

Kobe: Disaster Response and Adaptation

Bart Orr

**Case study prepared for
Enhancing Urban Safety and Security:
Global Report on Human Settlements 2007**

Available from <http://www.unhabitat.org/grhs/2007>

Bart Orr is based at the New School University, New York, US. Comments can be sent to the author at: BartOrr@fusemail.com

Disclaimer: This case study is published as submitted by the consultant, and it has not been edited by the United Nations.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning delimitation of its frontiers or boundaries, or regarding its economic system or degree of development.

The analysis, conclusions and recommendations of the report do not necessarily reflect the views of the United Nations Human Settlements Programme, the Governing Council of the United Nations Human Settlements Programme or its Member States.

Kobe: Disaster Response and Adaptation

Bart Orr

Introduction

Because of their density and vertical built forms, urban areas have an inherently high level of vulnerability to earthquakes. In recent decades, urban areas have suffered phenomenal levels of devastation from earthquakes—Mexico City (1985); Armenia (1988); Loma Prieta, California (1989); Newcastle, Australia (1989); Cairo, Egypt (1992); Hyogoken-Nanbu (Kobe), Japan, (1995) and Izmit, Turkey (1999). Besides the initial loss of lives as a result of collapsed structures, fires commonly spread through urban areas following earthquakes, and the destruction of major roads, loss of water and electrical services, and impeded communication make post-earthquake relief efforts particularly difficult in more populous zones.

Kobe, like most of the aforementioned cities to have endured earthquakes, was plagued by slow response and less than optimal coordination of relief efforts following the disaster. This case study examines the disaster, response, and long-term changes that have resulted from the catastrophe in Kobe. While the earthquake in 1995 claimed scores of lives and caused billions of dollars in damage, it would be a second tragedy if today, more than ten years later, Japan were no better suited to deal with such an event than on the morning of 17 January 1995. Fortunately, the lessons learned from the Kobe earthquake and the resulting changes have made Japan better poised to respond to such events in the future.

To understand the impact of the disaster on Kobe and to appreciate the changes that have come about as a result, this case study examines the city as both the built form as well as the culture of the city as it relates to the physical space-- not as separate entities or causal relationships, but rather as intertwined forces jointly interacting to change one another. The ideas of the urban area as a physical space and the urban area as a conglomeration of cultural interactions and relationships are not two discrete ways of envisioning the city, but two aspects of the modern city that interact dialectically to shape one another. As such, the devastation in Kobe--and the process of recovery-- goes beyond physical destruction, rebuilding, and provision of services. Livelihoods, loss, displacement, and deep social and psychological changes within the community play an equal role in the process.

Within the narrative of the disaster in Kobe lies the “hard” city--the built form and physical landscape, and the “soft” city--the interpretive, perceptual constructs that exist within the minds of its inhabitants. The ways residents’ mental maps of the city relate to the city’s physical form determine how inhabitants define themselves and how they interact within their environment. These interactions are guided by imprints of race, ethnicity, and class on mental and physical landscapes of the city. By considering the earthquake as an external shock to the urban system of Kobe—both the “hard” and “soft” city—the lessons learned convey various successes and failures at all levels of analysis.

The Kobe Earthquake

Kobe is located in the Hanshin region, which produces around 10 per cent of Japan’s total GNP. As the area’s major port, the city has a high population of working-class immigrants and middle class families involved in shipping and industrial activities. Like many older cities, central areas had narrow streets with very dense populations—around six thousand to twelve thousand people per square kilometer.

At 5:46 a.m. on 17 January 1995, an earthquake of magnitude 7.2 occurred on the northern tip of Awaji Island, heavily damaging structures as far away as 70 kilometers. Within this area was much of metropolitan Kobe, a city of roughly 1.5 million. The disaster left 6,300 dead, 150,000 buildings destroyed, 300,000 homeless, and direct economic losses of US\$200 billion—one of the costliest earthquakes on record.¹ For comparison, the Loma Prieta earthquake in California, which was of comparable magnitude, killed 62 and left 12,000 homeless.² The indirect losses resulting from disrupted commerce and industry in Kobe and its economic hinterland, which stretches into Southeast Asia are speculated to exceed direct losses.

Exacerbating the situation was the severity of damage to the city's lifelines. Transportation, gas, and water services were disrupted, and Kobe's power and communication systems were heavily damaged. 500 meters of the elevated Hanshin highway collapsed, and the rail tracks of the Shinkansen bullet train were fractured in at least eight places. Though gas leaks resulted in over 100 fires throughout the city, downed concrete utility poles and collapsed one and two-story residences blocked most of the smaller roads, preventing fire fighters from quickly addressing the situation. Most fires only subsided upon reaching some wall, road, or fire resistant structure. Extensive soil liquefaction also contributed to damaged bridges and underground lifelines.³

Though the earthquake impacted the entire city, all were not equally affected. Destruction was concentrated in low-income areas of the inner city, where residents tended to be older or students living in low-cost rooming houses.⁴ This is reflected in the death rates—53 per cent of those killed were more than sixty years old, and rates for persons in their mid-twenties were also comparatively high. Middle class families tended to live outside the city center, where newer, higher quality housing existed. In addition to the large elderly and student populations, the inner-city areas also had communities of immigrant laborers, squatters occupying houses as a result of post-war provisions, and *buraku*, a “historically untouchable caste.”⁵

While the earthquake itself was of a formidable magnitude, the resulting catastrophe was a combination of several factors:

- The actual seismic event—its magnitude, depth, type, and timing.
- Geologic conditions—The soft, water-saturated soils of many areas of the city led to structural damage and landslides as a result of soil liquefaction. Damage was concentrated in a narrow area of soft soil, 2 kilometers wide and 30 kilometers long.
- Geography—Kobe is located on a narrow strip of land between the Osaka Bay and the Rokko mountains. The collapse of elevated roads and railways severed all major transportation lines within this narrow corridor.
- The inadequacy of the built environment—most lifelines and infrastructure were built prior to the implementation of more rigorous codes and performed poorly during the earthquake. The older, traditional housing stock populating central Kobe consisted of heavy tiled roofs supported by light frames, a design created with storms in mind but ill-suited for earthquakes.

¹ Schiff, 1998, p1.

² Ibid, p4.

³ *ibid*, p4.

⁴ Shaw and Goda, 2004, p17.

⁵ Comerio, 1998, p148.

- Social Factors and Policy Responses—The limited presence of civil society prior to the earthquake and lack of coordination with government efforts contributed to what was widely seen as a less than efficient response to the disaster. Informal community networks and camaraderie among neighbors was one of the key factors in successful rescues immediately following the earthquake, however.

Accumulated risk: Housing

Housing constituted 95 per cent of the building damage, and accounted for more than 50 per cent of the total value of the damage in the Hanshin region.⁶ While commercial development is centered on the flatlands around the bay, housing extends onto the hillsides. As mentioned earlier, much of the housing in the area had been characterized by heavy tile roofs on a light wooden frame for storm resistance. Unfortunately, many of the tile roofs collapsed during the early-morning earthquake, killing thousands.

A UNCRD report estimated that around 60 per cent of the housing in Kobe was one of the two traditional wooden dwellings—Shinkabe and Ohkabe.⁷ These two styles of houses both have tile roofs, post-and-beam structures, and mud walls, though they differ in the framing of the roof truss and the way it connects to the walls.⁸ This type of housing was particularly dominant in the city center. While the suburban wards had benefited from substantial recent investment, investment in inner wards was stagnant—a fact reflected in the dilapidated and densely crowded neighborhoods.⁹ Through policies promoting large-scale developments in suburban areas to provide middle and high-income housing, the City of Kobe had drawn investment, and people, away from inner areas, exacerbating the degree of dilapidation and neglect.¹⁰ A process of socioeconomic polarization had already begun to manifest itself within the geography of the city well before the earthquake.

Shelter after the Earthquake

Given that several hundred thousand units of housing were left completely uninhabitable in the immediate aftermath of the earthquake, the provision of emergency shelter was paramount. While housing the displaced in schools and other public buildings, the government of Japan constructed 48,000 temporary housing units to house one hundred thousand people. Within the heavily-damaged center city parks and schools were used for temporary shelters, however, the majority of shelters were placed in the outer areas of the city in vacant lands or parking lots, two hours away by bus or train.¹¹

Resembling refugee camps, the prefabricated temporary shelters were twenty to twenty-six square meters, with toilet and bathing facilities. In an effort to provide for the large elderly population, preference was given to the elderly and disabled, who accounted for 60 per cent of the population in the camps, as well as to single parents. Despite good intentions, moving the elderly and disabled to the temporary housing in the outlying areas of the city separated an especially vulnerable population from their families and services.

⁶ Comerio, 1998, p147.

⁷ UNCRD, 1995.

⁸ Comerio, 1998, p148.

⁹ Hirayama, 2000..

¹⁰ *ibid*, p14.

¹¹ Comerio, 1998, p149.

Shelters officially closed after eight months, though the 48,000 temporary units left housing needs still unmet for thousands of displaced persons. As a result, many resorted to makeshift shelters in tents or under tarps, or relocated altogether to other cities.

Economic impacts

Despite the scale of the disaster, the impact on the Japanese insurance industry was less than that of other disasters, such as Hurricane Andrew, on American insurers. For residential damage at around US\$150 billion, insurance payments were estimated to only be around US\$6 billion. This is due to several key features of Japanese insurance policies:

- Basic home owners' fire insurance policies do not cover fires resulting from earthquakes.
- Owners may purchase a limited earthquake rider, with the indemnity covering 30 to 50 per cent of the structure's replacement value, up to a maximum of US\$100,000.
- Claims were categorized into three groups: total loss, half loss, and less than half. If damage was categorized as half loss, payout would be 15 to 20 per cent of the replacement value.
- Contents were not covered unless they were totally destroyed.¹²

In addition to the specificities of these insurance policies, only 7 per cent of homeowners nationally had such earthquake riders, and in Kobe coverage was less than 3 per cent of homeowners.¹³

Despite limited insurance claims paid, residential owners in Kobe did have several factors working to their advantage. One is that the value of Japanese residential properties lies more in the land than the actual structure, and therefore homeowners maintain significant equity and borrowing power following an earthquake. Furthermore, homeowners in Japan are less heavily mortgaged than those in America.¹⁴

Reconstruction: Inequality in Housing Recovery

The ability to rebuild did not guarantee homeowners' return to center-city Kobe with economic pressures leading to some – especially the poor, elderly and renters moving from high value city center property. Prior to the earthquake, middle-class families had already begun migrating to the suburbs. The elderly and lower-income families lacking job security, who comprised a large portion of residents in heavily impacted areas, often found it easier to sell their properties to speculators and move elsewhere than to borrow towards rebuilding. Renters, likewise, found it easier to move elsewhere than wait for housing to be reconstructed in their former neighborhoods. The result was a movement of property from vulnerable groups into the speculation sector with potential impacts on land-use and value which could reduce land and housing access and equity in the city.

In January of 1997, two years after the earthquake, the housing recovery rate had reached 100 per cent, and by the next year had reached 107 per cent. This city-wide data is deceptive, however, as recovery has been inconsistent across wards. In the eastern part of the heavily damaged central area, housing recovery has exceeded 100 per cent, but this includes market housing targeted to middle-income people commuting daily to Osaka. The western part of the

¹² Comerio, 1998, p151.

¹³ EQE, 1995.

¹⁴ Comerio, 1998, p151.

central area, which was also severely damaged, has suffered from stagnant recovery—82 per cent after three years. Only lightly damaged, suburban areas continued to grow at steady rates after the earthquake, further distorting citywide measurements of recovery.

This unequal pattern of recovery is also reflected in population changes during the three years following the earthquake. While outlying areas grew by as much as 20 per cent, the inner-city wards, after a sudden drop due to displacements immediately after the disaster, continued steadily downwards. Nagata's population had decreased by more than 30 per cent three years after the disaster. In the eastern part of the inner-city, where housing had been constructed to attract middle-income commuters to Osaka, high vacancy rates and oversupplied housing reflect a market that failed to materialize.¹⁵

National and City Governance for Reconstruction

Those who did attempt to repair or reconstruct their homes within the inner-city faced the difficult task of working within the physical limitations of the area while also meeting the demands of new building regulations. Plans to regroup building and landowners in a condominium scheme required the widening of streets as well as the regularization of plots. Towards this end, the government prohibited permanent reconstruction in about half of the heavily impacted areas. In lots where reconstruction was attempted, compliance with the Building Standards Act was mandatory. Whereas most of the housing in the inner city was exempted from the codes because they were built before the enactment of the law, structures built to replace those that collapsed or were burned were subject to the act. New buildings were required to be adjacent to a road at least four meters wide and of a building-to-site area ratio of 60 per cent or less. Because of the density and narrow streets of the area, it was often impossible for the rebuilt structure to match the former house's building area or floor area, and in some instances it was impossible to construct anything at all since more than half of the lots were adjacent to very narrow roads.¹⁶

Housing recovery in Kobe was, for the most part, left to market forces rather than government programs. Instead, the government focused on large infrastructural projects. Those inner-city areas designated for redevelopment were hindered by national programs unsuited for disaster response and cumbersome bureaucracies many saw as not acting in the City of Kobe's interest. The deputy mayor of Kobe, Takumi Ogawa, who was in charge of rebuilding, said at an international forum eight months after the disaster: "Every day is like fighting a battle. We have had a weak life since the earthquake." Six months later, the deputy mayor took his own life. The *San Francisco Chronicle* quotes him as saying before his death "I have stumbled against the mass of Japan's bureaucratic system—how little power the city was given by the nation."

Large infrastructural projects, on which the government focused intensely, were completed very quickly. One year later all three railroads were operational, the Hanshin expressway and bridges to the islands had been repaired, and large industries were back in operation. The port—the hub of the city's economy—was handling 70 to 80 per cent of its former capacity after one year. Temporary berths and twenty-four hour operations supplemented the forty per cent of berths that remained functional or had been repaired. Small-scale manufacturing enterprises found recovery much more difficult, resuming only 50 per cent of pre-disaster production one year later.

¹⁵ Hiriyama, p118.

¹⁶ *ibid*, p126.

Civil Society

The role of nongovernmental organizations, informal or otherwise, in post-disaster scenarios has been well documented in recent urban disasters, such as the Mexico City earthquake of 1985. Likewise, the Kobe area experienced an influx of voluntary actors following the earthquake of 1995, though the city historically has been described as lacking a tradition of voluntary organizations or community self-help.¹⁷ In fact, civil society in Japan—as defined as the organized, non-market sector—had faced “one of the most antagonistic regulatory frameworks among industrialized democracies.”¹⁸

Though Japan’s formal non-profit sector has a long history dating back to the Meiji era, it had been heavily regulated by the government. At the time of the Kobe disaster, Japan’s civil society was underdeveloped.¹⁹ The influx of local and international non-profit relief efforts catalyzed the re-conceptualization of civil society in Japan, both culturally and officially.

Impeded by the severity of infrastructural damage, rescue efforts hinged on the impromptu volunteer efforts of friends and neighbors. A study in the Nishi Suma area found that 60 per cent of residents evacuated themselves, while another 20 per cent were rescued by their neighbors. When interviewed, respondents cited the top reason why local residents were effective in rescue efforts as “information and knowledge of the community.” Studies following the Marmara earthquake in Turkey and the Gujarat earthquake in India produced similar findings.²⁰

In the year following the earthquake, an US\$8 million community fund was established to disperse grants to community redevelopment programmes, philanthropic programmes, and the non-profit sector. The Japanese NPO (Non-Profit Organization) Centre was established the same year to support civil society initiatives country-wide. The changes were evident in the passage of laws to promote civil society and, after organized lobbying by those impacted, a law providing some financial assistance for victims.²¹

The most significant law passed as a result of the earthquake was the Special Nonprofit Activities Law, or NPO Law. Prior to the earthquake, the regulatory framework governing nonprofit organizations was extremely restrictive. Prior laws required organizations to become legal persons, which involved a complicated and often unsuccessful bureaucratic process and capital on the order of US\$3 million. Technically groups could operate without legal standing, but they could not sign contracts, open bank accounts, hire staff, or own property.

Within two months of the earthquake, over 1.2 million volunteers had visited the region to assist in the relief efforts. While many groups were involved, most of them did not have legal status because of the prohibitive framework. Thus, most of the volunteers, even those with groups, were operating in hazardous conditions as individuals, without any kind of work insurance. As the Japanese media relayed the story of good-hearted volunteers and an ungrateful government, public anger put enormous pressure on the legislature to respond to the situation. The new NPO Law was passed, but not until after long deliberations between legislators, bureaucrats, and voluntary organizations.²²

¹⁷ *ibid.*, p17.

¹⁸ Pekkanen, 2000, p111.

¹⁹ Shaw and Goda, 2004, p19.

²⁰ *ibid.*, p21.

²¹ *ibid.*, p20.

²² Pekkanen, 2000.

While non-technical volunteers assisted in the initial relief stages of the disaster, the recovery phase brought in more technical volunteers from local areas. These volunteers focused on technical and network activities, as well as local welfare issues. While the reconstruction phase lasted from three to five years according to the government, local NGOs involved in the reconstruction recognized social needs and continued welfare and advocacy services, particularly in light of a growing distrust towards the government by more disadvantaged groups.

The Legacy of the Kobe Earthquake

The aforementioned relocation of residents from heavily impacted areas in the city center to outlying areas created new socioeconomic vulnerabilities and broken communities. To address this, the People's Rehabilitation Plan was created by citizens to fill what they saw as a critical gap between the administration's efforts and their needs. The PRP was based on three key concepts—environment, living together, and civil society—implemented according to three themes—community building and planning, alternative livelihoods, and living safely in the community.

The findings of the PRP led to the community's creation of the Kobe Action Plan six years after the earthquake. The goal of the plan was to create a more complete civil society while not becoming over dependant on the administration. Action plans stressed increasing the capacity of individual communities for disaster risk reduction, fostering sustainable livelihoods, and promoting civil society.

One successful NGO created in the aftermath of the earthquake was the Nishi Suma Damran, created by the residents of Nishi Suma. The residents of Nishi Suma, a neighborhood in central Kobe, became organized in response to an unpopular government redevelopment plan after the earthquake, but the social networks formed later contributed to the creation of a community welfare organization. The organization provides a variety of welfare services, many targeted at the needs of the large elderly population, as well as operating a community meeting place for seminars, cultural exchanges, and dinner parties. A membership system provides the organization with financial independence.²³

The government of Japan, in addition to recognizing the pivotal role civil society can play following a disaster, has made steps towards correcting issues that slowed response after the earthquake. The Self-Defence Forces (SDF), though immediately put on alert at a nearby base, were not dispatched for relief efforts for some time. By law, only the governor could ask the SDF to begin disaster rescue operations. In the case of Kobe, the mayor of the city was required to submit a request to the governor in writing, detailing the vessels and forces needed and the expected duration. Faxes and telephone calls were legally inadmissible. Following the Kobe earthquake, the governor was not immediately available at his residence and the formal request was not received until 10:00 a.m., over four hours after the incidence.

The delay in deploying the SDF was also a product of the financing system. Laws required that whoever placed the original request with the central government for rescue aid and operations be responsible for a large portion of the costs. For the governor, overestimating the number of SDF forces requested would have direct impacts on public finances. Eventually, 20,000 SDF forces were deployed in rescue operations.²⁴

²³ *ibid*, p26.

²⁴ Nakamura, 2000, p26.

Confusion and poor communication among government agencies delayed response as well. The National Land Agency was responsible for acting as a central post in rescue operations, coordinating efforts and centralizing information. Following the earthquake, the National Land Agency was not used as a central command and also failed to receive information from other agencies that were monitoring the situation. The National Police Agency issued an urgent alert to its mobile units immediately after the quake, but never contacted the National Land Agency. At the time, the National Land Agency was a new office that had yet to establish strong links across governmental agencies.

Though the emergency response mechanisms in place at the national level were ineffective in many ways, the national government immediately began working on new systems. The afternoon following the earthquake the Centre for Emergency Program Operation was established. Two days later, the Headquarters for Emergency Management was created, consisting of all cabinet members and chaired by the Prime Minister. The Headquarters served as the highest ranking decision making body, while the Centre managed operations. The newly appointed Minister for the Centre immediately left for Kobe, where he established the Field Centre for Emergency Response Operation, with 30 public officials representing a variety of government agencies. This Field Centre also hosted daily meetings between the various levels of government involved to assess the needs and progress of the situation. In response to the SDF difficulties, protocol was changed to allow mayors, rather than only the governor, to request rescue forces. Additionally, the Prime Minister may now deploy SDF forces himself if he does not receive a request from the impacted area within one hour of a disaster.²⁵

The experience of Kobe following one of the most costly urban disasters in modern history presents several lessons. While Japan is one of the most developed economies in the world, the disaster shared many of the same characteristics as those in urban areas of developing countries:

- The role of communities in the immediate aftermath of the disaster proved to be one of the most important factors in saving lives. Despite more advanced technology and infrastructure, victims of the Kobe earthquake depended on friends and neighbors for rescue just as did earthquake victims in Gujarat, India and Izmit, Turkey. As a result of the disaster rescue and relief process, communities and grassroots civil society emerge stronger and more unified than before.
- Despite the resources available, the poorest and most vulnerable groups—in this case primarily the elderly and working-class immigrants—were both the worst impacted during the disaster and benefited least from recovery efforts. Housing destruction was concentrated in inner-city neighborhoods, and housing “recovery” was most successful in outer areas. Recovery policy left homeowners to rebuild using their own credit—an option ill-suited for elderly owners and working-class renters.
- Disaster permanently changed the fabric and demography of the city. External migration and internal shifting resulted in a social, economic, and physical space unlike what existed prior. Accepting the implausibility of a return to the status quo ante can allow policymakers an opportunity to address the problems of pre-existing conditions as part of the recovery.
- The problems and challenges that arose from the disaster are not a direct result of the disaster itself, but rather can be traced back to conditions and trends prior to the earthquake. The earthquake was a natural event, but the inequity in its impact was the

²⁵*ibid*, p28.

result of social factors—middle-income families had already begun to leave the inner-city, where housing stock was become increasingly aged and dilapidated.

- The density of urban areas such as Kobe poses spatial difficulties for relief and recovery. The placement of temporary shelters in outlying areas of the city resulted in the disruption of social networks, communities and livelihoods, but the city was confronted with a massive homeless population and little room to house them in the already congested central areas. While the government's efforts focused on meeting the physical needs of those affected at the expense of social and familial networks, working with residents towards a suitable compromise would have been preferable.
- The narrow roads and traditional tile roofs that resulted in so many deaths in Kobe were clearly hazardous, but not easily remedied. Had the city undertaken measures to widen roads or reconstruct housing in older areas prior to the disaster, the same displacement issues created by the earthquake may have resulted. Likewise, cities are confronted with heritage issues when considering the vulnerability of older, traditional areas.

Conclusion

In conclusion, there were failures at the top levels, but the national government recognized problematic areas and took immediate remedial steps. The government emergency response mechanisms are now, hopefully, better equipped to manage similar events in the future and have learned from the successes and failures of Kobe. Likewise, a stronger, more robust civil society has emerged—both as a result of the disaster experience as well as the product of a new, more amicable relationship between the government and NGOs.

Housing may be the area of recovery judged most harshly by observers. While city-wide measures are highly positive, the benefits of the housing recovery were not reaped by those most in need. The central question in Kobe and other urban disasters is how to define and measure recovery. The city as a space has recovered in most sectors, but the victims of the earthquake have not recovered. Many of those displaced have never returned. Diasporas of disaster, such as the current situation in New Orleans, give a false impression of success by eliminating those most in need from the scope of concern. Following such calamitous events, holistic recovery requires recognizing that the city has, at least temporarily, been scattered beyond its boundaries.

Despite heavy losses, the city of Kobe and government of Japan made adjustments in almost every area of the response and recovery process. While the earthquake in Kobe may not be an example of post-disaster efficiency, the changes made as a result reflect adaptation and resilience.

References

- Comerio, Mary C. *Disaster Hits Home: New Policy for Urban Housing Recovery*. Berkeley and Los Angeles: University of California, 1998.
- Dear, Michael and Gustavo Leclerc. "The Postborder Condition: Art and Urbanism in Baja California." *Postborder City*. New York and London: Routledge, 2003.
- EQE International, *The January 17, 1995, Kobe Earthquake: An EQE Summary Report*. San Francisco: EQE, 1995.
- Hirayama, Yosuke. "Collapse and Reconstruction: Housing Recovery Policy in Kobe after the Hanshin Great Earthquake." *Housing Studies*. Vol. 15, No. 1, 111-128. 2000.
- Nakamura, Akira. "The Need and Development of Crisis Management in Japan's Public Administration: Lessons from the Kobe Earthquake." *Journal of Contingencies and Crisis Management*. Volume 8, Number 1. 2000.
- Pekkanen, Robert. "Japan's New Politics: The Case of the NPO Law." *Journal of Japanese Studies*, Vol. 26, No. 1. 2000.
- Schiff, Anshel J., Editor. *Hyogoken-Nanbu(Kobe) Earthquake of January 17, 1995: Lifeline Performance*. Reston, Virginia: American Society of Civil Engineers, 1998.
- Shaw, Rajib and Katsuihiro Goda. "From Disaster to Sustainable Society: The Kobe Experience." *Disasters*, 2004, 28(1).
- UNCRD, *Comprehensive Study of the Great Hanshin Earthquake*. Nagoya, Japan: UNCRD, 1995.