

Preparedness for Natural Disasters: An Overview

Paul K. Freeman

For this conference, I was requested to discuss the role of preparation as a component of natural disaster policies at the local government level. Since the conference is focused on issues of particular importance to Turkey, an emphasis on preparedness for earthquakes is appropriate. Before expressly addressing the issues associated with preparedness, it is important to briefly review the broader context within which preparedness must be discussed.

Preparedness is one stage of a comprehensive risk management process. It sets the stage for an appropriate response by the government when a natural disaster occurs. (This discussion is based on a report prepared for the Inter-American Development Bank. The report titled “Disaster Risk Management” is currently being published. Freeman, Martin, et al. 2003.) Although disaster response is important, it fails to address the causes of disaster losses. Those causes are rooted in the complex interaction of human settlement and the natural environment. Recurring natural events become disasters because populations exist in harm’s way with structures inadequately prepared to withstand anticipated natural hazard events. To protect people and their assets, natural disaster policies must deal with a broad set of issues. In developing countries, these issues are tied to the network of policies addressing economic development. The best protection from natural disasters is an economically viable country with strong democratic institutions. Just as the reduction of poverty requires a comprehensive mix of policies that involve many components of society and government, reducing the toll of natural disasters requires a comprehensive approach that accounts for the causes of a society’s vulnerability to disaster. Not only must a comprehensive strategy be articulated, the political and economic will must be created to sustain the new policies.

A national disaster system is composed of the interaction of the institutions, financial mechanisms, regulations, and policies that constitute a country’s approach to disaster risk management. This interaction can be formal or

informal. It is commonly believed that for a national disaster system to be comprehensive, national governments must be active participants in the creation and implementation of a formal system. This view is well expressed by the Asian Development Bank in its *Disaster Manager's Handbook* (Carter, 1992).

There is, however, disagreement in the literature regarding the advisability of depending on national governments as the appropriate foundation for a comprehensive program. As described in the classic analysis of the political economy of large disasters by Albala-Betrand (1993), focusing natural disaster policy through existing government systems enhances narrow power structures and draws away from local concerns and initiatives. Those holding this view favor reducing natural hazard risk through community-driven projects and programs developed by nongovernmental organizations (NGOs). Such an approach to risk management is not guaranteed to be comprehensive, but applies directly to identifiable needs and the empowerment of local populations.

These two approaches to risk management need not be mutually exclusive. The task facing policymakers is to create an effective national system with a comprehensive vision that engages senior government policymakers and accommodates and supports local decision-making.

Elements of Comprehensive Disaster Management

The disaster cycle is divided into two phases: the pre-disaster phase and the post-disaster phase. Table 1 lists the key components of disaster risk management according to these phases: actions required in the pre-disaster phase and actions needed in the post-disaster period. The pre-disaster phase includes risk identification, risk mitigation, risk transfer, and preparedness; the post-disaster phase is devoted to emergency response and rehabilitation and reconstruction. A comprehensive risk management program addresses all of these components. This paper focuses on the role of preparedness.

Table 1. Key Elements of Risk Management

Pre-disaster phase				Post-disaster phase	
Risk identification	Mitigation	Risk transfer	Preparedness	Emergency response	Rehabilitation and reconstruction
Hazard assessment (frequency, magnitude, and location)	Physical/structural mitigation works	Insurance and re-insurance of public infrastructure and private assets	Early warning systems and communication systems	Humanitarian assistance	Rehabilitation and reconstruction of damaged critical infrastructure
Vulnerability assessment (population and assets exposed)	Land-use planning and building codes	Financial market instruments (catastrophe bonds and weather-indexed hedge funds)	Contingency planning (utility companies and public services)	Clean-up, temporary repairs, and restoration of services	Macroeconomic and budget management (stabilization and protection of social expenditures)
Risk assessment (a function of hazard and vulnerability)	Economic incentives for pro-mitigation behavior	Privatization of public services with safety regulation (energy, water, and transportation)	Networks of emergency responders (local and national)	Damage assessment	Revitalization for affected sectors (exports, tourism, and agriculture)
Hazard monitoring and forecasting (GIS, mapping, and scenario building)	Education, training and awareness about risks and prevention	Calamity Funds (national or local level)	Shelter facilities and evacuation plans	Mobilization of recovery resources (public, multilateral and insurance)	Incorporation of disaster mitigation components in reconstruction activities
Building and strengthening national systems for disaster prevention and response: These systems are an integrated, cross-sector network of institutions addressing all the above phases of risk reduction and disaster recovery. Activities that need support are policy and planning, reform of legal and regulatory frameworks, coordination mechanisms, strengthening of participating institutions, national action plans for mitigation policies, and institutional development.					

Source: IDB (2000).

Preparedness

Preparedness involves building an emergency response and management capability before a disaster occurs. In its Guide for All-Hazard Emergency Operations Planning, the Federal Emergency Management Agency in the United States describes preparedness in the following terms:

While mitigation can make communities safer, it does not eliminate risk and vulnerability for all hazards. Therefore, jurisdictions must be ready to face emergency threats that have not been mitigated away. Since emergencies often evolve rapidly and become too complex for effective improvisation, a government can successfully discharge its emergency management responsibilities only by taking certain actions beforehand. This is preparedness.

Preparedness involves establishing authorities and responsibilities for emergency actions and garnering the resources to support them: a jurisdiction must assign or recruit staff for emergency management duties and designate or procure facilities, equipment, and other resources for carrying out assigned duties. This investment in emergency management requires upkeep: the staff must receive training and the facilities and equipment must be maintained in working order. To ensure that the jurisdiction's investment in emergency management personnel and resources can be relied upon when needed, there must be a program of tests, drills, and exercises. Consideration must also be given to reducing or eliminating the vulnerability of the jurisdiction's emergency response organizations and resources to the hazards that threaten the jurisdiction.

Accordingly, preparedness measures should not be improvised or handled on an *ad hoc* basis. A key element of preparedness is the development of plans that link the many aspects of a jurisdiction's commitment to emergency management (FEMA 1996).

Key disaster preparedness activities include training programs for response personnel, exercises and drills of emergency plans, education programs to inform citizens, hazard detection and warning systems, identification of evacuation routes and shelters, maintenance of emergency supplies and communications systems, establishment of procedures for notifying and mobilizing key personnel, and individual household measures such as clearing attic space to make room for belongings in case of a flood.

In contrast with elements such as mitigation that are often the product of major policy decisions at a national level, preparedness projects tend to be

oriented toward the actions of individuals and individual organizations. Programs must therefore focus on the community level and a national system should include mechanisms to coordinate with preparedness projects.

Disaster preparedness also requires significant political will. According to Smith (1996), “it ties up facilities and people that are apparently doing nothing, other than waiting for an event that no one wants and many believe will never happen.” It is inherently difficult to maintain impetus for diverting resources into preparedness projects if many years have passed since the last disaster event. Outdated plans and warning systems, however, have the potential of being worse than no provisions at all. Continued public awareness programs are therefore a key ingredient in increasing and maintaining disaster preparedness (Foster 1980; Garb and Eng 1969). Public awareness is increasingly important as populations become more mobile and newcomers are less aware of local risk conditions and traditional mitigation techniques (UNDHA, UNDP, and MWR 1994).

Many programs can be used to increase public disaster awareness. Broadcasting agencies can contribute to increasing public awareness by designing announcements and disaster-related programs. Inclusion of disaster awareness in school programs is a particularly efficient and economical strategy. Other successful practices include advertising at popular sporting events, on shopping bags, or during community programs; hosting workshops; and organizing national disaster preparedness days.

Preparedness and Earthquakes: Special Issues

There are a series of special issues related to earthquake preparedness. It is essential for response personnel to take immediate action to gather the necessary damage information. In earthquakes, response actions often have some unique characteristics that are not involved with other types of hazards. Since earthquakes occur with little warning, it is essential that response be available immediately. Generally, the response involves actions for search and rescue, access control and re-entry to impacted areas, debris clearance, restoration of utilities and lifeline repairs, and the inspection, condemnation, and/or demolition of buildings and other structures. These needs dictate a series of advance planning decisions specifically directed at earthquakes.

Damage

The capacity to conduct ground and aerial surveys must exist to determine the scope of the damage, casualties, and the status of key facilities.

Search and Rescue

Earthquakes cause the collapse of buildings and other structures as well as creating landslides. Many hundreds to thousands of people could be trapped. It is likely that local governments would be overwhelmed by the demand for emergency services. Most jurisdictions do not have a sufficient quantity of specialized equipment or enough trained personnel to accomplish the large-scale search and rescue operations. A program to access to assistance from other government and non-government agencies in the immediate post disaster period is an essential component of an effective earthquake preparedness program.

Access Control and Re-Entry

In the immediate aftermath of an earthquake, a program to establish control of access to a damaged region until it is safe is essential. Only people directly involved in the emergency response operations should be allowed to enter. This requires that a protocol be developed to determine the appropriate time to allow evacuees and the general public to re-enter the damaged area.

Debris Clearance

The identification, removal, and disposal of rubble, landslides, wreckage and other material will be a high priority activity in the immediate post disaster period. The failure to remove debris, clear obstructed roads, repair and reinforce roads and bridges, and the construction of emergency detours and access roads will impact emergency response actions. The allocation of responsibility for these functions in advance is essential.

Inspection, Condemnation, and Demolition

Since a major component of damage from earthquakes (as contrasted to floods and hurricanes) is structural damage, a program to inspect, condemn and demolish damaged buildings is required. Of first importance is a program to inspect structures critical to emergency service operations and mass care activities. These facilities must be inspected and marked as being safe for occupation. Of next order is an inspection system for facilities that threaten public safety. This includes inspection of dams and levees. Lastly, a system to inspect less critically damaged structures must be undertaken with a program to demolish those that are condemned.

Utilities and Lifeline Repair

Prompt restoration of electrical power, natural gas, water, sewer, and telephone and other communications systems minimizes the impacts of earthquakes on the public.

Warning

Earthquakes usually occur without warning. Although some earthquakes have been successfully predicted, a reliable warning system has not been developed. This lack of warning places greater emphasis on the immediate response obligations of the government and emphasizes the need for proper preparation of the immediate post disaster response.

Emergency Public Information

The flow of accurate and timely emergency information is critical to protect lives and property after an earthquake. Since much damage from earthquakes arises from fires, warnings and advice on the continued threat of fire, unsafe areas, building collapse and other hazards is essential.

Evacuation and Mass Care

In the immediate post-disaster period, people will need to be evacuated. This is a particularly troublesome problem since many structures, commonly used to support mass care could have been damaged by an earthquake. This highlights the need to consider in advance the need to move residents of custodial facilities (hospitals, jails, mental health facilities, nursing homes, retirement homes, etc.) in the immediate post-disaster period. The placement and construction of traditional mass care facilities like schools and religious institutions should be done with an eye to insuring their capacity to withstand earthquakes.

Examples of Urban Planning

As relates to earthquakes, several major urban regions in the world are subject to significant earthquake risk: among these is Tokyo. It is illustrative to examine the preparedness program for this large, well-developed city to understand the scope of preparedness planning possible.

The basic elements of disaster-preparedness planning for Tokyo are intended to increase the fire resistance of buildings, provide residents with safe evacuation routes to secure shelter areas, and equip these areas with the means to combat surrounding fire.

As noted earlier, planning for earthquakes is hampered by the lack of an effective warning system. This places an emphasis on immediate response to place populations in secure areas.

Fireproof buildings

A major cause of damage post-earthquake is fire. Two general steps can be taken to reduce the risk of fire: automated systems to shutoff natural gas and pipeline systems (this is used in Los Angeles) and intense effort to fireproof buildings in earthquake-prone regions. Tokyo is divided into two regions: a fireproof region and a quasi-fireproof region. In the fireproof region, all buildings of more than three stories must be built of fireproof material, like reinforced concrete. In the quasi-fireproof region, fireproofing is only required of certain taller and larger buildings. To support its fireproofing efforts, the government provides subsidies to promote fireproofing. In 1990, the subsidies were approximately US\$25,000 per building (Kumagai 1999).

Open Spaces for Evacuees

In Tokyo, 149 evacuation sites have been designated. These are large parks, university campuses, other public facilities, non-flammable housing complexes, cemeteries and riverbanks. Government guidelines provide that no citizen should have to travel more than two kilometers to a safe open space.

Disaster Prevention Bases

The government has constructed eight disaster prevention bases in different parts of the country. In the event of a disaster, these bases are intended as a secure location from which disaster countermeasures can be taken. During normal times they serve a variety of other disaster-prevention measures including public relations, education, and training.

These measures are simply part of the comprehensive program organized in Tokyo to protect against earthquake risk.

Sources of Information

Preparedness is one topic related to natural hazard losses that has received considerable international attention. It has been a major concern for decades for the International Red Cross ("IFRC"). The IFRC has published extensively on the role of preparation against disasters and this activity is a mainstay of their worldwide operations. As noted by IFRC, staying a step ahead of the next disaster is becoming increasingly important. This is why

the Federation has identified disaster preparedness as one of the four core areas of activities for itself and for National Societies in *Strategy 2010*.

The United Nations International Strategy for Disaster Reduction is focused on strategies to reduce losses from disasters. Key to their initiatives is providing information on proper preparedness. Comprehensive information related to disaster preparedness is available through the United Nations and this initiative.

The World Bank through its Disaster Management Facility has been an important player in examining strategies to cope with natural disaster losses. In addition, the regional development banks have also played an active role in establishing policies to reduce natural disaster losses. The Asian Development Bank and the Inter-American Development Bank both have on-going initiatives focusing on natural disaster risk reduction, including preparation. Recently, the Inter-American Development Bank had a regional policy dialogue that focused on the role of local governments in coping with natural disaster losses.

References

- Carter, W.N. (1992). *Disaster Management: A Disaster Manager's Handbook*. Manila: Asian Development Bank.
- Federal Emergency Management Agency (FEMA). (1996). "Guide for All-Hazard Emergency Operations Planning." Washington, D.C.: Federal Emergency Management Agency.
- Foster, H.D. (1980). *Disaster Planning: The Preservation of Life and Property*. New York: Springer-Verlag.
- Kumagai, Y. and Yoshiteru Nojima. (1999). *Urbanization and Disaster Mitigation in Tokyo*. Mitchell, James K. (ed.), *Crucibles of Hazard: Mega-Cities and Disasters in Transition*. New York: United Nations University Press.
- Freeman, P.K., L. Martin, et al. (2003). "Disaster Risk Management." Washington, D.C.: Inter-American Development Bank. in publication.
- Inter-American Development Bank (IDB). (2000b). "Facing the Challenge of Natural Disasters in Latin America and the Caribbean: An IDB Action Plan." Washington, D.C.: Inter-American Development Bank.
- International Federation of Red Cross and Red Crescent Societies (IFRC). (2001). *World Disasters Report: Focus on Recovery*. Geneva: International Federation of Red Cross and Red Crescent Societies.
- Red Cross and Red Crescent Society. (2001). *World Disasters Report: Focus on Recovery*. Washington, D.C.: International Federation of Red Crescent Societies.
- Red Cross, World Meteorological Organization, and Economic and Social Commission for Asia and the Pacific (Red Cross, WMO, and ESCAP). (1977). *Guidelines for Disaster Prevention and Preparedness in Tropical Cyclone Areas*. Geneva/Bangkok : Published jointly by ESCAP, WMO, and the League of Red Cross and Red Crescent Societies.

Preparedness for Natural Disasters: An Overview

- United Nations Department of Humanitarian Affairs (UNDHA, UNDP, and MWR). (1994). United Nations Department of Humanitarian Affairs, United Nations Development Program, and Ministry of Water Resources of the Socialist Republic of Viet Nam. "Strategy and action plan for mitigating water disasters in Viet Nam." New York and Geneva: DHA (94/1).
- World Bank. (1994). *World Development Report 1994: Infrastructure for Development*. Washington, D.C.: World Bank.
- _____. (2000). "Managing Economic Crises and Natural Disasters." In *World Development Report 2000/2001: Attacking Poverty*, 161-76. Washington, D.C.: Oxford University Press.
- World Bank and IMF. (1999). "Building poverty reduction strategies in developing countries." DC/99-29. Washington, D.C.: World Bank and IMF.