

# Mitigation of earthquakes

[Environment](#), [Disaster](#)



The location of Kobe town played a great role on the magnitude of the damage caused by the earth quake that occurred in the town in 1995. The damage was far much as compared to the damage caused in the Northridge earthquake in 1994 as much as the magnitudes of the quakes were the same. Kobe town is on a narrow strip, where we have a narrow transportation corridor that was severely impaired due to the collapse of the elevated roads and railways and this caused dislocation of public and commercial traffic.

There was evidence of ground failure including disruption of the road pavement, the subsiding of pavement around manholes and ejection of silt soils. The only transportation link became the ground level roads and this brought about congestion that impeded emergency response and recovery. There were large deformations in road pavements and also of the ground near buildings foundations in the district of Sannomiya of Kobe.

The deformations were in the order of tens of centimeters and this could have been the likely cause of the damages that included tilting of the building or collapse of the entire structures that were experienced in many multistory buildings that occurred in Kobe especially in the down town area. The time of occurrence of the quake also served to increase the people who died. The quake occurred at 5: 46 a. m. , the time which found many of the resident asleep or just beginning their morning routines. There were also so many old wood-frame houses with heavy clay tiles that collapsed causing many deaths.

There was also the ignition of fires that followed immediately after the collapse of the structures. The fires could not be extinguished on time to

avert more death because of the hindrance caused by the failure of the water supply system and the disruption in the traffic system. These did not happen in the case of the 1994 Northridge earthquake as all the fault rupture occurred at depth that were greater than 10km, and many of the multistory buildings in San Fernando Valley were at least 20km away from the fault rupture that was closest (Paul, 1995).

The Northridge earth quake also occurred at the time when there were no people occupying the building that were affected. These include a stadium that collapsed but there were no people in it at that early morning hours that the quake occurred. There was also the report of multi storey commercial buildings collapsing but were also not occupied during the time of collapse. In this town there was also incidence of fire eruption due to the breaking of the commercial gas pipe system, though this did not measure to what occurred at Kobe.

There was also the collapse of the wood structure but the number was not as big as the one experienced at Kobe. There were few such structures in this town as compared to the large number in the Kobe case. The design aspect of the structures also averted the occurrence of more death as seen from none collapsing of school buildings which are reinforced against earth quakes. Components to include in mitigation strategy a) Improve risk assessments. Risk assessment should be done to find out the chances that earth quake are likely to occur in a certain place and the frequency of such an occurrence and the severity determined.

Such information should be combined with the inventory of the structures that are in existence, and are likely to be affected by such disaster

accompanied by the fragility data. The fragility data estimates the degree of damage that various types of structure will experience, for example, the type of damage likely to be experienced by unreinforced masonry building which is in earthquake prone area. These risk assessments are very important in increasing public awareness about the threat posed by the natural disaster.

b) Implementation of mitigation measures.

Land use plan can help the communities reduce significantly on losses that are brought about by natural disasters like earth quakes by adoption of land use plans that aim at avoiding the hazards while taking care of the environment and other goals. There is however no willingness of local government to adopt land use measures to protect against hazards unless a direction is received from a higher level government. There should be accurate identification of the disaster affected areas though the mapping of the hazard zones could be very expensive for some municipalities.

Earth quake disaster can also be reduced substantially by improving the building codes. The code will guide the standard of buildings that are allowed (to be built) in certain areas and the rehabilitation of already existing structures. The life safety of buildings is currently being set by building codes. The maintenance of the functionality of the structures also is a very important aspect and becomes very critical in certain class of structures. For example in the US there was establishment of seismic safety standards for federally funded new construction by the federal government.

This has the mandate of addressing seismic safety standards of the buildings that are already in existence and are either owned or leased. About half of 30000 communities in US have not adapted any building code and the

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effectiveness of the building codes is also subject to reinforcement by the relevant authority (Science, 1999). This requires an ongoing inspection program and it has been noted that many communities lack the required number of inspectors that are required to perform the job efficiently.

c) Improve technologies that support warnings and the dissemination of, and response to, warnings. A good mitigation strategy should address this issue as one of the component of the mitigation strategies. Warnings are expected to be time specific, show location of the expected disaster and the severity of the expected events. The uncertainty accompanied by the events should also be stated in the manner that will allow the taking of action to ensure the survival of people and the protection of institutions and property.

There are some warnings that are developed in form of maps even before a disaster occurs in an area. These could also include the posting of signs in the areas or having a regulation that requires that real estate agents inform potential property owners the nature of disaster the area is prone to. d) Improve the basis for natural disaster insurance. Improvement of the basis of natural disaster insurance is an important component that should be included in the mitigation strategy.

There should be reward for individuals that invest in hazard-reduction measures and this should be before and after the disaster. Individuals that are insured are to be awarded lower premiums for adopting mitigation measures before disasters such as the potential losses are considerably reduced. The insurance companies have the freedom of refusing to provide coverage unless the policyholder has agreed to undertake certain

prospective measures that can lower the potential losses. REFERENCES  
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