Chapter 3

Case Studies in Asia
(Bandung, Tashkent, Zigong)

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Introduction

Three cities were chosen from Asia out of 27 pre-selected cities for RADIUS case studies. These are Bandung (Indonesia), Tashkent (Uzbekistan), and Zigong (China). All three cities are very important in their respective countries and regions, although the infrastructures and local conditions are quite different from one city to another.

Bandung is a tropical resort with a cluster of universities and research institutes. It is a rapidly growing city, the largest in the Western Java Province, it has a very high population growth rate and is one of the most important business and trading center in this region. In contrast, Tashkent is the capital of Uzbekistan, and one of the most strategic cities in Central Asia for education, culture, trading and business. Tashkent itself contributes more than one-fifth of Uzbekistan's total GDP. Zigong is a city in southern China, located in the Szechwan Province within mountain ranges. The city is a major industrial center for mechanical and chemical engineering, and salt production. Dinosaur fossils and an ancient salt producing well (more than 1,000 metres deep) are major attractions. Figure 1 summarizes the demographic features of these three cities.

Urban policy and disaster management

Although all the case-study cities are well equipped with modern infrastructures, they differ in the level of understanding of disaster issues, which is reflected in their future growth plan. A brief description of each city is given below.

In Bandung, there is a single coordinating office for emergency response, which becomes active during disasters, receiving reports and transmitting them to other agencies for emergency response. Disaster management is marginal in the urban growth plan. Because annual flooding is the most frequent disaster in the city, the focus is on flood disasters and seismic considerations are almost neglected. Bandung, a relatively new city, has no record of damaging earthquakes since its establishment almost 100 years ago. Therefore, the general awareness of citizens and decision makers of seismic risk is very low.

In contrast, Tashkent has experienced damaging earthquakes, and seismic risk issues are taken into consideration in urban planning. After the 1966 Tashkent earthquake, a special governmental commission was created comprised of ministries, scientists and engineers. There is also the Department for Extraordinary Situations in the Tashkent city government. Disaster management is carried out in accordance with a civil defence action plan, including emergency preparedness. The Uzbekistan Academy of Sciences coordinates earthquake research through the

City	Area (km²)	Status	Population (in millions)	Annual growth (pop.)	GDP contribution
BANDUNG	168	Provincial capital	2.06	3.48%	9.13% (regional GDP)
TASHKENT	326	National capital	2.08	2.00%	21.00% (national GDP)
ZIGONG	817	Industrial city	3.13	0.74%	7.60% (regional GDP)

Figure 1. Basic demographic data of the case-study cities in Asia.

Council of Safety and Seismic Resistant Construction. Tashkent has good planning for the seismic risk assessment and management. The level of public awareness is also quite high.

In Zigong, the administrative department for earthquake disaster prevention and mitigation is the Zigong Seismological Bureau, established in 1971. The Zigong Seismological Bureau coordinates with the provincial seismological bureau (in Szechwan Province) for seismological work. Seismic countermeasures have been included in the Ninth Five-Year Plan for the Economy and Social Development of Zigong City and the Year 2010 Development Plan. Programmes about seismic safety and countermeasures are presented on television, quake awareness pictures are shown on street billboards, and information is disseminated through radio and local newspapers. Consequently, the people of Zigong have a relatively high level of awareness regarding the possibility of earthquake damage.

Case studies

The case studies were jointly coordinated by OYO Corporation and the International Center for Disaster Mitigation Engineering (INCEDE). At the city level, a steering committee responsible for administrative and monetary matters was formed of representatives from the city government, local educational institutions, and international advisers. Several working groups were designated for specific tasks with the participation of community members. These activities were monitored by two advisory committees, one at the regional level consisting of international experts and the other at the local level with the participation of decision makers, government officials, and academicians.

Risk evaluation and earthquake scenario

To evaluate the seismic risk of each city a target area and organizations to be studied were designated. Data on past seismicity were collected to understand the magnitude and recurrence of earthquakes. Based on these data the scenario earthquake was chosen. To choose the scenario earthquake, special caution was taken, depending on the future urban planning and management. The return period of the scenario earthquake was also a strategic decision, which would ultimately lead to modification of existing building laws and seismic codes. In all three cases, the scenario earthquake was decided by the steering committee with the agreement of community representatives. In the case of Bandung, a probabilistic approach was taken with a 200-year return period with a probability of 60 percent. In Tashkent, the scenario earthquake was considered to be of Richter Scale 6.1 magnitude at a depth of 10 km beneath the city. In the case of Zigong, two different scenario earthquakes were postulated, one of 5.5 and the other of 6.0 magnitude.

Ground classification is the second step in earthquake hazard analysis. Deep geological structures were carefully studied in and around the city, and geological profiles were made. An inventory of the buildings, lifelines and infrastructures was prepared, and vulnerability curves were decided, modified from ATC and examples of similar earthquake damage. Damages to lifelines were calculated based on these vulnerability curves. Several damage maps are shown in figures 2 to 4.

A parallel process included interviews of several stakeholder organizations by the working group representative, with active participation of the media. At first, a detailed questionnaire was prepared and sent to the organizations for a reply. Based on this, a detailed interview was held with major decision makers and technical officers. The interviews covered earthquake preparedness, emergency drills, earthquake risk assessment, earthquake recovery, major earthquake impact, vulnerable points, responsible organizations, and damage estimation from the scenario earthquake.