergency Land and Building Lease Control Act, the Ministry of Justice

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