Rebuilding Communities Following Disaster: Lessons from Kobe and Los Angeles

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Shortly before dawn on 17 January 1994, the magnitude 6.7 Northridge Earthquake struck the Los Angeles region in southern California, costing over $48 billion in direct losses and leaving 25,000 housing units uninhabitable. Exactly one year later, a magnitude 6.9 earthquake struck the Kobe region of Japan, causing approximately $150 billion in losses, the loss of over 6,400 lives, and severe damage to nearly 450,000 housing units. This paper reports on a study that sought to understand the local and individual planning and reconstruction decisions following these two earthquakes, set within the larger context of regional and national policies. It summarizes reconstruction progress and planning decisions for seven urban districts in the two affected areas. The next catastrophic urban disaster to strike a developed nation will be extraordinarily expensive, and prudence demands preparedness for both post-disaster financing and planning processes; provision of temporary and permanent housing requires external funding and local flexibility; local governments need to combine firm safety regulations with citizen participation in reconstruction planning; and post-disaster planning – to be fast, effective, equitable, and provide some improvements over previous conditions – requires well-funded planning processes, rich in information and communication.

Shortly before dawn on 17 January 1994, the magnitude 6.7 Northridge Earthquake struck the Los Angeles region in southern California. This was the largest quake in the Los Angeles region since a magnitude 6.6 quake hit the community of San Fernando in 1971. Areas affected by the Northridge Earthquake included portions of Los Angeles City and County, and Ventura County, including the cities of Santa Clarita, San Fernando, and Santa Monica (figure 1). Felt hardest in the San Fernando Valley, the earthquake resulted in 57 deaths and over 9,000 injuries, and left 25,000 dwelling units uninhabitable (OES, 1995). The total economic loss from this earthquake is estimated to have been US$48.3 billion; US$41.8 billion in direct economic losses and US$6.5 billion in indirect losses (Petak and Elahi, 2000).

Exactly one year later, shortly before dawn on 17 January 1995, a magnitude 6.9 earthquake struck the Kansai region of Japan's main island of Honshu. The region comprises seven prefectures and has three of Japan's six major cities. The earthquake's impact was strongest in the international port city of Kobe and the surrounding cities of Ashiya, Nishinomiya, and Amagasaki in southern Hyogo Prefecture (figure 2). Losses from this earthquake – referred to as the Hanshin-Awaji earthquake – were truly immense. In all, over 6,400 people were killed and 40,000 injured (Hyogo Prefecture, 1999). Fires consumed 82 hectares (203 acres) of

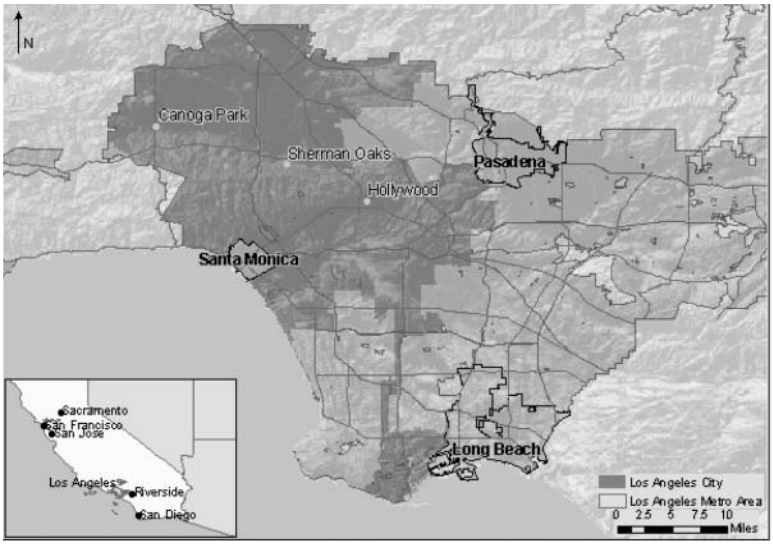

Figure 1. Cities affected by the 1994 Northridge Earthquake.

urban land, and more than 400,000 buildings were damaged, of which 100,000 collapsed completely. Nearly 450,000 housing units were either partially or completely destroyed (Hyogo Prefecture, 1999) and 85 per cent of the region's schools, many hospitals, Kobe's city hall, and other major public facilities sustained heavy damage. The total economic loss is estimated at US$150 billion, with more than $100 billion in property damage (RMS, 1999).

These two earthquakes were significant in being the largest earthquakes to strike modern, industrialized metropolitan areas. The earthquakes of 17 January 1994 and 1995 provide a rare opportunity to help to imagine the consequences of a future catastrophic urban earthquake in the United States or

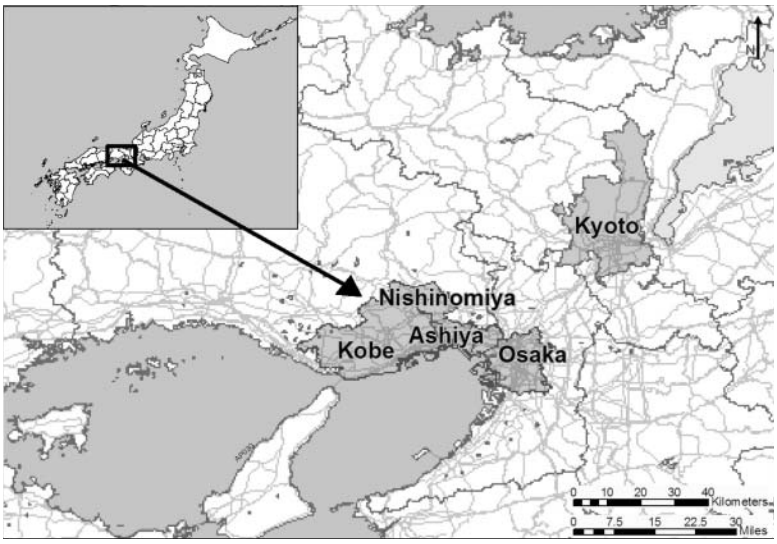

Figure 2. Cities affected by the 1995 Kobe Earthquake.

Japan, at, for example, San Francisco, Seattle or Tokyo. From the US perspective, we can glimpse what could happen in a future earthquake by viewing Kobe through the lens of Northridge. Studies of these two events can provide lessons for planners and policy-makers, both as they prepare for a catastrophic earthquake and when, inevitably, they must plan for the recovery following such an event.

Research on Post-Disaster Recovery

Recovery studies are few and systematic comparative studies are fewer. The studies that exist look at recovery through a variety of lenses (Haas *et al*., 1977; Friesema *et al*., 1979; Rubin *et al*., 1985; Spangle Associates, 1991; Arnold, 1993; Berke *et al*., 1993; Comerio, 1998; Schwab, 1998; Johnson, 1999; Tyler *et al*., 2002; Nakabayashi, 2004). Nevertheless, considerable consensus exists in the literature regarding a variety of recovery issues (Olshansky, 2005):

Urban Systems

- Cities usually rebuild in the same place, and with the same general urban form following all but the most catastrophic of disasters. This is because economic and social networks are more resilient than buildings. The economic functions of the city will usually continue after the disaster, and residents will usually try to locate their homes so as to maintain their pre-disaster social networks.

- Negative trends that existed before the disaster will usually worsen during the recovery period. These include declining economies, social problems and out-migration.

Physical Change

- Cities see physical improvements after disasters. Although widespread land-use change and relocations are rare – because of timing and logistical challenges as well as citizen resistance – focused redevelopment efforts are common and have been quite successful.

- Citizens resist relocation of residential areas, and relocations without citizen support and participation are likely to fail.

Equity

- The higher the socioeconomic level, the more likely households and businesses are to recover to pre-disaster levels. Similarly, those who are better integrated into economic and social networks will recover faster.

- Conversely, those with the fewest resources get less attention from aid organizations, and get it later.

Money and Other Outside Resources

- Outside resources – in the form of money, supplies, technical assistance, and employees – are vital.

- Money comes from many sources: local and national governments, insurers, foundations, investors, victims' savings and international aid organizations. The amount of funds and mix of sources after any particular event are not easy to predict. Setting priorities for use of limited funds is a challenge, and the process is not usually a rational one.

- Financial resources are often in the form of loans, which eventually need to be repaid. This can create problems many years after the disaster.

- The national political context is often a crucial factor in delivery of resources. In numerous cases the ruling political party allocates aid based on the importance of the affected region in upcoming elections.

Process

- At a minimum, the goal of recovery is

to return to the previous level of economic function and to replace the quantity of lost housing units. Beyond that, the recovery process depends on local social and economic context, as well as on local and national politics; in general, speed and quality are the measures of a successful recovery process.

- Bureaucracies lack the flexibility to be able to respond quickly to the uncertainties of the recovery process. As a result, new community-based organizations emerge. Such organizations are, in fact, crucial to a successful recovery process.

- Government agencies can facilitate recovery to the extent that they can support – financially and technically – local organizations and not tie their hands with excessive requirements. Establishment of a separate recovery coordination organization is often helpful.

- Citizen participation is essential, to help determine recovery goals, provide communication during the recovery process, and ensure community support.

- Local leadership is critical to successful recovery. An effective leader can provide vision, work with community organizations, communicate with other government agencies, and take decisive actions.

Planning Strategies

- Speed is important in rebuilding – to keep businesses alive, rebuild infrastructure, and provide temporary and permanent housing. Victims will seek to rebuild quickly, with or without official help.

- Taking the time to plan for post-disaster reconstruction is also important, in order to make the new 'permanent' city the best it can be. But if planning takes too long, it will be ineffective.

- Previously-existing plans can help to improve both the speed and quality of post-disaster decisions. Having 'existing plans' means much more than simply having land-use maps. It means that the community has an active planning process, including well-established community organizations, lines of communication, a variety of planning documents and tools, and some degree of community consensus.

- Information is a crucial resource, because it provides the basis for strategic planning decisions. Information systems that include inventories of parcels, structures, and hazards can greatly facilitate the recovery process.

Research Approach

Despite the growing body of knowledge of recovery processes, significant research gaps remain. In this research, we sought to understand better the local and individual planning and reconstruction decisions following the Kobe and Northridge earthquakes, set within the larger context of regional and national policies.

This study differs from previous work in three ways. First, it seeks recovery lessons for future catastrophic earthquakes by studying two of the largest earthquakes to strike cities in advanced, industrialized nations in modern times. It explores to what extent these unique events provide lessons that differ from those in the reported literature. Second, it complements previous studies by examining a fine-scale of decision-making and physical change in selected districts within these metropolitan areas. Third, it considers the issue of post-disaster betterment, by which we mean reconstruction that adds value beyond what existed before the earthquake. In addition, as planners we sought to draw practical lessons from these events: for the future, how can local governments effectively manage post-disaster recovery and reconstruction, particularly to maximize the opportunity for community betterment?

To accomplish this, we used a hierarchical, comparative case study approach, set within

the larger context of city and national decision-making. Case studies consisted of urban districts – activity centres that combine related uses, such as retail districts, residential areas, defined mixed-use areas, or land subdivisions – as a means of defining a context for examining the interrelationships of damage, community and individual decisions, and reconstruction actions. This study involved three districts in Kobe, three in Los Angeles, and the entire city of Ashiya, immediately east of Kobe. Within each district, we performed more detailed study of selected areas of high damage concentration, and we produced case histories of selected land parcels, their owners and tenants.

Our research consisted of structured interviews, field observations, and collection of detailed data for all case study areas. We also conducted interviews and data collection at city and state/prefectural levels in both countries in order to establish a policy and factual context for the case studies. We conducted field research in Los Angeles in August 1998, November 1998, March 1999, November 1999, and March 2000. On those trips, we interviewed a total of 44 people regarding the case studies and citywide issues. We conducted field research in Kobe in January 1999, July 1999, and June 2000, as well as making a brief visit to the study districts in January 2003. On those trips, we interviewed a total of 64 people. This paper is a brief summary of a much larger report which includes details of all the case studies (Olshansky *et al.*, 2006).

Reconstruction following the Northridge Earthquake

Ninety per cent of the Northridge earthquake's damage was concentrated in the San Fernando Valley, north of downtown Los Angeles (OES, 1995). Of the 20,000 dwelling units deemed uninhabitable in the City of Los Angeles by the LA Building and Safety Department, 15,000 were apartments. An additional 34,000 multi-family units were very heavily damaged (Comerio, 1998). Sixty per cent of all homeowners had earthquake insurance, but many property owners lost equity because of the economic recession, and their loans were valued more highly than the current worth of the properties. The recession also meant that rental vacancy rates were high, which helped the more than 15,000 displaced rental households to find replacement housing in the area.

General Reconstruction Strategies following the Northridge Earthquake

Because damage to roads and freeways threatened business resumption in an already slow economy, transportation restoration was a high priority. Housing and commercial reconstruction policy evolved over time. The LA Mayor's office and the City Council's Earthquake Recovery Committee were key leaders in defining reconstruction policy (Spangle Associates, 1997). In addition to federal assistance for infrastructure repair, approximately US$800 million in funding for housing and commercial recovery programmes came to LA City from the US Department of Housing and Urban Development (HUD) (Petak *et al*., 2000). The primary strategies are detailed below:

Ghost Town Programme. Most of the damaged housing units were located in low-rise, wood-framed apartment buildings, built between the 1950s and the 1970s. Apartment building owners generally lacked adequate insurance, and clusters of damaged and abandoned buildings became magnets for gangs and other criminal elements.

The City of Los Angeles identified 17 'ghost towns' as clusters with more than 60 per cent of the units at least heavily damaged and located in one of the 38 census tracts that had more than 100 vacated units (City of Los Angeles, 1995). In all, LA's ghost towns contained about 1,000 properties and 17,000 residential units, of which 7,400 units were in vacant buildings (City of Los Angeles,

1995). These ghost towns served as the focus of efforts to secure buildings, reduce crime at vacant properties and facilitate action (demolition, repair, or reconstruction) by owners.

Housing Recovery Loan Programme. The Los Angeles Housing Department (LAHD) obtained US$320 million from the US Department of Housing and Urban Development (HUD) to provide loans to residential property owners who were refused loans by the Federal Small Business Administration (SBA). A large portion of this funding (US$240 million) came in the form of a community development block grant, which gave LAHD flexibility. Multi-family property owners were allowed to take out loans of up to US$35,000 per unit with a 0 per cent interest rate, and payments could be deferred for 5 years. LAHD required that 20 per cent of all rental units in buildings repaired with these loans must be 'affordable' (i.e. available at below market rental rates). Single-family homeowners were eligible for negotiable rate low-interest loans for up to US$50,000.

By December 1995, most of the city funds had been loaned, and by January 1996, more than 65 per cent of the ghost town units had loans and repairs were underway (City of Los Angeles, 1998). By January 1999, nearly all units were repaired.

Redevelopment Districts. California redevelopment law specifically authorizes community redevelopment disaster projects. These allow for streamlined establishment of areas in which reconstruction can be supported by tax-increment financing. LA's Community Redevelopment Agency (CRA) proposed five such districts following the 1994 earthquake. Four of these were adopted, and the fifth proposal was abandoned due to community opposition. The programme had limited success, however, because the post-earthquake declines in property value made it difficult to achieve an adequate tax increment.

Commercial Loan Programme. The CRA also administered a citywide commercial and industrial earthquake recovery loan programme. These loans were aimed at repairing damaged buildings that did not have insurance or qualify for SBA loans. These loans had 0 per cent interest, with no repayment for the first 5 years. Furthermore, 15 per cent of the loan would be forgiven upon project completion. This programme funded 42 projects for a total of US$26 million. As of August 1998, 28 of the projects had completed construction.

Study Districts in Los Angeles

The three study districts for the LA portion of this study were: Sherman Oaks, Hollywood, and Canoga Park. A geographic database was assembled for each district, including US census data, 1993 City of LA land-use data, and earthquake damage and repair permit data over time.

Table 1 summarizes damage to housing units in each district. Table 2 summarizes earthquake building permits issued for the study districts. For all three districts, well over 90 per cent of permits were for repair rather than rebuilding. Residential uses accounted for 56 per cent of permits in Canoga Park, 61 per cent in Hollywood, and 76 per cent in Sherman Oaks. Sherman Oaks, which was the most heavily damaged district, had the greatest number of permits, and the total value exceeded US$93 million. Based on several individual building cases investigated in detail, we estimate that the recorded permit values represent only 15–25 per cent of the eventual actual value of construction; therefore, total value of construction in the Sherman Oaks district was approximately US$400 to 600 million.

Table 3 summarizes repair permits over time. For all three districts, approximately 60 per cent of earthquake building permits were issued by the end of 1994. This means, conversely, that 40 per cent of the permits were issued more than one year following

Table 1. Earthquake-damaged housing units, Los Angeles study districts.

Housing Units	*Canoga Park*	*Hollywood*	*Sherman Oaks*
1990 Census	5,178	17,612	4,803
Unsafe (red tag)	118	350	1,346
Limited entry (yellow tag)	536	1,500	1,670

Table 2. Earthquake building permit totals, Los Angeles study districts.

	Canoga Park	*Hollywood*	*Sherman Oaks*
Repair permits*	243	231	488
Value of repair permits	$8,646,061	$13,820,301	$71,844,131
Rebuilding permits	11	5	35
Value of rebuilding permits	$1,839,300	$823,700	$21,291,000
Average duration, repairs (days)	372	308	450
Permits by use type:			
Residential	142	143	400
Retail/office	73	61	79
Other uses	39	32	44

* Excludes chimneys and block walls

Source: Los Angeles Department of Building and Safety, October 1999.

Table 3. Earthquake building repair permits over time, 1994–1998, Los Angeles study districts.

	Canoga Park			*Hollywood*			*Sherman Oaks*		
Date of Issuance	*Permits issued**	*Avg. Value*	*Median completion date*	*Permits Issued**	*Avg. Value*	*Median completion date*	*Permits Issued**	*Avg. Value*	*Median completion date*
Jan–June 94	86	$17,629	Dec. 94	81	$29,598	Oct. 94	178	$76,635	June 95
July–Dec 94	54	$19,204	July 95	68	$36,081	June 95	124	$156,805	Jan. 96
Jan–June 95	46	$64,757	Jan. 96	31	$85,474	Sept. 95	81	$250,065	March 96
July–Dec 95	34	$73,564	May 96	25	$60,560	July 96	46	$143,959	May 96
Jan–June 96	13	$25,685	Jan. 97	13	$124,231	May 97	19	$162,805	Oct. 96
July–Dec 96	8	$27,075	Nov 96	6	$141,667	May 97	27	$138,796	Aug. 97
1997–1998	2	$31,250	April 97	7	$334,357	Feb. 98	13	$387,769	April 98
TOTAL	243	$35,580		231	$59,827		488	$147,222	

* Excludes chimneys and block walls

Source: Los Angeles Dept. of Building and Safety, October 1999.

the earthquake. For all three districts, average permit values generally increased with time: the easiest repairs were initiated in 1994, with more complex, expensive repairs initiated in subsequent years (figures 3*a*, 3*b*, and 3*c*).

Canoga Park

Prior to 1994, Canoga Park was undergoing change in response to an increasing Latino immigrant population and a decrease in

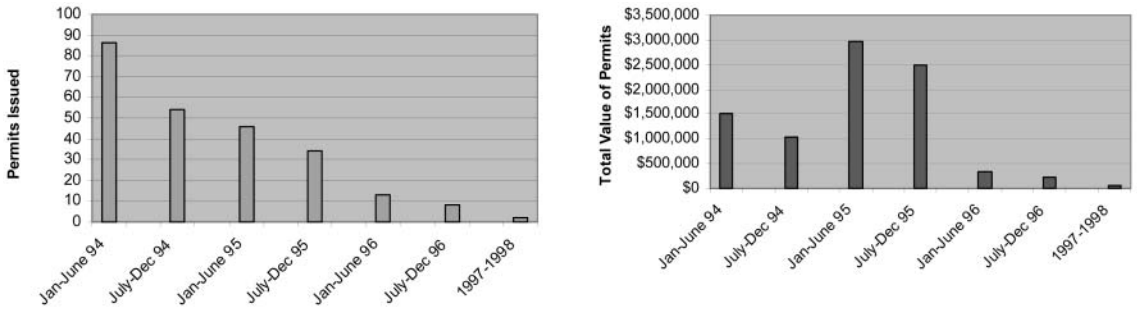

Figure 3*a*. Canoga Park earthquake permits over time.

middle-income families. The district had moderate damage, and the commercial district serving the neighbourhood, which had been declining for several years, had considerable damage to its older buildings. The city designated part of Canoga Park (mainly the commercial area) as an earthquake redevelopment project, and the district also contained a 'ghost town'. CRA commercial loans helped fund two commercial district projects: a natural food store and restaurant, and a movie theatre conversion.

Because the earthquake drew attention to many pre-existing problems, it provided funds for community rehabilitation and helped start a community planning process that did not exist before. The district was subsequently included in the city's targeted neighbourhood initiative – which provided community development funds for a community centre and streetscaping – and a Business Improvement District (BID) which helped promote clean-up and recovery in the commercial area. Tensions continue to exist, however, between Anglos, recent Latino immigrants, and established Latino residents.

Hollywood

The study district is a low-income residential area with a large immigrant population. The Hollywood Revitalization Plan of the mid-1970s defined much of the city's vision for the district, and the Hollywood Redevelopment Plan, formally adopted in 1986, created an implementation framework. Following the earthquake, the city acted on several initiatives from these pre-existing plans.

Hollywood's recovery relied heavily on public funds, most notably the city's housing and commercial loan programmes, Community Development Block Grant (CDBG) funds, the Federal Emergency Management Agency's (FEMA) hazard mitigation and public assistance funds, and SBA loans. CRA provided a total of US$7.4 million in loans to rehabilitate historic buildings along Hollywood Boulevard, including the Egyptian Theatre, El Capitan Office Building, Max Factor Building, and the Mayer Building.

The city also used the opportunity of the earthquake to clear out several notorious crime-ridden apartment buildings, as one element of a strategy to stabilize distressed neighbourhoods. The Hollywood Community Housing Corporation rehabilitated several earthquake-damaged properties, while the Hollywood Business Improvement District (BID) helped to clean up adjacent retail areas. Residential occupancies changed following the earthquake, as many damaged single apartments were combined to meet the needs of larger, immigrant families.

The opening of two Metro Rail subway stations in Hollywood in the year 2000

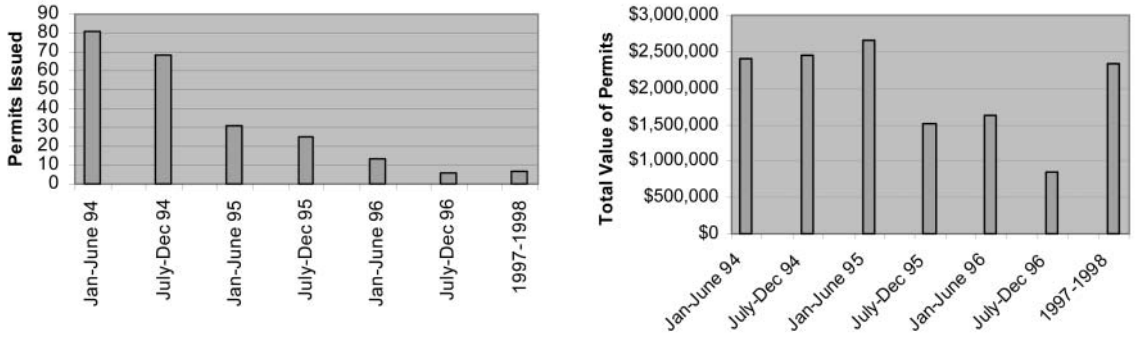

Figure 3*b*. Hollywood earthquake permits over time.

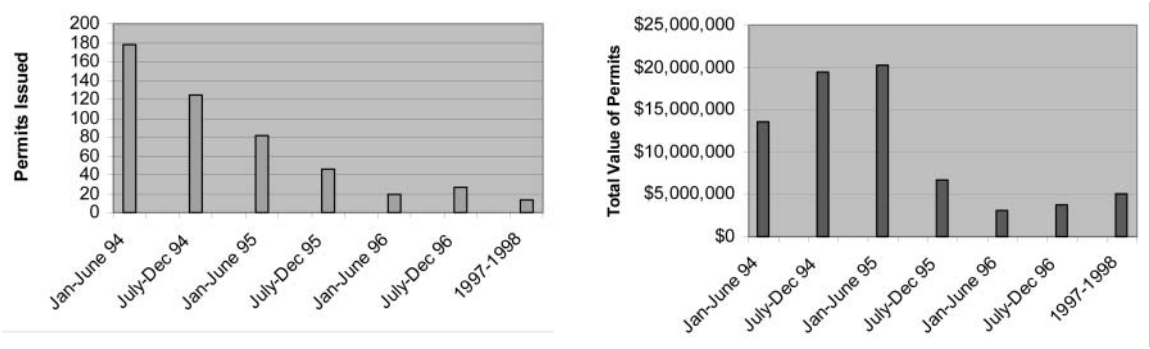

Figure 3*c*. Sherman Oaks earthquake permits over time.

also helped to catalyse redevelopment. The developers of a new commercial and entertainment complex with 1.3 million square feet of space stated that the post-earthquake revitalization of the area was the key in prompting their investment at that time.

Sherman Oaks

Sherman Oaks is a relatively high-income area and had high damage concentrations, including two 'ghost towns'. Citizens rejected an earthquake redevelopment area. Sherman Oaks successfully recovered, primarily with private capital and insurance money for condominiums and businesses and with the aid of the city's Housing Loan Program for apartment buildings. Sherman Oaks saw some improvement after the earthquake: damaged apartment buildings were substantially upgraded and approximately 100 affordable units were added to the district's housing stock – a resulting condition of the city's loan programme.

The Willis-Natick ghost town in Sherman Oaks may well have been the most severely damaged area in the 1994 earthquake, and both streets were successfully rebuilt. We identified 41 buildings on these two streets, containing approximately 1,014 housing units. Thirty of these buildings received earthquake building permits, and all were completed by mid-1998.

Reconstruction following the Kobe Earthquake

The earthquake destruction in Kobe and adjacent cities was concentrated in older, densely-developed neighbourhoods. Many of these neighbourhoods had old wooden houses constructed in the massive rebuilding

period after World War II, but before the 1981 update of seismic safety standards in the national Building Standards Law. The region's traditional wooden houses had heavy clay-tiled roofs designed to withstand the region's strong winds. Lacking internal partition walls that provide lateral strength and bracing, however, over 60 per cent of the wooden structures in the region were seriously damaged or collapsed in the earthquake.

In 1994, Japan and the Kansai region were in the midst of an economic recession that had lowered land prices and raised commercial vacancy rates. Kobe's economy was in transition, away from heavy industry and toward office, service and retail sectors. Kobe's central core was losing affluent population to new suburbs, and the earthquake accelerated this process. Central city residents, especially the elderly and immigrants, had limited personal resources to finance recovery.

The catastrophic scale and lack of private resources instigated a top-down, government-led, reconstruction planning and implementation process. The central government implemented a two-month moratorium on reconstruction to help facilitate planning and policy development. The first two-month phase of planning undertaken by the City of Kobe focused on basic citywide plans for major centres, trunk roads and parks. The overall plan for the rebuilt city was based on pre-earthquake plans for large-scale housing and redevelopment projects.

Planning Tools

The key recovery programmes and tools were:

Figure 4. Earthquake damage in Kobe. (*Photo*: Robert B. Olshansky)

land readjustment, urban redevelopment and other projects for residential areas. These are detailed below.

Land Readjustment Projects. Land readjustment, enabled by the Land Readjustment Law of 1954, is a process that modifies property boundaries for road-widening, open spaces and other public facilities (Japan Ministry of Construction, 2000; Sorensen, 2002). The City of Kobe used land readjustment, because it was one means under national law by which the city could receive national funds for reconstruction. Funds pay for the land and public facilities, but not for private construction on the new parcels. Land readjustment is a complex process in which each owner receives a new parcel that is proportionately smaller than the original parcel, in order to provide for the wider roads and parks. The city also purchased land from willing sellers, which helped to minimize the parcel reductions for those who remained.

Urban Redevelopment Projects. A project under the Urban Redevelopment Law of 1969 involves consolidation of all the land and building rights, construction of new buildings and public facilities, and the transfer of the pre-existing property rights into the new buildings (Japan Ministry of Construction, 2000). Rights holders may end up in very different situations than before; for example, someone who owned a house and the land beneath it may end up on the fifteenth floor of a new building, with some share also of a common land right. Redevelopment is financed primarily through the sale of reserve floors – floor space exceeding that needed for existing rights holders. In addition, the central government provides a subsidy for land preparation and common spaces.

Projects for Residential Areas. A large number of residential programmes were available, including ones for reconstruction of condominiums and construction of joint housing projects. Because Japan's land tenure system allows for separate ownership of land and structures, many joint housing options are available, as well as complicated financing schemes involving sales and buybacks of these assets. Government programmes assisted a variety of such schemes, providing support in the form of loans and design fees.

Narrow streets, small lots, and condominiums posed special challenges. In many areas, lot sizes and street widths were too small to allow reconstruction under the current Building Standards Law. In such cases, joint housing was a frequent solution (Yajima, 1999). Damaged condominiums required government-backed financing and were further challenged by requirements to achieve consensus on repair or reconstruction.

Planning Process

The Hyogo prefecture issued the Hanshin-Awaji Disaster Reconstruction Strategic Vision in March 1995, and the first version of the Hanshin-Awaji Disaster Reconstruction Plan, named the Hyogo Phoenix Plan, was announced on 31 July (Evans, 2001). This included a plan to provide 125,000 new housing units. A stated purpose of the plan, which had a 10-year time horizon, was to rebuild the region with a view to the future. This meant recognizing the aging of Japanese society and providing for welfare, enhancement of culture and other life amenities in the region, creating new industries in the international economy, improving disaster resistance, and the creation of a multi-centred metropolitan region (Hyogo Prefecture, 1999).

The City of Kobe's Restoration Plan, containing 1,000 projects, was published on 30 June 1995, and the Kobe Reconstruction Emergency Three-year Plan for Housing, published a week later, on 7 July, called for construction of 82,000 housing units. This ambitious plan was successful in building the number of units required. By March 2001,

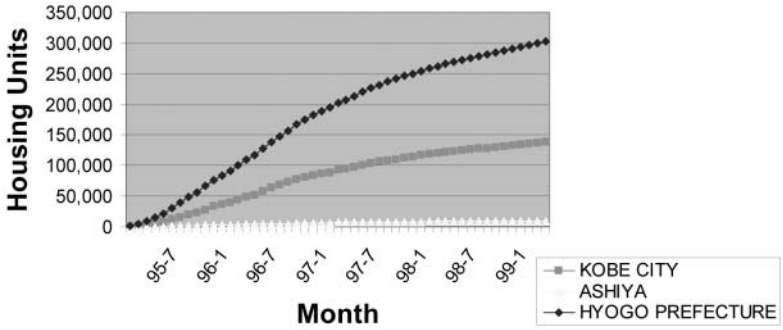

Figure 5. Housing starts in Kobe, Ashiya, and Hyogo Prefecture. (*Source*: Hyogo Prefecture, 1999)

70,095 building confirmations were filed, and 168,620 housing starts were reported as of April 2001 (City of Kobe, 2001). The rest of the prefecture was also successful in rapidly replacing the lost housing units (figure 5). Despite this success, the housing units were not necessarily built in the areas that needed them most, nor did they meet the needs of all elements of the population.

Recovery and reconstruction in Hyogo Prefecture were organized around priority restoration districts (Saito, 1999). These were the areas that suffered the heaviest damage in the earthquake; in many cases, they were also the region's few remaining areas of older buildings and streets that had not been heavily damaged during World War II (Evans, 2001; Tsuruki, 2004). Hyogo Prefecture established a total of 30 restoration projects within the priority restoration districts throughout the prefecture. These included 18 land readjustment project areas and 12 urban redevelopment projects. Kobe included six land readjustment project areas initially totalling 125 hectares (310 acres) and two redevelopment projects totalling 26 hectares (64 acres) (City of Kobe, 2003; Kinmokusei, 1999).

Public Involvement

Public participation was limited in the first phase because of time constraints, and no process existed for extensive input from impacted landowners, renters and other earthquake victims. Responding to heavy public criticism regarding first-phase decisions, however, Hyogo Prefecture began, during the six months after the earthquake, to encourage cities to use the *machizukuri* ('town building') citizen-participation process. This process had been well-established in certain parts of Kobe prior to 1995, but it blossomed after the earthquake (Hein, 2001; Evans, 2001). In many cases the remedies developed by the citizens underscored flaws in city-led plans. By the time the *machizukuri* organizations became active, however, major planning decisions for restoration promotion districts had already been made by the city. This reduced the scope of issues considered by participants in the *machizukuri* process to more localized and detailed questions, such as local street and park plans. Local government-funded consulting planners, working with the *machizukuri* organizations, were involved throughout the planning process, helping to build consensus and to negotiate the complex agreements needed to implement the plans.

Study Districts in Kobe

The study districts selected for the Kobe portion of this study were: Shin-Nagata, Misuga, and Shin-Zaike (figure 6). A portion of the City of Ashiya was also included in the study. A geographic database was assembled for each district, including 1990 and 1995 census data, land readjustment and post-

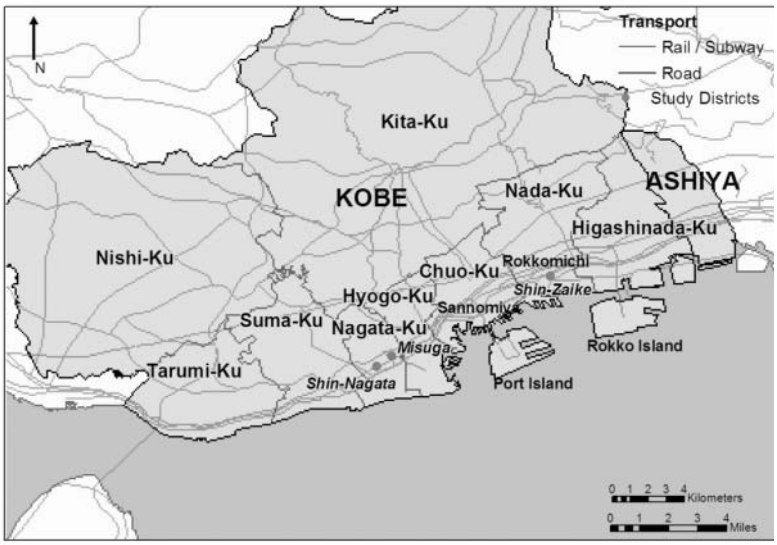

Figure 6. Kobe study districts, the nine wards ('Ku') of Kobe, and City of Ashiya.

earthquake planning data, and annual surveys of damage and reconstruction changes.

Both the Shin-Nagata and Misuga districts are located in Nagata Ward of western Kobe (figure 6), which had more than 23,800 structures either fully or partially collapsed, and another 4,800 fully or partially destroyed by fire (City of Kobe, 2001). The Shin-Nagata and Misuga study districts contained a majority of this loss. Prior to the earthquake, Nagata Ward had about 130,000 residents, of which 10,000 (8 per cent) were foreigners, primarily Korean or Vietnamese. This ethnic mix stands in sharp contrast to Japan's relatively homogeneous population. Twenty-seven fires ripped through Nagata, leaving behind a swathe of wholesale destruction measuring more than 3,000 hectares (1200 acres), nearly half of all the 8,191 hectares (3,316 acres) of land destroyed by fire in Kobe (City of Kobe, 2001).

The Shin-Zaike district is located in Nada Ward of eastern Kobe, which had more than 18,200 structures either fully or partially collapsed, and another 370 structures destroyed by fire (City of Kobe, 2001). The City of Ashiya, located east of Kobe City, had more than 7,000 severely damaged structures (Hyogo Prefecture, 1999).

Shin-Nagata

Shin-Nagata is a dense, mixed use district and home to some of Kobe's most affordable neighbourhoods for low-income families, foreigners, and the elderly. Nagata Ward, in general, had many *nagaya*, one- and two-storey wooden row houses, typically located on narrow lots and housing two or more families. Nagata Ward was home to many Koreans and Vietnamese, who worked in the synthetic shoe factories and supporting chemical manufacturing facilities in the area. Before the earthquake, about 1,600 separate shoe manufacturers and affiliated industries (representing 80 per cent of Japan's synthetic shoe manufacturers) were located in Nagata ward (Takahashi, 1999, p. 325). Many of these structures were built in the 1940s and 1950s and housed a small 'factory' or business on the ground floor, with housing at the back or on the upper floors.

The Japan Railways (JR) Shin Nagata train station is located in the heart of Nagata ward and is one of Kobe's busiest transportation hubs. Efforts to redevelop Shin Nagata neighbourhoods began in the 1980s and expanded rapidly after the earthquake. Master plan changes in 1992–1993

designated portions of this area for high-intensity redevelopment, which permitted construction of taller buildings following the earthquake. Kobe's Urban Restoration Plan, released in June 1995, outlined major goals for the district, including: development of a western urban centre at Shin-Nagata station; restoration of the synthetic shoe industry's former competitive status; and construction of the Kaigan subway line to enhance economic revitalization. The study district also includes a land readjustment area, comprising a neighbourhood that burned following the earthquake.

A large shopping mall and housing project, started before the earthquake, were accelerated and completed in 1998. Citizen involvement led to the establishment of a temporary shopping centre that helped keep the small, neighbourhood commercial uses alive while the new projects were built. A citizen-led design review committee, formed in the land readjustment area, played a substantial role in attracting new business and improving neighbourhood design.

Misuga

Also located in Nagata Ward, Misuga is similar to the northern part of the Shin-Nagata study district. Containing a mix of residential and commercial land uses, Misuga was severely damaged by fire. Two land re-adjustment areas totalling 10 hectares (25 acres) required extensive relocation of parcels and some residents and businesses were permanently displaced by the slow progress.

One co-operative project named Mikura Five is especially illustrative. Ten households, a restaurant, and a business owner combined resources to develop a new 6-storey building. Ten off-site landowners donated their land to the city, which exchanged their rights to their former land holdings for the right to participate with the owners of two parcels that composed the new building site. Each participant was entitled to one-twelfth ownership of the site. The owners received 67 per cent of their previous floor area, but could pay extra to obtain more space. The result is that a new, multi-storey building has replaced many small, single-family homes. Most owners paid to have equivalent or more space than before, and the new building is resistant to earthquake and fire.

Shin-Zaike

This area contains a mix of residential and industrial land uses. It had been home to many of Kobe's old *sake* factories, but the earthquake destroyed about 95 per cent of the traditional *sake* buildings. The district was designated as a 'grey zone' (as distinct from a land readjustment or redevelopment 'black zone' on the one hand, or a 'white zone' with no reconstruction programmes, on the other hand). In this 'grey zone' several unique recovery strategies have been applied, particularly in rebuilding the multi-family housing stock. Street widening and other building standards were enforced to improve neighbourhood conditions. A major public housing project altered community character and brought 650 new households to the district.

Construction of a major highway in the late 1980s had isolated the district, but also helped formalize a strong *machizukuri* organization, which developed townscape guidelines in 1993. This organization continued to be active after the earthquake, facilitating management of neighbourhood recovery issues. The townscape guidelines helped preserve the historic style and character of the district, despite the many losses. A damaged *sake* factory was rebuilt in traditional style and a historic travel route has been preserved.

Ashiya

The City of Ashiya, immediately east of Kobe, is an upper-income area with primarily residential uses. Of all the Japanese districts studied, land use and income levels in Ashiya most resemble those in US single-family

residential areas. Damage was concentrated in the older area near the train station and along the waterfront. Ashiya relied heavily upon private funding mechanisms to recover from the earthquake. To address unmet needs, a variety of condominium financing schemes was used to facilitate housing reconstruction. A land readjustment project for the older central residential area met with significant resistance from the community. Most *machizukuri* organization members pragmatically cooperated, however, feeling that the prefecture and city were determined to proceed.

Following the earthquake, residential densities have increased dramatically, as owners increased numbers of housing units in their buildings in order to finance reconstruction. Developers were also attracted by Ashiya's reputation and its short commuting distance to Osaka. As a result, many parts of Ashiya have lost the traditional streetscapes and greenery evident before the earthquake.

Discussion

Despite the differences in the effects of the two earthquakes, the reconstruction approaches shared many similarities. Both initially emphasized rapid reconstruction of infrastructure. Both countries lacked a comprehensive strategy, yet in both cities local leaders helped to advance recovery, to rebuild in a timely fashion and to address some long-standing problems. This study underscores the importance of local government in facilitating a lasting recovery.

In both regions, programmes evolved over time in response to the disaster conditions. Hardest-hit districts were targeted for special attention in both disasters, but many other areas also required substantial financial assistance. In both cities, small businesses suffered and only limited public resources were available to them. Redevelopment of certain neighbourhoods and businesses took time in both places, and some plans met with local resistance.

In Kobe the urban landscape and social environment of many neighbourhoods changed significantly after the earthquake. Land readjustment, redevelopment, and restrictions against rebuilding on non-conforming lots resulted in widespread physical change. Housing policies favoured demolition and full reconstruction rather than repair. High-rise buildings have replaced the smaller, wooden and post-war structures destroyed by the earthquake. Although housing quality has improved, some residents have been permanently displaced, unable to afford the replacement housing.

The City of Los Angeles' multi-family housing loan programme successfully rebuilt damaged housing and stabilized neighbourhoods. Focused on repairs, only 500 units were demolished, reducing the recovery time and cost that would have been needed for demolition and reconstruction. The Los Angeles experience demonstrates local government's capacity for designing and implementing disaster recovery plans and financing schemes. Condominiums, however, often posed special challenges not well addressed by either public assistance programmes or private insurance.

Taken together, the experience following both earthquakes illustrates the importance of coupling external funding with local flexibility. In Los Angeles, the city was able to decide how best to apply the national funds strategically to local circumstances, and the City of Kobe probably would have appreciated similar flexibility. On the other hand, Kobe, because of the scale of destruction, offers many valuable lessons to the US and others. The *machizukuri* process, though admittedly not involved in important initial decisions, showed how local governments can support neighbourhood planning in the wake of a catastrophic disaster. And the many examples of redevelopment, land readjustment, and joint housing, show how rights holders can leverage their remaining value into collective reconstruction solutions.

Finally, many of the financing details offer caution for future large urban disasters. Such disasters are expensive, and they have far-reaching effects for governments, individuals, and insurers, all of whom must use considerable amounts of reserve funds.

Lessons for Planners

This research generally supports the common findings from previous studies, described earlier in this paper. But we also found that we were able to extend many of those findings in a way relevant to the perspective of planners operating in modern urban environments. The case study work – although not possible to elaborate on in this brief paper – provides details of time, financing, and hierarchical processes that can help to inform future practice and research.

The case studies identify several practical lessons for planners in the wake of a catastrophic disaster. The lessons fall generally into one of three overlapping categories:

- Process and timing;
- Physical conditions;
- Finance.

Process and Timing Lessons

Planners can take advantage of the disaster in order to further pre-disaster goals.

Sometimes a disaster can reveal existing problems to higher levels of government, thereby leading to actions that would not otherwise have occurred. The Canoga Park story is intriguing in that it shows how, in some cases, a disaster can help to identify problems and initiate planning. We suspect that this, in fact, is not that unusual, and that the next major earthquake in the United States will reveal many similar situations.

Disasters also release funds not available in normal times. These provide opportunities to implement long-standing plans.

The cases confirm the delicate nature of the trade-off between speed and deliberation. To balance these needs most equitably, local governments should have the flexibility to work as quickly as they can and as quickly as the community can tolerate.

Quick, strategic action by the City of Los Angeles helped to secure the ghost towns. And, by acting quickly, private and public actors in Kobe were able to provide housing for thousands of displaced families. Some time, however, is also needed to plan. In Japan, the two-month moratorium was not long enough to make major urban planning decisions, and more time would have allowed for more meaningful participation and recovery of communities. In Los Angeles, some opportunities to redress existing problems were missed.

Viewed from the point of view of local planning processes, speed and deliberation might not be as contradictory as they initially appear. If local governments have the flexibility to act strategically and quickly, they can direct actions where most needed, and set aside issues or areas that need further study.

Citizen involvement is vital, especially in the face of significant reconstruction or land use change.

In Kobe, the citizen *machizukuri* organizations were critical to recovery in many ways. They created valuable linkages between the city and residents. For example, the *machizukuri* organization in Shin-Nagata South organized temporary parking, temporary housing and a local currency to help retailers. However, in Shin-Nagata, as well as in the other Kobe cases, the city made the major initial decisions, and only then consulted with the community for their review and comment. In retrospect, the city should have given them a more substantial role earlier in the planning process.

To work most effectively after disasters, community organizations should already be in place and have working relationships with the

city. It is difficult to invent participatory processes in the intensity of a post-disaster situation.

In Shin-Zaike, for example, the existing community organizations and planning activities facilitated the post-earthquake planning efforts. Hollywood's steady recovery progress was rooted in a strong, pre-existing planning and institutional framework. The earthquake did not change the pre-existing plans, but rather created new funding sources that the CRA could readily funnel into the district. Conversely, if citizens are resistant to change, they will resist post-earthquake change as well, as occurred in Sherman Oaks.

Governments can improve the effectiveness of neighbourhood planning organizations by providing professional assistance.

In Kobe, the dispatching of expert consultants to neighbourhoods greatly facilitated post-earthquake planning and communication. The consultants played a critical role as facilitators and mediators between residents and local government. The network of consultants was also important, because it allowed for local groups to share their experiences and exchange ideas.

Condominiums and other co-operative or joint housing schemes will pose challenges to governments in future disasters. Methods of implementing co-operative reconstruction should be addressed before the next disaster.

In Los Angeles, condominium owners were left on their own. Technical assistance, advice and communication with other condominium owners would have been welcome. Furthermore, in condominium and co-operative housing situations, 'holdouts' can be a significant problem. The presence of neutral, third-party consultants in Kobe was valuable in successfully resolving such disagreements.

Physical Planning Lessons

It is better to repair buildings than to rebuild them. Repair is usually more cost-effective, less disruptive, and causes less change to neighbourhoods.

The Los Angeles cases suggest that post-disaster economic recovery is faster if buildings are repaired rather than torn down, even if repairs involve stripping the buildings to their frames. In Kobe and Ashiya, reconstruction was costly, time-consuming, and disruptive. Many Japanese officials now believe that more incentives for repair should have been available.

Disasters can lead to physical betterment of neighbourhoods.

All the cases demonstrate some physical neighbourhood improvements, although large-scale changes also negatively affected the fabric of some communities. Building rehabilitations in Los Angeles involved building upgrades, including some for seismic safety. Shin-Nagata now has higher-quality, safer buildings and streets. Hollywood regained its community by means of successful community organization in relation to crime and safety.

Betterment comes at a price, however, as reconstructed properties in damaged areas often cost more than before.

With new buildings, landlords can charge higher rents. Many households that previously lived in these areas can no longer afford to do so. In Misuga, for example, many generations had lived there without paying much for rent, but reconstructed properties now cost much more. Furthermore, in Shin-Nagata South the new buildings have transformed the scale of the community and its sense of place.

Providing temporary and permanent housing following a catastrophic disaster is a major challenge. Success requires external funding and favourable local conditions.

Kobe and adjacent areas rose to this challenge by rapidly replacing lost housing units, but with social and economic costs. It was

difficult to find space for temporary housing near to damaged neighbourhoods, and new replacement housing was built without neighbourhoods in mind. Local housing officials now admit that a slower approach would have been better.

In Los Angeles, because of high vacancy rates, residents neither required temporary housing nor construction of thousands of replacement units, as in Kobe. In Canoga Park, for example, the vacancies helped surrounding areas to absorb the effect of 12 per cent of study district housing units being severely damaged. Thus, LA's successful rebuilding programme comes with a caveat: programmes that succeeded in this environment may be less successful following a disaster in which vacancy rates are lower.

Financing Lessons

Local flexibility is important, in order to provide finance mechanisms appropriate to the situation.

On a citywide scale, the cases illustrated the advantages of Los Angeles's flexible use of HUD funds to catalyse repair of damaged apartment buildings, and they illustrated some of the difficulties posed by the rigid requirements of land readjustment in Kobe and Ashiya. Flexibility is also important in providing appropriate solutions on a neighbourhood scale. For example, a senior collective housing project in Shin-Nagata was a significant example of the central government's willingness to consider adjustments to the rules, appropriate to community demographics, needs and resources.

Insurance is the fastest and most equitable means of financing reconstruction. Public policies to encourage disaster insurance would provide long-term benefits.

Insured owners were able to receive settlements and rebuild, generally within a couple of years of the earthquake. This was particularly evident in the San Fernando Valley. Furthermore, insurance-based reconstruction is equitable because it is financed by individuals according to their risk.

Those without private financial resources and without insurance took longer to recover, if at all. Uninsured owners and renters suffer an irreplaceable loss of both home and assets. Examples of uninsured elderly owners in Sherman Oaks and Shin-Zaike help to illustrate these effects. The joint housing schemes in Shin-Zaike and other places were a great help towards providing acceptable housing and maintaining neighbourhoods. Even these schemes, however, only replaced a fraction of the assets that were lost.

Public funding, though neither as fast nor as equitable as insurance, can more readily promote community betterment.

Public funding provided by the City of Los Angeles was able to target ghost town rebuilding, affordable housing, and the redevelopment of Hollywood Boulevard and adjacent neighbourhoods. In Kobe, public funding provided public housing, street widening and related design improvements, and the development of new urban centres.

Redevelopment is a useful funding concept following disasters but, in some places in Kobe and Los Angeles, ambitious redevelopment plans diverted resources away from other needs.

Redevelopment was a helpful way to rebuild Shin-Nagata and other areas in Kobe into new urban centres, and it was also critical to the revitalization of Hollywood Boulevard. But in both cities, these projects received a disproportionate share of resources and attention. In the case of Hollywood, the Community Redevelopment Agency spent most of its citywide funds in this one area. The lesson here is that redevelopment can be very valuable, but it should be thought of as one piece of a comprehensive recovery strategy.

For redevelopment, it is necessary to have different procedures during disaster times, and these must be established ahead of time.

In the United States, where redevelopment is financed via tax increments on the improvements, post-disaster redevelopment must be designed with a base value so as actually to provide a tax increment. This would require specifying ahead of time a procedure for determining the base value following disaster. The cases also point to the importance of having substantial public involvement, to identify priority redevelopment needs and to consider redevelopment within the context of other recovery strategies.

Condominium owners need technical and financial assistance following an earthquake.

Kobe provided assistance to condominium owners, including a wide variety of condominium reconstruction finance options. These were very helpful in addressing the unique needs of each case, but the options also should have included repair financing.

Los Angeles provided no systematic assistance to condominium owners, who had to depend on insurance or SBA loans. This will be a greater problem in future earthquakes, as the number of condominium owners increases and the availability of insurance decreases. At minimum, they will need technical assistance and advice regarding possible courses of action. Even better would be the availability of low interest loans for structural repairs.

The earthquakes produced both winners and losers.

In Los Angeles, where real estate prices later increased, investors and residents of rehabilitated buildings benefited. In Kobe, construction companies profited. But there were more losers. Those who walked away from damaged apartment buildings or condominiums in Los Angeles lost their investment. In both cities, small businesses which could not survive for many months with reduced revenue had to shut down. And in all cases, many of the long-term costs are hidden: depleted savings, lost retirement funds and loans that require many years of repayment.

Final Remarks: Managing the Recovery Process

The challenge is this: how can local governments effectively manage post-disaster recovery and reconstruction – meeting the time-sensitive needs of housing and economic recovery, while also maximizing the opportunity for community betterment? The cases described here illustrate the difficulty of this task, but they also suggest some principles for success.

The next catastrophic urban disaster to strike a developed nation will be extraordinarily expensive and prudence demands preparedness for both post-disaster financing and planning processes. External funding and resources for temporary and permanent housing are important prerequisites for successful recovery. National governments need mechanisms to be able to deliver these, while allowing local flexibility in implementation. Local governments need to combine firm regulations (building codes, lot sizes, land-use types) with citizen participation. An optimal approach would couple incentives with basic safety standards.

Planning processes following disasters will necessarily be complicated, involving numerous agencies and stakeholders. Given the cases described in this paper, it is difficult to imagine a single, 'one-size-fits-all' planning approach as a solution in such situations. The reality is that post-disaster planning will involve multiple actors and multiple plans, advancing a variety of reconstruction and financing strategies. In Kobe, for example, many decisions happened simultaneously – the city was even unaware for weeks that the national law had been changed in late February 1995 – and it is only hindsight that gives them a sense of order. Housing was over-supplied because many different actors were advancing a variety of programmes and strategies simultaneously.

The best way to improve post-disaster planning processes, in terms of both speed and quality, is by emphasizing information and communication and by explicitly providing funding for them. High-quality, systematic data collection, information systems and communication mechanisms would be a good start. Secondly, the lead state recovery agency needs to designate a clearing-house for plans and for supporting information – this could be both a physical entity and an internet site linking all relevant plans and data. Thirdly, planning agencies need to recognize explicitly the conflicting requirements of speed and deliberation. Regular communication between agencies – perhaps by means of meetings or workshops sponsored by the clearing-house – can provide the arenas for deciding the trade-offs between speed and deliberation in real time. Finally, government needs to be committed to supporting fully inclusive planning processes as soon after the disaster as possible.

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