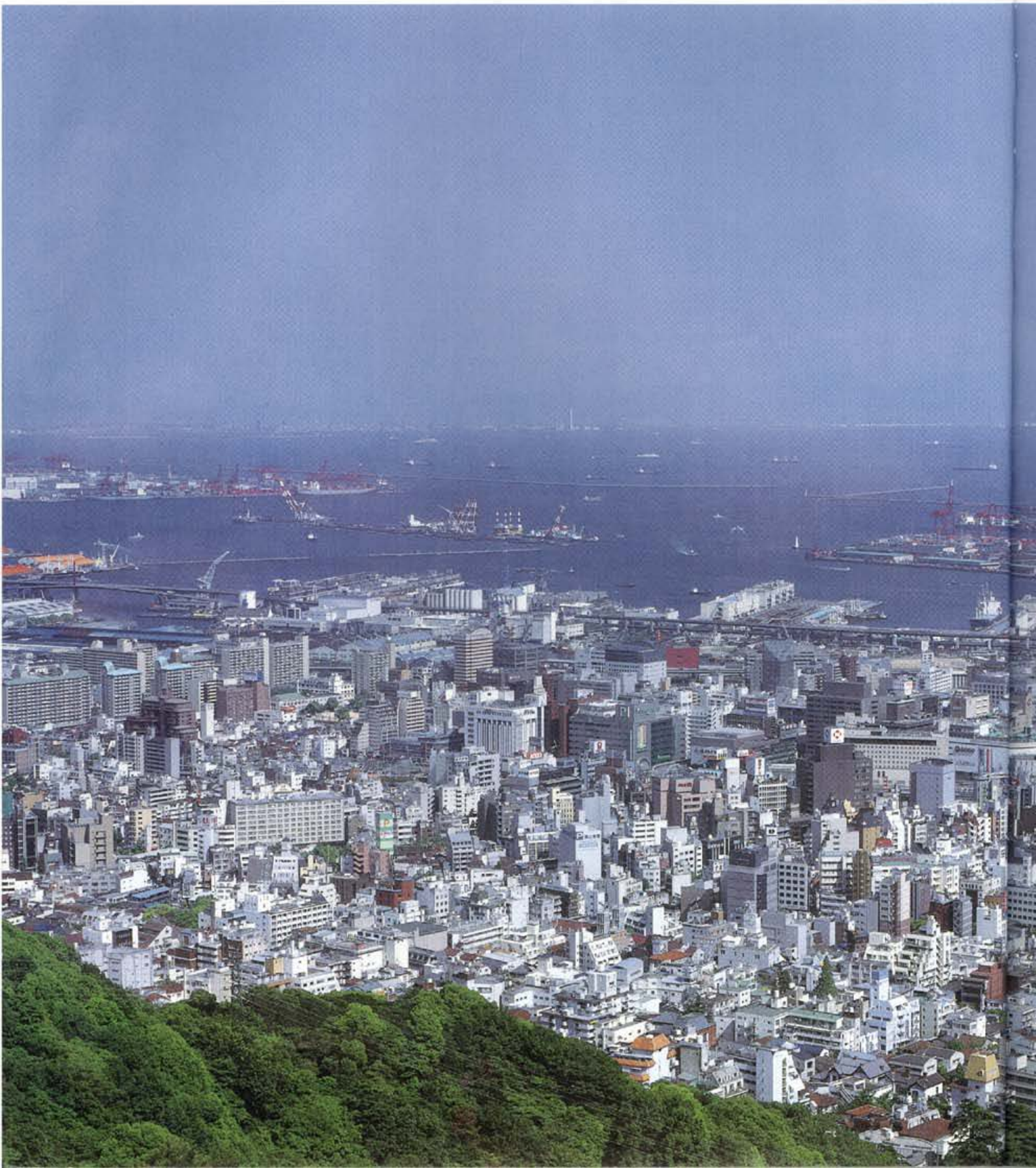
THE ANIMAL RESCUE AT THE GREAT HANSHIN EARTHQUAKE



Great Hanshin Earhthquake Animal Rescue Headquarters



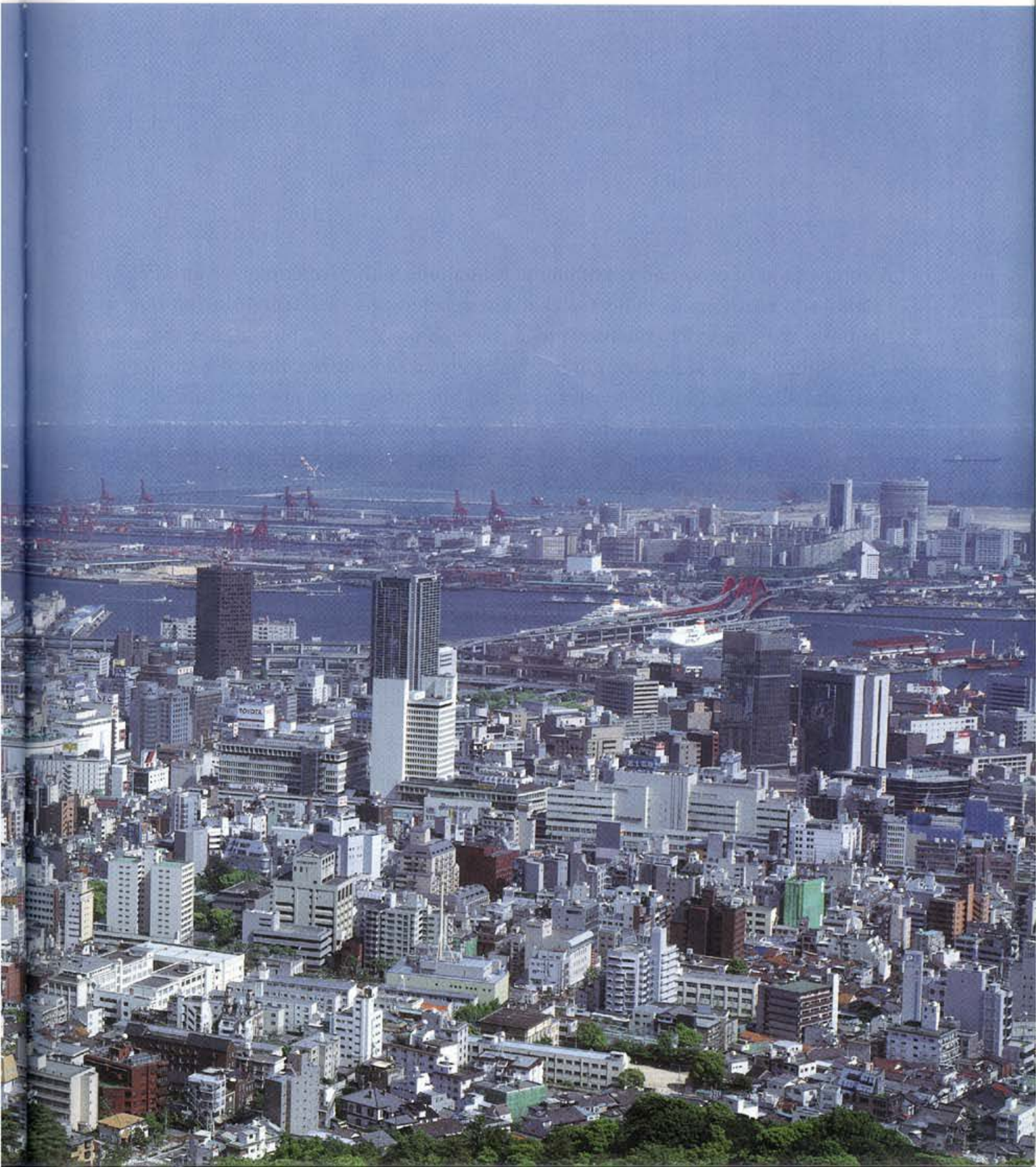
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Kobe before the Earthquake



A comparison of recorded maximum accelerations with predictions for an MW 6.9 strike-slip earthquake indicates that the accelerations recorded during the earthquake are generally consistent with, though possibly slightly higher than, those recorded worldwide during other major strike-slip earthquakes of a similar magnitude. The maximum accelerations are also similar on average to those recorded during the 1994 MW 6.7 Northridge, California earthquake. This comparison, along with other structural and geotechnical information that is available, suggests that the greater damage and the larger numbers of deaths, casualties, and destruction of homes sustained during the Kobe Earthquake were likely caused by the aggregated effects of an extremely dense population, an older building stock, and the predominance of poor soils in the strongly shaken area.

A LIST OF ERRATA

- Color page: The damage in the Great Hanshin Earthquake

  Damege → Damage
- PREFACE: Left column, Line 8

  1997 → 1995
- Page 4 (Chapter 1): Brid Conservation Law

  Brid → Bird

  Particulars for prevention of cruelty of wild animals →

  Particulars for prevention of cruelty to wild animals
- Page 4 (Chapter 1): Brid Conservation Law
- Page 29: ORGANIZATION FOR THE ANIMAL RESCUE

  Tokyo Headquarter → Tokyo Headquarters
- Page 44: Figure A

  covner → corner
- Page 45: Figure D

  difficulty → difficulty

  difficulties → difficulties
- Page 46: Figure E

  covner → corner
- Page 47: Figure H

  difficulty → difficulty

  difficulties → difficulties
- Page 72: Figure D

  pitital → pitiful
- Chapter 5 Summary: CONTENTS and the title of the next page

  TO RESCUE SUFFERING ANIMALS THE GREAT HANSHIN EARTHQUAKE →

  TO RESCUE SUFFERING ANIMALS AT THE GREAT HANSHIN EARTHQUAKE

  Headquarter → Headquarters
- Color page: AN ANIMAL HAS A PECULAR CAPACITY FOR SENSING A COMING EARTHQUAKE

  PECULAR → PECULIAR

Kobe Crumbles

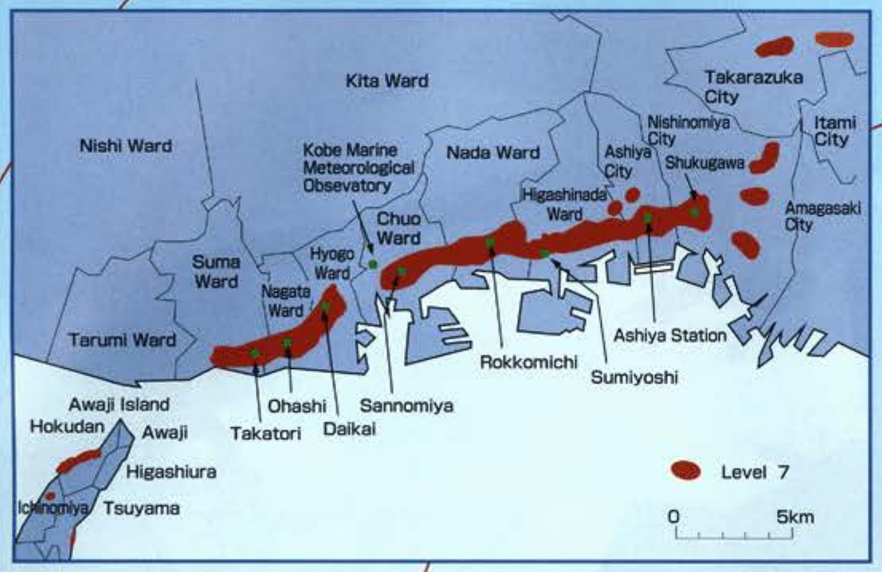
At 5:46 a.m. local time, on Tuesday, January 17, 1995, an earthquake of magnitude 7.2 (Mj) struck the region of Kobe and Osaka in south-central Japan. The Great Hanshin Earthquake killed more than 5,500, injured nearly 35,000, and left 300,000 homeless.

Mj: Based on the Japan Meteorological Agency (JMA) magnitude scale, roughly equivalent to a moment magnitude (MW) of 6.9.





Distribution of level 7



DISTRIBUTION OF THE SEISMIC SCALE AT THE GREAT HANSHIN EARTHQUAKE

The epicenter of the shock was the northern area of Awaji Island in Hyogo Prefecture, which is situated at 34 degrees 36 minutes north latitude and 135 degrees 3 minutes east longitude, which was about 14 km deep. Innumerable houses collapsed by the severe earthquake of magnitude (Mj) 7.2. An earthquake of Mj 7.2 and frequent aftershocks (1798 aftershocks ranging from after the earthquake until April 7, 1995) panicked the inhabitants. Milder earthquakes occurred 217 times. The maximum level of the aftershocks was Mj 4.9 (a strong earthquake of the 4th degree on the seismic scale, at Kobe and Nishinomiya) which occurred at 23:16 on January 25.

The damage in the Great Hashin Earthquake



TOTAL AMOUNT OF THE DAMEGE

DEAD
3,837
(MAR.12)

INJURY
14,679
(FEB. 9)

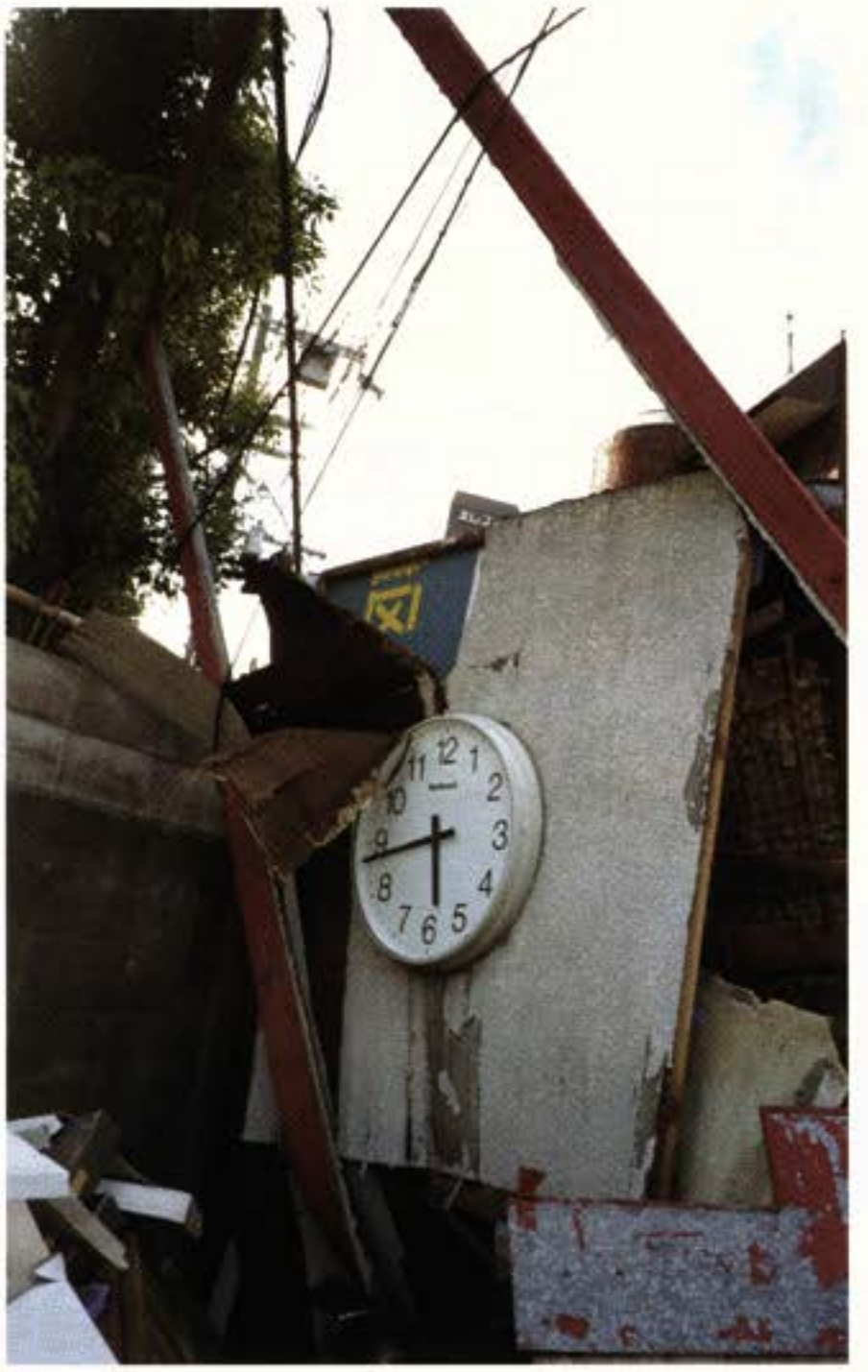
BURNED AREA
641,684m²
NUMBER OF FIRES
176 CASES
(MAR. 6)

TOTAL DAMEGE
54,949HOUSES
PARTIAL DAMEGE
31,783HOUSES
(FEB. 5)

Earthquake intensities

The levels of strength of an earthquake according to the intensity scale used by the Meteorological Agency

Level 0:	Not felt by people but strong enough to be recorded on a seismometer
Level 1:	Felt only by people remaining still or people sensitive to quakes
Level 2:	Felt by most people. Slight tremors of doors or shoji (sliding paper screen) can be seen
Level 3:	Houses are jolted. Doors and shoji screens rattle. Objects hanging from ceilings, such as light fixtures, swing much. Liquids in containers pitch and roll
Level 4:	Houses are jolted strongly. Unstable objects, such as a vase, topple. Liquids spill out of containers. Felt also by people walking. Many people go out of their houses
Level 5:	Walls get cracked. Tombstones fall down. Chimneys and stone fences are damaged
Level 6:	Less than 30 percent of houses collapse. Landslides occur. Cracks appear in the ground. Most people cannot stand
Level 7:	30 percent of houses or more collapse. Landslides occur, the ground cracks or faults are caused by the earthquake





The magnitude shows the seismic sizes, while the intensity scale represents the levels of the strength of an earthquake at a point.

Major quakes, tsunami

Japan is no stranger to earthquakes. The following is a list of major earthquakes and tsunami that have struck the country this century. Strength is according to the Richter scale unless otherwise specified.

Aug. 14, 1909 — 41 people killed and 978 houses destroyed in a 6.8 earthquake in Shiga and Gifu prefectures.

March 15, 1914 — 94 people killed in a 7.1 earthquake in Akita Prefecture.

Sept. 1, 1923 — Fires after the Great Kanto Earthquake, which registered 7.9, killed about 140,000 people in Tokyo and Yokohama, with more than 560,000 homes destroyed.

May 23, 1925 — A 6.8 quake killed 428 people in western Japan.

March 7, 1927 — A direct hit earthquake of 7.3 killed 2,935 people in Kyoto Prefecture. The quake's focal point was located immediately beneath the surface.

Nov. 26, 1930 — A main temblor of 7.3 and aftershocks killed 272 people in northern Izu, Shizuoka Prefecture.

March 3, 1933 — Tsunami as high as 27.8 meters killed 3,064 people on the coast of Miyagi Prefecture.

1945 — A 6.8 quake that killed 1,961 people in Aichi Prefecture was kept secret by military authorities during World War II.

Dec. 7, 1944 — Tsunami and an initial shock of 7.9 killed 998 people in Wakayama Prefecture.

Dec. 21, 1946 — About 1,400 people were killed, 13,042 buildings collapsed and 2,598 structures were destroyed by fire in an 8 earthquake centered off Wakayama Prefecture.

June 28, 1948 — 3,769 were people killed, 36,184 buildings collapsed and 3,851 buildings burned down in a 7.1 earthquake in Fukui Prefecture.

March 4, 1952 — 33 people died, 815 buildings collapsed and 91 people were washed away in an 8.2 quake focused off Hokkaido.

May 23, 1960 — A tidal wave originating from an 8.5 quake off Chile killed 142 people and destroyed 1,599 buildings in northeastern Japan.

June 16, 1964 — 26 people were killed and 1,960 buildings destroyed in a 7.5 earthquake in Niigata Prefecture.

Feb. 21, 1968 — An earthquake registering 5 on the Japanese scale of 7 killed three and injured 42 in Miyazaki Prefecture.

May 16, 1968 — 52 people perished and 673 buildings collapsed in a 7.9 earthquake focused in the seabed off Tokachi, Hokkaido.

May 9, 1974 — 30 were killed and 134 buildings destroyed in a 6.9 earthquake focused off Izu Peninsula, Shizuoka Prefecture.

Jan. 14, 1978 — 25 people were killed and 94 buildings collapsed in a 7 quake off Izu Oshima island, Tokyo.

June 12, 1978 — 28 perished and 1,183 buildings were destroyed in a 7.4 earthquake focused off Miyagi Prefecture.

March 21, 1982 — An earthquake registering 6 on the Japanese scale of 7 injured 136 in Urakawa, Hokkaido.

May 26, 1983 — 104 people were killed and 934 buildings collapsed in Akita and Aomori prefectures in a 7.7 earthquake focused in the Sea of Japan.

Sept. 14, 1984 — 29 people were killed in an earthquake registering 6 on the Japanese scale of 7 in Otaki, Nagano Prefecture.

Jan. 15, 1993 — One person was killed and 34 buildings destroyed in a 7.8 quake centered off Kushiro, Hokkaido.

July 12, 1993 — More than 200 people were killed and 307 injured in a 7.8 quake and tsunami off Okushiri Island, Hokkaido.

Oct. 4, 1994 — An 7.9 earthquake off eastern Hokkaido injured 436 people.

Dec. 28, 1994 — 3 people were killed and 688 injured in an earthquake with a magnitude of 7.9 off the Sanriku area (covering Aomori, Iwate and Miyagi prefectures.)

Jan. 7, 1995 — A 6.9 aftershock from the Dec. 28 earthquake in Hachinohe, Aomori Prefecture, killed one person.

Jan. 17, 1995 — More than 5,300 people are killed and injured in an earthquake with a magnitude of 7.2 in the Kansai region.

The earthquake that hit the big cities caused fatal damage to lifelines such as electricity, water, gas, telecommunications, and transportation. The earthquake caused an enormous collapse of lifelines and fires in the area where old wooden houses stood close together. Fires ravaged Kobe's Hyogo and Nagata wards throughout the night on Day 1. If the earthquake would have occurred later, during commuting time, the damage would be beyond imagination.





LIFE LINES

Water, gas, electricity, and telecommunications are lifelines which cover the whole area and support our lives. When one point is broken down, the effect is felt in a large area. Restorations of the lifelines varied in this event, with electric power and telecommunications quickly restoring most systems to functionality. On the other hand, most of Kobe lost water, wastewater, and gas services. All of these lifelines were extensively damaged.

Current estimates of the repair costs in this earthquake have been reported in the range of U.S.$95 billion to U.S.$147 billion, many times the damage inflicted by the 1994 Northridge Earthquake. These figures do not include the loss of building contents, such as equipment and inventory, which will also be substantial. Repair cost estimates made by the Hyogo Prefectural Government, the National Land Agency, and the Ministry of Transportation three weeks to a month after the disaster are shown in the table.

KANSAI ELECTRIC POWER RESTORATION

DATE	TIME	CUSTOMERS WITHOUT POWER
January 17	5 : 46 A.M.	(Data not available)
January 17	7 : 30 A.M.	1,000,000
January 17	8 : 00 P.M.	500,000
January 18	5 : 00 P.M.	200,000
January 19	7 : 00 P.M.	110,000
January 20	1 : 00 P.M.	70,000
January 22	9 : 00 A.M.	17,000
January 23	9 : 00 A.M.	2,000
January 23	3 : 00 P.M.	0[1]

1. Does not include more than 70,000 customers whose buildings or houses were destroyed by the earthquake or the fire thereafter.

REPAIR COST ESTIMATES (U.S.$ BILLIONS)

AGENCY	BUILDINGS	HARBORS	ROADS	RAIL - ROADS	UTILITIES	OTHER
Hyogo Prefectural Government	65.7	11.8	6.8	4.6	- -	- -
National Land Agency	71.3	- -	24.9	- -	6.8	5.7
Ministry of Transportation	- -	8.4	- -	4.7	- -	- -

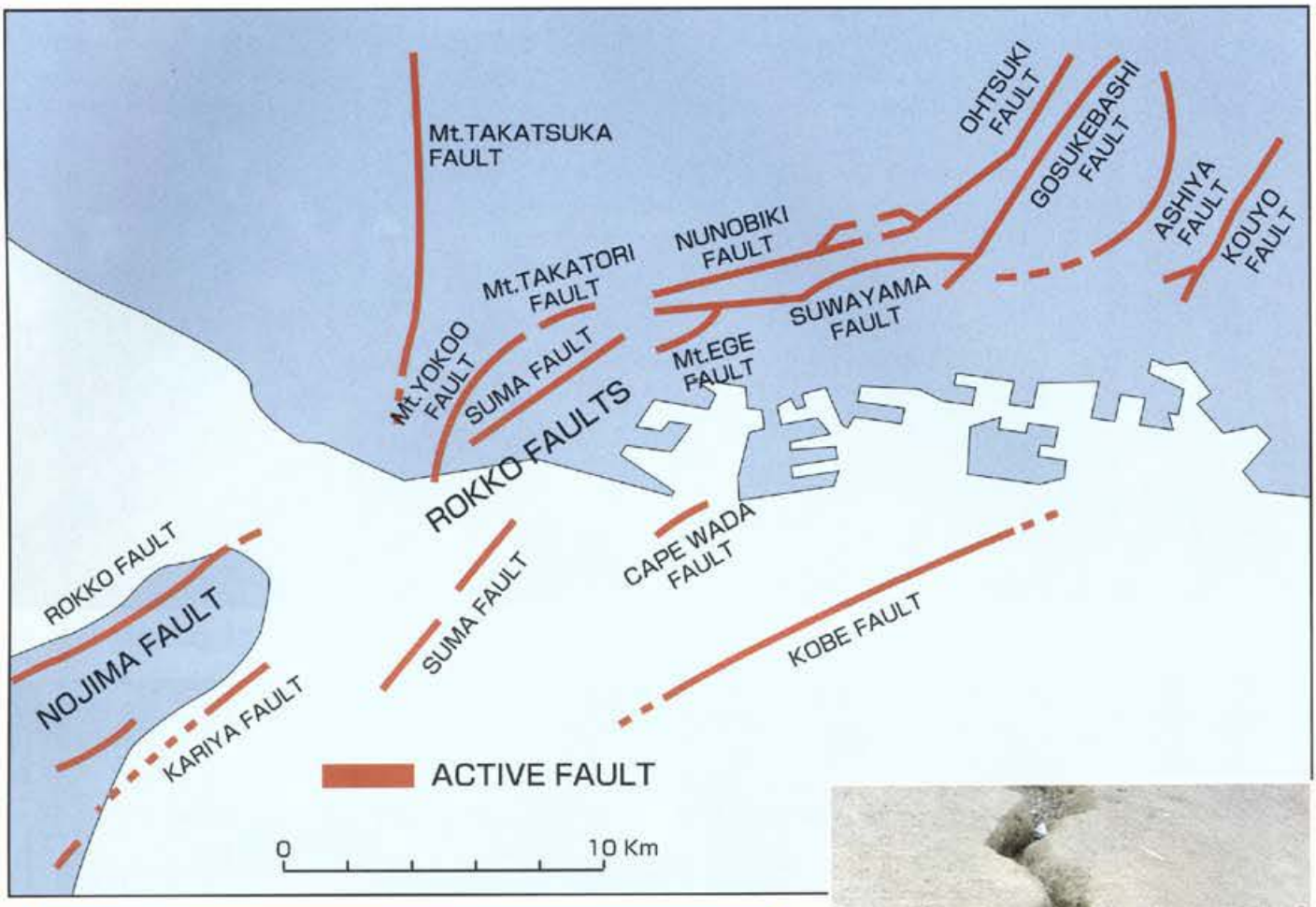


Long lines for water (Takarazuka City)



Restoration of gas lines (Ashiya City)

ACTIVE FAULTS





ACTIVE FAULTS

An approximately 9-kilometer-long surface fault rupture was identified along the Nojima Fault, which is on the northwestern coast of Awaji Island and southwest of Kobe. The fault strikes 40° NW, dips steeply to the southeast, and has a predominantly right-lateral strike-slip sense of displacement consistent with the mechanism of the main shock and the trend of the aftershocks. Geomatrix Consultants (a geotechnical firm) measured local displacements at two locations along the northern part of the fault from the recent earthquake: Vertical displacement was 1.2 meters, and right-1ateral displacement was 1.5 meters. These displacements are in agreement with measurements taken by others, who reported maximum vertical displacements of about 1.2 meters and right-lateral displacements of 2.1 meters. Past surface-faulting events, which are probably similar to the most recent event, were made evident by the 6- to 7-meter-high scarp along the fault. Given a long-term slip rate of 1 millimeter per year for the Arima-Takatsuki Tectonic Line (ATTL) (as listed in "Active Faults in Japan: Sheet Maps and Inventory by the Research Group of Active Faults"), and an average displacement of about 1 to 1.5 meters (as suggested from observed displacement on the Nojima Fault), it appears that an earthquake roughly the size of the Kobe shock occurs once every 1,000 to 1,500 years, on the average, along this portion of the ATTL.

It is unknown whether the surface fault rupture extended to the northeast across the Akashi Strait and continued onland to connect with faults in the Kobe-Nishinomiya area. People in this area live on the active faults.

COLLAPSE WITH BUCKLING

The disaster in the Great Hanshin Earthquake was produced by the unexpected pitch of the quake. This disaster brings to mind the question of why seismic designs of buildings and structures did not take the pitch factor of earthquakes into consideration and only prepared for a rolling motion.

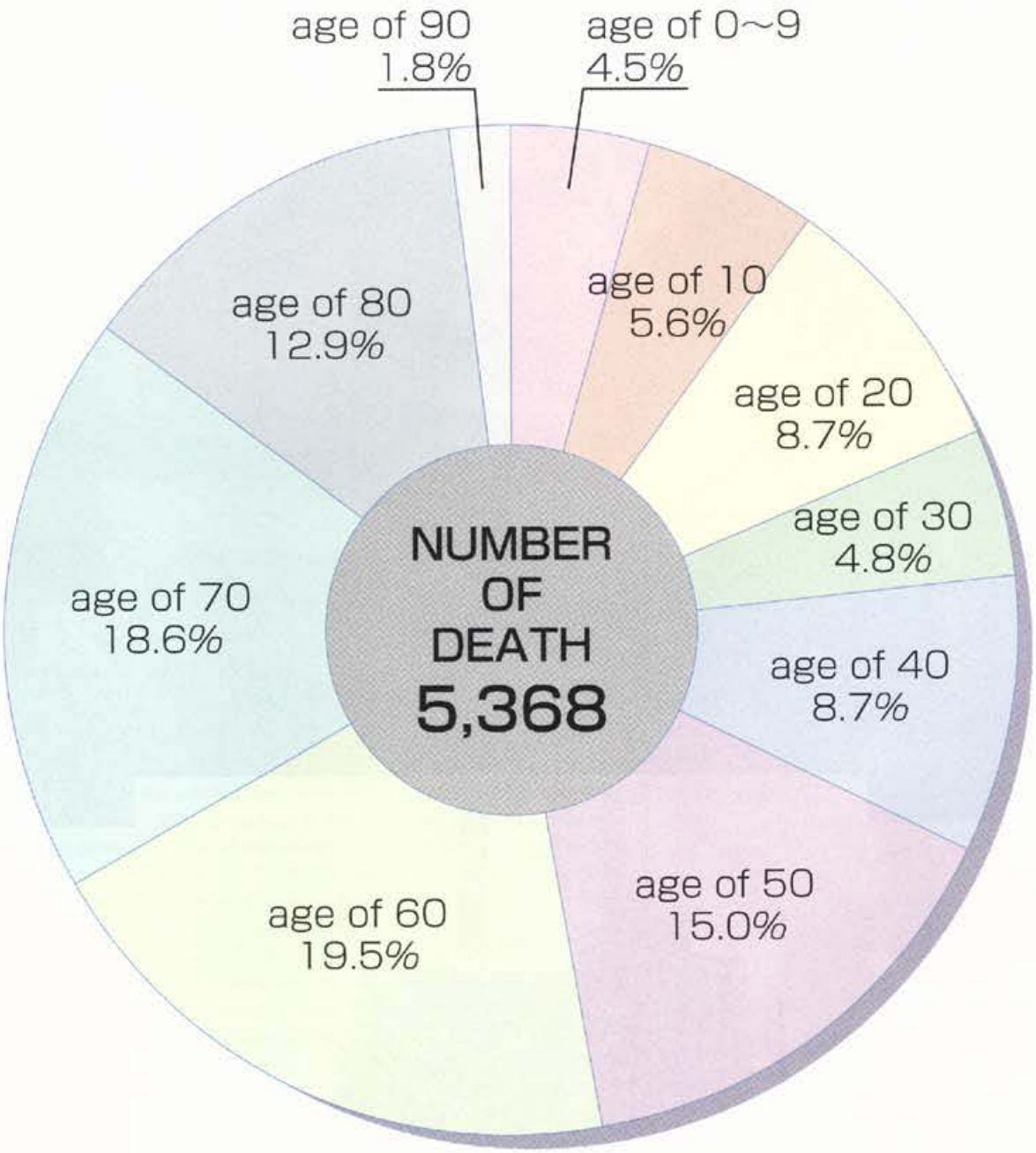




DEATH FROM PRESSURE

The Great Kanto Earthquake killed about 142,000 people in Tokyo on September 1, 1923. The death from pressure was less than 10%.

In contrast, eighty-nine percent of lives were lost by suffocation or pressure due to the collapse of the buildings and the furniture. The majority of the deaths were suffered by aged people: an aged person who lived in an old wooden house; an aged person who was sleeping on the first floor of a two-storied house.



DISTRIBUTION OF THE AGE

SAFETY MYTH

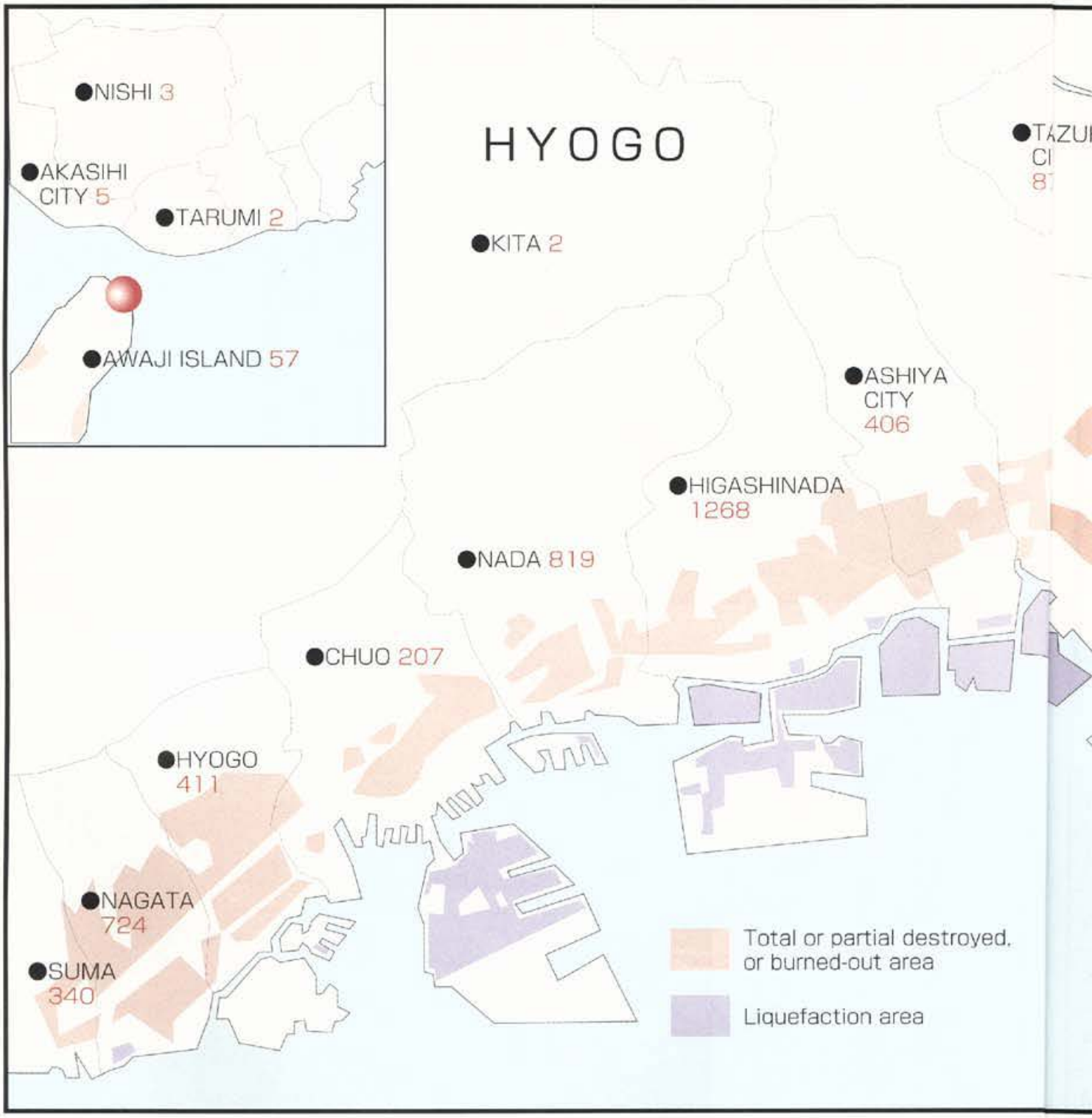
Everybody believed that an earthquake would never occur in the Kansai district. However, earthquake-resistant structures and roads and even subways collapsed in the earthquake. A safety myth has been perfectly ruined. There exist no perfect structures which are made by human beings.

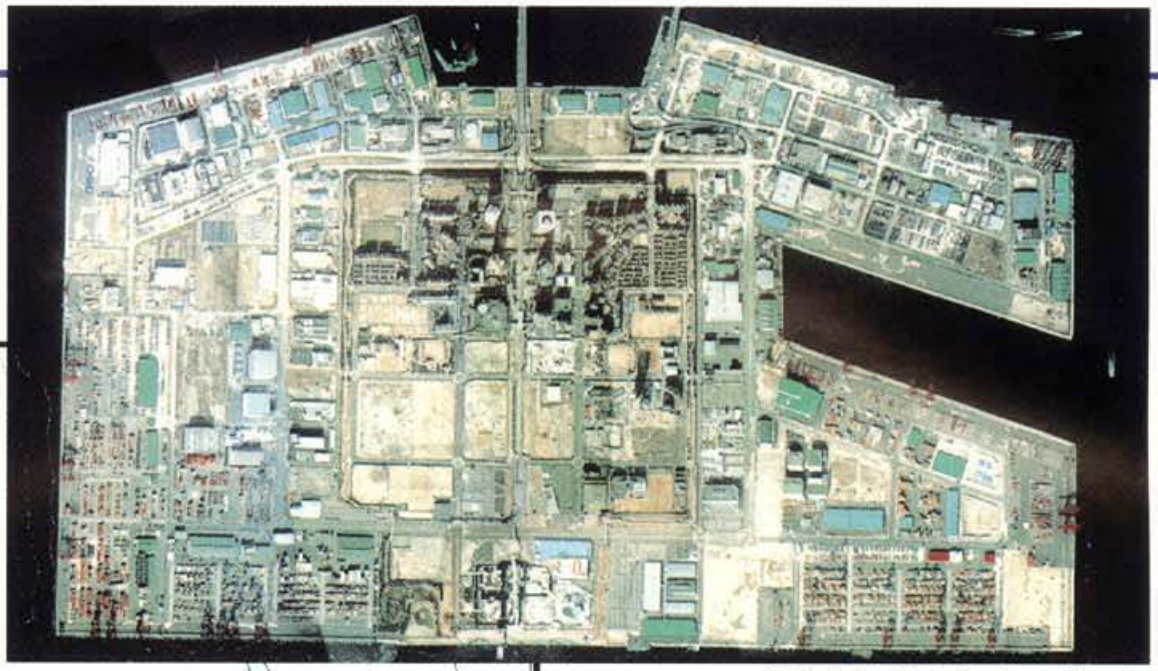




LIQUEFACTION

Living in the city of the future built on the ocean had always been the pride of Kobe's citizens. However, the foundation of this great city almost literally dissolved when ground failures occurred as a result of loose, water-saturated sand being shaken during an earthquake and assuming a semi-liquid state. The most obvious and destructive liquefaction and related lateral spreading of soils and settlement occurred along the dozens of kilometers of seawalls along the port. Lateral and vertical spreading on the order of 3 or more meters and vertical settlement of 2 or 3 meters were observed along the seawalls of numerous islands, including Port and Rokko island, and throughout the Port of Kobe.





Rokko Island just after the earthquake

●TAZUKA
CI
87

●NISHINOMIYA
CITY
985

●AMAGASAKI
CITY 27

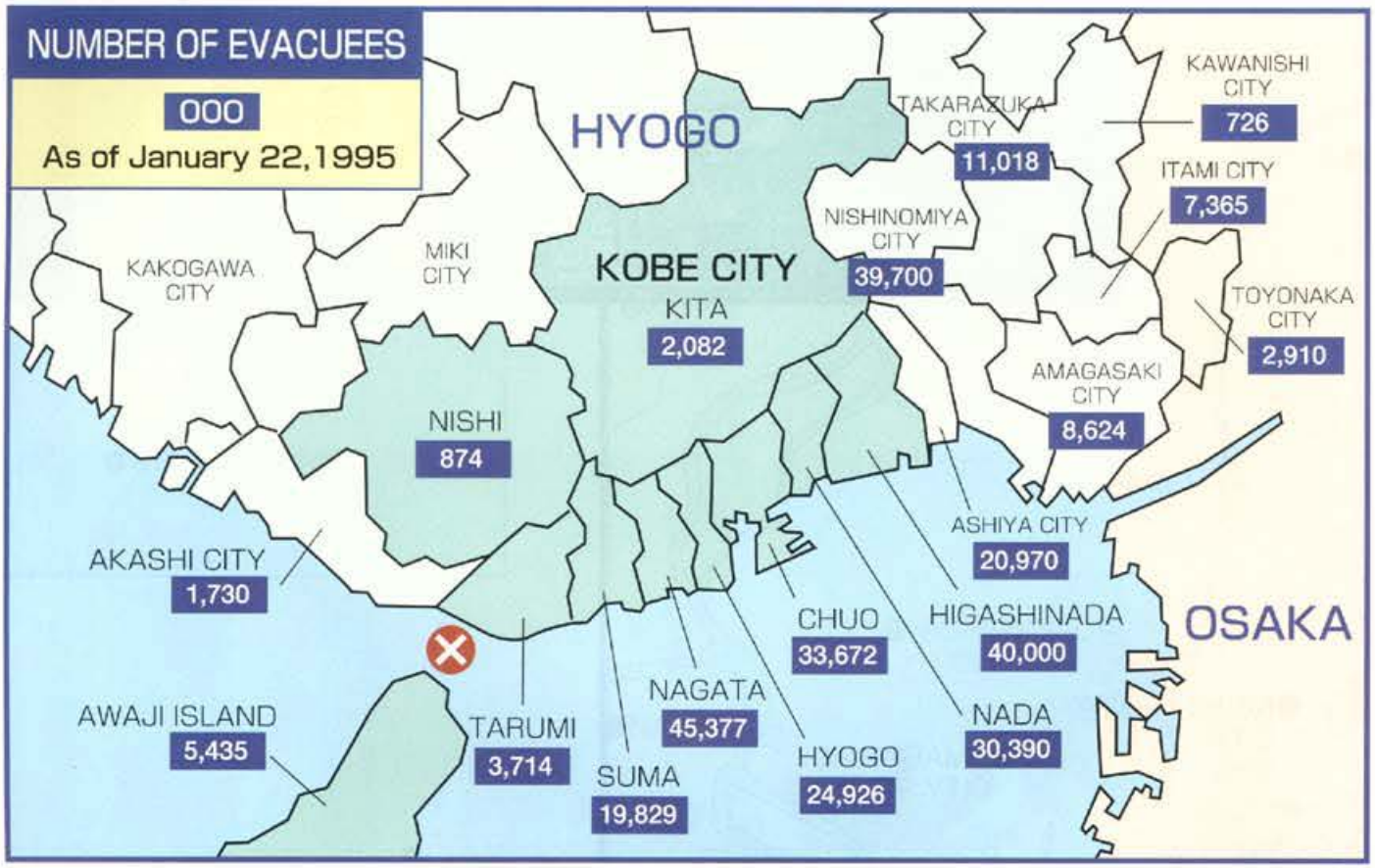
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Damage of each place

	Dead	Injury
HYOGO (AUG. 2)	5480	34900
OSAKA (JUL. 17)	21	1980
TOTAL	5501	36880

TEMPORARY HOUSING

There were 30,186 temporary houses distributed throughout about 500 areas in Hyogo Prefecture at the end of March, 1995. Although everyone camped out the temporary shelters had hoped to return to their former lifestyles soon, their hopes took much more time to be fulfilled.





Numbers of shelters and evacuees

Days	Shelter	Evacuee
JAN. 19	984	274,780
JAN. 20	1077	310,862
JAN. 23	1153	316,678
JAN. 24	1133	294,078
FEB. 22	933	199,127
MAR. 3	872	99,913
APR. 5	699	59,947
APR. 19	630	49,980
APR. 23	627	48,314
MAY 7	536	39,804

(Examination by Hyogo Prefecture)

Location		Shelter peak (Jan.24)	Evacuee peak (Jan.24)
KOBE CITY	HIGASHINADA	120	67,767
	NADA	66	34,736
	CHUO	81	32,500
	HYOGO	93	25,500
	KITA	29	2,360
	NAGATA	78	46,995
	SUMA	69	21,148
	TARUMI	39	3,807
	NISHI	16	630
	TOTAL	591	235,443
AMAGASAKI CITY		90	7,112
NISHINOMIYA CITY		184	28,700
ASHIYA CITY		54	16,134
ITAMI CITY		71	3,848
TAKARAZUKA CITY		59	8,580
KAWANISHI CITY		13	432
AKASHI CITY		20	1,352
KAKOGAWA CITY		1	44
MIKI CITY		3	62
TAKASAGO CITY		1	11
ONO CITY		1	120
KURODASYO		1	16
SUMOTO CITY		1	1
TUNA		8	327
AWAJI		4	114
HOKUDAN		13	3,635
ICHINOMIYA		6	890
GOSHIKI		6	16
HIGASHIURA		11	185
TOTAL		1,138	307,022

A PLACE OF REFUGE

The number of people who needed shelters reached 320,000, and the number of shelters on January 23, 1995 was 1,239. According to the Disaster Relief Act in Japan, the shelters must become available within seven days of the disaster. The majority of sufferers camped out at the shelters for a time far exceeding 7 days.

The sufferers in the shelters have had a great deal of difficulties with various services such as drinking water, electricity, gas, and toilets. Old and disabled people suffered the most from temporary toilets. Small electric heaters were the only source of warmth in most of the shelters. Cold and influenza were rampant among people who lost homes and were living in shelters. Many people had symptoms such as fever, coughing, and diarrhea. About 80 percent of those who came in to the temporary clinic set up at the shelter were 50 years or older.



Temporary houses in the south seaside of Ashiya City



Small temporary houses: living goods outside

Number of temporary houses

Cities	Number of temporary houses
Kobe City	29,178
Amagasaki City	2,218
Nishinomiya City	4,901
Ashiya City	2,900
Itami City	660
Takarazuka City	1,564
Kawanishi City	620
Sanda City	244
Inagawa Town	48
Akashi City	856
Kakogawa City	1,194
Takasago City	412
Miki City	94
Inami Town	38
Harima Town	61
Himeji City	569
Awaji	1,673
Osaka	1,070

Estimated number of temporary houses

Location	Number	Mid-February	Early in March	Mid-March	Late in March
Kobe City	14,619	1,013	5,572	3,570	4,464
Amagasaki City	1,100	250	200	184	466
Nishinomiya City	3,657	939	416	1,552	750
Ashiya City	2,112	40	857	315	900
Itami City	380	80	0	300	0
Takarazuka City	1,358	151	151	796	260
Kawanishi City	620	170	250	200	0
Sanda City	290	0	30	260	0
Inagawa Town	48	0	0	48	0
Akashi City	847	0	100	630	117
Kakogawa City	1,201	0	0	1,201	0
Takasago City	385	0	0	385	0
Miki City	99	0	0	87	12
Inami Town	32	0	0	32	0
Harima Town	28	0	0	28	0
Himeji City	595	0	0	595	0
Sumoto City	14	0	0	14	0
Tsuna District	230	100	100	30	0
Awaji Town	110	50	50	0	10
Hokudan Town	600	50	285	169	96
Itinomiya Town	370	0	72	222	76
Goshiki Town	60	4	30	6	20
Higashiura Town	216	114	28	60	14
Seidan Town	4	0	0	4	0
Mihara Town	2	0	0	0	2
Osaka	1,070	0	0	0	1,070
Unsending an order part	9,953	0	0	0	0
Total	40,000	2,961	8,141	10,688	8,257

(February 15, 1995)



Temporary houses with air-conditioners: Someone commented on their necessities, but the air-conditioners were actually essential. (Asiya City)

THE FIRST YEAR OF THE VOLUNTEERS

There was a lot of human warmth evident in the volunteer activities. Many people volunteered their time to make sure the victims and the remains of the destruction were taken care of.

1995 was the first year of volunteer activities. The volunteers played important parts in almost every field, such as the sorting of relief goods, the management of the refuge centers, the supply of water to drink, the demolition of destroyed houses, and the rescue of suffering animals.



Emergency food (Minatogawa, Kobe)

Volunteers	about 9,200 per day
1/17~2/17	about 20,000 per day
2/18~3/16	about 14,000 per day
3/17~4/ 3	about 7,000 per day
4/ 4 ~4/26	about 2,700 per day
4/27~5/29	about 1,100 per day

(Total number from 1/17 to 5/29 was about 1,214,800 people.)



Volunteers for the human rescue
(Higashinada, Kobe)



Volunteers for the animal rescue (Animal Rescue Center of Kobe)



Veterinarian volunteers (Animal Rescue Center of Kobe)



Open-air concert (Motoyama-minami Junior High School)