A primary aim of recovery management is to use the opportunity to build or strengthen resilience in society that is, its citizens, livelihoods, buildings, critical facilities, government administration, and the natural environment. To establish an effective DRR framework, key institutional actors and stakeholders need to work together and be aware of their respective roles and responsibilities. These include the national, provincial, and local government levels, the relevant government ministries and agencies, and local communities. An effective disaster management system covers the following five aspects: (i) risk identification; (ii) emergency preparedness; (iii) institutional capacity building; (iv) risk mitigation; and, (v) catastrophe risk financing.

**Risk identification:** The first step is to identify and understand the problem. This can include updating hazard maps, analyzing the vulnerability and capacity of a community, modeling risks, and understanding the direct, indirect, and secondary effects of disasters.

**Emergency preparedness:** These systems need to be simple to operate and applicable to a wide range of natural hazards. Citizens and government agencies need to be prepared for breakdowns in essential services. Contingency
Disaster risk management in East Asia and the Pacific plans need to be developed, implemented, and practiced. It is important that all levels of the emergency management system be involved, from the national to provincial to local government.

**Institutional capacity building:** Strong and effective institutions, and the collaboration between them, contribute significantly to the efficiency and effectiveness of a hazard risk management system. This includes the review of legal frameworks to support institutions. Capacity building should involve agencies at all levels, including stakeholders at the community level. Successful institutional capacity building needs to have a strong coordinating system, an adequate budget, and the authority to act. It also needs to focus on the knowledge, awareness, and capacity of the stakeholders involved.

For this purpose, establishing a facility, such as a think tank, in Sichuan Province could be considered. The think tank would have two combined functions: (i) promoting public awareness and education on disaster risk reduction and (ii) keeping records and data on the Wenchuan Earthquake as well as any research and study materials on disaster prevention and risk reduction in China. The facility could look to Kobe as a case study. After the earthquake in 1995, Kobe became the center of disaster prevention and management in Japan by establishing national and international organizations for disaster risk reduction and management. Kobe now plays an important role in enhancing the national disaster prevention and management system. Sichuan could play a similar role in disaster management and risk reduction in China.

**Risk mitigation:** Preemptive by design, these activities are geared toward preparedness and pre-disaster recovery planning in order to reduce potential impacts. This includes a wide range of structural and nonstructural mechanisms and interventions (e.g., land-use planning, structural design and construction practices, building codes, public education, early warning systems, and preparing response plans). Special attention needs to be paid to safe building practices in critical facilities.

**Catastrophe risk financing:** These mechanisms and instruments help communities and governments deal with the economic and financial shocks caused by hazard events. Examples are self-insurance, informal community-based mechanisms, safety nets, insurance and reinsurance, catastrophe bonds, contingency financing, and calamity funds.

**International experiences**

This note gives examples of disaster risk reduction initiatives in three earthquake-affected regions: (i) Los Angeles, California (United States); (ii) Marmara, Turkey; and, (iii) Gujarat, India. Los Angeles is a unique case study because it reviews pre-disaster preparedness and planning and how it reduced the loss of life and positively impacted the post-earthquake recovery program following the Northridge Earthquake. In the other two cases, the Governments of India and Turkey realized the necessity of establishing a proactive disaster risk management policy framework. Gujarat is a good example of how the post-earthquake recovery led to building institutional capacity and investing in risk mitigation efforts over the longer term. And, the Marmara case is noteworthy due to its development of innovative catastrophe risk financing mechanisms.
Los Angeles–Northridge Earthquake: Assessment of risk and preparing for emergencies

The state of California (United States) is located along the seismically active San Andreas Fault and suffers from frequent earthquakes. Learning from past experiences, California has developed a system to enable the state to effectively cope with natural disasters, particularly earthquakes. Seismic risk maps for California, produced by United States Geological Survey and other organizations, have informed state and local government preparedness and response plans. These data help the local government determine where its actions and investments should be focused to reduce future earthquake losses.

The city of Los Angeles (California) is a pioneer in developing a disaster prediction system and preparing for emergencies based on risk assessment. In 1978, in order to draft an earthquake prediction response plan, the mayor of Los Angeles established a blue ribbon task force on earthquake prediction. Based on risk assessment data gathered by the task force, infrastructure retrofitting was undertaken in the 1980s by the California Department of Transportation (Caltrans). It reinforced more than 100 freeway overpasses in Los Angeles and Ventura Counties.

In 1993, a short-term earthquake response plan was developed to meet the following objectives:

- Describe an overall concept of operations and responsibilities for the city government.
- Outline the procedures necessary to rapidly notify city departments and the public of the warning.
- Identify actions that could realistically be accomplished within a few hours to a few days.
- Ensure consistency of emergency plans and planning concepts with that of the state and other local governments.

The city also designed its recovery and reconstruction plan in the early 1990s. It had four themes: (i) planning, (ii) hazard mitigation, (iii) short-term recovery, and (iv) long-term reconstruction. Lead responsibility for each action was assigned to one or more departments or agencies within the government of the city of Los Angeles.

Los Angeles was struck by an earthquake on 17 January 1994 measuring 6.7 on the Richter scale; the suburb of Northridge was the epicenter. It was the costliest earthquake in United States history with total damage estimated at USD 15 billion. However, because of the readiness of the city to deal with this type of disaster, deaths were minimal and recovery response was swift. The death toll only reached 72, with 12,000 injuries, which was considered very low for such a heavily populated area. Debris removal started on the same day as the earthquake, with main transportation routes quickly reopened and minimal failures of critical infrastructure (e.g., hospitals and energy supply systems). In addition, none of the reinforced freeway overpasses failed, whereas seven unreinforced spans in the same area collapsed.
Gujarat Earthquake: Institutional capacity building and risk mitigation investments

On 26 January 2001, the second largest recorded earthquake in India devastated the state of Gujarat. It registered 6.9 on the Richter scale and caused more than 13,800 deaths. Around 600,000 people were left homeless, and total asset losses amounted to USD 2.1 billion.

The huge loss of life and assets made the Indian government reorient its policy approach to disasters. The government now aimed at a long-term goal, which included implementing a comprehensive disaster management program and improving its disaster preparedness and emergency response capacity. The government also focused on turning a tragedy into an opportunity: The main disaster risk reduction policies in India now focus on institutional capacity building and mobilized resources at all levels to support policy implementation.

At the national level, the Government of India transferred disaster management responsibility from the Ministry of Agriculture to the Ministry of Home Affai

At the state level, four institutions were created. The Gujarat State Disaster Management Authority (GSDMA) was created to lead recovery and become a state disaster prevention and management organization. Within the GSDMA a training and research wing was operationalized, the Gujarat Institute of Disaster Management. To study and monitor earthquakes, the Institute of Seismological Research was set up by Gujarat’s Science and Technology Department. Finally, the All India Disaster Mitigation Institute became a facilitator/intermediary between poor communities and insurance companies to develop a microfinance policy.

At the local level, the importance of communities as first responders was recognized. In fact, the official policy for disaster management emphasized the roles and responsibilities of communities with upward integration with the district and state.

In the recovery phase, the Gujarat State Disaster Management Authority was highly effective. It was managed by senior state government officials, linked to line departments, and had independent financial and executive authority to disburse funds. The GSDMA was provided a level of authority to review progress as well as to insist on corrective action based on field assessments. It was also empowered to use the existing field agencies of the state government to implement programs, working through the district authorities and district councils, as well as the various line departments of public works, education, health, and water supply.

Another part of the recovery phase was community preparedness in disaster management. Early warning,
search and rescue, and first aid groups were formed or strengthened at the village level. A massive public awareness and information and education campaign was launched through various media to create awareness on disaster preparedness, insurance, multihazard-resistant construction practices, and other relevant topics. The local, state, and national governments were better prepared for future disasters as an outcome of the Gujarat Earthquake.

**Marmara Earthquake: Innovative risk financing**

During the 1990s, Turkey experienced a series of severe disasters, including the Erzincan Earthquake in 1992, floods in the Black Sea Region in 1998, and the Adana–Ceyhan Earthquake in 1998. On 17 August 1999, an earthquake measuring 7.4 on the Richter scale hit the Marmara Region. Over 17,000 lives were lost and approximately 400,000–600,000 people were left homeless. The quake extensively damaged the industrial heartland of Turkey, with estimated losses of between USD 3 to 6.5 billion, or 1.5–3.3 percent of GNP. The devastation strongly pushed the government toward decisive action, instead of long-standing debate, in shifting the disaster management policy to proactive risk management.

To streamline institutional arrangements for emergency management at the national level, the government established the Turkey Emergency Management General Directorate (TEMAD). As a permanent agency under the Office of the Prime Minister, the TEMAD was put in charge of central coordination of disaster relief and reconstruction. Two major decrees were also issued, which introduced an obligatory building insurance scheme and regulations on building control.

Examples of Turkey’s efforts to move from emergency response toward disaster risk reduction include the Strategic Disaster Management in Urban Areas program, which covers a range of issues, including emergency management, infrastructure and lifelines, superstructure buildings, cultural/historical sites, legal issues, and training. In addition, the World Bank financed Istanbul Seismic Risk Mitigation and Emergency Preparedness project focuses on enhancing emergency preparedness capacity, seismic risk mitigation for priority public buildings, and enforcement of building codes at the city level.

One particular transformation that came out of Turkey’s policy shift was its risk financing program. The National Catastrophic Insurance Program (NCIP) was set up to provide compulsory insurance for residential buildings in order to transfer risk from individuals and the state budget. The NCIP was carried out by the Turkish Catastrophe Insurance Pool (TCIP), which was set up as per the Compulsory Earthquake Insurance, Decree 587, effective in December 1999, as a separate, state-owned, legal entity.

The board of directors of the Turkish Catastrophe Insurance Pool is comprised of representatives from the government, private sector, and academic community. The TCIP has no public sector employees because its management function was contracted out to Milli Re, the oldest national reinsurance company. Local insurance companies act as distributors of TCIP policies. Coverage in excess of the TCIP level can be obtained on a voluntary basis from private insurance providers.
The TCIP provides coverage up to USD 25,000 for each dwelling for a premium, and the premium varies across the country depending upon seismicity, local soil conditions, and the type and quality of construction.

Since the program began in September 2000, the insurance penetration for catastrophic coverage has more than tripled. The TCIP is one of the largest government insurance programs in the world (second to the Japanese earthquake program), providing coverage to 2.7 million Turkish homeowners (about 20 percent of the eligible housing stock). The program has developed into a viable and sustainable insurance pool.

The Turkish Catastrophe Insurance Pool has contributed to a rapid and efficient implementation of nationwide earthquake insurance coverage. Without it, Turkey would have been severely constrained by the low level of reserves and insufficient earthquake underwriting capacity in the private insurance industry. It also ensures that the less-advantaged, lower-income groups have access to a reliable catastrophe pooling mechanism. There are, however, limitations to the TCIP: (i) retrofitting is not covered; (ii) renewal of policies is not promoted; and, (iii) penalties are limited for absence of insurance, which curtails furthering its productivity. In addition, the Disaster Insurance Law, which legislates tighter enforcement of the compulsory nature of the insurance, has yet to be enacted.

LESSONS LEARNED

Los Angeles–Northridge Earthquake
Risk assessment is important for identifying risks posed by different types of hazards. Investments in multihazard mapping and disaster databases are necessary as a foundation for future risk reduction and mitigation initiatives. These measures have shown to save lives and reduce damage to structures.

Having a clear emergency management structure and protocols, as well as a pre-recovery preparedness plan, are essential to ensure the success of disaster relief, reconstruction, and risk mitigation programs.

Priorities need to be identified among the various sectors to maximize investments that safeguard critical infrastructure (e.g., communications, infrastructure, and critical public facilities) from the impact of a disaster.

Gujarat Earthquake
A robust central coordination mechanism with clear lines of responsibility at different levels enables quick mobilization of government agencies to support emergency response.

Knowledge and information sharing with local communities helps build local capacity to better prepare for and respond to emergencies. It also creates a sense of ownership and responsibility for action in the event of a disaster.

Marmara Earthquake
Having a national insurance program is necessary to overcome the capacity constraint of the private insurance industry in the case of large-scale natural disasters. It is also important for providing security to lower income groups, who would be the most in need of financial assistance to recover from a disaster.

A legal framework and political will are necessary foundations for effective policy implementation and are necessary to clarify the roles and responsibilities of various stakeholders.

Recommendations
- Establish a comprehensive legal framework that covers all aspects of disaster risk management, clarifying the organizational responsibilities of agencies from the national to the local government. That being said, the government should bear in mind that the build-
Disaster risk reduction

Invest in multihazard mapping systems and develop hazard-specific mitigation plans at the local and provincial levels.

Improve and enforce seismically strengthened construction methods, building codes, and construction standards and prioritize those for public facilities such as schools and hospitals.

Revise land-use plans based on hazard maps to incorporate risk mitigation measures, particularly in the earthquake-affected areas. Measures would include: widened streets for improved evacuation and identification of critical lifeline infrastructure that merits additional investments in retrofitting.

Incorporate disaster response training and strengthen disaster preparedness planning at the local level, and raise public awareness through different channels of the media. Through knowledge and technology transfer, local ownership of and community participation in risk reduction is enhanced and long-term disaster risk management capacity is built.

Initiate risk-financing mechanisms, involving private insurers with access to the international reinsurance market under the supervision of public regulators offering insurance to the owners of private property.

End Note
1 The USD 25,000 figure is based on the exchange rate at the time of the Wenchuan Earthquake, May 2008.

Resources

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<th>Resource</th>
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<tr>
<td>The ProVention Consortium1</td>
<td><a href="http://www.proventionconsortium.org">http://www.proventionconsortium.org</a></td>
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<tr>
<td>All India Disasters Mitigation Institute, “From Kutch to Kashmir: Lessons for Use. Ahmedabad, India,” Special Issue 8, October 11, 2005.</td>
<td><a href="http://www.southasiadisasters.net">www.southasiadisasters.net</a></td>
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1 A global coalition of governments, international organizations, academic institutions, the private sector, and civil society organizations aimed at reducing disaster impacts in developing countries.
East Asia and the Pacific Region
The World Bank
1818 H St. NW, Washington, D.C., 20433
http://www.worldbank.org/eap

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